ENVIRONMENTAL PRODUCT DECLARATION

Quenched and tempered bars

PROGRAMME	PROGRAMME OPERATOR	EPD REGISTRATION NUMBER	PUBLICATION DATE	VALID UNTIL
The International EPD® System, www.environdec.com	EPD International AB	S-P-05810	2022-04-20	2027-03-21

Programme information

PROGRAMME	The International EPD® System	
	EPD International AB Box 210 60 SE-100 31 Stockholm - Sweden	www.environdec.com info@environdec.com

PRODUCT CATEGORY RULES (PCR)

Basic iron or steel products & special steels, except construction steel products, registration number PCR 2015:03, version 2.0, UN CPC code: 4112 and 412

INDEPENDENT VERIFICATION

PCR review was conducted by: The Technical Committee of the International EPD® System.
PCR moderator: Gorka Benito Alonso, IK INGENIERIA, *g.benito@ik-ingenieria.com*.
Chair of the PCR review: Hudai Kara.

The review panel may be contacted via *info@environdec.com*.

Independent third-party verification of the declaration and data, according to ISO 14025:2006:

☐ EPD process certification ☑ EPD verification

Third party verifier: Michela Gallo, University of Genoa

In case of recognised individual verifiers:
Approved by: The International EPD® System

Procedure for follow-up of data during EPD validity involves third party verifier:

☐ Yes ☑ No

The EPD owner has the sole ownership, liability, and responsibility for the EPD.
EPDs within the same product category but from different programmes may not be comparable.

ORI MARTIN

Company information

OWNER OF THE EPD	Ori Martin S.p.A, via Cosimo Canovetti, 13, 25128 Brescia (Italy). *info@orimartin.it* - +39 030 39991/2/3
CONTACT PERSON	Marco Paura *marco.paura@orimartin.it* – +39 030 3999.342; Maurizio Zanforlin *maurizio.zanforlin@orimartin.it* – +39 030 3999.236

DESCRIPTION OF THE ORGANISATION

ORI Martin is a modern steel plant with an electric furnace, considered one of the most advanced companies in technological and innovative terms.
Thanks to farsighted investments in Research and Development, over the years it has become a benchmark for the steel sector.

The main raw material used to produce steel is scrap. Accordingly, ORI Martin operates following a circular economy approach.

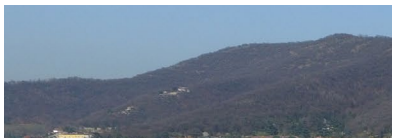
The Group's current composition is the result of a diversification strategy that began in the 1960s which led to the internalisation and consolidation of various companies operating at different levels of the steel industry.

This strategy is much appreciated by customers because it guarantees full traceability, end-product quality and punctual deliveries along the entire transformation chain.

Today the Group is composed of eleven companies, where ORI Martin is present with either equal shares or as majority shareholder.

Now, with more than 200 steel grades for special uses in the mechanical and automotive industries, the Group is present in all the main European markets, thanks to its strategic geographical position and a wide commercial network in all of the main markets of special steels.

The ORI Martin Group operates in Italy, France, Germany, England, Poland, Romania, Spain, Sweden, Turkey, Austria, Finland, Greece, Slovenia, Switzerland, Czech Republic, Netherlands, Lichtenstein and Bosnia through sales offices and agents spread throughout Europe. Outside Europe, the Group also exports to China, South Korea, India, Algeria, Brazil, and Argentina.



344 million euros of **generated value**

620 **tons of steel produced** by recycling scrap

435 **people** in the Brescia facility

Product-related or management system-related certifications:

ORI Martin is certified according to:

IATF 16949:2016 (former ISO/TS 16949 since 2004) Quality Management System for automotive market	**2014/68/EU Directive** For the market of stationary pressure equipment
UNI EN ISO 14001:2015 Since 2002 (first plant in Italy) Environmental Management System	**UNI ISO 45001:2018** Since 2019 (former BS OHSAS 18001:2007 Since 2011) Health & Safety Management System
UNI EN ISO 9001:2015 Since 1990 Quality Management System	**ISO 14064:2018** Product Carbon Footprint – specific CO_2 emissions per unit of product
UNI EN ISO 50001:2018 Since 2020 Energy Management System	

NAME AND LOCATION OF PRODUCTION SITE

Production facility in Brescia
Via Cosimo Canovetti, 13, 25128 Brescia, Italy

ORI MARTIN

Product information

PRODUCT NAME
QUENCHED AND TEMPERED BARS

UN CPC CODE: 412 | **GEOGRAPHICAL SCOPE:** Global

PRODUCT IDENTIFICATION

Quenched and tempered bars are made from carbon steels, low alloyed steels and alloyed carbon steels. They are semi-finished products directly coming from the quench and temper heat treatment of hot-rolled bars. They are produced according with national and international standards, depending on final destination and customer requests.

PRODUCT DESCRIPTION

They are semi-finished steel products whose destination is the selling to customer that with plastic deformation (cold drawing, cold forging) and/or machining operations will transform them into final components.

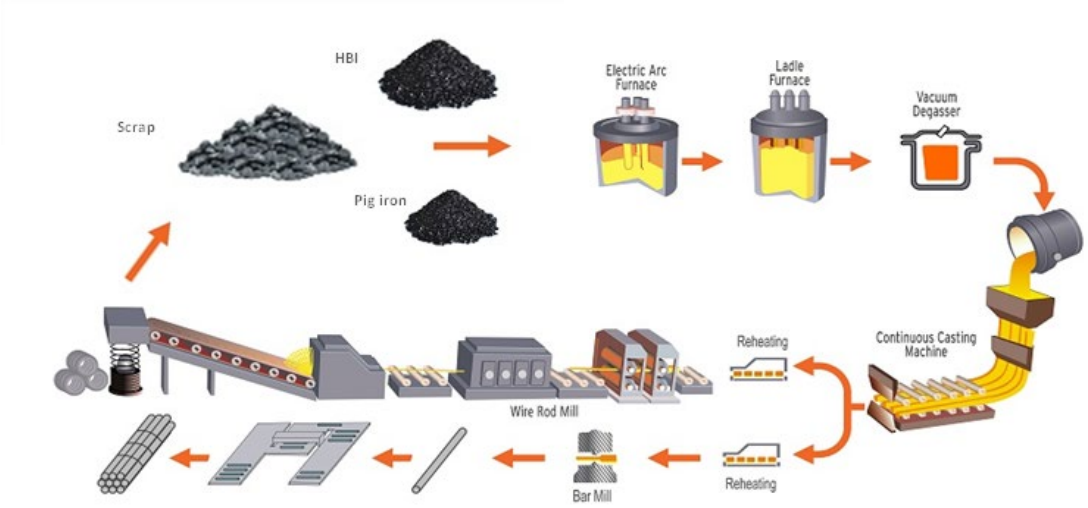
DIMENSIONS AND PRODUCTS

- **Round bars:**
  15 – 65 mm diameter

The previously described products are usually dedicated to the production of mechanical components, for several markets, principally the Automotive market.

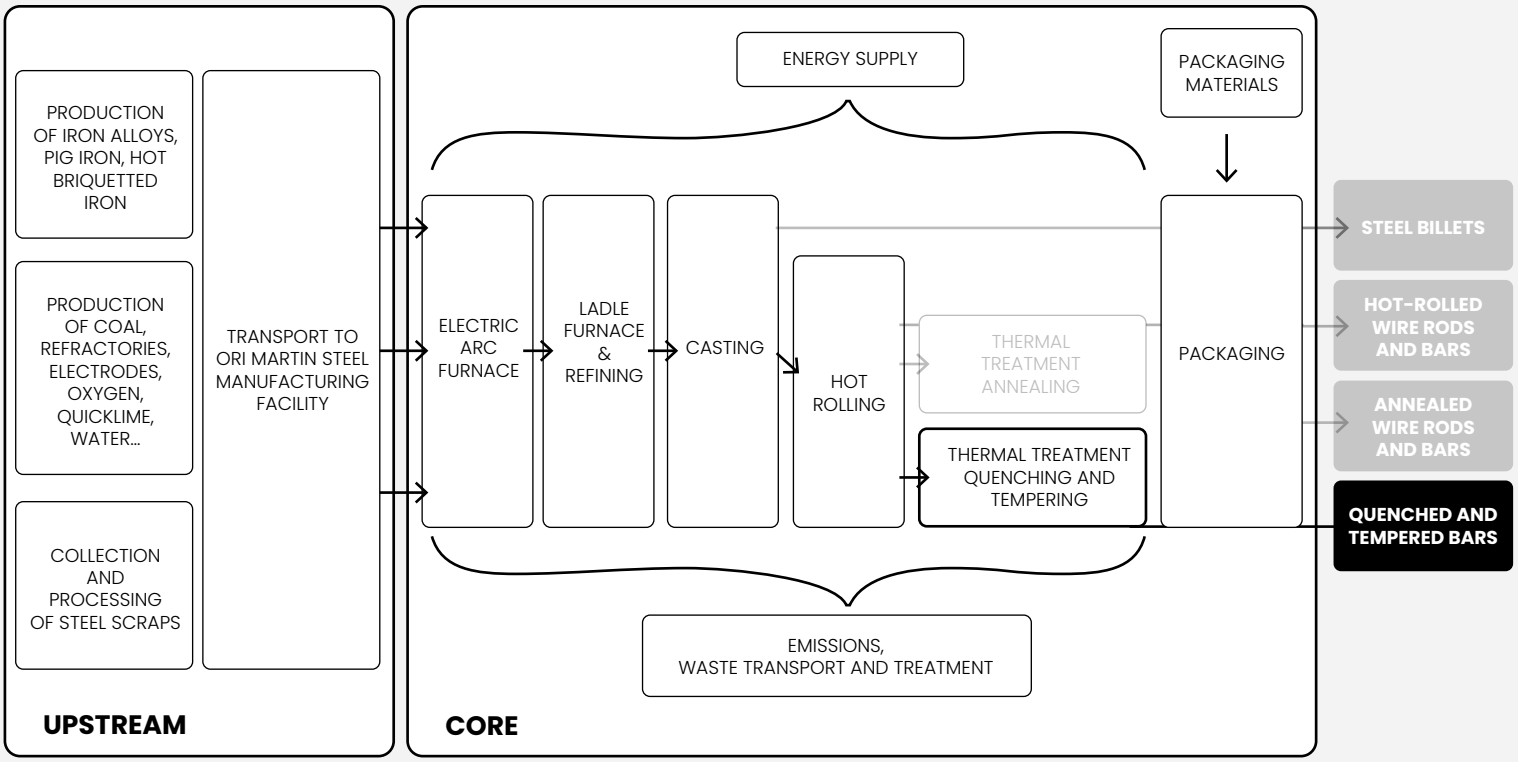
With respect to alloying elements, the production ranges from unalloyed carbon steels to low alloyed or alloyed carbon steels, with alloying elements minimum and maximum values being listed in the Content Declaration below.

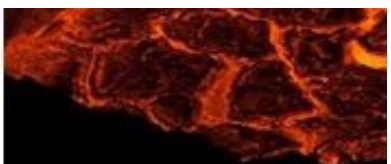
Process Description



LCA INFORMATION

DECLARED UNIT
1 tonne (1000 kg) of quenched and tempered bars at ORI MARTIN gate in Brescia, Italy
REFERENCE SERVICE LIFE
Not applicable
TIME REPRESENTATIVENESS
The LCA covered 2018 data
DATABASE(S) AND LCA SOFTWARE USED
Ecoinvent 3.6 cut-off by classification, Open LCA 1.10.3
SYSTEM DIAGRAM:





DESCRIPTION OF SYSTEM BOUNDARIES
Cradle-to-gate

EXCLUDED LIFECYCLE STAGES
Use and End-of-life stages were not included, since they are out of the scope of the PCR used in the present EPD

MORE INFORMATION
The 2020 sustainability report can be downloaded here.

NAME AND CONTACT INFORMATION OF LCA PRACTITIONER
Davide Rovelli - *davide.rovelli@stiima.cnr.it*
Carlo Brondi - *carlo.brondi@stiima.cnr.it*
Michele Andreotti - *michele.andreotti@stiima.cnr.it*
Elisabetta Abbate - *elisabetta.abbate@stiima.cnr.it*

NAME AND CONTACT INFORMATION OF THE ORGANISATION CARRYING OUT THE UNDERLYING LCA STUDY
STIIMA-CNR (Institute of Intelligent Industrial Technologies and Systems for Advanced Manufacturing of the National Research Council of Italy) – website link.

ADDITIONAL INFORMATION
No Cut off rules have been applied. A quality check based on pedigree matrix has been applied. Italian 2018 residual electricity mix (612 g CO_2eq/kWh) is used for Core processes.

Content declaration

Product

Materials / chemical substances	[kg/tonne]	%	Environmental / hazardous properties
Iron	Balance	Balance	-
Carbon	1,2 – 5.5	0.12 - 0.55	
Manganese	2 – 21.5	0.2 - 2.15	-
Chromium	0.5 – 15	0.05 – 1.5	-
Nickel	1 - 18	0.1 – 1.8	Nickel is classified in EC Directive 67/548/EEC as a suspect carcinogen (category 3 – R40) and as a skin sensitizer (R43).
Silicon	0.2 - 5	0.02 – 0.5	-
Molybdenum	0.1 - 12	0.01 – 1.2	-
Vanadium	0.1 – 3.5	0.01 – 0.35	
Others	<10	<1.0	

Steel products are considered as articles under the European Regulation (EC) 1907/2006, concerning the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH). All intentionally added alloying elements in Ori Martin products with the exception of nickel are not classified as hazardous. Nevertheless, there are certain substances covered by European and national chemical legislation and lists (REACH Annex XIV and XVII, RoHS-directive (2011/65/EC and 2015/863/EU) Annex II and Global Automotive Declarable Substance List ("GADSL")) that cannot physically be measured in steel and others that are difficult to measure due to being present in very low levels. The alloying elements in low alloyed steel are firmly bonded in its chemical matrix. Due to this bonding and to the presence of a protective oxide film the release of any of the constituents is very low and negligible when the steel is used appropriately.

Packaging

DISTRIBUTION PACKAGING
Approximately 1.03 kg of wood packaging and 0.02 kg of carton board packaging per ton of steel.

CONSUMER PACKAGING
Not applicable.

Recycled material

PROVENIENCE OF RECYCLED MATERIALS (PRE-CONSUMER OR POST-CONSUMER) IN THE PRODUCT
The steel billet product is made from 89% recycled steel.

Environmental performance

Potential environmental impact

PARAMETER		UNIT	Upstream	Core	Downstream	TOTAL
Global warming potential (GWP)	Fossil	kg CO_2 eq.	447.234	939.500	INA	1386.734
	Biogenic	kg CO_2 eq.	0.676	0.161	INA	0.837
	Land use and land transformation	kg CO_2 eq.	0.500	0.063	INA	0.562
	TOTAL	kg CO_2 eq.	448.409	939.729	INA	1388.138
Acidification potential (AP)		kg SO_2 eq.	3.840	3.188	INA	7.028
Eutrophication potential (EP)		kg PO_4^{3-} eq.	2.671	1.414	INA	4.085
Photochemical oxidant formation potential (POFP)		kg NMVOC eq.	2.392	1.957	INA	4.350
Abiotic depletion potential – Elements		kg Sb eq.	0.025	0.003	INA	0.028
Abiotic depletion potential – Fossil fuels		MJ, net calorific value	6732.262	13985.491	INA	20717.753
Water scarcity potential		m^3 eq.	215.573	106.511	INA	322.084

Use of resources

PARAMETER		UNIT	Upstream	Core	Downstream	TOTAL
Primary energy resources – Renewable	Use as energy carrier	MJ, net calorific value	169.602	489.300	INA	658.901
	Used as raw materials	MJ, net calorific value	345.893	24.285	INA	370.178
	TOTAL	MJ, net calorific value	515.494	513.585	INA	1029.079
Primary energy resources – Non-renewable	Use as energy carrier	MJ, net calorific value	2793.184	16130.067	INA	18923.251
	Used as raw materials	MJ, net calorific value	4457.963	6.111	INA	4464.074
	TOTAL	MJ, net calorific value	7251.147	16136.178	INA	23387.325
Secondary material		kg	892.245	0.000	INA	892.245
Renewable secondary fuels		MJ, net calorific value	INA	INA	INA	INA
Non-renewable secondary fuels		MJ, net calorific value	INA	INA	INA	INA
Net use of fresh water		m3	4.948	2.479	INA	7.427

ORI MARTIN

Waste production and output flows

Waste production

PARAMETER	UNIT	Upstream	Core	Downstream	TOTAL
Hazardous waste disposed	kg	0.034	0.016	INA	0.050
Non-hazardous waste disposed	kg	90.582	69.163	INA	159.745
Radioactive waste disposed	kg	0.019	0.035	INA	0.053

Output flows

PARAMETER	UNIT	TOTAL
Components for reuse	kg	INA
Material for recycling	kg	138.585
Materials for energy recovery	kg	0.000
Exported energy, electricity	MJ	0.000
Exported energy, thermal	MJ	0.034

Other environmental indicators

Direct amount of water consumed by the core process: 1.301 m^3 .

Additional information

The Company operates according to high quality standards and responsibly manages its business activities.
To achieve the targets, ORI Martin has structured a procedural body based on the principles established in the **Code of Business Conduct.**

This document defines the preventive approach adopted by ORI Martin for the management of negative impacts, in particular relating to the environment and employee safety. This is achieved through a risk assessment which allows us to identify and implement mitigation actions in favour of the environment around the community in which the Company operates and of its employees.

In 2002, ORI Martin had already provided itself with an **Environmental Management System certified UNI EN ISO 14001** and an integrated policy for environmental protection highlighting the Company's commitment
to safeguarding both the environment and occupational health and safety in a combined manner - these two aspects being so fundamental and so embedded in the Company activities.

The Company has also implemented an **Energy Management System compliant with UNI EN ISO 50001**, with certification attained in 2020.

As for the environmental impact, plant activities are authorised and regulated by the Integrated Environmental Authorisation **(AIA)** issued first of all in 2006 and renewed in 2017.

In compliance with AIA provisions, ORI Martin adopts a plan to monitor and control the environmental impacts, with special reference to atmospheric emissions, water discharge and noise, periodically checked by the Regional Agency for environmental protection (ARPA).

In addition, AIA provides for the need to use the best available techniques to reduce pollution **(BAT - Best Available Technologies)** defined at European level.

ORI MARTIN released the second Sustainability Report (financial year 2020). It was drawn up in accordance with the "GRI Sustainability Reporting Standards", the most recent and widespread non-financial reporting standards established in 2016 (and updated in 2018 and 2020) by the Global Reporting Initiative (GRI) , based on "Core" option and represents the first audited version of the ORI Martin Sustainability Report.

The sustainability and innovation policies of ORI Martin aim at strengthening the circular economy model which the Company considers as the basis of its production process.
The choice to produce steel starting from electric arc melting, in fact, allows for the use of ferrous scrap as raw material with the double effect of reducing the use of natural resources and lowering the amount of industrial waste that would otherwise be disposed of.

This process is made possible by the ability of steel to maintain all of its properties unchanged throughout the process of melting and re-solidification.

ORI Martin is also involved in an energy and gradual transition project of decarbonisation of the production processes; with the progressive increase of the use of renewable energy sources and contextual containment of greenhouse gas emissions by plant activities.

In this regard, the Company certifies the carbon footprint of its products, in order to communicate the impact generated by the components produced in the factory and identify the critical variables where action is needed.

Since November 2020, there has been an agreement in force for the purchase of renewable energy (PPA - Power Purchase Agreement), that

will enable the Company to guarantee that about 10% of the plant's electricity supply comes from renewable sources.

On issues such as decarbonisation and circular economy, since 2020 the Company has been taking part in the activities of ESTEP (European Steel Technology Platform) a noprofit organisation that promotes research activities in the technological field at European level to improve the sustainability of steel processes. In particular, through the "Clean Steel" project, guidelines for the production of sustainable steel from electric arc furnace at European level have been defined. This is the framework containing the **I-Recovery®** project, aimed at exploiting the heat generated by the industrial processes of the plant, that would otherwise be lost, to satisfy part of the city's energy needs.

I-Recovery® is a project worth over 12 million euro, active since 2016 and the first of its kind in Italy, implemented with a number of technical partners: Tenova, Turboden and A2A.

The I-Recovery® system enables conveying the large amount of heat contained in the fumes of the steel plant's electric arc furnace into a system that avoids its dispersion.

In fact, the heat is recovered through the generation of steam, which is stored and used for a dual purpose: it is either transformed into thermal energy to be fed into Brescia district heating network or into electricity through an organic fluid turbine (ORC).

Thanks to this technology, I-Recovery supplies about 10MWt for heating in the winter period, equivalent to the annual needs of about 2,000 families. In summer, it produces clean electricity (about 1.8 MWe), equivalent to the needs of about700 families.

HEAT LEAP

In 2020, the European project called Heat Leap was launched; it recovers heat from the cooling water of the melting furnace and the Consteel®. Thanks to a special, large heat pump, the heat is recovered at a low temperature (about 70°C) and then taken up to an adequate temperature (about 120°C) to then be put into the town district heating network.

CORALIS

ORI Martin has adhered to and launched the project CORALIS, financed by the European Community, for industrial symbiosis in the territory and to reduce waste through recovery in industrial processes.

LIGHTHOUSE

Ori Martin adhered to the Lighthouse project, funded by the Lombardy region and Italian Ministry of Economic Development. In such project an automated framework for environmental monitoring based on LCA methodology was set up in order to dynamically monitor the environmental impacts of Ori Martin steel products, guaranteeing automatic data retrieval and LCA calculations and possibly integrating with other management systems within the organization.

References

General Programme Instructions of the International EPD® System.
Version 4.0. PCR 2015:03.

Basic iron or steel products & special steels, except construction steel products. Version 2.0

Association of Issuing Bodies, European Residual Mixes 2018,
URL: *https://www.aib-net.org/facts/european-residual-mix*

EUROPEAN INDUSTRIAL GASES ASSOCIATION AISBL, Benchmarking:
Air Separation Plants and Indirect CO2 Emissions

Rovelli, D.; Brondi, C.; Andreotti, M.; Abbate, E.; Airoldi, F.; Ballarino, A.; Institute of Intelligent Industrial Technologies and Systems for Advanced Manufacturing of the National Research Council of Italy (STIIMA-CNR), Life Cycle Assessment of Ori Martin steel products – Methodological report, 1 March 2022.
ecoinvent Association, ecoinvent 3.6 Allocation cut-off by classification.

Environmental performance – sensitivity to electricity mix

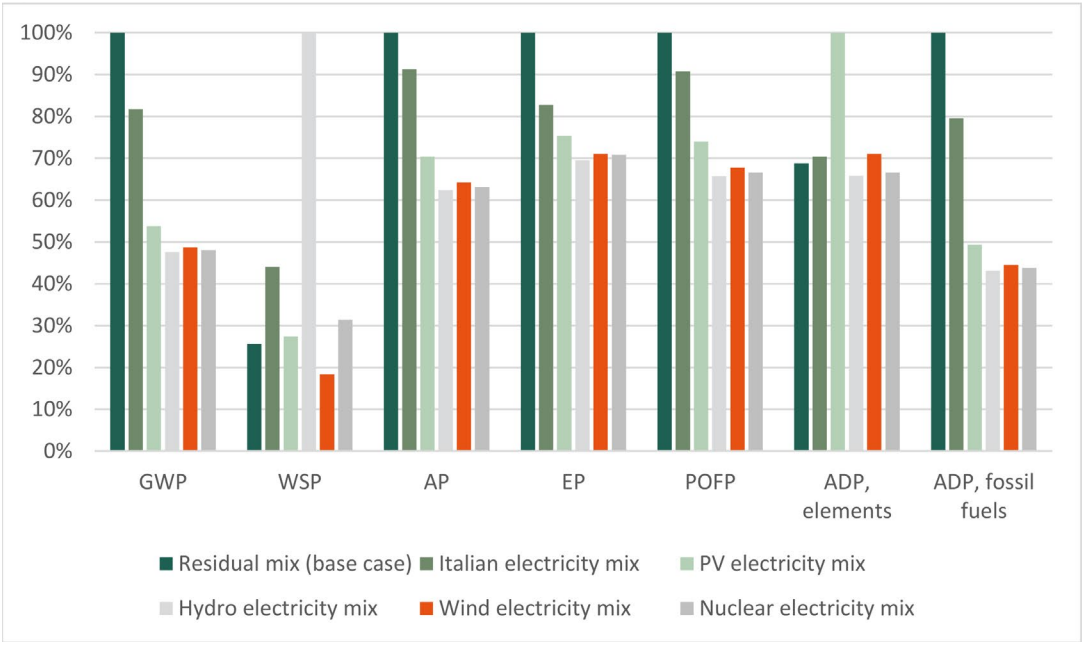
Given the high relevance of electricity in LCA results, a sensitivity to changes in the electricity mix is here provided.

Totally, 5 additional cases are evaluated, with respect to the base case which employs the Italian residual mix of 2018:

- Italian national electricity mix;
- 100% hydro electricity mix;
- 100% photovoltaic electricity mix;
- 100% wind electricity mix;
- 100% nuclear electricity mix.

Grid losses and electricity network infrastructure are kept equal to the Italian datasets for electricity.

The results show that the base case shows the highest impacts across all impact categories, excluding Water Scarcity Potential (WSP) and ADP, elements. Excluding these two categories, the Italian electricity mix case is associated to an average decrease of impacts by 15%, while the other cases are associated to an average decrease ranging between 35% and 42%. In particular, for the GWP category, a 18% decrease is observed for the Italian electricity mix case, while in the other cases the decrease ranges between 46% and 52%. This means that between 642-728 kg CO_2-eq per ton of steel could be saved by changing the electricity mix with nuclear, hydro, photovoltaic or wind sources, leading to a GWP result equal to 660-746 kg CO_2-eq/ton steel.



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