Environmental Product Declaration

In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021 for:

Non-alloyed structural steels
Galvanized coils, strips and sheets

from

Acciaieria Arvedi Spa

Programme:	The International EPD® System, www.environdec.com
Programme operator:	EPD International AB
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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

General information

EPD References

Owner of the EPD: Acciaieria Arvedi Spa
Name and location of production site: Acciaieria Arvedi, Via Acquaviva, 18, 26100 Cremona (IT)
EPD of multiple products, based on the average results of the product group.

Programme information

Programme:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	www.environdec.com
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Product Category Rules (PCR)
CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product Category Rules (PCR): *CONSTRUCTION PRODUCTS - PCR 2019:14 - VERSION 1.3.1*
PCR review was conducted by: *Martin Erlandsson, IVL Swedish Environmental Research Institute, martin.erlandsson@ivl.se*
Third-party verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: ☒ EPD verification by accredited certification body Third-party verification: *Rina Services Spa* The certification body is accredited by: Accredia, n. 0002VV
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 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.

Contact

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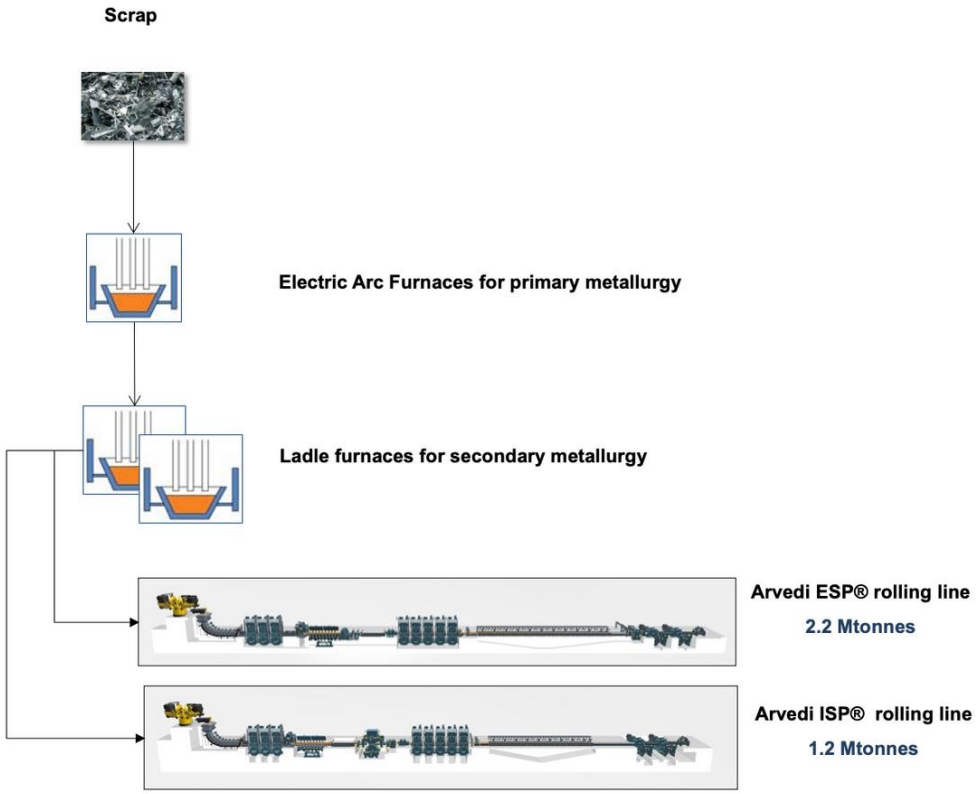
Technical support for LCA model was provided by: e3- studio associato di consulenza www.ecubo.it

Company information

The Cremona production site is a very modern industrial works, which, thanks to its technological, environmental and ergonomic conception, can be defined as a new system for steel manufacturing.
It is Europe's first and the world's second mini-mill for the manufacture of flat rolled steel.
Since 2009 it has had two complete lines for the production of steel in the form of hot rolled coils, each fitted with its own melt shop for the production of liquid steel and an integrated cast-rolling line (ISP and ESP).
With the second plant it has achieved an epoch-making innovation, the continuous cast-rolling process called Arvedi ESP - Endless Strip Production (patented in the most important countries).
The particular plant equipment allows the special products to be produced flexibly and economically, making it the strong point of the works.
The hot rolled coil is further finished on pickling, cold rolling, galvanizing and painting lines, which, together with the slitting lines, process a considerable share of production, supplying customized products and speedy service to end users.

The industrial complex is organized into a hot area and a cold one.
The hot area includes:

- 2 scrap yards, each one dedicated to an EAF
- 2 EAFs for primary metallurgy, one fitted with Consteel ® technology
- 4 ladle furnaces for secondary metallurgy
- 1 VOD (Vacuum Oxygen Decarburization) furnace
- 2 casting + rolling mills based on Arvedi ISP/ESP ® technology



In the northern area the products are subjected to pickling and galvanizing treatments.

Product information

Product identification	Galvanised coils, strips and sheets in non-alloyed structural steels
Product features	Gauges from 0,2 mm to 4 mm. EN standard: EN 10346
Product properties	Properties according to EN 10346 Steel grade: S220GD S250GD S280GD S320GD S350GD S390GD S420GD S450GD

The products are CE marked according to the Regulation CE 305/2011 “laying down harmonised conditions for the marketing of construction products”.

UN CPC code: 41231 Flat-rolled products of non- alloy steel, coated or otherwise further worked

LCA information

This EPD is an EPD of multiple products, based on the average results of the product group.
The EPD is compliant with ISO 21930, none of the declared environmental impact indicator results, aggregated over all included modules (from A to C), differ by more than 10% between any of the included products.

Declared unit
The declared unit is 1 ton of Arvzero product (Galvanised coils, strips and sheets in non-alloyed structural steels).

Time representativeness: the reference year for the data collection is 2022.

Database and LCA software used: Ecoinvent 3.9.1 cut-off e Sima Pro 9.5
The reference package used for impact indicator is based on EF 3.1.
Characterization factors for GWP-GHG refer to IPCC 2021.

Modules declared, geographical scope, share of specific data (in GWP-GHG results) and data variation (in GWP-GHG results): Cradle to gate with options

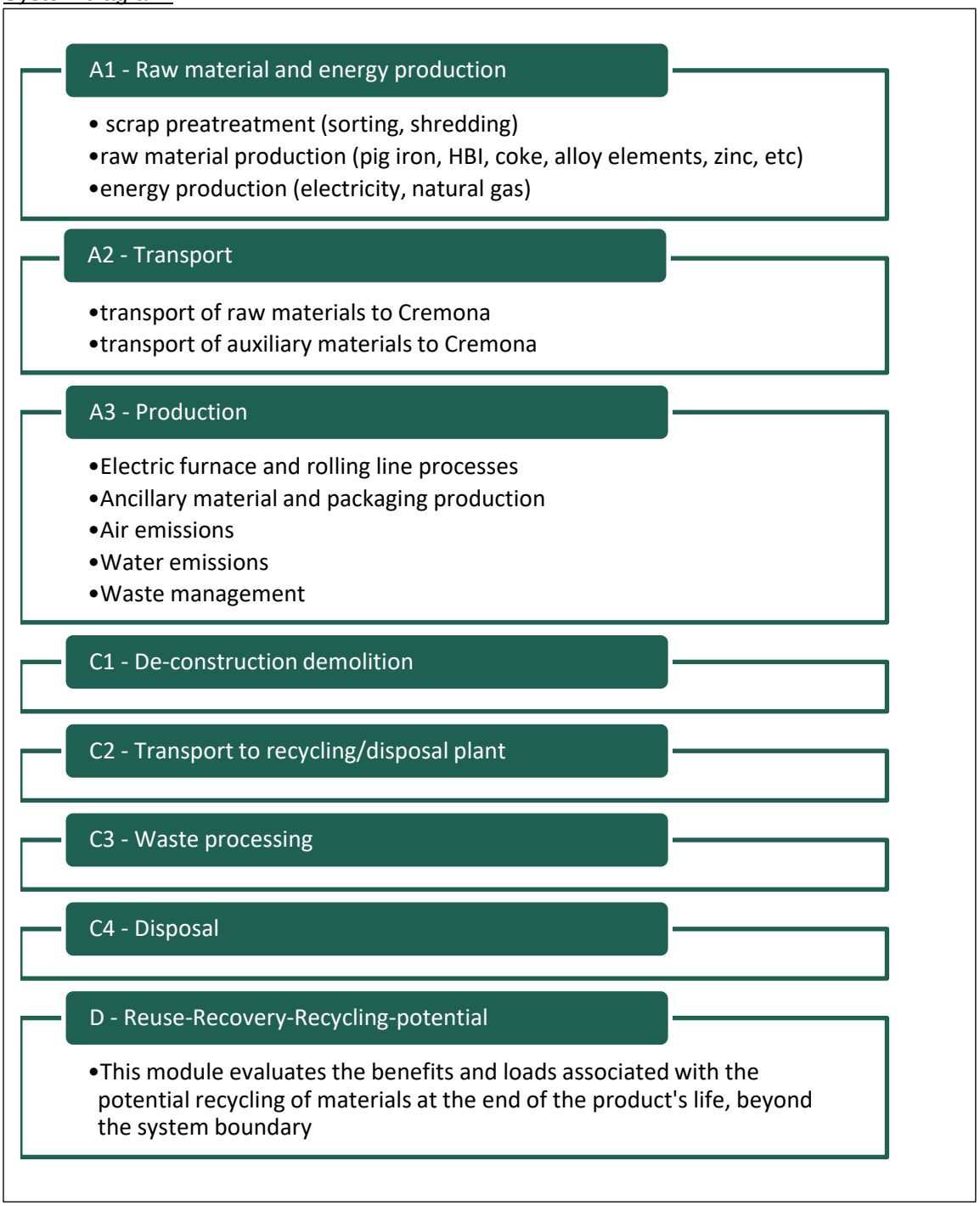
	Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	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	X	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	GLO	GLO	IT		ND	ND	ND	ND	ND	ND	ND	ND	EU27	EU27	EU27	EU27	EU27
Specific data used	27%					-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	<10%					-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	n.a.					-	-	-	-	-	-	-	-	-	-	-	-

According to the PCR, only electricity data, direct emission data from the plant and transport data of incoming raw materials were considered specific data. Data derived from ecoinvent database processes are not primary.

The A5 module is declared only for the balancing of biogenic emissions from packaging

Geographical scope
Modules A1, A2: Global
Module A3: Italy
Modules C1, C2, C3, C4, D: Europe.

System diagram:



The use phase was not considered according to EN:15804 and PCR 2019:14, while the end of life was considered (C1-C2-C3-C4-D).

More information:

The following specific data were collected for the objectives of the study:

- consumption of raw materials of the analysed products
- incoming logistics
- energy consumption
- maintenance and general consumption

• emissions in the atmosphere
• waste production

The consumption of scrap, pig iron and HBI is specific to structural steels.

The energy consumption is specific to each production line; all the electricity consumed in 2022 by the plant is renewable and covered by Guarantees of Origin.

For the scrap that enters the plant as a by-product, according to PCR, an allocation was made on its average economic value, compared to the economic value of the black coil.

In the study it was considered that Inertex, an artificial aggregate used in various sectors of the constructions, is derived from the steel production process. An economic allocation of the impacts of the steelworks was carried out on this product considering the relationship between the prices of steel and Inertex.

In the LCA model the infrastructures and the equipment production aren't considered.
A cut-off of 1% in terms of environmental significance was used. Data quality was assessed and validated during data collection process.

End of life scenario:

C1 – De-construction demolition
It is assumed a diesel consumptions for the dismantling operations of 239 MJ/t.
C2 – Tranport
An average distance of 50 km has been assumed for the transport to recycling facility.
C3 – Waste processing
A recycling percentage of 86% was used, deriving from the average recycling percentages weighted on the sales of the various countries - Eurostat data for demolition waste in Europe in 2020.
C4 – Disposal
A landfill percentage of 14% was assumed
D – Benefits and loads beyond the system boundary
Module D considers the potential environmental benefit of recycling steel on the market. The advantage is considered as the difference between the impacts of a blast furnace, in which virgin ores are used, and an EAF steel mill, using scraps. In calculating the environmental advantage, the melting yield is considered, so the content of recycled material used in the production.

Content information

Product components	Weight, kg	Post-consumer material, weight-%	Biogenic material, weight-% and kg C/kg
Carbon steel	981	80%*	0
Zinc	19**		
Packaging materials	**Weight, kg**	**Weight-% (versus the product)**	**Weight biogenic carbon, kg C/kg**
Wood	1,8	0,18%	33%
Steel	0,3	0,03%	-
TOTAL	2,1	0,21%	

* Validation Of Self-Declared Environmental Assertion C079 released by IGQ, current revision 08/28/2022.
**average data 2022

The product does not contain SVHC substances above 0.1%.

Results of the environmental performance indicators

Mandatory impact category indicators according to EN 15804

Indicator	Unit	Tot.A1-A3	A5	C1	C2	C3	C4	D
GWP-fossil	kg CO_2 eq.	1,12E+03	0,00E+00	4,29E+00	5,19E+00	2,23E+01	8,51E-01	-5,99E+01
GWP-biogenic	kg CO_2 eq.	4,60E+00	1,19E-01	3,35E-02	3,99E-03	1,24E-09	4,87E-04	5,74E-01
GWP-luluc	kg CO_2 eq.	2,23E+00	0,00E+00	4,14E-03	2,44E-03	3,27E-02	5,14E-04	9,07E-03
GWP-total	kg CO_2 eq.	1,13E+03	1,19E-01	4,33E+00	5,20E+00	2,23E+01	8,52E-01	-5,93E+01
ODP	kg CFC 11 eq.	1,92E-05	0,00E+00	8,91E-08	1,14E-07	3,54E-07	2,46E-08	-1,56E-06
AP	mol H^+ eq.	5,97E+00	0,00E+00	2,28E-02	1,75E-02	2,50E-01	6,41E-03	-1,94E-01
EP-freshwater	kg P eq.	4,89E-01	0,00E+00	1,15E-03	3,69E-04	1,31E-02	7,08E-05	-2,85E-02
EP-marine	kg N eq.	1,54E+00	0,00E+00	7,92E-03	6,05E-03	5,83E-02	2,46E-03	-5,02E-02
EP-terrestrial	mol N eq.	1,56E+01	0,00E+00	8,37E-02	6,39E-02	6,50E-01	2,64E-02	-5,42E-01
POCP	kg NMVOC eq.	5,55E+00	0,00E+00	2,81E-02	2,72E-02	1,95E-01	9,18E-03	-3,52E-01
ADP-minerals&metals*	kg Sb eq.	4,02E-02	0,00E+00	2,05E-05	1,40E-05	1,37E-03	1,18E-06	8,18E-05
ADP-fossil*	MJ	1,34E+04	0,00E+00	6,83E+01	7,59E+01	3,02E+02	2,12E+01	-4,97E+02
WDP	m^3	3,76E+02	0,00E+00	4,54E-01	3,63E-01	3,66E+00	9,37E-01	-3,41E+00
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.*

A negative value in module D indicates an environmental benefit.

Additional mandatory and voluntary impact category indicators

Indicator	Unit	Tot.A1-A3	A5	C1	C2	C3	C4	D
GWP-GHG[1]	kg CO_2 eq.	1,12E+03	0,00E+00	4,30E+00	5,20E+00	2,24E+01	8,52E-01	-5,99E+01

[1] 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.

Resource use indicators

Indicator	Unit	Tot.A1-A3	A5	C1	C2	C3	C4	D
PERE	MJ	3,89E+03	0,00E+00	5,30E+00	1,11E+00	4,69E+01	1,79E-01	2,78E+01
PERM	MJ	2,70E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	3,92E+03	0,00E+00	5,30E+00	1,11E+00	4,69E+01	1,79E-01	2,78E+01
PENRE	MJ	1,34E+04	0,00E+00	6,83E+01	7,59E+01	3,02E+02	2,12E+01	-4,97E+02
PENRM	MJ.	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	1,34E+04	0,00E+00	6,83E+01	7,59E+01	3,02E+02	2,12E+01	-4,97E+02
SM	kg	8,17E+02	0,00E+00	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
NRSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m^3	2,05E+01	0,00E+00	2,40E-02	1,19E-02	1,50E-01	2,25E-02	-1,38E-03
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							

Waste indicators

Indicator	Unit	Tot.A1-A3	A5	C1	C2	C3	C4	D
Hazardous waste disposed	kg	2,86E-01	0,00E+00	3,34E-04	4,72E-04	1,67E-03	1,12E-04	-8,38E-03
Non-hazardous waste disposed	kg	3,82E+02	0,00E+00	2,81E+00	6,66E+00	8,69E+02	1,40E+02	8,58E+00
Radioactive waste disposed	kg	1,46E-02	0,00E+00	1,65E-04	2,32E-05	6,12E-04	3,13E-06	1,31E-03

Output flow indicators

Indicator	Unit	Tot.A1-A3	A5	C1	C2	C3	C4	D
Components for re-use	kg	0	0	0	0	0	0	0
Material for recycling	kg	3,34E+01	2,07E+00	0,00E+00	0,00E+00	8,60E+02	0,00E+00	0,00E+00
Materials for energy recovery	kg	0	0	0	0	0	0	0
Exported energy, electricity	MJ	0	0	0	0	0	0	0
Exported energy, thermal	MJ	0	0	0	0	0	0	0

Additional environmental information

Environmental management system

The Cremona site of Acciaieria Arvedi is certified according to the prestigious EMAS Eco-Management and Audit Scheme certification.
This certification, promoted by the European Union, is granted to companies that adhere on voluntary basis to a strict standard protocol in assessing and documenting their environmental performances and in accordingly informing institutions, the public and relevant stakeholders.
The award of EMAS certification represents for Acciaieria Arvedi a public recognition confirming our engagement about quality of the environment and certifies the accuracy and transparency of the information we make public about our performances.

All the electricity consumed in 2022 by the plant is renewable and covered by Guarantees of Origin.

The Direct greenhouse gas emissions and the Indirect greenhouse gas emissions from electricity consumption of the product Arvzero are balanced by the purchase of carbon credits.
Acciaieria Arvedi declares that this EPD (UNI EN ISO 14025 and EN 15804) is attributable solely to the product certified by RINA Service called Arvzero (Carbon Neutral CNP-1 “COIL PROCEDURE PURPOSE 1-2”Rev.6.0). We decline any responsibility for the use of certifications for non-ARVZERO products.

References

General Programme Instructions of the International EPD® System. Version 4.0.
CONSTRUCTION PRODUCTS - PCR 2019:14 - VERSION 1.3.1
Studio LCA coil e lastre di acciai strutturali in varie finiture (nero, decapato, zincato e preverniciato) secondo la ISO 14040, ISO 14044, EN 15804:2012+A2:2019 - ACCIAIERIA ARVEDI S.P.A. - Stabilimento di Cremona - Rev 1 del 17/11/2023

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