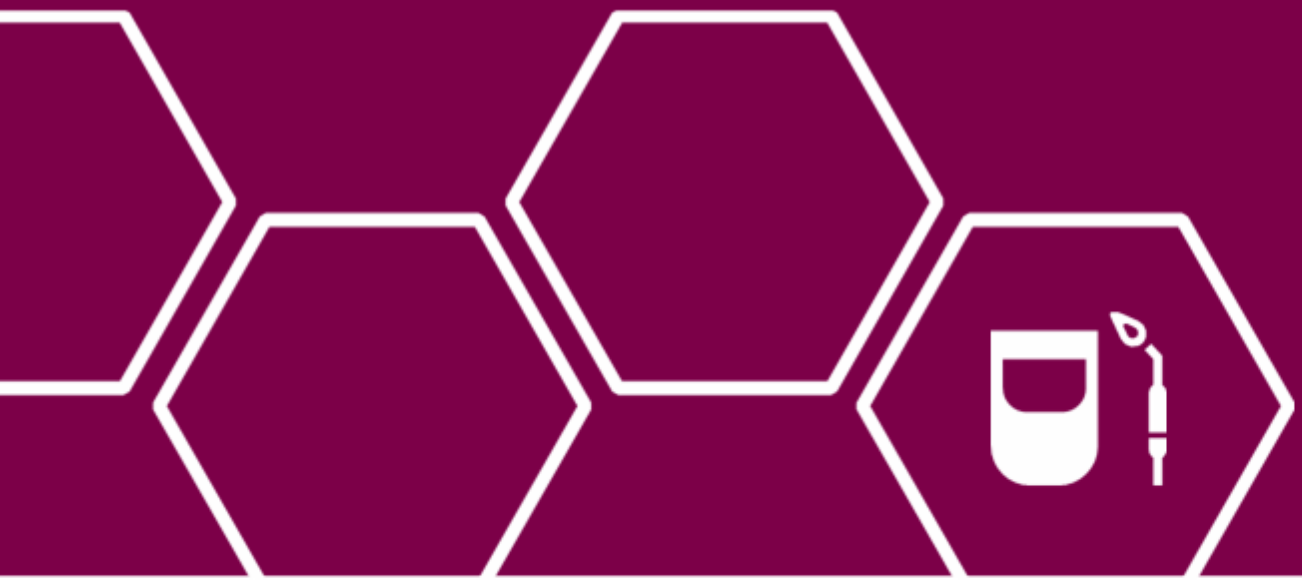
ACT

SECTOR METHODOLOGY

Assessing low-Carbon Transition

Iron & Steel



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1. Introduction

The 2015 United Nations Climate Change Conference (COP21) in Paris strengthened the global commitment to mitigating dangerous climate change. Political agreement was reached on limiting warming to well below 2 degrees, while striving for the more aspirational target of1.5 degrees Celsius above pre-industrial levels. The Assessing low-Carbon Transition® (ACT) initiative measures the preparedness of companies to transition to a low-carbon economy. ACT aims to help businesses improve their climate strategy, their business model(s), their investments and operations, and set targets compatible with a low-carbon pathway. The general approach of ACT is based on the Sectoral Decarbonization Approach (SDA) developed by the Science-Based Targets initiative (SBTi) in order to compare companies' alignment with a low-carbon world (compatible with 2°C - or beyond - climate change scenarios). The application of this approach is described in the ACT Framework (1). The ACT Iron & Steel Methodology aligns with other reporting frameworks where applicable (e.g., CDP, TCFD, EU Taxonomy).

Why do we need to develop a methodology for the iron and steel sector?

Among heavy industries, the iron and steel sector ranks first when it comes to CO_2 emissions, and second when it comes to energy consumption. Steel production is highly energy- and emissions-intensive, accounting for around 8% of global energy demand and 7% (2.6 Gt CO_2) of total emissions from the energy system[1].

The use of steel is associated with economic growth. In 2019, the amount of steel used globally reached 1768 Mt with the four main markets being building and infrastructure (52%), mechanical equipment (16%), automotive (12%) and metal products (10%)[2]. According to the IEA, global demand for steel is projected to increase by more than a third through to 2050 as a result of growth in these markets.

IEA analysis for the iron and steel sector states that "the direct CO_2 intensity of crude steel has been relatively constant (within a 20% range) during the past two decades, and in the last couple of years has returned to roughly the 2000-08 level. To align with the SDS (Sustainable Development Scenario), the CO_2 intensity of crude steel needs to fall an average of 2.5% annually between 2018 and 2030. Achieving this reduction and maintaining it after 2030 will not be easy. [For primary production] energy efficiency improvements spurred much of the reduction in recent years, returning CO_2 intensity to previous levels, but opportunities for further efficiency improvements will likely soon be exhausted. Thus, innovation in the upcoming decade will be crucial to commercialise new low-emissions process routes, including those integrating CCUS (carbon capture use and storage) and hydrogen, to realise the long-term transformational change required. Governments can help by providing R&D funding, creating a market for near-zero-emissions steel production, adopting mandatory CO_2 emissions reduction policies, expanding international co-operation and developing supporting infrastructure."[3]

In fact, steel recycling is possible through the use of electric arc furnaces, by recovering steel scraps from dismantled buildings, infrastructure, cars, machinery and equipment. Nearly all end-of-life (EoL) steel can be recycled. Nevertheless, the continuous increase of steel consumption, associated with growth at a global

[1] Iron and Steel Technology Roadmap, IEA, 2020

[2] World Steel Association Fact Sheet: https://Steelfacts.worldSteel.org/fact/105

[3] IEA website, Iron and Steel analysis, https://www.iea.org/reports/Iron-and-Steel

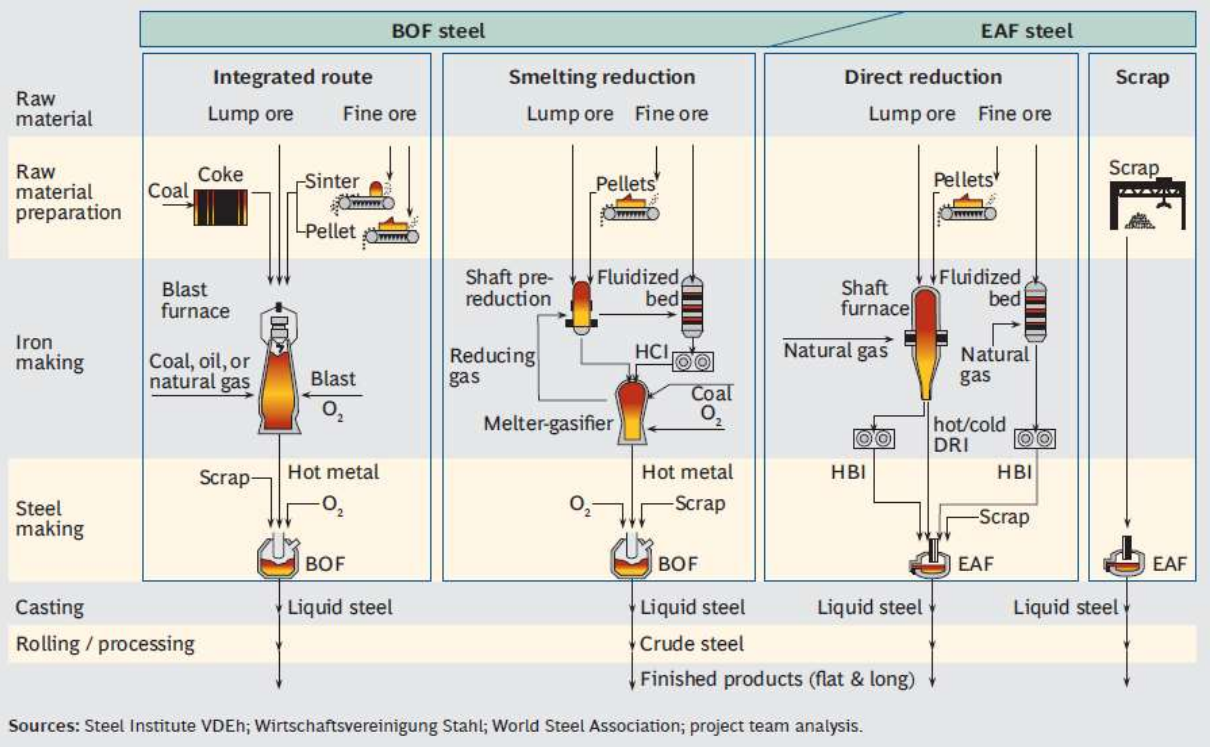
level (China, India, etc.), together with the relatively long lifespan of steel products, means there is still a significant need for primary steel production for the years to come. In fact, some applications of steel (such as stamping) exclusively require blast furnace grade steel (quality issue).

According to the IEA, "Secondary production of steel should also be increased through more effective scrap collection and sorting. Stakeholders should work to increase scrap collection and recovery by improving recycling channels and sorting methods, and by better connecting participants along supply chains. The steel industry can also take advantage of opportunities for industrial symbiosis – including using the waste or by-products from one process to produce another product of value – to help close the material loop, reduce energy use and reduce emissions in the case of carbon capture and utilisation. Examples include using steel blast-furnace slag in cement production and carbon from steel waste gases to produce chemicals and fuels."[4]

It is important to note that the choice of low-carbon scenario might differ between each ACT sectoral methodology, so it is not always possible to compare assessment results across sectors. In addition, the methodology itself is scenario-agnostic, meaning that companies within the same sector could be given two different scores if the scenario chosen in the benchmark were to change.

1.1. INTRODUCTION TO IRON AND STEEL PROCESSES

Steel's strength and formability make it a versatile material that can be used for a wide range of applications. Steel is an alloy made by combining iron with carbon and other chemical elements. Different grades of steel exist, with varying chemical composition and characteristics (material microstructure, surface conditions, corrosion resistance, etc.). Figure 1 gives an overview of the most common iron- and steel-making processes (not exhaustive):



Sources: Steel Institute VDEh; Wirtschaftsvereinigung Stahl; World Steel Association; project team analysis.

[4] IEA website, Iron and Steel analysis

FIGURE 1 : OVERVIEW OF THE STEEL-MAKING PROCESS (2)

Several routes are currently used to produce steel:

- The primary steel production process using a Blast Furnace and Basic Oxygen Furnace (BF-BOF) is the most common. According to the WorldSteel website, a total of 70.7% of steel is produced using the BF-BOF route (3):
    - First, iron ores are reduced to iron (also referred to as hot metal, or pig iron in solidified state). This process takes place in a Blast Furnace (BF), using predominantly coke and coal as reducing agents. When elements are melted in the BF, impurities in the iron ores, coke and coal ashes are separated from the hot metal to form a liquid slag, leaving pure iron behind.
    - The iron is then converted to steel in the Basic Oxygen Furnace (BOF), also called a converter. There, Dioxygen (O_2) is injected, to remove any remaining unwanted elements and as much of the residual carbon as necessary in order to convert the metal into steel of the required quality (the target carbon content depends on the steel grade, but must be below 2% to be considered steel). This reaction is exothermic (releasing energy), so coolants are required. Scrap is often used for this purpose, but sometimes cold pig iron or direct reduced iron (see below) can be added in the BOF. According to WorldSteel sources, a BOF can be charged with up to 30% scrap (3).
    - After casting and rolling, the steel is delivered as coils, plates, sections or bars.
- An alternative primary production route is the smelting reduction converter (SR-BOF) route:
    - The BF is replaced by a two-stage process: first, iron ores are pre-reduced using off-gasses from the melter-gasifier. Then, the pre-reduced iron ores are melted in the melter-gasifier, using coal as a reducing agent. Two main technologies exist for smelting reduction: Corex, where pellets and lump ores are pre-reduced in a shaft, and Finex, where fine ores are pre-reduced in a multistage fluidized bed reactor.
    - The hot metal produced by smelting reduction is then charged into a BOF and follows the same steps as the BF-BOF method .
- Steel can also be made in an Electric Arc Furnace (EAF). According to WorldSteel, about 28.9% of steel is produced via an EAF (3). This includes different routes:
    - The most common route is scrap-EAF, for which scrap steel is used as input. Steel produced from scrap is called “secondary steel” and is melted by the energy supplied by an electric arc, often assisted by O_2 injection, oxy-fuel burners, or both. Additives, such as alloys, are often used to adjust to the desired chemical composition. Producing steel from 100% scrap is possible, but additives can also be produced from ore.
    - EAF can also be charged with hot metal produced from iron ore, or with direct reduced-iron (DRI). This DRI-EAF route represents only a small share of the steel produced currently, but this share is expected to grow in the future, as it does not require the use of coal or coke:
        - In the DRI process, iron ores remain solid through the entire process, rather than being melted as in the BF and SR. Oxygen contained in the ores is removed by a chemical reaction with the hot reducing gas (currently, mostly reformed natural gas, which is high in hydrogen (H_2) and carbon monoxide (CO) content. The predominant technologies for direct reduction processes are Midrex and HYL.
        - The hot DRI can either be fed directly to the EAF, or be compacted as hot briquetted iron (HBI), which allows better storage and transportation (DRI can be produced close to where the ores are produced, and then transported to another place for producing steel close to where it will be used. This reduces the amount of material transported, compared to the

traditional BF-BOF route which requires a large amount of iron ore and coal to be transported).

- The DRI or HBI is fed to an EAF, where it is melted into liquid steel. Unlike hot metal, DRI still contains residual O_2 and other unwanted materials from the iron ores, that need to be eliminated in the steel-making stage.

- Another steel-making technology, the open-hearth furnace (OHF), makes up about 0.4% of global steel production. The OHF process is very energy-intensive and is in decline owing to its environmental and economic disadvantages.

The iron and steel industry produces many by-products in addition to iron and steel products. Some of them can be used by other industrial sectors to help them to transition to a low-carbon economy. The most common ones are:

- gases (mainly in coke ovens, Blast Furnaces and Basic Oxygen Furnaces), which can be burnt to generate heat or electricity, either directly on site or exported to a third party;
- slag, which is commonly used as an alternative to clinker in cement production, and can also replace roadstone and fertilizer.

Not all steel production routes produce the same type and same amounts of these by-products.

The steel is then cast into semi-finished products such as blooms, billets or slabs, which can then be processed in a variety of finished products. A presentation of the different finished products is presented in Figure 2. For a more detailed technical analysis of the main processes in the iron and steel sector, a study from the EU-MERCI project presents each process in-depth. (4)

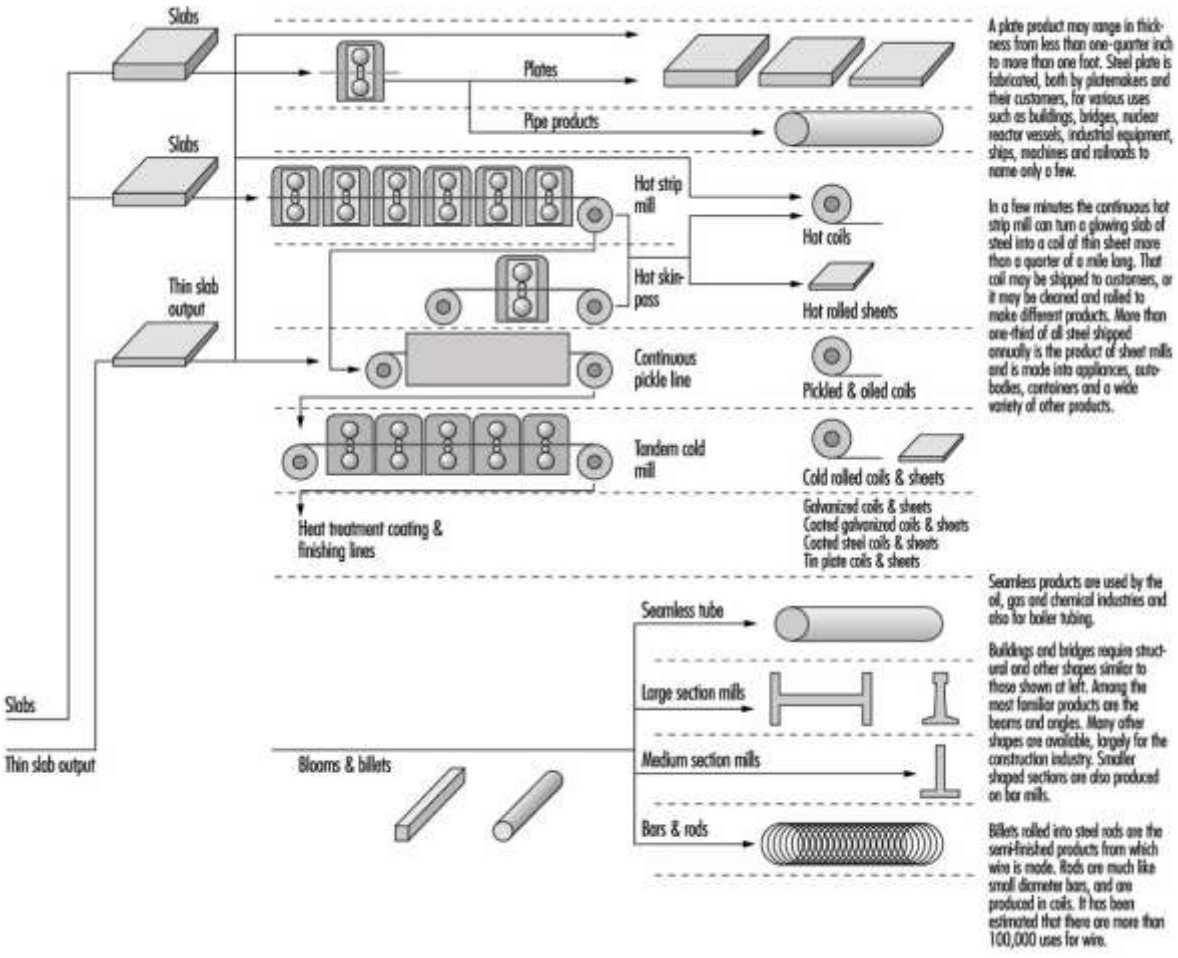


FIGURE 2: FLOW LINE OF HOT- AND COLD-ROLLED SHEET MILL PRODUCTS (5)

Steel can be associated with other materials (e.g., concrete and stone, wood) to form final products, such as buildings and other structures (e.g., bridges), cars and other transport means (e.g., marine), and industrial applications (e.g., machinery and equipment). Most of these products have a relatively long lifespan. Additionally, Iron is one of the most common metals available in Earth's crust, which may disincentivize recycling.

The amount of CO_2 associated with the BF route is linked with the method used to reduce iron ore (see above), the pig iron treatment to produce steel in the BOF (Basic Oxygen Furnace). and with the energy used in each process stage. The scrap-EAF route does not involve iron ore reduction, and therefore emits less CO_2. Moreover, the energy used in the EAF route is mainly electricity, which may have a lower CO_2 emissions intensity in some countries (such as France), than the use of fossil fuels. As electricity grids continue to reduce their emissions intensity in the future, this method will become increasingly low-impact.

Once produced, steel can be continually recycled and reused. With a global recovery rate of more than 70%, steel is the most recycled material on the planet. What is more, 97% of by-products from steel manufacturing can also be reused. For example, slag from steel plants is often used to make concrete. (6)

1.2. GHG EMISSIONS IN THE IRON AND STEEL SECTOR

1.2.1. COMPARISON OF PRODUCTION ROUTES

- **Comparison of liquid Steel carbon footprint**

The 4 main production routes for iron and steel products have been presented in chapter 1.1. Each of these production routes involve several processes. For instance, Corex and Finex are two different processes in the smelting reduction family, sometimes called the SR-BOF route. Direct iron reduction can be done through a wide range of processes, the most common currently being Midrex (about 60% of the global DRI production (7)) and Finored, which both use natural gas as the reducing agent.

Rammer et al. compared 7 production routes in a study (8), which was presented at the European Coke and Ironmaking Congress (9). Those routes are presented in Figure 3.

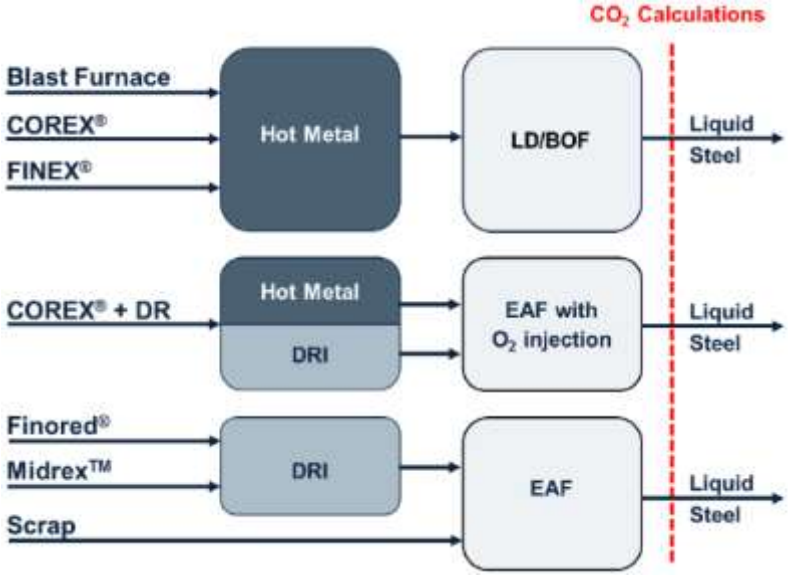


FIGURE 3: PRESENTATION OF THE 7 PRODUCTION ROUTES COMPARED (9)

These processes are not directly comparable, as they generate different types and quantities of by-products (off-gases, which are often burnt to produce electricity, and slag, which is generally recovered to produce cement). Comparing the emissions intensity of these production routes requires a GHG allocation procedure. This is generally calculated by allocating carbon credits for producing these by-products, based on the carbon footprint of the products they replace: Slags can replace clinker, electricity from off-gas combustion can replace grid electricity. To realistically model this process, these credits must be included in the calculation, since no blast furnace, Corex, or Finex plant can economically operate without further utilization of its off-gas, and no Corex or Finex plant will be built without appropriate gas utilization (8).

Therefore, as the carbon footprint of electricity decreases, the value of the credit for generating blast furnace gas will decrease as well, making the carbon footprint of iron produced through the BF-BOF route increase. For this reason, Rammer et al. calculated the carbon footprint of each route using a range of emissions factors for electricity, as presented in Figure 4.

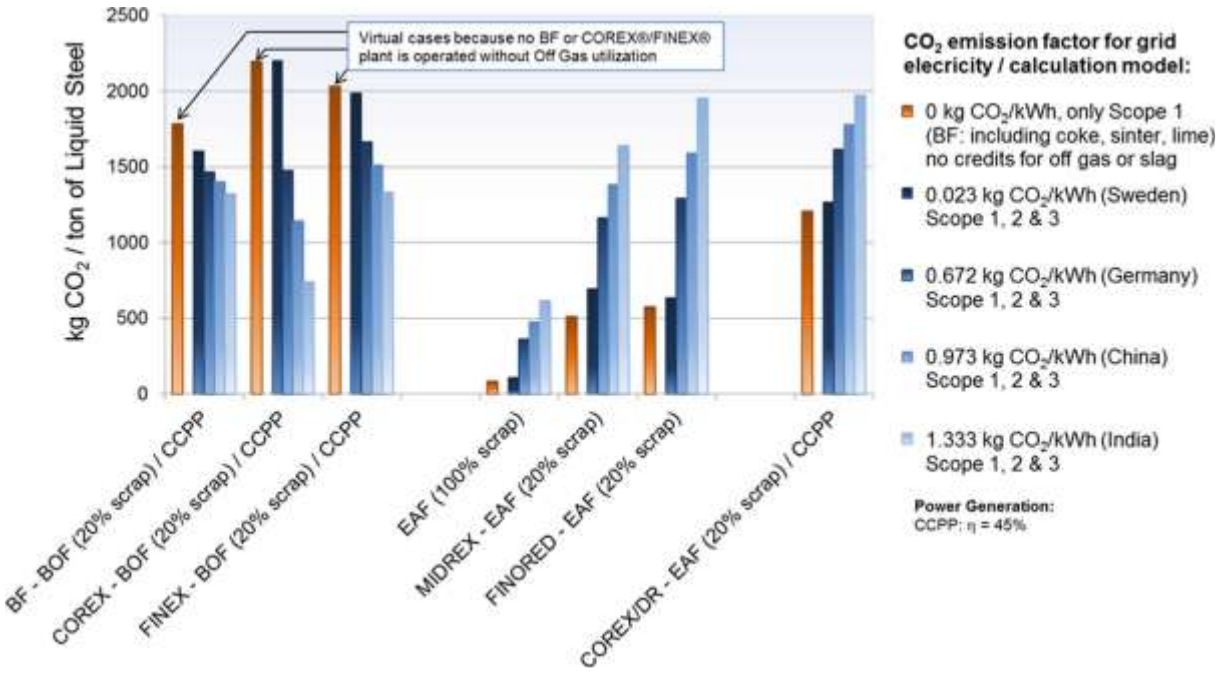


FIGURE 4: COMPARISON OF CO_2 EMISSIONS OF LIQUID STEEL PRODUCTION ROUTES (9)

According to Figure 4, steel produced from smelting reduction (Corex – BOF and Finex-BOF) have higher direct emissions than with the BF-BOF route, but generate more by-products, especially off-gases. When those gases are burnt in a combined cycle power plant (efficiency of 45%), in a country with carbon-intense electricity (e.g., China or India), the carbon footprint of steel produced by SR-BOF can be equivalent or lower than the one from the BF-BOF route. Smelting reduction can be a short-term solution for replacing a blast furnace, but it cannot be considered a low-carbon technology.

The two DRI-EAF routes mentioned both have significantly smaller carbon footprints than the BF-BOF route, but only with a low-carbon electricity mix. For instance, the DRI-EAF route would have higher emissions than the BF-BOF route if it was developed in India today. Nevertheless, if electricity generation is decarbonized, the Midrex-EAF and Finored-EAF routes can lead to a significant decrease in carbon emissions. Rammel et al. explain that these processes can only be deployed if sufficient amounts of natural gas are available (at reasonable cost).

Other processes are currently being researched for direct iron reduction, which could lead to further improvements in carbon performance.

- **Contribution of processes for hot metal from blast furnace**

The BF-BOF route requires the production of coke and sinter, which is responsible for carbon emissions. For this route, data is available on the contribution of each process to the carbon footprint of steel. Figure 5 shows the components of the hot metal carbon footprint, produced in a blast furnace from sinter, coke and pellet. This has been calculated using data from the ecoinvent database.

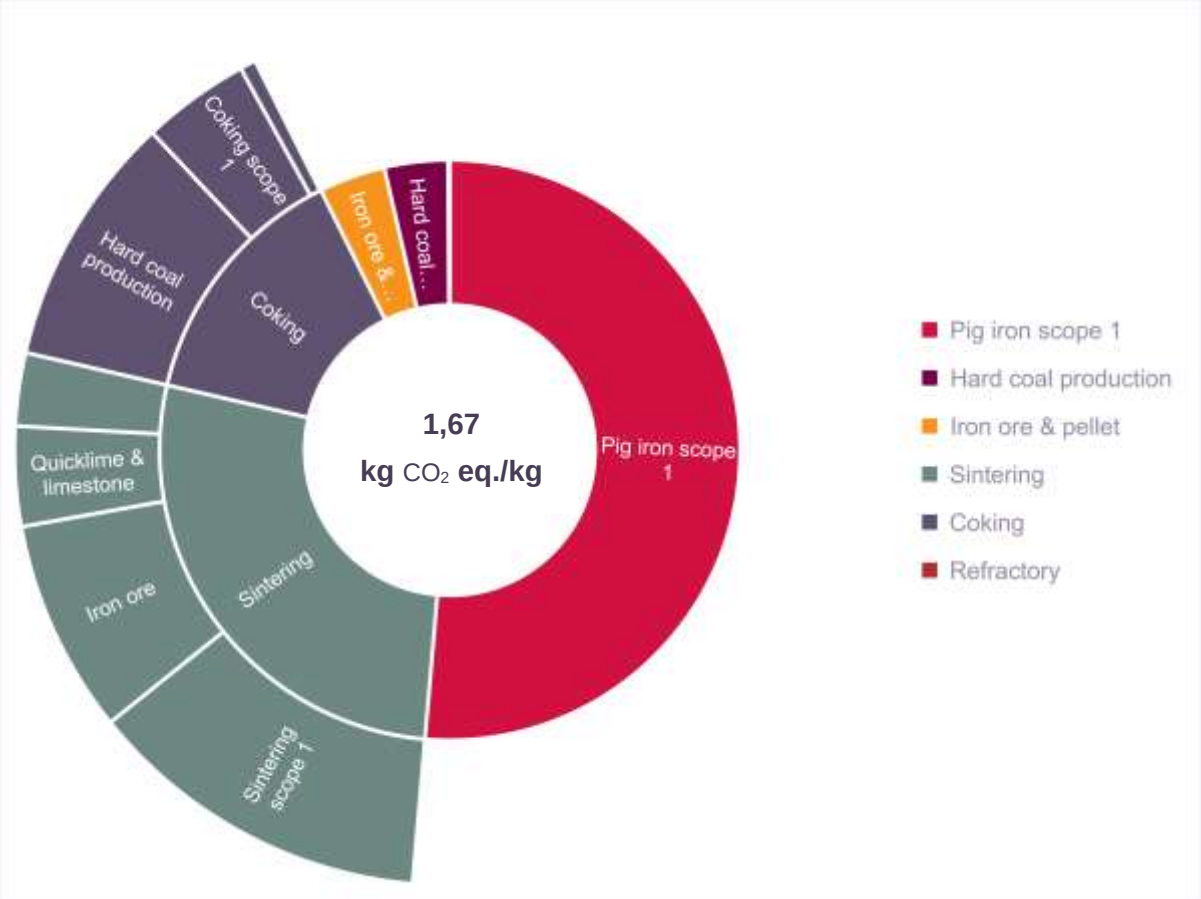


FIGURE 5 : CONTRIBUTION TO THE PIG IRON (HOT METAL) CARBON FOOTPRINT (ECOINVENT 3.6 CUT-OFF DATABASE)

Direct emissions from the blast furnace represent about half of the cradle-to-gate emissions for pig iron production. If coke and sinter are also produced in the same plant, Scope 1 emissions from the plant represent about 70% of the total emissions (1.14 kg CO_2e / kg hot metal). The rest of the emissions come from the production and preparation of other materials (mainly iron ore and pellet, hard coal and quicklime).

- **Contribution of processes for other production routes**

For the other production routes, no data could be found on the individual contribution of each phase. Most of these processes are highly integrated. For example, one process which generates hot gas may be used to preheat another process downstream. Therefore, carbon performance should rather be considered at the plant scale, and not at the scale of an individual process.

1.2.2. COMPARISON OF IRON AND STEEL PRODUCTS

The iron and steel sector produces a wide range of products, through various industrial processes. Therefore, the carbon footprint of products can vary significantly depending on the type of steel and its grade. In this section, we have analysed the carbon footprint of several steel products available in the ecoinvent 3.6 database (cut-off system model).

- **Steel-making in basic-oxydation furnace (BOF)**

Figure 6 presents the carbon footprint of the main products from the BF-BOF route. This figure shows that there is a high variability in the carbon footprint depending on the type of steel produced. Three products, produced in a BOF (also called a converter) are compared, considering European average data as provided by the ecoinvent database:

- Unalloyed steel (or plain / non-alloy steel)
- Low-alloyed steel
- Chromium steel (18% chromium, 8% nickel)[5]

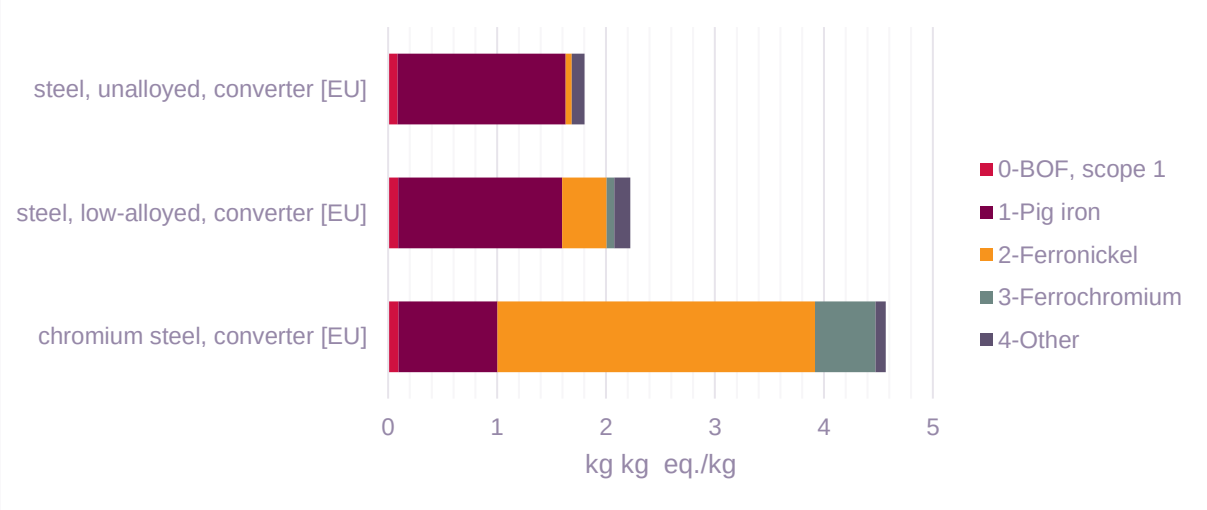


FIGURE 6: CARBON FOOTPRINT OF THE MAIN STEEL PRODUCTS PRODUCED FROM THE BF-BOF ROUTE (ECOINVENT 3.6 CUT-OFF DATABASE)

The production of alloyed steel requires the use of alloying elements such as ferrosilicon, ferronickel and ferrochromium to reach the desired composition. The production of these alloying elements can be very carbon-intensive. Stainless steel in particular requires the use of ferronickel and ferrochromium. The most common stainless steel is chromium steel 18/8 (18% chromium, 8% nickel), which gives a carbon footprint of more than 2.5 times of unalloyed steel. However, different steels have different applications, and better technical characteristics can result in lower material use for a given application (for instance, a higher mechanical resistance can result in lower mass, resistance to corrosion might lead to longer lifetime, antibacterial stainless steel might need lower use of coating or cleaning agents, etc.).

Direct emissions at the BOF correspond to about 0.1 kg CO_2 / kg, which is quite low.

- **Steel-making in electric arc furnace (EAF)**

Figure 7 presents the carbon footprint of the main products produced from the EAF route. Three products are compared, considering European average data:

- Cast iron, produced by remelting pig iron in an EAF
- Chromium steel, produced from steel scrap, ferronickel and ferrochromium, melted in an EAF
- Low-alloyed steel, produced from steel scrap in an EAF

[5] According to WorldSteel, there are currently very few chromium Steel producers in the world that use the BF-BOF route and none in Europe.

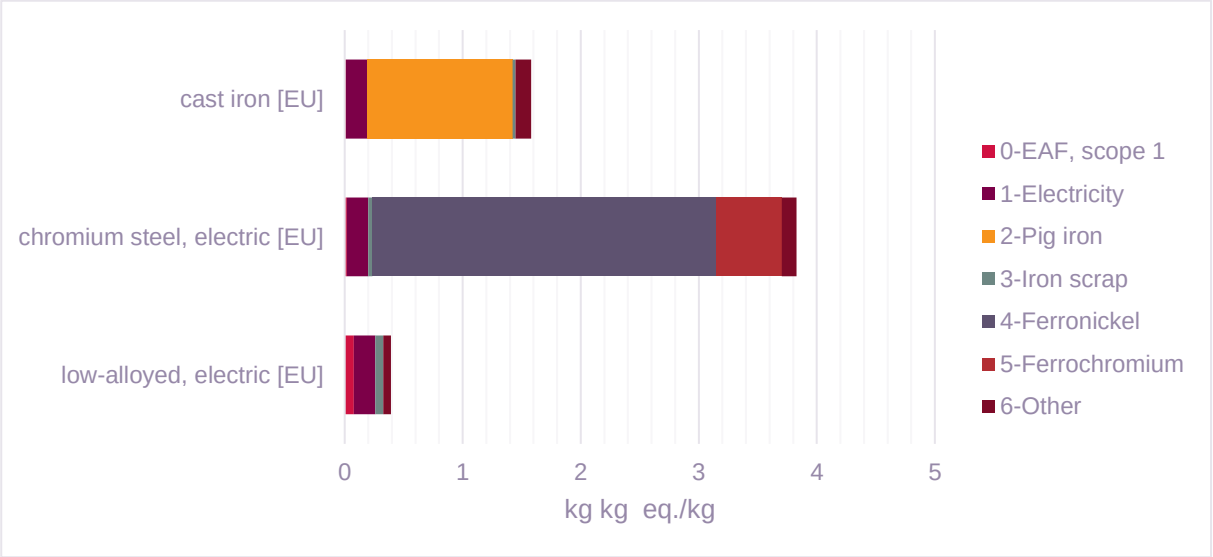


FIGURE 7: CARBON FOOTPRINT OF THE MAIN STEEL PRODUCTS PRODUCED FROM THE EAF ROUTE (ECOINVENT 3.6 CUTOFF DATABASE)

Again, the carbon footprint varies greatly between products. Direct emissions and emissions related to the production of electricity consumed by the EAF represent only a small share of the total (about 0.2 kg CO_2e / kg). Most of the emissions occurs during upstream activities: production of pig iron, and production of other alloying elements (ferronickel, ferrochromium).

The ecoinvent data does not provide any data regarding the production of primary steel from the DRI-EAF route, as it currently has a very low market share.

2. Principles

The selection of principles to be used for the methodology development and implementation are explained in the general ACT Framework. Table 1 recaps the principles that were adhered to when developing the methodology.

TABLE 1: PRINCIPLES FOR IMPLEMENTATION

RELEVANCE - Select the most relevant information (core business and stakeholders) to assess low-carbon transition.
VERIFIABILITY - The data required for the assessment shall be verified or verifiable.
CONSERVATIVENESS - Whenever the use of assumptions is required, the assumption shall be on the side of achieving a 2° maximum global warming.
CONSISTENCY - Whenever time series data is used, it should be comparable over time.
LONG-TERM ORIENTATION - Enables the evaluation of the long-term performance of a company while simultaneously providing insights into short- and medium-term outcomes in alignment with the long-term.

3. Scope

3.1. SCOPE OF THE DOCUMENT

This document presents the ACT assessment methodology for the iron and steel sector. It includes descriptions of indicators alongside their calculation methods and rationale for the sector-specific aspects of performance, narrative and trend scorings. It was developed in compliance with the ACT guidelines for the development of sector methodologies (10), which describe the governance and process of this development, as well as the required content for such documents. It is intended to be used in conjunction with the ACT Framework, which describes the overarching philosophy of the ACT initiative and elements of the methodology that are not sector specific.

3.2. SCOPE OF THE SECTOR

3.2.1. IRON AND STEEL SECTOR VALUE CHAIN

The iron and steel value chain can be divided into five main stages:

- Iron ore mining;
- Iron making;
- Steel making and casting;
- Steel product shaping;
- Finished product manufacturing.

The main processes involved in these activities are presented in Figure 8 below.

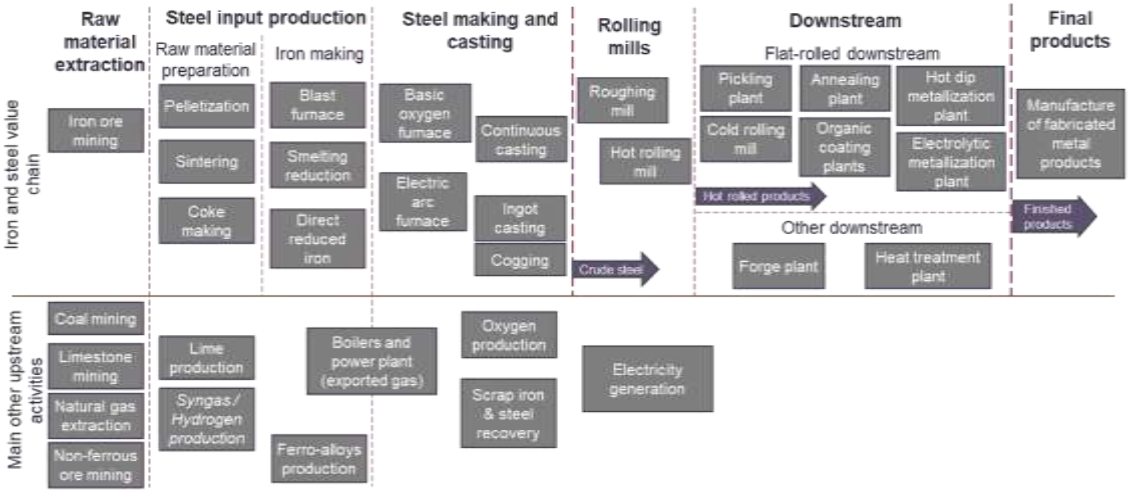


FIGURE 8 : IRON AND STEEL VALUE CHAIN

3.2.2. SCOPE

The ACT methodology relies on the principle of relevance and therefore only the companies that have both significant climate impact and significant mitigation levers can be covered by the ACT methodology.

The companies that are covered by the ACT Iron & Steel Methodology are the following:

- Integrated steel mills (companies can be assessed as integrated, whether or not they include iron ore mining);
- Cast iron producers;
- Stainless steel producers;
- EAF mills;
- Re-rollers.

Iron ore miners, iron and steel service providers (designing plants, providing engineering and/or maintenance services), as well as steel product traders (importers, exporters) cannot be evaluated using the present methodology.

Companies who are active only in primary materials production for the iron and steel sector, without being active in other parts of the value chain, will also not be covered by the methodology. This includes ferroalloy producers, lime and coke producers, CDRI / HBI producers as well as iron granules and powders producers.

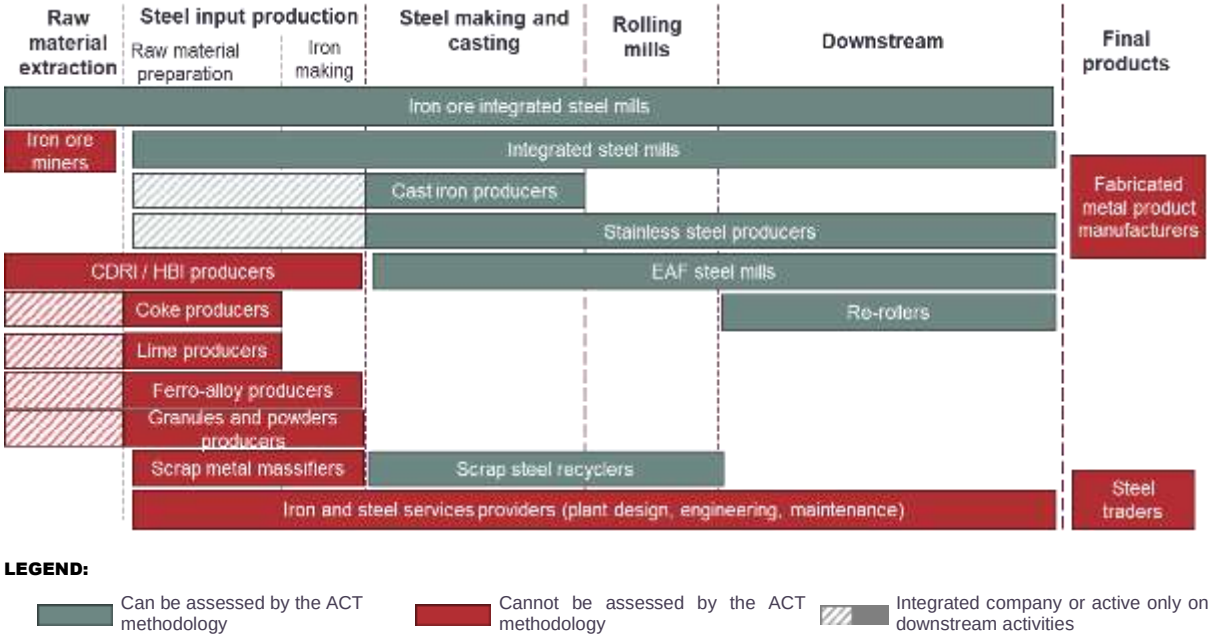


FIGURE 9: COMPANIES THAT CAN BE ASSESSED BY THE ACT IRON AND STEEL METHODOLOGY

Depending on the activities they are involved with, iron and steel companies within the scope have different levers of action to reduce carbon emissions of the sector. Therefore, the assessment is adapted to three types of companies:

- **Integrated companies**, which are active in both steel-making and product-shaping activities.
- **Steel-making companies**, which operate up to steel casting. This includes cast iron producers as well.
- **Steel-shaping companies**, who purchase crude steel to process it into a finished steel product which is then sold to product manufacturers.

As there are many different iron and steel products (cast iron, rolled tonnes, crude steel, different alloys, etc.), the company is to select whether the products they produce are closer to crude steel (produced steel) or steel-shaping products/semis (processed steel). The main implication of this is that companies are grouped into three categories (integrated, steel-making and steel-shaping), each with separate indicator weightings and low-carbon pathways.

- **Rationale for Scope**

The scope of the ACT methodology is defined to focus on companies which have the most efficient levers to reduce the emissions of the iron and steel sector.

- Iron ore mining is excluded from the Scope as the contribution of this activity to the carbon footprint of steel products is low (lower than 8% of pig iron carbon footprint).
- Ferroalloys production is excluded from the scope, as the processes involved here are different from those of steelmaking. Ferroalloys production is responsible for a significant share of the carbon footprint of high alloy steel (e.g., stainless steel); these emissions are included in the scope 3 upstream emissions of steelmaking companies. ACT can evaluate how steelmaking companies are working with their ferroalloy suppliers to improve their carbon performance.
- Companies producing primary inputs for an iron- reduction process or steel-making process (e.g., coke producers, lime producers, CDRI or HBI producers, scrap metal massification actors), without making steel themselves, are excluded from the scope, as they are considered suppliers of steel-making companies, with limited control over the iron or steel production.

- **Detailed Activities covered by the Scope of the ACT Iron & Steel methodology**

The scope of the ACT Iron & Steel Methodology covers the activities of steel making, casting and product shaping. Any company operating facilities related to these activities can be assessed. In practice, many companies are also performing iron reduction through blast furnace reduction, smelting reduction or direct reduced iron. This section refers to the NACE Rev. 2 statistical classification of economic activities in the European Community.

The activities of the **steel-making companies segment** included in the ACT Scope are the following:

- Manufacture of basic Iron and Steel [NACE – 24.10, partly]
- Casting of Iron [NACE – 24.51]
- Casting of Steel [NACE – 24.52]

NACE code 24.10 covers both iron reduction and steel-making. Not all companies classified under this NACE code are covered by the Scope. The activities corresponding to the production of products classified under the category “Basic iron and steel and ferroalloys” [CPA 24.10] in the CPA classification version 2.1 (44), or under “Primary materials of the iron and steel industry” [CPC 4111] of the CPC version 2.1 (44) are excluded from the Scope. They are the following:

- Pig iron and spiegeleisen in pigs, blocks or other primary forms [CPA 24.10.11] [CPC 41111]
- Ferroalloys [CPA 24.10.12]
    - Ferro-manganese [CPC 41112]
    - Ferro-chromium [CPC 41113]
    - Ferro-nickel [CPC 41114]
    - Other ferroalloys [CPC 41115]
- Ferrous products obtained by direct reduction of iron ore and other spongy ferrous products, in lumps, pellets or similar forms; iron having a minimum purity by weight of 99,94%, in lumps, pellets or similar forms [CPA 24.10.13] [CPC 41116]
- Granules and powders, of pig iron and spiegeleisen, or steel [CPA 24.10.14] [CPC 41117]

TABLE 2: ACTIVITIES OF THE STEEL-MAKING COMPANIES SEGMENT INCLUDED IN OR EXCLUDED FROM THE SCOPE

NACE Rev 2 code	Description of the category	Activities included in the NACE category included in the Scope	Activities included in the NACE category but excluded from the Scope
24.10	Manufacture of basic iron and steel and of ferroalloys	Operation of blast furnaces, steel converters, rolling and finishing mills Remelting of scrap ingots of iron or steel Production of steel in ingots or other primary forms Production of semi-finished products of steel Manufacture of hot-rolled and cold-rolled flat-rolled products of steel Manufacture of hot-rolled bars and rods of steel Manufacture of hot-rolled open sections of steel	Production of ferroalloys production of pig iron and spiegeleisen in pigs, blocks or other primary forms Production of ferrous products by direct reduction of iron and other spongy ferrous products Production of iron of exceptional purity by electrolysis or other chemical processes Production of granular iron and iron powder
24.51	Casting of iron	Casting of semi-finished iron products Casting of grey iron castings Casting of spheroidal graphite iron castings Casting of malleable cast-iron products Manufacture of tubes, pipes and hollow profiles and of tube or pipe fittings of cast-iron	None
24.52	Casting of steel	Casting of semi-finished steel products Casting of steel castings Manufacture of seamless tubes and pipes of steel by centrifugal casting Manufacture of tube or pipe fittings of cast-steel	None

The activities of the **steel-shaping companies segment** included in the ACT Scope are the following:

- Manufacture of tubes, pipes, hollow profiles and related fittings, of steel [NACE – 24.20] ;
- Cold drawing of bars [NACE – 24.31] ;
- Cold rolling of narrow strip [NACE – 24.32] ;
- Cold forming or folding [NACE – 24.33] ;
- Cold drawing of wire [NACE – 24.34] ;

The following activities, which are related to the iron and steel value chain, are not included in the Scope of the ACT methodology for this sector:

- Mining of iron ores [NACE – 07.1] ;
- Mining of other non-ferrous metal ores [NACE – 07.29] ;
- Manufacture of coke ovens products [NACE – 19.10] ;
- Roasting of iron pyrites [NACE – 20.13] ;
- Manufacture of fabricated metal products, except machinery and equipment [NACE – 25] ;
- Manufacture of machinery and equipment [NACE – 28] ;
- Manufacture of motor vehicles, trailers and semi-trailers [NACE – 29] ;
- Manufacture of other transport equipment [NACE – 30] ;
- Recovery of sorted materials [NACE – 38.32] ;

- Wholesale of metals and metal ores [NACE – 46.72].

TABLE 3: ACTIVITIES OF THE STEEL-SHAPING COMPANIES SEGMENT INCLUDED IN OR EXCLUDED FROM THE SCOPE

NACE Rev 2 code	Description of the category	Activities included in the NACE category included in the Scope	Activities included in the NACE category excluded from the Scope
07.1	Mining of iron ores		Mining of ores valued chiefly for iron content Beneficiation and agglomeration of iron ores
07.29	Mining of other non-ferrous metal ores		Mining and preparation of ores chiefly valued for non-ferrous metal content: • aluminium (bauxite), copper, lead, zinc, tin, manganese, chrome, nickel, cobalt, molybdenum, tantalum, vanadium etc. • precious metals: gold, silver, platinum
19.10	Manufacture of coke ovens products		Operation of coke ovens Production of coke and semi-coke Production of pitch and pitch coke Production of coke oven gas Production of crude coal and lignite tars Agglomeration of coke
20.13	Roasting of iron pyrites		Manufacture of chemicals using basic processes. The output of these processes are usually separate chemical elements or separate chemically defined compounds.
24.20	Manufacture of tubes, pipes, hollow profiles and related fittings, of steel	Manufacture of seamless tubes and pipes of circular or non-circular cross-section and of blanks of circular cross-section, for further processing, by hot rolling, hot extrusion or by other hot processes of an intermediate product which can be a bar or a billet obtained by hot rolling or continuous casting Manufacture of precision and non-precision seamless tubes and pipes from hot rolled or hot extruded blanks by further processing, by cold-drawing or cold-rolling of tubes and pipes of circular cross section and by cold drawing only for tubes and pipes of non-circular cross section and hollow profiles Manufacture of welded tubes and pipes of an external diameter exceeding 406.4 mm, old formed from hot rolled flat	

		products and longitudinally or spirally welded Manufacture of welded tubes and pipes of an external diameter of 406.4 mm or less of circular cross section by continuous cold or hot forming of hot or cold rolled flat products and longitudinally or spirally welded and of non-circular cross-section by hot or cold forming into shape from hot or cold rolled strip longitudinally welded Manufacture of welded precision tubes and pipes of an external diameter of 406.4 mm or less by hot or cold forming of hot or cold rolled strip and longitudinally welded delivered as welded or further processed, by cold drawing or cold rolling or cold formed into shape for tube and pipe of non-circular cross section Manufacture of flat flanges and flanges with forged collars by processing of hot rolled flat products of steel Manufacture of butt-welding fittings, such as elbows and reductions, by forging of hot rolled seamless tubes of steel Threaded and other tube or pipe fittings of steel	
24.31	Cold drawing of bars	Manufacture of steel bars and solid sections of steel by cold drawing, grinding or turning	
24.32	Cold rolling of narrow strip	Manufacture of coated or uncoated flat rolled steel products in coils or in straight lengths of a width less than 600 mm by cold re-rolling of hot-rolled flat products or of steel rod	
24.33	Cold forming or folding	Manufacture of open sections by progressive cold forming on a roll mill or folding on a press of flat rolled products of steel Manufacture of cold-formed or cold-folded, ribbed sheets and sandwich panels	
24.34	Cold drawing of wire	Manufacture of drawn steel wire, by cold drawing of steel wire rod	
25	Manufacture of fabricated metal products, except machinery and equipment		This division includes the manufacture of “pure” metal products (such as parts, containers and structures), usually with a static, immovable function, as opposed to the following divisions 26-30, which cover the manufacture of combinations or assemblies of such metal products (sometimes with other materials) into more complex units that, unless they are purely electrical,

			electronic or optical, work with moving parts. The manufacture of weapons and ammunition is also included in this division.
28	Manufacture of machinery and equipment		This division includes the manufacture of machinery and equipment that act independently on materials either mechanically or thermally or perform operations on materials (such as handling, spraying, weighing or packing), including their mechanical components that produce and apply force, and any specially manufactured primary parts. This includes the manufacture of fixed and mobile or hand-held devices, regardless of whether they are designed for industrial, building and civil engineering, agricultural or home use. The manufacture of special equipment for passenger or freight transport within demarcated premises also belongs within this division. This division distinguishes between the manufacture of special-purpose machinery, i.e. machinery for exclusive use in a NACE industry or a small cluster of NACE industries, and general-purpose machinery, i.e. machinery that is being used in a wide range of NACE industries. This division also includes the manufacture of other special-purpose machinery, not covered elsewhere in the classification, whether or not used in a manufacturing process, such as fairground amusement equipment, automatic bowling alley equipment, etc.
29	Manufacture of motor vehicles, trailers and semi-trailers		Manufacture of motor vehicles for transporting passengers or freight. The manufacture of various parts and accessories, as well as the manufacture of trailers and semi-trailers, is included here.
30	Manufacture of other transport equipment		This group includes the building of ships, boats and other floating structures for transportation and other commercial purposes, as well as for sports and recreational purposes.
38.32	Recovery of sorted materials		Processing of metal and non-metal waste and scrap and other articles into secondary raw materials, usually

			involving a mechanical or chemical transformation process. Also included is the recovery of materials from waste streams in the form of (1) separating and sorting recoverable materials from non-hazardous waste streams (i.e. garbage) or (2) the separating and sorting of commingled recoverable materials, such as paper, plastics, used beverage cans and metals, into distinct categories. Examples of the mechanical or chemical transformation processes are presented in the NACE Rev 2 document.
46.72	Wholesale of metals and metal ores		Wholesale of ferrous and non-ferrous metal ores Wholesale of ferrous and non-ferrous metals in primary forms Wholesale of ferrous and non-ferrous semi-finished metal products n.e.c.[6] Wholesale of gold and other precious metals

[6] not elsewhere classified

4. Boundaries

Based on the principle of relevance and to facilitate the data collection on the companies' side, the ACT methodology focuses on the main sources of GHG emissions throughout the value chain.

4.1. REPORTING BOUNDARIES

The main source of GHG emissions of steel products depends on the type of alloy produced and the production route (BF-BOF, scrap-EAF, SR-BOF, DRI-EAF). Most emissions from the BF-BOF route occur in the iron-making process and the production of the required input material (blast furnace, coke oven, sinter plant).

The boundaries of the ACT methodology for the iron and steel sector include all direct emissions and energy-related emissions of the main production steps:

- Steel making and casting
- Iron making
- Preparation of iron ore before iron reduction
- Production of the reducing agent (coke, or alternative reducing agent)
- Production of steel alloying elements
- Production of heat and electricity from gases generated during steel production
- Steel product shaping, including hot rolling, flat-rolled products, mechanical treatments and any other process that is performed to prepare steel products before selling them to product manufacturers.

The main processes included in these production steps are presented in Figure 10.

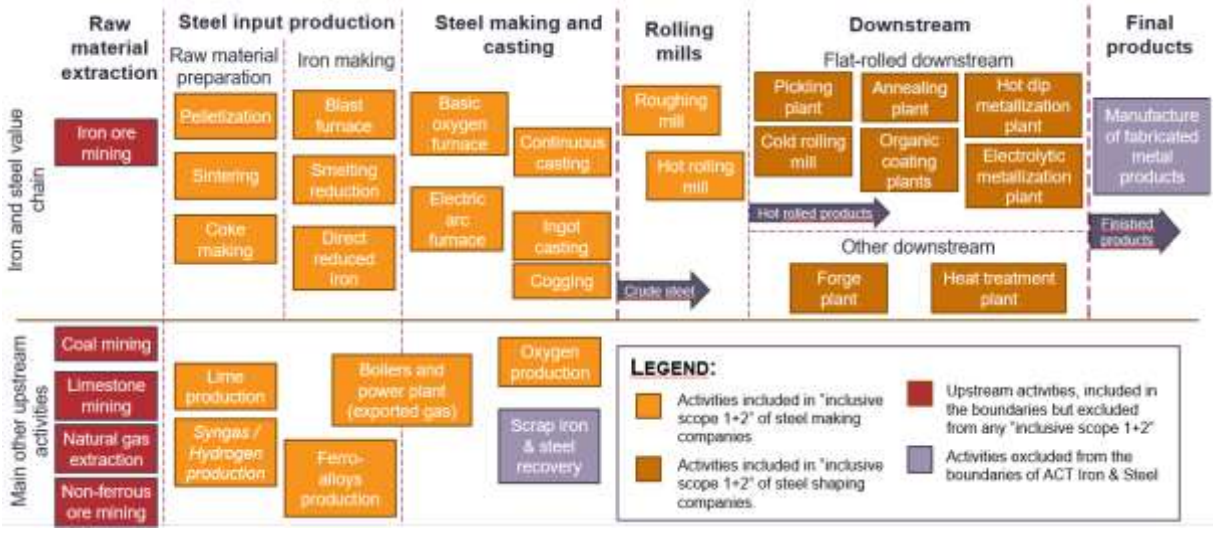


FIGURE 10: BOUNDARIES FOR THE IRON AND STEEL SECTOR

Significant emissions reductions can be achieved in the iron and steel value chain by improving the material efficiency of steel (e.g., using less steel for the same application) and steel circularity (e.g., reusing existing steel products and recycling more end-of-life steel products). How iron and steel companies act on these levers is also included within the boundaries of the ACT methodology.

Not all companies from the iron and steel sector operate all the processes within the value chain: for instance, some steel-making companies can outsource coke production. An ACT assessment is based on a comparison of the emissions at corporate level to a benchmark. It is important that both the benchmark and company emissions are calculated using the same boundaries, whether the company is fully integrated or outsourcing part of its production process. For this reason, the concept of "Inclusive Scope 1+2" emissions for iron and steel companies is introduced. Inclusive Scope 1+2 emissions includes all Scope 1 and Scope 2 of the company's emissions for activities that are part of the ACT Iron & Steel scope, as well as relevant Scope 3 upstream emissions from activities operated by suppliers. "Inclusive Scope 1+2" covers the activities presented in Table 4, whether they are directly operated by the company or outsourced to one or several suppliers, and includes:

- Direct emissions;
- Emissions from purchased or acquired electricity, steam, heat and cooling;
- Emissions from the production of purchased or acquired hydrogen and syngas.

The downstream is not taken into account as data might be much more difficult to obtain, and the downstream CO_2 emissions are much smaller than the upstream ones in the iron and steel value chain.

TABLE 4: EMISSIONS WHICH MUST BE INCLUDED IN THE "INCLUSIVE SCOPE 1+2 EMISSIONS" DEPENDING ON THE TYPE OF COMPANY

Type of company	Emissions which must be included in the "Inclusive Scope 1+2 emissions"
Steel-making companies	Pelletization, sintering, coke making, lime production, ferroalloy production Blast furnace, smelting reduction, direct reduced iron production Basic oxygen furnace, electric arc furnace Continuous casting, ingot casting, cogging Roughing mill, hot rolling mill
Steel-shaping companies	Pickling plant, annealing plant, hot dip metallisation plant Cold rolling mill, organic coating mill, electrolytic metallisation plant Forge plant, heat treatment plant
Integrated companies	All of the above. For example, if the company processes crude steel purchased from another company, it should add the Scope 1+2 CO_2 emissions of its suppliers of the steel-making part in its Inclusive Scope 1+2

For consistency with how the sectoral benchmark has been developed, the following emissions should not be included in the Inclusive Scope 1+2 emissions, even if the company is directly operating in these activities:

- Emissions from raw material extraction (e.g., iron ore, coal or limestone mining) are not covered by the benchmark as they are considered part of the mining sector

Inclusive Scope 1+2 emissions are used for quantitative indicators in Module 1: Targets, and Module 2: Direct operations. Companies' efforts to reduce their Scope 3 upstream emissions which are not included in their Inclusive Scope 1+2 emissions are also assessed by ACT in Module 4: Indirect operations and Module 6: Supplier engagement.

4.2. RATIONALE FOR BOUNDARY SETTING

The most significant emissions for the iron and steel sector occur during the stages of iron reduction and steel making. However, there are currently many different production routes and future technological evolutions in the iron and steel sector will tend to displace carbon emissions from the direct emissions at the iron reduction and steel-making stages, to electricity generation and reducing agent production. It is therefore important to include these emissions within the reporting boundaries even if they do not yet represent a large share of emissions for some companies.

Ferroalloy production can also be a significant source of emissions for high alloy products. As stainless steel producers are within the scope of the activities, these emissions are also included within the boundaries.

However, due to the sheer number of different production routes, it would be difficult to create an exhaustive list of all processes that should be included in the boundaries. It is intended that future versions of the methodology will include more production routes when benchmarks become available.

4.3. FOCUS ON CO_2

In ACT Iron & Steel, companies are expected to report only CO_2 emissions and not to include other GHGs. The rationale for this is:

- The bulk of the GHG emissions of the iron and steel sector come from CO_2;
- It will facilitate data collection from companies;
- It is consistent with other ACT methodologies for sectors in which the bulk of GHG emissions come from CO_2 (e.g., ACT Pulp & Paper).

Note that the SBTi's Sectoral Decarbonization Approach, which informed the low-carbon pathways used in the ACT Iron & Steel Methodology, gives companies the option of including the other GHGs (11).

5. Construction of the data infrastructure

Indicators were built using sectoral research and collaboration with the Technical Working Group. Module weightings in the methodology are proposed in accordance with the ACT Guidelines (10).

5.1. DATA SOURCES

In order to carry out a company-level assessment, many data points need to be gathered using a combination of viable sources. Principally, ACT relies on the voluntary provision of data by the participating companies. External data sources are consulted when they can offer additional value for checking, validation and preparation of the assessment narrative. External data sources can also help to harmonize the data collection process.

The ACT assessment uses the following data sources:

TABLE 5: ACT ASSESSMENT DATA SOURCES

Data source	Main use
Company data request and CSR reports	Primary data source for most indicators
Contextual and financial information database sources (e.g., online and press news, RepRisk, investor reports)	Contextual and financial information on company and events related to the company that could impact the ACT assessment
IPCC WG3 Assessment	Emissions factors and related figures (“Mitigation of climate change” IPCC, Contrib. Work. Group III Fifth Assess. Rep. Intergov. Panel Clim. Change, *2014)* Technology-level data ("Climate Change", IPCC, 2014)
Asset activity database: GlobalData asset database. Available at: https://www.globaldata.com	Additional information used to fill the gaps of company reporting on assets
Environmental declarations on steel based on ISO 14040&44, ISO 14025 and EN 15804 WorldSteel LCI based data	Information about life cycle assessment of product produced by the company (traditional product or low-carbon product)
IEA Roadmap and business models	Give an overview of the strategy of the company and its targets IEA Roadmap (12)

CDP questionnaire (where cited in this document, in the data requirements, the questions refer to the 2020 question numbers. E.g., [C1.2a], [C4.1]).	Data regarding company emissions, targets, management, business model, etc

Where indicators refer to third-party data sources as the default option, reporting companies may provide their own data to replace it if they can provide a justification for doing so, alongside information about its verification status, any assumptions used and the calculation methodology.

5.2. COMPANY DATA REQUEST

The data request will be presented to companies in a comprehensive data collection format.

The CDP questionnaire can be a source of information for data collection. The ACT data collection form will highlight the correspondence between requested data in the ACT Iron & Steel Methodology and the 2020 version of the CDP questionnaire. All data should be collected by the analyst or the company.

Each data point required is given a code of IS (to indicate Iron & Steel) followed by a number (e.g., IS 1).

Regarding the calculation of Scope 2 emissions, ACT prefers the location-based approach to calculating Scope 2 emissions. However, to be consistent with a company's GHG reporting, the market-based approach can be used if the reporting complies with the GHG protocol or ISO standards.

5.3. PERFORMANCE INDICATORS

The performance indicators have been conceived following the main principles described in Chapter 2.

The sections below give an overview of the Key Performance Indicators used in the ACT Iron & Steel Methodology. Section 5.3.2 also explains the calculation of a key ACT Iron & Steel metric, "Accounted processing emissions intensity of crude steel".

5.3.1. CHOICE OF EMISSIONS INTENSITY METRIC

The ACT indicators are based on comparison against a benchmark:

- For quantitative indicators in Modules 1 and 2, a company benchmark, derived from a sectoral benchmark, is used to define a reference pathway for the company in terms of carbon emissions intensity.
- For the iron and steel sector, the IEA provides pathways for crude steel carbon intensity (both direct carbon emissions from the iron and steel sector as well as its electricity consumption).
- To be able to compare the crude steel carbon intensity of a company to its company benchmark, consistency is required between the emissions intensity calculation at company level and the benchmark against which it is compared.
- As there are many different iron and steel products (such as cast iron, rolled tonnes, crude steel, and different alloys), the company should select whether the products they produce are closer to crude steel (produced steel) or steel-shaping products /semis (processed steel). This will determine the type of actor the company is classed as (integrated, steel-making or steel-shaping), and the resulting indicator weightings and low-carbon pathways used in the assessment. As the CO_2 emissions from the steel-shaping processes are included in the IEA data used to build the low-carbon pathways of ACT Iron & Steel, and since IEA does not provide semis activity volume data, the metric used for

integrated companies is kg CO_2 / tonnes of crude steel produced. When reporting CO_2 emissions from semis production and steel shaping, companies should convert this data into the correct crude steel metric.

To define how crude steel carbon intensity can be evaluated, several existing standards have been referred to:

- The EU Emissions Trading System (EU ETS);
- The EN 19694-2:2016 standard (Stationary source emissions - Greenhouse Gas (GHG) emissions in energy-intensive industries - Part 2: iron and steel industry);
- The ISO 14404 family;
- The "CO_2 Emissions Data Collection User Guide" (18) established by the World Steel Association.

Most standards allow the assessment of carbon emissions intensity, including both direct and indirect emissions. While it was agreed that including all indirect emissions would be a better way to assess the carbon intensity of iron and steel facilities, the computation of a benchmark including those indirect emissions is not currently feasible, as some of the data required for this is not available. This includes:

- The amount of each product produced by other sectors and consumed by the iron and steel sector, in order to produce the amount of crude steel considered in the IEA pathway. This level of information is not available in public reports.
- The emissions factor to be associated with each material. Default emissions factors representative of the current context could be used. However, the emissions intensity for producing these upstream products is also expected to decrease. To be able to compute a pathway for steel which includes Scope 3 upstream emissions from purchased goods, we would therefore need to have a Scope 1+2 pathway for the production of each upstream product, which is not possible.

The EN 19694-2 standard (13) permits the calculation of an indicator for assessing the carbon performance of a process, called the "Accounted processing emissions intensity of crude steel". It is then possible to assess the performance of a facility by "rolling up" this assessment (according to the standard-specific vocabulary) at facility and company levels. The result provides an assessment of the company's carbon emissions, including its direct emissions (Scope 1) and energy-related emissions (Scope 2), minus emissions offloaded to steel by-products (exported gas, slags, etc.). It is then possible to compute benchmarks for this intensity metric using IEA pathways as a basis. Therefore, the specific ACT Iron & Steel metric which is presented in section 5.3.2 is based on this EN 19694-2 indicator.

The EN 19694-2 standard offers some flexibility in certain aspects:

- Electricity emissions factor: either a world average emissions factor or a country-specific one can be used. For the ACT intensity metric, the emissions factor for electricity shall be supplier specific. If no data is available on the supplier-specific emissions factor, a country-specific emissions factor can be used.
- Credit for slag production: for the ACT intensity metric, no credit for slag production will be used in the calculation. This choice has been made for consistency with the way the benchmark (presented in chapter 6) is computed.[7]

[7] IEA Iron and Steel Technology Roadmap 2020 (p42): "Slags are not included No adjustments or additions are added to the IEA figures for "Scope 3" emissions, whereas WorldSteel includes further quantities of emissions or emissions credits related to the procurement or delivery of raw materials and coproducts. These adjustments tend to be small."

- Credit for exported gas and electricity: in compliance with the EN 19694-2, a credit for the co-production of gas is awarded.

5.3.2. CALCULATION OF ACCOUNTED PROCESSING EMISSIONS INTENSITY OF CRUDE STEEL

To compute the carbon intensity, the company is to refer to the full EN 19694-2 standard. Please refer to the full standard for a detailed explanation on context, definitions, normative references and other calculation formulae. This standard "provides a stepwise approach for the determination of CO_2 emissions and the assessment of CO_2 performance of steel facilities, providing a set of methodologies allowing for a fair and reliable assessment of the CO_2 performance of each individual process along the steel production value chain. It can be seen as a toolbox which enables the determination of CO_2 emissions and the assessment of CO_2 performance of steel production facilities at various levels of disaggregation" (14)

All the calculations could be undertaken using the specific EUROFER tool available on the EUROFER website[8]. This tool is in line with the EN 19694-2 standard.

The roll up shall include different processes to compute the "inclusive scope 1+2" depending on the type of actor:

- For integrated actors, the roll up shall include all processes involved in steel input material preparation, iron reduction, steel making and casting, and steel product shaping. If some processes for steel input material preparation (e.g., coke making, sintering, pelletising, DRI/HBI production) are outsourced, related emissions shall also be included by collecting data from suppliers.
- For steel-making actors, the roll up shall include all processes involved in steel input material preparation, iron reduction, steel-making and casting. If some processes for steel input material preparation (e.g., coke making, sintering, pelletising, DRI/HBI production) are outsourced, related emissions shall also be included by collecting data from suppliers.
- For steel-shaping actors, the roll up shall include all processes operated by the company.

5.3.3. MATURITY MATRIX

Qualitative Modules in the ACT methodology are scored using a maturity matrix. The matrix contains five levels of evaluation that are associated with scores given to the company for each indicator. With some exceptions (e.g. 3-level maturity matrices used in Module 9: Business Model), all matrices in the methodology make use of the full five-level matrix structure. The scores for these are: 0 for Basic, 0.25 for Standard, 0.5 for Advanced, 0.75 for Next Practice, 1 for Low-Carbon Transition Aligned. e.g., Some of the indicators are divided into sub-dimensions that are evaluated individually before the score is aggregated to obtain the indicator score.

[8] https://www.eurofer.eu/publications/reference-documents/excel-tool-for-european-standard-en-19694-2/

TABLE 6: STRUCTURE OF MATURITY MATRIX WITH ITS FIVE LEVELS AND THEIR ASSOCIATED SCORES

Evaluation level	Basic	Standard	Advanced	Next Practice	Low-carbon Aligned
Score	0	0.25	0.5	0.75	1

5.3.4. PERFORMANCE INDICATORS

Table 7 gives an overview of performance indicators for the iron and steel sector.

Some indicators are the same across the ACT methodologies, such as those presented in Module 5: Governance, Module 6: Supplier Engagement and Module 7: Client Engagement.

TABLE 7 : PERFORMANCE INDICATORS

		IRON AND STEEL SECTOR		
		Past	**Present**	**Future**
	1.TARGETS	IS 1.3 Achievement of previous targets		IS 1.1 Alignment of emissions reduction targets IS 1.2 Time horizon of targets
Core business performance	**2. DIRECT OPERATIONS**	IS 2.1 Trend in past emissions intensity of all crude steel production assets IS 2.2 Trend in past emissions intensity per technical route	IS 2.7 Co-products/waste reduction, reuse and recycling activities	IS 2.3 Locked-in emissions of crude steel production assets IS 2.4 Trend in future emissions intensity of all crude steel production assets IS 2.5 Trend in future emissions intensity per technical route IS 2.6 Scrap reduction strategy
Investment	**3. INTANGIBLE INVESTMENT**		IS 3.1 R&D in climate change mitigation technologies IS 3.2 Company low-carbon patenting activity	
	4 INDIRECT OPERATIONS	IS 4.1 Trend in past emissions intensity of purchased crude steel		IS 4.2 Purchased product interventions
	5. GOVERNANCE		IS 5.1 Oversight of climate change issues IS 5.2 Climate change oversight capabilities IS 5.4 Climate change management incentives	IS 5.3 Low-carbon transition plan IS 5.5 Climate change scenario testing
Influence	**6. SUPPLIER**	IS 6.2 Activities to influence suppliers to reduce their GHG emissions	IS 6.1 Strategy to influence suppliers to reduce their GHG emissions	
	7. CLIENT	IS 7.2 Activities to influence customer behaviour to reduce their GHG emissions	IS 7.1 Strategy to influence customer behaviour to reduce their GHG emissions	
	8. POLICY ENGAGEMENT		IS 8.1 Company policy on engagement with trade associations IS 8.2 Trade associations supported do not have climate-negative activities or positions IS 8.3 Position on significant climate policies	
	9. BUSINESS MODEL	IS 9.1 Business activities that increase the use of low-carbon energy IS 9.2 Business activities around steel circularity (e.g., end-of-life collection, circular economy, material efficiency) and contribute to low-carbon optimization of steel services with an equivalent performance IS 9.3 Business activities related to synergies with other industries (CCU/CCS, H2 or exhaust gas networks, chemical industry, cement industry, etc)		

In order to address the relevant issues for each iron and steel company, the methodology has been segmented in three parts: steel-makers, steel-shapers, and integrated companies that operate in both steel-making and steel-shaping. Some of the quantitative indicators are specific for steel-making and steel-shaping actors. Integrated

companies need to distinguish both activities in their organisation and calculate most indicators as reported in Table 8. The majority of qualitative indicators are the same for each type of company.

TABLE 8 : PERFORMANCE INDICATORS RELATED TO THE COMPANY SEGMENTATION

IS	Modules	Indicators	Integrated	Steel-making	Steel-shaping
1.1	1.Targets	Alignment of emissions reduction targets	X	X	X
1.2		Time horizon of targets for crude steel production	X	X	X
1.3		Achievement of previous targets	X	X	X
2.1	2.Direct operations (Inclusive Scope 1+2)	Trend in past emissions intensity of all crude steel production assets	X	X	X
2.2		Trend in past emissions intensity per technical route, per type	X	X	
2.3		Locked-in emissions of all crude steel production assets	X	X	
2.4		Trend in future emissions intensity of all crude steel production assets	X	X	X
2.5		Trend in future emissions intensity per technical route, per type	X	X	
2.6		Scrap reduction strategy	X		X
2.7		Co-products/waste reduction and reuse activities	X	X	
3.1	3.Intangible Investment	R&D in climate change mitigation technologies	X	X	X
3.2		Company low-carbon patenting activity	X	X	X
4.1	4. Indirect operations (Scope 1+2+3 upstream)	Trend in past emissions intensity of purchased crude steel production assets	X		X
4.2		Purchased product interventions	X	X	X
5.1	5.Governance	Oversight of climate change issues	X	X	X
5.2		Climate change oversight capability	X	X	X
5.3		Low-carbon transition plan	X	X	X
5.4		Climate change management incentives	X	X	X
5.5		Climate change scenario testing	X	X	X
6.1	6.Supplier engagement	Strategy to influence suppliers to reduce their GHG emissions	X	X	X
6.2		Activities to influence suppliers to reduce their GHG emissions	X	X	X

7.1	7. Client engagement	Strategy to influence customer behaviour to reduce their GHG emissions	X	X	X
7.2		Activities to influence customer behaviour to reduce their GHG emissions	X	X	X
8.1	8.Policy Engagement	Company policy on engagement with trade associations	X	X	X
8.2		Trade associations supported do not have climate-negative activities or positions	X	X	X
8.3		Position on significant climate policies	X	X	X
9.1	9.Business model	Business activities that increase the use of low-carbon energy	X	X	X
9.2		Business activities around steel circularity (e.g.: end of life collection, circular economy, material efficiency) and contribute to low-carbon optimization of steel services with an equivalent performance	X	X	X
9.3		Business activities related to synergies with other industries (CCU/CCS, H2 or exhaust gas networks, chemical industry, cement industry etc.)	X	X	

MODULE 1: TARGETS (WEIGHTING: 15%)

IS 1.1 ALIGNMENT OF EMISSIONS REDUCTION TARGETS

DESCRIPTION & REQUIREMENTS	IS 1.1 ALIGNMENT OF EMISSIONS REDUCTION TARGETS
SHORT DESCRIPTION OF INDICATOR	A measure of the alignment of the company's emissions reduction target with its decarbonization pathway. The indicator will identify the gap between the company's targets and the decarbonization pathway as a percentage, which is expressed as the company's commitment gap.
DATA REQUIREMENTS	The questions covering the information relevant to this indicator are: ♦ IS 1.A: Company's target and target year Variation of [C4.1a], [C4.1b] External sources of data used for the analysis of this indicator are: ♦ IEA ETP (15) – background scenario data ♦ SDA (11) – specific benchmark pathway definition The benchmark indicators involved are:

SEGMENT	TARGET TYPE	PARAMETER	INTENSITY METRIC	BENCHMARK
Integrated	Inclusive Scope 1+2 intensity	CB_{S12}	Kg CO_2 / tonne crude steel produced	IEA ETP– background scenario data

Steel-making	Inclusive Scope 1+2 intensity	CB_{S12}	Kg CO_2 / tonne crude steel produced	Adapted from IEA ETP–background scenario data
Steel-shaping	Scope 1+2 intensity	CB_{S12}	Kg CO_2 / tonne crude steel processed	Adapted from IEA ETP–background scenario data

HOW THE ANALYSIS WILL BE DONE

The analysis has two dimensions.

- Dimension 1 assesses the alignment of the company's near-term targets. Any target where the target year ≤ reporting year + 10 can be included in this dimension.
- Dimension 2 assesses the alignment of a company's long-term targets. Any target for which the target year > reporting year + 10 can be included in this dimension.
- The scoring rationale and calculation are the same for both dimensions.

The analysis is based on the difference between the company's Scope 1+2 target (T_{S12}) and the company's Scope 1+2 benchmark (CB_{S12}) at the target year.

The company target (T_{S12}) is the decarbonization over time, defined by the company's emissions reduction target. To compute T, a straight line is drawn between the starting point of the analysis (i.e. base year) and the company's target endpoint.

The company benchmark (CB_{S12}) pathway is the 'company specific decarbonization pathway'. See section 6.1 for details on the computation of this pathway.

The indicator compares T_{S12} to CB_{S12}, by assessing the difference between these pathways. The pathways are expressed in kilograms of CO_2 per unit of activity (intensity measure). The unit of activity for the iron and steel sector is tonne of crude steel produced or processed. Where necessary, targets shall be normalized to this activity unit. The result of the comparison is the commitment gap.

To assign a score to this indicator, the size of the commitment gap shall be compared to the maximum commitment gap, which is defined by the business-as-usual pathway (BAU_{S12}). BAU_{S12} is defined as an unchanging (horizontal) intensity pathway, whereby the emissions intensity is not reduced at all from the base year.

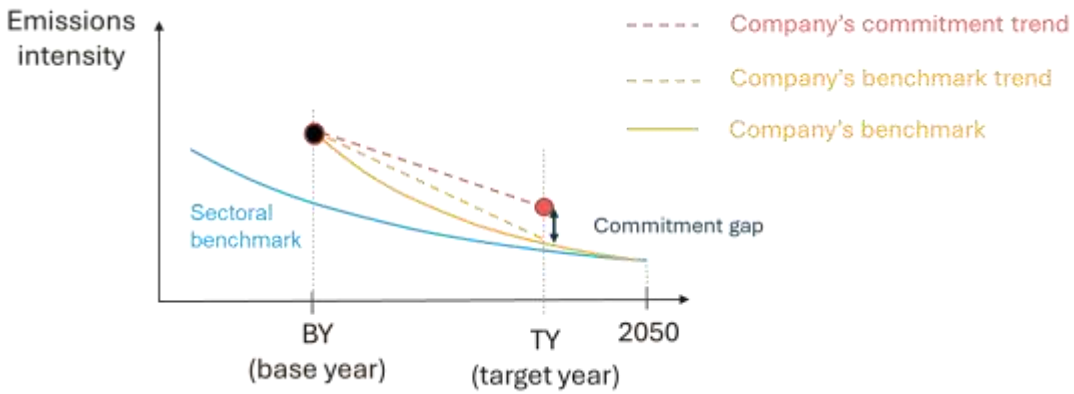


FIGURE 11: TREND RATIO AND COMMITMENT GAP

CALCULATION OF SCORE:

The score is a percentage of the maximum commitment gap. The commitment gap is calculated by dividing the company's commitment gap by the maximum commitment gap:

$$Commitment\ gap = \frac{T_{S12} - CB_{S12}}{BAU_{S12} - CB_{S12}}$$

$$Score = 1 - Commitment\ gap$$

The score assigned to the indicator is equal to 1 minus the commitment gap and is expressed as a percentage (1 = 100%). Therefore, if T_{S12}- CB_{S12} is equal to zero, the company's target is aligned with the sectoral benchmark and the maximum score is achieved.

In most cases, only one target is presented. The analyst shall focus on targets that cover the scope (Inclusive Scope 1+2 or Scope 1+2 for steel-shaping companies) defined in the methodology. Target at group or corporate level is preferred than at country or facility level. When several targets are assessed, the closest one to the reporting year is preferred.

If the target coverage of total company emissions at base year represents less than 95%, the final score is equal to Target intermediate score (Ts) x Target coverage of total company emissions. Otherwise score of the indicator is equal to target intermediate score (Ts).

AGGREGATE SCORE: DIMENSION 1: 50%, DIMENSION 2: 50%

RATIONALE	IS 1.1 ALIGNMENT OF EMISSIONS REDUCTION TARGETS
RATIONALE OF THE INDICATOR	**RELEVANCE OF THE INDICATOR:** Targets are included in the ACT Iron & Steel assessment for the following reasons: • Targets are an indicator of corporate commitment to reduce emissions and are a meaningful metric of the company's internal planning towards the transition. • As most emissions of the sector are within the sector boundaries of control, targets are a very powerful management tool to reduce emissions. Most emissions from the iron and steel sector can be captured in targets using existing target-setting frameworks. • Targets are one of the few metrics that can predict a company's long-term plans beyond that which can be projected in the short-term, satisfying ACT's need for indicators that can provide information on future commitment of a company. **SCORING RATIONALE:** Targets are quantitatively interpreted and directly compared to the low-carbon benchmark for the sector, depending on the segment position of the company. This is done because most of the emissions from the sector are from direct and indirect emissions, which makes the crude steel production (produced or processed) emissions benchmark the most relevant for the company. The gap is determined by comparing the target directly to the benchmark pathway, as well as the business-as-usual pathway. The gap method was chosen for its relative simplicity in interpretation and powerful message, which aligns with the United Nations Environment Program's (UNEP) narrative of the global commitment gap of the United Nations Framework Convention on Climate Change (UNFCCC) Climate Agreements [6]. The percentage score also needs no further computation to become meaningful on its own, as well as being useable for aggregation in the performance score.

IS 1.2 TIME HORIZON OF TARGETS

DESCRIPTION & REQUIREMENTS	IS 1.2 TIME HORIZON OF TARGETS
SHORT DESCRIPTION OF INDICATOR	A measure of the time horizons of company targets. The ideal set of targets is forward looking enough to a long-time horizon compatible with sector plant lifetimes (lifetime of infrastructural assets such as furnaces and process machines), but also includes short-term targets that incentivise action in the present.
DATA REQUIREMENTS	The questions comprising the information request that are relevant to this indicator are: ♦ IS 1.B The benchmark indicator involved is the following:

	Parameter	Intensity metric	Benchmark
Average plant lifetime	LT	Years	30 years as a proxy

External sources of data used for the definition of the benchmark are:

- "The EII (Energy Intensive Industries) are highly capital-intensive with an average investment cycle of 20 to 30 years hence they need predictability of energy costs so as to limit investment risks. " (16)
- "Evolution of any new technology is a long drawn process. It may take about 5~20 years and beyond to achieve maturity of a concept/idea." & "Renovate/ modify obsolete facilities/machinery put up in the last 20 years" (17)
- Lifetime of 35 years for iron and steel assets (18)
- 25 years before refurbishment for steel asset (19)
- 30 years is the trade-off the ACT initiative chose for this industry's benchmark

HOW THE ANALYSIS WILL	The analysis has two dimensions:

BE DONE

- A comparison of: (a) the longest time horizon of the company's targets, and (b) the quantiles and median of the company's capacity weighted asset lifetimes.
- The company has interval targets that ensure both short and long-term targets are in place to incentivise short-term action and communicate long-term commitments.

Yearly CO_2 emissions are defined as:

$$\text{Total capacity of the plant x CO2 emissions intensity for the plant at reporting year}$$

DIMENSION 1 - TARGET ENDPOINT:

The company's target endpoint (T_e) is compared to LT, a relevant time horizon for the sector - 30 years is proposed for the iron and steel sector (see the table above for further details) - as it may be used as a proxy for iron and steel plants average lifetime.

The company's target endpoint (T_e) is equal to the longest time horizon among the company's targets, minus the reporting year:

$$T_e = Longest\ target\ time\ horizon - reporting\ year$$

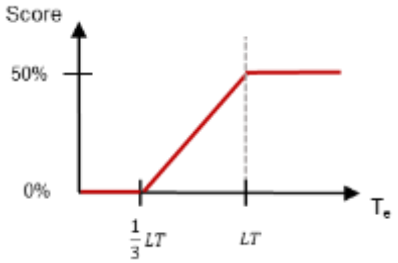
The analysis compares Te to LT. This analysis measures the horizon gap:

$$Horizon\ gap = LT - T_e$$

The company's target endpoint is scored according to the following scoring table:

HORIZON GAP	SCORE
$T_e > LT$	50%

$33\% * LT < T_e < LT$	$75\% \times \frac{T_e}{LT} - 25\%$



DIMENSION 2 – INTERMEDIATE HORIZONS:

For each sector segment, all company targets and their endpoints are calculated and plotted. To get a full score, the company must not have time gaps larger than 5 years between target horizons, starting from the reporting year as baseline.

The company's targets are compared according to the following scoring table:

INTERMEDIATE TARGET GAP	SCORE
No gaps of more than 5 years during T_e	50%
No gaps of more than 5 years during 80% of T_e	40%
No gaps of more than 5 years during 60% of T_e	30%
No gaps of more than 5 years during 40% of T_e	20%
No gaps of more than 5 years during 20% of T_e	10%
There are gaps of more than 5 years before 20% of T_e	0%

An example is illustrated in Figure 12 below.

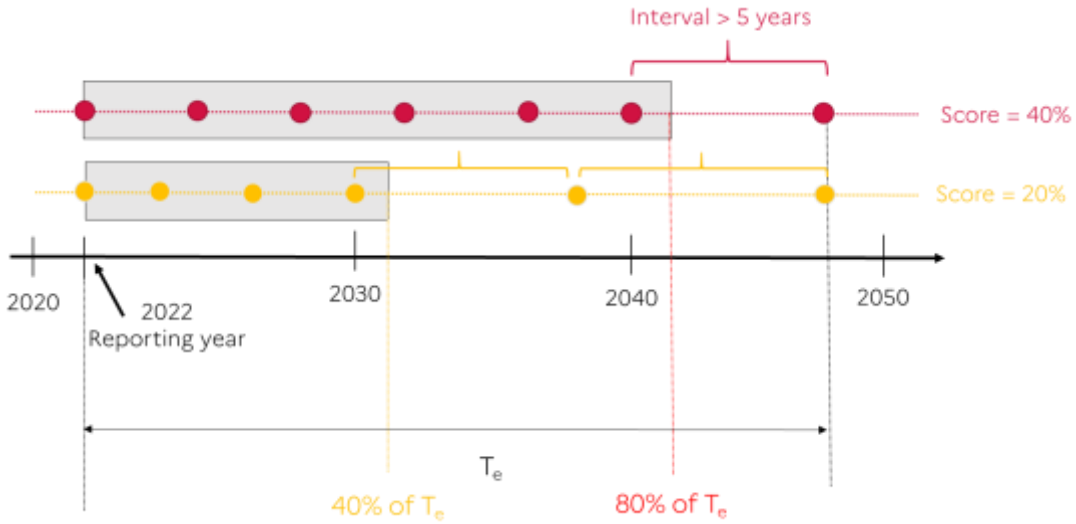


FIGURE 12 : EXAMPLES OF HORIZONS OF INTERMEDIATE TARGETS SET BY THE COMPANY AND CORRESPONDING SCORES ON DIMENSION 2 OF THE INDICATOR 1.2

FOR ALL CALCULATIONS:

- Targets that cover over 95% of Scope 1+2 emissions for downstream processing and Inclusive Scope 1+2 for crude streel production are preferred in the calculations. If these types of targets are not available, the score is adjusted downwards in proportion with the % coverage. Figure 13 graphically illustrates emissions covered by the targets:

FIGURE 13 : ILLUSTRATION OF EMISSIONS COVERED BY TARGETS THAT ARE CONSIDERED FOR CALCULATION

Note: In most cases, only one target is presented. The analyst shall focus on targets that cover the scope (Inclusive Scope 1+2 or Scope 1+2 for steel-shaping companies) defined in the methodology. Target at group or corporate level is preferred than at country or facility level. When several targets are assessed, the closest one to the reporting year is preferred.

AGGREGATE SCORE - DIMENSION 1: 50%, DIMENSION 2: 50%.

RATIONALE	IS 1.2 TIME HORIZON OF TARGETS
RATIONALE OF THE INDICATOR	**RELEVANCE OF THE INDICATOR:** The time horizon of targets is included in the ACT assessment for the following reasons: ♦ The target endpoint is an indicator of how forward looking the company's transition strategy is. ♦ The long-expected time horizon of production assets means that producers 'commit' a large amount of GHG emissions into the future, which requires targets that have time horizons that are aligned with this reality. ♦ Aside from communicating long-term commitments, short-term action needs to be incentivised. Therefore short-time intervals between targets are needed. A 5-year interval is seen as a suitable interval to ensure company is taking enough action, holding itself accountable by measuring progress every 5 years.

SCORING RATIONALE

The score of this indicator is tied to how the target timeline compares to the lifetimes of the company's asset portfolio. The company has a 'horizon gap' if its targets do not include a significant part of its asset portfolio. It is however recognized that some assets may have lifetimes that exceed meaningful target endpoints.

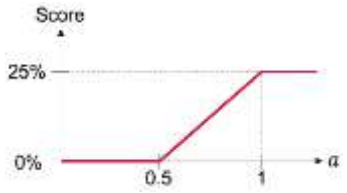
IS 1.3 ACHIEVEMENT OF PREVIOUS TARGETS

DESCRIPTION & REQUIREMENTS	IS 1.3 ACHIEVEMENT OF PREVIOUS TARGETS
SHORT DESCRIPTION OF INDICATOR	A measure of the company's historical target achievements and current progress towards active emissions reduction targets. The ambition of the target is qualitatively assessed and is not included in the performance indicators.
DATA REQUIREMENTS	The questions comprising the information request that are relevant to this indicator are: ♦ IS 1.C ♦ For each target: ○ Base year ○ Target year ○ Percentage of reduction target from base year in absolute emissions ○ Percentage of reduction target achieved in absolute emissions.
HOW THE ANALYSIS WILL BE DONE	For the performance score, this will be assessed on two dimensions. **DIMENSION 1: ACHIEVEMENT OF PAST TARGETS** The company has achieved all previous emissions reduction targets with a target year in the past 10 years. If all past targets are indeed achieved, the highest score is obtained. If not, the achievement ratio a is computed as follows: $$a = \frac{E(t_{ref}) - E(t_{horizon})}{E(t_{ref}) - T(t_{horizon})} \geq 0.5$$

where $E(t_{ref})$ is the level of emissions of the company on the year the target was set, $T(t_{horizon})$ is the target the company set (a given level of emission at a given horizon year, now past), and $E(t_{horizon})$ is the effective level of emission reached by the company on the year of horizon of the target.

A threshold is set for scoring at 0.5: if the company has achieved less than 50% of its own past target, it shall receive a zero score.

If the company has several past targets over the last 10 years, the ratio a shall be computed for each target, and the average of all a ratio shall be kept for scoring.

Achievement ratio	Score	
$a \geq 1$	25%	
0.5 < a< 1	25%*(2*a-1)	
$a \leq 0.5$	0%	

DIMENSION 2: EXISTING TARGET ACHIEVEMENT

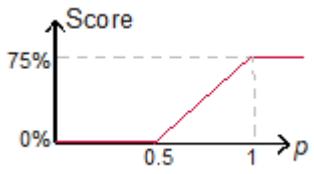
The company is currently on track to meet an existing emissions reduction target, whereby the ratio between the remaining time period and the level missing to target achievement (Progress Ratio p) is not lower than 0.5:

$$p = \frac{1 - \%time}{1 - \%complete} \geq 0.5$$

The highest score (100%) is attained if p is 1 or higher, and the lowest score (0%) is attained if p is 0.5 or lower. A score proportional to the achievement is assigned for any value between 0.5 and 1.

Note that the target year should be different (therefore later) than the reporting year.

Progress ratio	Score	
$p \geq 1$	75%	

$0.5 < p < 1$	$75\% * (2 * p-1)$	
$p \leq 0.5$	0%	

AGGREGATE SCORE - DIMENSION 1:25%, DIMENSION 2:75%.

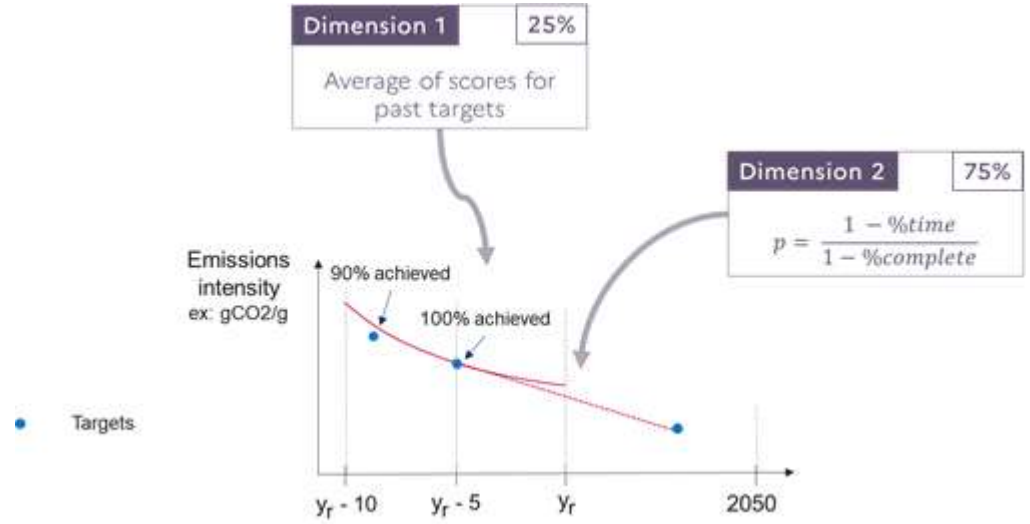


FIGURE 14: CALCULATION OF THE ACHIEVEMENT OF PREVIOUS TARGET INDICATOR

FOR ALL CALCULATIONS:

- Companies who do not have targets with target years in the past but only with target years in the future are not assessed on Dimension 1. Their score for this indicator is based on Dimension 2.

- Targets that cover >95% of Scope 1+2 emissions for steel-makers and Inclusive Scope 1+2 for steel-shapers are preferred in the calculation of Dimension 2, but will not be penalized, as other indicators already penalize companies for not having a large coverage in the target.
- If the company has several active targets in different scopes that can be assessed according to the above criteria, then the score will be an average score based on the progress ratios of all targets assessed.

The performance score does not assess the ambition level and scope of previous targets, which is reflected in the low weight for Dimension 1 (25% of Performance score). This information is assessed in the company's narrative assessment, which will look at the following dimensions:

- Achievement level: To what degree has the company achieved its previously set emissions reduction targets?
- Progress level: To what degree is the company on track to meet its current emissions reduction targets?
- Ambition level: What level of ambition do the previously achieved emissions reduction targets represent?

RATIONALE	IS 1.3 ACHIEVEMENT OF PREVIOUS TARGETS
RATIONALE OF THE INDICATOR	**RELEVANCE OF THE INDICATOR:** ♦ The ACT assessment only looks to the past to the extent that it can inform on the future. This indicator is future-relevant by providing information on the company's organizational ability to set and meet emissions reduction targets. Dimension 1 of this indicator adds credibility to any company claiming to commit to a science-based reduction pathway. ♦ Indicators 1.1 to 1.3 look at targets in an undefined, theoretical future. Dimension 2 of Indicator 1.3 adds value and grounds the assessment to the analysis of a comparison of the company's historical performance with its targets in the reporting year. **SCORING RATIONALE:** Quantitative interpretation of previous target achievement is not straightforward. The performance score thus makes no judgement of previous target ambition and leaves that to later narrative scoring. ♦ Dimension 1 of the performance score will penalize companies who have not met previous targets in the past 10 years, as this means the company has lower credibility when setting ambitious science-based targets. ♦ Dimension 2 uses a simple ratio sourced from existing CDP data points (C 3.1e) in order to compare targets. The threshold 0.5 was chosen as it allows companies some flexibility with respect to the implementation of the target, but it does have the ability to flag companies that are not on track towards achievement. When p is lower than 0.5, the company needs to achieve more than twice the reduction per unit of time than the target originally envisioned.

MODULE 2: DIRECT OPERATIONS (WEIGHTING: 10 – 32%)

If some assets represent less than 5% of the total production, a cut off rule would be applied to simplify the calculation and limit the time for data collection.

IS 2.1 TREND IN PAST EMISSIONS INTENSITY OF ALL CRUDE STEEL PRODUCTION ASSETS

DESCRIPTION & REQUIREMENT	IS 2.1 TREND IN PAST EMISSIONS INTENSITY OF ALL CRUDE STEEL PRODUCTION ASSETS
SHORT DESCRIPTION OF INDICATOR	A measure of the alignment of the company's recent crude steel production assets emissions intensity trend with that of its decarbonization pathway. The indicator will compare the gradient of this trend over a 5-year period to the reporting year (reporting year minus 5 years) with the decarbonization pathway trend over a 5-year period after the reporting year.
DATA REQUIREMENTS	The questions comprising the information request that are relevant to this indicator are: ♦ IS 2.A / IS 2.B / IS 2.C: For all existing and planned assets: Asset name, Geographic Location (country level), Plant type, Technology/Routes, Status, Total capacity (metric tonne), Production (metric tonne of crude steel produced per plant or metric tonne of crude steel shaped per plant), Emissions factor (kg CO_2 / tonne crude steel), Year of commissioning, Expected lifetime (years), Decommissioning or modernization year, if planned, Ownership stake (%), Attributable to reporting boundary (%) ♦ For this indicator, we ask directly the carbon intensity (all routes) for Y-5 and Y, and the production for Y. The production for Y+5 is computed using asset data External sources of data used for the analysis of this indicator are: ♦ IEA ETP (15) – background scenario data for integrated companies and steel-making companies ♦ SDA and ACA (11) – specific benchmark pathway definition ♦ IPCC (2006) (20) – Fuel emissions factors ♦ Environmental Product Declaration according to ISO 21930:2017 or EN15804+A1:2014 (or EN15804+A2:2019) ♦ EN 19694-2 standard. The benchmark indicators involved are:

SEGMENT	TARGET TYPE	PARAMETER	INTENSITY METRIC	BENCHMARK
Integrated	Inclusive Scope 1+2 intensity	CB_{S12}	Kg CO_2 / tonne crude steel produced	IEA ETP– background scenario data
Steel-making	Inclusive Scope 1+2 intensity	CB_{S12}	Kg CO_2 / tonne crude steel produced	IEA ETP– background scenario data
Steel-shaping	Scope 1+2 intensity	CB_{S12}	Kg CO_2 / tonne crude steel processed	No benchmark, Absolute Contraction Approach

HOW THE ANALYSIS WILL BE DONE

Integrated and steel-making companies

The analysis is based on the comparison between the company's recent (reporting year minus 5 years) emissions intensity trend gradient (CR'_{S12}) and the company's decarbonization pathway trend gradient (CB'_{S12}) in the short-term (reporting year plus 5 years). The emissions intensity of the company at the reporting year (CEI_Y) and the sectoral benchmark value of emissions intensity in 2050 (SB_{2050}) are also considered to calculate the company's score.

CR'_{S12} is the gradient of the linear trend-line of the company's recent Inclusive Scope 1+2 emissions intensity (kg CO_2 / tonne crude steel) over time (CR_{S12}).

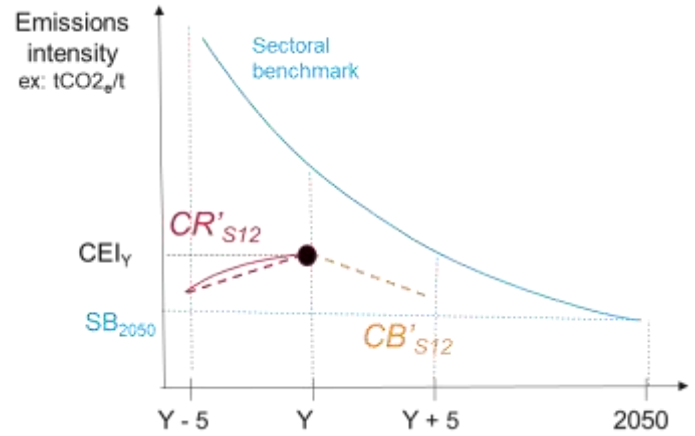
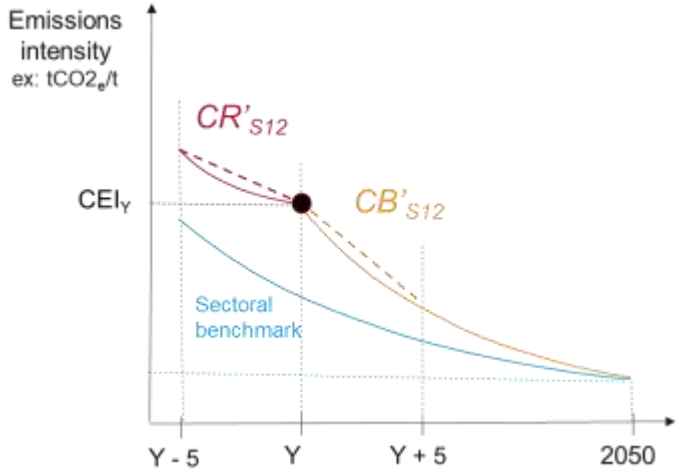
CB'_{S12} is the gradient of the linear trendline of the company benchmark pathway for emissions intensity (kg CO_2 / tonne crude steel) (CB_{S12}). See Section 6 (Assessment) for details on the quantitative benchmarks used for the indicators, and the computation of the 'company specific decarbonization pathway'.

The difference between CR'_{S12} and CB'_{S12} will be measured by their ratio (r_{S12}). This is the Inclusive Scope 1+2 emissions Transition Ratio' which is calculated by the following equation, with the symbol ' used to denote gradients:

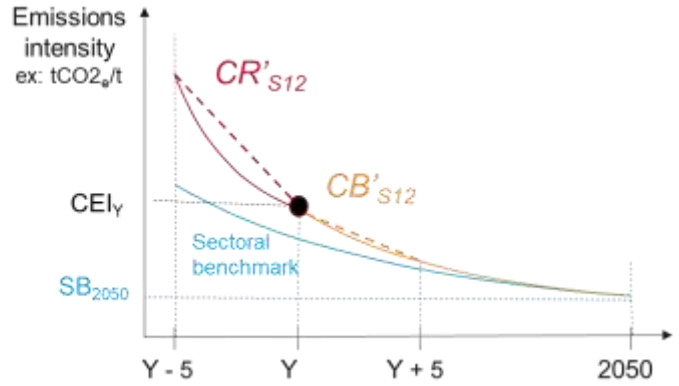
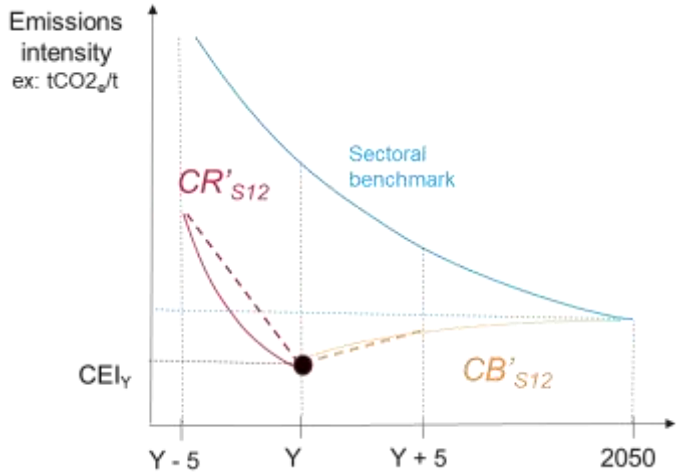
$$r_{S12} = \frac{CR'_{S12}}{CB'_{S12}}$$

Four different cases are to be taken into consideration to compute the score, illustrated in Figure 15.

FIGURE 15: ILLUSTRATION OF DIFFERENT CASES

Case #1	Case #2
	
$CR'_{S12} > 0$ Whatever the r_{S12} value Whatever the CEI_Y value	$CR'_{S12} < 0$ $0 < r_{S12} < 1$ $CEI_Y > SB_{2050}$
Score = 0	**Score = r_{S12} (%)**

Case #3	Case #4

	
$CR'_{S12} < 0$ $r_{S12} \geq 1$ $CEI_Y > SB_{2050}$	$CR'_{S12} < 0$ $CEI_Y < SB_{2050}$ whatever the r_{S12} value
Score = 100 %	**Score = 100 %**

Steel-shaping companies

As no sectoral benchmark is available, the company's benchmark is computed using the Absolute Contraction Approach (11), see 6.1.4.

The analysis is based on the comparison between the company's recent (reporting year minus 5 years) emissions intensity trend gradient (CR'_{S12}) and the company's decarbonization pathway trend gradient (CB'_{S12}) in the short-term (reporting year plus 5 years).

CR'_{S12} is the gradient of the linear trend-line of the company's recent Scope 1+2 emissions intensity (kg CO_2 / tonne crude steel) over time (CR_{S12}).

CB'_{S12} is the gradient of the linear trendline of the company benchmark pathway for emissions intensity (kg CO_2 / tonne crude steel) (CB_{S12}).

The difference between CR'_{S12} and CB'_{S12} will be measured by their ratio (r_{S12}). This is the Scope 1+2 emissions Transition Ratio' which is calculated by the following equation, with the symbol ' used to denote gradients:

$$r_{S12} = \frac{CR'_{S12}}{CB'_{S12}}$$

The score equals to r_{S12}.

RATIONALE	IS 2.1 TREND IN PAST EMISSIONS INTENSITY OF ALL CRUDE STEEL PRODUCTION ASSETS

RATIONALE OF THE INDICATOR

RELEVANCE OF THE INDICATOR:

This indicator is meant to ensure that companies have been investing enough in transitioning to be in line with the company benchmark.

Trend in past emissions intensity is included in the ACT Iron & Steel assessment for the following reasons:

- The trend shows the speed at which the company has been reducing its emissions intensity over the recent past. Comparing this to the decarbonization pathway gives an indication of the scale of the change that needs to be made within the company to bring it onto a low-carbon pathway.
- While ACT aims to be as future-oriented as possible, it nevertheless does not want to solely rely on projections of the future, in a way that would make the analysis too vulnerable to the uncertainty of those projections. Therefore, this measure, along with projected emissions intensity and absolute emissions, forms part of a holistic view of company emissions performance in the past, present, and future.

SCORING RATIONALE:

While 'gap' type scoring is preferred where possible for any indicator, this indicator only looks at past emissions and would therefore require a different baseline to generate a gap analysis. Thus, instead of a gap analysis, a trend analysis is conducted to compare current data of the company to past data and any resulting improvements. An advantage of the trend analysis is that it does not require the use of a business-as-usual pathway to anchor the data points and aid interpretation; trends can be compared directly and a score can be directly correlated to the resulting ratio.

IS 2.2 TREND IN PAST EMISSIONS INTENSITY PER TECHNICAL ROUTE

DESCRIPTION & REQUIREMENT	IS 2.2 TREND IN PAST EMISSIONS INTENSITY PER TECHNICAL ROUTE

SHORT DESCRIPTION OF INDICATOR

A measure of the alignment of the company's recent emissions crude steel emissions intensity trend with that of its decarbonization pathway, specific to each type of production route. This indicator is split into 2 sub-indicators, one per type of asset. Each sub-indicator will compare the gradient of this trend over a 5-year period to the reporting year (reporting year minus 5 years) with the decarbonization pathway trend over a 5-year period after the reporting year. An aggregated score is computed as the average of sub-indicator scores, weighted by the share of the asset type in the company's total Inclusive Scope 1+2 emissions.

DATA REQUIREMENTS

The questions comprising the information request that are relevant to this indicator are:

- IS 2.A / IS 2.B / IS 2.C: For all existing and planned assets: Asset name, Geographic Location (country level), Plant type, Technology/Routes, Status, Total capacity (metric tonne), Production (metric tonne of crude steel produced per plant or metric tonne of crude steel shaped per plant), Emissions factor (kg CO_2/tonne crude steel), Year of commissioning, Expected lifetime (years), Decommissioning or modernization year, if planned, Ownership stake (%), Attributable to reporting boundary (%)
- For this indicator, we ask directly the carbon intensity (per technical route) for Y-5 and Y, and the production for Y. The production for Y+5 is computed as explained above

External sources of data used for the analysis of this indicator are:

- IEA ETP (15)– background scenario data
- SDA (11) – specific benchmark pathway definition
- IPCC (2006) (20) – Fuel emissions factors
- Environmental Product Declaration according to ISO 21930:2017 or EN15804+A1:2014 (or EN15804+A2:2019)

The benchmark indicators involved are:

TARGET TYPE	PARAMETER	INTENSITY METRIC	BENCHMARK
Ore based crude steel production emissions (Inclusive Scope 1+2)	CB_{S12}^{BF-OB}	Kg CO_2 / tonne ore based crude steel produced	Adapted from IEA ETP– background scenario data

	Scrap-EAF crude steel production emissions (Inclusive Scope 1+2)	$CB_{S12}^{scrap-EAF}$	Kg CO_2 / tonne scrap-EAF crude steel produced	Adapted from IEA ETP– background scenario data

HOW THE ANALYSIS WILL BE DONE

This indicator is split into 2 sub-indicators, one for each type of asset:

- Ore based crude steel production asset
- Scrap-EAF crude steel production asset

For each sub-indicator, the computation is the same as described in IS 2.1.

An aggregated score is computed as the average of sub-indicator scores, weighted by the share of the asset type in the company's total Inclusive Scope 1+2 emissions:

$$R_{S12} = \frac{\sum_i R_{S12}^i . E_i}{\sum_i E_i}$$

Where:

- R_{S12}^i is the score on the sub-indicator i
- E_i is the total Inclusive Scope 1+2 emissions of all assets of type i

RATIONALE

IS 2.2 TREND IN PAST EMISSIONS INTENSITY PER TECHNICAL ROUTE

RATIONALE OF THE INDICATOR

RELEVANCE OF THE INDICATOR:

This indicator helps companies to work on a finer improvement on each activity than the global indicator (IS 2.1).

Trend in past emissions intensity is included in the ACT Iron & Steel assessment for the following reasons:

- The trend shows the speed at which the company has been reducing its emissions intensity over the recent past. Comparing this to the decarbonization pathway gives an indication of the scale of the change that needs to be made within the company to bring it onto a low-carbon pathway.
- While ACT aims to be as future-oriented as possible, it nevertheless does not want to solely rely on projections of the future, in a way that would make the analysis too vulnerable to the uncertainty of those projections. Therefore, this measure, along with projected

emissions intensity and absolute emissions, forms part of a holistic view of company emissions performance in the past, present, and future.

SCORING RATIONALE:

While 'gap' type scoring is preferred where possible for any indicator, this indicator only looks at past emissions and would therefore require a different baseline to generate a gap analysis. Thus, instead of a gap analysis, a trend analysis is conducted to compare current data of the company to past data and any resulting improvements. An advantage of the trend analysis is that it does not require the use of a business-as-usual pathway to anchor the data points and aid interpretation; trends can be compared directly and a score can be directly correlated to the resulting ratio.

IS 2.3 LOCKED-IN EMISSIONS OF CRUDE STEEL PRODUCTION ASSETS

DESCRIPTION & REQUIREMENT	IS 2.3 LOCKED-IN EMISSIONS OF CRUDE STEEL PRODUCTION ASSETS
SHORT DESCRIPTION OF INDICATOR	A measure of the company's cumulative GHG emissions from the reporting year to reporting year + 15 years from installed and planned plants. The indicator will compare this to the absolute emissions budget entailed by the company's intensity decarbonization pathway and projected activity.
DATA REQUIREMENTS	The questions comprising the information request that are relevant to this indicator are: ♦ IS 2.A / IS 2.B / IS 2.C: For all existing and planned assets: Asset name, Geographic Location (country level), Plant type, Technology/Routes, Status, Total capacity (metric tonne), Production (metric tonne of crude steel produced per plant or metric tonne of crude steel shaped per plant), Emissions factor (kg CO_2/tonne crude steel), Year of commissioning, Expected lifetime (years), Decommissioning or modernization year, if planned, Ownership stake (%), Attributable to reporting boundary (%) ♦ Projected activity for Y+5 and Y+15 External sources of data used for the analysis of this indicator are: ♦ IEA ETP (15) – background scenario data ♦ SDA (11) – specific benchmark pathway definition

- IPCC (2006) (20) – Fuel emissions factors

The benchmark indicators involved are:

TARGET TYPE	PARAMETER	INTENSITY METRIC	BENCHMARK
crude steel production emissions, (Inclusive Scope 1+2)	CB_G	Kg CO_2 / tonne crude steel produced	• IEA ETP – background scenario data • SDA – specific benchmark pathway definition

HOW THE ANALYSIS WILL BE DONE

The analysis is based on the ratio between the company's installed and planned emissions for the 15 years after the reporting year [$L_G(t)$], and the emissions budget entailed by the company's carbon budget [$B_G(t)$] over the same period of time.

$L_G(t)$ is calculated as the total cumulative emissions implied by the lifetimes of currently active assets and assets for which future commission is planned and confirmed. If unknown, the commissioning year of projects is estimated from the project status (e.g., bidding process, construction, etc.) and data on typical project periods by plant type. An average historical capacity factor over a 5-year period to the reporting year is applied to plant capacities to estimate future production.

$L_G(t)$ is calculated as the company's locked-in carbon commitments, up until the chosen time period t, which is derived by taking the area under the company's future locked-in emissions curve. This curve in turn is derived from the company's intensity pathway CA_G, multiplied by activity A_G:

$$L_G(t) = \int_{from\ the\ reporting\ year}^{t} A_G * CA_G$$

Figure 16 illustrates locked-in emissions of one facility and of the whole company.

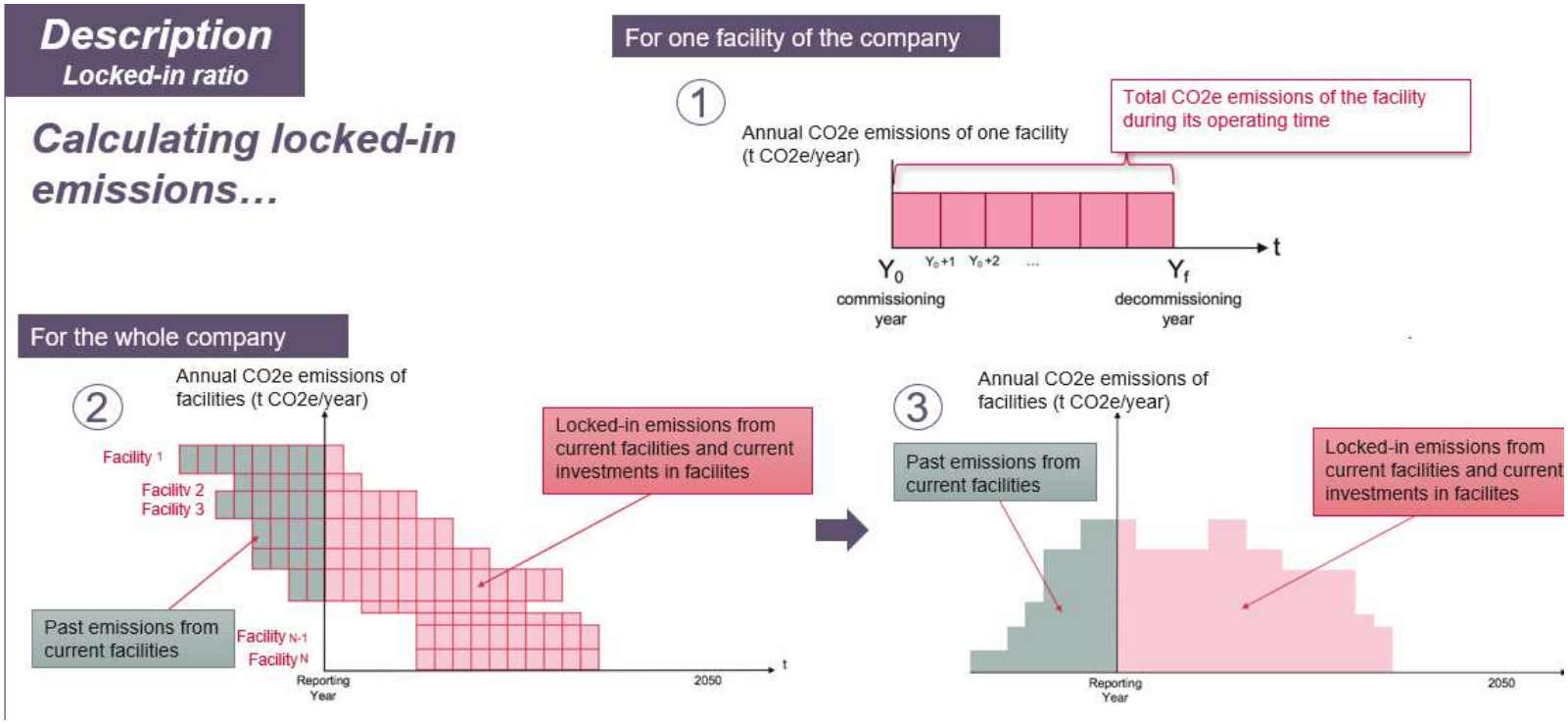


FIGURE 16 : COMPUTING LOCKED-IN EMISSIONS FROM FACILITY

$B_G(t)$ is calculated as the company's carbon budget up until time t, which is derived by taking the area under the absolute emissions reduction curve. This curve in turn is derived from the company benchmark pathway (CB_G) by multiplying it by the projected activity A_P:

$$B_G(t) = \int_{from\ the\ reporting\ year}^{t} A_P * CB_G$$

The company's benchmark is computed from the company's current emissions at reporting year and the level of carbon intensity defined by the sectoral benchmark presented in section 6.1. The carbon budget is illustrated in Figure 17 below.

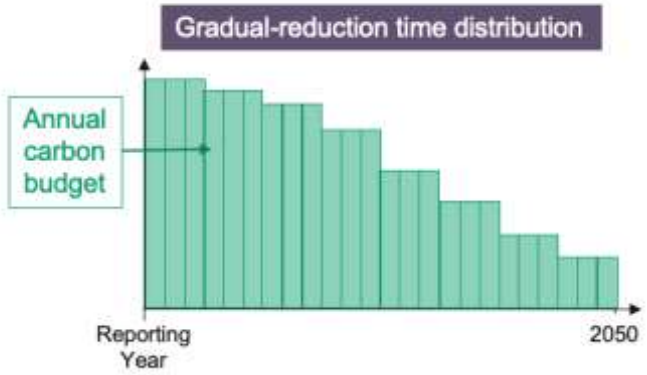


FIGURE 17 : CARBON BUDGET DERIVED FROM THE COMPANY'S BENCHMARK

Depending on the data availability, the computation of these areas may not be as straightforward as the equations shown and will be done by approximation, but the principles will hold.

The locked-in ratio (r_{LB}) is illustrated in Figure 18, and calculated as follows:

$$r_{LB}(t) = \frac{L_G(t)}{B_G(t)}$$

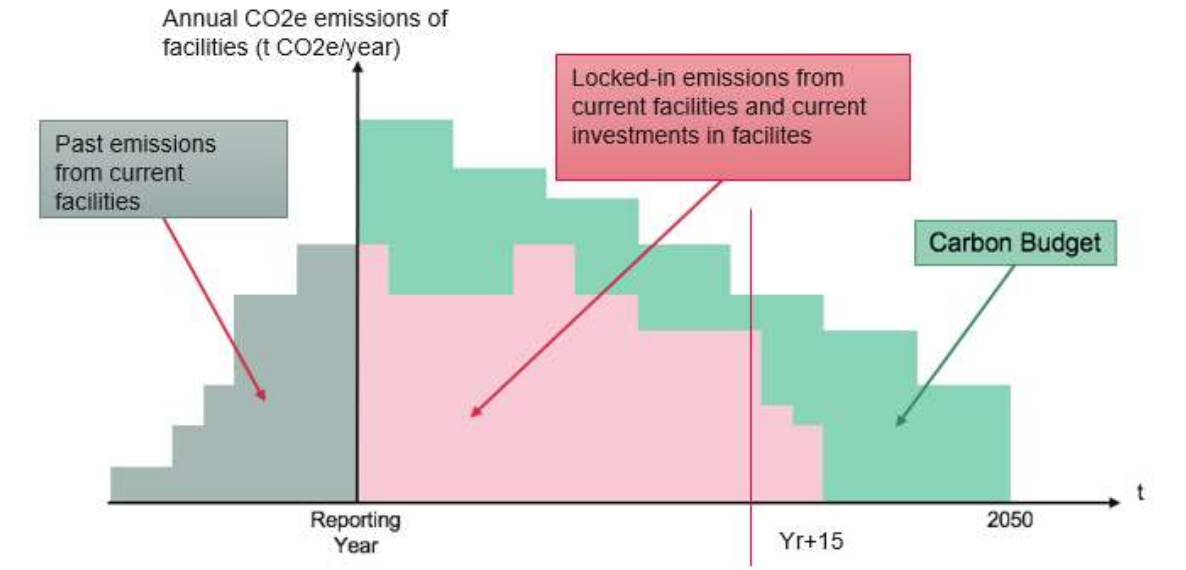


FIGURE 18 : ILLUSTRATION OF THE LOCKED-IN RATIO

To be able to give a score regarding the amount of carbon budget consumed, the level of activity performed with the existing and planned assets needs to be taken into account. Therefore, in a similar way to locked-in emissions, the level of activity that the company is able to perform thanks to the existing and planned assets, per yea,r is called the secured activity and is illustrated in Figure 19.

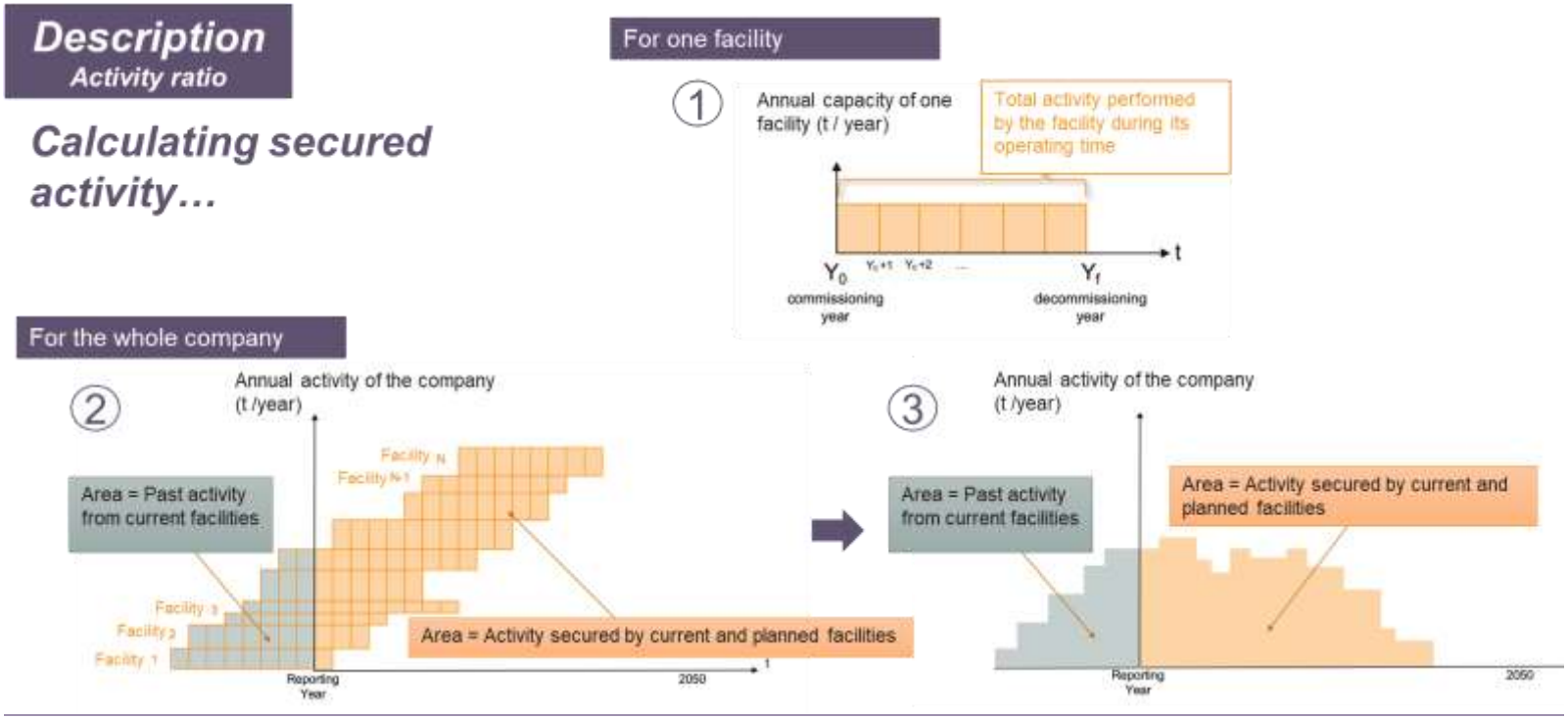


FIGURE 19 : SECURED ACTIVITY BY THE COMPANY

The secured activity is compared to the level of activity projected by the company up to reporting year + 15 years. If the company does not have any projections or not up to reporting year + 15 years, it will be considered that its market share will remain constant and its activity will evolve at the same rate as the sector and sectoral projections of activity are used (see section 6.1). The company's projected activity is illustrated in Figure 20. The projected activity covers the activity from current and planned assets but also from assets that do not exist / are not planned yet.

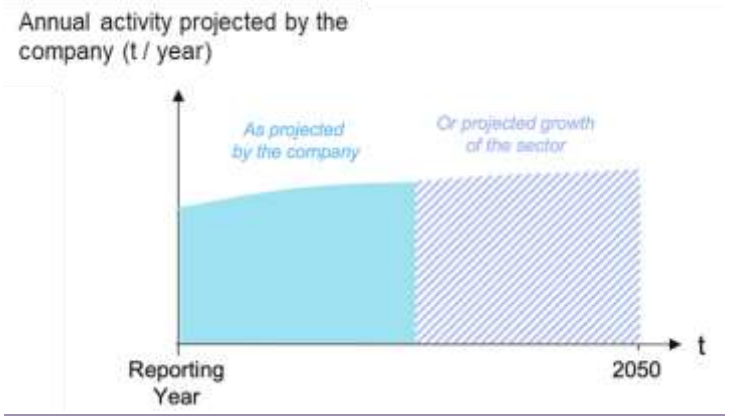


FIGURE 20 : PROJECTED ACTIVITY

The secured activity ratio r_{SA} compares the secured activity up to $(y_r + 15)$ with the projected activity up to $(y_r + 15)$. It is illustrated in Figure 21.

$$r_{SA} = \frac{A_S(up\ to\ y_r + 15)}{A_P(up\ to\ y_r + 15)}$$

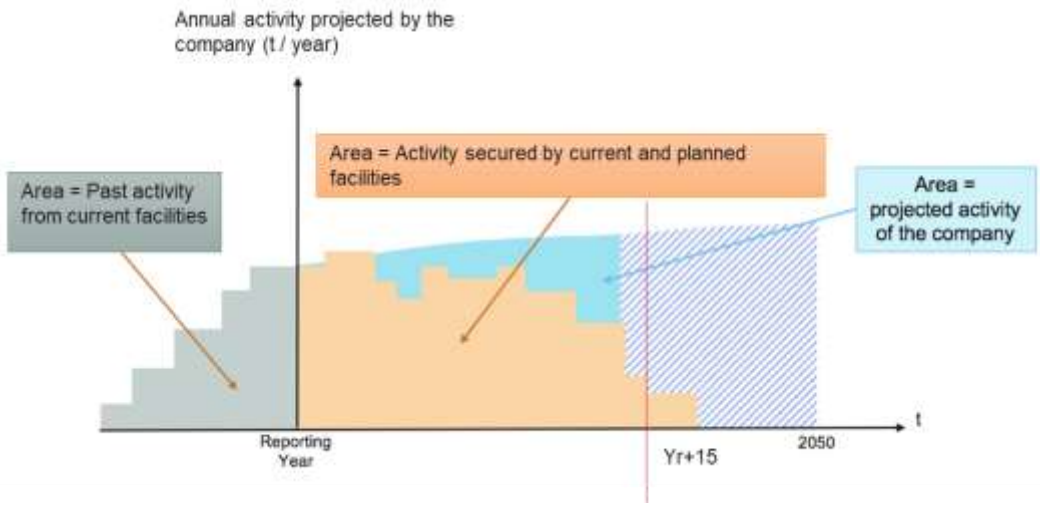


FIGURE 21 : SECURED ACTIVITY RATIO

CALCULATION OF THE SCORE:

r_{SA} is used as a threshold value for the scoring:

$r_{SA} < 1$: More investments will be needed	
Value of r_{LB}	**Score**
$r_{LB} \leq r_{SA}$	100%
$r_{SA} < r_{LB} < 1.5$	$\frac{r_{LB}-1.5}{r_{SA}-1.5}$
$r_{LB} \geq 1.5$	0%

This means that if the company has planned its activity and its locked-in emissions are lower than the carbon budget, it gets 100%, but if the locked-in emissions exceed by more than 50% its carbon budget, it gets 0%.

The case $r_{SA} > 1$ is unlikely to happen as the company is unlikely to have existing or planned assets able to meet or exceed the projection of activity until $(y_r + 15)$.

RATIONALE	IS 2.3 LOCKED-IN EMISSIONS OF CRUDE STEEL PRODUCTION ASSETS
RATIONALE OF THE INDICATOR	**RELEVANCE OF THE INDICATOR:** Locked-in emissions are included in the ACT assessment for the following reasons: • Absolute GHG emissions over time are the most relevant measure of emissions performance for assessing a company's contribution to global warming. While the indicator IS 2.4 has a short-term measurement point on reporting year plus 5 years, the concept of locked-in emissions allows a judgement to be made about the company's outlook in more distant time periods. • Analysing a company's locked-in emissions alongside science-based budgets also introduces the means to scrutinise the potential cost of inaction, including the probability of stranded assets. • Examining absolute emissions, along with recent and short-term emissions intensity trends, forms part of a holistic view of a company's emissions performance in the past, present, and future. **SCORING RATIONALE:** Part of the data coming in is provided by the asset dataset: currently active plants and modernization / retrofit plans that are 'in the pipeline' (which can be estimated to become active in the short-term). When a plant reaches the end of its estimated lifetime, no replacement is assumed because those decisions have not been made yet. In fact, iron and steel plants are not often decommissioned but more likely modernized with new equipment, so the lifetime of the asset is assumed to be the average lifetime of the process equipment (furnace, buildings…), which could be 30 years. Hence, the locked-in emissions calculated are the locked-in emissions of committed (existing and pipeline) plants only. The indicator describes the proportion of their budget (computed from the reporting year for 15 years ahead) that will be used up by committed activity. Unlike the 'gap' and 'trend' comparisons done in all other quantitative indicators, this indicator compares two areas: that of the carbon budget until t and the locked-in emissions until t. It is expected that companies will exceed their budget when t is in the short-term future but will not when it is in the long-term future. However, any short-term excess will have to be compensated for in later time periods. This is called carbon

budget displacement, which makes the company's actual decarbonization pathway steeper than the original benchmark. There is a dimension of risk from inaction here.

When the company exceeds its full carbon budget to reporting year + 15 years, it will not be able to displace enough carbon from later time periods to nearer ones and will be faced with stranded assets when the current lifetime estimates are held up. This is a major problem, and this situation will certainly result in a zero score.

When companies are closer to their carbon budget than others, they will be less flexible in their future strategy as there is more pressure to change their equipment on a plant (modernization for example). There is also less room for refurbishment to extend the lifetimes of existing assets as this carries the risk of exceeding the carbon budget. Therefore, there is a rationale for intermediate scoring levels that magnify this risk due to future flexibility.

NOTE ON CALCULATING L_G AND B_G:

Data on typical project periods by plant type can be obtained from annex A.III. 4.2.2 of IPCC. Where plant lifetime information is unavailable (requested in IS 2.A), the median of known lifetimes in iron and steel sector will be applied. The rationale for using these sources is that the medians are built on comprehensive samples of data.

IS 2.4 TREND IN FUTURE EMISSIONS INTENSITY OF ALL CRUDE STEEL PRODUCTION ASSETS

DESCRIPTION & REQUIREMENT	IS 2.4 TREND IN FUTURE EMISSIONS INTENSITY OF ALL CRUDE STEEL PRODUCTION ASSETS
SHORT DESCRIPTION OF INDICATOR	A measure of the alignment of the company's projected crude steel production assets emissions intensity with its decarbonization pathway. The indicator will identify the gap in 5 years after the reporting year between the company's performance and the decarbonization pathway as a percentage, which is expressed as the company's 'action gap'.
DATA REQUIREMENTS	The questions comprising the information request that are relevant to this indicator are: ♦ IS 2.A / IS 2.B / IS 2.C: For all existing and planned assets: Asset name, Geographic Location (country level), Plant type, Technology/Routes, Status, Total capacity (metric tonne), Production (metric tonne of crude steel produced per plant or metric tonne of crude steel shaped per plant), Emissions factor (kg CO_2/tonne crude steel), Year of commissioning, Expected lifetime (years), Decommissioning or modernization year, if planned, Ownership stake (%), Attributable to reporting boundary (%)

- For this indicator, we ask directly the carbon intensity (all routes) for Y, and the production for Y. The carbon intensity of Y+5 and the production for Y+5 is computed as explained above

External sources of data used for the analysis of this indicator are:

- IEA ETP [10]– background scenario data
- SDA [11] – specific benchmark pathway definition
- IPCC (2006) [13] – Fuel emissions factors

The benchmark indicators involved are:

SEGMENT	TARGET TYPE	PARAMETER	INTENSITY METRIC	BENCHMARK
Integrated	Inclusive Scope 1+2 intensity	CB_{S12}	Kg CO_2 / tonne crude steel produced	IEA ETP– background scenario data
Steel-making	Inclusive Scope 1+2 intensity	CB_{S12}	Kg CO_2 / tonne crude steel produced	IEA ETP– background scenario data
Steel-shaping	Scope 1+2 intensity	CB_{S12}	Kg CO_2 / tonne crude steel produced	No benchmark, Absolute Contraction Approach

HOW THE ANALYSIS WILL BE DONE

The analysis is based on the difference between the company's action pathway (CA_G) and the company's benchmark (CB_G) developing from the reporting year to 5 years after.

The company's action pathway (CA_G) is the weighted average plant emissions intensity over time, assuming the continuation of active plants until anticipated decommissioning and the completion of known plant/retrofit projects. If unknown, the commissioning year of projects is estimated from the project status (e.g., bidding process, construction, etc.) and data on typical project periods by plant type.

The company's benchmark (CB_G) pathway is the 'company specific decarbonization pathway'. See section 6.1 for details on the computation of this pathway.

The analysis compares CA_G to CB_G, by examining the difference between these pathways in 5 years after the reporting year. The pathways are expressed in kilograms of CO_2 per unit of activity (intensity measure). The unit of activity for the iron and steel sector is tonne of crude steel. The result of the comparison is the 'action gap'.

CALCULATION OF THE SCORE:

To assign a score to this indicator, the size of the action gap will be compared to the maximum action gap, which is defined by the business-as-usual pathway (BAU_G). BAU_G is defined as an unchanging (horizontal) intensity pathway, whereby the emissions intensity is not reduced at all over a period after the reporting year.

$$Future\ emissions\ action\ gap = \frac{CA_G - CB_G}{BAU_G - CB_G}$$

$$Score = 1 - Future\ emissions\ action\ gap$$

The score assigned to the indicator is equal to 1 minus the action gap and is expressed as a percentage (1 = 100%). Therefore, if CA_G- CB_G is equal to zero, the company's target is aligned with the sectoral benchmark, and the maximum score is achieved

RATIONALE	IS 2.4 TREND IN FUTURE EMISSIONS INTENSITY OF ALL CRUDE STEEL PRODUCTION ASSETS
RATIONALE OF THE INDICATOR	**RELEVANCE OF THE INDICATOR:** The trend in future emissions intensity is included in the ACT assessment for the following reasons: • It indicates if the company is in line with a low-carbon scenario • This indicator is the most valuable in terms of the information it provides on the company's actual action towards decarbonization. • This particular measure, along with recent emissions intensity and absolute emissions, forms part of a holistic view of company emissions performance in the past, present, and future. **SCORING RATIONALE:** The gap method was chosen for its relative simplicity in interpretation and is aligned with most of the other forward-looking indicators. Indeed, the indicator looks at a fixed point in the future and assesses the capacity of the company to deploy a range of low-carbon products in the short term. **NOTE ON CALCULATING CA_G:** Where plant lifetime information is unavailable (requested in IS 2.A), the median of known lifetimes in iron and steel sector will be applied. The rationale for using these sources is that the medians are built on comprehensive samples of data. Data on typical project periods by plant type is obtained from annex A.III. 4.2.1 of IPCC

IS 2.5 TREND IN FUTURE EMISSIONS INTENSITY PER TECHNICAL ROUTE

DESCRIPTION & REQUIREMENT	IS 2.5 TREND IN FUTURE EMISSIONS INTENSITY PER TECHNICAL ROUTE
SHORT DESCRIPTION OF INDICATOR	A measure of the alignment of the company's projected crude steel emissions intensity with its decarbonization pathway, specific to each type of asset. This indicator is split into 2 sub-indicators, one per type of asset. Each sub-indicator will identify the gap in 5 years after the reporting year between the company's performance and the decarbonization pathway as a percentage, which is expressed as the company's 'action gap'.
DATA REQUIREMENTS	The questions comprising the information request that are relevant to this indicator are: ♦ IS 2.A / IS 2.B / IS 2.C: For all existing and planned assets: Asset name, Geographic Location (country level), Plant type, Technology/Routes, Status, Total capacity (metric tonne), Production (metric tonne of crude steel produced per plant or metric tonne

of crude steel shaped per plant), Emissions factor (kg CO_2/tonne crude steel), Year of commissioning, Expected lifetime (years), Decommissioning or modernization year, if planned, Ownership stake (%), Attributable to reporting boundary (%)

- For this indicator, we ask directly the carbon intensity (per technical route) for Y, and the production for Y. The carbon intensity of Y+5 and the production for Y+5 is computed as explained above

External sources of data used for the analysis of this indicator are:

- IEA ETP [10]– background scenario data
- SDA [11] – specific benchmark pathway definition
- IPCC (2006) [13] – Fuel emissions factors

The benchmark indicators involved are:

TARGET TYPE	PARAMETER	INTENSITY METRIC	BENCHMARK
Ore based crude steel production emissions (Inclusive Scope 1+2)	CB_{S12}^{BF-OB}	Kg CO_2 / tonne BF-BOF crude steel produced	Adapted from IEA ETP– background scenario data
Scrap-EAF crude steel production emissions (Inclusive Scope 1+2)	$CB_{S12}^{scrap-EAF}$	Kg CO_2 / tonne scrap-EAF crude steel produced	Adapted from IEA ETP– background scenario data

HOW THE ANALYSIS WILL BE DONE

This indicator is split into 2 sub-indicators, one for each type of asset:

- Ore based crude steel production asset
- Scrap-EAF crude steel production asset

For each sub-indicator, the analysis is based on the difference between the company's action pathway (CA_G) and the company's benchmark (CB_G) developing from the reporting year to 5 years after.

The company's action pathway (CA_G) is the weighted average plant emissions intensity over time, assuming the continuation of active plants until anticipated decommissioning and the completion of known plant/retrofit projects. If unknown, the commissioning year of projects is estimated from the project status (e.g., bidding process, construction, etc.) and data on typical project periods by plant type.

The company's benchmark (CB_G) pathway is the 'company specific decarbonization pathway'. See section 6.1 for details on the computation of this pathway.

The analysis compares CA_G to CB_G, by examining the difference between these pathways in 5 years after the reporting year. The pathways are expressed in kilograms of CO_2 per unit of activity (intensity measure). The unit of activity for the iron and steel sector is tonne of crude steel. The result of the comparison is the 'action gap'.

CALCULATION OF THE SCORE:

To assign a score to each sub-indicator, the size of the action gap will be compared to the maximum action gap, which is defined by the business-as-usual pathway (BAU_G). BAU_G is defined as an unchanging (horizontal) intensity pathway, whereby the emissions intensity is not reduced at all over a period after the reporting year.

$$Future\ emissions\ action\ gap = \frac{CA_G - CB_G}{BAU_G - CB_G}$$

$$Score = 1 - Future\ emissions\ action\ gap$$

The score assigned to the indicator is equal to 1 minus the action gap and is expressed as a percentage (1 = 100%). Therefore, if CA_G- CB_G is equal to zero, the company's target is aligned with the sectoral benchmark, and the maximum score is achieved.

An aggregated score is computed as the average of sub-indicator scores, weighted by the share of the asset type in the company's total Inclusive Scope 1+2 emissions:

$$Score_{agg} = \frac{\sum_i Score_i \,.\, E_i}{\sum_i E_i}$$

Where:

- $Score_i$ is the score on the sub-indicator i
- E_i is the total Inclusive Scope 1+2 emissions of all assets of type i

RATIONALE	IS 2.5 TREND IN FUTURE EMISSIONS INTENSITY PER TECHNICAL ROUTE
RATIONALE OF THE INDICATOR	**RELEVANCE OF THE INDICATOR:** This indicator helps companies to work on a finer improvement on each activity than the global indicator (IS 2.4). The trend in future emissions intensity is included in the ACT assessment for the following reasons: • It indicates if the company is in line with a low-carbon scenario • This indicator is the most valuable in terms of the information it provides on the company's actual action towards decarbonization. • This particular measure, along with recent emissions intensity and absolute emissions, forms part of a holistic view of company emissions performance in the past, present, and future. **SCORING RATIONALE:** The gap method was chosen for its relative simplicity in interpretation and is aligned with most of the other forward-looking indicators. Indeed, the indicator looks at a fixed point in the future and assesses the capacity of the company to deploy a range of low-carbon products in the short term. **NOTE ON CALCULATING CA_G:** Where data on plant emissions intensity is unavailable at the asset level (requested in IS 2.A), default factors are applied and are the median of the range of values published in annex A.III. 4.2.1 of IPCC. Data on typical project periods by plant type is also obtained from this source. Where plant lifetime information is unavailable (requested in IS 2.A), the median of known lifetimes in iron and steel will be applied. The rationale for using these sources is that the medians are built on comprehensive samples of data.

IS 2.6 SCRAP REDUCTION STRATEGY

DESCRIPTION & REQUIREMENT	IS 2.6 SCRAP REDUCTION STRATEGY
SHORT DESCRIPTION OF INDICATOR	The company demonstrates that it has a comprehensive strategy at the corporate level to reduce scrap within its own operations.
DATA	The questions comprising the information request that are relevant to this indicator are:

REQUIREMENTS

- IS 2.D: Have you implemented a strategy to reduce scrap within your own operations? What are the commitments (target, timescale)? What is the applied method? How is the strategy monitored?

HOW THE ANALYSIS WILL BE DONE

The analyst evaluates the description and evidence of the scrap reduction strategy for the presence of best practice elements and consistency with the other reported management indicators. The company description and evidence are compared to the maturity matrix developed to guide the scoring and a greater number of points is allocated for elements indicating a higher level of maturity.

Best-practice elements to be identified in the scrap reduction strategy include:

- Basing it on costing of the value of scrap
- Commitment to reduce scrap in direct operations (covers all operations and whole organisational boundary)
- Using targets with end dates for scrap reduction
- Having interim targets
- Following a waste hierarchy approach (prevention first) (for example, from the UNEP national waste management strategies report (21))
- Governance at a high level within the organisation
- Monitoring, reporting and verification processes included to track progress
- Continuous improvement/learning feedback mechanisms
- Commitments to employee education
- Linking the scrap reduction strategy to the core business strategy
- Linking the scrap reduction strategy to core business operations (procurement, product design)

The maximum score (100%) is assigned if all of these elements are demonstrated.

The maturity matrix used for the assessment is the following:

Questions	Basic	Standard	Advanced	Next practice	Low-carbon aligned	Weighting
Commitments	No defined commitments on a defined timescale		Timescale for implementation is mentioned but no clear target, or target		Strategy includes both a clear quantitative target and includes a	100%/3

			is mentioned but no clear timescale		timescale for its implementation	
Method	No defined strategy	Strategy implementation focuses on the largest sources of scrap but has no robust method of quantification and verification for this implementation	Company quantifies the value of scrap through a costing exercise, but does not have clear prioritization or verification process.	Company quantifies the value of scrap through a verifiable costing exercise and is linked to circular economy business models	Company has costed the value of scrap, links this to circular economy in the core business strategy, and has applied a scrap hierarchy approach to prioritise prevention.	100%/3
Monitoring	No clear monitoring approach in place	Responsibility at high level in the organisation, but no clear monitoring approach in place.	Monitoring systems in place for own operations to track progress but not for the parts of the value chain outside of control boundary	Monitoring systems in place for own operations and the value chain elements under the strategy to track progress	Includes next practice monitoring, and it is clear that there is an organizational learning process in place to continuously improve the strategy after interim evaluation of results	100%/3

RATIONALE — IS 2.6 SCRAP REDUCTION STRATEGY

RATIONALE OF THE INDICATOR

Scrap is a waste that could significantly reduce the energy and CO_2 emissions of steel production if it is avoided.

Here, it is the generation of pre-consumer scrap that is assessed, arising from yield losses in iron- and steel-making and manufacturing of steel-based products.

Waste is a significant source of GHG emissions which can be avoided with co-benefits in economic and environmental terms for producers. As links between producers and consumers in the economy, steel-shapers could influence both halves of the value chain. This needs to be within a coherent strategic framework to ensure that (i) GHG impacts are decreased, and (ii) benefits are maximised by prioritising opportunities and scaling up successes. Waste reduction approaches can require cultural shifts and education within organisations, both of which require buy-in from across an organisation

that can be enhanced by a specific strategic focus. For the iron and steel sector, waste reduction approaches could also be supported by local regulations.

IS 2.7 CO-PRODUCTS/WASTE REDUCTION, REUSE AND RECYCLING ACTIVITIES

DESCRIPTION & REQUIREMENT	IS 2.7 CO-PRODUCTS/WASTE REDUCTION, REUSE AND RECYCLING ACTIVITIES
SHORT DESCRIPTION OF INDICATOR	The company demonstrates that it has a comprehensive activity at the corporate level to sell or reuse co-products and waste within its own operations and in the upstream phases of its value chain.
DATA REQUIREMENTS	The questions comprising the information request that are relevant to this indicator are: ♦ IS 2.E: % of co-products landfilled / % of off-gases used for flaring
HOW THE ANALYSIS WILL BE DONE	For the performance score, this will be assessed on two dimensions, whereby companies achieve the maximum score if they fully valorise their solid co-products and their off-gases. **DIMENSION 1: OF SOLID CO-PRODUCTS:** This dimension concerns only solid co-products as slags, dusts and sludges. Calculation is directly proportional to the % of solid co-products valorised. Score = 1 - % of landfilled solid co-products **DIMENSION 2: REUSE OF OFF-GASES:** This dimension concerns only gaseous co-products. Calculation is directly proportional to the % of off-gases valorised. Score = 1 - % of flared off-gases. **AGGREGATE SCORE - DIMENSION 1: 50%, DIMENSION 2: 50%.**
RATIONALE	IS 2.7 CO-PRODUCTS/WASTE REDUCTION, REUSE AND RECYCLING ACTIVITIES
RATIONALE OF THE INDICATOR	**RELEVANCE OF THE INDICATOR:** ♦ According to WorldSteel, the main co-products produced during iron and crude steel production are slags, dusts and sludges. Process gases, for example, from the coke oven, BF or BOF are also important co-products (22).

- The slag volume at iron making affects the CO_2 intensity of the process but depends on factors which are beyond the responsibility of the operator due to local conditions or company choices on raw material procurements. Knowing that slag volumes ranking 160-650 kg/t can be observed, this aspect should not be forgotten in performance assessment (23) (24).
- Indicators in Module 9: Business Model are forward-looking and go beyond this indicator by opening the financial and environmental valuation of the product, for example with synergies with other industries or specific ways of treatment.

SCORING RATIONALE:

This indicator is important to follow the management of these resources. The goal of this additional indicator is to go towards a circular economy.

Solid co-products can be valued and sold; the worst case considered is landfilling (in that case the co-products could be called a waste). Co-products, and especially slags, could be important for other sectors such as cement. Valuing/commercialising them could be a way for the company to develop a new business model.

For exhaust gases, increasing their use as heat inside the plant is more efficient than producing electricity or reinjecting them into the grid. Flaring should be avoided wherever possible.

MODULE 3: INTANGIBLE INVESTMENT (WEIGHTING: 2 – 10%)

IS 3.1 R&D SPENDING ON LOW-CARBON TECHNOLOGIES

DESCRIPTION & REQUIREMENTS	IS 3.1 R&D SPENDING ON LOW-CARBON TECHNOLOGIES
SHORT DESCRIPTION OF INDICATOR	A measure of the ratio of R&D investments in mitigation-relevant technologies. The indicator will identify the company's R&D investment and the required investment in mature and non-mature technologies.
DATA REQUIREMENTS	The questions comprising the information request that are relevant to this indicator are: ♦ IS 3.A: R&D costs/investments in climate change mitigation technologies of the company for the three last years [C-ST9.6a] ♦ IS 3.B: Total R&D costs/investments of the company - Variation of [C-CO9.6/C-CE9.6/C-OG9.6] for the three last years[C-ST9.6a] ♦ IS 3.C: Investment in mature and non-mature technologies (a table is supplied in the methodology below to distinguish what is mature and what is non-mature) [C-ST9.6a] External sources of data used for the analysis of this indicator are: ♦ Industrial Efficiency Technology Database: www.iipinetwork.org/wp-content/Ietd/content/Iron-and-Steel.html ♦ GGSD Forum (25) ♦ IIGCC – net zero investment framework (in development) (26) ♦ IEA - https://iea.blob.core.windows.net/assets/355d9b26-b38c-476c-b9fa-0afa34742800/iea_technology-guide-poster.pdf Maturity of technology – Technology Readiness Levels (TRLs): ♦ IEA website: ETP Clean Energy Technology Guide
HOW THE ANALYSIS WILL BE DONE	This indicator has two dimensions: ♦ The share of R&D costs/investments in low-carbon technologies compared to the total R&D costs/investments ♦ The share of R&D costs in non-mature technologies within the total R&D in low-carbon technologies.

DIMENSION 1

The analysis is based on the ratio of the company's annual R&D investments in low-carbon technologies to its total annual R&D expenditure.

The score is calculated using the following formula:

$$Score = Share\ of\ low\ carbon\ R\&D\ \times \frac{1}{80\%}$$

A company whose share of low-carbon R&D exceeds 80% of its total R&D expenditure will receive the highest score.

DIMENSION 2

The analysis is based on the ratio of the company's annual R&D investments in non-mature technologies to its total annual low-carbon R&D expenditure.

The score is calculated using the following formula:

$$Score = Share\ of\ \text{R\&D costs in non mature technologies}\ \times \frac{1}{65\%}$$

A company whose share of low-carbon R&D in non-mature technologies exceeds 65% of its total low-carbon R&D expenditure will receive the highest score.

AGGREGATE SCORE: DIMENSION 1: 50%, DIMENSION 2: 50%

RATIONALE	IS 3.1 R&D SPENDING ON LOW-CARBON TECHNOLOGIES
RATIONALE OF THE INDICATOR	**RELEVANCE OF THE INDICATOR:** R&D in climate change mitigation technologies is included in the ACT assessment for the following reasons:

- To enable the transition, sectors like iron and steel rely heavily on R&D to develop low-carbon technologies to replace their currently high-emitting portfolio of assets, new iron and steel grades with low ratios of coke or pig iron, the use of new and low-emitting fuels, and carbon capture utilisation and/or storage (CCS/CCUS).
- R&D is also one of the principal tools to reduce the costs of a technology in order to increase its market penetration.
- Lastly, the R&D investment of a company into non-mature technologies allows for direct insight into the company's commitment to alternative technologies that may not currently be part of its main business model.

DEFINING R&D:

Research and development (R&D): Refers to the activities companies undertake to innovate and introduce new products and services. It is often the first stage in the development process. Investment in R&D is a type of operating expense associated with the research and development of a company's goods or services (definition from CDP guidance).

Research and experimental development comprise creative work undertaken on a systematic basis to increase the stock of knowledge, including knowledge of humans, culture and society, and the use of this stock of knowledge to devise new applications. The term R&D covers three activities (definitions from OECD website, 2012):

- Basic research is experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundation of phenomena and observable facts, without any application or use in view.
- Applied research is original investigation undertaken in order to acquire new knowledge. It is, however, directed primarily towards a specific practical aim or objective.
- Experimental development is systematic work, drawing on existing knowledge gained from research and/or practical experience, which is directed to producing new materials, products or devices, to installing new processes, systems and services, or to improving substantially those already produced or installed.

R&D covers both formal R&D in R&D departments and informal or occasional R&D in other departments.

DEFINING THE R&D SCOPE:

The indicator focuses on mature and non-mature technologies or construction and organizational methodologies that mitigate climate change.

Climate mitigation technologies for the iron and steel sector may include:

- Waste heat recovery
- Improving energy efficiency
- Switching to alternative fuels (including low-carbon H_2)
- Using emerging and innovative technologies
- Carbon capture and storage (CCS)
- Carbon capture, utilization and storage (CCUS)
- Material efficiency that reduces steel demands
- Other relevant technologies for the sector

R&D expenditures should cover development of concepts and ideas and development of pilot projects. A first environmental balance should demonstrate that the solution reduces the overall CO_2 emissions in the life cycle and does not make pollution transfers between life cycle stages impact categories or services (functional unit).

DEFINING 'MITIGATION R&D':

The 'mitigation R&D' is defined by the categorization employed by IEA.

DEFINING 'NON-MATURE R&D':

A Technology Readiness Level (TRL) should be used to assess the maturity of a technology. Higher scoring levels of this indicator exclude research in technologies that are already considered mature in terms of market penetration, to incentivise a focus on those technologies that have a higher need for R&D investment, in order to break through technical barriers and reduce the levelized costs of deploying these technologies.

To formalize this distinction in the analysis, the company is asked for a detailed breakdown of R&D expenditure in Section 3 of the data request. Since defining what type of R&D is 'non-mature' is theoretically difficult, the classification is inverted, and undertaken on the principle of exclusion. This methodology excludes only those low-carbon technologies that are considered mature in terms of market position and levelized cost.

The mature and non-mature technologies are defined in Table 16 (Annex, paragraph 10.3). The table is constructed for the year 2020 and should be useful for companies and analysts. However, some technologies that are non-mature today could become mature in the coming years. So the current status of the technologies are important to help categorize them into mature and non-mature technologies according to Table 9:

TABLE 9: CATEGORIZATION OF MATURE AND NON-MATURE TECHNOLOGIES

Technology Readiness Level (TRL) from IEA	**IEA explaining acronyms**	
1.	Initial idea: basic principles have been defined	Non-mature technologies
2.	Application formulated: concept and application of solution have been formulated	
3.	Concept needs validation: solution needs to be prototyped and applied	
4.	Early prototype: prototype proven in test conditions	
5.	Large prototype: components proven in conditions to be deployed	
6.	Full prototype at scale: prototype proven at scale in conditions to be deployed	
7.	Pre-commercial demonstration: solution working in expected conditions	
8.	First-of-a-kind commercial: commercial demonstration, full-scale deployment in final form	Mature technologies
9.	Commercial operation in relevant environment: solution is commercially available, needs evolutionary improvement to stay competitive	
10.	Integration at scale: solution is commercial but needs further integration efforts	
11.	Proof of stability: predictable growth	

IIPI network explaining acronyms	**TRL**	
Research	1-3	Non-mature technologies
Demonstration	4-7	
Commercial	8-11	Mature technologies

SCORING RATIONALE:

Expenditures over the 3 last years are used for the indicator to consider that expenditure for major R&D projects may not be linear over years.

IEA ETP 2020 (12) : “Innovative technologies for steel production are generally around 10-50% more expensive than their commercially available counterparts, with gas-based DRI with CCUS and H2 DRI being highly sensitive to the cost of natural gas and electricity respectively”.

IS 3.2 COMPANY LOW-CARBON PATENTING ACTIVITY

DESCRIPTION & REQUIREMENTS	IS 3.2 COMPANY LOW-CARBON PATENTING ACTIVITY
SHORT DESCRIPTION OF INDICATOR	A measure of the company patenting activity related to climate change mitigation. The indicator identifies the ratio between the company's patent activity (number of patents) for the last 5 years and average patenting activity linked to climate change of the sector.
DATA REQUIREMENTS	The questions comprising the information request that are relevant to this indicator are: ♦ IS 3.D: Patenting activity in climate change mitigation technologies of the company over the last 5 years. ♦ IS 3.E: Total patenting activity of the company over the last 5 years
HOW THE ANALYSIS WILL BE DONE	The assessment is based on the ratio of the company's patenting activity dedicated to climate change mitigation technologies over the last 5 years to the company's total patenting activity over the same span of time. **FINAL SCORE** The score is calculated using the following formula: $$Score = Share\ of\ low\ carbon\ \text{patents} \times \frac{1}{80\%}$$ A company whose share of low-carbon patents exceeds 80% of its total patenting activity will receive the highest score. A company whose low-carbon patents ratio is below 80% will receive a score proportional to that ratio.
	DEFINING CLIMATE CHANGE MITIGATION TECHNOLOGIES PATENTS: The indicator focuses on patents that mitigate climate change. The European Patent Office (EPO) and the US Patent and Trademark Office (USPTO) have developed a dedicated patent classification scheme (Cooperative Patent Classification - CPC) which details patents for climate change mitigation or technologies: (EPO, 2017) • Y02C – Capture, storage, sequestration, or disposal of greenhouse gases • Y02P – CCMTs relating to production in energy intensive industries • Other relevant technologies for the sector

RATIONALE	IS 3.2 COMPANY LOW-CARBON PATENTING ACTIVITY

RATIONALE OF THE INDICATOR

RELEVANCE OF THE INDICATOR:

The indicator on CCMTs patenting activity is complementary to the one dedicated to R&D in climate change mitigation technologies, as it monitors the technology diffusion whereas R&D expenditures monitor the technology development.

It is included in the ACT Iron & Steel assessment for the following reasons:

- To enable the transition, the sector relies heavily on the development of low-carbon solutions to replace its currently high emitting systems
- Patent data are commensurable because patents are based on an objective standard (OECD 2015)
- Patent data measure the intermediate outputs of an inventive process, where R&D data expenditures measure the input (OECD 2015)
- Patent data can be disaggregated into specific technological fields (OECD 2015)

RELEVANCE OF THE INDICATOR'S 5-YEAR TIME HORIZON

Patent applications are typically disclosed 18 months after their filing date (OECD 2015). To avoid the effects of this "publication lag" and smooth the ratio used for the assessment, the indicator monitors the last 5 years of the company's patenting activity.

SCORING RATIONALE:

Innovation in the iron and steel sector is key for developing low-carbon solutions. These efforts are reflected in patent data. "Evidence from patent data indicates that the steel sector is far from dormant, with significant innovation in terms of both production processes and product characteristics." (quote from OECD Secretary General Angel Gurria at WorldSteel 2017 General Assembly)

MODULE 4: INDIRECT OPERATIONS (WEIGHTING 10 – 32%)

IS 4.1 TREND IN PAST EMISSIONS INTENSITY OF PURCHASED CRUDE STEEL

DESCRIPTION & REQUIREMENT	IS 4.1 TREND IN PAST EMISSIONS INTENSITY OF PURCHASED CRUDE STEEL
SHORT DESCRIPTION OF INDICATOR	A measure of the alignment of the company's recent purchased crude steel emissions intensity trend with that of its decarbonization pathway. The indicator will compare the gradient of this trend over a 5-year period to the reporting year (reporting year minus 5 years) with the decarbonization pathway trend over a 5-year period after the reporting year.
DATA REQUIREMENTS	The questions comprising the information request that are relevant to this indicator are: ♦ IS 4.A: For the past 5 years, for each supplier, quantity of crude steel purchased and CO_2 emissions or intensity of crude steel purchased (a weighted average should be calculated in the tool) Variation of [C6.5] External sources of data used for the analysis of this indicator are: ♦ IEA ETP (15) – background scenario data ♦ SDA (11) – specific benchmark pathway definition ♦ IPCC (2006) (20) – Fuel emissions factors ♦ Environmental Product Declaration according to ISO 21930:2017 or EN15804+A1:2014 (or EN15804+A2:2019) ♦ EN 19694-2 standard. The benchmark indicators involved are:

SEGMENT	TARGET TYPE	PARAMETER	INTENSITY METRIC	BENCHMARK
Steel-shaping	Partial Scope 3 upstream (crude steel supplier Inclusive Scope 1+2)	CB_{S12}	Kg CO_2 / tonne crude steel purchased	Adapted from IEA ETP– background scenario data

	Integrated	Partial Scope 3 upstream linked to purchased crude steel if any (crude steel supplier Inclusive Scope 1+2)	CB_{S12}	Kg CO_2 / tonne crude steel purchased	Adapted from IEA ETP– background scenario data

HOW THE ANALYSIS WILL BE DONE	The same computation is used as in IS 2.1. If no data from the suppliers is provided, the score assigned is 0. Note: For the crude steel purchases, if the company cannot collect data about the amount and emissions intensity for all its suppliers, the score shall be adjusted downwards proportionally to the percentage of crude steel purchased missing compared to the total amount of steel purchased.
RATIONALE	**IS 4.1 TREND IN PAST EMISSIONS INTENSITY OF PURCHASED CRUDE STEEL**
RATIONALE OF THE INDICATOR	**RELEVANCE OF THE INDICATOR:** This indicator is meant to ensure that companies have been investing enough in transitioning their purchased steel to low-carbon steel, in line with their suppliers benchmark. Trend in past emissions intensity is included in the ACT Iron & Steel assessment for the following reasons: - The trend shows the speed at which the company has been reducing the emissions intensity of purchased crude steel over the recent past. Comparing this to the decarbonization pathway gives an indication of the scale of the change that needs to be made within the company to bring it onto a low-carbon pathway. - While ACT aims to be as future-oriented as possible, it nevertheless does not want to solely rely on projections of the future, in a way that would make the analysis too vulnerable to the uncertainty of those projections. **SCORING RATIONALE:** While 'gap' type scoring is preferred where possible for any indicator, this indicator only looks at past emissions and would therefore require a different baseline to generate a gap analysis. Thus, instead of a gap analysis, a trend analysis is conducted to compare current data of the company to past data and any resulting improvements. An advantage of the trend analysis is that it does not require the use of a business-as-usual pathway to anchor the data points and aid interpretation; trends can be compared directly and a score can be directly correlated to the resulting ratio.

IS 4.2 PURCHASED PRODUCT INTERVENTIONS

DESCRIPTION & REQUIREMENT	**IS 4.2 PURCHASED PRODUCT INTERVENTIONS**

SHORT DESCRIPTION OF INDICATOR	An analysis of the company's reporting of mature interventions to reduce GHG emissions for purchased product determined as being high GHG impact, such as ferroalloy, electrodes, iron ore or mined coal, relative to the other categories of products relevant to the company. This indicator also covers crude steel purchased for integrated and shaping actors.
DATA REQUIREMENTS	The questions comprising the information request that are relevant to this indicator are: • IS 4.B: Quantity of product purchased, CO_2 emissions factors collected from these specific suppliers (cradle-to-gate emissions factors) Note that some default emissions factors are not provided as they did not exist in the LCA database used. To solve this, the company might: - Ask for the emissions factor of its suppliers if they have it - Try to find default emissions factors in other LCA databases - Use the default emissions factors with the highest carbon intensity (conservative approach) External sources of data used for the analysis of this indicator are: • Online and press news • EU taxonomy for transport (27) – low-carbon vehicles • Ferroalloy, graphite for anodes, lime fluxes, iron ore or mined coal (12)
HOW THE ANALYSIS WILL BE DONE	To be ready for the transition to a low-carbon economy, iron and steel companies – in particular those who purchase resources that could significantly increase their carbon footprint, such as ferroalloys, electrodes, iron ore or mined coal - need to plan and carry out "interventions" within the value chain in order to exercise their market position and influence the reduction of GHG emissions. The analyst will look at the significant share of CO_2 emissions of product purchased. The hotspots are the high emitting products of all products purchased, for example, graphite for anode for EAF facilities. For all its activity, the company identifies interventions that determine the most ambitious impacts achievable and highlights the GHG hotspots in accordance with best practices. The analyst compares the interventions reported by the company with a benchmark and against other interventions reported by sectoral practices, whereby the analyst assigns a 'maturity scoring' to the reported interventions. Several measures are combined to assign a score to the intervention. These measures are: • Extent size of the intervention • Intervention maturity scoring • Level of ambition of the intervention • Future emissions assessment

- Transport of material

The maturity matrix used for the assessment is the following. A maturity matrix for the three main hotspots should be filled.

Questions	Basic	Standard	Advanced	Next practice	Low-carbon aligned	Weighting
Extent size of the intervention	Intervention involves suppliers that together represent a marginal coverage of the hotspot (less than 40%)		Intervention involves suppliers that together represent a significant coverage of the hotspot (between 40 and 80%)		Intervention involves products that together represent the majority coverage of the hotspot (more than 80%)	20%
Intervention maturity scoring	Intervention is common practice and not backed with success factors like planning, adequate resources, clear goals, performance tracking and measures of success.		Intervention is an advanced practice and backed with some success factors like planning, adequate resources, clear goals, performance tracking, and measures of success.		Intervention is cutting-edge innovation practice and backed with all relevant success factors like planning, adequate resources, clear goals, performance tracking and measures of success.	20%
The company shall report on the level of ambition of the intervention	Incremental improvement with quantified actions		Improvements to achieve more than 20% of GHG reduction of the purchased product before 2035		Breakthrough innovation to achieve more than 38% of the GHG reduction of the purchased product before 2050	20%
Is the company able to determine with high level of assurance future CO_2 emissions intensity linked to the purchased product?	No knowledge of purchased product carbon intensity	No robust carbon intensity data on purchased product (i.e. not certified by a third party)	Robust CO_2 data on purchased product certified by third party	Robust CO_2 data on purchased product certified by third party Future CO_2 emissions intensity of suppliers is	Robust CO_2 data on purchased product certified by third party Future CO_2 emissions intensity of suppliers is forecasted and the	35%

				forecasted but the intensity is not low-carbon aligned	intensity is low-carbon aligned	
Action to reduce the carbon emissions and increase efficiency linked to the transport of the purchased product purchased	There are no reported actions	Quantification of carbon emissions and efficiency of transports used	Actions have been taken to reduce by 20% the carbon emissions and increase the use of low-carbon vehicles by 20%	Actions have been taken to reduce by 50% the carbon emissions and increase the use of low-carbon vehicles by 50%	Use of low-carbon transportation only	5%

SIGNIFICANCE AND EXTENT OF THE INTERVENTION:

Whether the intervention is large or small in scale affects its overall level of impact on GHG emissions. Large-scale interventions receive more points (e.g. significant interventions covering a high percentage of ferroalloy purchased)

INTERVENTION MATURITY SCORING:

This assesses how advanced the intervention is relative to current practice, and other elements that can ensure its success like clear goals and measures of success, use of supporting technology, use of certification and verification.

LEVEL OF AMBITION:

The company shall report on the level of ambition of the intervention. The first level is an incremental improvement (e.g. GHG reduction). The second level consists of a new development (e.g. new product development, eco design products or installation of a technology to achieve more than 20% of GHG reduction of the purchased ferroalloy). The third level is a breakthrough innovation (e.g. new business model development or installation of a technology to achieve more than 38% of GHG reduction of the purchased ferroalloy in the next 30 years).

The percentages in the matrix have been set in accordance with the absolute-based approach of SBTi. This method requires all companies to reduce their own emissions by the same percentage of absolute emission reductions as required for a given scenario (e.g. globally or for a sector). When referring to this method at a global level, the SBTi is currently using the IPCC Special Report on Global Warming of 1.5°C (SR15) for two pathways, a well-below 2°C and a 1.5°C trajectory. This equates to at least a 2.5% absolute reduction per year for well-below 2°C alignment, or a 4.2% absolute reduction per year for 1.5°C alignment. (https://sciencebasedtargets.org/methods/).

FUTURE EMISSIONS ASSESSMENT:

This indicator assesses the communication between the company and the purchased product supplier. This indicator is looking at the data reported, concerning the carbon intensity data and the future CO_2 emissions intensity. Robust and certifiable data are more highly scored.

TRANSPORT OF PRODUCT PURCHASED:

Even if the transportation is a low CO_2 hotspot, it is possible to take action to improve this step.

RATIONALE	IS 4.2 PURCHASED PRODUCT INTERVENTIONS

RATIONALE OF THE INDICATOR

RELEVANCE OF THE INDICATOR:

Ferroalloy production can be responsible for a significant share of the carbon footprint of high alloy steel (e.g. stainless steel). For chromium steel producers, 65% of steel emissions come from ferroalloy production, as presented in Figure 6. Steel producers shall interact with their ferroalloy suppliers in order to reduce the emissions - they shall demonstrate their willingness to drive their suppliers to reduce their emissions.

The amount of CO_2 associated with the BF route is linked with the reduction (see 1.1) of iron ore, the pig iron treatment to produce steel in the BOF (Basic Oxygen Furnace) and with energy used in all the process stages itself.

For shaping actors, the crude steel purchased is a very important indicator to reduce the emissions of the sector.

A key issue with the interventions approach is that if interventions have no measurable impact on GHG emissions, they are effectively “greenwash”. However, we recognise that, when attempting to influence GHG emissions outside of direct operations, measurement may be difficult. Barriers to measurement should not be barriers to action, therefore the analysis will consider interventions where the GHG emissions mitigation has not been measured. Nonetheless, companies should describe the rationale for emissions reduction connected to the intervention so that it is clear this potential exists.

The reporting should also include, where possible, enough detail on mitigation potential, and the scale of impact expected, to distinguish between interventions that could be considered greenwash and those with a materia climate change mitigation impact.

MODULE 5: GOVERNANCE (WEIGHTING: 10%)

IS 5.1 OVERSIGHT OF CLIMATE CHANGE ISSUES

DESCRIPTION & REQUIREMENT	**IS 5.1 OVERSIGHT OF CLIMATE CHANGE ISSUES**
SHORT DESCRIPTION OF INDICATOR	The company discloses that responsibility for climate change within the company lies at the highest level of decision making within the company structure.
DATA REQUIREMENTS	The questions comprising the information request that are relevant to this indicator are: ♦ IS 5.A: Details on where is the highest level of direct responsibility for climate change within the organization - Variation of [C1.1], [C1.2] ♦ IS 5.B: Position of the individual or name of the committee with this responsibility and outline of their expertise regarding climate change and the low-carbon transition - Variation of [C1.1a], [C1.2a]
HOW THE ANALYSIS WILL BE DONE	The benchmark case is that climate change is managed within the highest decision-making structure within the company. The company situation is compared to the benchmark case; if it is similar then points are awarded. The position at which climate change is managed within the company structure is determined from the company data submission and accompanying evidence. The maturity matrix used for the assessment is the following:

Question	Basic	Standard	Advanced	Next practice	Low-carbon aligned
Position of individual(s)/committee with highest responsibility for climate change	No one in charge of climate change issues	Manager/Officer	Senior Manager/Officer	Senior Manager/Officer closely related to decision-making structure within the company	Board or individual/sub-set of the board or other committee appointed by the board

RATIONALE	**IS 5.1 OVERSIGHT OF CLIMATE CHANGE ISSUES**
RATIONALE OF THE INDICATOR	Successful change within companies, such as the transition to a low-carbon economy, requires strategic oversight and buy-in from the highest levels of decision making within the company. For the iron and steel sector, a change in strategy and potentially business model will be required and this

cannot be achieved at lower levels within an organisation. Evidence of how climate change is addressed within the top decision-making structures is a proxy for how seriously the company takes climate change, and how well integrated it is at a strategic level. High-level ownership also increases the likelihood of effective action to address the low-carbon transition.

Changes in strategic direction are necessarily future-oriented, which fits with this principle of the ACT project.

Management oversight of climate change is considered good practice.

IS 5.2 CLIMATE CHANGE OVERSIGHT CAPABILITY

DESCRIPTION & REQUIREMENT	IS 5.2 CLIMATE CHANGE OVERSIGHT CAPABILITY
SHORT DESCRIPTION OF INDICATOR	Company board or executive management has expertise on the science and economics of climate change, including an understanding of policy, technology and consumption drivers that can disrupt current business.
DATA REQUIREMENTS	The questions comprising the information request that are relevant to this indicator are: ♦ IS 5.B: Position of the individual or name of the committee with this responsibility and outline their expertise regarding climate change and the low-carbon transition - Variation of [C1.1a], [C1.2a]
HOW THE ANALYSIS WILL BE DONE	The presence of expertise on topics relevant to climate change and the low-carbon transition at the level of the individual or committee with overall responsibility for it within the company is assessed. The presence of expertise is the condition that must be fulfilled for points to be awarded in the scoring. The analyst determines if the company has expertise as evidenced through a named expert biography outlining capabilities. A cross check is performed against 5.1 on the highest responsibility for climate change, the expertise should exist at the level identified. To be awarded Low-carbon aligned, the company must provide examples of how the individual or committee's expertise has informed strategic investment planning and/or decision-making processes. The maturity matrix used for the assessment is the following:

Question	Basic	Standard	Advanced	Next practice	Low-carbon aligned	Weighting
Associated score	*0%*	*25%*	*50%*	*75%*	*100%*	

Does the individual or committee with oversight of climate change issues (as reported in indicator 5.1) have relevant climate change- and low-carbon transition-related expertise*?	The employee/committee does not meet any of the characteristics of climate change- and low-carbon transition-related expertise*.	The employee/committee meets 1 of the characteristics of climate change- and low-carbon transition-related expertise*.	The employee/committee meets 2 of the characteristics of climate change- and low-carbon transition-related expertise*.	The employee/committee meets 3 or more of the characteristics of climate change- and low-carbon transition-related expertise*.	The employee/committee meets 3 or more of the characteristics of climate change- and low-carbon transition-related expertise*. Expertise systematically informs strategic investment planning/decision-making processes.	***100%***

* "Characteristics of climate change- and low-carbon transition-related expertise" include:
    - Academic/professional qualification related to climate change and the low-carbon transition, including an understanding of the impacts and risks, and the solutions to implement (e.g., Bachelors, Masters, Doctorate, professional certification, diploma, etc.)
        - A purely energy-related background with no relationship to climate change and the low-carbon transition is not enough to qualify as expertise.
    - Recent (i.e., within the last 10 years) professional experience related to climate change and the low-carbon transition (e.g., previous employment in a climate change/low-carbon transition-related role, or with a climate change/low-carbon transition-related organisation, etc.)
    - Recent (i.e., within the last 10 years)/active membership of organization(s) driving corporate knowledge and action on climate change and the low-carbon transition (e.g., World Business Council For Sustainable Development, Solar Energy Industry Association, etc.)

Technical knowledge related to climate change and the low-carbon transition, evidenced through recently (i.e., within the last 10 years) published outputs written by the individual/committee (e.g., statements, reports, etc.)

RATIONALE **IS 5.2 CLIMATE CHANGE OVERSIGHT CAPABILITY**

RATIONALE OF THE INDICATOR	Effective management of the low-carbon transition requires specific expertise related to climate change and its impacts, and their likely direct and indirect effects on the business. Presence of this capability within or closely related to the decision-making bodies that will implement low-carbon transition both indicates company commitment to that transition and increases the chances of success. Even if companies are managing climate change at the Board level or equivalent, a lack of expertise could be a barrier to successful management of a low-carbon transition. This disclosure is in line with Governance (a) of the TCFD: "a) Describe the board's oversight of climate-related risks and opportunities."

IS 5.3 LOW-CARBON TRANSITION PLAN

DESCRIPTION & REQUIREMENT	IS 5.3 LOW-CARBON TRANSITION PLAN
SHORT DESCRIPTION OF INDICATOR	The company has a plan on how to transition the company to a business model compatible with a low-carbon economy.
DATA REQUIREMENTS	The questions comprising the information request that are relevant to this indicator are: ♦ IS 5.C: Details on the organization's low-carbon transition plan [C3.1a], [C3.1b], [C3.1c], [C3.1d], [C3.1e], [C3.1f]
HOW THE ANALYSIS WILL BE DONE	The analyst evaluates the description and evidence of the low-carbon transition plan for the presence of best practice elements and consistency with the other reported management indicators. The company description and evidence are compared to the maturity matrix developed to guide the scoring and a greater number of points are allocated for elements indicating a higher level of maturity. Among the best practice elements identified to date are: ♦ The plan includes financial projections ♦ The plan should include cost estimates or other assessment of financial viability as part of its preparation ♦ The description of the major changes to the business is comprehensive, consistent, aligned with other indicators ♦ Quantitative estimates of how the business will change in the future are included ♦ Costs associated with the plan (e.g., write-downs, site remediation, contract penalties, regulatory costs) are included ♦ Potential "shocks" or stressors (sudden adverse changes) have been taken into consideration ♦ Relevant region-specific considerations are included

- The plan's measure of success is SMART (Specific, Measurable, Attainable, Relevant, Time Bound) - contains targets or commitments with timescales to implement them, is time-constrained or the actions anticipated are time-constrained
- The plan's measure of success is quantitative
- The description of relevant testing/analysis that influenced the transition plan is included
- The plan is consistent with reporting against other ACT indicators
- Scope – should cover the entire business, and is specific to that business
- The plan should cover the short, medium and long terms. From now or the near future <5 years, until at least 2035 and preferably beyond (2050)
- The plan contains details of actions the company realistically expects to implement (and these actions are relevant and realistic)
- The plan has been approved at the strategic level within the organisation
- Discussions about the potential impacts of a low-carbon transition on the current business have been included
- The company has a publicly acknowledged low-carbon (or beyond) science-based target

The maturity matrix used for the assessment is the following:

Subdimension	Basic	Standard	Advanced	Next practice	Low-carbon aligned	Weighting
Associated score	***0%***	***25%***	***50%***	***75%***	***100%***	
Measure of success	No measure of success		At least one measure of success which is fully SMART* and contains both qualitative and quantitative elements.		More than one measure of success. All measures of success are fully SMART*, contain both qualitative and quantitative elements, and are aligned with a low-carbon scenario.	***10%***
Financial content in plan	No financial content	Financial projections, cost estimates or other estimates of financial	Financial projections, cost estimates or other estimates of financial	Quantitative estimations of how the business will change in the future are	Description of the major financial changes to the business over all timescales is	***10%***

		viability are described but not quantified.	viability are quantified in some detail.	included. Costs associated with the plan (e.g., write-downs, site remediation, contract penalties, regulatory costs) are included.	comprehensive and aligned with other indicators. The transition plan is integrated into the overall business strategy of the organization and linked to the profit and loss statement.	
Short-term actions (recent past up to reporting year + 5 years)	Contains no discussion of short-term actions.		Contains examples of short-term actions the company expects to implement.		Contains detailed descriptions of relevant and achievable short-term actions the company expects to implement to make the transition a reality.	***10%***
Long-term actions and vision (from reporting year + 5 years onwards)	Contains no discussion of long-term actions or vision.		Contains descriptions of long-term actions the company expects to implement to make the transition a reality.		Contains descriptions of long-term actions the company expects to implement to make the transition a reality. Contains a vision of what the far-future company could look like in terms of physical assets and business model.	***10%***

Scope	Scope of transition plan is not defined.	Transition plan applies only to specific business units/operations (representing less than 50% of company's GHG emissions).	Transition plan applies only to specific business units/operations (representing more than 50% of company's GHG emissions).	Transition plan applies to all business units/operations.	Transition plan applies to all business units/operations and the rest of the value chain (upstream and downstream). Any exclusions from the plan must not be material to the organization in terms of GHG emissions.	***10%***
Implementation of results of scenario testing	The results of the company's scenario testing (as assessed in Indicator 5.5 – Scenario testing) have not informed the development of the company's transition plan.				The results of the company's scenario testing (as assessed in Indicator 5.5 – Scenario testing) have informed the development of the company's transition plan.	***10%***
Transition plan timescale†	Covers only short term, from reporting year until (RY + 3 years)	Covers only short and medium term, from reporting year until (RY + 4 to 10 years)	Covers short, medium and long term, from reporting year until (RY + 11 to 20 years)	Covers short, medium and long term, from reporting year until (RY + 21 years to 2049)	Covers short, medium and long term, from reporting year until 2050 or beyond	***10%***
Review and update process	No transition plan review and update process is in place.	Commitment to review and update transition plan, but no defined timescale or process.	Commitment to review and update transition plan, with either a defined timescale or process.	Commitment to review and update transition plan less often than every 5 years, with a defined process.	Commitment to review and update transition plan at least every 5 years for continuous relevancy and efficacy, with a defined process.	***10%***

Progress reporting process	No transition plan progress reporting process is in place.	Commitment to report progress against the transition plan and any material changes, but no defined timescale or stakeholder feedback process (e.g., shareholders and AGMs).	Commitment to report progress against the transition plan and any material changes, with either a defined timescale or stakeholder feedback process (e.g., shareholders and AGMs).	Commitment to report progress against the transition plan and any material changes less often than annually, with a defined stakeholder feedback process (e.g., shareholders and AGMs).	Commitment to report progress against the transition plan and any material changes annually, with a defined stakeholder feedback process (e.g., shareholders and AGMs).	***10%***
The role of a carbon price in the plan	No carbon price is considered.	Internal studies have been conducted regarding a carbon price, but this has not been used to guide decisions.	A carbon price is used only qualitatively by the company.	A carbon price is embedded in cost calculations as a financial indicator.	The carbon price value is aligned with a low-carbon scenario‡ and is integrated into the financial scenario used for making key business decisions.	***10%***

* A measure of success is considered “fully SMART” if it meets each of the following SMART elements (21):
    1. Specific: the measure of success is explicit, with no room for misinterpretation.
    2. Measurable: the measure of success is measurable, and it will be clear when it has been achieved.
    3. Achievable: the measure of success is stretching and ambitious, but not so much that it is unachievable.
    4. Relevant: the measure of success contributes to the organisation’s overall objectives and complements other measures of success.
    5. Time-bound: the measure of success has a set deadline.
† Companies aiming to achieve their low-carbon transition (e.g., reach net-zero emissions) any year before 2050 and maintain or improve this low-carbon state beyond this specified year, should score Low-carbon aligned.

Refer for instance to International Energy Agency (IEA), World Energy Outlook 2019, Annex B, p 758 (22). CO_2 prices are displayed by world regions, predicted values in 2030 and 2050.

RATIONALE	IS 5.3 LOW-CARBON TRANSITION PLAN
RATIONALE OF THE INDICATOR	The iron and steel sector will require substantial changes to its business to align with a low-carbon economy over the short, medium and long term, whether voluntarily following a strategy to do so or if forced to change by regulations (e.g., obligations to use waste as alternative fuels) and structural changes to the market (e.g., customer demand for low-carbon solutions). It is better for the success of the business and its transition that these changes occur in a planned and controlled manner. The *Investor Expectations of Companies in the Construction Materials Sector document* (28) specifically states that companies in the sector should develop such a plan. This disclosure is in line with Strategy a) and b) of the TCFD: "a) Describe the climate-related risks and opportunities the organization has identified over the short, medium, and long term." and "b) Describe the impact of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning." (29)

IS 5.4 CLIMATE CHANGE MANAGEMENT INCENTIVES

DESCRIPTION & REQUIREMENT	IS 5.4 CLIMATE CHANGE MANAGEMENT INCENTIVES
SHORT DESCRIPTION OF INDICATOR	The Board's compensation committee has included metrics for the reduction of GHG emissions in the annual and/or long-term compensation plans of senior executives; the company provides monetary incentives for the management of climate change issues as defined by a series of relevant indicators.
DATA REQUIREMENTS	The questions comprising the information request that are relevant to this indicator are: ♦ IS 5.D: Whether the company provides incentives for the management of climate change issues, including the attainment of targets [C1.3] ♦ IS 5.E: Details on the incentives provided for the management of climate change issues [C1.3a]
HOW THE ANALYSIS WILL BE DONE	The analyst verifies if the company has compensation incentives set for senior executive compensation and/or bonuses, that directly and routinely reward specific, measurable reductions of metric tonne of GHG emitted by the company in the preceding year and/or the future attainment of emissions reduction targets, or other metrics related to the company's low-carbon transition plan. The maturity matrix used for the assessment is the following:

Questions	Basic	Standard	Advanced	Next practice	Low-carbon aligned	Weighting

	Who is entitled to benefit?	Any other answer		Executive	Senior executive	Board chairman - Board/Executive board - Director on board - Corporate executive team - Chief Executive Officer (CEO) - Chief Operating Officer (COO) - Chief Financial Officer (CFO) - All employees	100%/3
	Type of incentives		Recognition (non-monetary)	Other non-monetary reward		Monetary reward	100%/3
	Incentivized performance indicator	No targets incentivized	Behaviour change-related indicator or other similar specification	Efficiency project, Efficiency target, Environmental criteria included in purchases, Supply chain engagement, or other similar specification		Emissions reduction project, Emissions reduction target, Energy reduction project, Energy reduction target, or other similar specification	100%/3

RATIONALE — **IS 5.4 CLIMATE CHANGE MANAGEMENT INCENTIVES**

RATIONALE OF THE INDICATOR

Executive compensation should be aligned with overall business strategy and priorities. As well as commitments to action the company should ensure that incentives, especially at the executive level, are in place to reward progress towards a low-carbon transition. This will improve the likelihood of a successful low-carbon transition.

Monetary incentives at the executive level are an indication of commitment to successful implementation of a low-carbon transition strategy.

IS 5.5 CLIMATE CHANGE SCENARIO TESTING

DESCRIPTION & REQUIREMENT — **IS 5.5 CLIMATE CHANGE SCENARIO TESTING**

SHORT DESCRIPTION OF INDICATOR

Testing or analysis relevant to determining the impact of the transition to a low-carbon economy on the current and projected business model and/or business strategy has been completed, with the results reported to the Board or C-suite (CEO, CFO, etc.), the business strategy revised where necessary, and the results publicly reported.

DATA REQUIREMENTS

The questions comprising the information request that are relevant to this indicator are:

- IS 5.F: Details on the organization's climate change scenario testing [C3.1a], [C3.1b] , [C3.1c] , [C3.1d] , [C3.1e] , [C3.1f]
- IS 5.G: Consideration of risk types in organization's climate-related risk assessments [C3.1a], [C3.1b] , [C3.1c] , [C3.1d] , [C3.1e] , [C3.1f]
- IS 5.H: Details of risks identified with the potential to have a substantive financial or strategic impact on business [C3.1a], [C3.1b], [C3.1c] , [C3.1d] , [C3.1e] , [C3.1f]

HOW THE ANALYSIS WILL BE DONE

The analyst evaluates the description and evidence of the low-carbon economy scenario testing for the presence of best-practice elements and consistency with the other reported management indicators. The company description and evidence are compared to the maturity matrix developed to guide the scoring and a greater number of points is allocated for elements indicating a higher level of maturity.

Best-practice elements to be identified in the test/analysis include:

- full coverage of the company's boundaries
- timescale from present to long-term (2035-2050)
- results are expressed in value-at-risk or other financial terms
- multivariate: a range of different changes in conditions are considered together
- changes in conditions are specific to a low-carbon climate scenario
- climate change conditions are combined with other likely future changes in operating conditions over the timescale chosen

The maturity matrix used for the assessment is the following:

Questions	Basic	Standard	Advanced	Next practice	Low-carbon aligned	Weighting
Boundary	Large element not included		Small element not included		Covers entire boundary of the company	25%
Timescale	From present to near future	From present to RY+5 years	From present to RY+10 years	From present to RY+20 years	From present to 2050 and beyond	25%
Results		Expressed in qualitative terms	Expressed in financial terms	Expressed in financial terms and results are translated into value-at-risk	Expressed as value-at-risk	25%

	Conditions considered	Does not consider any changing conditions	Considers a narrow range of different changes in conditions.	Considers a range of changing conditions together (multivariate)	Considers changing climate conditions in combination with changes in operating conditions	Considers changing conditions specific for a low-carbon decarbonization scenario	25%

RATIONALE	**IS 5.5 CLIMATE CHANGE SCENARIO TESTING**
RATIONALE OF THE INDICATOR	Changes predicted to occur due to climate change could have several consequences for the iron and steel sector, including the risk of “stranded assets”, increased costs and a dramatically changed operating environment. There are a variety of ways of analysing the potential impacts of climate-related changes on the business, whether these are slow and gradual developments or one-off “shocks”. Investors are increasingly calling for actions to reduce greenhouse gas emissions across the value chain (see IIGCC investor expectations document for the sector (28)). Effective mitigation will require a combination of actions: improve energy efficiency, use alternative fuels, use clinker substitutes, develop new technologies, sell less steel but increase sales of services or advice to use steel in a better way. These actions should be linked with a strong governance framework to manage the physical and transitional risks of the sector. The ACT methodology thus provides a broad definition of types of testing and analysis that can be relevant to this information requirement, to identify both current and best practices and consider them in the assessment. Risk management plans are important management tools for preparing for the low-carbon transition. For businesses likely to be strongly affected by climate change impacts (both direct and indirect), and businesses with large fixed-asset bases and long management horizons, such as the iron and steel sector, it has even greater importance. This disclosure is in line with Disclosure c) of the TCFD: "c) Describe the resilience of the organization’s strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario".

MODULE 6: SUPPLIER ENGAGEMENT (WEIGHTING: 2 – 10%)

The suppliers for the iron and steel industry vary considerably depending on the structure of the company and its activities. This Module aims to assess the actions that companies take to influence their suppliers (including transport suppliers) to reduce their GHG emissions.

No specific sub-dimensions are given for the two indicators, but a global evaluation should be used to rate the level of the company. The analyst should make sure to identify the most important suppliers in the company's supply chain. This identification is necessary to give recommendations on where emissions could be lowered.

Note: steel producers can use wood as a fuel in their process as well as other bio-sourced fuels. In that case, they should demonstrate that these resources are managed sustainably and that sustainable purchases are encouraged.

IS 6.1 STRATEGY TO INFLUENCE SUPPLIERS TO REDUCE THEIR GHG EMISSIONS

DESCRIPTION & REQUIREMENT	IS 6.1 STRATEGY TO INFLUENCE SUPPLIERS TO REDUCE THEIR GHG EMISSIONS
SHORT DESCRIPTION OF INDICATOR	The company has a strategy, ideally governed by policy and integrated into business decision making, to influence, enable, or otherwise shift suppliers' choices and behaviour in order to reduce GHG emissions.
DATA REQUIREMENTS	The questions comprising the information request that are relevant to this indicator are: ♦ IS 6.A: Details of the methods of supplier engagement, strategy for prioritizing supplier engagements and measures of success, including the list of environmental contract clauses in purchasing & suppliers' selection process [Variation of [C12.1] + [C12.1a]]
HOW THE ANALYSIS WILL BE DONE	The assessment will assign a maturity score based on the company's formalized strategy with their suppliers, expressed in a maturity matrix. This maturity matrix is indicative but does not show all possible options that can result in a particular score. Company responses will be scrutinized by the analyst and then placed on the level in the matrix where the analyst deems it most appropriate. The analyst should identify the most important suppliers in the company's global carbon emissions. This identification is necessary to give recommendations.

Questions	Subdimension	Basic	Standard	Advanced	Next practice	Low-carbon aligned	Weighting
To what extent are GHG emissions reduction issues integrated in engagement with suppliers?	Consideration of reduction targets	No consideration of reduction targets.	CSR clause included in engagements with suppliers. Means commitment included in contracts.	. CSR clause with GHG emissions reduction included in engagements with suppliers. Results driven commitment in contracts.	CSR clause with quantified GHG emissions reduction included in engagements with suppliers. Results commitment in contracts. Regular reporting.	CSR clause with GHG emissions reduction included as priority in engagements with suppliers. Results driven commitment in contracts. Regular reporting.	20%
What action levers are used by the company to encourage suppliers to develop low carbon offer?	Use of action levers	No actions levers used.	Passive approach (suppliers may offer low-carbon product but no specific requirements from the company).	Use of one action lever (see examples below).	Use of several action levers (see examples below).	Use of several action levers (see examples below). Regular audits of the supplier by the purchaser or a representative.	30%
What is the Scope of the action levers used?	Scope	No strategy applied to any suppliers.	Strategy applied to few large suppliers.	Strategy applied to most large suppliers.	Strategy applied to all large suppliers and few small suppliers.	Strategy applied to all of suppliers.	20%

To what extent are carbon issues integrated in the selection process of suppliers?	Suppliers selection process	No selection of suppliers based on environmental criteria. No change in suppliers' base.	Selection of suppliers based on at least one environmental criterion. No change in suppliers' base.	No change in suppliers' base. Selection of suppliers with low-carbon alternatives.	No change in suppliers' base. Selection of suppliers offering low-carbon alternatives.	Engaging suppliers over low-carbon alternatives.	30%

Examples of action levers:

- Purchasing rules
- Joint R&D
- Supporting/leading industry environmental groups
- Sanctions
- Audits
- Sharing patents
- Sustainability manager involved in appointment/can veto new supplier appointments
- …

RATIONALE

IS 6.1 STRATEGY TO INFLUENCE SUPPLIERS TO REDUCE THEIR GHG EMISSIONS

RATIONALE OF THE INDICATOR

Since the raw material being used is linked to the environmental performance of the final steel product, companies must engage their suppliers to reduce their emissions. Due to its significance in company decarbonization targets, purchasing low-carbon products is an important lever to help companies to achieve their low-carbon transition.

Supplier engagement is included in the ACT Iron & Steel assessment for the following reasons:

1. Given their size and decision-making power in the value chain, integrated companies can influence the strategy and performance of suppliers regarding climate. This means that having an effective supplier engagement strategy is key to aligning with the low-carbon transition.
2. The upstream segment represents a high source of emissions throughout the value chain and should be engaged. Direct emissions at the blast furnace represent about half of the cradle-to-gate emissions for pig iron production. If coke and sinter are

also produced in the same plant, Scope 1 emissions from the plant represent about 70% of the total emissions (1,14 kg CO_2 / kg pig iron). The rest of the emissions comes from the production and preparation of other materials (mainly iron ore and pellet, hard coal and quicklime). This analysis has been calculated from data for average global pig iron production, available in the ecoinvent 3.6 database (cut-off system model).

3. Engaging suppliers through contract clauses and sales incentives is necessary to take them on board.

SCORING THE INDICATOR:

Because of data availability and complexity, a direct measure of the outcome of such engagement is not very feasible currently. It is often challenging to quantify the emissions reduction potential and outcome of collaborative activities with the supply chain. Therefore, the approach of a maturity matrix allows the analyst to consider multiple dimensions of supplier engagement and assess them together towards a single score for Supplier Engagement.

IS 6.2 ACTIVITIES TO INFLUENCE SUPPLIERS TO REDUCE THEIR GHG EMISSIONS

DESCRIPTION & REQUIREMENT	IS 6.2 ACTIVITIES TO INFLUENCE SUPPLIERS TO REDUCE THEIR GHG EMISSIONS
SHORT DESCRIPTION OF INDICATOR	This indicator assesses the level of engagement that the company has with its suppliers, based on an assessment of previous initiatives that show whether or not the company engages with suppliers in various ways.
DATA REQUIREMENTS	The questions comprising the information request that are relevant to this indicator are: ♦ IS 6.B: List of initiatives implemented to influence suppliers to reduce their GHG emissions, green purchase policy or track record, supplier code of conduct ([Variation of [C12.1] +[C12.1a])
HOW THE ANALYSIS WILL BE DONE	The maturity matrix used for the assessment is the following:

Questions	Subdimension	Basic	Standard	Advanced	Next practice	Low-carbon aligned	Weighting

	How the company encourage suppliers to reduce their GHG emissions?	Suppliers GHG emissions	No activity (no engagement with suppliers with respect to emissions reduction) ( )	Company requires suppliers to sign a code of conduct (or similar) and/or to provide data regarding their environmental performance (for audited suppliers). Means-driven commitment	Company assists suppliers to reduce their GHG emissions	Company partners with large suppliers to define common GHG emissions reduction plan	Company contributes in GHG emissions reduction along its value chain through close partnerships with suppliers	60%
	Does the company use its purchasing power to drive low-carbon demand?	Low-carbon offer of suppliers	No green purchase		Company purchases low-carbon products /equipment/services.		Company purchases low-carbon products/equipment/ services Company partners with suppliers to develop low-carbon products.	40%

RATIONALE **IS 6.2 ACTIVITIES TO INFLUENCE SUPPLIERS TO REDUCE THEIR GHG EMISSIONS**

RATIONALE OF THE INDICATOR

Activities to influence suppliers are included in the ACT Iron & Steel assessment for the following reasons:

1. Given their size and their decision-making power in the value chain, integrated companies can influence the strategy and performance of suppliers regarding climate.
2. The upstream segment represents a high source of emissions throughout the value chain and should be engaged.
3. Engaging suppliers through contract clauses and sales incentives is necessary to take them on board.

SCORING THE INDICATOR:

Because of data availability and complexity, a direct measure of the outcome of such engagement is not currently feasible. It is often challenging to quantify the emissions reduction potential and outcome of collaborative activities along the supply chain. Therefore, the approach of a maturity matrix allows the analyst to consider multiple dimensions of supplier engagement and assess them together towards a single score for Supplier Engagement.

MODULE 7: CLIENT ENGAGEMENT (WEIGHTING: 6%)

IS 7.1 STRATEGY TO INFLUENCE CUSTOMER BEHAVIOUR TO REDUCE GHG EMISSIONS

DESCRIPTION & REQUIREMENTS	IS 7.1 STRATEGY TO INFLUENCE CUSTOMER BEHAVIOUR TO REDUCE GHG EMISSIONS
SHORT DESCRIPTION OF INDICATOR	The company has a strategy, ideally governed by policy and integrated into business decision-making, to influence, enable, or otherwise shift customer choices and behaviour in order to reduce GHG emissions and to enhance scrap reduction, sorting and recycling.
DATA REQUIREMENTS	The questions comprising the information request that are relevant to this indicator are: ♦ IS 7.A: details of client policy formalized and implemented by the company, in order to influence client behaviour to reduce their GHG emissions and to enhance scrap reduction, sorting and recycling (Variation of [C12.1] + [C12.1b])
HOW THE ANALYSIS WILL BE DONE	The analyst checks if the policy or strategy exists and analyses if it targets customer behaviour through specific actions undertaken by the company. Examples of best practice could include: ♦ GHG emissions reduction are part of the goal ♦ Customers are engaged either through education or information sharing, or through collaboration & innovation. ♦ It is an active rather than a reactive strategy: a reactive strategy responds only to customer demand for more low-carbon systems and services, whereas an active strategy attempts to change the existing customer demand towards low-carbon alternatives. ♦ If it is widespread: the strategy must apply to most customers. Maturity matrix is built as following:

Questions	Basic	Standard	Advanced	Next practice	Low-carbon aligned	Weighting
Scope of the action levers	No clients engaged	Clients engaged represent up to 20% of total revenues	Clients engaged represent 21-60% of total revenues	Clients engaged represent 61-90% of total revenues	Clients engaged represent over 90% of total revenues	20%

Consideration of reduction targets in engagement with clients	No strategy	GHG emissions reduction included in engagement with clients Means-driven commitment		Quantified GHG emissions reduction included in engagement with clients	Quantified GHG emissions reduction included as priority in engagements with clients	40%
Influence on clients to encourage buying low-carbon products and sorting scrap	No strategy	Passive approach (clients may use low-carbon products and sort scrap but no specific action levers from the company)	Use of one action lever (awareness campaign, compensation, purchasing rule, etc.) Provision of documents and tools by the lessor	Use of several action levers (awareness campaign, compensation, purchasing rule, etc.) Provision of documents and tools Multi-party working group with annual meeting at least	Use of several action levers (awareness campaign, compensation, purchasing rule, etc.) Contribution to shift demand towards low-carbon products and to increase good quality scrap availability	40%

RATIONALE

IS 7.1 STRATEGY TO INFLUENCE CUSTOMER BEHAVIOUR TO REDUCE GHG EMISSIONS

RATIONALE OF THE INDICATOR

RELEVANCE OF THE INDICATOR:

Strategy to influence consumer behaviour to reduce GHG impacts is included in the analysis for the following reasons:

1. Given their size and their decision-making power in the value chain, integrated companies can influence the strategy and performance of clients regarding climate.
2. The downstream segment has a key role to play in scrap availability and quality. The integrated and steel shaping companies should encourage fine sorting of scrap to enhance both the quantity and the quality of the material.

SCORING RATIONALE:

The scoring of elements in the way that it is presented is similar to the CDP scoring methodology, whereby a narrative answer that details a certain strategy is checked for whether it includes certain elements that the ACT assessment deems vital for any sound customer engagement strategy.

IS 7.2 ACTIVITIES TO INFLUENCE CUSTOMER BEHAVIOUR TO REDUCE GHG EMISSIONS

DESCRIPTION & REQUIREMENTS

IS 7.2 ACTIVITIES TO INFLUENCE CUSTOMER BEHAVIOUR TO REDUCE GHG EMISSIONS

SHORT DESCRIPTION OF INDICATOR	The company participates in activities, to influence, enable, or otherwise shift customer choices and behaviour to reduce GHG emissions and to enhance scrap reduction, sorting and recycling.
DATA REQUIREMENTS	The questions comprising the information request that are relevant to this indicator are: ♦ IS 7.B: details of previous initiatives that show whether or not the company engages with clients in various ways, to reduce GHG emissions and to enhance scrap reduction, sorting and recycling. Variation of [C12.1] + [C12.1b])

HOW THE ANALYSIS WILL BE DONE

The analyst assigns a maturity score based on the company's demonstration of engagement with its customers, expressed in a maturity matrix. This indicator takes a holistic viewpoint on the interventions reported and assesses how together they paint a picture of the company's level of active engagement with their customers.

It uses a maturity matrix to cover different types of activities under one score. The level that the company has achieved is determined by the analyst after reviewing all the information provided on the value chain interventions.

Successive levels into this matrix represent a more advanced level of engagement that works towards a collaborative effort of decarbonizing the iron and steel sector and assumes that the actions in the previous level are also part of the company's engagement.

Maturity matrix is built as following:

Subdimension	Basic	Standard	Advanced	Next practice	Low-carbon aligned	Weighting
Clients GHG emissions reduction engagement	No engagement	Company promotes products with lower carbon footprint but no data reported Company defines means-driven commitment	Company assists clients to reduce their GHG emissions	Company partners with large clients to define common GHG emissions reduction plan Provision of documents and tools Multi-party working group with annual meeting at least	Company contributes in GHG emissions reduction along its value chain through close partnerships with clients	30%
Low-carbon products	No offer	The company does offer low-carbon products but no promotion strategy developed	The company promotes its low-carbon offer through marketing and communication channels	The company promotes its low-carbon offer through marketing and communication channels. The company offers buying incentives	The company promotes its low-carbon offer through marketing and communication channels. The company offers buying incentives regarding	40%

					regarding low-carbon products	low-carbon products. The brand identity of the company is based only on its range of low-carbon solutions.	
	Support provided to clients to help them reducing their GHG emissions and better sorting scrap	No support provided		The company provides support (consulting services, premium customer service) to a small part of its clients (represent more than 20% of total revenues) in order to help them reduce their GHG emissions and better sort scrap		The company provides support (consulting services, premium customer service) to a large part of its clients (represent more than 60% of total revenues) in order to help them reduce their GHG emissions and better sort scrap	30%

RATIONALE

IS 7.2 ACTIVITIES TO INFLUENCE CUSTOMER BEHAVIOUR TO REDUCE GHG EMISSIONS

RATIONALE OF THE INDICATOR

RELEVANCE OF THE INDICATOR:

While measurement of strategy as in IS 7.1 is important, measuring activities and their outcome is more insightful with regards to the company's actual emissions reduction activities in the supply chain. Because of the difficulty in measuring this, the ACT assessment uses this maturity matrix approach that has been piloted by several other institutions (see scoring rationale) to fill this gap in indicators IS 6.2 and IS 7.2.

SCORING RATIONALE:

Because of data availability and complexity, a direct measure of the outcome of supply chain engagement activities is not very feasible currently. Therefore, the approach of a maturity matrix allows the analyst to consider multiple dimensions of client engagement and analyse them together towards a single score. This approach has been used before by several institutions that attempt to make measurements of progress in the complex and multidimensional industry sectors.

MODULE 8: POLICY ENGAGEMENT (WEIGHTING: 5%)

MODULE RATIONALE

For the iron and steel sector, company policy should require the adoption of best available technologies (BAT) when modernizing, purchasing or designing a new plant.

The policy should also require life-cycle assessments (LCA) of products to assess their CO_2 performance relative to the product functions [WorldSteel, STEEL'S CONTRIBUTION TO A LOW CARBON FUTURE AND CLIMATE RESILIENT SOCIETIES, 2020]. As Angel Gurría, OECD Secretary-General, said in his speech of 16 October 2017: "For the steel sector, policymakers should ensure that the right framework conditions and incentives are in place so that companies focus and invest more on product quality and industrial upgrading as well as the identification of new market opportunities." Companies should not oppose effective and well-designed regulation in these areas but should support it.

Policy mechanisms should be established which ensure an international competitive level playing field between the different steel-producing regions in order to avoid the risk of carbon leakage. Some regulations have been set in some regions of the world, such as the EU ETS in the EU, but it could be criticized in some other regions since EU ETS looks only at direct emissions and does not seek to improve material circularity, even if circularity could be done locally.

From the IEA analysis, "governments have an outsized role to play in supporting transitions towards net-zero emissions. Long-term visions need to be backed up by detailed clean energy strategies involving measures that are tailored to local infrastructure and technology needs. Effective policy toolkits must address five core areas:

- Tackle emissions from existing assets
- Strengthen markets for technologies at an early stage of adoption
- Develop and upgrade infrastructure that enables technology deployment
- Boost support for research, development and demonstration
- Expand international technology collaboration.

In addition, policy makers can promote CO_2 emissions reduction efforts by adopting mandatory reduction policies, such as a gradually increasing carbon price or tradeable industry performance standards that require average CO_2 intensity for production of each key material to decline across the economy and permit regulated entities to trade compliance credits."

IS 8.1 COMPANY POLICY ON ENGAGEMENT WITH TRADE ASSOCIATIONS

DESCRIPTION & REQUIREMENTS	IS 8.1 COMPANY POLICY ON ENGAGEMENT WITH TRADE ASSOCIATIONS

SHORT DESCRIPTION OF INDICATOR	The company has a constructive policy on what action to take when industry organisations of which it is a member are found to oppose 'climate-friendly' policies.
DATA REQUIREMENTS	The questions comprising the information request that are relevant to this indicator are: ♦ IS 8.A: The company shall disclose if it has a policy to govern action when trade associations of which it is a member take positions on legislation that could hinder progress on transition to a low-carbon economy, and if this policy is public [C12.3] ♦ IS 8.B: If it has a policy as outlined at IS 8.A, the company shall describe this policy including the following details: Include [C12.3f] ♦ IS 8.C: The company shall disclose if (yes or no) it is on the board of any trade associations or provides funding beyond membership [C12.3b] ♦ IS 8.E: The company should attach supporting documentation, if this exists, giving evidence [C12.3d]
HOW THE ANALYSIS WILL BE DONE	The analyst evaluates the description and evidence of the policy on trade associations and climate change for the presence of best-practice elements and consistency with the other reported management indicators. The company description and evidence are compared to the maturity matrix developed to guide the scoring and a greater number of points are allocated for elements indicating a higher level of maturity. Best practice elements to be identified in the test/analysis include: ♦ Having a publicly available policy in place ♦ The scope of the policy covers the entire company and its activities, and all group memberships and associations ♦ The policy sets out what action is to be taken in the case of inconsistencies ♦ The action carries the option to terminate membership of the association ♦ The action carries the option of publicly opposing or actively countering the association's position ♦ Responsibility for oversight of the policy lies at the top level of the organisation ♦ Presence of a process to monitor and review trade association positions

The maturity matrix used for the assessment is the following:

Question	Subdimension	Basic	Standard	Advanced	Next practice	Low-carbon aligned	Weighting
What is the scope covered by the	Transparency and Scope	Does not cover entire company or all group memberships.	Does not cover entire company or	Covers the entire company and its activities, and all group		Covers the entire company and its	40%

	engagement policy? Is the policy publicly available?		Is not publicly available.	all group memberships. Is publicly available.	memberships and associations, but not publicly available		activities, and all group memberships and associations. Public policy is publicly available	
	Does the company have a review process of trade associations?	Oversight	No process to review trade associations positions	A process to review trade association positions exists but is not necessarily implemented	A process to monitor and review trade association positions exists and is well implemented	A process to monitor and review trade association positions exists and is well implemented at a high level of the organization	A process to monitor and review trade associations positions is in place. Responsibility for oversight of the policy lies at top level of the organization	40%
	Does the company have an action plan regarding engagement with trade associations?	Action plan	No mention of this element		Sets out what action is to be taken in the case of inconsistencies	Option to terminate membership of the association	Option of publicly opposing or actively countering the association position	20%

RATIONALE	**IS 8.1 COMPANY POLICY ON ENGAGEMENT WITH TRADE ASSOCIATIONS**
RATIONALE OF THE INDICATOR	See also the Module rationale. Trade associations are a key method by which companies can influence policy on climate indirectly. Thus, where trade associations take positions that are negative for the climate, companies need to take action to ensure that this negative influence is countered or minimised. Transparency about public policy is a specific request of the Investor Expectations report (28).

IS 8.2 TRADE ASSOCIATIONS SUPPORTED DO NOT HAVE CLIMATE-NEGATIVE ACTIVITIES OR POSITIONS

DESCRIPTION & REQUIREMENTS	**IS 8.2 TRADE ASSOCIATIONS SUPPORTED DO NOT HAVE CLIMATE-NEGATIVE ACTIVITIES OR POSITIONS**
SHORT DESCRIPTION OF INDICATOR	The company is not on the Board or providing funding beyond membership of any trade associations that have climate-negative activities or positions. It should also be considered if the company is supporting trade associations with climate-negative activities and/or positions.

DATA REQUIREMENTS

The questions comprising the information request that are relevant to this indicator are:

- IS 8.D If yes, the reporter shall provide details of those trade associations that are likely to take a position on climate change legislation [C12.3c]
- IS 8.E: The company should attach supporting documentation, if this exists, giving evidence [C12.3d]

External sources of data shall also be used for the analysis of this indicator:

- RepRisk database,
- Climate Action 100+
- Ellen Macarthur Foundation (30)
- press news
- EP100 – Climate Group www.theclimategroup.org/project/ep100
- Low-carbon Technology Partnerships initiative www.wbcsd.org/Programs/Climate-and-Energy/Climate/Low-Carbon-Technology-Partnerships-initiative

HOW THE ANALYSIS WILL BE DONE

The list of trade associations declared in the CDP data and other external sources entries relating to the company is assessed against a list of associations that have climate-negative activities or positions. The results will be compared to any policy described in IS 8.1.

If the company is part of trade associations that have climate-negative activities and/or positions, this should be considered for the analysis.

The maturity matrix used for the assessment is the following:

Question	Subdimension	Basic	Standard	Advanced	Next practice	Low-carbon aligned
Does the company support trade associations that have climate negative activities/positions?	Membership / funding	Company is on the board or provides funding beyond membership to trade associations that have climate – negative activities or positions		The company is not on the board or providing funding beyond membership of any trade associations that have climate-negative activities or positions. Company can be member.		Company is not a member of any trade associations that have climate-negative activities or positions

RATIONALE	IS 8.2 TRADE ASSOCIATIONS SUPPORTED DO NOT HAVE CLIMATE-NEGATIVE ACTIVITIES OR POSITIONS
RATIONALE OF THE INDICATOR	See also the Module rationale. Trade associations are a key instrument by which companies can indirectly influence policy on climate.

IS 8.3 POSITION ON SIGNIFICANT CLIMATE POLICIES

DESCRIPTION & REQUIREMENTS	IS 8.3 POSITION ON SIGNIFICANT CLIMATE POLICIES
SHORT DESCRIPTION OF INDICATOR	The company is not opposed to any significant climate relevant policies and/or supports climate friendly policies.
DATA REQUIREMENTS	The questions comprising the information request that are relevant to this indicator are: ♦ IS 8.E: The company should attach supporting documentation, if this exists, giving evidence [C12.3d] ♦ IS 8.F: The company shall disclose details of the issues on which it has been directly engaging with policy makers and its proposed legislative solution [C12.3a] External sources of data shall also be used for the analysis of this indicator (e.g., RepRisk database, press news, actions in standard development).
HOW THE ANALYSIS WILL BE DONE	The analyst evaluates the description and evidence of the company's position on relevant climate policies (see Module rationale for the description of relevant climate policies) for the presence of best practice elements, negative indicators and consistency with the other reported management indicators. The company description and evidence are compared to the maturity matrix developed to guide the scoring and a greater number of points will be allocated for elements indicating a higher level of maturity. The maturity matrix used for the assessment is the following:

Question	Subdimension	Basic	Standard	Advanced	Next practice	Low-carbon aligned
What is the position of the company on significant climate policies?	Climate policy support	The company publicizes direct opposition to relevant climate policy (e.g., direct statement issued or given by a company representative in a speech or interview) or reported direct opposition to climate policy can be found (e.g., third-party claims)	Reported indirect opposition to climate policy (e.g., via trade association or in standards development)	No report of any opposition to climate policy	Reported direct support to relevant significant climate policy can be found	Publicly supports relevant significant climate policy

RATIONALE — IS 8.3 POSITION ON SIGNIFICANT CLIMATE POLICIES

RATIONALE OF THE INDICATOR

See also the Module rationale.

Policy and regulation that acts to promote transition to a low-carbon economy is key to the success of the transition. Companies should not oppose effective and well-designed regulations in these areas but should support them.

MODULE 9: BUSINESS MODEL (WEIGHTING: 10%)

MODULE RATIONALE

In addition to developing low-carbon steel, a company may transition its business model to other areas to remain profitable in a low-carbon economy. The company's future business model should enable it to decouple financial results from GHG emissions, in order to meet the constraints of a low-carbon transition while continuing to generate value. The business model shifts identified do not conflict with the changes that are implied by decarbonizing the company's production and sales.

These indicators aim to identify both relevant current business activities and those still at a burgeoning stage. It is recognized that transition to a low-carbon economy, with the associated change in business models, will take place over several years. The analysis will thus seek to identify and reward projects at an early stage as well as more mature business activities, although the latter (i.e., substantially sized, profitable, and/or expanding) business activities will be more highly rewarded.

A variety of sources have been consulted to develop a comprehensive review of the challenges facing the iron and steel sector in relation to the low-carbon transition. Several opportunities for the sector have been identified, which the ACT initiative has formatted under a taxonomy for reporting the development of business activities connected to them. The main reference sources for building these indicators are extracted from the literature and from exchanges with experts during the methodology development process.

Climate scenarios can identify shifts in the use of steel (e.g., for transport and construction) that will foster the transition to a low-carbon economy. Companies committed to adapting their business to these predicted changes will be better positioned to take advantage of associated opportunities and successfully transition to a low-carbon economy.

SCORING

The maturity matrix used for the assessing all indicators in this Module is the following:

	Basic	Advanced	Low-carbon aligned	
Associated score	0%	50%	100%	**Weighting**
Profitability of business model	Not estimated or in a very early stage of development (research or conception stage)	Mature business model but not profitable or in a development stage (prototype / demonstration or test)	Mature and profitable business model	25%
Size of business model	Not estimated	Limited size of business for the company (few FTE or time dedicated, small turnover, few revenues expected, etc.)	Substantial size of market for the company (significant number or FTE or dedicated hours, great turnover, great anticipated profitability, etc.)	25%
Growth potential of business model	Not estimated, or exploration of the business model interrupted	Scheduling next development steps	Scheduling the expansion of the target or size of the business model	25%

Deployment schedule of business model	Not scheduled	Deployment scheduled with a 2-year horizon or less	Deployment scheduled with a 2-year horizon or more	25%

If more than one business model is available for an indicator, note that only the best score per indicator will be kept.

IS 9.1 BUSINESS ACTIVITIES THAT INCREASE THE USE OF LOW-CARBON ENERGY

DESCRIPTION & REQUIREMENTS	IS 9.1 BUSINESS ACTIVITIES THAT INCREASE THE USE OF LOW-CARBON ENERGY
SHORT DESCRIPTION OF INDICATOR	The company is actively developing business models for a low-carbon future and participating in business activities that increase the use of low-carbon energy
DATA REQUIREMENTS	The questions comprising the information request that are relevant to this indicator are: ♦ IS 9.A: Business model subcategory, Description of business activity, Stage of development, Activity timeframe, Indicator of business size (over activity timeframe), Business size, What are your future plans for this activity? What is your deployment timeframe? How do you manage this business plan deployment? Variation of [C-ST4.9], [C4.3c]
HOW THE ANALYSIS WILL BE DONE	The analysis is based on the company's degree of activity in one of the future business model areas using the benchmark (sectoral roadmap). Relevant business activity areas for this indicator include: ♦ Switch to low-carbon electricity (use of renewables: on-site production or PPA that guarantees the development of a new renewable electricity source (additionality)) ♦ Switch to the use of sustainable biofuels ♦ Hazardous & Non-hazardous waste treatment (use as fuel) ♦ Hydrogen DRI (using low- or zero-GHG hydrogen) ♦ Hydrogen replacement of natural gas in DRI-EAF Note that energy efficiency measures and green electricity purchase (GO, REC,) are not business models and cannot be assessed here. These areas will be assessed in the quantitative modules as they decrease the Inclusive Scope 1+2 of the company.

CALCULATION OF THE SCORE:

For companies to align with a low-carbon future, it is expected that they pursue at least one of these future business model pathways and integrate them into their strategic plans. The analyst evaluates the description and evidence of the company's degree of activity in one of the future business model areas for the presence of best practice elements and consistency with the other reported management indicators. The company description and evidence are compared to the maturity matrix developed to guide the scoring and a greater number of points are allocated for elements indicating a higher level of maturity.

The minimum requirement for points to be awarded is that some level of exploration of one or more of these relevant business areas has started. This could include participation in collaborations, pilot projects, or research funding.

Best practice elements to be identified in the test/analysis include:

- the company has developed a mature business model that integrates one or many of the above elements
- the business activity is profitable
- the business activity is of a substantial size
- the company is planning to expand the business activity
- expansion will occur on a defined timescale

Maximum points are awarded if all these elements are demonstrated.

If several business models are developed by the company, the final score will be the one given to the most mature business model (usually the one that is best scored too). The company should not be penalized if it has built a mature business model, and also explores other tracks (which would be scored with a lower score) compared to another company having only one mature business model.

RATIONALE	IS 9.1 BUSINESS ACTIVITIES THAT INCREASE THE USE OF LOW-CARBON ENERGY
RATIONALE OF THE INDICATOR	See the Module rationale.

IS 9.2 BUSINESS ACTIVITIES AROUND STEEL CIRCULARITY (E.G., END-OF-LIFE COLLECTION, CIRCULAR ECONOMY, MATERIAL EFFICIENCY) AND CONTRIBUTION TO LOW-CARBON OPTIMIZATION OF STEEL SERVICES WITH AN EQUIVALENT PERFORMANCE

DESCRIPTION & REQUIREMENTS	IS 9.2 BUSINESS ACTIVITIES AROUND STEEL CIRCULARITY (E.G., END-OF-LIFE COLLECTION, CIRCULAR ECONOMY, MATERIAL EFFICIENCY) AND CONTRIBUTION TO LOW-CARBON OPTIMIZATION OF STEEL SERVICES WITH AN EQUIVALENT PERFORMANCE
SHORT DESCRIPTION OF INDICATOR	The company is actively developing business models around the circular economy, and participating in business activities associated with collecting, reuse and recycling of material. In addition, the company is actively working on improving design and use of their product that could increase the lifetime or environmental performance of the systems with equivalent or better performance
DATA REQUIREMENTS	The questions comprising the information request that are relevant to this indicator are: ♦ IS 9.B: Business model subcategory, Description of business activity, Stage of development, Activity timeframe, Indicator of business size (over activity timeframe), Business size, What are your future plans for this activity? What is your deployment timeframe? How do you manage this business plan deployment? Variation of [C-ST4.9], [C4.3c]
HOW THE ANALYSIS WILL BE DONE	Relevant business activity areas for this indicator include: ♦ Increase steel waste collection ♦ Improve systems of collection of end-of-life materials (e.g., careful separation of iron and steel when buildings are demolished) ♦ Increase the use of scrap steel in new available products ♦ Reduce new scrap creation through better product design (e.g., 3D printing and powder metallurgy) ♦ Product designs and end-of-life recycling processes that make it easier to separate copper from steel (to avoid copper contamination) ♦ Redesign products for materials efficiency and circularity ♦ More intensive use of steel-based products (e.g., sharing of products) ♦ Develop metallurgy to enable higher-quality and higher-value recycling of steel ♦ Develop higher-performance steel to increase the lifecycle of the end product

- Other actions reported

The calculation of the score is the same as in the IS 9.1 indicator.

RATIONALE	IS 9.2 BUSINESS ACTIVITIES AROUND STEEL CIRCULARITY (E.G., END-OF-LIFE COLLECTION, CIRCULAR ECONOMY, MATERIAL EFFICIENCY) AND CONTRIBUTION TO LOW-CARBON OPTIMIZATION OF STEEL SERVICES WITH AN EQUIVALENT PERFORMANCE
RATIONALE OF THE INDICATOR	See the Module rationale.

IS 9.3 BUSINESS ACTIVITIES RELATED TO SYNERGIES WITH OTHER INDUSTRIES (E.G., CCU/CCS, H2 OR EXHAUST GAS NETWORKS, CHEMICAL INDUSTRY, CEMENT INDUSTRY)

DESCRIPTION & REQUIREMENTS	IS 9.3 BUSINESS ACTIVITIES RELATED TO SYNERGIES WITH OTHER INDUSTRIES (E.G., CCU/CCS, H2 OR EXHAUST GAS NETWORKS, CHEMICAL INDUSTRY, CEMENT INDUSTRY)
SHORT DESCRIPTION OF INDICATOR	The company is actively developing business models around circular economy, through participation in business activities that create synergies with other industries, such as CCU/CCS, H2 or exhaust gas networks, chemical industry and cement industry.
DATA REQUIREMENTS	The questions comprising the information request that are relevant to this indicator are: ♦ IS 9.C: Business model subcategory, Description of business activity, Stage of development, Activity timeframe, Indicator of business size (over activity timeframe), Business size, What are your future plans for this activity? What is your deployment timeframe? How do you manage this business plan deployment? Variation of [C-ST4.9], [C4.3c]
HOW THE ANALYSIS WILL BE DONE	Relevant business activity areas for this indicator include: ♦ Development of CCU/CCS complete solutions: the analyst should pay attention to the products manufactured by CCU selling (time frame for the release of CO_2) ♦ Development of H2 or, if on-site valorisation is not possible, exhaust gas network to be used outside of the plant (in other industries or cities networks or to communities) ♦ Valorisation of by-products such as slags or carbon captured in the chemical or cement industry ♦ Develop more functionalities out of the steel by-products / scrap generated during the steel-making step

- Other actions reported

The calculation of the score is the same as in the IS 9.1 indicator.

RATIONALE	IS 9.3 BUSINESS ACTIVITIES RELATED TO SYNERGIES WITH OTHER INDUSTRIES (E.G., CCU/CCS, H2 OR EXHAUST GAS NETWORKS, CHEMICAL INDUSTRY, CEMENT INDUSTRY)
RATIONALE OF THE INDICATOR	See the Module rationale.

6. Assessment

6.1. SECTOR BENCHMARK

For the quantitative modules, two different types of benchmarks will be used depending on the type of actor in the sector.

The first benchmark is a convergence approach for integrated companies and steel-making companies. The allocation mechanism is taken from the sectoral decarbonization approach (SDA (11)) to science-based targets.

The sectoral pathway used is the one described in the IEA ETP 2020 Sustainable Development Scenario, and it only concerns CO_2 emissions, since other GHGs are not material in the iron and steel sector.

The iron and steel company production emissions benchmark (CB_G as in the indicator calculation) is the company's allocated decarbonization pathway ("company specific decarbonization pathway"). It is calculated from the sectoral decarbonization pathway.

To compute the SDA, the sector benchmark is used as an input to compute the company's benchmark that will adapt to the company's carbon intensity of the reporting year. The rate of convergence is determined by a market share parameter that will require the company to reduce its carbon intensity faster if its market share increases (based on the total amount of steel of IEA ETP 2020 projected), and a convergence index based on the emissions reduction pathway of the sector benchmark.

The second benchmark is the absolute contraction method from SBTi. Based on the data released in IEA ETP 2020 alone, it was not possible to create a SDA benchmark for steel-shaping companies only, so the WB2D scenario has been chosen for steel-shaping companies instead, as it matches with the SDA from IEA ETP 2020 Sustainable Development Scenario.

6.1.1. DESCRIPTION OF THE BENCHMARK

The fundamental target to achieve for all organizations is to contribute to not exceeding a threshold of 2ºC global warming compared to pre-industrial temperatures. This target has long been widely accepted as a credible threshold for achieving a reasonable likelihood of avoiding climate instability, while a 1.5ºC rise has been agreed upon as an aspirational target.

Consequently, low-carbon scenarios used for the benchmark are Well Below 2°C (WB2D) scenarios or 1.5°C scenarios.

Every company shall be benchmarked according to an acceptable and credible benchmark that aligns with the spatial boundary of the methodology. All steel-making and integrated companies shall be benchmarked to the global pathway for all technical routes as well as to the technical route-specific pathway. Steel-shaping companies will be benchmarked to the steel-shaping pathway (absolute contraction method from SBTi).

Later in the chapter, the reference pathway definition and classification are presented.

6.1.2. MECHANISMS TO COMPUTE THE COMPANY BENCHMARK

For the steel-making and integrated companies, the allocation mechanism chosen, as defined in the SDA, is the convergence mechanism. This allocation takes the company's emissions intensity in the initial year and converges it to the sector's emissions intensity in 2050 at a rate that ensures that the corresponding sectoral carbon budget is not exceeded.

Figure 22 illustrates the mechanism.

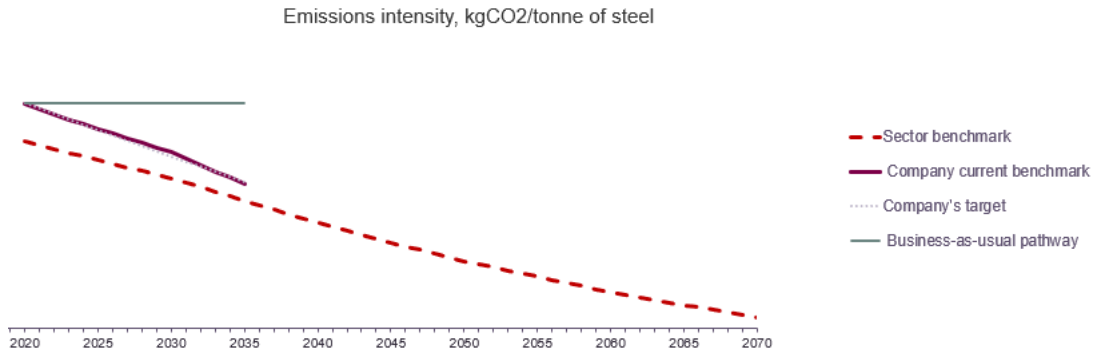


FIGURE 22 : CONVERGENCE MECHANISM ILLUSTRATION

Thus, companies starting from a lower intensity will have a shallower decarbonization pathway than companies starting from a higher intensity. In this way, past action or inaction to reduce intensity is taken into consideration.

Two routes (ways of producing steel) have been created based on IEA ETP 2020 data and other sources from IEA:

- Scrap-EAF route
- Ore route (gathers all routes except the Scrap-EAF route). This includes all direct emissions, electricity consumption and steel production from the iron and steel sector AFTER subtracting the data from the Scrap-EAF route.
- All route. i.e. combining the two routes above.

A finer granularity of routes might be built in future updates of the ACT Iron & Steel Methodology (such as DRI-EAF with or without CCUS).

For steel-shaping companies, due to low data availability, it is not possible to use the convergence approach. The absolute contraction method is used instead. All companies in the steel-shaping segments are expected to reduce their Scope 1+2 emissions by 2.5% every year for 15 years, thus a reduction of 37.5% over a 15-year period (annual linear variation). This is the SBTi approach that corresponds to the WB2D scenario of IEA ETP and thus compatible with the Sustainable Development Scenario (SDS) used in the convergence approach for the steel-making and integrated segments.

The contraction approach provides the company with the amount of absolute CO_2 emissions that it cannot exceed. To be consistent with the other types of actors (integrated and steel-making companies), ACT will compute the corresponding emissions intensity. The numerator (CO_2) will be the one provided by the absolute contraction approach, and the denominator will be the tonne of steel processed by the steel-shaping company. Note that there is no sector benchmark for absolute contraction.

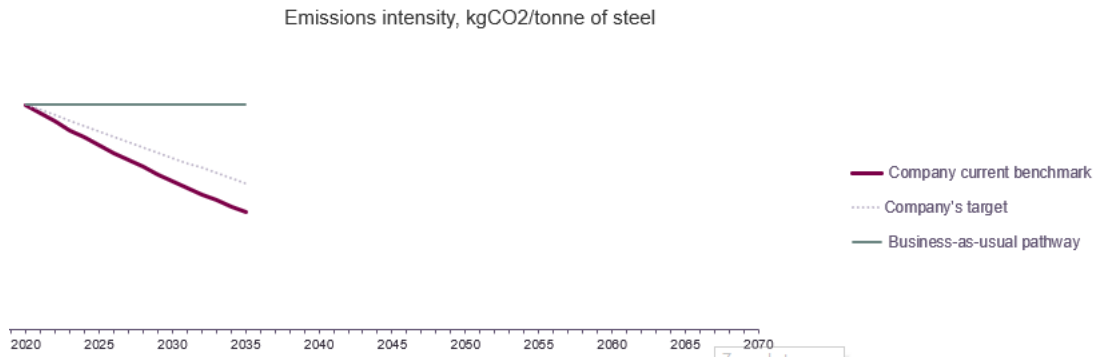


FIGURE 23: ABSOLUTE CONTRACTION MECHANISM ILLUSTRATION (IN THIS EXAMPLE, THE VOLUME OF STEEL PROCESSED BY THE FICTIONAL COMPANY INCREASES, HENCE A NON-LINEAR CURVE REQUIRING THE COMPANY TO DECREASE ITS CARBON INTENSITY FASTER)

6.1.3. REFERENCE PATHWAY CLASSIFICATION

A reference pathway defines the carbon intensity (kg CO_2 / tonne crude steel produced or processed) pathway for a given company type.

For the iron and steel sector the following types of pathways are considered:

- A Global Pathway for the steel-making (integrated and steelmakers) companies (SDA)
- 2 technical route-specific pathways for the steel-making (integrated and steelmakers) companies:
    - Ore based pathway (SDA)
    - Scrap-EAF pathway (SDA)
- A pathway for the steel-shaping companies (SBTi absolute contraction approach)

6.1.4. AVAILABLE REFERENCE PATHWAYS

The available pathway that will be used as the basis for the methodology development of the Global, Ore based and Scrap-EAF pathways is the one described in the IEA ETP 2020 Sustainable Development Scenario presented in Figure 24.

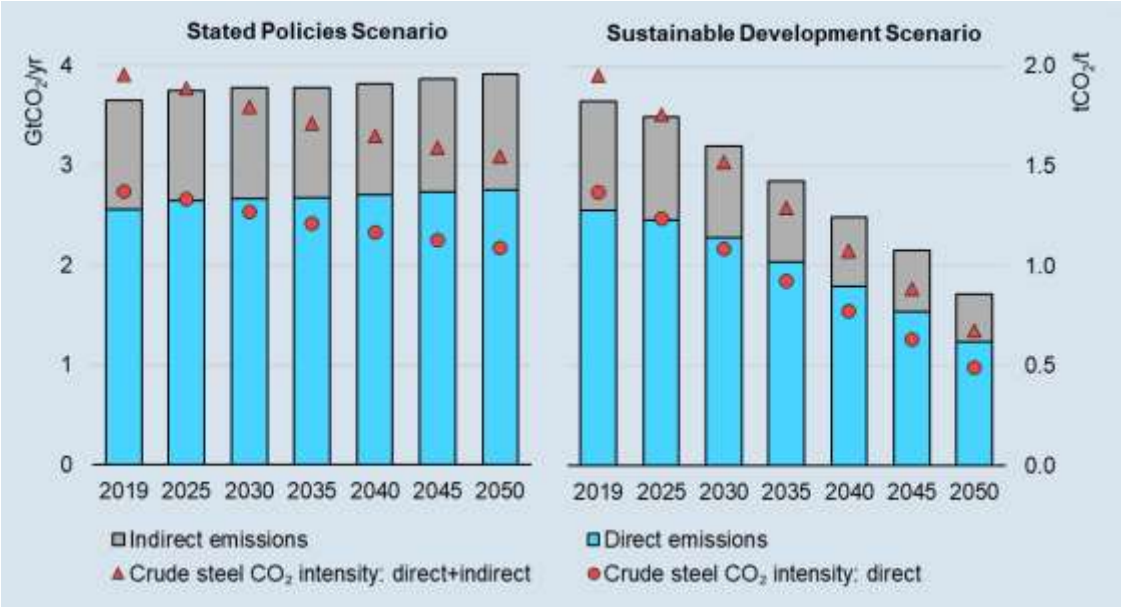


FIGURE 24: IEA DIRECT AND INDIRECT CO_2 EMISSIONS FOR CRUDE STEEL FOR STATED POLICIES SCENARIO AND SUSTAINABLE DEVELOPEMENT SCENARIO (SDS)

The ETP pathway shows the direct and indirect emissions (Scope 1 and 2) evolution in the Sustainable Development Scenario. The boundaries include emissions coming from the following activities (see details in Annex 0):

- Manufacture of basic Iron and Steel [ISICS – 24.10] (31)
- Casting of Iron and steel [ISICS – 24.31] (31)

Moreover, it is to be noticed that:

- Emissions from electrolytic hydrogen production, which is using electricity from the grid, are considered as indirect. For fossil-based hydrogen production, this depends on where it is produced – whether on-site of the plant (for example within the DRI-EAF route and hence direct) or if it is imported (hence indirect).
- The upstream CO_2 emissions of biomass is not taken into account. In general, biomass is considered carbon neutral within the IEA analysis, so any emissions resulted from its combustion are considered as zero.
- Ferroalloy production CO_2 emissions are included.

Figure 25 is a view of the calculated pathway for the ACT Iron and Steel Methodology from IEA ETP 2020 Sustainable Development Scenario.

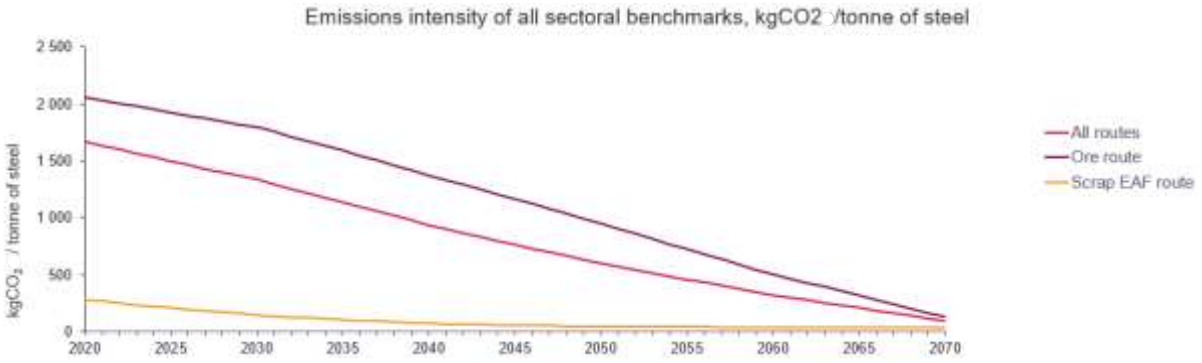


FIGURE 25: CALCULATED PATHWAY FROM IEA ETP 2020 SDS FOR CRUDE STEEL (ALL ROUTES, ORE ROUTE, SCRAP-EAF ROUTE)

"All routes" pathway is the IEA ETP 2020 pathway for the iron and steel sector.

To compute the SDA per route for "Ore based" and "Scrap-EAF" routes, calculations are based on the SDA from the iron and steel sector.

ACT computed the production of steel for the "Scrap-EAF route" and the carbon intensity for Scope 1 based on IEA iron and steel technology roadmap, as well as electricity consumption for this route (IEA sources). The assumptions made are the following:

- Direct emissions remain constant for the scrap-EAF route starting at 2019
- Linear decrease in electricity consumption (attributable to electricity generation) from 2019 to 2050 – flat afterwards
- Decrease in electricity emissions intensity (IEA ETP 2020)

This enabled the creation of an SDA convergence pathway for the Scrap-EAF route.

To get the SDA convergence pathway for the Ore based route, ACT computed the data by subtracting the data of the Scrap-EAF route from the global iron and steel pathway.

6.2. BENCHMARKS USED FOR INDICATORS

Table 10 lists the benchmarks used for the quantitative indicators and their sources:

TABLE 10: BENCHMARKS FOR THE INDICATORS

BENCHMARK	PARAMETER	SOURCE	INDICATOR RELEVANCE
Company and sector benchmark	Production Emissions: Scope 1+2 CB_G	IEA ETP 2020 (12) - background scenario data SDA (11) – specific benchmark pathway definition SBT – WB2DS https://sciencebasedtargets.org/step-by-step-process#develop-a-target WorldSteel data collection (32)	IS 1 IS 2 IS 4
R&D benchmark for iron and	TRL	Maturity of technology – TRL IEA ETP 2020 (12) and IEA website	IS 3

steel technology		IIPI network website http://www.iipinetwork.org/wp-content/Ietd/content/Iron-and-Steel.html	
Governance benchmark	TCFD		IS 5
Average lifetime of assets		• "The EII (Energy Intensive Industries) are highly capital-intensive with an average investment cycle of 20 to 30 years hence they need predictability of energy costs so as to limit investment risks. " - COMMUNICATION FROM THE COMMISSION TO THE PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF REGIONS - Action Plan for a competitive and sustainable steel industry in Europe – 2013 • "Evolution of any new technology is a long-drawn process. It may take about 5~20 years and beyond to achieve maturity of a concept/idea." & "Renovate/ modify obsolete facilities/machinery put up in the last 20 years" - REPORT OF THE WORKING GROUP ON STEEL INDUSTRY FOR THE TWELFTH FIVE YEAR PLAN (2012 – 2017) – 2011 (Indian iron and steel Industry)	IS 2
Business model		WorldSteel indicators and figures (33) (34) Ellen Macarthur Foundation (30) Material Economics (35) IEA ETP 2020 (12)	IS 9

6.3. WEIGHTINGS

The selection of weightings for both the Modules and the individual indicators was guided by the principles of value of information, impact of variation, future orientation and data quality sensitivity (see ACT framework (1)). The ACT Guidance (10) gives percentage ranges for the Modules.

6.3.1. DYNAMIC WEIGHTINGS OF MODULE 2 AND MODULE 4

- **Principle**

Modules are weighted depending on where the emissions of the assessed company are the most significant:

- The Module 2 (Direct operations) is focussed on the actions of the company to reduce its Inclusive Scope 1+2 emissions.
- The Module 4 (Indirect operations) is focussed on the actions of the company to reduce its Scope 3 upstream emissions

This dynamic calculation has been developed to consider the stainless-steel variable CO_2 emissions for steel-making and integrated companies.

Note: For upstream Scope 3 emissions, the analyst should focus on the ones that are relevant for the company. The exercise is not to get an exhaustive list unless it is the first time the company is making this list. This should be considered when completing the questionnaire.

For integrated companies, the weight for indicator IS 4.1 linked to purchased steel depends on the relative share of CO_2 emissions linked to the purchased steel vs those linked to all the processed steel.

- **Calculation**

The $Share_{Scope3upstream}$ is defined at corporate level for the reporting year as:

$$Share_{Scope3\ upstream} = \frac{\sum(Scope\ 3\ upstream\ emissions)}{\sum(scope\ 1{+}2\ emissions) + \sum(Scope\ 3\ upstream\ emissions))}$$

The weights for Module 2 and Module 4 are calculated according to the formula:

$Weight_{M2}$ = 32% - 22% x $Share_{Scope3\ upstream}$

$Weight_{M4}$ = 10% + 22% x $Share_{Scope3\ upstream}$

The weight for indicators IS 4.1 and 4.2 for integrated companies are calculated according to the formula:

$$Weight_{IS4.1} = \frac{10}{32} \times Weight_{M4} \times \frac{CO_2\ emissions\ linked\ to\ purchased\ crude\ steel}{CO_2\ emissions\ linked\ to\ (purchased + produced)\ crude\ steel}$$

Rationale for $\frac{10}{32}$: IS 4.1 and IS 4.2 weighting ratio is the same for steel shaping companies and a hypothetical integrated company that would produce no steel.

6.3.2. PERFORMANCE INDICATOR WEIGHTINGS AND PERFORMANCE MODULE WEIGHTINGS

TABLE 11: PERFORMANCE INDICATOR WEIGHTINGS

IS	Modules	Indicators	INTEGRATED	STEELMAKING	STEEL SHAPING
1.1	1.Targets	Alignment of emissions reduction targets	10%	10%	10%
1.2		Time horizon of targets	3%	3%	3%
1.3		Achievement of previous targets	2%	2%	2%
2.1	2.Direct operations (Inclusive Scope 1+2)	Trend in past emissions intensity for (global) crude steel production	$Weight_{M2}$ x 9.5% (1 - 3%)	$Weight_{M2}$ x 12.5% (1 - 4%)	2%
2.2		Trend in past emissions intensity per technical route, per type	$Weight_{M2}$ x 12.5% (1 - 4%)	$Weight_{M2}$ x 12.5% (1 - 4%)	
2.3		Locked-in emissions for crude steel production	$Weight_{M2}$ x 28% (3 – 9%)	$Weight_{M2}$ x 28% (3 – 9%)	
2.4		Trend in future emissions intensity for (global) crude steel production	$Weight_{M2}$ x 12.5% (1 - 4%)	$Weight_{M2}$ x 12.5% (1 - 4%)	4%
2.5		Trend in future emissions intensity per technical route, per type	$Weight_{M2}$ x 12.5% (1 - 4%)	$Weight_{M2}$ x 12.5% (1 - 4%)	
2.6		Scrap reduction strategy	$Weight_{M2}$ x 3% (0 – 1%)		4%
2.7		Co-products/waste reduction, reuse and recycling activities	$Weight_{M2}$ x 22% (2 – 7%)	$Weight_{M2}$ x 22% (2 – 7%)	
3.1		R&D in climate change mitigation technologies	7%	7%	1%

3.2	3.Intangible Investment	Company low-carbon patenting activity	3%	3%	1%
4.1	4. Indirect operations (Scope 1+2+3 upstream)	Trend in past emissions intensity of purchased crude steel	$Weight_{IS4.1}$] (0% – 10%)		10%
4.2		Purchased product interventions	$Weight_{M4}$ – $Weight_{IS4.1}$ (7% – 32%)	$Weight_{M4}$ (10 – 32 %)	22%
5.1	5.Governance	Oversight of climate change issues	2%	2%	2%
5.2		Climate change oversight capability	1%	1%	1%
5.3		Low-carbon transition plan	3%	3%	3%
5.4		Climate change management incentives	1%	1%	1%
5.5		Climate change scenario testing	3%	3%	3%
6.1	6.Supplier engagement	Strategy to influence suppliers to reduce their GHG emissions	1%	1%	5%
6.2		Activities to influence suppliers to reduce their GHG emissions	1%	1%	5%
7.1	7. Client engagement	Strategy to influence customer behaviour to reduce their GHG emissions	3%	3%	3%
7.2		Activities to influence customer behaviour to reduce their GHG emissions	3%	3%	3%
8.1	8.Policy Engagement	Company policy on engagement with trade associations	2%	2%	2%
8.2		Trade associations supported do not have climate-negative activities or positions	1%	1%	1%
8.3		Position on significant climate policies	2%	2%	2%
9.1	9.Business model	Business activities that increase the use of low-carbon energy	3%	3%	5%
9.2		Business activities around steel circularity (e.g., end-of-life collection, circular economy, material efficiency) and contribution to low-carbon optimization of steel services with an equivalent performance	5%	5%	5%
9.3		Business activities related to synergies with other industries (CCU/CCS, H2 or exhaust gas networks, chemical industry, cement industry, etc)	2%	2%	
TOTAL			**100%**	**100%**	**100%**

For integrated and steel-making actors, the quantitatively scored Modules (Targets, Direct operations, Intangible investment, Indirect operations) carry 67% of the final weight, and the qualitatively scored Modules (Governance, Policy engagement, Business model) carry 33%.

For steel-shaping actors, the quantitatively scored Modules (Targets, Direct operations, Intangible investment, Indirect operations) carry 59% of the final weight, and the qualitatively scored Modules (Governance, Policy engagement, Business model) carry 41%. The indicators within the Modules also carry their own weighting.

TABLE 12 : MODULE WEIGHTINGS

	INTEGRATED		STEELMAKING		STEEL SHAPING	
Modules	**Weight**	**Rationale**	**Weight**	**Rationale**	**Weight**	**Rationale**
1. Targets	**15%**	Fixed weight across all sectors	**15%**	Fixed weight across all sectors	**15%**	Fixed weight across all sectors
2. Direct operations	**10%-32%**	Owned assets (production infrastructure) could represent a high source of emissions	**10%-32%**	Owned assets (production infrastructure) could represent a high source of emissions.	**10%**	Owned assets do not represent a high source of emissions, but they need investments
3. Intangible Investment	**10%**	R&D investments for low-carbon innovation are crucial for the value chain	**10%**	R&D investments for low-carbon innovation are crucial for the value chain	**2%**	R&D investments for low-carbon innovation exist but not crucial for the value chain
4. Indirect operations	**10%-32%**	Raw materials could be critical especially for stainless steel producers	**10%-32%**	Raw materials could be critical especially for stainless steel producers	**32%**	The upstream emissions represent a large part of emissions and can be assessed through the Indirect operations Module.
5. Governance	**10%**	Fixed weight across all sectors	**10%**	Fixed weight across all sectors	**10%**	Fixed weight across all sectors
6. Supplier	**2%**	Upstream suppliers are not strategically significant, compared to the rest of the value chain.	**2%**	Upstream suppliers are not strategically significant, compared to the rest of the value chain.	**10%**	High level of influence on upstream suppliers
7. Client	**6%**	Improvement potential by working with client on the right steel for the right application (including reducing scrap production and increasing scrap recycling)	**6%**	Improvement potential by working with client on the right steel for the right application	**6%**	Improvement potential by working with client on the right steel for the right application
8. Policy engagement	**5%**	Average weight compared to the other sectors	**5%**	Average weight compared to the other sectors	**5%**	Average weight compared to the other sectors
9. Business Model	**10%**	Fixed weight across all sectors	**10%**	Fixed weight across all sectors	**10%**	Fixed weight across all sectors

6.3.3. RATIONALE FOR WEIGHTINGS

The selection of weightings for both the Modules and the individual indicators was guided by a set of principles. These principles helped define the value of the indicators.

PRINCIPLE	EXPLANATION
Value of information	The value of the information that an indicator gives about a company's outlook for the low-carbon transition is the primary principle for the selection of the weights.
Impact of variation	A high impact of variation in an indicator means that not performing in such an indicator has a large impact on the success of a low-carbon transition, and this makes it more relevant for the assessment.
Future orientation	Indicators that measure the future, or a proxy for the future, are more relevant for the ACT assessment than past & present indicators, which serve only to inform the likelihood and credibility of the transition.
Data quality sensitivity	Indicators that are highly sensitive to expected data quality variations are not recommended for a high weight compared to other indicators, unless there is no other way to measure a dimension of the transition.

Based on exchanges with the TWG and the bibliography work for the iron and steel sector, weightings have been defined as below:

1. **Targets: 15%**

Description of the weighting for: • **Integrated actors**	**Description of the weighting for:** • **Steel-making actors** • **Steel-shaping actors**
For integrated actors, each indicator is doubled to be added for each segment. The weightings for each indicator presented for other actors are divided by two.	The Targets Module has a relatively large weight of 15%. Most of it is placed on the '*alignment of Scope 1+2 emissions reduction targets*' with 10%. The '*time horizon of targets'* is a proxy of how forward-looking the company is, and has a medium weight of 3%. Finally, the '*achievement of previous targets'* indicator measures the company's past credentials on target setting and achievement, which provides more contextual information on the company's ability to meet ambitious future targets. This indicator is given a weighting of 2%.

2. **Direct operations: Weighting depends on company type**

Total weighting for the Module: 32% to 10% depending on the share of upstream Scope 3 emissions **Description of the weighting for** • **Integrated actors** • **Steel-making actors**	**Total weighting for the Module: 10%** **Description of the weighting for** • **Steel-shaping actors**

Manufacturing iron and steel requires high and long-term investment with best available technologies. Roadmaps specific to the iron and steel sector show that resources and energy efficiency are key for low-carbon transition. This is the primary Module that assesses the development of the company's assets, and how these existing assets influence the likelihood of a low-carbon transition. The "*locked-in emissions"* indicator uses the same information but tries to measure the amount of GHG emissions that the company has already committed from its individual carbon budget. This means it is also future-oriented and receives a weight of 9% to 3%. In the short-term, the company's current portfolio and confirmed planned assets are used to generate an estimate of the company's *"trend in future emissions intensity"*. As this is a direct measurement of the decarbonization pathway, has a high impact of variation, and looks to the future, it receives a weighting of 8% to 2%. The "*trend in past emissions intensity"* is an indication of the 'adjustment' that the company must make to place itself on a low-carbon pathway. This indicator is given a weighting of 7% to 2%. The indicator *"Co-products/waste reduction, reuse and recycling activities"* aims to encourage actors to implement best practices and is given a weighting of 7% to 2%. *"Scrap reduction strategy"* is also applicable for integrated actors and is weighted at 1% to 0%.	As owned assets do not represent a high source of emissions, only 10% is attributed to the total Module. The indicator "*trend in future emissions intensity*" is weighted 4% and the "*trend in past emissions intensity*", only 2%. *"Scrap reduction strategy"* is an important indicator for measuring a company's commitment to improving the "steel loop". This indicator is given a 4% weighting. Locked-in emissions are not relevant here.

3. Intangible Investment: Weighting depends on company type

Total weighting for the Module: 10% **Description of the weighting for** • **Integrated actors** • **Steel-making actors**	**Total weighting for the Module: 2%** **Description of the weighting for** • **Steel-shaping actors**
"*R&D in climate change mitigation technologies*" reflects the R&D efforts of the company to prepare their low-carbon transition, which are key to developing the technologies (such as CCS/CCU) needed to reduce otherwise unavoidable emissions in the future. It is given a weighting of 7%. As "*low-carbon patenting activity*" is a new way to assess R&D involvement of a company, a low weighting (3%) is attributed to this indicator.	R&D is not key to decarbonizing the sector for downstream actors since their assets are not high emitting. However, they can undertake some R&D in the area of steel processing. A low rating of 1% is attributed to each indicator.

4. Indirect operations: Weighting depends on company type

Total weighting for the Module: 10% to 32% depending on the share of upstream Scope 3 emissions **Description of the weighting for** • **Integrated actors** • **Steel-making actors**	**Total weighting for the Module: 32%** **Description of the weighting for** • **Steel-shaping actors**
Raw materials such as ferroalloy, lime fluxes, H_2, iron ore or graphite for anodes are critical to the production of iron and steel. This Module encourages actors to implement interventions which decrease emissions from products purchased from hotspot suppliers, via *"Purchased product interventions".* These present and future actions are key to ensuring GHG emissions reductions, so the indicator is given a weighting of 10% to 32% for steel-making actors and 7% to 32% for integrated companies. As integrated companies may purchase part of the steel they process, they are also assessed on IS 4.1 (trend in past emissions intensity of purchased steel). The weighting of IS 4.1 (0 to 10%) depends on the share of CO_2 emissions of purchased steel vs all processed steel. - Maximum = 31% of the total weighting of module 4 (thus 10% max) - Minimum = 0% (no purchased steel). **The weighting ratio between IS 4.1 and IS 4.2 is the same as for steel shaping companies.**	As the performance of purchased products represents a high source of emissions, the "*trend in past emissions intensity"* is an indication of the 'adjustment' that the company must make to place itself on a low-carbon pathway. This indicator is given a 10% weighting. This Module encourages actors to implement interventions which decrease emissions from products purchased from hotspot suppliers, via *"Purchased product interventions".* These present and future actions are key to ensuring GHG emissions reductions, so the indicator is given a weighting of 22%.

5. Governance: 10%

Governance is a multi-faceted Module. It incorporates many smaller indicators that together create a narrative of the company's management and strategic approach to the low-carbon transition.

Based on the principle of future orientation, the main elements of the overall 10% weighting are the "*Low-carbon transition plan*" and "*Climate change scenario testing"*, which are both given a weighting of 3%. Both indicators provide valuable insights into how a company will manage its transition, given its unique constraints and opportunities.

The indicators "*Oversight of climate change issues"* and *"Climate change management incentives"* are both weighted at 1%. These indicators provide more information on how a company is managed and whether emissions-related decisions are made at the highest levels of management. They are contextual indicators,

the outcome of which can strengthen or undermine the company's ability to carry out the transition plan and meet ambitious science-based targets.

6. Supplier engagement: Weighting depends on company type

Total weighting for the Module: 2% **Description of the weighting for** • **Integrated actors** • **Steel-making actors**	**Total weighting for the Module: 10%** **Description of the weighting for** • **Steel-shaping actors**
In order to develop the technology required for the low-carbon transition, it is essential that all actors involve their supply chains. The indicator "*Activities to influence suppliers to reduce their GHG emissions"* focuses on current actions of a company towards its suppliers, whereas the indicator *"Strategy to influence suppliers to reduce their GHG emissions"* focuses on the global strategy and general activities that a company has in place with respect to its engagement with suppliers and thus is more future-oriented. However, it is not an indicator that is easy to measure and relies heavily on data quality to make a proper analysis. The indicators are therefore equally weighted.	
Suppliers for upstream value chain are not strategically significant compared to the rest of the value chain. As such, the module is given a weighting of 2%.	Steel-shaping actors have a high level of influence on upstream actors. As such, the module is given a weighting of 10%.

7. Client engagement: 6%

The client engagement Module is focused on the company's efforts to promote low-carbon products, more efficient use of iron and steel (right steel for the right use, with the right quantities) and recycling of products to their customers. This information helps to identify companies making real efforts to make low-carbon iron and steel a significant part of their sales and to encourage their clients to sort scrap. Nevertheless, this module alone is a narrow aspect of the transition and therefore its total weighting is medium at 6%.

8. Policy Engagement: 5%

In line with the rationale for management indicators with low weightings, the policy engagement indicators are also contextual aspects which tell a narrative about the company's stance on climate change and how the company expresses this in their engagement with policy makers and trade associations. The total weight for this Module is therefore medium at 5%. As the *''Trade associations supported do not have climate-negative actions or positions'* is more difficult to assess than other indicators as this type of data might not be public, it is given a lower weighting.

9. Business Model: 10%

Description of the weighting for • **Integrated actors** • **Steel-making actors**	Description of the weighting for • **Steel-shaping actors**
The integration of a low-carbon economy in current and future business models is a composite indicator that captures many elements that cannot otherwise be captured in any of the other Modules. It includes information that is relevant to the transition but is not directly a part of the company's primary activities. It is future-oriented since it asks companies about their narrative on specific changes to business models and strategy that the sector can/must make to transition. As this is an important aspect of long-term future planning, it holds a medium weight of 10% in the analysis.	
The IEA analysis **(12)** shows that the primary way to decarbonize the sector is to have a specific focus on low-carbon energy use. Regarding this priority, the indicator "*Business activities that increase the use of low-carbon energy*" is weighted at 3%. The indicator "*Business activities around steel circularity and low-carbon optimization of steel services with an equivalent performance*" covers, for example, end-of-life collection, circular economy and material efficiency. It is weighted at 5%. Through synergies with other industries, such as CCU/CCS, companies are able to improve the circularity of their business models, thus contributing to emissions reductions within the iron and steel sector or other sectors. As such, the indicator "*Business activities related to synergies with other industries*" is weighted at 2%.	The IEA analysis (12) shows that the primary way to decarbonize the sector is to have a specific focus on low-carbon energy use. Regarding this priority, the indicator "*Business activities that increase the use of low-carbon energy*" is weighted at 5%. Product performance depends also on the forming and shaping of the product sold to the final user and the steel circularity, so the indicator "*Business activities around steel circularity and low-carbon optimization of steel services with an equivalent performance"* should be consistent throughout the value chain. It is therefore weighted at 5%.

7. Rating

The ACT rating shall comprise of:

→ A Performance Score

→ A Narrative Score

→ A Trend Score

These pieces of information shall be represented within the ACT rating as follows:

a. Performance score as a number from 0 (lowest) to 100 (highest)
b. Narrative score as a letter from E (lowest) to A (highest)
c. Trend score as either "+" for improving, "-" for worsening, or "=" for stable.

The highest rating is thus represented as "100A+", the lowest as "0E-" and the midpoint as "50C=".

TABLE 13: LOWEST, HIGHEST AND MIDPOINT FOR EACH ACT SCORE TYPE

LOW SCORES	MID SCORES	HIGH SCORES
0 E -	50 C =	100 A +

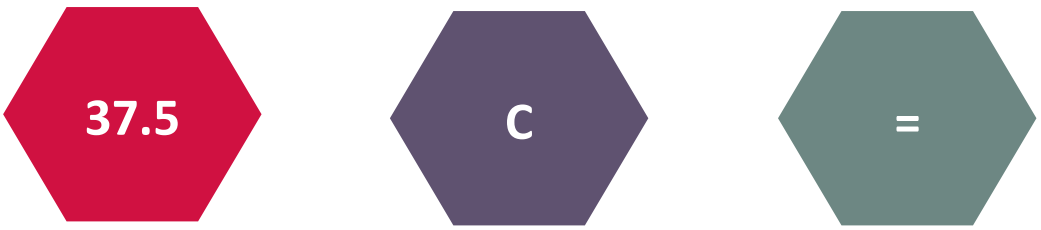
See the ACT Framework [1] for general information and methodology on the ACT rating.

7.1. PERFORMANCE SCORING

A detailed description of the Performance indicators and of their weightings for the iron and steel sector is presented in 5.3 Performance indicators. Performance scoring shall be performed in compliance with the ACT Framework. No additional sector-specific issue impacting the Performance scoring for this sector has been identified to date.

Figure 26 shows the results of the road test phase of the methodology, involving a sample of 14 companies (integrated and steel-making actors).

Overall Results



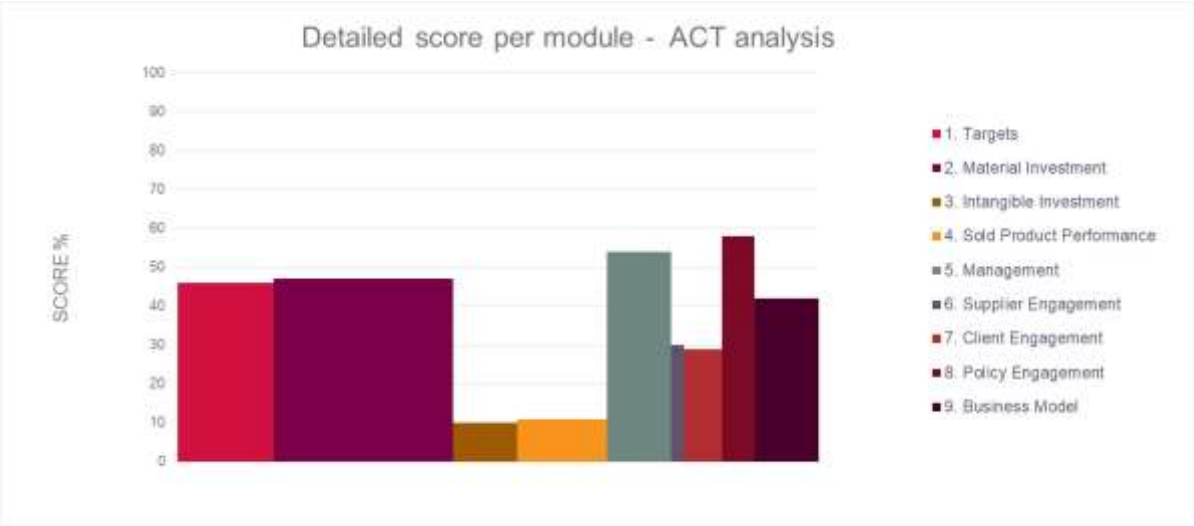


FIGURE 26: AVERAGE RATINGS FOR THE PERFORMANCE SCORE FOR THE IRON AND STEEL SECTOR FROM ROADTEST PHASE. PERFORMANCE SCORE ARE BROKEN DOWN BY MODULE (THE WIDTH OF THE BARS IS PROPORTIONAL TO THE MODULE'S WEIGHTING).

7.2. NARRATIVE SCORING

Narrative scoring shall be performed in compliance with the ACT Framework, assessing the company on the 4 following criteria:

- Business model and strategy
- Consistency and credibility
- Reputation
- Risk

The organisation of the company – type of actors and assets – shall be considered in the narrative assessment and narrative scoring for the iron and steel sector.

The information reported in Module 2 and 4 shall be considered with particular attention for the narrative analysis because those Modules capture the bulk of the CO_2 emissions generated in the iron and steel sector. Especially in IS 4.2, raw materials management, hotspots should be justified.

The analyst should also look at the way that the industry is integrating circular economy actions in their strategy.

With this information, the analyst can take a holistic view on the company's actions to perform deep decarbonization of its process and assess the consistency of actions taken with respect to targets, business model and engagement with other stakeholders.

No other sector-specific issue impacting the Narrative scoring for this sector has been identified to date.

7.3. TREND SCORING

Trend scoring shall be performed in compliance with the ACT Framework.

To apply the Trend scoring methodology presented in the ACT Framework, the analyst should identify the trends from the existing data infrastructure based on the data points and/or indicators that can indicate the future direction of change within the company.

Table 14 includes an overview of which indicators/data points could possibly have valuable information about future directions for the iron and steel sector.

TABLE 14 : RELEVANT PERFORMANCE INDICATORS FOR TREND IDENTIFICATION FOR THE IRON AND STEEL SECTOR

MODULE	INDICATOR
1.TARGETS	IS 1.1 Alignment of emissions reduction targets IS 1.2 Time horizon of targets
2. DIRECT OPERATIONS	IS 2.3 Locked-in emissions of crude steel production assets IS 2.4 Trend in future emissions intensity of all crude steel production assets IS 2.5 Trend in future emissions intensity per technical route IS 2.6 Scrap reduction strategy
3. INTANGIBLE INVESTMENT	IS 3.1 R&D in climate change mitigation technologies
4. INDIRECT OPERATIONS	IS 4.2 Purchased product interventions
5. GOVERNANCE	IS 5.3 Low-carbon transition plan IS 5.5 Climate change scenario testing
6. SUPPLIER	IS 6.1 Strategy to influence suppliers to reduce their GHG emissions
7. CLIENT	IS 7.1 Strategy to influence customer behaviour to reduce their GHG emissions
9. BUSINESS MODEL	IS 9.1 Business activities that increase the use of low-carbon energy IS 9.2 Business activities around steel circularity (e.g., end of life collection, circular economy, material efficiency, etc) and contribution to low-carbon optimization of steel services with an equivalent performance IS 9.3 Business activities related to synergies with other industries (CCU/CCS, H2 or exhaust gas networks, chemical industry, cement industry, etc)

8. Aligned state

Figure 27 presents the response of a low-carbon aligned company of the sector to the five ACT questions:

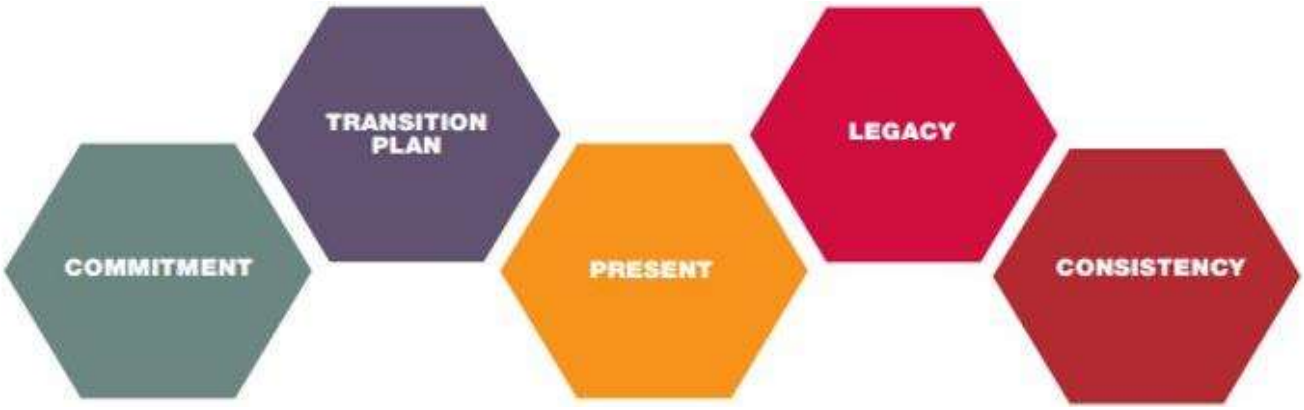
→ What is the company planning to do? **[Commitment]**

→ How is the company planning to get there? **[Transition Plan]**

→ What is the company doing at present? **[Present]**

→ What has the company done in the recent past? **[Legacy]**

→ How do all these plans and actions fit together? **[Consistency]**



1	2	3	4	5
The company has science-based targets covering direct emissions and significant upstream emissions. Collaboration with the main suppliers, ensuring they are also low-carbon aligned, is key to making a low-carbon product that is of both high quality and performance for the final use.	The company discloses a transition plan that details a growing share of low-carbon systems and services and operational steps to achieve their objectives	The investment strategy for new production capacity, refurbishment and R&D places clear focus on low-carbon alternatives or decarbonization technologies	A trend is evident of lowering emissions intensity of delivered product and developing systems and services. The company achieved this decrease through deliberate operational or investment decisions	The company's targets, transition plan, present action and past legacy show a consistent willingness to achieve the goals of low-carbon transition. The company operates as a strong actor in the circular economy during all the life cycle stages of the product.

FIGURE 27: ALIGNED STATE FOR COMPANIES IN THE IRON AND STEEL SECTOR

9. References

1. **ACT Initiative.** *ACT Framework, version 1.1.* 2019.
2. **BCG.** Steel's Contribution to a low-carbon Europe 2050. Technical and economic analysis of the sector's CO2 abatement potential. [Online] 2013. https://www.bcg.com/publications/2013/metals-mining-environment-steels-contribution-low-carbon-europe-2050.aspx.
3. **World Steel Association.** About Steel. [En ligne] [Citation : 23 November 2021.] https://www.worldsteel.org/about-steel/about-steel.html.
4. **EU-MERCI.** European MEthods and procedures based on Real Cases for the effective implementation of polilcies and measures supporting energy efficiency in the Industry. HORIZON 2020 Project Nr. 36.845. Deliverable 4.2 Technical analysis - Iron and Steel sector. [Online] 9 September 2017. http://www.eumerci-portal.eu/documents/20182/41722/Iron+and+Steel.pdf/a86fed1f-634d-4854-9b01-c7b1664ac125.
5. **Schneider, H*.** Rolling mills. *Encyclopaedia of Occupational Health and Safety.* [Online] http://www.ilocis.org/documents/chpt73e.htm#JD_Figure73.13.
6. **World Steel Association.** The White book of Steel. [Online] 2012. https://www.worldsteel.org/en/dam/jcr:7b406f65-3d94-4e8a-819f-c0b6e0c1624e/The%2520White%2520Book%2520of%2520Steel_web.pdf. ISBN 978-2-930069-67-8.
7. **Primetals technologies.** The winding road toward zero-carbon iron. [Online] January 2020. https://www.primetals.com/press-media/metals-magazine/issue-02-2020/the-winding-road-toward-zero-carbon-iron.
8. *Comparing the CO 2 Emissions of Different Steelmaking Routes.* **RAMMER, Barbara, MILLNER, Robert et BOEHM, Christian.** 7–13, s.l. : BHM Berg- und Hüttenmännische Monatshefte, 2017, Vol. 162.
9. **RAMMER, Barbara, MILLNER, Robert and BOEHM, Christian.** Comparing the CO2 Emissions of Different Ironmaking Routes. [Online] 13 September 2016. http://m-n.marketing/downloads/conferences/ecic2016/presentations/Dienstag%20Room%20B/Rammer,%20Primetals.pdf.
10. **ACT Initiative.** *Guidance for ACT sectoral methodologies development, version 1.0.* 2019.
11. **Science Based Targets Initiative.** *Sectoral Decarbonization Approach (SDA): A method for setting corporate emissions reduction targets in line with climate science.* 2015.
12. **IEA.** *Energy Technology Pespectives 2020.* 2020.
13. **European_Standards.** EN19694-2. [En ligne] https://www.en-standard.eu/csn-en-19694-2-stationary-source-emissions-greenhouse-gas-ghg-emissions-in-energy-intensive-industries-part-2-iron-and-steel-industry/.
14. **19694-2:2016, EN.** *Stationary source emissions - Greenhouse Gas (GHG) emissions in energy-intensive industries - Part 2: Iron and steel industry.* https://standards.cencenelec.eu/dyn/www/f?p=205:110:0::::FSP_ORG_ID,FSP_LANG_ID:6245,25&cs=10C1D054EEF984413E74F696F72A080C9.
15. **IEA.** *Tracking Clean Energy Progress 2017- Energy Technology Perspectives 2017 Exerpt.* 2017.
16. **EU.** *COMMUNICATION FROM THE COMMISSION TO THE PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF REGIONS - Action Plan for a competitive and sustainable steel industry in Europe.* 2013.
17. **Working_group_steel_industry.** *REPORT OF THE WORKING GROUP ON STEEL INDUSTRY FOR THE TWELFTH FIVE YEAR PLAN (2012 – 2017) – 2011 (Indian iron and steel industry)[RR1] .*
18. **WRI.** [En ligne] https://www.wri.org/insights/carbon-lock-in-definition.
19. **IEA.** [En ligne] https://iea.blob.core.windows.net/assets/beceb956-0dcf-4d73-89fe-1310e3046d68/NetZeroby2050-ARoadmapfortheGlobalEnergySector_CORR.pdf.
20. **IPCC.** *IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3, Chapter 2.* 2006.
21. **UNEP.** *Guidelines for National Waste Management Strategies.* 2013.
22. **Association, World Steel.** *Steel industry co-products.* 2020.
23. **CEN.** EN 19694-2:2016. Stationary source emissions - Greenhouse Gas (GHG) emissions in energy-intensive industries - Part 2: Iron and steel industry. [Online] 20 July 2016. https://standards.cen.eu/dyn/www/f?p=204:110:0::::FSP_PROJECT,FSP_ORG_ID:38640,6245&cs=1C197D84E14A0753D823484C107832672.

24. **International Organization for Standardization.** ISO/AWI TS 19694-2. Stationary source emissions — Greenhouse Gas (GHG) emissions in energy-intensive industries — Part 2: Iron and steel industry. [Online] https://www.iso.org/standard/70746.html.

25. **Forum, GGSD.** *Low and zero emissions in the steel and the cement industries.* 2019.

26. **IIGCC.** *https://www.iigcc.org/resource/net-zero-investment-framework-implementation-guide/.*

27. **EU technical expert group on sustainable finance.** *Final report of the Technical Expert Group on Sustainable Finance and Updated methodology & Updated Technical Screening Criteria.* 2020.

28. **IIGCC.** *Investor Expectations of Companies in the Construction Materials Sector.* 2019.

29. **TCFD.** Strategy. [En ligne] [Citation : 22 11 2021.] https://www.tcfdhub.org/strategy/.

30. **Ellen Macarthur Foundation, Material Economics.** *Completing the picture how the circular economy tackles climate change.* 2019.

31. **Nations, United.** International_Standard_Industrial_Classification_Rev4. [En ligne]

32. **World Steel Association.** CO2 emissions data collection, User guide, version 7. [Online] 25 May 2015. https://www.worldsteel.org/en/dam/jcr:0e4a13c7-1cf7-4b9b-9577-17b752441249/Data+collection+user+guide.pdf.

33. —. World steel in figures. [Online] 2019. https://www.worldsteel.org/en/dam/jcr:96d7a585-e6b2-4d63-b943-4cd9ab621a91/World%2520Steel%2520in%2520Figures%25202019.pdf.

34. —. Sustainability indicators 2003 - 2018. [Online] January 2020. https://www.worldsteel.org/en/dam/jcr:296df0e7-6182-4574-bbc9-f8fbeac12d4e/Sustainability%2520indicators%25202003%2520to%25202018%2520and%2520participation.pdf.

35. **Material Economics.** *Industrial transformation 2050 - Pathways to Net-Zero Emissions from EU Heavy Industry.* 2019.

Other relevant documents

36. **European Commission, DG Climate Action.** Guidance document n°9 on the harmonized free allocation methodology for the EU-ETS post 2012. [Online] 2011. https://ec.europa.eu/clima/sites/clima/files/ets/allowances/docs/gd1_general_guidance_en.pdf.

37. **International Stainless Steel Forum.** Stainless Steel in Figures. [Online] 2019. https://www.worldstainless.org/Files/issf/non-image-files/PDF/ISSF_Stainless_Steel_in_Figures_2019_English_public_version.pdf.

38. **EU Technical expert group on sustainable finance.** Taxonomy report: technical annex. [Online] 2020. https://ec.europa.eu/info/sites/info/files/business_economy_euro/banking_and_finance/documents/200309-sustainable-finance-teg-final-report-taxonomy-annexes_en.pdf.

39. *Mapping the Global Flow of Steel: From Steelmaking to End-Use Goods.* **Cullen, Jonathan M., Allwood, Julian M. et Bambach, Margarita D.** 24, 2012, Environ. Sci. Technol, Vol. 46, pp. 13048–13055.

40. **Levi, Peter.** IEA Technology Roadmap. The global iron and steel sector. [Online] March 2019. http://www.oecd.org/sti/ind/86th%20Steel%20Committee%20meeting%20%20Presentation%20by%20IEA,%20IEA%20Technology%20Roadmap.pdf.

41. **Government of India - Ministry of steel.** Definitions commonly used in the Iron & Steel sector. [Online] June 2020. https://steel.gov.in/glossary-terms-definitions-commonly-used-iron-steel-industry.

42. **International Energy Agency.** Energy Technology Perspectives 2017. [Online] 6 June 2017. https://www.iea.org/reports/energy-technology-perspectives-2017.

43. —. Energy Technology Perspectives 2016. [Online] June 2016. https://www.iea.org/reports/energy-technology-perspectives-2016.

44. **ICF Consulting Services Ltd; Fraunhofer ISI.** Industrial Innovation | Part 2: Scenario analysis and pathways to deep decarbonisation. [Online] 20 March 2019. https://ec.europa.eu/clima/sites/clima/files/strategies/2050/docs/industrial_innovation_part_2_en.pdf.

45. **WSP ; Parsons Brinckerhoff; DNV GL.** Industrial Decarbonisation and Energy Efficiency Roadmaps to 2050. [Online] 25 March 2015. https://www.gov.uk/government/publications/industrial-decarbonisation-and-energy-efficiency-roadmaps-to-2050.

46. **Pardo, N., Moya, J.A. and Vatopoulos, K.** Prospective Scenarios on Energy Efficiency and CO2 Emissions in the EU Iron & Steel Industry. *JRC Scientific and policy reports.* [Online] 2012. ISBN 978-92-79-26971-4.

47. **Carbone 4.** Business strategy in (and for) a decarbonised world: Case study of the steel industry. [Online] January 2019. http://www.carbone4.com/wp-content/uploads/2019/01/Business-strategy-scenario-analysis-STEEL.pdf.

48. **Van Sluisveld, Mariësse, et al.** EU decarbonisation scenariosfor industry. Deliverable 4.2. *REINVENT decarbonisation.* [Online] 04 July 2018. https://www.reinvent-project.eu/documentation/.

49. **Eurofer.** Low carbon roadmap. Pathways to a CO2-neutral European steel industry. [Online] November 2019. https://www.eurofer.be/documents/greendealonsteel/ENSURE%20COMPETITIVENESS%20THROUGHOUT%20THE%20CLIMATE%20TRANSITION%20AND%20BEYOND/EUROFER%20Low%20Carbon%20Roadmap%20'Pathways%20to%20a%20CO2-neutral%20European%20Steel%20Industry'.pdf.

50. **Institute for Industrial Productivity.** Industrial Efficiency Technology Database. *Iron and Steel.* [Online] http://www.iipinetwork.org/wp-content/Ietd/content/iron-and-steel.html.

51. **Callister, William D. and Rethwisch, David G.** Materials Science and Engineering: An Introduction, 7th Edition (p360). [Online] 2007. https://fr.slideshare.net/anasimdad007/callister-materials-science-and-engineering-an-introduction-7e-wiley-2007-57476495.

52. **Reck, Barbara K., et al.** Global Stainless Steel Cycle Exemplifies China's Rise to Metal Dominance. *Environ. Sci. Technol.* [Online] 25 March 2010. Global Stainless Steel CycleExemplifies China's Rise to MetalDominance.

53. **McKinsey&Company.** Learnings from upstream integration of steelmakers. [Online] 11 December 2014. http://www.oecd.org/sti/ind/Session%202%20%20-%20McKinsey%20-%20OECD-SA%20Dec%202014.pdf.

54. **Wieland, Hanspeter and Giljum, Stefan.** Constructing global physical input-output tables for iron and steel. [Online] August 2019. https://www.fineprint.global/briefs/iron-steel-piot/.

55. **International Organization for Standardization.** ISO/AWI 19694-6: Stationary source emissions — Determination of greenhouse gas (GHG) emissions in energy-intensive industries — Part 6: Ferroalloy industry . [Online] 2020. https://www.iso.org/standard/73760.html.

56. —. ISO 14404-2:2013: Calculation method of carbon dioxide emission intensity from iron and steel production — Part 2: Steel plant with electric arc furnace (EAF). [Online] March 2013. https://www.iso.org/obp/ui/fr/#iso:std:iso:14404:-2:ed-1:v1:en.

57. —. ISO 14404-1:2013 : Calculation method of carbon dioxide emission intensity from iron and steel production — Part 1: Steel plant with blast furnace. [Online] 03 2013. https://www.iso.org/obp/ui/fr/#iso:std:iso:14404:-1:ed-1:v1:en.

58. —. ISO 14404-3:2017: Calculation method of carbon dioxide emission intensity from iron and steel production — Part 3: Steel plant with electric arc furnace (EAF) and coal-based or gas-based direct reduction iron (DRI) facility. [Online] June 2017. https://www.iso.org/obp/ui/fr/#iso:std:iso:14404:-3:ed-1:v1:en.

59. —. ISO/DIS 14404-4 : Calculation method of carbon dioxide emission intensity from iron and steel production — Part 4: Guidance for using ISO 14404 family. [Online] 2020. https://www.iso.org/obp/ui/fr/#iso:std:iso:14404:-4:dis:ed-1:v1:en.

60. **World Steel Association.** Steel Statistical Yearbook. [Online] 2019. https://www.worldsteel.org/steel-by-topic/statistics/steel-data-viewer/P1_crude_steel_total/WORLD_ALL.

61. *Thermodynamic analysis for the controllability of elements in therecycling process of metals.* **Nakajima, K., et al.** 11, s.l. : Environ. Sci. Technol., 2011, Vol. 45, p. 4929−4936.

62. **Midrex Technologies, Inc.** 2018 World Direct Reduction Statistics. [En ligne] July 2019. https://www.midrex.com/wp-content/uploads/Midrex_STATSbookprint_2018Final-1.pdf.

63. **Schütze, Wolfgang R.** HBI – Hot Briquetting of Direct Reduced Iron. Technology and Status of Industrial Applications. [Online] November 2013. https://www.koeppern-international.com/fileadmin/user_upload/downloads/Briquetting/Brochure_HBI_-_Hot_Briquetting_of_Direct_Reduced_Iron.pdf.

64. **Pometon Powder.** Metal powdersfor sintering technology. [Online] September 2017. https://www.pometon.com/media/product/class-attachment/brochure_sinter_17.pdf.

65. **Capus, Joseph M.** *Metal Powders: A Global Survey of Production, Applications and Markets 2001-2010.* s.l. : Elsevier Advanced Technology, 2005. ISBN 1856174794.

66. **ResponsibleSteel.** ResponsibleSteel Standard version 1.0. [Online] 5 November 2019. https://www.responsiblesteel.org/wp-content/uploads/2019/11/ResponsibleSteel_Standard_v1-0.pdf.

67. —. ResponsibleSteel standard. Draft version 4.1. [En ligne] 24 June 2019. https://www.responsiblesteel.org/wp-content/uploads/2019/06/Standard-DRAFT-4.1-ResponsibleSteel2018-06-24eng.pdf.

68. **WLI, LMI.** *The greenhouse gas protocol initiative, public sector protocol, provisionnal draft.* 2009.

Glossary

ACT	The Assessing low-Carbon Transition (ACT) initiative was jointly developed by ADEME and CDP. ACT assesses how ready an organization is to transition to a low-carbon world using a future-oriented, sector-specific methodology (ACT website).
ACTION GAP	In relation to emissions performance and reduction, the action gap is the difference between what a given company has done in the past plus what it is doing now, and what has to be done. For example, companies with large action gaps have done relatively little in the past, and their current actions point to continuation of past practices.
ADEME	Agence de la Transition Ecologique; The French Agency for Ecological Transition (ADEME webpage).
ALIGNMENT	The ACT project seeks to gather information that will be consolidated into a rating that is intended to provide a general metric of the 2-degree alignment of a given company. The wider goal is to provide companies specific feedback on their general alignment with 2-degrees in the short and long term.
ANALYST	Person in charge of the ACT assessment.
ASSESS	Under the ACT project, to evaluate and determine the low-carbon alignment of a given company. The ACT assessment and rating will be based on consideration of a range of indicators. Indicators may be reported directly from companies. Indicators may also be calculated, modelled or otherwise derived from different data sources supplied by the company. The ACT project will measure 3 gaps (Commitment, Horizon and Action – defined in this glossary) in the GHG emissions performance of companies. This measurement closely follows the assessment framework presented above. It starts with the future, with the goals companies want to achieve, followed by their plans, current actions and past actions.
ASSET	An item of property owned by a company, regarded as having value and available to meet debts, commitments, or legacies. Tangible assets include 1) fixed assets, such as machinery and buildings, and 2) current assets, such as inventory. Intangible assets are non-physical such as patents, trademarks, copyrights, goodwill and brand value.

BASE YEAR	According to the GHG Protocol and ISO14064-1, a base year is "a historic datum (a specific year or an average over multiple years) against which a company's emissions are tracked over time". Setting a base year is an essential GHG accounting step that a company must take to be able to observe trends in its emissions information (GHG Protocol Corporate Standard).
BENCHMARK	A standard, pathway or point of reference against which things may be compared. In the case of pathways for sector methodologies, a sector benchmark is a low-carbon pathway for the sector average value of the emissions intensity indicator(s) driving the sector performance. A company's benchmark is a pathway for the company value of the same indicator(s) that starts at the company performance for the reporting year and converges towards the sector benchmark in 2050, based on a principle of convergence or contraction of emissions intensity.
BUSINESS-AS-USUAL	No proactive action taken for change. In the context of the ACT methodology, the business-as-usual pathway is constant from the initial year onwards. In general, the initial year – which is the first year of the pathway/series – is the reporting year (targets indicators) or the reporting year minus 5 years (performance indicators).
BUSINESS MODEL	A plan for the successful operation of a business, identifying sources of revenue, the intended customer base, products, and details of financing. Under ACT, evidence of the business model shall be taken from a range of specific financial metrics relevant to the sector and a conclusion made on its alignment with low-carbon transition and consistency with the other performance indicators reported.
CAPITAL EXPENDITURE	Money spent by a business or organization on acquiring or maintaining fixed assets, such as land, buildings, and equipment.
CARBON DIOXIDE REMOVAL TECHNOLOGIES (CDR)	Carbon Dioxide Removal technologies (CDR) are anthropogenic activities removing CO_2 from the atmosphere and durably storing it in geological, terrestrial, or ocean reservoirs, or in products. It includes existing and potential anthropogenic enhancement of biological or geochemical sinks (afforestation, reforestation, land management, bio-energy carbon capture and storage, enhanced weathering, etc.) and direct air capture and storage (DAC).
CARBON CAPTURE AND STORAGE (CCS)	Carbon Capture and Storage (CCS) is a process in which a relatively pure stream of carbon dioxide (CO_2) from industrial and energy-related sources is separated (captured), conditioned, compressed and transported to a storage location for long-term isolation from the atmosphere. CCS is considered as a CDR only when applied to a biogenic stream of CO_2 (e.g., coming from a bio-energy power plant): it is then called BECCS (bio-energy carbon capture and storage).
CARBON CAPTURE, USE AND STORAGE (CCUS)	Carbon Capture, Use and Storage (CCUS) is a process in which CO_2 is captured and then used to produce a new product. If the CO_2 is stored in a product for a climate-relevant time horizon, this is referred to as carbon dioxide capture,

	utilization and storage (CCUS). CCUS is sometimes referred to as carbon dioxide capture and use (CCU).
CDP	Formerly the "Carbon Disclosure Project", CDP is an international, not-for-profit organization providing the only global system for companies and cities to measure, disclose, manage and share vital environmental information. CDP works with market forces, including 827 institutional investors with assets of over US$100 trillion, to motivate companies to disclose their impacts on the environment and natural resources and take action to reduce them. More than 13,000 companies worldwide disclose environmental information through CDP. CDP now holds the largest collection globally of primary climate change, water and forest risk commodities information and puts these insights at the heart of strategic business, investment and policy decisions (CDP website).
CLIMATE CHANGE	A change in climate, attributed directly or indirectly to human activity, that alters the composition of the global atmosphere and that is, in addition to natural climate variability, observed over comparable time periods (UNFCCC).
COMPANY PATHWAY	A company's past emissions intensity performance pathway up until the present.
COMPANY TARGET PATHWAY	The emissions intensity performance pathway that the company has committed to follow from the initial year on until a future year, for which it has set a performance target.
COMMITMENT GAP	In relation to emissions performance, the difference between what a company needs to do and what it says it will do.
CONSERVATIVENESS	A principle of the ACT project; whenever the use of assumptions is required, the assumption shall err on the side of achieving 2-degrees maximum.
CONSISTENCY	A principle of the ACT project; whenever time series data is used, it should be comparable over time. In addition to internal consistency of the indicators reported by the company, data reported against indicators shall be consistent with other information about the company and its business model and strategy found elsewhere. The analyst shall consider specific, pre-determined pairs of data points and check that these give a consistent measure of performance when measured together.
CRUDE STEEL	The term is internationally used to mean the 1st solid steel product upon solidification of liquid steel (produced from any production route, primary or secondary). In other words, it includes ingots (in conventional mills) and semis (in modern mills with continuous casting facility). According to the International Iron and Steel Institute (IISI), for statistical purposes, crude steel also includes liquid steel which goes into production of steel castings.

DATA	Facts and statistics collected together for reference and analysis (e.g., the data points requested from companies for assessment under the ACT project indicators).
DECARBONIZATION	A complete or near-complete reduction of greenhouse gas emissions over time.
DECARBONIZATION PATHWAY	Benchmark pathway (See 'Benchmark')
EMISSIONS	Emissions of GHGs. The GHG Protocol defines direct GHG emissions as emissions from sources that are owned or controlled by the reporting entity, and indirect GHG emissions as emissions that are a consequence of the activities of the reporting entity, but occur at sources owned or controlled by another entity (GHG Protocol).
FOSSIL FUEL	A natural fuel such as coal, oil or gas, formed in the geological past from the remains of living organisms.
FUTURE	A period of time following the current moment; time regarded as still to come.
GREENHOUSE GAS (GHG)	One of the gases (e.g., carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O) and three groups of fluorinated gases (sulfur hexafluoride (SF_6), hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs)) which are the major anthropogenic greenhouse gases that are regulated under the Kyoto Protocol. Nitrogen trifluoride (NF_3) is now considered a potent contributor to climate change and is therefore mandated to be included in national inventories under the United Nations Framework Convention on Climate Change (UNFCCC).
GUIDANCE	Documentation defining standards or expectations that are part of a rule or requirement (e.g., CDP reporting guidance for companies).
HORIZON GAP	In relation to emissions performance, the difference between the average lifetime of a company's production assets (particularly carbon intensive) and the time-horizon of its commitments. Companies with large asset-lifetimes and small time-horizons do not look far enough into the future to properly consider a transition plan.
INCENTIVE	A thing, for example money, that motivates or encourages someone to do something (e.g., a monetary incentive for company board members to set emissions reduction targets).
INCLUSIVE SCOPE 1+2	"Inclusive Scope 1+2 emissions" includes all Scope 1 and Scope 2 of the company emissions that are part of the ACT iron & steel boundaries, as well as relevant Scope 3 upstream emissions from activities operated by suppliers which are also part of the iron and steel sector. The downstream is not taken into account as data

	might be much more difficult to obtain, and the downstream CO_2 emissions are much smaller than the upstream ones in the iron and steel value chain.
INDICATOR	An indicator is a quantitative or qualitative piece of information that, in the context of the ACT project, can provide insight on a company's current and future ability to reduce its carbon intensity. In the ACT project, 3 fundamental types of indicators can be considered: Key performance indicators (KPIs); Key narrative indicators (KNIs); and Key asset indicators (KAIs).
INTENSITY (EMISSIONS)	The average emissions rate of a given pollutant from a given source relative to the intensity of a specific activity; for example, grams of carbon dioxide released per MWh of energy produced by a power plant.
INTERVENTION	Methods available to companies to influence and manage emissions in their value chain, both upstream and downstream, which are out of their direct control (e.g., a retail company may use consumer education as an intervention to influence consumer product choices in a way that reduces emissions from the use of sold products).
LIFETIME	The duration of a thing's existence or usefulness (e.g., a physical asset such as a power plant).
LONG-TERM	Occurring over or relating to a long period of time; under ACT this is taken to mean until the year 2050. The ACT project seeks to enable the evaluation of the long-term performance of a given company while simultaneously providing insights into short- and medium-term outcomes in alignment with the long-term.
LOW-CARBON SCENARIO (OR PATHWAY)	A low-carbon scenario (or pathway) is a 2°C scenario, a well-below 2°C scenario or a scenario with higher decarbonization ambition.
LOW-CARBON TRANSITION	The low-carbon transition is the transition of the economy according to a low-carbon scenario.
MANUFACTURE	Making objects on a large scale using machinery.
MATURITY MATRIX	A maturity matrix is essentially a "checklist", the purpose of which is to evaluate how well advanced a particular process, program or technology is according to specific definitions.
MITIGATION (EMISSIONS)	The action of reducing the severity of something (e.g., climate change mitigation through absolute GHG emissions reductions)

MODEL	A program designed to simulate what might or what did happen in a situation (e.g., climate models are systems of differential equations based on the basic laws of physics, fluid motion, and chemistry that are applied through a 3-dimensional grid simulation of the planet Earth).
PATHWAY (EMISSIONS)	A way of achieving a specified result; a course of action (e.g., an emissions reduction pathway).
PERFORMANCE	Measurement of outcomes and results.
PLAN	A detailed proposal for doing or achieving something.
POINT	A mark or unit of scoring awarded for success or performance.
PRIMARY ENERGY	Primary energy is an energy form found in nature that has not been subjected to any conversion or transformation process. It is energy contained in raw fuels, and other forms of energy received as input to a system. Primary energy can be non-renewable or renewable.
RELEVANT / RELEVANCE	In relation to information, the most relevant information (core business and stakeholders) to assess low-carbon transition.
RENEWABLE ENERGY	Energy from a source that is not depleted when used, such as wind or solar power.
REPORTING YEAR	Year under consideration.
RESEARCH AND DEVELOPMENT (R&D)	A general term for activities in connection with innovation. In industry, for example, this could be considered work directed towards the innovation, introduction, and improvement of products and processes.
ROUTE	- Scrap-EAF route - Ore route (gathers all routes except the Scrap-EAF route). This includes all direct emissions, electricity consumption and steel production from the iron and steel sector AFTER subtracting the data from the Scrap-EAF route - All route. i.e. combining the two routes above
SCENARIO	The Fifth Assessment Report (AR5) of the Intergovernmental Panel on Climate Change (IPCC) presents the results of an extensive climate modelling effort to make predictions of changes in the global climate based on a range of development/emissions scenarios. Regulations on climate change-related issues may present opportunities for an organization if it is better suited than its competitors to meet those regulations, or more able to help others to do so. Possible scenarios would include a company whose products already meet anticipated standards designed to curb emissions, those whose products will

	enable its customers to meet mandatory requirements or those companies that provide services assisting others in meeting regulatory requirements.
SCENARIO ANALYSIS	A process of analysing possible future events by considering alternative possible outcomes.
SCIENCE-BASED TARGET AND SCIENCE BASED TARGETS INITIATIVE (SBTi)	To meet the challenges that climate change presents, the world's leading climate scientists and governments agree that it is essential to limit the increase in the global average temperature to below 2°C. Companies making this commitment will be working toward this goal by agreeing to set an emissions reduction target that is aligned with climate science and meets the requirements of the Science-Based Targets initiative (SBTi).
SCOPE 1 EMISSIONS DIRECT GHG EMISSIONS AND REMOVALS	All direct GHG emissions (GHG Protocol Corporate Standard). Category 1 from ISO 14064-1:2018*: Direct GHG emissions and removals occur from GHG sources or sinks inside organizational boundaries and that are owned or controlled by the* [reporting] *organization. Those sources can be stationary (e.g., heaters, electricity generators, industrial processes) or mobile (e.g., vehicles).*
SCOPE 2 EMISSIONS INDIRECT GHG EMISSIONS FROM IMPORTED ENERGY	Indirect GHG emissions from consumption of purchased electricity, heat or steam (GHG Protocol Corporate Standard). Category 2 from ISO 14064-1:2018: *GHG emissions due to the fuel combustion associated with the production of final energy and utilities, such as electricity, heat, steam, cooling and compressed air* [imported by the reported company]. *It excludes all upstream emissions (from cradle to power plant gate) associated with fuel, emissions due to the construction of the power plant, and emissions allocated to transport and distribution losses.*
SCOPE 3 EMISSIONS INDIRECT GHG EMISSIONS	Other indirect emissions, such as the extraction and production of purchased materials and fuels, transport-related activities in vehicles not owned or controlled by the reporting entity, electricity-related activities (e.g., transmission & distribution losses) not covered in Scope 2, outsourced activities, waste disposal, etc. (GHG Protocol Corporate Standard). Scope 3 also encompass the emissions related to the use of sold-products. ISO 14064-1:2018: *GHG emission that is a consequence of an organization's operations and activities, but that arises from GHG sources that are not owned or controlled by the* [reporting] *organization*. *These emissions occur generally in the upstream and/or downstream chain.* *Category 3: indirect GHG emissions from transportation* *Category 4: Indirect GHG emissions from products used by an organization* *Category 5: Indirect GHG emissions associated with the use of products from the organization* *Category 6: Indirect GHG emissions from other sources*

SECTOR	A classification of companies with similar business activities, e.g., automotive manufacturers, power producers, retailers, etc.
SECTORAL DECARBONIZATION APPROACH (SDA)	To help businesses set targets compatible with 2-degree climate change scenarios, the Sectoral Decarbonization Approach (SDA) was developed. The SDA takes a sector-level approach and employs scientific insight to determine the least-cost pathways of mitigation, and converges all companies in a sector towards a shared emissions target in 2050.
SHORT-TERM	Occurring in or relating to a relatively short period of time in the future.
STRATEGY	A plan of action designed to achieve a long-term or overall aim. In business, this is the means by which a company sets out to achieve its desired objectives; long-term business planning.
SUPPLIER	A person or entity that is the source for goods or services (e.g., a company that provides engine components to an automotive manufacturing company).
SUSTAINABLE BIOFUELS AND SUSTAINABLE BIOGAS	If produced from the advanced bioenergy feedstock listed in Annex IX of Directive (EU) 2018/2001. Only production of advanced biofuels as per Art2(34), and certified low-ILUC fuels, in line with the requirements of RED II, is eligible. If primary forest-related feedstock (item (o) of Annex IX, Part A of Directive (EU) 2018/2001) is used, it must be produced in economic activities fulfilling the Afforestation & Reforestation, and/or Rehabilitation & Existing Forest Management criteria. If crop feedstock is used, it must be produced in economic activities fulfilling the Growing of Perennial Crops or the Growing of Non-perennial Crops criteria. *Green EU taxonomy alignment*
TRADE ASSOCIATION	Trade associations (sometimes also referred to as industry associations) are an association of people or companies in a particular business or trade, organized to promote their common interests. Their relevance in this context is that they present an “industry voice” to governments to influence their policy development. The majority of organizations are members of multiple trade associations, many of which take a position on climate change and actively engage with policymakers on the development of policy and legislation on behalf of their members. It is acknowledged that in many cases companies are passive members of trade associations and therefore do not actively take part in their work on climate change (CDP climate change guidance).
TRANSPORT	To take or carry (people or goods) from one place to another by means of a vehicle, aircraft, or ship.

TREND	A general direction in which something (e.g., GHG emissions) is developing or changing.
TECHNOLOGY	The application of scientific knowledge for practical purposes, especially in industry (e.g., low-carbon power generation technologies such as wind and solar power, in the electric power generation sector).
TRANSITION	The process or a period of changing from one state or condition to another (e.g., from an economic system and society largely dependent on fossil fuel-based energy, to one that depends only on low-carbon energy).
VERIFIABLE / VERIFIABILITY	To prove the truth of, as by evidence or testimony; confirm; substantiate. Under the ACT project, the data required for the assessment shall be verified or verifiable.
WEIGHTING	The allowance or adjustment made in order to take account of special circumstances or compensate for a distorting factor.

10. Annex

10.1. TWG MEMBERS

ACT Iron & Steel Methodology has been developed with input and feedback from the iron and steel Technical Working Group, which met five times over the course of the development phase.

TABLE 15: LIST OF IRON AND STEEL TWG MEMBERS

Organisation	Name
A3M (Alliance des Minerais, Minéraux, Métaux)	Mélisande Couespel
ADEME	Aïcha El Khamlichi
Agora Energiewende	OLIVER SARTOR
Aperam	Alain MENEC
Aperam	Laurent PIRANDA
ARCELOR MITTAL	Annie Heaton
ARCELOR MITTAL	Jean Luc Reboul
AURA FINANCIAL	Andy Mills
CTICM (centre technique industriel de la construction en métal)	Stéphane Herbin
DNCA Investments	Alix Chosson
ERAMET	Pierre Gueudet
Global CCS Institute	David Kearns
IEA	Peter LEVI
Jindal Stainless Ltd	Rajiv Williams
JSW Steel Ltd.	Prabodha Acharya
Réseau Action Climat (RAC)	Meike Fink
ResponsibleSteel	Matthew Wenban-Smith
Rocky Mountain Institute	Lucy Kessler
Rocky Mountain Institute	Estefania Marchan
Saint Gobain Group	Yves Coquelet
Schrodinger Limited	Stanley Ijeoma
SIDEREX	Cristina Bilbao

SUSTAIN	Richard Curry
Tata Steel	Peter Hodgson
Tata Steel Limited	Tirtha Prasad Sapkota
Ugitech	Virginie Corbic
Vallourec	Dominique Cazeele
WBA	Charlotte Hugman
Word Steel Association	Clare Broadbent

10.2. COMPANIES INVOLVED IN THE ROAD-TEST

Aperam
CSN
Liberty Steel
Riva
Saarstahl Ascoval
Saint-Gobain PAM
Voestalpine

10.3. LOW CARBON TRANSITION

IDENTIFICATION OF THE TECHNOLOGIES USED TO DECARBONIZE THE IRON AND STEEL SECTOR AND DISTINCTION BETWEEN MATURE AND NON-MATURE TECHNOLOGIES

The Table 16 is used for Intangible investment Module, IS 3.1 indicator calculation.

This table has been built with IEA website and IIPI network. This table is not exhaustive and should be updated according to the development progress of technologies.

Technology Readiness Level (TRL) from IEA:	**IEA explaining acronyms**	
1.	Initial idea: basic principles have been defined	Non mature technologies
2.	Application formulated: concept and application of solution have been formulated	
3.	Concept needs validation: solution needs to be prototyped and applied	
4.	Early prototype: prototype proven in test conditions	
5.	Large prototype: components proven in conditions to be deployed	

6.	Full prototype at scale: prototype proven at scale in conditions to be deployed	
7.	Pre-commercial demonstration: solution working in expected conditions	
8.	First-of-a-kind commercial: commercial demonstration, full-scale deployment in final form	Mature technologies
9.	Commercial operation in relevant envIronment: solution is commercially available, needs evolutionary improvement to stay competitive	
10.	Integration at scale: solution is commercial but needs further integration efforts	
11.	Proof of stability: predictable growth	

TRL	**IIPI network explaining acronyms**	
1-3	Research	Non mature technologies
4-7	Demonstration	
8-11	Commercial	Mature technologies

TABLE 16: MATURE AND NON-MATURE TECHNOLOGIES FOR IS 3.1 INDICATOR CALCULATION

Activity	Technology or Measure	TRL (Proposition based on IEA and IIPI network status)	Distinction non-mature and mature technologies
Basic Oxygen Furnace	Automated Steel Cleanliness Analysis Tool	1-3	Non mature technologies
Basic Oxygen Furnace	Aluminium Bronze Alloy to Improve Hood, Roof and Sidewall Life	4-7	Non mature technologies
Basic Oxygen Furnace	In-Situ Real-Time Measurement of Melt Constituents	4-7	Non mature technologies
Basic Oxygen Furnace	Recycling of BOF Steel-making slag	4-7	Non mature technologies
Basic Oxygen Furnace	BOF Heat and Gas Recovery	8-11	Mature technologies
Basic Oxygen Furnace	BOF Bottom Stirring	8-11	Mature technologies
Basic Oxygen Furnace	Improved Process Monitoring and Control	8-11	Mature technologies
Basic Oxygen Furnace	Improved Ladle Preheating	8-11	Mature technologies
Basic Oxygen Furnace	Variable Frequency Drives on Ventilation Fans	8-11	Mature technologies
Basic Oxygen Furnace	ProVision Lance-Based Camera System for Vacuum Degasser	8-11	Mature technologies
Basic Oxygen Furnace	Laser Contouring System	8-11	Mature technologies
Basic Oxygen Furnace	MultiGas Analyzer	8-11	Mature technologies
Basic Oxygen Furnace	Improving System Life of BOF and EAF Hoods,Roofs and Side Vents	8-11	Mature technologies
Basic Oxygen Furnace	Steel Slag Usage in Cement	8-11	Mature technologies
Blast Furnace System	Hydrogen enrichment + CO_2 removal - use of works arising gases / CCUS	5	Non mature technologies
Blast Furnace System	Conversion of Steel works arising gases to chemicals	7	Mature technologies
Blast Furnace System	Partial electrolytic hydrogen replacement of injected coal	7	Mature technologies
Blast Furnace System	Partial torrefied biomass replacement of injected goal	7	Mature technologies
Blast Furnace System	CCU / Conversion of Steel works arising gases to chemicals	7	Mature technologies
Blast Furnace System	Conversion of Steel works arising gases to fuel	8	Mature technologies
Blast Furnace System	COURSE 50	1-3	Non mature technologies
Blast Furnace System	Top Gas Recycling Blast Furnace	1-3	Non mature technologies
Blast Furnace System	Slag Heat Recovery	1-3	Non mature technologies

Blast Furnace System	Extended Universal Fuel Gas Measuring Device	1-3	Non mature technologies
Blast Furnace System	Biomass use in BF	4-7	Non mature technologies
Blast Furnace System	Charging Carbon Composite Agglomerates	4-7	Non mature technologies
Blast Furnace System	Use of High Quality Ore	8-11	Mature technologies
Blast Furnace System	Pulverized Coal Injection	8-11	Mature technologies
Blast Furnace System	Top Pressure Recovery Turbines	8-11	Mature technologies
Blast Furnace System	Increased Blast Furnace Top Pressure (> 0.5 Bar Gauge)	8-11	Mature technologies
Blast Furnace System	Improved Hot Stove Process Control	8-11	Mature technologies
Blast Furnace System	Blast Furnace Process Control	8-11	Mature technologies
Blast Furnace System	Heat Recuperation from Hot Blast Stoves	8-11	Mature technologies
Blast Furnace System	Increased Hot Blast Temperature (>1 000 oC)	8-11	Mature technologies
Blast Furnace System	Improved Combustion in Hot Stoves	8-11	Mature technologies
Blast Furnace System	Injection of Coke Oven Gas	8-11	Mature technologies
Blast Furnace System	Improved Recovery of Blast Furnace Gas	8-11	Mature technologies
Blast Furnace System	Bell Less Top Charging System	8-11	Mature technologies
Blast Furnace System	Injection of Oil	8-11	Mature technologies
Blast Furnace System	Natural Gas Injection	8-11	Mature technologies
Blast Furnace System	Dry Dedusting of Blast Furnace Gas	8-11	Mature technologies
Blast Furnace System	Plastic Waste Injection	8-11	Mature technologies
Blast Furnace System	Oxy-Oil Injection	8-11	Mature technologies
Blast Furnace System	Residue Injection	8-11	Mature technologies
Blast Furnace System	Improvement of Hearth Drainage Efficiency and Refractory Life	8-11	Mature technologies
Blast Furnace System	Charcoal Use	8-11	Mature technologies
Casting	In-Situ Real-Time Measurement of Melt Constituents	4-7	Non mature technologies
Casting	Continuous Temperature Monitoring and Control	4-7	Non mature technologies
Casting	MGGate for Continuous Caster	4-7	Non mature technologies
Casting	Elimination or minimization of oscillation marks	4-7	Non mature technologies
Casting	Continuous Casting	8-11	Mature technologies
Casting	Efficient Ladle Preheating	8-11	Mature technologies
Casting	Direct Rolling (Integrated Casting and Rolling)	8-11	Mature technologies
Casting	Endless Strip Production (ESP)	8-11	Mature technologies
Casting	Thin Slab Casting - Near Net Shape Casting	8-11	Mature technologies
Casting	Strip Casting – Castrip® Process	8-11	Mature technologies
Casting	Strip Casting	8-11	Mature technologies
Casting	Integrated Casting and Rolling	8-11	Mature technologies
Casting	Using Unheated Tundish	8-11	Mature technologies
Casting	On-line Laser-ultrasonic Measurement system	8-11	Mature technologies
Coke making	COURSE 50	1-3	Non mature technologies
Coke making	Single Chamber System	4-7	Non mature technologies
Coke making	SCOPE 21 - Next Generation Coke Making Technology	4-7	Non mature technologies
Coke making	Coke Dry Quenching	8-11	Mature technologies
Coke making	Additional Use of Coke Oven Gas	8-11	Mature technologies
Coke making	Automation and Process Control System	8-11	Mature technologies

Coke making	Coal Stamp Charging Battery	8-11	Mature technologies
Coke making	Coal Moisture Control	8-11	Mature technologies
Coke making	Non-Recovery Coke Ovens	8-11	Mature technologies
Coke making	Variable Speed Drive Coke Oven Gas Compressors	8-11	Mature technologies
Coke making	Coke Stabilization Quenching	8-11	Mature technologies
Direct Reduced Iron	CCUS / Physical absorption	5	Non mature technologies
Direct Reduced Iron	Reduction using solely electrolytic hydrogen	5	Non mature technologies
Direct Reduced Iron	Based on natural gas with high levels of electrolytic hydrogen blending	7	Mature technologies
Direct Reduced Iron	CCUS / Chemical absorption	9	Mature technologies
Direct Reduced Iron	Sustainable Steel-making using Biomass and Waste Oxides	1-3	Non mature technologies
Direct Reduced Iron	Suspended Hydrogen Reduction of Iron Oxide Concentrates	1-3	Non mature technologies
Direct Reduced Iron	ULCORED	1-3	Non mature technologies
Direct Reduced Iron	MXCOAL™ - Midrex© with Coal Gasification	4-7	Non mature technologies
Direct Reduced Iron	Paired Straight Hearth Furnace	4-7	Non mature technologies
Direct Reduced Iron	Midrex© Process	8-11	Mature technologies
Direct Reduced Iron	HYL III Process	8-11	Mature technologies
Direct Reduced Iron	FASTMET© & FASTMELT©	8-11	Mature technologies
Direct Reduced Iron	ITmk3® Process	8-11	Mature technologies
Direct Reduced Iron	Midrex with CO_2 Removal System	8-11	Mature technologies
Direct Reduced Iron	Coal-Based HYL Process	8-11	Mature technologies
Direct Reduced Iron	Dust Recycling in Rotary Hearth Furnace	8-11	Mature technologies
Direct Reduced Iron	SL/RN Process	8-11	Mature technologies
Direct Reduced Iron	Waste Heat Recovery for Rotary Kiln Direct Reduction	8-11	Mature technologies
Direct Reduced Iron	Finmet	8-11	Mature technologies
Direct Reduced Iron	Iron Carbide Process	8-11	Mature technologies
Direct Reduced Iron	Circored	8-11	Mature technologies
Direct Reduced Iron	Redsmelt	8-11	Mature technologies
Electric Arc Furnace	Waste Heat Recovery for EAF	1-3	Non mature technologies
Electric Arc Furnace	Injection of Aluminium instead of Ferrosilicon for Stainless Steel-making in EAF	1-3	Non mature technologies
Electric Arc Furnace	Model Based Steel Temperature Measurement	1-3	Non mature technologies
Electric Arc Furnace	Hydrogen and Nitrogen Control in Ladle and Casting Operations	1-3	Non mature technologies
Electric Arc Furnace	ECOARC	4-7	Non mature technologies
Electric Arc Furnace	Used Tires for Insulation in EAF	4-7	Non mature technologies
Electric Arc Furnace	New-Scrap Based Steel-making Process using Primary Energy	4-7	Non mature technologies
Electric Arc Furnace	Holistic Quality Driven Production Control	4-7	Non mature technologies
Electric Arc Furnace	Development of a process to continuously melt, refine and cast high quality Steel	4-7	Non mature technologies
Electric Arc Furnace	Improved Process Control (Neural Networks)	8-11	Mature technologies
Electric Arc Furnace	EAF Controls	8-11	Mature technologies
Electric Arc Furnace	Oxyfuel Burners/Lancing	8-11	Mature technologies
Electric Arc Furnace	Flue Gas Monitoring and Control	8-11	Mature technologies
Electric Arc Furnace	Post Combustion Optimization in Steel-making	8-11	Mature technologies

Electric Arc Furnace	Hot DRI/HBI Charging to EAF	8-11	Mature technologies
Electric Arc Furnace	Foamy Slag Practices	8-11	Mature technologies
Electric Arc Furnace	Scrap Preheating	8-11	Mature technologies
Electric Arc Furnace	Bottom Stirring/Stirring Gas Injection	8-11	Mature technologies
Electric Arc Furnace	Shaft Furnace Scrap Preheating	8-11	Mature technologies
Electric Arc Furnace	Tunnel Furnace Preheating – CONSTEEL Process	8-11	Mature technologies
Electric Arc Furnace	Direct Current (DC) Arc Furnace	8-11	Mature technologies
Electric Arc Furnace	Airtight EAF Process	8-11	Mature technologies
Electric Arc Furnace	Adjustable Speed Drives (ASDs)	8-11	Mature technologies
Electric Arc Furnace	Comelt	8-11	Mature technologies
Electric Arc Furnace	Contiarc Furnace	8-11	Mature technologies
Electric Arc Furnace	Twin-Shell DC Arc Furnace	8-11	Mature technologies
Electric Arc Furnace	Post Combustion of EAF Flue Gas	8-11	Mature technologies
Electric Arc Furnace	Engineered Refractories	8-11	Mature technologies
Electric Arc Furnace	Eccentric Bottom Tapping	8-11	Mature technologies
Electric Arc Furnace	Ultra High Power (UHP) Transformers	8-11	Mature technologies
Electric Arc Furnace	Optimal Charge Calculation in EAF	8-11	Mature technologies
Electric Arc Furnace	Dynamic Asymmetrical Control of AC EAF	8-11	Mature technologies
Electric Arc Furnace	Modification of Side Wall Water Cooled Panels and Water Header	8-11	Mature technologies
Ore electrolysis	Low temperature alkaline electrolysis (110°C)	4	Non mature technologies
Ore electrolysis	High temperature molten oxide electrolysis (>1500°C)	4	Non mature technologies
Ore electrolysis	Reducing metal forming losses and light weighting / Additive manufacturing	7	Mature technologies
Rolling Mills	Preventing Scale Formation in Rolling	1-3	Non mature technologies
Rolling Mills	Extended Universal Fuel Gas Measuring Device	1-3	Non mature technologies
Rolling Mills	High Temperature Membrane Module for Oxygen Enrichment of Combustion Air	1-3	Non mature technologies
Rolling Mills	Thermochemical Recuperation for High Temperature Furnaces	4-7	Non mature technologies
Rolling Mills	Novel Post Combustion Method	4-7	Non mature technologies
Rolling Mills	Model Based Closed-Loop Oxygen Control	4-7	Non mature technologies
Rolling Mills	Innovative Reheat Furnace Management	4-7	Non mature technologies
Rolling Mills	Development of Oxygen-rich Furnace System for reduced CO_2 and NOx emissions	4-7	Non mature technologies
Rolling Mills	Oscillating Combustion	4-7	Non mature technologies
Rolling Mills	Process Control in Hot Strip Mill	8-11	Mature technologies
Rolling Mills	Proper Reheating Temperature	8-11	Mature technologies
Rolling Mills	Throughput Optimisation in Rolling Mills	8-11	Mature technologies
Rolling Mills	Oxygen Level Control and VSDs on Combustion Fans	8-11	Mature technologies
Rolling Mills	Pressure Control for Furnace	8-11	Mature technologies
Rolling Mills	Avoiding Furnace Overloading	8-11	Mature technologies
Rolling Mills	Energy Efficiency Drives for Rolling Mills	8-11	Mature technologies
Rolling Mills	Regenerative Burners for Reheating Furnaces	8-11	Mature technologies
Rolling Mills	Flameless Burners - Dilute Oxygen Combustion	8-11	Mature technologies

Rolling Mills	Walking Beam Furnace	8-11	Mature technologies
Rolling Mills	Recuperative Burners	8-11	Mature technologies
Rolling Mills	Installing Lubrication Systems	8-11	Mature technologies
Rolling Mills	Improved Insulation of Reheating Furnace	8-11	Mature technologies
Rolling Mills	Hot Charging	8-11	Mature technologies
Rolling Mills	Cold Rolling - Reducing Losses on Annealing Line	8-11	Mature technologies
Rolling Mills	Cold Rolling - Automated Monitoring and Targeting System.	8-11	Mature technologies
Rolling Mills	Cold Rolling - Reduced Steam Use in the Acid Pickling Line	8-11	Mature technologies
Rolling Mills	Cold Rolling - Continuous Annealing Furnace	8-11	Mature technologies
Rolling Mills	Heat Recovery to the Product	8-11	Mature technologies
Rolling Mills	Heat Recovery from Cooling Water	8-11	Mature technologies
Rolling Mills	Thin Slab Casting - Near Net Shape Casting	8-11	Mature technologies
Rolling Mills	Endless Strip Production (ESP)	8-11	Mature technologies
Rolling Mills	Strip Casting – Castrip® Process	8-11	Mature technologies
Rolling Mills	Integrated Casting and Rolling	8-11	Mature technologies
Rolling Mills	Thin Slab Casting	8-11	Mature technologies
Rolling Mills	Strip Casting	8-11	Mature technologies
Sinter plant	Wood Char in Sinter making	4-7	Non mature technologies
Sinter plant	Waste Heat Recovery in Sinter Plant	8-11	Mature technologies
Sinter plant	Improved Process Control and Quality Assurance	8-11	Mature technologies
Sinter plant	Improved Ignition Oven Efficiency with Multi-Slit Burners	8-11	Mature technologies
Sinter plant	Emissions Optimized Sintering	8-11	Mature technologies
Sinter plant	Selective Waste Gas Recycling - EPOSINT Process	8-11	Mature technologies
Sinter plant	Improved (Segregated) Charging of Materials	8-11	Mature technologies
Sinter plant	Low Emissions and Energy Optimised Sintering Process	8-11	Mature technologies
Sinter plant	Sectional Gas Recirculation	8-11	Mature technologies
Sinter plant	Leakage Reduction in Sinter Plant	8-11	Mature technologies
Sinter plant	District Heating Using Waste Heat	8-11	Mature technologies
Sinter plant	Curtain Flame Ignition System	8-11	Mature technologies
Sinter plant	Utilization of Waste Fuels in Sintering	8-11	Mature technologies
Sinter plant	Pelletized Blast Furnace Dust	8-11	Mature technologies
Sinter plant	Control Modules	8-11	Mature technologies
Smelting reduction	Smelting reduction based on hydrogen plasma	4	Non mature technologies
Smelting reduction	Enhanced smelting reduction / CCUS	8	Mature technologies

10.4. EMISSIONS INCLUDED IN IEA ETP 2020 SCENARIO

IEA ETP 2020 scenario includes the CO_2 emissions coming from the following activities (extracted from ISICS classification):

2410 Manufacture of basic iron and steel

This class includes operations of conversion by reduction of iron ore in blast furnaces and oxygen converters or of ferrous waste and scrap in electric arc furnaces or by direct reduction of iron ore without fusion to obtain crude steel which is smelted and refined in a ladle furnace and then poured and solidified in a continuous caster in order to produce semi-finished flat or long products, which are used, after reheating, in rolling, drawing and extruding operations to manufacture finished products such as plate, sheet, strip, bars, rods, wire, tubes, pipes and hollow profiles.

This class includes:

— operation of blast furnaces, steel converters, rolling and finishing mills
— production of pig iron and spiegeleisen in pigs, blocks or other primary forms
— production of ferro-alloys
— production of ferrous products by direct reduction of iron and other spongy ferrous products
— production of iron of exceptional purity by electrolysis or other chemical processes
— production of granular iron and iron powder
— production of steel in ingots or other primary forms
— remelting of scrap ingots of iron or steel
— production of semi-finished products of steel
— manufacture of hot-rolled and cold-rolled flat-rolled products of steel

— manufacture of hot-rolled bars and rods of steel
— manufacture of hot-rolled open sections of steel
— manufacture of steel bars and solid sections of steel by cold drawing, grinding or turning
— manufacture of open sections by progressive cold forming on a roll mill or folding on a press of flat-rolled products of steel
— manufacture of wire of steel by cold drawing or stretching
— manufacture of sheet piling of steel and welded open sections of steel
— manufacture of railway track materials (unassembled rails) of steel
— manufacture of seamless tubes, pipes and hollow profiles of steel, by hot rolling, hot extrusion or hot drawing, or by cold drawing or cold rolling
— manufacture of welded tubes and pipes of steel, by cold or hot forming and welding, delivered as welded or further processed by cold drawing or cold rolling or manufactured by hot forming, welding and reducing
— manufacture of tube fittings of steel, such as:
  - flat flanges and flanges with forged collars
  - butt-welded fittings
  - threaded fittings
  - socket-welded fittings

This class excludes:

— *manufacture of tubes, pipes and hollow profiles and of tube or pipe fittings of cast-iron, see 2431*
— *manufacture of seamless tubes and pipes of steel by centrifugal casting, see 2431*
— *manufacture of tube or pipe fittings of cast-steel, see 2431*

2431 Casting of iron and steel

This class includes the casting of iron and steel, i.e. the activities of iron and steel foundries.

This class includes:

— casting of semi-finished iron products
— casting of grey iron castings
— casting of spheroidal graphite iron castings
— casting of malleable cast-iron products
— casting of semi-finished steel products
— casting of steel castings
— manufacture of tubes, pipes and hollow profiles and of tube or pipe fittings of cast-iron
— manufacture of seamless tubes and pipes of steel by centrifugal casting
— manufacture of tube or pipe fittings of cast-steel