

**TOWN AND COUNTRY PLANNING ACT 1990**

**Application by West Cumbria Mining Ltd**

**Development of a new underground metallurgical coal mine and  
associated development at Former Marchon Site, Pow Beck Valley  
and area from Marchon Site to St Bees Coast**

**Planning Inspectorate Reference: APP/H0900/V/21/3271069**

**Local Planning Authority Reference: 4/17/9007**

**Date of Inquiry: 7<sup>th</sup> September 2021**

**REBUTTAL PROOF OF EVIDENCE**

**of**

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31 August 2021

## Table of Contents

1.	INTRODUCTION	3
2.	USE OF “BASE CASE STEEL PRODUCTION FORECAST”	3
3.	LIST OF DIRECT REDUCTION PROJECTS IN THE EU	5
4.	STEEL PRODUCTION PROJECTIONS	8
5.	CCS	9
6.	CORRECTIONS	11
7.	APPENDICES	13
	Appendix R1	14
	Appendix R2	17
	Appendix R3	21
	Appendix R4	28

## **1. Introduction**

- 1.1 In this rebuttal evidence I respond to four aspects of the proof of evidence WCM/JT/1 and appendix WCM/JT/2 of Jim Truman. This rebuttal evidence should be read together with my proof of evidence SLACC/LN/1 and its appendices SLACC/LN/2.
- 1.2 As with my Main Proof, the evidence and professional opinions which I offer represent the best of my knowledge and understanding of the future of the steel industry, and the evidence which I have prepared and provide for this public inquiry is true to the best of my knowledge and belief. I confirm that the opinions expressed are my true and professional opinions based on the facts I regard as relevant in connection with the inquiry.

## **2. Use of “Base Case Steel Production Forecast”**

- 2.1 Though it is only mentioned a few times in his Proof of Evidence, the conclusions set out in section 4 of Mr Truman’s proof of evidence clearly relate to Wood Mackenzie’s “base case steel production forecast”. The conclusions that Wood Mackenzie (“WM”) derives from this base case forecast are set out, in summary, at WCM/JT/2 paras 1.65 – 1.71.
- 2.2 It may be noted that the WM base case forecast appears to clearly assume that EU and UK legislated climate targets will not be met. EU legislation requires a 55% reduction in GHG emissions by 2030, and a 100% reduction by 2050. UK legislation requires a 57% reduction by 2030, a 78% reduction by 2035 and a 100% reduction by 2050. The UK Government Climate Change Committee’s “Balanced Net Zero Pathway” anticipates that the Iron and Steel subsector will reduce emissions by 77% from 2020 levels by 2035 and by 93% by 2040 (See CD8.11, page 30, Figure A3.3d; Appendix R1). The CCC’s analysis indicates they expect the steel sector will generate 2.6 Mt CO<sub>2</sub>e in 2035<sup>1</sup>, whereas WM indicates its base case would involve emissions of more than double that figure, indicating it expects the UK steel industry to generate greenhouse gas emissions of 5.5 – 6.4 Mt CO<sub>2</sub>e in 2035. (WCM/JT/2 para 1.62).<sup>2</sup> Whilst no figures are provided to indicate what GHG emissions are anticipated after 2035 in the WM base case scenario, the assumption that there will be very little adoption of alternative technologies such

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<sup>1</sup> 23% of the CCC’s 2018 baseline figure of 11.5 Mt.

<sup>2</sup> Whilst the CCC does not appear to provide sector-by-sector data for the Iron and Steel sector in the other scenarios it produced accompanying the 6<sup>th</sup> Carbon Budget, it may be noted that in all scenarios, manufacturing and construction emissions fall by close to 80% by 2035 and by more than 90% by 2040. CD8.11, Fig A3.3.f.

as HDR, the expectation that BF-BOF production is likely to decline only marginally, and the limits on the efficiency of CCS (which WM acknowledges, to some degree – see below at paragraphs 5.3 and 5.6) would also preclude the pathways required to reach UK and EU emissions targets in 2040 and beyond.

2.3 It should also be noted that one of the “key assumptions” (WCM/JT/2 para 1.66) of the Wood Mackenzie (WM) base case forecast is that “Hydrogen-based DRI production is limited to specific projects.”

2.4 Paragraph 1.49 of WCM/JT/2 explains further that the base case considers only the Hybrit project (considered by WM to affect demand in Sweden and Finland), and the ArcelorMittal (Spain) project. Thus, despite having indicated earlier in its own report that certain hydrogen DRI projects are expected to be operational by certain dates, these are artificially excluded from the base case forecast without any clear rationale. The projects excluded in the base case forecast that WM itself says that it expects to be operational before 2030 include:

2.4.1 2 projects by ArcelorMittal in Germany totalling 3.5 Mtpa of DRI by 2030.

2.4.2 Salzgitter SALCOS project, with capacity of 1.5 Mtpa expected to be in operation around 2025.

2.4.3 The H2 Green Steel project, with a planned capacity of 5.0 Mtpa is also listed, albeit that WM states that it has excluded the project on the basis that “Financing and permitting is not yet in place.” Whilst this may be true, the project has secured USD \$105 million in initial funding<sup>3</sup> and is under consideration for further financing by the European Investment Bank.<sup>4</sup>

2.5 In addition to the base case forecast, the WM Report also notes that WM produces a further forecast called the Wood Mackenzie Accelerated Energy Transition 2.0 scenario (AET 2.0) which represents “an alternative scenario whereby the steel industry successfully follows a two-degree warming pathway” (WCM/JT/2 para 1.72).

2.6 It is notable, however, that:

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<sup>3</sup> <https://www.h2greensteel.com/complete>.

<sup>4</sup> <https://www.eib.org/en/projects/pipelines/all/20200902>.

- 2.6.1 The AET 2.0 Scenario is also not consistent with UK and EU legislated GHG targets. See Appendix R1 to SLACC/PE/3 at page 3. I have reviewed paragraphs 2.4 – 2.7 in Dr Ekins’ rebuttal proof of evidence and adopt those points, here.
- 2.6.2 However, even the non-compliant AET2.0 Scenario is never referred to in Mr Truman’s proof, which relies solely on the base case forecast. Thus, Mr Truman’s evidence all rests on a forecast which assumes the steel sector will not follow a two-degree warming pathway, and which is incompatible with legislated UK and EU emissions targets.
- 2.6.3 The WM Report provides very little discussion of the scenario and the only graphs presented relate to the global picture. No numbers are presented in relation to the UK. The only numbers presented in relation to Europe are that “total metallurgical coal demand would fall from 85 Mt in 2021 to 60 Mt in 2040, a fall of ~30%.” (WCM/JT/2 para 1.76). However, these figures appear to be in error. Elsewhere, WCM indicate that total European metallurgical coal demand is approximately 55 Mt in 2021. (WCM/JT/2 figure 1.8; para 1.35). Furthermore, this implies that metallurgical coal demand is higher in 2050 in the AET 2.0 Scenario than in the base case, which is clearly wrong.
- 2.6.4 No figures are presented in relation to the AET 2.0 Scenario for any time beyond 2040. This is surprising and raises questions about what the figures beyond 2040 might show.

### **3. List of direct reduction projects in the EU**

- 3.1 In paragraph 1.43 of Appendix WCM/JT/2 to Mr Truman’s proof, he states that “[a]t present, there are only a handful of hydrogen DRI projects in Europe, all of which are small-scale, and most of these will not be operational within the next ten years”. He goes on to provide a list of the projects he included in his analysis. This issue has already been dealt with in my proof of evidence at paragraphs 3.25 – 3.30 and in Appendix 11 to my proof a more complete list of projects is provided.
- 3.2 The list provided in Mr. Truman’s proof lacks several projects and thus underestimates the “pipeline” of projects that will lead to the further development and rolling out of DRI

technology. Table 1 lists the projects that were included in my proof but have been missed in Mr. Truman's proof.

*Table 1: List of additional hydrogen direct reduction projects not included in Mr. Truman's proof.*

Company	Project name	Country	Location	Tech-nology	Year online	Project scale	capacity (product) (Mtpa)
ArcelorMittal		France	Dunkirk	DR	2030 <sup>5</sup>	full scale	full scale plant
Liberty Steel	TBD	France	Dunkirk	DR	Not stated	full scale	2 (iron)
Voestalpine	TBD	Austria	Donawitz	DR	2020	pilot	0.25 (iron)
ThyssenKrupp	N/A	Germany	Duisburg	DR	2025	full scale	1.2 (iron)
Liberty Steel	TBD	Romania	Galati	DR	2024	full scale	full scale plant
LKAB	TBD	Sweden	Kiruna, Malmberget, Svappavaara	DR	2029	full scale	full scale plant

3.3 It is important to note that not all DRI projects in the EU will use hydrogen right away. Some projects in the list for example aim to use natural gas and blend in hydrogen over time. However, it is clear that none of them will use coking coal for ironmaking and that all of them stand in competition to existing primary steel production based on blast furnaces. As already shown in my proof of evidence, natural gas-based DRI is a commercial technology around the world. Mr Truman appears to artificially narrow the scope of technologies that will potentially reduce the use of metallurgical coal in steelmaking, focusing only on what he says are the challenges of green hydrogen DRI. Mr Truman also does not consider the possibility that HDR plants could start by using so-called "blue" hydrogen (creating by reacting natural gas with steam, but which then provides a relatively pure stream of CO<sub>2</sub> which can be captured more easily than CO<sub>2</sub> from industrial waste gases) and then transition to green hydrogen as it becomes more widely available. Instead, Mr Truman focuses only on what he says are the challenges of scaling up green hydrogen, to the exclusion of other technologies which also have the potential to reduce metallurgical coal use in steelmaking.

3.4 In paragraph 1.43 of Appendix WCM/JT/2 to Mr Truman's proof, he states that "Wood Mackenzie expects 9.1 Mt of H-DRI capacity in the EU prior to 2030". However, first, the projects listed above this (that WM expect to be operational before 2030 - not counting the H<sub>2</sub> Green

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<sup>5</sup> Note that the year appears as 2021 in the Green Steel Tracker and in my Appendix 12 (SLACC/LN/2 page 189) due to the implementation of a pilot project implementing small-scale CCS at the Dunkirk plant. 2030 is the date by which a full scale, hydrogen-ready direct reduction plant is expected.

Steel Project) total to 9.6 Mt, not 9.1 Mt. Second, considering the additional projects shown in Table 1 and the additional project details provided in my proof, Mr Truman's figure is likely to be an underestimate. In my proof I estimate more than 10 Mt of hydrogen direct reduction capacity by 2030. In fact, these figures are not dramatically different. What is surprising, however, is that, despite WM itself considering that these projects are anticipated to become operational by 2030:

3.4.1 There is no real analysis of how this might impact the need for metallurgical coal. As set out below in section 4, I do not accept Mr Truman's projections in relation to steel production growth. However, even if one were to accept these and accept Mr Truman's list of HDR projects as being the only ones that will come onstream, this would still equal 9.6 Mtpa of capacity as compared with his estimate of roughly 100 Mtpa BF-BOF steel production in Europe in 2030 (WCM/JT/2 para 1.33 and Figure 1.6) indicating that these few projects alone could reduce the use of coal in BF-BOF steel production by as much as roughly 1/10<sup>th</sup>.

3.4.2 Whilst that is not a large percentage, even this would begin to reduce the market for metallurgical coal. Further, this would very likely imply HDR steel production many times greater than that figure by 2050. As I noted in my proof at para. 3.29, the Data in the Green Steel Tracker indicates that there will be more than 20 Mtpa by 2040.

3.4.3 I find it surprising that despite identifying 9.6 Mtpa of HDR capacity before 2030, and despite identifying that "hydrogen-based steel offers the most attractive long-term solution that might eventually lead to widespread replacement of coal and coke in steelmaking" (WCM/JT/1 para 4.6) Mr Truman does not appear to seriously consider whether HDR growth will continue beyond 2030.

3.5 In sum, evidence indicates that significantly more direct reduction capacity is expected to enter production by 2030 than suggested by Mr Truman. Importantly, Mr Truman ignores projects that will initially use natural gas or mixtures of natural gas with hydrogen in his proof. The large-scale DRI plant and EAF planned by ArcelorMittal in Dunkirk, for example, will initially use natural gas but will be built "fully 'hydrogen-ready'" (See Appendix R2). By ignoring this fact Mr Truman underestimates the DR capacity to come online until 2030, which will stand in direct competition to blast furnace ironmaking and metallurgical coal use in the EU. And Mr Truman

makes no attempt to consider further growth beyond 2030, though the evidence indicates that the growth of HDR is likely to accelerate.

#### **4. Steel production projections**

- 4.1 In paragraph 4.3 of Mr Truman's proof, he states that "Steel production in Europe is forecast to grow gradually in the future. European crude steel production is forecast to increase at a CAGR [Compound Average Growth Rate] of 0.5% in the 2021-2049 period." Paragraph 1.28 of WCM/JT/2 indicates that this leads to 220 Mt by 2049. This estimate is based on MW internal modelling, which I do not have any insights into.
- 4.2 As I noted in my main proof, there is general agreement among scenarios showing the future production of steel in the EU that total production is unlikely to increase much and may decrease slightly (SLACC/LN/1 para 3.19). The prediction that European steel production will grow at a CAGR of 0.5% implies that it will grow approximately 15% over the period 2021-2049, from roughly 190 Mt to 220 Mt. This prediction either appears to be reliant on growth outside the EU - most likely in Turkey, which the WM Report includes in the Europe category (see e.g. caption to Figure 1.6, WCM/JT/2 page 11) – or appears to me to be out of line with the general consensus.
- 4.3 I would note that EU steel production has been declining steadily since pre-financial crisis levels (EU27 production peak in 2007<sup>6</sup>) with a negative compound annual growth rate of -2.4% until 2019. If the production slump of the pandemic year 2020 is included, the negative CAGR since 2007 is -3.1% (210 Mt in 2007<sup>7</sup> to 157 in 2019<sup>8</sup> and 139 Mt in 2020<sup>9</sup>). I thus deem an annualised production growth of 0.5%, or any production growth for that matter, unlikely.
- 4.4 Truman addresses EAF production in his para 4.5. Mr Truman projects an increase from 47% currently (though Eurofer data indicates this is actually 43% currently<sup>10</sup>) to 60% by 2049. (WCM/JT/1 para 4.5). In my proof I have already provided peer-reviewed evidence (see Figure

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<sup>6</sup> See Appendix R3, page 3; Appendix R4, page 1.

<sup>7</sup> See Appendix R3, p.3.

<sup>8</sup> CD 9.17 page 16.

<sup>9</sup> CD9.17, page 17.

<sup>10</sup> CD9.17 page 17.

1 in my proof) showing that the minimum likely EAF share in Europe by 2050 is 66%.<sup>11</sup> If additional material efficiency potentials are tapped by climate policy measures, this figure could be even higher.

## 5. CCS

- 5.1. In paragraph 4.7 of Mr Truman's proof, he states that "Steelmakers will continue to invest in CCS, which will support the continuation of BF-BOF steel production in Europe." He further states that "Wood Mackenzie's base case forecast assumes that CCS is applied to between 30-40% of UK steel production by 2035, which is lower than the level of 50% assumed in the UK's Sixth Carbon Budget Report."
- 5.2. The issue of CCS has already been dealt with in my proof of evidence at paragraphs 3.31 – 3.33, where I demonstrate that only two CCS projects are currently being undertaken in the EU and UK, aiming in total to capture 3.9Mt of CO<sub>2</sub> by 2026 from the steel industry and other industrial emitters<sup>12</sup>.
- 5.3. At paragraphs 1.52-1.57 of WCM/JT/2, WM succinctly explains many of the technical challenges that CCS in steelmaking poses and that "cost rises exponentially with climbing difficulty" as capture rates increase [WCM/JT/2 para 1.56]. The one project mentioned by WM seeks to reduce emissions by only 30%, and "is expensive – adding about 30% to current steel production costs."
- 5.4. This evidence supports the findings in my proof [SLACC/LN/1 para.3.33] that high costs and the economic and technical difficulty to achieve very low emissions, represents an unfertile environment for steel CCS in the EU and explains why the steel industry itself is choosing to invest in far more HDR projects than CCS projects.

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<sup>11</sup> The figure adapted from Vogl et al, indicates that in 2050 the minimum EAF share in Europe corresponds with BF/BOF production of 58.0 Mt and EAF production of 113.7 Mt.

<sup>12</sup> Note that the Green Steel Tracker includes only what are defined by the GST as "low-carbon investments". To qualify for inclusion in the GST a project must involve sufficiently significant emission reduction ambitions to reach net-zero emissions by around 2050. The GST methodology notes that "Incremental improvements and process optimisation in current steel mills are not regarded if they do not enable deep emission reductions" and that projects utilising fossil carbon CCS projects "are only included insofar as they include plans to either phase out fossil carbon in line with global climate targets or to permanently capture and store carbon emissions." Projects such as the CCS project with a 30% emissions reduction such as presented by Mr Truman in paragraph 1.56 are not included as a 30% reduction in carbon intensity is not sufficient to qualify for the GST.

- 5.5. It is notable that despite discounting hydrogen DR projects because funding or permitting is not fully in place, Mr Truman concludes that CCS will play a major role in the UK and EU steel industries after noting that “Major steelmakers including Tata Steel and ArcelorMittal have announced plans to invest in CCS, although its use in steelmaking is negligible at present.” (WCM/JT/1 para 4.7, emphasis added). He considers that “costs are expected to decline going forward” despite the technical challenges WM highlights, and CCS being a “technology that has been in existence for decades.” It is not clear why he does not consider that the existence of many more HDR steel projects will lead to similar costs decreases.
- 5.6. In addition to what was set out in my main proof, I want to stress that CCS in coal-based steelmaking is not an effective way to meet the levels of emission reductions required by the UK and EU in 2035 and beyond. The WM Report acknowledges, for instance that “[a]t present, such a high level of capture efficiency is not considered to be practically possible,” noting the challenges of capturing carbon from “dirty” waste gases (WCM/JT/2 para 1.56), and separately the fact that carbon emissions arise from multiple sources at integrated iron and steel mills (WCM/JT/2 para 1.55). The only project cited by WM is a project in which it is stated that the developer “thinks it can reduce emissions by 30%”. Due to the exponentially increasing costs at higher capture rates (WCM/JT/2 para 1.56), it is highly uncertain whether it would be feasible to capture at rates sufficiently high to achieve emissions reductions sufficient to meet UK and EU targets in 2030, 2035 and beyond.
- 5.7. Of course, projects aiming to capture e.g. emissions of 30% should be considered in the context of the more significant emissions reductions targets set out by the UK and EU. Indeed, the CCC has recommended “that UK ore-based steelmaking be near-zero emissions by 2035” (CD8.11, Table P4.1, page 38, first row)
- 5.8. In contrast, HDR (and a number of other emerging technologies) offer the opportunity for near-total CO<sub>2</sub> abatement.
- 5.9. Mr Truman is correct to say that the report associated with the 6<sup>th</sup> Carbon Budget refers to applying CCS to 50% of the UK integrated steel plants as one potential pathway. However, the CCC’s analysis indicates that 2/3rds of the carbon abatement in the subsector comes from

a combination of electrification, efficiency gains, and hydrogen, implying a significant decrease in coal use in any event. (CD8.11; Figure A.3.3.d; Appendix R1).

- 5.10. It is not surprising to me that the steel industry is largely choosing to invest in technologies which would allow the long-term continuation of their business under legislated emissions limits as opposed to investing in CCS on traditional BF-BOF, which may be “obsolete” within 15 years under the legislated targets.
- 5.11. I would also note that Lord Deben Chair of the UK Climate Change Committee has made it clear that: *“Coking coal should only be used in steelmaking beyond 2035 if a very high proportion of the associated carbon emissions is captured and stored”* (CD8.13).
- 5.12. Blast furnaces are known to have long economic lives of 15 to 25 years.<sup>13</sup> The installation of CCS technology on a blast furnace represents a significant technical endeavour and requires the blast furnace to be shut down to be able to access the furnace’s off-gases. It follows that once CCS is installed on a blast furnace, it is likely to remain operational for the whole economic lifetime of the furnace.
- 5.13. I want to illustrate this with an example. If a blast furnace were equipped with CCS in 2025 achieving emission reductions of 30% as indicated in Mr. Truman’s proof in paragraph 1.56, then this furnace would likely be operational until at least 2040-2050. In contrast, the CCC’s target for the steel sector is to “achieve near zero emissions by 2035”, and as noted above, the Balanced Net Zero Pathway involves a 77% reduction in the iron and steel sector by that year and 93% by 2040. The installation of CCS on a blast furnace is thus an inadequate means to achieve the emission reductions that the UK CCC indicates are required.

## 6. Corrections

- 6.1 I wish to make the following minor corrections to my Proof of Evidence:

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<sup>13</sup> Different claims are made in the literature around the exact length of economic lives of blast furnaces and how this correlates with the blast furnace campaign. The IEA (2020) assumes that reinvestment periods occur every 25 years. [CD 9.20, page 46] Fishedick et al. (2014) use reinvestment periods of 20 years. [SLACC/LN/2 page 151, table A.2] IEAGHG (2013) assumes regular investment periods of 15 years for the blast furnace. Schneider et al. (2014) assume technical lifetimes of 20 years. All cases, however, share the conviction that blast furnace investments prolong the blast furnace life by at least 15 years.

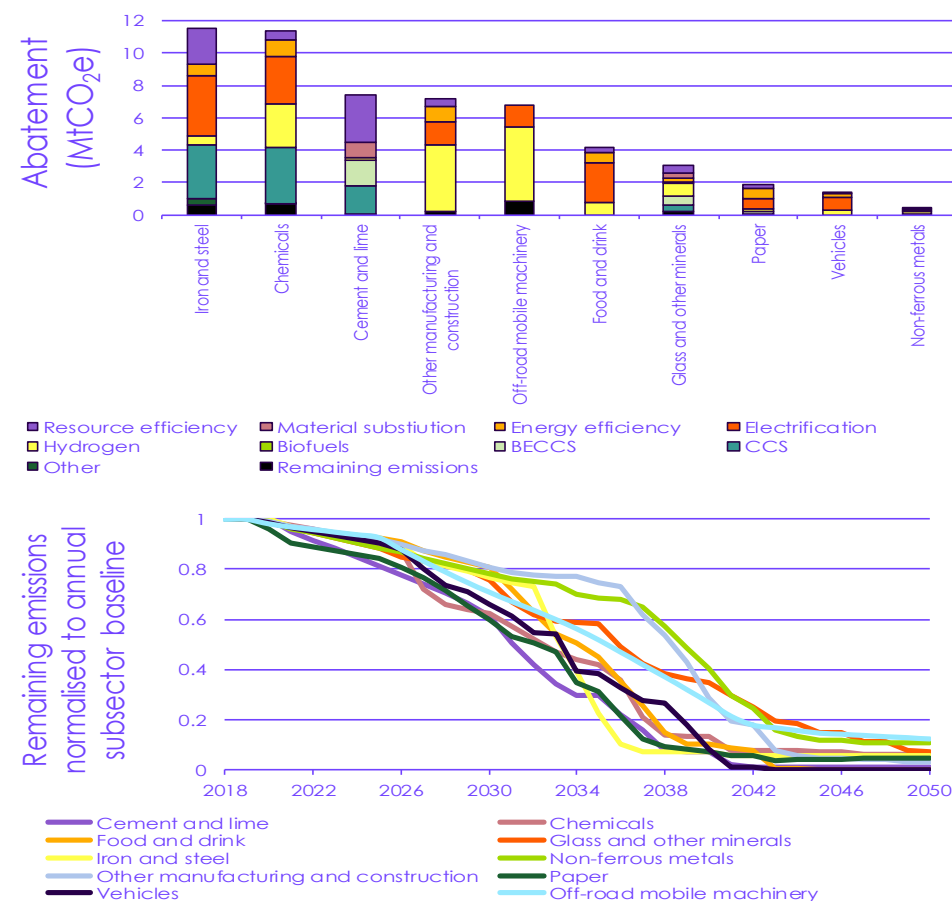
- 6.1.1. Footnote 5 presently refers to “CD1.145, pp.46-50.” It should refer to CD1.145, §6(vi-vii), p.30.
- 6.1.2. At paragraph 3.15, there is a reference to “(see paragraph 3.3654)”. This should be deleted.
- 6.1.3. At paragraph 3.18, the reference to “(Appendix 9, p. (tbc once doc provided))” should instead read “(Appendix 9, pp. 710-712, 729, 731).”
- 6.1.4. At paragraph 3.32, the reference to “(Appendix 13, p. (tbc when paywall down))” should instead read “Appendix 13, pp. 121-125, 127).”
- 6.1.5. At paragraph 3.32, the reference to “(Appendix 14, p. (tbc when paywall down))” should instead read “(Appendix 14, pp. 9-11).”
- 6.1.6. At paragraph 3.32, the reference to “(Appendix 15, p. (tbc when paywall down))” should instead read “(Appendix 15, pp. 8-13).”

31 August 2021

## 7. Appendices

<b><u>Number</u></b>	<b><u>Document</u></b>	<b><u>Page</u></b>
<b>Appendix R1</b>	CCC, 6 <sup>th</sup> Carbon Budget – Charts and data in the Report, Manufacturing & Construction, Data for figure 3.3.d	14
<b>Appendix R2</b>	Press Release: ArcelorMittal Europe to produce ‘green steel’ starting in 2020	17
<b>Appendix R3</b>	Worldsteel Association: Steel Statistical Yearbook 2011 (extract)	21
<b>Appendix R4</b>	Steel Statistical Yearbook 2020 Concise Version (extract)	28

Figure 3.3.d Abatement and remaining emissions for manufacturing and construction subsectors in 2050



Source: CCC analysis

MtCO<sub>2</sub>e

Baseline

Remaining  
emissions

Iron and steel	11.5	0.6
Chemicals	11.4	0.7
Cement and lime	7.4	0.1
Other manufacturing and construction	7.1	0.2
Off-road mobile machinery	6.8	0.8
Food and drink	4.2	0.0
Glass and other minerals	3.1	0.2
Paper	1.9	0.1
Vehicles	1.4	0.0
Non-ferrous metals	0.4	0.0

	2018	2019
Cement and lime	1.00	1.00
Chemicals	1.00	1.00
Food and drink	1.00	1.00
Glass and other minerals	1.00	1.00
Iron and steel	1.00	1.00
Non-ferrous metals	1.00	1.00
Other manufacturing and construction	1.00	1.00
Paper	1.00	1.00
Vehicles	1.00	1.00
Off-road mobile machinery	1.00	1.00

	Electric	Hydroge			Energy	Resource	Material	
CCS	ation	n	BECCS	Biofuels	efficienc	efficienc	substiutio	Other
3.3	3.7	0.6	0.0	0.0	0.7	2.2	0.0	0.3
3.4	2.9	2.7	0.0	0.0	1.0	0.6	0.0	0.0
1.7	0.0	0.1	1.6	0.0	0.0	2.9	1.0	0.0
0.0	1.4	4.1	0.0	0.0	1.0	0.4	0.0	0.0
0.0	1.4	4.6	0.0	0.0	0.0	0.0	0.0	0.0
0.0	2.5	0.8	0.0	0.0	0.6	0.3	0.0	0.0
0.4	0.1	0.8	0.5	0.0	0.2	0.5	0.3	0.0
0.0	0.6	0.2	0.1	0.0	0.6	0.3	0.0	0.0
0.0	0.8	0.3	0.0	0.0	0.2	0.1	0.0	0.0
0.0	0.1	0.2	0.0	0.0	0.0	0.1	0.0	0.0

2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
1.00	0.95	0.92	0.88	0.85	0.81	0.78	0.74	0.70	0.67	0.61	0.51	0.42	0.34	0.30	0.30
0.99	0.98	0.96	0.94	0.93	0.91	0.88	0.72	0.66	0.64	0.62	0.57	0.52	0.47	0.44	0.42
0.99	0.97	0.96	0.95	0.94	0.93	0.91	0.87	0.85	0.83	0.81	0.72	0.63	0.54	0.51	0.45
0.99	0.96	0.94	0.92	0.90	0.88	0.85	0.83	0.81	0.80	0.75	0.67	0.62	0.59	0.59	0.58
1.00	0.97	0.96	0.94	0.93	0.91	0.89	0.83	0.81	0.79	0.77	0.75	0.73	0.53	0.39	0.23
0.99	0.96	0.94	0.92	0.90	0.89	0.87	0.84	0.82	0.80	0.78	0.76	0.75	0.74	0.70	0.68
0.99	0.97	0.96	0.95	0.93	0.92	0.90	0.88	0.86	0.83	0.81	0.79	0.78	0.77	0.77	0.75
0.96	0.90	0.89	0.87	0.86	0.84	0.81	0.77	0.72	0.65	0.60	0.53	0.50	0.47	0.35	0.31
0.99	0.97	0.95	0.94	0.92	0.90	0.88	0.80	0.73	0.71	0.66	0.61	0.55	0.54	0.39	0.39
0.98	0.97	0.96	0.95	0.94	0.93	0.88	0.83	0.79	0.75	0.71	0.67	0.64	0.60	0.56	0.52

2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
0.22	0.16	0.08	0.07	0.07	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.36	0.21	0.14	0.14	0.13	0.08	0.08	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.06
0.35	0.26	0.15	0.10	0.10	0.09	0.08	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
0.49	0.42	0.38	0.36	0.35	0.30	0.25	0.19	0.19	0.15	0.15	0.11	0.11	0.08	0.07
0.10	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
0.68	0.65	0.57	0.49	0.40	0.29	0.25	0.16	0.13	0.12	0.12	0.11	0.11	0.11	0.11
0.73	0.62	0.54	0.43	0.29	0.19	0.18	0.08	0.06	0.05	0.05	0.04	0.04	0.03	0.03
0.21	0.12	0.09	0.08	0.07	0.05	0.06	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05
0.33	0.27	0.27	0.18	0.08	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.47	0.42	0.37	0.32	0.27	0.21	0.18	0.17	0.16	0.15	0.14	0.14	0.13	0.13	0.12

## APPENDIX R2

13 October 2020

### ArcelorMittal Europe to produce 'green steel' starting in 2020

[← Back to news](#)

#### Hydrogen technologies at the heart of drive to lead the decarbonisation of the steel industry and deliver carbon-neutral steel

ArcelorMittal Europe today announces details of the CO2 technology strategy that will enable it to offer its first green steel solutions to customers this year (30,000 tonnes), scale up this offering in coming years (to reach 120,000 tonnes in 2021 and 600,000 tonnes by 2022), deliver its 30% CO2 emissions target by 2030, and achieve net zero by 2050.

The strategy is centred around two main technology routes, as introduced in the first ArcelorMittal Europe climate action report published earlier this year:

The use of hydrogen in DRI-EAF and, also, the blast furnace

The expansion of its Smart Carbon route, also utilising hydrogen

#### HYDROGEN

Hydrogen plays a central role in the company's decarbonisation strategy. ArcelorMittal Europe is developing a series of industrial-scale hydrogen projects for use in blast furnace-based steelmaking that will start to deliver substantial CO2 emissions savings even within the next five years, as well as progressing a project to test the ability of hydrogen to reduce iron ore and form DRI on an industrial scale.

Ultimately to reach zero, this hydrogen will need to be 'green' (produced via electrolysis which is powered by renewable electricity). ArcelorMittal is therefore developing new facilities to produce green hydrogen using electrolyzers. Teams at ArcelorMittal Bremen in Germany are working on the first large-scale deployment of this technology which can then be deployed in both the blast furnace and the DRI-EAF route. Previously, this emerging technology has only been tested at small pilot plants in Europe.

#### 1. Hydrogen and the blast furnace

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will reduce the volumes of coal needed in the iron ore reduction process, thereby cutting CO2 emissions.

### **IGAR in Dunkirk**

At ArcelorMittal Dunkirk, the company is developing a hybrid blast furnace process, which involves using DRI gas injection technology in the blast furnace shaft as well as using gas injection in the blast furnace tuyeres, using plasma technology to create a reducing gas. This is the first large-scale implementation of what is essentially a hybrid BF/DRI technology. In due course it will enable green hydrogen to be injected into the blast furnace as it becomes available.

### **Blast furnace injection across Flat Products sites**

ArcelorMittal Europe is also implementing projects in almost all its Flat Products sites to use gases from different sources for blast furnace injection. Injecting hydrogen-rich coke oven gas is an efficient, cost effective method that allows steelmakers to reduce CO2 emissions now. ArcelorMittal Asturias has the most advanced coke oven gas project, with injection of grey hydrogen (hydrogen that has been recovered from gases including natural gas and coke oven gas) due to start in early 2021.

## **2. Hydrogen and DRI-EAF**

### **Testing hydrogen to reduce iron ore and form DRI, at ArcelorMittal Hamburg**

ArcelorMittal Europe owns Europe's only DRI-EAF facility in Hamburg, where a project is planned to test the ability of hydrogen to reduce iron ore and form DRI on an industrial scale, as well as testing carbon-free DRI in the EAF steelmaking process.

### **Large-scale DRI plant being studied for Dunkirk**

At ArcelorMittal Dunkirk a study has been launched to build a large-scale DRI plant, combined with an electric arc furnace. Initially, the DRI installation would use natural gas but ArcelorMittal's unique experience in DRI production, together with the results of the DRI-hydrogen project in Hamburg mean the DRI installation will be fully 'hydrogen-ready'.

## **SMART CARBON WITH HYDROGEN**

### **Second Carbalyst plant planned, in Fos-sur-Mer; further CO2 cuts with large electrolyser for hydrogen injection**

ArcelorMittal is also planning to expand its use of the Smart Carbon technology route. At ArcelorMittal Fos-sur-Mer, France, a study is underway in collaboration with partner Lanzatech, to build a second Carbalyst plant in addition to the one under construction at ArcelorMittal Ghent in Belgium. This involves carbon capture from the blast furnace waste gas, and biologically converting it into ethanol for use as a biofuel or recycled carbon feedstock for the chemical industry. In parallel with the company's electrolyser project in Bremen, the Carbalyst plant in Fos-sur-Mer will boost CO2 savings through hydrogen injection, supplied by a large-scale electrolyser that will produce the hydrogen locally from renewable electricity.

### **First verified green steel for customers**

The first impact of these decarbonisation efforts means ArcelorMittal Europe will be offering customers green steel products this year, when the first 30,000 tonnes will be ready.

A system that quantifies the CO2 emissions savings made thanks to the decarbonisation projects being rolled out by ArcelorMittal Europe has been developed. Customers will be able to buy green steel, based on verified emissions compared with a 2018 baseline.

### **Innovation Fund submissions**

To fund the capital investment needed for the projects announced today, ArcelorMittal Europe is preparing funding applications

"Today we are providing an important update on our progress in achieving our target of reducing CO2 emissions by 30% by 2030 and carbon neutrality by 2050, including the vital role that hydrogen has in our strategy. Our talented teams across ArcelorMittal Europe are working hard to ensure our CO2 emissions reduction projects deliver results as fast as possible, on an industrial scale. We are focussed on being ready for the hydrogen economy and the exciting opportunities this presents for us as European steelmakers.

"In parallel we continue to roll out our Smart Carbon technology which we are convinced also offers huge potential given the world will need so-called BECCS technologies (bio-energy, carbon capture and storage) to reach net zero by 2050.

"Our plans to offer greener and more circular steel will support our customers in their circular economy objectives. We are pleased to be able to offer our first green tonnes this year and look forward to being able to provide customers with larger volumes of this steel as our decarbonisation projects are ramped up and rolled out across Europe.

"We are in the process of applying for funding for various projects from the ETS Innovation Fund which we hope will be successful, giving us the vital access to finance that we need for these important projects. The success of these projects will also be secured through partnerships, and we would like to thank our partners for their hard work and willingness to co-develop the new technologies we need to make carbon-neutral steel."

### **ArcelorMittal Europe climate action report**

In June 2020, ArcelorMittal Europe published its first climate action report which outlined the company's strategy for reducing CO2 emissions by 30% by 2030 and reaching carbon neutrality by 2050.

In the report the company identified two breakthrough carbon-neutral technology routes, Smart Carbon and innovative DRI based on hydrogen, that will help the company reach its CO2 reduction targets.

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[Read ArcelorMittal Europe's climate action report](#)

[Watch a short animation about how ArcelorMittal Europe will reach carbon neutrality by 2050](#)

[ArcelorMittal sets 2050 group carbon emissions target of net zero](#)

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# Steel Statistical Yearbook 2011

## Preface

This yearbook presents a cross-section of steel industry statistics. The co-operation of members and non-members in supplying the information included in this publication is gratefully acknowledged.

Further details of the statistical sources used are given in the Annex (p. 119). These contents were finalised in July 2011.

Data are expressed in thousand metric tons unless stated otherwise. Zero indicates that the quantity concerned is less than 500 metric tons.

'e' indicates that a figure has been estimated by worldsteel.

Totals comprise listed countries only. Trade data totals include intra-regional exports and imports.

An ellipsis (...) indicates that an item of information was not available.

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# Contents

		Page
Table 1	Total Production of Crude Steel	3
Table 2	Crude Steel Production by Product, 2009 and 2010	6
Table 3	Production of Ingots	10
Table 4	Production of Continuously Cast Steel	14
Table 5	Production of Liquid Steel for Castings	18
Table 6	Crude Steel Production by Process, 2009 and 2010	22
Table 7	Production of Crude Steel in Oxygen Blown Converters	26
Table 8	Production of Crude Steel in Electric Furnaces	30
Table 9	Production of Crude Steel in Open Hearth Furnaces	34
Table 10	Monthly Crude Steel Production, 2010	36
Table 11	Production of Hot Rolled Products	38
Table 12	Production of Hot Rolled Long Products	40
Table 13	Production of Hot Rolled Flat Products	42
Table 14	Production of Railway Track Material	44
Table 15	Production of Heavy Sections (≥80mm)	45
Table 16	Production of Light Sections (<80mm)	46
Table 17	Production of Concrete Reinforcing Bars	47
Table 18	Production of Hot Rolled Bars (other than Concrete Reinforcing Bars)	49
Table 19	Production of Wire Rod	51
Table 20	Production of Electrical Sheet and Strip	53
Table 21	Production of Tinmill Products	54
Table 22	Production of Other Metallic Coated Sheet and Strip	55
Table 23	Production of Non-metallic Coated Sheet and Strip	57
Table 24	Production of Tubes and Tube Fittings	58
Table 25	Production of Seamless Tubes	60
Table 26	Production of Welded Tubes	61
Table 27	Exports of Semi-finished and Finished Steel Products	63

(continued overleaf)

		Page
Table 28	Imports of Semi-finished and Finished Steel Products	65
Table 29	Exports of Ingots and Semis	68
Table 30	Imports of Ingots and Semis	70
Table 31	Exports of Long Products	73
Table 32	Imports of Long Products	75
Table 33	Exports of Flat Products	78
Table 34	Imports of Flat Products	80
Table 35	Exports of Tubular Products	83
Table 36	Imports of Tubular Products	85
Table 37	Apparent Steel Use (crude steel equivalent)	88
Table 38	Apparent Steel Use per Capita (crude steel equivalent)	91
Table 39	Apparent Steel Use (finished steel products)	94
Table 40	Apparent Steel Use per Capita (finished steel products)	97
Table 41	Production of Pig Iron	100
Table 42	Production of Direct Reduced Iron	102
Table 43	Monthly Production of Primary Iron, 2010	103
Table 44	Exports of Pig Iron	105
Table 45	Imports of Pig Iron	107
Table 46	Production of Iron Ore	109
Table 47	Exports of Iron Ore	111
Table 48	Imports of Iron Ore	113
Table 49	Exports of Scrap	115
Table 50	Imports of Scrap	117
Annex	Sources and Definitions	119

Table 1

## Total Production of Crude Steel

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Austria	5 869	6 189	6 261	6 530	7 031	7 129	7 578	7 594	5 662	7 206
Belgium	10 762	11 343	11 114	11 698	10 420	11 631	10 692	10 673	5 635	7 973
Denmark	751	392								
Finland	3 938	4 003	4 766	4 832	4 739	5 054	4 431	4 417	3 066	4 030
France	19 343	20 258	19 758	20 770	19 481	19 852	19 250	17 879	12 840	15 414
Germany	44 803	45 015	44 809	46 374	44 524	47 224	48 550	45 833	32 670	43 830
Greece	1 281	1 835	1 701	1 967	2 266	2 416	2 554	2 477	2 000	1 821
Ireland	150									
Italy	26 545	26 066	27 058	28 604	29 350	31 624	31 553	30 590	19 848	25 750
Luxembourg	2 725	2 719	2 675	2 684	2 194	2 802	2 858	2 582	2 141	2 548
Netherlands	6 037	6 117	6 571	6 848	6 919	6 372	7 368	6 853	5 194	6 651
Portugal (e)	728	920	1 000	1 250	1 338	1 338	1 847	1 630	1 587	1 351 e
Spain	16 504	16 408	16 286	17 621	17 826	18 391	18 999	18 640	14 358	16 343
Sweden	5 518	5 754	5 707	5 978	5 723	5 466	5 673	5 164	2 804	4 846
United Kingdom	13 543	11 667	13 268	13 766	13 239	13 871	14 317	13 521	10 079	9 709
<b>European Union (15)</b>	<b>158 497</b>	<b>158 686</b>	<b>160 975</b>	<b>168 921</b>	<b>165 050</b>	<b>173 171</b>	<b>175 668</b>	<b>167 852</b>	<b>117 885</b>	<b>147 472</b>
Bulgaria	1 972	1 860	2 317	2 106	1 949	2 102	1 909	1 330	726	747
Czech Republic	6 316	6 512	6 783	7 033	6 189	6 862	7 059	6 387	4 594	5 180
Hungary	1 956	2 053	1 989	1 952	1 958	2 084	2 227	2 097	1 403	1 678
Latvia (e)	515	520	520	662	688	690	696	635	692	655 e
Poland	8 809	8 368	9 107	10 593	8 336	10 008	10 632	9 728	7 128	7 993
Romania	4 935	5 491	5 691	6 042	6 280	6 266	6 261	5 035	2 761	3 721
Slovak Republic	3 989	4 275	4 588	4 454	4 485	5 093	5 089	4 489	3 747	4 580
Slovenia	462	481	541	566	583	628	638	642	430	606
<b>Accession Cts.</b>	<b>28 954</b>	<b>29 560</b>	<b>31 536</b>	<b>33 407</b>	<b>30 468</b>	<b>33 732</b>	<b>34 511</b>	<b>30 343</b>	<b>21 481</b>	<b>25 158</b>
<b>European Union (27)</b>	<b>187 452</b>	<b>188 246</b>	<b>192 511</b>	<b>202 328</b>	<b>195 518</b>	<b>206 903</b>	<b>210 179</b>	<b>198 195</b>	<b>139 366</b>	<b>172 630</b>
Albania	80	140	140	143	180	206	263	300	250	250 e
Bosnia-Herzegovina	84	74	95	75	289	490	533	608	519	592
Croatia	58	34	41	86	73	81	75	89	43	95
Macedonia	260	260	291	309	310	354	359	253	270	291
Montenegro							174	170	130	130 e
Norway	640	698	703	725	705	684	708	560	595	520
Serbia							1 478	1 662	1 061	1 254
Serbia and Montenegro	595	591	711	1 175	1 292	1 823				
Switzerland	1 000	1 000	1 000	1 000	1 158	1 252	1 264	1 312	934	1 320
Turkey	14 981	16 467	18 298	20 478	20 965	23 315	25 754	26 806	25 304	29 143
<b>Other Europe</b>	<b>17 697</b>	<b>19 265</b>	<b>21 281</b>	<b>23 992</b>	<b>24 972</b>	<b>28 205</b>	<b>30 608</b>	<b>31 760</b>	<b>29 106</b>	<b>33 595</b>
Azerbaijan (e)	80	125	250	250	330	300	150	150	120	120 e
Byelorussia	1 486	1 484	1 591	1 792	2 027	2 324	2 410	2 589	2 417	2 530
Kazakhstan	4 655	4 814	4 898	5 385	4 451	4 269	4 782	4 250	4 146	4 220
Moldova	967	514	850	1 012	1 016	675	965	885	380	240
Russia	58 970	59 777	61 450	65 583	66 146	70 830	72 387	68 510	60 011	66 942
Ukraine	33 108	34 050	36 932	38 738	38 641	40 891	42 830	37 279	29 855	33 432
Uzbekistan	433	450	499	602	595	617	645	682	716	716
<b>C.I.S.</b>	<b>99 699</b>	<b>101 214</b>	<b>106 470</b>	<b>113 362</b>	<b>113 206</b>	<b>119 906</b>	<b>124 169</b>	<b>114 345</b>	<b>97 645</b>	<b>108 200</b>

**Table 1**  
**(continued)**

**Total Production of Crude Steel**

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Canada	15 276	16 002	15 929	16 305	15 327	15 493	15 572	14 845	9 286	13 013
Cuba	270	268	210	192	245	257	268	279	267	278
El Salvador	39	49	57	59	48	72	73	71	56	64
Guatemala	202	216	226	232	207	292	349	250	224	274
Mexico	13 300	14 010	15 159	16 737	16 195	16 447	17 573	17 209	14 132	16 710
Trinidad and Tobago	668	817	903	815	712	673	682	489	417	572
United States	90 104	91 587	93 677	99 681	94 897	98 557	98 102	91 350	58 196	80 495
<b>North America</b>	<b>119 858</b>	<b>122 949</b>	<b>126 161</b>	<b>134 021</b>	<b>127 631</b>	<b>131 789</b>	<b>132 618</b>	<b>124 494</b>	<b>82 578</b>	<b>111 406</b>
Argentina	4 107	4 356	5 044	5 133	5 380	5 533	5 387	5 541	4 013	5 138
Brazil	26 717	29 604	31 147	32 909	31 610	30 901	33 782	33 716	26 506	32 928
Chile	1 247	1 279	1 377	1 579	1 537	1 627	1 679	1 523	1 308	1 011
Colombia	638	664	668	730	842	1 220	1 245	1 053	1 053	1 213
Ecuador	60	69	80	72	84	85	87	128	259	372
Paraguay	71	80	91	107	101	115	95	83	54	59
Peru	690	611	669	726	790	896	881	1 001	718	880
Uruguay	31	34	40	58	64	57	71	86	57	65
Venezuela	3 813	4 164	3 930	4 561	4 910	4 864	5 005	4 225	3 808	2 207
<b>South America</b>	<b>37 372</b>	<b>40 861</b>	<b>43 047</b>	<b>45 875</b>	<b>45 316</b>	<b>45 298</b>	<b>48 232</b>	<b>47 354</b>	<b>37 776</b>	<b>43 873</b>
Algeria	947	1 091	1 051	1 014	1 007	1 158	1 278	646	543	688
Angola (e)										
Egypt	3 799	4 316	4 398	4 810	5 603	6 045	6 224	6 198	5 541	6 676
Ghana (e)	25	25	25	25	25	25	25	25	25	25 e
Kenya (e)	20	20	20	20	20	20	20	20	20	20 e
Libya	846	886	1 007	1 026	1 255	1 151	1 250	1 137	914	825
Mauritania (e)	5	5	5	5	5	5	5	5	5	5 e
Morocco	5	5	5	5	205	314	512	478	479	455
Nigeria				40	100	100	100	100	100	100
South Africa	8 821	9 095	9 481	9 500	9 494	9 718	9 098	8 246	7 484	7 617
Tunisia (e)	239	200	86	66	70	75	80	82	155	150 e
Uganda (e)	30	30	30	30	30	30	30	30	30	30 e
Zaire (e)	30	30	30	30	30	30	30	30	30	30 e
Zimbabwe	149	105	152	135	107	24	23			
<b>Africa</b>	<b>14 916</b>	<b>15 807</b>	<b>16 289</b>	<b>16 706</b>	<b>17 950</b>	<b>18 695</b>	<b>18 675</b>	<b>16 997</b>	<b>15 326</b>	<b>16 621</b>
Iran	6 916	7 321	7 869	8 682	9 404	9 789	10 051	9 964	10 908	11 995
Israel	280	280	280	280	300	300	300	300	300	300 e
Jordan	30	134	135	140	150	150	150	150	150	150 e
Qatar	891	1 027	1 055	1 089	1 057	1 003	1 147	1 406	1 448	1 970
Saudi Arabia	3 413	3 570	3 944	3 902	4 186	3 974	4 644	4 667	4 690	5 015
Syria	70	70	70	70	70	70	70	70	70	70 e
United Arab Emirates	90	90	90	90	90	90	90	90	90	90 e
<b>Middle East</b>	<b>11 690</b>	<b>12 492</b>	<b>13 443</b>	<b>14 253</b>	<b>15 257</b>	<b>15 376</b>	<b>16 452</b>	<b>16 646</b>	<b>17 656</b>	<b>19 590</b>

**Table 1**  
**(continued)**

**Total Production of Crude Steel**

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
China	151 634	182 366	222 336	282 911	353 240	419 149	489 288	500 312	573 567	626 654
India	27 291	28 814	31 779	32 626	45 780	49 450	53 468	57 791	63 527	68 321
Indonesia	2 781	2 462	2 042	3 682	3 675	3 759	4 160	3 915	3 501	3 664
Japan	102 866	107 745	110 511	112 718	112 471	116 226	120 203	118 739	87 534	109 599
North Korea (e)	300	300	300	300	300	300	300	300	250	250 e
South Korea	43 852	45 390	46 310	47 521	47 820	48 455	51 517	53 625	48 572	58 363
Malaysia	4 100	4 722	3 960	5 698	5 296	5 834	6 895	6 423	5 354	5 694
Mongolia (e)	35	35	35	35	35	35	35	35	35	35 e
Myanmar (e)	25	25	25	25	25	25	25	25	25	25 e
Pakistan	953	970	1 000	1 145	825	1 040	1 090	1 000	800	800 e
Philippines	500	550	500	400	470	558	718	711	824	825
Singapore	456	460	561	610	572	607	640	764	664	728
Sri Lanka (e)	30	30	30	30	30	30	30	30	30	30 e
Taiwan, China	17 261	18 230	18 832	19 599	18 942	20 000	20 903	19 882	15 873	19 755
Thailand	2 127	2 538	3 551	4 533	5 161	4 914	5 565	5 211	3 646	4 145
Viet Nam	319	409	544	689	890	1 869	2 024	2 250	2 700	4 314
<b>Asia</b>	<b>354 529</b>	<b>395 046</b>	<b>442 316</b>	<b>512 521</b>	<b>595 533</b>	<b>672 252</b>	<b>756 861</b>	<b>771 013</b>	<b>806 901</b>	<b>903 201</b>
Australia	7 033	7 527	7 544	7 414	7 757	7 881	7 939	7 625	5 249	7 296
New Zealand	826	765	853	885	889	810	845	799	765	853
<b>Oceania</b>	<b>7 859</b>	<b>8 292</b>	<b>8 397</b>	<b>8 300</b>	<b>8 646</b>	<b>8 691</b>	<b>8 783</b>	<b>8 424</b>	<b>6 014</b>	<b>8 149</b>
<b>World</b>	<b>851 073</b>	<b>904 170</b>	<b>969 915</b>	<b>1 071 358</b>	<b>1 144 029</b>	<b>1 247 116</b>	<b>1 346 577</b>	<b>1 329 228</b>	<b>1 232 368</b>	<b>1 417 264</b>

# Steel Statistical Yearbook **2020** concise version

A cross-section of  
steel industry statistics  
2010 - 2019

## Preface

This yearbook presents a cross-section of steel industry statistics that are exchanged or published by the World Steel Association (worldsteel).

The willing co-operation of both members and non-members alike in supplying the information included in this publication is gratefully acknowledged.

Further details of the statistical sources used are given in the Annex (p.40). These contents were finalised in November 2020.

Data are expressed in thousand metric tons unless stated otherwise.

Zero indicates that the quantity concerned is less than 500 tonnes.

'e' beside a figure indicates that the figure that has been estimated by worldsteel.

'(e)' following a country name indicates that the series has been estimated by worldsteel.

Totals comprise listed countries only. Trade data totals include intra-regional exports and imports.

Three dots (...) indicate that an item of information was not available.

**World Steel Association  
Economics Committee**



# Contents

	Page
Total Production of Crude Steel	1
Crude Steel Production by Process, 2018 and 2019	3
Production of Hot Rolled Products	7
Exports of Semi-finished and Finished Steel Products	9
Imports of Semi-finished and Finished Steel Products	12
Apparent Steel Use (crude steel equivalent)	15
Apparent Steel Use per Capita (crude steel equivalent)	18
Apparent Steel Use (finished steel products)	21
Apparent Steel Use per Capita (finished steel products)	24
Production of Pig Iron	27
Production of Direct Reduced Iron	29
Indirect Exports of Steel	30
Indirect Imports of Steel	32
Indirect Net Exports of Steel	34
True Steel Use (finished steel equivalent)	36
True Steel Use per Capita (finished steel equivalent)	38
Annex. Sources and Definitions	40

Table 1

## Total Production of Crude Steel \*

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Austria	7 206	7 474	7 421	7 953	7 876	7 687	7 438	8 135	6 885	7 424
Belgium	7 973	8 026	7 301	7 127	7 331	7 257	7 687	7 842	7 980	7 760
Bulgaria	737	835	633	523	612	543	527	652	666	566
Croatia	95	96	1	135	167	122	0	0	136	69
Czechia	5 180	5 583	5 072	5 171	5 360	5 262	5 305	4 550	4 864	4 437
Germany	43 830	44 284	42 661	42 645	42 943	42 676	42 080	43 297	42 435	39 627
Finland	4 029	3 989	3 759	3 517	3 807	3 988	4 101	4 003	4 146	3 473
France	15 414	15 780	15 609	15 685	16 143	14 984	14 413	15 505	15 387	14 450
Greece	1 821	1 934	1 247	1 030	1 022	910	1 158	1 359	1 467	1 350
Hungary	1 678	1 746	1 542	883	1 152	1 675	1 274	1 901	1 989	1 769
Italy	25 750	28 735	27 252	24 093	23 714	21 958	23 312	24 007	24 496	23 190
Latvia	655	568	805	198						
Luxembourg	2 548	2 521	2 208	2 090	2 193	2 127	2 175	2 172	2 228	2 119
Netherlands	6 651	6 937	6 879	6 713	6 964	6 995	6 917	6 781	6 813	6 657
Poland	7 993	8 779	8 366	7 950	8 558	9 198	9 001	10 332	10 167	8 956
Portugal	1 543	1 942	1 960	2 050	2 070	2 030	2 010	2 076	2 215	2 033
Romania	3 721	3 828	3 292	2 985	3 158	3 352	3 276	3 361	3 550	3 448
Slovakia	4 583	4 236	4 403	4 511	4 705	4 562	4 808	4 974	4 800	3 600 e
Slovenia	606	648	632	618	615	604	613	648	654	623
Spain	16 343	15 504	13 639	14 252	14 249	14 845	13 616	14 441	14 320	13 588
Sweden	4 846	4 867	4 326	4 404	4 539	4 557	4 817	4 926	4 654	4 721
United Kingdom	9 708	9 478	9 579	11 858	12 033	10 907	7 635	7 491	7 268	7 218
<b>European Union (28)</b>	<b>172 909</b>	<b>177 791</b>	<b>168 589</b>	<b>166 390</b>	<b>169 215</b>	<b>166 238</b>	<b>162 164</b>	<b>168 455</b>	<b>167 119</b>	<b>157 078</b>
Albania (e)	390	464	500	550	560	150	50			
Bosnia-Herzegovina	592	649	700	722	793	819	806	756	695	801
Macedonia	292	386	217	100	188	121	169	273	266	239
Montenegro (e)	130	140	120	70	140	150	120	120	100	75 e
Norway	530	610	700	605	600	590	620	603	575	621
Serbia	1 254	1 324	346	396	583	955	1 173	1 477	1 973	1 929
Switzerland	1 320	1 400	1 450	1 530	1 475	1 475	1 500	1 450	1 500	1 500 e
Turkey	29 143	34 107	35 885	34 654	34 035	31 517	33 163	37 524	37 312	33 743
<b>Other Europe</b>	<b>33 650</b>	<b>39 079</b>	<b>39 917</b>	<b>38 627</b>	<b>38 374</b>	<b>35 778</b>	<b>37 601</b>	<b>42 203</b>	<b>42 421</b>	<b>38 908</b>
Azerbaijan (e)	120	120	120	173	180	180	180	180	200	200 e
Belarus	2 530	2 614	2 687	2 245	2 513	2 510	2 188	2 343	2 470	2 621
Kazakhstan	4 220	4 699	3 676	3 275	3 681	3 910	4 289	4 641	3 966	4 134
Moldova	240	313	335	190	351	443	126	469	497	392
Russia	66 942	68 852	70 209	69 008	71 461	70 898	70 453	71 491	72 122	71 897
Ukraine	33 432	35 332	32 975	32 771	27 170	22 968	24 218	21 417	21 100	20 848
Uzbekistan	716	733	736	746	723	643	654	654	646	666
<b>C.I.S.</b>	<b>108 200</b>	<b>112 663</b>	<b>110 739</b>	<b>108 408</b>	<b>106 079</b>	<b>101 552</b>	<b>102 108</b>	<b>101 195</b>	<b>101 002</b>	<b>100 759</b>
Canada	13 009	12 891	13 507	12 417	12 730	12 473	12 646	13 208	13 443	12 897
Cuba	278	282	277	322	256	284	244	221	225	230
El Salvador	64	97	72	118	121	124	100	96	99	102
Guatemala	274	294	334	385	395	403	314	294	300	306
Mexico	16 870	18 110	18 073	18 242	18 930	18 218	18 824	19 924	20 204	18 387
Trinidad and Tobago	572	603	628	616	487	591	36			
United States	80 495	86 398	88 695	86 878	88 174	78 845	78 475	81 612	86 607	87 761
<b>North America</b>	<b>111 562</b>	<b>118 675</b>	<b>121 586</b>	<b>118 978</b>	<b>121 093</b>	<b>110 938</b>	<b>110 638</b>	<b>115 355</b>	<b>120 879</b>	<b>119 683</b>

**Table 1**  
(continued)

**Total Production of Crude Steel \***

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Argentina	5 138	5 611	4 995	5 186	5 488	5 028	4 126	4 624	5 162	4 645
Brazil	32 948	35 220	34 524	34 163	33 897	33 258	31 642	34 778	35 407	32 569
Chile	1 011	1 615	1 671	1 323	1 079	1 112	1 153	1 158	1 145	1 133
Colombia	1 208	1 287	1 302	1 236	1 208	1 211	1 272	1 253	1 219	1 333
Ecuador	372	463	425	570	667	720	576	561	583	607
Paraguay	59	30	44	45	47	48	35	24	25	26
Peru	880	877	981	1 069	1 078	1 082	1 168	1 207	1 217	1 230
Uruguay	65	81	78	91	94	97	61	58	60	62
Venezuela	2 207	2 980	2 359	2 139	1 485	1 345	553	444	129	51
<b>South America</b>	<b>43 888</b>	<b>48 165</b>	<b>46 379</b>	<b>45 822</b>	<b>45 043</b>	<b>43 900</b>	<b>40 587</b>	<b>44 106</b>	<b>44 947</b>	<b>41 656</b>
Algeria	662	551	557	417	415	650	650	415	2 300	2 400 e
D.R. Congo (e)	30	30	30	30	30	30	30	30	30	30 e
Egypt	6 676	6 485	6 627	6 754	6 485	5 506	5 036	6 870	7 807	7 257
Ghana (e)	25	25	25	25	25	25	25	25	25	25 e
Kenya (e)	20	20	20	20	20	20	20	20	20	20 e
Libya	825	100	315	712	712	352	492	422	396	606
Mauritania (e)	5	5	5	5	5	5	5	5	5	5 e
Morocco	485	654	539	558	501	516	520	550	520	500
Nigeria (e)	100	100	100	100	100	100	100	100	100	100 e
South Africa	7 617	7 546	6 938	7 162	6 412	6 417	6 141	6 301	6 327	6 152
Tunisia	150	150	150	150	150	50	50	50	50	50 e
Uganda (e)	30	30	30	30	30	30	30	30	30	30 e
<b>Africa</b>	<b>16 624</b>	<b>15 696</b>	<b>15 337</b>	<b>15 963</b>	<b>14 885</b>	<b>13 701</b>	<b>13 099</b>	<b>14 818</b>	<b>17 610</b>	<b>17 175</b>
Bahrain (e)									720	700 e
Iran	11 995	13 197	14 463	15 422	16 331	16 146	17 895	21 236	24 520	25 609
Israel (e)	300	300	300	300	300	300	300	300	300	300 e
Jordan (e)	150	150	200	200	250	300	330	330	350	350 e
Kuwait (e)									1 300	1 270 e
Oman (e)		200	300	500	1 500	2 000	2 000	2 000	2 000	2 000 e
Qatar	1 970	2 038	2 145	2 236	3 019	2 593	2 521	2 644	2 575	2 558
Saudi Arabia (1)	5 015	5 275	5 203	5 471	6 291	5 229	5 461	4 831	8 187	8 191
Syria (e)	70	70	10	10	5	5	5	5	5	5 e
United Arab Emirates	500	2 000	2 408	2 878	2 390	3 006	3 149	3 309	3 247	3 327
<b>Middle East</b>	<b>20 000</b>	<b>23 230</b>	<b>25 029</b>	<b>27 017</b>	<b>30 086</b>	<b>29 579</b>	<b>31 660</b>	<b>34 655</b>	<b>43 204</b>	<b>44 310</b>
Bangladesh (e)	1 900	1 900	1 900	1 900	2 800	3 500	3 500	3 500	3 800	5 100 e
China	638 743	701 968	731 040	822 000	822 306	803 825	807 609	870 855	928 260	996 342
India	68 976	73 471	77 264	81 299	87 292	89 026	95 477	101 455	109 272	111 351
Indonesia	3 664	3 621	2 254	2 644	4 351	4 854	4 746	5 195	6 183	7 783
Japan	109 599	107 601	107 232	110 595	110 666	105 134	104 775	104 661	104 319	99 284
D.P.R. Korea (e)	1 300	1 300	1 280	1 250	1 250	1 250	1 250	1 250	1 250	1 250 e
South Korea	58 914	68 519	69 073	66 061	71 543	69 670	68 576	71 030	72 464	71 412
Malaysia	5 694	5 941	5 612	4 693	4 316	3 784	2 764	3 215	4 108	6 820
Mongolia (e)	35	35	35	40	45	45	50	50	50	50 e
Myanmar (e)	25	50	50	70	100	150	200	250	300	350 e
Pakistan (e)	1 401	1 592	1 631	1 845	2 423	2 892	3 553	4 966	4 719	3 304
Philippines	1 050	1 200	1 260	1 308	1 196	968	1 075	1 378	1 475	1 915
Singapore	728	752	688	434	540	501	520	596	618	766
Sri Lanka (e)	30	30	30	30	30	30	30	30	30	30 e
Taiwan, China	19 755	20 178	20 664	22 282	23 221	21 392	21 751	22 438	23 240	21 954
Thailand	4 145	4 256	3 641	3 613	5 835	5 069	5 400	6 762	6 403	4 246
Viet Nam	4 314	4 900	5 298	5 474	5 847	5 647	7 811	11 473	15 471	17 469
<b>Asia</b>	<b>920 272</b>	<b>997 315</b>	<b>1 028 952</b>	<b>1 125 537</b>	<b>1 143 762</b>	<b>1 117 739</b>	<b>1 129 087</b>	<b>1 209 102</b>	<b>1 281 962</b>	<b>1 349 427</b>
Australia	7 296	6 404	4 893	4 688	4 607	4 925	5 259	5 328	5 689	5 493
New Zealand	853	844	912	900	859	793	577	657	652	667
<b>Oceania</b>	<b>8 149</b>	<b>7 248</b>	<b>5 805</b>	<b>5 588</b>	<b>5 466</b>	<b>5 717</b>	<b>5 837</b>	<b>5 985</b>	<b>6 341</b>	<b>6 160</b>
<b>World</b>	<b>1 435 254</b>	<b>1 539 861</b>	<b>1 562 332</b>	<b>1 652 329</b>	<b>1 674 003</b>	<b>1 625 141</b>	<b>1 632 780</b>	<b>1 735 875</b>	<b>1 825 486</b>	<b>1 875 155</b>

\* - Includes all qualities: carbon, stainless, and other alloy.

(1) - 2010-17 HADEED only. 2018-19 national total.

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