# Environmental Product Declaration

Acciaierie d'Italia
Steel Forward

In accordance with
ISO 14025 and EN 15804:2012+A2:2019 for:

## *Cold formed welded tubes Hollow sections from Hot Rolled Coils*

from

## *Acciaierie d'Italia S.p.A.*

EPD®
ECO PLATFORM EPD VERIFIED
RINA

| | |
|---|---|
| Programme: | The International EPD® System, www.environdec.com |
| Programme operator: | EPD International AB |
| EPD registration number: | S-P-11804 |
| Publication date: | 2023-12-19 |
| Valid until: | 2028-12-19 |

*An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com*

# Content

# 1. General information

## 1.1. EPD, PCR, LCA Information

| EPD Information | |
|---|---|
| **Programme** | The International EPD® System<br>www.environdec.com<br>info@environdec.com |
| **Programme operator** | EPD International AB<br>Box 210 60 SE-100 31 Stockholm, Sweden |
| **Declaration holder** | Acciaierie d'Italia<br>Viale Certosa 239, Milan, Italy<br>www.acciaierieditalia.com |
| **Product** | Cold formed welded tubes – Hollow sections from Hot Rolled Coils |
| **CPC Code** | 412 Products of iron or steel |
| **Geographical Scope** | Global |
| **Reference standards** | ISO 14025:2006; EN 15804:2012+A2:2019 |
| **Reference period** | 2022-01-01 – 2022-12-31 |

| Product Category Rules (PCR) | |
|---|---|
| **Reference PCR** | "Construction Products" 2019:14, Version 1.2.5 |
| **Data of Issue** | 2022-11-01 (VALID UNTIL 2024-12-20) |

| Third-party verification | |
|---|---|
| **Demonstration of verification** | External, accredited certification body independent verification |
| **Third party verifier** | RINA Services S.p.A., accredited by Accredia (Registration number 0002VV) |
| **Follow-up procedure** | Follow-up procedure of data during EPD validity does not involve third-party verifier |

| Life cycle assessment (LCA) | |
|---|---|
| **Title** | Cold formed welded tubes – Hollow sections from HRC |
| **Reference standards** | ISO 14040/44 standard |
| LCA accountability | Maria Chiara Caruso, Marcello Casa, Vincenzo Lariccia – Rina Consulting S.p.A. |

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

# 2. Company information

## 2.1. Owner of the EPD

Acciaierie d'Italia S.p.A.
sostenibilita@acciaierieditalia.com

## 2.2. Contact

To get more information regarding this product declaration and/or related configurations to contact sostenibilita@acciaierieditalia.com

## 2.3. Description of the organization

Acciaierie d'Italia is one of the largest Italian industrial groups and one of the most important integrated-cycle steel producers at European level.
Our mission is to produce the steel for the leading sectors of Italian and European industry: automotive, buildings and bridges, construction, furniture, packaging, ship.

At the Taranto plant the complete steel manufacturing cycle is carried out for most of the products of the portfolio. Hot rolled heavy plates, hot rolled coils and hot dip galvanized thin coils are prepared for the customer. Important sites, due to their strategic location in the north of Italy namely Genoa, Novi Ligure and Racconigi, are also terminals of high quality verticalized products like tin coated cold rolled strip for packaging and beverage, hot dip galvanized cold rolled strips specialized for the automotive sector and structural pipes.

Taranto plant is strictly connected with the most important merchant harbor in the south of Italy from which the steel products can be delivered around all the Mediterranean Sea and to the world.
Steel production is based on the use of iron ore as a raw material. However, ADI uses approximately 19% of scrap steel in conjunction with steel production.
When scrap steel is used instead of virgin raw materials in steelmaking, the carbon dioxide emissions originating in steel production decrease accordingly. Steelmaking at Acciaierie d'Italia uses scrap material from ADI's own production processes and material sourced on the scrap steel market.
At AdI, steelmaking processes have been continuously improved and the latest state of the art equipment has been installed for improving the environmental impact of the production processes. Most of the energy used in ore-based steel production comes from coal, which is used as a reducing agent in iron-making. The mineral products formed in s iron and steel production processes and the by-products generated in the coking process are recycled as industrial raw material or material to replace virgin resources. A high percentage of the dust originating in various processes is returned to the process to reduce waste and improve material efficiency.

Steel is a fully recyclable material for infinite times without losing any of its original properties. Therefore, it is never consumed but continuously transformed through recycling processes that make it a permanent material, contributing substantially to the development of a circular economy.

## 2.4. Product-related or management system-related certifications

Acciaierie d'Italia has a management system certified according to ISO 14001 (Environment), ISO 50001 (Energy) (only Taranto plant), ISO 9001 & IATF 16949:2016 (Quality), ISO 45001 (Health and Safety) and SA8000 (Social Responsibility).

## 2.5. Name and location of production site

Cold formed welded tubes – Hollow sections from Hot rolled coils are manufactured at:

- Racconigi Plant: Strada Regionale 20, Km 27, 12035 Racconigi CN

# 3. Product information

***Hollow section from HRC (Hot rolled coil)*** is produced at the Racconigi plant. The production unit is specialized in the production of cold-formed electro-welded hollow sections (circular, square, rectangular, and special profiles) using the coils supplied by the Group's plants. The hollow sections are in fact produced from black coils, pickled or hot-dip galvanized ones, with remetallization of the weld. Hollow sections are used for iron engineering and in various installations for structural purpose. Some examples are scaffolding, agricultural and earthmoving machinery, industrial carpentry, greenhouses, vineyards, micropiles for construction, window frames, photovoltaic structures, and styling elements. Several advantages result from the structural use of hollow sections due to resistance to operating loads, for carriability and for the suitability to truss and frames assembly. In addition, the hollow sections allow a considerable lightening of the structures as well as allowing the passage of electrical cables and hydraulic pipes.

| Facilities Hollow section - Racconigi | |
|---|---|
| **Production lines (nr.):** | 7 |
| **Slitter (nr.)** | 3 |
| **Production capability (mt/year):** | 260 000 |

| Dimensional Range - Racconigi | |
|---|---|
| **Thicknesses (mm)** | 1,5 – 8,0* |
| **Diameters (mm)** | 20 ÷ 219* |
| **Length (mm)** | 5 000 ÷ 13 000** |

*Thicknesses and diameters can change depending on the steel grade.
**Maximum length depending on profile.

| Main reference quality standard | | |
|---|---|---|
| **Applications** | Standard | Steel Grade |
| **Structural Pipes** | EN 10219 | S235; S275; S355 |
| **Precision tubes** | EN 10305/3-5 | E155; E190; E195; E220; E260; E275; E320; S355 |

# 4. LCA information

**Functional unit / declared unit:** 1000 kg of Cold formed welded tubes – Hollow sections from Hot Rolled Coils

**Reference service life**: Not applicable

**Time representativeness:** Data input was collected in May 2023-July 2023, based on data related to the year 2022.

**Database(s) and LCA software used:** Ecoinvent v3.8, GaBi database, GaBi Software v.10.6

## Description of system boundaries:

Cradle to gate with modules C1–C4 and module D (A1–A3 + C + D).
Hollow sections are used for multiple applications; for this reason, Modules A4 and A5 have not been considered, together with Modules B.
The hollow sections are produced in Racconigi plant, starting from the hot rolled coil produced in Taranto plant, according to the production process shown in Figure 1 and described hereafter.

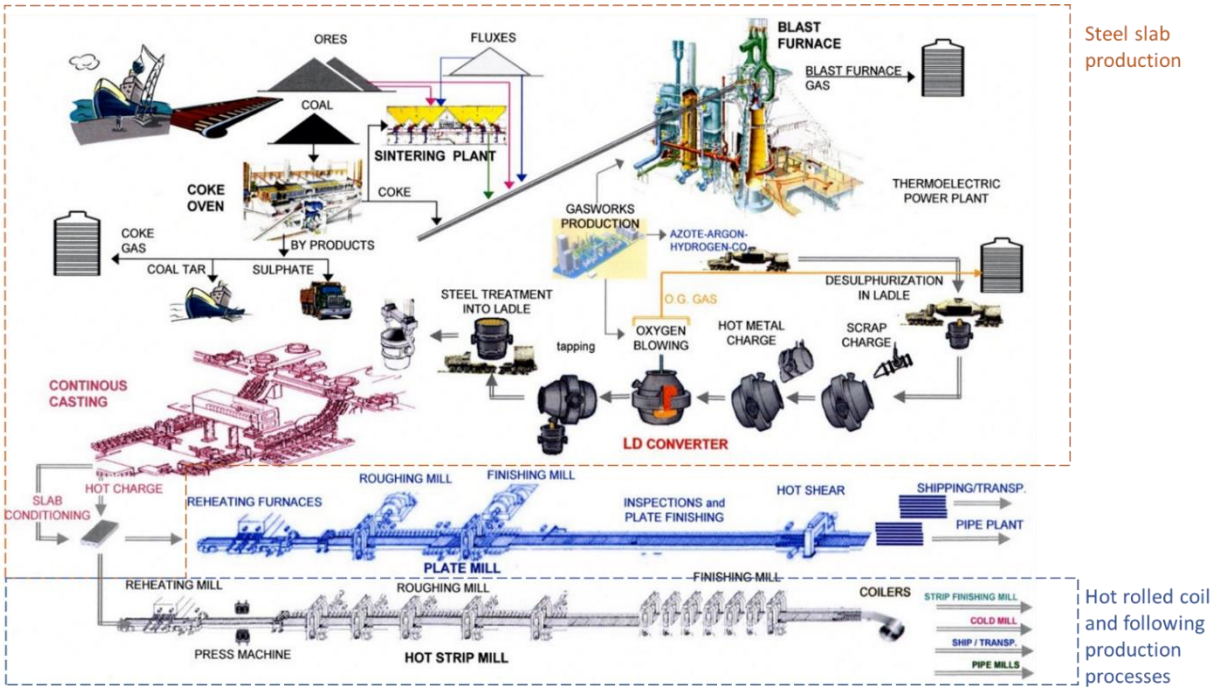



*Figure 1: Steel slab and hot rolled coil production in Taranto plant, necessary for the hollow section production*

All the steel products realized in Taranto plant derive from the production of the steel slab, which is the result of the steel-making process; therefore, the manufacturing process starts with the production of the steel slabs according to the following process:

1) **Raw materials**, such as iron ores and coals, reach Taranto Port and are sent to Taranto plant, where they are stored and handled in primary stockyards;
2) Before being utilized in blast furnaces, coals picked up from parks and properly mixed go through a distillation process that transform them into **carbon coke**, that is then used in blast furnace for production of hot metal or pig iron from the iron ores;
3) The iron ores, along with other materials is treated in the **sintering plant** and transformed into sinter to feed the blast furnace, the heart of the steel cycle;

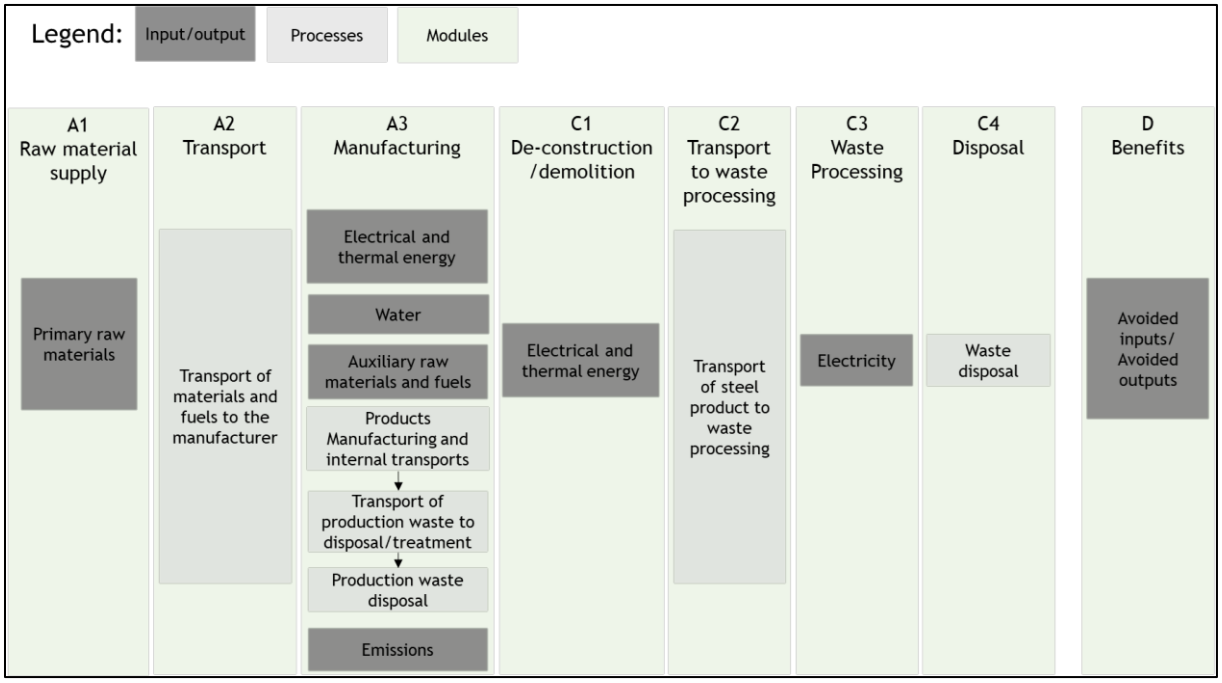
4) Blast furnaces produce **hot metal or pig iron**, the metal alloy of iron and carbon (Fe-C), that in the same plant are made subservient to process and automation control systems, which allow supervision and process control;

5) Pig iron is an iron alloy, composed of iron and a small percentage of carbon. The hot metal (liquid pig iron) is transferred into the steel mill, to be transformed into **steel**, through a process that uses huge converters into which the hot metal is poured. Oxygen insufflation allows then the reduction of the carbon content;

6) The liquid steel is transferred to the continuous casting plants where it is poured into **ingot molds**, inside which the solidification process gests started. The obtained semi-finished product is called slab.

Then, **hot rolled coils** are produced in dedicated hot strip mills, allowing the incoming slab to be preheated in order to be pressed and rolled to achieve the thickness reduction.
Finally, part of hot rolled coils production is sent to Racconigi plant, where the low-alloy carbon steel coils are profiled in order to produce **cold formed welded tubes - hollow sections from HRC** of different sizes, with a diameter from 20 to 219 mm, thickness from 1.5 to 8 mm, with circular, square, rectangular shape and special profiles.

## System diagram:




**Module A1** includes the supply of all raw materials, considering their extraction and processing. Raw materials are completely used for the production of the steel slabs and can be listed as follows:

- Iron ores
- Solid Pig iron
- Fluxes
- Ferroalloys
- Materials for treatment in BOF
- Lime
- Limestone
- Fossils
- Coke
- PCI
- Iron scrap

**Module A2** includes the data on transportation of the materials to the manufacturing site, by means of different transport typologies, i.e., ship, train, lorry. Transports by ships are exclusively made for the raw materials supply, whilst auxiliary materials are supplied by lorry, except for a small number of refractories coming from China by ship.

**Module A3** regards the entire manufacturing process of the product. This module includes all the inputs/outputs related to the activities and processes taking place in the manufacturing site and is modelled through specific data.
For each production step, data referred to Module A3 include: the list of ancillary and gaseous materials utilized, the electrical and thermal energy inputs, the water consumption, other materials internally used, steel industry gases outputs, emissions into air, water and soil, waste. Machines, infrastructure, construction, production equipment, and tools, as well as input and output flows related to their scheduled maintenance and repair activities, have not been included in the system boundary. All the machines are powered by electrical and thermal energy. Electrical energy is modelled considering that 6,6% of electricity is purchased by the national grid and 93,4% of electricity is produced within the AdI group plant in Taranto by AdI Energy (ADIE), which converts steel-making process gases (i.e., Blast Furnace Gas, Coke Oven Gas and Oxygen Converter Gas) into electrical energy. The energy conversion process has also been modelled as a stand-alone production step.

**Module C1** concerns the deconstruction phase of the product after its usage. The product can have multiple applications and it is generally removed through a cold shearing/cutting process. In particular, this stage has been modelled considering the energy consumption to cut a material with 485 MPa UTS (Ultimate Tensile Strength) and $\tau / \sigma$ equal to 0,8. Three different techniques have been modelled with different weight: mechanical shear with electric motor drive (20%), mechanical shear with diesel motor drive (20%), mechanical shear with electrohydraulic drive (60%).
A recovery percentage of the material at its end of life equal to 95% has been assumed.

**Module C2** includes the data on transportation of dismantled product to the waste treatment site. Considering that the product can have multiple applications, the transports to waste processing or disposal are different for each use. Therefore, C2 stage is modelled assuming that 1000 kg of steel product is sent to waste processing site, which is assumed to be 100km far. Assumed truck is a Euro 5, 28 - 32t gross weight truck.

**Module C3** is included in the system boundary. Waste treatment of steel basically consists in steel sorting and shredding, before sending the steel scrap to further recycling treatments. For this reason, even if this is an activity AdI has no control over it, energy consumptions related to steel sorting and shredding has been considered. In particular, a value of electric consumption equal to 0,075 kWh/kg of treated steel has been assumed according to Norgate T. (2013)[1].

Regarding the disposal and the recycling potential, the proportion of the steel material in the product that is recycled in a subsequent system is equal to 95% w/w[2]. Therefore, **Module C4** is modelled considering that 5% w/w of steel waste is not reused or recycled, but it is sent to landfill as inert material.

**Module D** includes the reuse, recovery and/or recycling potentials, expressed as net impacts and benefits.
In particular, Module D has been modelled by considering the environmental benefits deriving from 4 different contributions:

1. post-consumer steel waste
2. Gas by-products for energy production
3. Sold by-products
4. Waste to recovery/reuse

[1] Norgate T. (2013) Metal recycling: The need for a life cycle approach. EP135565, CSIRO, Australia
[2] Product Environmental Footprint Guidance: Annex C – List of Default Values for A, R1, R2, R3 and Qs/Qp available at https://ec.europa.eu/environment/eussd/smgp/pdf/PEFCR_guidance_v6.3.pdf
https://ec.europa.eu/environment/eussd/smgp/pdf/2019-06-28_PEFCR_Metal_Sheets_final.pdf

**More information:** Purchased and self-produced electricity used in the manufacturing process of module A3 accounts for around 24% of the GWP-GHG results of modules A1-A3.

Modules declared, geographical scope, share of specific data (in GWP-GHG results) and data variation (in GWP-GHG results):

| | Product stage | | | Construction process stage | | Use stage | | | | | | | End of life stage | | | | Resource recovery stage |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Raw material supply | Transport | Manufacturing | Transport | Construction installation | Use | Maintenance | Repair | Replacement | Refurbishment | Operational energy use | Operational water use | De-construction demolition | Transport | Waste processing | Disposal | Reuse-Recovery-Recycling-potential |
| **Module** | **A1** | **A2** | **A3** | **A4** | **A5** | **B1** | **B2** | **B3** | **B4** | **B5** | **B6** | **B7** | **C1** | **C2** | **C3** | **C4** | **D** |
| Modules declared | X | X | X | ND | ND | ND | ND | ND | ND | ND | ND | ND | X | X | X | X | X |
| Geography | GLO | GLO, EU, IT | GLO, EU, IT | - | - | - | - | - | - | - | - | - | IT, GLO | IT, GLO | IT, GLO | EU, GLO | IT, EU, GLO |
| Specific data used | >90% | | | | | - | - | - | - | - | - | - | - | - | - | - | - |
| Variation – products | Not relevant | | | | | - | - | - | - | - | - | - | - | - | - | - | - |
| Variation – sites | Not relevant | | | | | - | - | - | - | - | - | - | - | - | - | - | - |
| (X = declared module; ND = module Not Declared) | | | | | | | | | | | | | | | | | |

## Content information

| Product components | Weight, kg | Post-consumer material, weight-% | Biogenic material, weight-% and kg C/kg |
|---|---|---|---|
| **Fe** | 993,82 | 99,38 | 0 |
| **C** | 0,64 | 0,06 | 0 |
| **Mn** | 3,84 | 0,38 | 0 |
| **Others** | 1,69 | 0,17 | 0 |
| **TOTAL** | 1 000 | 100 | - |

No packaging materials are here presented because the Hallow section are sold unpacked.

The list of components does not include products included in the “Candidate List of Substances of Very High Concern for Authorizations” by European Chemicals Agency (ECHA).

## 4.1. Results of the environmental performance indicators

### Mandatory impact category indicators according to EN 15804

| Results per 1000 kg of Hollow Sections | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Indicator** | **Unit** | **A1** | **A2** | **A3** | **A1-A3** | **C1** | **C2** | **C3** | **C4** | **D** |
| **GWP-fossil** | kg $CO_2$ eq. | 3,67E+02 | 2,36E+02 | 2,45E+03 | 3,06E+03 | 3,55E-04 | 6,56E+00 | 3,04E+01 | 2,63E-01 | -1,74E+03 |
| **GWP-biogenic** | kg $CO_2$ eq. | 6,65E-01 | 2,78E-01 | 2,42E+00 | 3,36E+00 | 3,23E-06 | 2,30E-02 | 4,89E-01 | 1,72E-04 | -1,12E+00 |
| **GWP-luluc** | kg $CO_2$ eq. | 1,07E+00 | 4,82E-02 | 9,37E-02 | 1,21E+00 | 8,73E-08 | 4,40E-02 | 1,08E-02 | 2,54E-04 | -2,67E-01 |
| **GWP-total** | kg $CO_2$ eq. | 3,68E+02 | 2,36E+02 | 2,46E+03 | 3,06E+03 | 3,58E-04 | 6,62E+00 | 3,09E+01 | 2,63E-01 | -1,74E+03 |
| **ODP** | kg CFC 11 eq. | 7,88E-05 | 1,38E-11 | 6,41E-06 | 8,52E-05 | 3,34E-11 | 6,42E-13 | 6,22E-10 | 1,07E-07 | -6,03E-05 |
| **AP** | mol $H^+$ eq. | 3,04E+00 | 8,41E+00 | 3,54E+00 | 1,50E+01 | 1,90E-06 | 2,12E-02 | 4,21E-02 | 2,48E-03 | -6,19E+00 |
| **EP-freshwater** | kg P eq. | 6,43E-01 | 7,51E-05 | 3,92E-02 | 6,82E-01 | 5,81E-09 | 2,34E-05 | 1,48E-04 | 2,41E-05 | -6,05E-01 |
| **EP-marine** | kg N eq. | 5,45E-01 | 2,23E+00 | 8,54E-01 | 3,63E+00 | 8,00E-07 | 9,65E-03 | 1,24E-02 | 8,62E-04 | -1,42E+00 |
| **EP-terrestrial** | mol N eq. | 5,47E+00 | 2,44E+01 | 9,50E+00 | 3,94E+01 | 8,75E-06 | 1,08E-01 | 1,33E-01 | 9,42E-03 | -1,54E+01 |
| **POCP** | kg NMVOC eq. | 1,49E+00 | 6,22E+00 | 3,63E+00 | 1,13E+01 | 2,38E-06 | 1,90E-02 | 3,28E-02 | 2,74E-03 | -7,39E+00 |
| **ADP-minerals & metals*** | kg Sb eq. | 5,11E-04 | 9,05E-06 | 3,74E-04 | 8,94E-04 | 1,38E-10 | 6,59E-07 | 8,83E-06 | 6,01E-07 | -2,33E-02 |
| **ADP-fossil*** | MJ | 2,67E+04 | 2,85E+03 | 7,10E+03 | 3,67E+04 | 4,95E-03 | 8,58E+01 | 4,30E+02 | 7,38E+00 | -2,54E+04 |
| **WDP*** | $m^3$ | 1,22E+02 | 4,85E-01 | 3,37E+02 | 4,59E+02 | 8,60E-05 | 7,31E-02 | 1,23E+01 | 3,39E-01 | -1,50E+02 |
| **Acronyms** | **GWP-fossil** = Global Warming Potential fossil fuels; **GWP-biogenic** = Global Warming Potential biogenic; **GWP-luluc** = Global Warming Potential land use and land use change; **ODP** = Depletion potential of the stratospheric ozone layer; **AP** = Acidification potential, Accumulated Exceedance; **EP-freshwater** = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; **EP-marine** = Eutrophication potential, fraction of nutrients reaching marine end compartment; **EP-terrestrial** = Eutrophication potential, Accumulated Exceedance; **POCP** = Formation potential of tropospheric ozone; **ADP-minerals & metals** = Abiotic depletion potential for non-fossil resources; **ADP-fossil** = Abiotic depletion for fossil resources potential; **WDP** = Water (user) deprivation potential, deprivation-weighted water consumption | | | | | | | | | |

** Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.*

## 4.2. Additional mandatory and voluntary impact category indicators

| Results per 1000 kg of Hollow Sections | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Indicator** | **Unit** | **A1** | **A2** | **A3** | **A1-A3** | **C1** | **C2** | **C3** | **C4** | **D** |
| **GWP-GHG**[3] | kg $CO_2$ eq. | 3,68E+02 | 2,36E+02 | 2,45E+03 | 3,06E+03 | 3,55E-04 | 6,60E+00 | 3,04E+01 | 2,63E-01 | -1,74E+03 |

## 4.3. Resource use indicators

| Results per 1000 kg of Hollow Sections | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Indicator** | **Unit** | **A1** | **A2** | **A3** | **A1-A3** | **C1** | **C2** | **C3** | **C4** | **D** |
| **PERE** | MJ | 5,27E+02 | 1,70E+01 | 8,06E+02 | 1,35E+03 | 2,42E-03 | 5,95E+00 | 3,68E+02 | 6,40E-02 | -9,98E+02 |
| **PERM** | MJ | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| **PERT** | MJ | 5,27E+02 | 1,70E+01 | 8,06E+02 | 1,35E+03 | 2,42E-03 | 5,95E+00 | 3,68E+02 | 6,40E-02 | -9,98E+02 |
| **PENRE** | MJ | 2,67E+04 | 2,86E+03 | 7,10E+03 | 3,67E+04 | 4,95E-03 | 8,61E+01 | 4,30E+02 | 7,38E+00 | -2,55E+04 |
| **PENRM** | MJ | 1,30E-01 | 0,00E+00 | 2,54E-01 | 3,85E-01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,29E-03 | -8,01E-01 |
| **PENRT** | MJ | 2,67E+04 | 2,86E+03 | 7,10E+03 | 3,67E+04 | 4,95E-03 | 8,61E+01 | 4,30E+02 | 7,39E+00 | -2,55E+04 |
| **SM** | kg | 0,00E+00 | 0,00E+00 | 2,73E+02 | 2,73E+02 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| **RSF** | MJ | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| **NRSF** | MJ | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| **FW** | $m^3$ | 2,85E+00 | 2,37E-02 | 7,67E+00 | 1,05E+01 | 2,25E-06 | 6,87E-03 | 3,25E-01 | 7,88E-03 | -3,51E+00 |
| **Acronyms** | **PERE** = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; **PERM** = Use of renewable primary energy resources used as raw materials; **PERT** = Total use of renewable primary energy resources; **PENRE** = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; **PENRM** = Use of non-renewable primary energy resources used as raw materials; **PENRT** = Total use of non-renewable primary energy re-sources; SM = Use of secondary material; **RSF** = Use of renewable secondary fuels; **NRSF** = Use of non-renewable secondary fuels; **FW** = Use of net fresh water | | | | | | | | | |

[3] This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic $CO_2$ is set to zero.

## 4.4. Waste indicators

| Results per 1000 kg of Hollow Sections | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Indicator** | **Unit** | **A1** | **A2** | **A3** | **A1-A3** | **C1** | **C2** | **C3** | **C4** | **D** |
| **Hazardous waste disposed** | kg | 8,31E-13 | 1,18E-08 | 1,60E-06 | 1,61E-06 | 5,95E-13 | 4,56E-10 | 9,09E-08 | 0,00E+00 | -2,00E-06 |
| **Non-hazardous waste disposed** | kg | 4,36E-06 | 2,75E-01 | 1,91E+00 | 2,19E+00 | 3,12E-06 | 1,40E-02 | 4,77E-01 | 0,00E+00 | -1,20E+00 |
| **Radioactive waste disposed** | kg | 1,76E-07 | 3,32E-03 | 5,30E-02 | 5,64E-02 | 1,26E-07 | 1,60E-04 | 1,93E-02 | 0,00E+00 | -9,59E-04 |

## 4.5. Output flow indicators

| Results per 1000 kg of Hollow Sections | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Indicator** | **Unit** | **A1** | **A2** | **A3** | **A1-A3** | **C1** | **C2** | **C3** | **C4** | **D** |
| **Components for re-use** | kg | 0,00E+00 | 0,00E+00 | 2,94E+02 | 2,94E+02 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| **Material for recycling** | kg | 0,00E+00 | 0,00E+00 | 2,08E-02 | 2,08E-02 | 0,00E+00 | 0,00E+00 | 9,50E+02 | 0,00E+00 | 0,00E+00 |
| **Materials for energy recovery** | kg | 0,00E+00 | 0,00E+00 | 9,44E-01 | 9,44E-01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| **Exported energy** | MJ | 0,00E+00 | 0,00E+00 | 7,77E+03 | 7,77E+03 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |

## 4.6. Other environmental performance indicators

| Results per 1000 kg of Hollow Sections | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Indicator** | **Unit** | **A1** | **A2** | **A3** | **A1-A3** | **C1** | **C2** | **C3** | **C4** | **D** |
| **Particulate matter** | Disease incidences | 2,38E-05 | 1,44E-04 | 2,52E-05 | 1,93E-04 | 4,54E-11 | 1,23E-07 | 3,65E-07 | 4,85E-08 | -8,75E-05 |
| **Ionising radiation, human health** | kBq U235 eq. | 3,98E+01 | 4,87E-01 | 1,27E+01 | 5,30E+01 | 3,30E-05 | 2,41E-02 | 3,57E+00 | 3,27E-02 | 4,02E+01 |
| **Ecotoxicity, freshwater** | CTUe | 4,53E+04 | 1,98E+03 | 2,97E+03 | 5,02E+04 | 2,82E-03 | 6,08E+01 | 2,40E+02 | 4,67E+00 | -4,93E+04 |
| **Human toxicity, cancer** | CTUh | 2,20E-06 | 3,69E-08 | 5,22E-07 | 2,75E-06 | 9,59E-14 | 1,25E-09 | 7,23E-09 | 1,18E-10 | 1,08E-05 |
| **Human toxicity, non-cancer** | CTUh | 4,51E-06 | 1,75E-06 | 3,68E-05 | 4,31E-05 | 2,28E-12 | 7,68E-08 | 2,08E-07 | 3,05E-09 | -3,58E-05 |
| **Land Use** | Pt | 3,06E+03 | 4,55E+01 | 8,46E+02 | 3,96E+03 | 1,79E-03 | 3,63E+01 | 2,33E+02 | 1,54E+01 | -4,00E+03 |

# References


[1] General Programme Instructions of the International EPD® System. Version 4.0.

[2] PCR 2019:14. Construction products. v.1.2

[3] BS EN 15804:2012+A2:2019 "Sustainability of construction works — Environmental product declarations Core rules for the product category of construction products"

[4] ISO 14040:2021 "Environmental management -- Life cycle assessment -- Principles and framework"

[5] ISO 14044:2021 "Environmental management -- Life cycle assessment -- Requirements and guidelines"

[6] ISO 14025:2010, Environmental labels and declarations -- Type III environmental declarations -- Principles and procedures

[7] DG JRC/IES, ILCD Handbook, 2011

[8] EU Commission, Product Environmental Footprint Pilot Guidance, Guidance for the implementation of the EU Product Environmental Footprint (PEF) during the Environmental Footprint (EF) pilot phase, 2016

[9] EU Recommendations 2013/179, Commission Recommendation on the use of common methods to measure and communicate the life cycle environmental performance of products and organisations, 2013

[10] ISO and SETAC Europe (modified from Heijungs & Hofstetter), Terminology used in life cycle assessment as defined by (ISO, 1997a; 1997b; 1997d), 1996.

[11] Institute of Environmental Sciences, Leiden University, The Netherlands: Handbook on impact categories "CML 2001 ", 2001.

[12] Institute of Environmental Sciences, Leiden University, The Netherlands: "Life Cycle Assessment, An operational guide to the ISO standards, Volume 1, 2 and 3", 2001.

[13] IPCC, Climate change 2007. Impacts, adaptations and mitigation of climate change: Scientific and technical analysis. Intergovernmental Panel on Climate Change, Cambridge, University Press, New York, 2008.

[14] ReCiPe 2008 A life cycle impact assessment method which comprises harmonised category indicators at the midpoint and the endpoint level Mark Goedkoop, 6 January 2009.

[15] GaBi software, version 10 (sphera) < http://www.gabi-software.com/>.

[16] Gabi database < http://www.gabi-software.com/international/databases/>.

[17] Ecoinvent Version 3 - Wernet, G., Bauer, C., Steubing, B., Reinhard, J., Moreno-Ruiz, E., and Weidema, B., 2016. The ecoinvent database version 3 (part I): overview and methodology. The International Journal of Life Cycle Assessment, [online] 21(9), pp.1218–1230. Available at: http://link.springer.com/10.1007/s11367-016-1087-8.

[18] Description of life cycle impact assessment methods Supplementary information for tenders, ESU-services Ltd, 2020.

[19] AdI website - https://www.acciaierieditalia.com

[20] AdI website. - Dichiarazione ambientale centrale di Taranto 2021-2023. Dati aggiornati al 31/12/2022, available at https://www.acciaierieditalia.com/media/fm/source/Documenti/Dichiarazione%20Ambientale/Dichiarazione%20ambientale%20ADI%20Energia.pdf

[21] Acciaierie d'Italia Group - Sustainability Report, 2022 available at https://www.acciaierieditalia.com/en/insight/sustainability-report-2022-acciaierie-d-italia/

[22] Weidema, B. P., & Wesnaes, M. S. (1996). Data quality management for life cycle inventories—an example of using data quality indicators. Journal of cleaner production, 4(3-4), 167-174

[23] Product Environmental Footprint Guidance: Annex C – List of Default Values for A, R1, R2, R3 and Qs/Qp available at https://ec.europa.eu/environment/eussd/smgp/pdf/PEFCR_guidance_v6.3.pdf https://ec.europa.eu/environment/eussd/smgp/pdf/2019-06-28_PEFCR_Metal_Sheets_final.pdf.

[24] Norgate T. (2013) Metal recycling: The need for a life cycle approach. EP135565, CSIRO, Australia

[25] Life Cycle Assessment (LCA) report - 1 mt of Plates, 1 mt of Hot rolled coils, 1 mt of Hollow sections for Multiple Uses

EPD®

www.environdec.com