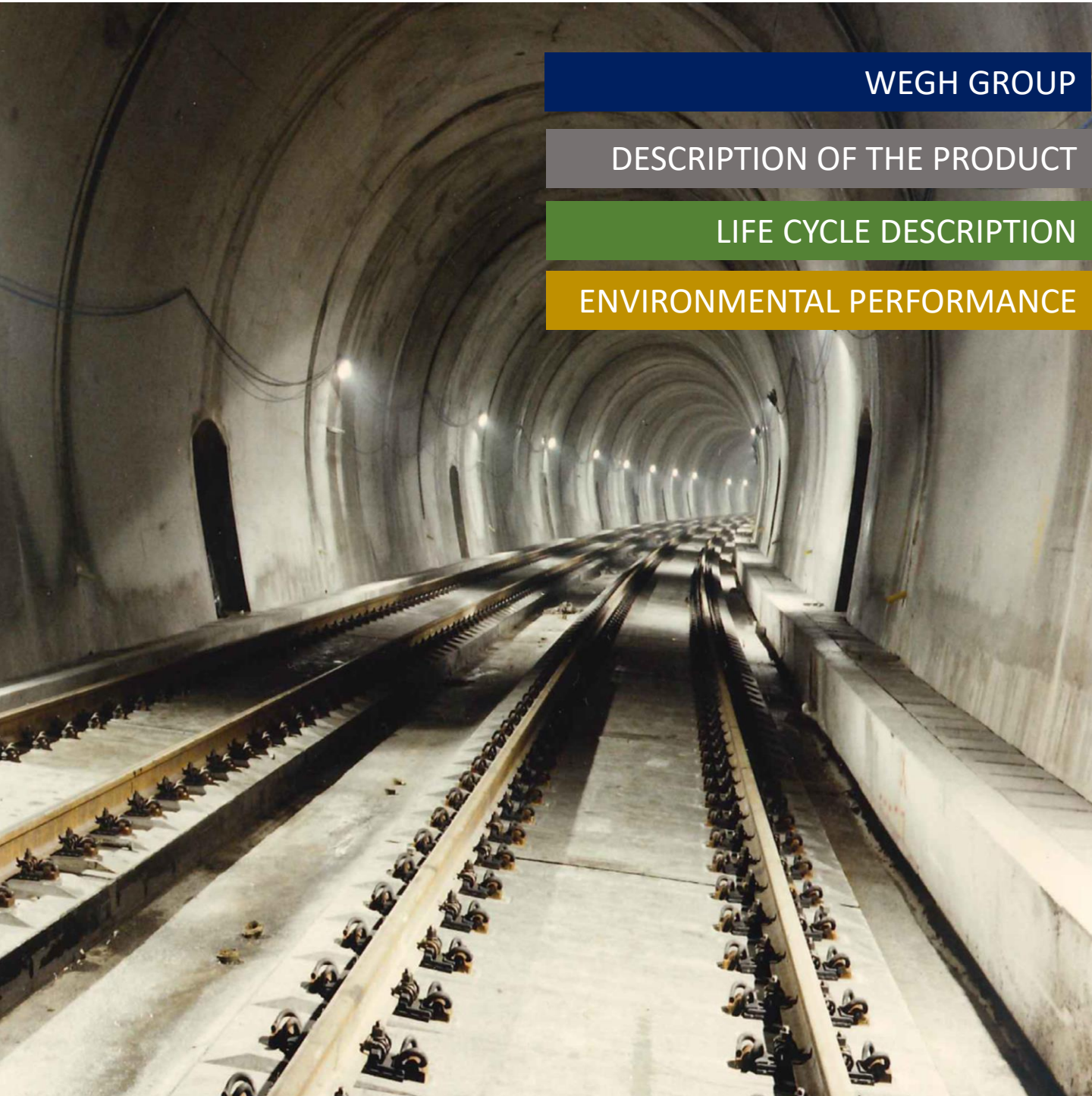




## Environmental Product Declaration for **Arianna<sup>®</sup> Slab Track System**

EPD registration number: S-P-04332  
Date of publication: 2021/08/09  
Date of revision: 2024/11/12 (version 02)  
Date of validity: 2026/08/04

# INDEX



WEGH GROUP

DESCRIPTION OF THE PRODUCT

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## ABOUT US

**WEGH Group** is a leader in the design and construction of solutions for the railway industry, with more than **530 customers** in over **40 Countries**.

With 4 production plants and different foreign branches, **WEGH Group** is firmly established in the reference markets and able to meet the international market requirement.

Its significant product skills, acquired in over sixty years of experience, synergistically combine to create a fundamental and comprehensive treasure of know-how that is placed at the service of the railway sector and make **WEGH Group** a reliable partner, considered a reference supplier by the most important contractors and sub contractors.



## MISSION

Mastering complexity and making it simple for our clients.

Sharing aims, goals and all the options to reach them.

Focusing on excellence and going with our customers step by step.

Because their way is our way.

## PHILOSOPHY

### COMPETENCE

Thanks to 60 years of experience in the railway sector, synergistically integrated product lines covering different needs, and a young qualified team that is constantly looking for innovative solutions.

### TRANPARENCY

We push customers to make aware choices.

### EXCELLENCE

Thanks to an all-round service covering all possible needs: not only design, production, laying and maintenance, but also support and assistance in case customers undertake projects autonomously.

## HISTORY

The history of WEGH Group dates to 1958 with the founding of "Niccoli e Naldoni", a well-established company in the railway sector, specializing in the production of components for signalling systems and for railway superstructure.

As time progressed, other companies, all operating in the railway sector, joined the group, each bringing its own specific know-how.





# DESCRIPTION OF THE PRODUCT

ARIANNA<sup>®</sup> STS consist in a sequence of slabs, with cross-section and length which vary according to the gauge and rolling stock. For railways the typical cross-section is 2,40 x 0,18 m and the total length is 4,80m.

## 1- RAILS

Common rail used for high speed line (60 E1). Arianna<sup>®</sup> is designed to integrate all others track equipment such as switch and crossing with using the same rail profile

## 2- SLAB

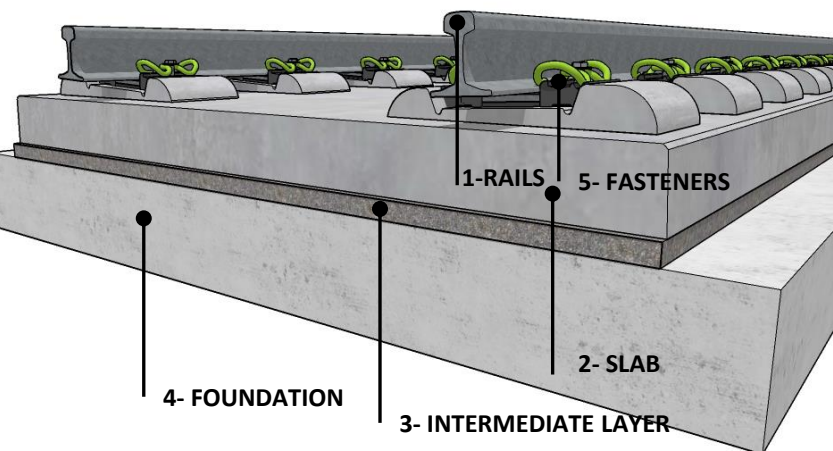
Concrete slab is made with C45/55 prestressed reinforced concrete

## 3- INTERMEDIATE LAYER

This layer is designed by WEGH GROUP to ensure high mechanical performance and high resistance to environmental actions.

## 4- FOUNDATION

Sub-structure lying on the track platform and made of C30/37 concrete



## 5- FASTENERS

Arianna<sup>®</sup> is designed to integrate all others fastening system approved by the customer





# DESCRIPTION OF THE PRODUCT

ARIANNA<sup>®</sup> STS is the ballastless solution designed specifically for railway lines and is particularly suitable for:

- passenger lines
- high-speed lines
- tunnel, viaduct and embankment
- reducing maintenance costs.

ARIANNA<sup>®</sup> STS does not require the maintenance operations usually associated with conventional line such as ballast tamping, levelling, cleaning and renewal.

## KEY BENEFITS



Low life cycle cost due to it being very low-maintenance



Quick and guaranteed production times



Quick laying and maintenance time



Constant quality control of the manufactured elements



Suitable for installation when available space is reduced because it reduces the overall size and weight of the track system



High stability of track geometry over time



Transitable for road vehicles and pedestrians





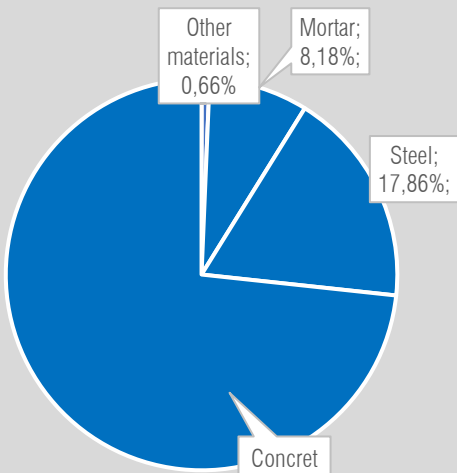
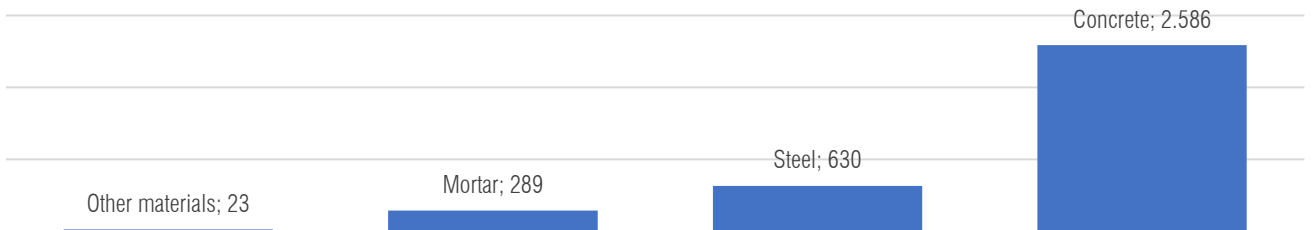


# LIFE CYCLE DESCRIPTION

## Bill of materials

Materials used for the construction of the Arianna<sup>®</sup> STS infrastructure as well as for maintenance and reinvestments have been inventoried. Total weight associated to the solution is 3.529 t/km. Top four materials and corresponding quantities per km of single track are:

Top 4 materials  
t/km



## Hazardous substances

No substance meeting the criteria of REACH regulation (Registration, Evaluation, Authorisation and Restriction of Chemicals) have been identified in the solution.

## Maintenance

Each maintenance activities are considered in this LCA:

- Use of engine and vehicles for inspection site
- Replacement of parts including raw materials, production, transport and installation





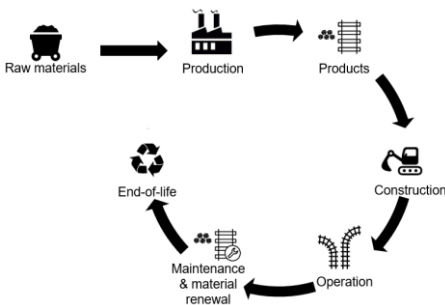
# LIFE CYCLE DESCRIPTION

Environmental impacts of the Arianna<sup>®</sup> STS has been characterized through the realization of a LCA in accordance with ISO 14040: 2006.

SimaPro software and associated EcolInvent databases are used to perform this life cycle impact assessment.

The function of the Arianna<sup>®</sup> STS is to provide rolling support and guide trains at the required speed on railways main-lines.

The **Declared Unit** is for 1 km of Arianna<sup>®</sup> STS single track, over **90 years** of infrastructure service life. Only full Arianna<sup>®</sup> STS track without transition zone nor tunnel or viaduct sections is considered in this LCA. Reference Service LIFE – RLS – are the same of the useful life of the asset (90 years).





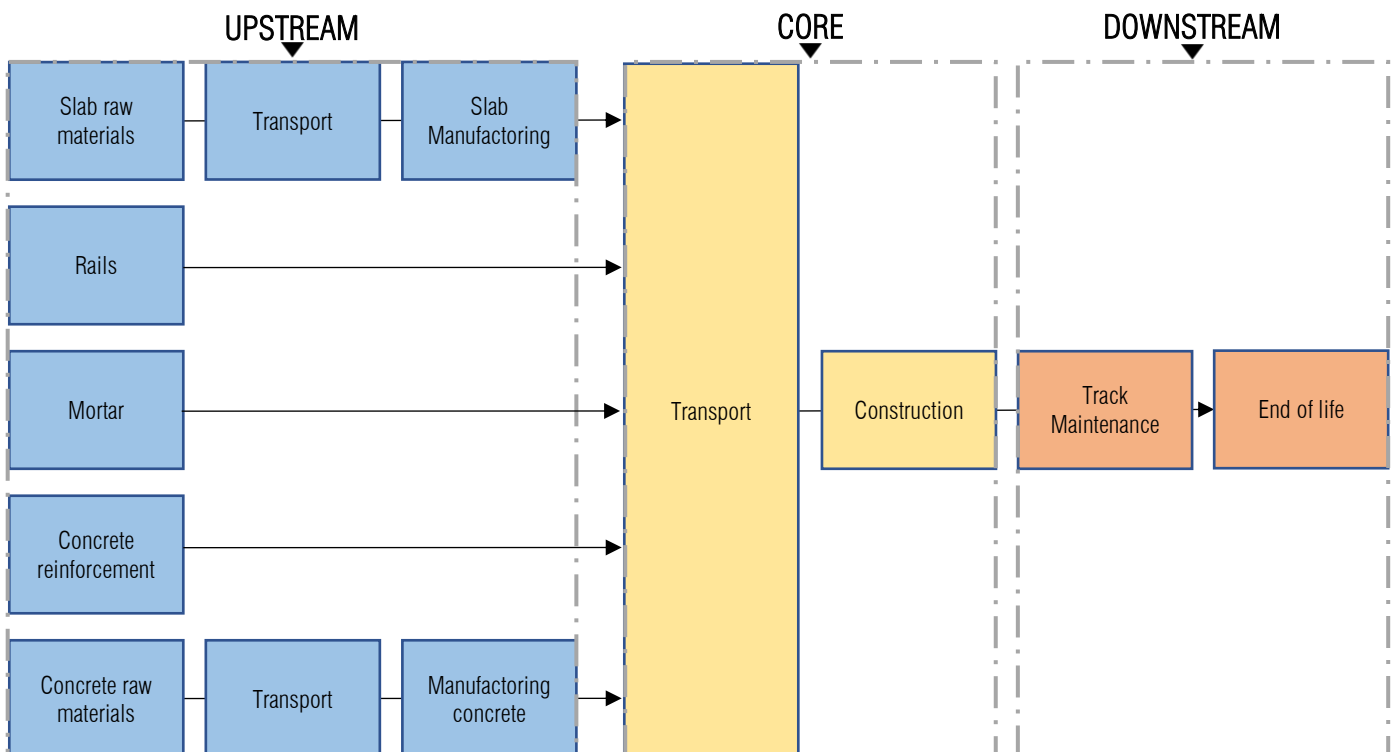


# LIFE CYCLE DESCRIPTION

The whole life cycle of the solution is considered, in other words, the LCA is a “cradle to grave” LCA that take into account all life cycle phases form the extraction of raw materials which compose Arianna<sup>®</sup> STS to the end-of-life waste management.

Transports along the supply chain and to the construction site are included as well as all construction activities (tools, electricity, vehicles and consumable).

Maintenance activities mainly consist of inspections, repair and replacement of equipment as well as periodical grinding of the track. Finally, deconstruction, collection and treatment end of life materials have been considered.





# LIFE CYCLE DESCRIPTION

EPD

UPSTREAM

CORE

DOWNSTREAM

EN 15804 PHASES

Raw material supply  
(A1)

Transport to  
construction site and  
transport on site (A4)

Railway construction  
and product in use (B1)

Maintenance and  
reinvestment (B2/B5)

Transport to  
manufacturer (A2)

Construction process  
(A5)

Operation (B6/B7)

Manufacturing(A3)

Dismantling and  
recycling and Transport  
(C1/C4)

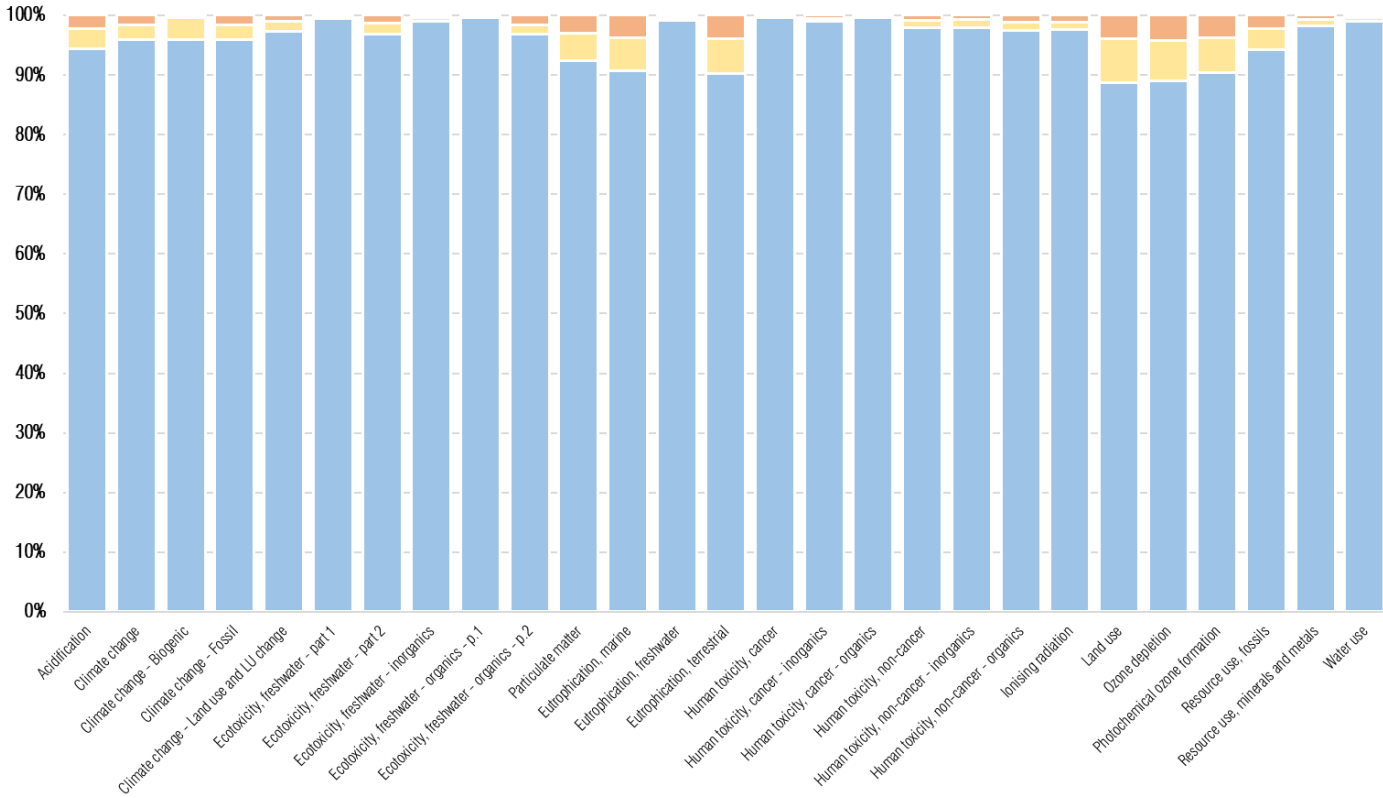


# ENVIRONMENTAL PERFORMANCE

INDICATOR PER DECLARED UNIT	UNIT	TOTAL	UPSTREAM	CORE	DOWNSTREAM
Acidification	mol H+ eq	8,48E+03	8,00E+03	2,87E+02	1,92E+02
Climate change	kg CO2 eq	2,25E+06	2,15E+06	5,53E+04	3,51E+04
Climate change - Biogenic	kg CO2 eq	7,17E+03	6,88E+03	2,66E+02	2,45E+01
Climate change - Fossil	kg CO2 eq	2,24E+06	2,15E+06	5,51E+04	3,51E+04
Climate change - Land use and LU change	kg CO2 eq	9,47E+02	9,21E+02	1,54E+01	1,03E+01
Ecotoxicity, freshwater - part 1	CTUe	4,67E+07	4,64E+07	1,40E+05	9,66E+04
Ecotoxicity, freshwater - part 2	CTUe	2,00E+06	1,94E+06	3,68E+04	2,56E+04
Ecotoxicity, freshwater - inorganics	CTUe	1,57E+07	1,55E+07	9,60E+04	6,30E+04
Ecotoxicity, freshwater - organics - p.1	CTUe	3,27E+07	3,26E+07	7,60E+04	5,46E+04
Ecotoxicity, freshwater - organics - p.2	CTUe	2,79E+05	2,70E+05	4,40E+03	4,59E+03
Particulate matter	disease inc.	1,63E-01	1,50E-01	7,60E-03	4,89E-03
Eutrophication, marine	kg N eq	2,09E+03	1,89E+03	1,18E+02	7,77E+01
Eutrophication, freshwater	kg P eq	6,59E+02	6,53E+02	3,34E+00	2,55E+00
Eutrophication, terrestrial	mol N eq	2,17E+04	1,96E+04	1,28E+03	8,48E+02
Human toxicity, cancer	CTUh	1,45E-01	1,44E-01	3,24E-04	2,38E-04
Human toxicity, cancer - inorganics	CTUh	8,28E-04	8,19E-04	4,08E-06	4,65E-06
Human toxicity, cancer - organics	CTUh	1,44E-01	1,43E-01	3,20E-04	2,33E-04
Human toxicity, non-cancer	CTUh	3,19E-02	3,13E-02	4,08E-04	2,51E-04
Human toxicity, non-cancer - inorganics	CTUh	2,98E-02	2,92E-02	3,79E-04	2,28E-04
Human toxicity, non-cancer - organics	CTUh	2,07E-03	2,02E-03	2,89E-05	2,27E-05
Ionising radiation	kBq U-235 eq	6,33E+04	6,17E+04	8,53E+02	7,06E+02
Land use	Pt	7,64E+06	6,78E+06	5,60E+05	3,02E+05
Ozone depletion	kg CFC11 eq	1,56E-02	1,38E-02	1,04E-03	6,66E-04
Photochemical ozone formation	kg NMVOC eq	7,61E+03	6,88E+03	4,41E+02	2,88E+02
Resource use, fossils	MJ	2,23E+07	2,10E+07	7,77E+05	4,99E+05
Resource use, minerals and metals	kg Sb eq	1,09E+01	1,07E+01	1,19E-01	7,98E-02
Water use	m3 depriv.	5,91E+05	5,85E+05	3,28E+03	2,40E+03

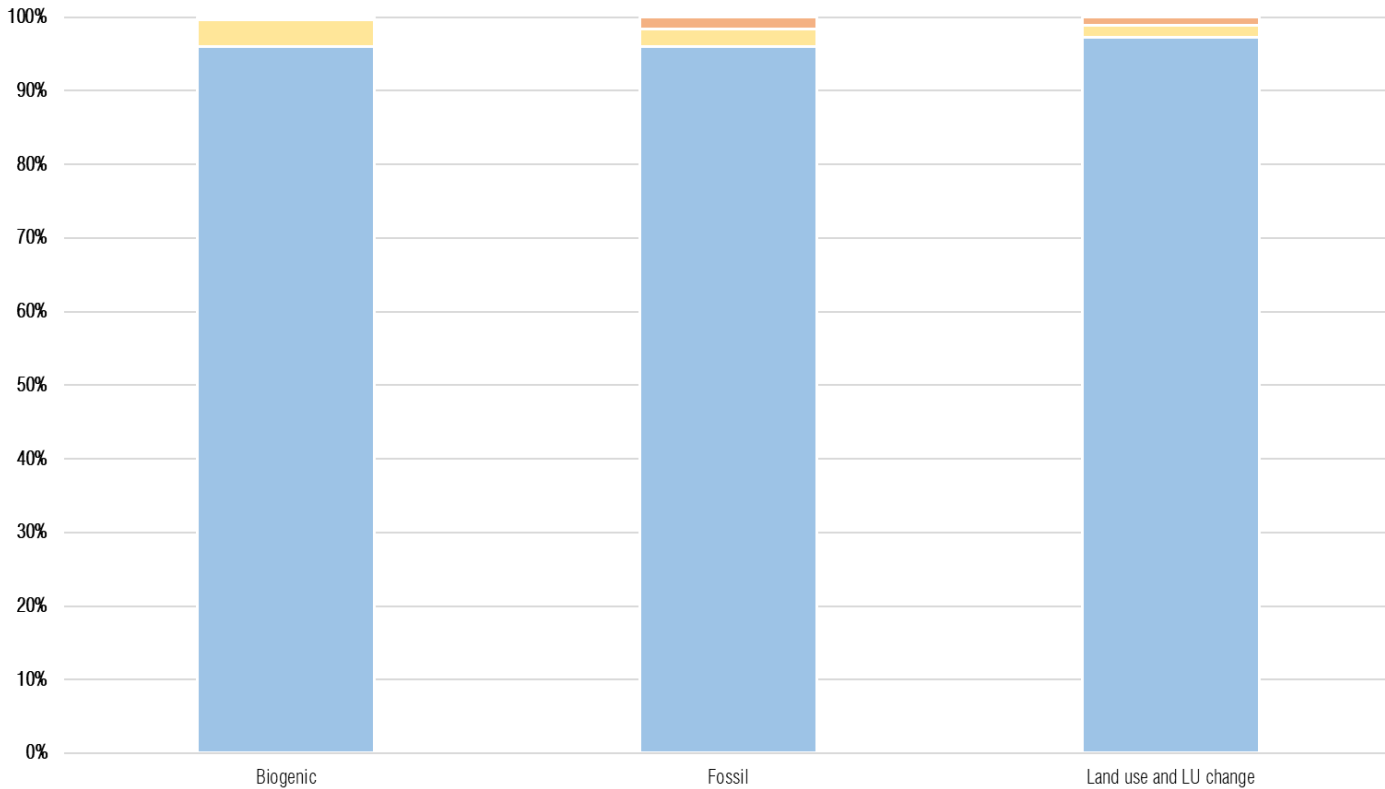






# ENVIRONMENTAL PERFORMANCE

INDICATOR PER DECLARED UNIT ▼	UNIT ▼	TOTAL ▼	UPSTREAM ▼	CORE ▼	DOWNSTREAM ▼
Biogenic	kg CO2 eq	7,17E+03	6,88E+03	2,66E+02	2,45E+01
Fossil	kg CO2 eq	2,24E+06	2,15E+06	5,51E+04	3,51E+04
Land use and LU change	kg CO2 eq	9,47E+02	9,21E+02	1,54E+01	1,03E+01



### NON-RENEWABLE RESOURCES - Material resources

FLOW PER DECLARED UNIT	UNIT	TOTAL	UPSTREAM	CORE	DOWNSTREAM
Natural aggregate	kton	2,03E+00	2,03E+00	0,00E+00	0,00E+00
Barium	kg	1,26E+03	1,11E+03	9,35E+01	6,01E+01
Laterite	kg	3,29E+02	3,22E+02	4,21E+00	2,55E+00
Peat	kg	1,64E+02	1,59E+02	2,50E+00	2,32E+00
Oils, unspecified	kg	5,56E+01	4,68E+01	5,01E+00	3,72E+00
Titanium	kg	4,76E+02	4,71E+02	3,57E+00	2,26E+00
Holmium	mg	8,90E+01	6,74E+01	1,33E+01	8,24E+00
Basalt	kg	1,40E+02	1,36E+02	2,65E+00	1,63E+00
Zinc	kg	1,78E+02	1,65E+02	7,19E+00	5,15E+00
Carbon	g	2,34E+00	2,19E+00	8,52E-02	6,67E-02
Iron	ton	6,16E+02	6,13E+02	1,24E+00	9,45E-01

### NON-RENEWABLE RESOURCES - Energy resources

FLOW PER DECLARED UNIT	UNIT	TOTAL	UPSTREAM	CORE	DOWNSTREAM
Gas, natural/m3	m3	1,14E+05	1,11E+05	1,96E+03	1,52E+03
Oil, crude	ton	1,41E+02	1,17E+02	1,49E+01	9,22E+00
Coal, hard	ton	5,64E+02	5,60E+02	2,16E+00	1,47E+00

### RENEWABLE RESOURCES - Energy resources

FLOW PER DECLARED UNIT	UNIT	TOTAL	UPSTREAM	CORE	DOWNSTREAM
Energy, geothermal, converted	GJ	4,22E+01	4,12E+01	5,53E-01	4,27E-01
Energy, gross calorific value, in biomass	GJ	4,76E+02	4,72E+02	2,29E+00	1,85E+00
Energy, kinetic (in wind), converted	GJ	1,78E+02	1,74E+02	2,40E+00	2,01E+00
Energy, potential (in hydropower reservoir), converted	GJ	9,23E+02	9,12E+02	5,91E+00	4,99E+00
Energy, solar, converted	GJ	3,13E+01	3,12E+01	5,90E-02	6,10E-02

### WATER USE

FLOW PER DECLARED UNIT	UNIT	TOTAL	UPSTREAM	CORE	DOWNSTREAM
Water use in the life cycle (Italian type)	m3	6,04E+04	5,91E+04	6,57E+02	6,40E+02

The additional informations indicated in paragraph 5.4.6. (PCR Railways, 2013:19 version 2.11) are not included in this EPD because heavily influenced by external factors (infrastructure, installation site, etc). This EPD is only referred to the product named Arianna<sup>®</sup> STS.





Product category rules (PCR):  
Railways, PCR 2013:19, version 2.11

PCR review was conducted by:  
The Technical Committee of the International EPD<sup>®</sup> System. A full list of members available on [www.environdec.com/TC](http://www.environdec.com/TC). The PCR review panel may be contacted via [info@environdec.com](mailto:info@environdec.com).  
Members of the Technical Committee were requested to state any potential conflict of interest with the PCR moderator or PCR committee and were excused from the review.

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

EPD Process Certification (internal)  EPD Verification (external)

Third party verifier:  
DNV Business Assurance Italia  
<https://www.dnv.it/assurance>

Accredited by:  
ACCREDIA  
<https://www.accredia.it>

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EPD registration number:  
S-P-04332

LCA author:  
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LCA: LCA Analysis performed by UniPR (July 2024)

Published:  
2021/08/09

Programme operator:  
EPD International AB  
[info@environdec.com](mailto:info@environdec.com)

Valid until:  
2026/08/04

References:

- LCA Analysis (rev. July 2024)
- PCR 2013:19 Railways. Version 2.11
- General Programme Instructions of the International EPD<sup>®</sup> System, version 3.0, based on ISO 14025 and ISO 14040/14044
- EN 15804:2012+A1:2013 Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products.

Revision date:  
No. 01  
Date: 2023/05/16  
Description: Updated parameters according to PCR 2013:19 Railways. Version 2.11  
No. 02  
Date: 2024/11/12  
Description: Updated parameters

Product Category Rules:  
PCR 2013:19 Railways. Version 2.11

Product group classification:  
UN CPC 53212

Reference year for data:  
2023

Geographical scope:  
Global

(\*) Wegh Group SpA has the sole ownership, liability and responsibility of the EPD

## Configurations

- Life cycle description information and environmental performance results published in this EPD corresponds to the reference design configuration developed by WEGH GROUP.
- To know the performance associated to other possible configurations of the solution please contact WEGH Group.





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