# **ENVIRONMENTAL PRODUCT DECLARATION**

as per ISO 14025 and EN 15804+A2

Owner of the Declaration	ArcelorMittal Europe – Flat Products
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
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Valid to	15.11.2027

# XCarb<sup>®</sup> Recycled and Renewably produced hot dip galvanized steel with Magnelis<sup>®</sup> Coating ArcelorMittal



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#### XCarb<sup>®</sup> Recycled and Renewably **ArcelorMittal** Produced Hot dip galvanized steel with Magnelis<sup>®</sup> Coating Owner of the declaration **Programme holder** IBU - Institut Bauen und Umwelt e.V. ArcelorMittal Europe - Flat Products Hegelplatz 1 24-26 Boulevard d'Avranches 10117 Berlin L-1160 Luxembourg Germany Luxembourg **Declaration number** Declared product / declared unit The declared unit is 1 metric ton of XCarb® Recycled EPD-ARC-20220236-CBA1-EN and Renewably Produced Magnelis® coated steel (1.5 mm steel thickness with 310 g/m<sup>2</sup> Magnelis® coating) This declaration is based on the product Scope: category rules: This declaration applies to 1 metric tonne of Structural steels, 11.2017 XCarb® Recycled and Renewably Produced Magnelis® coated steel produced at ArcelorMittal. (PCR checked and approved by the SVR) Issue date The Life Cycle Assessment is based on the LCA model and data for ArcelorMittal XCarb® Recycled and 16.11.2022 Renewably Produced Hot Rolled Coils, coupled with downstream processes at ArcelorMittal plants, Valid to covering 100% of the production of the declared 15.11.2027 product. The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences. The EPD was created according to the specifications of EN 15804+A2. In the following, the standard will be simplified as EN 15804. Verification Man Leten The standard EN 15804 serves as the core PCR Independent verification of the declaration and data according to ISO 14025:2011 Dipl. Ing. Hans Peters internally externally (chairman of Institut Bauen und Umwelt e.V.) Minke Man H Walls Dr. Alexander Röder Matthias Klingler (Managing Director Institut Bauen und Umwelt e.V.)) (Independent verifier) Product

#### Product description/Product definition

This Environmental Product Declaration refers to XCarb® Recycled and Renewably Produced hot dip galvanized steel with Magnelis® Coating. The product is a double-sided hot-dip galvanized carbon steel coated on both sides with a zinc-aluminiummagnesium alloy. This alloy, composed of 93.5 % zinc, 3.5 % aluminium and 3 % magnesium, is applied by means of a continuous hot dip galvanizing process. A post-treatment (passivation, thin organic coating and/or oiling) can also be applied on the product.

This chemical composition has been selected to provide an excellent corrosion resistance.

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XCarb® Recycled and Renewably Produced hot dip galvanized steel with Magnelis® Coating is compliant with *EN 10346*.

The coated steel is available in a very wide range of steel grades (steels for cold forming and deep drawing applications, structural steels and High Strength Low Alloy steels), and coating masses (from 70 to 800 g/m<sup>2</sup>). ZM is the symbol used in *EN 10346* to refer to Zinc Aluminium Magnesium coatings to which Magnelis® coated steel belongs.





For the use and application of the product, the respective national provisions at the place of use apply.

## Application

XCarb<sup>®</sup> Recycled and Renewably Produced hot dip galvanized steel with Magnelis® coating can be used in various industrial applications, such as:

- Construction: structural or non-structural profiles, roofing & cladding, decking, cable trays, expanded metal, gratings, composite flooring, concrete moulds
- Road and railway infrastructure: safety barriers, protection equipment, sound
- insulation wall panels, walls providing protection against hail
- Agriculture and farming: barns, greenhouse structures, agricultural equipment
- Solar energy generation: structures for photovoltaic plants
- Tubular applications: structural tubes for scaffolding, road signals, poles.

The coated steel is delivered in wide coils, slit coils, blanks or sheets. It can be processed by all conventional processing operations used for hot dip galvanized steel: bending, drawing, clinching, profiling, stamping, welding etc.

The friction coefficient of XCarb<sup>®</sup> Recycled and Renewably Produced hot dip galvanized steel with Magnelis® coating is lower than the one of standard hot dip galvanized steel and is stable during cold forming operations.

## **Technical Data**

Due to its 3 % magnesium content, XCarb<sup>®</sup> Recycled and Renewably Produced hot dig galvanized with Magnelis<sup>®</sup> coating offers self-healing on cut edges and corrosion resistance in chloride and ammonia atmospheres. This high corrosion resistance means that less metallic coating is required to ensure an equivalent corrosion protection than with standard hot dip galvanized steels.

The coating process can apply various thickness of the Zinc Aluminium Magnesium layer, up to  $800 \text{ g/m}^2$  (total of both sides).

Specific mechanical properties are defined for each

steel grade used as substrate and measured according to *EN ISO 6892*. The corrosion resistance performance can be evaluated with different indoor and outdoor tests. One of the most common tests is the 'Salt Spray Test' defined according to *EN ISO 9227/ASTM B-117*.

## **Constructional data**

The following table refers to steel properties without the coating. Properties with coating differ according to thickness. If necessary, specific characteristics can be obtained at

http://industry.arcelormittal.com/catalogue/E35/EN.

Name	Value	Unit
Density	7850	kg/m <sup>3</sup>
Modulus of elasticity	210000	N/mm <sup>2</sup>
Coefficient of thermal expansion	12	10 <sup>-6</sup> K <sup>-1</sup>
Thermal conductivity	48	W/(mK)
Melting point	1536	C°

Performance data of the product with respect to its characteristics in accordance with the relevant technical provision (no CE-marking).

## Base materials/Ancillary materials

The base material of XCarb® Recycled and Renewably Produced hot dip galvanized with Magnelis® coating is iron. Alloying elements are added on the form of ferroalloys or metals. The metallic coating includes only zinc, aluminium and magnesium.

This product comes from a production process flow which only uses XCarb® Recycled and Renewably Produced Hot Rolled Coil. This pre-material will only be transported by sea or train to the ArcelorMittal finishing mills outside Spain.

The substrates can be made of different steel grades (DX51D to DX57D, S220GD to S550GD, HX260LAD to HX500LAD, *EN 10346*) with steel thicknesses ranging between 0.36 mm and 6.0 mm.

Detailed steel and coating properties and chemical compositions are available at: http://industry.arcelormittal.com/catalogue/E35/EN.

This product contains substances listed in the *candidate list* (date 02.06.2022) above 0.1 mass percent: **No.** 

## **Reference service life**

Hot dip galvanized coated steels are used in construction with many different application purposes. The service life therefore will be limited by the



application and corresponding service. At the end of life, they will be recovered and recycled into a new steel product.

## LCA: Calculation rules

## **Declared Unit**

The declaration refers to the functional unit of 1 metric ton of double-sided XCarb<sup>®</sup> Recycled and Renewably Produced hot dip galvanized steel with Magnelis<sup>®</sup> coating, packed and ready to be transported from ArcelorMittal to its clients as specified in Part B requirements on the EPD.

The results are calculated based on a 1.5mm steel thickness with 310 g/m<sup>2</sup> Magnelis<sup>®</sup> coating. The steel substrate has been elaborated from an XCarb<sup>®</sup> Recycled and Renewably Produced Hot Rolled Coil.

## **Declared unit**

Name	Value	Unit
Declared unit	1	t
Thickness	1.5	mm
Density	7828	kg/m <sup>3</sup>

The product described refers to the average annual production at ArcelorMittal in Europe for the reference year of 2021. The results are within a 10 % variation.

## System boundary

Type of EPD: cradle to gate with modules C1–C4 and module D (A1-A3, C and D)

**Modules A1-A3** of the XCarb® Recycled and Renewably Produced hot dip galvanized steel with Magnelis® coating production include:

- The provision of resources, additives, and energy
- Transport of resources and additives to the production site
- Transport of intermediate products within ArcelorMittal sites
- Production processes on site include energy, production of additives, disposal of production residues, and consideration of related emissions.

 Recycling of production/manufacturing scrap. Steel scrap is assumed to reach the end-ofwaste status once is shredded and sorted, thus becoming input to the product system in the inventory.

**Module C1** assumes a generic multi-story building demolition scenario. **Module C2** includes impacts of assumed distances of 100 km from the demolition site of a scrap processing plant and 200 km from this plant to the disposal. In both cases, empty returns of transport were assumed.

**Module C3** takes into account the sorting and shredding of after-use steel to allow its orientation towards the recycling solutions. This process will also produce losses due to efficiency that will be oriented towards landfill sites. A conservative value of 2 % landfill is then considered in C4.

**Module C4** takes into account the waste disposal including physical pre-treatment and management of the disposal site. Steel is an inert material which does not require any specific treatment on disposal site.

**Module D** refers to the end of life of the structural steel, including reuse and recycling

## Comparability

Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to *EN 15804* and the building context, respectively the product-specific characteristics of performance, are taken into account.

For life cycle modelling of the considered products, *GaBi ts software* version 10.6.1.35 was used with GaBi database 2022.2. This database contains consistent and documented datasets available in *Gabi Documentation* 

## LCA: Scenarios and additional technical information

## Characteristic product properties Information on biogenic carbon

The declared product does not contain any biogenic carbon.

Product packaging is adapted to the way the product will be transported, its intended use, its thickness and width, and the customer's request.

For modelling, a conservative scenario was employed, considering the following amounts of packaging materials.

- Steel 0.796 kg
- Plastic 0.075 kg
- Timber 1.5 kg
- Cardboard 1.73 kg.

# Information on describing the biogenic Carbon Content at factory gate

Name	Value	Unit
Biogenic carbon content in product	0	kg C
Biogenic carbon content in accompanying packaging	1.46	kg C

End of life (C1 - C4)

Current practice for the average hot dip galvanized steel consists of 98 % recycling and 2 % landfill



according to the *European Commission Technical Steel Research*.

Name	Value	Unit
Recycling	980	kg
Landfilling	20	kg

# Reuse, recovery and/or recycling potentials (D), relevant scenario information

Name	Value	Unit
Recycling	98	%



## LCA: Results

## DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; ND = MODULE OR INDICATOR NOT DECLARED; MNR = MODULE NOT RELEVANT)

PRODUCT STAGE			USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES		
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse- Recovery- Recycling- potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Х	Х	Х	ND	ND	ND	ND	MNR	MNR	MNR	ND	ND	X	Х	X	X	Х
RESU	ILTS	OF TH		- EN	VIRON	MENT		IPACT	accor	ding t	O EN	15804+	A2: 1	ton X	Carb®	Recycled
and R	lenew	ably l	Produ	ced ho	ot dip g	jalvar	nized s	steel v	vith Ma	ignelis	s® coa	ating	1			
		Core	Indicato	or			Unit	A	1-A3	C1		C2	C	3	C4	D
	Glo	bal warm	ning poten	tial - total	ole	[kg	$CO_2 - Eq$	.] 7.9	97E+2	4.35E	+1	2.13E+1	1.53	E+0	2.90E-1	-5.42E+1
	Globa	al warming	g potentia	al - biogen	lic	[kg	<u>ј СО2-Е</u> q ј СО2-Еq	.] 7.	43E+0	4.32L 1.83E	-3	1.53E-2	5.40	DE-3	-8.84E-3	3 8.68E-2
( Dook	GWP from	m land us	se and lar	nd use ch	ange Iavor	[kg	$CO_2$ -Eq	.] 1.	60E-1	2.82E	-1	1.45E-1	9.36	6E-4	5.51E-4	-1.45E-2
Acio	dification	potential,	, accumul	ated exce	edance	[rg (	ol H⁺-Eq.	] 2.	51E+0	2.46E	-1	1.27E-12	3.75	5E-3	2.12E-3	3 -1.49E-1
Eutroph	nication, 1	fraction o end co	f nutrients ompartme	s reaching ent	g freshwate	er [ŀ	(g P-Eq.]	2.	17E-3	1.52E	-4	7.70E-5	4.31	1E-6	5.06E-7	-9.69E-6
Eutroph	nication, f	raction of	f nutrients	reaching	marine er	nd [k	(g N-Eq.]	5.	64E-1	1.19E	-1	6.20E-2	1.03	3E-3	5.41E-4	-3.10E-2
E	Eutrophic	cation, ac	cumulate	d exceed	ance	[m	nol N-Eq.	6.	08E+0	1.32E	+0	6.87E-1	1.10	)E-2	5.94E-3	3 -3.36E-1
Formatio	on poten	tial of trop o	oospheric xidants	ozone pr	notochemi	cal [kg N	IMVOC-E	Eq.] 1.0	66E+0	2.31E	-1	1.20E-1	2.82	2E-3	1.64E-3	3 -1.04E-1
Abio	tic deple	tion pote	ntial for no	on-fossil re	esources	[k	g Sb-Eq.]	9.	13E-2	4.45E	-6	2.17E-6	3.84	1E-7	3.06E-8	3 1.19E-6
At Water (	biotic dep luser) de	pletion po privation	tential for potential,	tossil reso deprivatio	ources on-weighte	d [mi	[MJ] <sup>3</sup> world-E	J] 9.26E+3 1d-Eg 4.75E 0			+2	2.83E+2	2.68	SE+1	3.91E+(	) -4.03E+2
DEOL	W	ater cons	sumption	(WDP)			leprived]						3.11		3.2/E-2	
RESU				4 - INU	ICATU	IRS I	O DE	SURIB	E RES				anan		15×11/1-	
XCarl	n® Re	cvcle	d and	Renev	vably F	Produ	iced h	ot din	galvar	nized s	steel	vith Ma	anelis		ating	
XCarl	o® Re	cycle	d and Indic	Renev	wably F	Produ	iced h	ot dip Unit	galvar A1-A3	nized s	steel v	with Ma	gnelis		ating C4	D
XCarl	D® Re	ecycle	d and Indic primary er	Renev cator	wably F	Produ	iced h	ot dip Unit [MJ]	galvar A1-A3		<b>Steel \</b> <b>C1</b> 44E+1	vith Ma	gnelis	<b>C3</b> 38E+1	25.86E	D 1 5.87E+1
XCarl Re	Ren Ren Renwable	ecycle	d and Indic primary er energy re	Renev cator hergy as e	wably F energy car as materia	Produ rier I utilizatio	on location	ot dip Unit [MJ] [MJ]	galvar A1-A3 2.06E+ 0.00E+	1ized :	<b>C1</b> 44E+1 00E+0	vith Ma C2 1.96E+1 0.00E+0	gnelis	<b>C3</b> 38E+1 00E+0	C4	D 1 5.87E+1 0 0.00E+0
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XCarl Re	Ren Ren newable Total u Non-ren Total use	ewable p primary use of rer enewable p e of non-r- Use of r Use of r	d and India primary er energy re newable p e primary er enewable e of secon renewable n-renewa	Renev cator hergy as e esources a rimary en energy as r e primary dary mate e seconda ble seconda	wably F energy car as materia ergy reso s energy c naterial uti energy res erial ary fuels idary fuels	rier I utilizatio urces arrier lization sources	on in the second	ot dip Unit [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ]	galvar A1-A3 2.06E+ 0.00E+ 2.06E+ 9.27E+ 9.27E+ 9.27E+ 9.52E+ 0.00E+ 0.00E+	ized	c1 44E+1 00E+0 44E+1 85E+2 00E+0 85E+2 00E+0 00E+0 00E+0 00E+0	C2           1.96E+           0.00E+(           1.96E+           2.84E+2           0.00E+(           2.84E+2           0.00E+(           0.00E+(           0.00E+(	gnelis 1 1.1 2 2.0 0 0.0 2 2.0 0 0.0 0 0.0 0 0.0	<b>C3</b> 38E+1 00E+0 38E+1 68E+1 00E+0 68E+1 00E+0 00E+0 00E+0	ating C4 5.86E 0.00E 5.86E 3.91E 0.00E 3.91E 0.00E 0.00E	D           1         5.87E+1           +0         0.00E+0           -1         5.87E+1           +0         -4.08E+2           +0         0.00E+0           +0         2.76E+1           +0         0.00E+0           +0         2.76E+1           +0         0.00E+0           +0         0.00E+0
Re	Ren Ren newable Total L Non-ren Total use	ecycle ewable p primary use of rer enewable ewable p e of non-r Use Use of r Use of n Use of n Use of n Use of n Use of n Use of n Use of n	d and India primary energy re- newable p e primary energy re- newable e of secon re-newable n-renewa- se of net	Renew cator hergy as e isources a rimary en- energy as n e primary dary mate e seconda ble seconda ble seconda	wably F energy car as materia lergy resou s energy ce material uti energy reso rial any fuels dary fuels er	Produ rier I utilizatio urces arrier lization sources	on	ot dip Unit [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ]	galvar A1-A3 2.06E+ 0.00E+ 2.06E+ 9.27E+ 0.00E+ 9.27E+ 9.52E+ 0.00E+ 0.00E+ 4.26E+	ized s           4         4.4           0         0.0           4         4.4           3         5.3           3         5.3           2         0.1           0         0.1           0         0.1           0         0.1           0         0.1           0         0.1           0         0.1	steel           c1           44E+1           00E+0           44E+1           85E+2           00E+0           85E+2           00E+0           00E+0           00E+0           00E+0           00E+0           04E-2	vith Ma C2 1.96E+* 0.00E+( 1.96E+* 2.84E+2 0.00E+(	gnelis           1         1.1.1           0         0.0           1         1.1.1           2         2.1           0         0.0           2         2.1           0         0.0           0         0.0           0         0.0           2         1.1	R         CO           C3         38E+1           00E+0         38E+1           68E+1         00E+0           68E+1         00E+0           00E+0         00E+0           32E-2         0	C4           5.86E           0.00E           3.91E           0.00E           3.91E           0.00E           9.93E           9.93E	D           1         5.87E+1           +0         0.00E+0           -1         5.87E+1           +0         -4.08E+2           +0         0.00E+0           +0         -4.08E+2           +0         2.76E+1           +0         0.00E+0           +0         0.00E+0           +0         0.00E+0           +0         0.00E+0           +0         0.00E+0           +0         -3.52E-2
RESU	Ren newable Total u Non-ren Total use	ewable p primary use of rer enewable wable p of non-r Use Use of no Use OF N	d and Indic orimary en energy re every be primary en enewable of secon enewable of secon enewable n-renewa se of net E LCA	Reney ator hergy as e sources a rimary en energy as n e primary dary matu ble second ble second fresh wate A – WA d and	wably f energy car as materia ergy resor s energy c energy resor naterial uti energy resor erial ary fuels dary fuels er ASTE O Renew	Produ rier I utilizatio urces arrier lization sources	on Bon BORIE Produ	ot dip Unit [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ]	galvar A1-A3 2.06E+ 0.00E+ 2.06E+ 9.27E+ 9.27E+ 9.27E+ 9.52E+ 0.00E+ 0.00E+ 4.26E+ 0.00E+ 0.0	ized	C1 44E+1 00E+0 44E+1 85E+2 00E+0 85E+2 00E+0 00E+0 00E+0 00E+0 00E+0 00E+0 00E+0 00E+0 00E+0 00E+0 00E+0	vith Ma C2 1.96E+* 0.00E+( 1.96E+* 2.84E+2 0.00E+( 2.00E+( 0.00E+(	gnelis 1 1.1.1 0 0.0.1 1 1.1.2 2 2.0.0 0 0.0.2 2 2.0.0 0 0.0.0 0 0.0.0 0 0.0.0 1 1.1 2 2.0.0 0 0.0.0 0 0.0.	<b>c3</b> <b>c3</b> 38E+1 00E+0 38E+1 00E+0 68E+1 00E+0 00E+0 00E+0 00E+0 32E-2 <b>c0 EN</b> gnelis	c4           5.86E           0.00E           5.86E           3.91E           0.00E           3.91E           0.00E           0.00E           0.00E           1.00E           0.00E           1.00E           0.00E           0.00E           1.00E           1.00E           0.00E	D           1         5.87E+1           +0         0.00E+0           -1         5.87E+1           +0         -4.08E+2           +0         0.00E+0           +0         2.76E+1           +0         2.76E+1           +0         0.00E+0           +0         2.76E+1           +0         0.00E+0           +0         0.00E+0           +0         0.00E+0           +0         2.76E+1           +0         0.00E+0           +0         2.76E+2
RESU 1 ton	Ren newable Total L Non-ren Total use	ecycle e primary use of ren e newable e of non-r Use of no Use of no Use of no USE of no DF TH b® Re	d and Indic orimary er energy re enewable p e primary er enewable e of secon renewable of secon renewable n-renewable se of net IE LCA cycleo	Reney ator hergy as e sources a rimary en energy as hergy	wably f energy car as materia as materia ergy reso s energy c material util energy reso material util energy reso material util energy reso real any fuels er ASTE O Renew	rier I utilizatio urces arrier lization sources	GORIE Produ	ot dip Unit [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ]	galvar A1-A3 2.06E+ 0.00E+ 2.06E+ 9.27E+ 9.27E+ 9.52E+ 0.00E+ 9.27E+ 9.52E+ 0.00E+ 4.26E+ <b>DOUT</b> ot dip 0 A1-A3	hized s           4         4.4           0         0.1           4         4.4           3         5.8           2         0.1           3         5.4           2         0.1           0         0.1           3         5.4           2         0.1           0         0.1	C1 44E+1 00E+0 44E+1 85E+2 00E+0 85E+2 00E+0 00E+0 00E+0 00E+0 00E+0 00E+2 LOWS ized s	vith Ma c2 1.96E+' 0.00E+( 1.96E+' 2.84E+2 0.00E+(	gnelis 1 1.1 0 0.0 1 1.1 2 2.0 0 0.0 2 2.0 0 0.0 0 0.0 2 1.1 ding t th Ma	C3           38E+1           00E+0           38E+1           68E+1           00E+0           68E+1           00E+0           00E+0           32E-2           00 EN           gnelis           C3	C4           5.86E           0.00E           5.86E           0.00E           3.91E           0.00E           3.91E           0.00E           0.00E           0.00E           1.00E           0.00E           9.93E           158041           © coa           C4	D           1         5.87E+1           +0         0.00E+0           -1         5.87E+1           +0         -4.08E+2           +0         0.00E+0           +0         2.76E+1           +0         0.00E+0           +0         0.00E+0           +0         0.00E+0           +0         0.00E+0           +0         0.00E+0           +1         -3.52E-2           +A2:         ting
RESU	Ren Renewable Total L Non-ren Non-ren Total use	ecycle ewable p e primary ise of rer enewable p e of non-r Use of no Use of no Use of no Use of no Use of no Use of no USE OF USE OF US	d and Indic orimary er energy re newable p e primary er enewable e of secon enewable of secon enewable n-renewable ise of net ise of	Reney ator hergy as a sources a rimary en- energy as energy as esconda da and astor aste dispo	wably F energy car as materia wergy resous s energy c material ut energy res erial any fuels relation any fuels relation ASTE O Renew	Produ rier I utilizatio urces arrier lization sources ATEC ably	GORIE Produ	ot dip Unit [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ]	galvar A1-A3 2.06E+ 0.00E+ 2.06E+ 9.27E+ 9.27E+ 9.27E+ 9.52E+ 0.00E+ 4.26E+ OUT ot dip 0 A1-A3 3.00E4	hized s           4         4.4           0         0.1           4         4.4           3         5.5           0         0.1           3         5.5           2         0.1           0         0.2           0         0.5           PUT F         galvar           5         4.	ct           ct           44E+1           00E+0           44E+1           85E+2           00E+0           00E+0           00E+0           00E+0           00E+0           00E+0           00E+0           00E+0           04E-2           LOWS           c1           07E-9	Vith Ma           C2           1.96E+*           0.00E+(           1.96E+*           0.00E+(           0.00	gnelis gnelis 1 1.3 0 0.0 1 1.3 2 2.0 0 0.0 2 2.0 0 0.0 0 0.0 0 0.0 0 0.0 1 1.3 2 2.0 0 0.0 2 2.0 0 0.0 0 0.0 1 1.3 2 2.0 0 0.0 0 0.0	R         Coa           38E+1         00E+0           38E+1         68E+1           00E+0         68E+1           00E+0         00E+0           00E+0         32E-2           co         EN           gnelis         C3           90E-8         90E-8	cting           c4           5.86E           0.00E           5.86E           3.91E           0.00E           0.00E           0.00E           1.00E           0.00E           9.93E           158044           © coa           c4           0.00E	D           1         5.87E+1           +0         0.00E+0           -1         5.87E+1           +0         -4.08E+2           +0         0.00E+0           +0         2.76E+1           +0         0.00E+0           4         -3.52E-2           +A2:         ting           D         0           +0         2.02E-8
XCarl Re Re RESU	0® Ren newable Total L Non-ren Total use	ewable p primary isse of rer- newable p e of non-r Use of no- Use	d and Indic primary ere newable pe e primary ere newable of secon renewable n-	Renew cator hergy as e isources a rimary en- energy as hergy as hergy hergy as hergy he	wably F energy car as materia lergy resous s energy c material ut energy res erial any fuels odary fuels er ASTE C Renew osed sposed	Produ rier I utilizatic urces arrier lization sources	GORIE Produ	ot dip Unit [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ]	galvar A1-A3 2.06E+ 0.00E+ 2.06E+ 9.27E+ 9.27E+ 9.52E+ 0.00E+ 4.26E+ DOUT ot dip 0 A1-A3 3.00E4 2.06E+	hized s           4         4.4           0         0.1           4         4.4           3         5.5           0         0.1           3         5.3           2         0.1           0         0.2           0         0.5           PUT F           galvar           5         4.1           1         1.1	ct           44E+1           00E+0           44E+1           85E+2           00E+0           85E+2           00E+0           00E+0           00E+0           00E+0           00E+0           00E+0           00E+0           00E+0           01E+0           04E+2           00E+0           04E-2           LOWS           01Zed           07E-9           03E-1	All         C2           1.96E+*         0.00E+(           1.96E+*         0.00E+(           1.96E+*         2.84E+2           0.00E+(         0.00E+(           0.00E+(         0.00E+(           0.00E+(         2.87E-2           3 accord         3 accord           steel with         C2           1.50E-(2         1.50E-(2	gnelis 1 1.1 0 0.0 1 1.1 2 2.4 0 0.0 2 2.4 0 0.0 0 0.0 2 2.4 0 0.0 0 0.0 0 0.0 1 1.1 2 2.4 0 0.0 0 0.0 0 0.0 0 0.0 1 1.1 2 2.4 0 0.0 0 0.0 1 1.1 2 2.4 0 0.0 0 0.0 0 0.0 1 1.1 2 2.4 0 0.0 0 0.0 0 0.0 0 0.0 1 1.1 2 2.4 0 0.0 0	®         Coa           38E+1         00E+0           38E+1         68E+1           00E+0         68E+1           00E+0         00E+0           32E-2         co           co         gnelis           c3         90E-8           90E-8         90E-8	c4           5.86E           0.00E           5.86E           3.91E           0.00E           3.91E           0.00E           3.91E           0.00E           3.91E           0.00E           1.00E           0.00E           9.93E           158044           0.00E           C4           0.00E           2.00E	D           1         5.87E+1           40         0.00E+0           1         5.87E+1           40         4.08E+2           40         0.00E+0           40.8E+2         0           40         2.76E+1           40         0.00E+0           40         2.76E+1           40         0.00E+0           40         3.52E-2           FA2:         1           ting         D           40         2.02E-8           41         -7.70E-1
Result	0® Ren newable Total L Non-ren Total use	ewable p primary ise of ren- use of ren- use of non- use of non- tuse of non-tuse of	d and Indic primary ere newable pe ewable pe primary ere newable of secon renewable n-rene	Reney ator ergy as e sources a rimary energy as energy a	wably F energy car as materia lergy resous s energy ce material uti energy resous erial any fuels indary fuels indary fuels or <b>ASTE C</b> <b>Renew</b> posed osed osed osed osed	Produ rier I utilizatic urces arrier lization sources	GORIE Produ	ot dip Unit [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ]	galvar galvar A1-A3 2.06E+ 0.00E+ 2.06E+ 9.27E+ 9.27E+ 9.27E+ 9.52E+ 0.00E+ 4.26E+ 0.00E+ 4.26E+ 0.00E+ 4.26E+ 0.00E+ 2.87E- 0.00E+	hized s           4         4.4.           0         0.0.           4         4.4.           3         5.4           0         0.0.           3         5.4           0         0.0.           0         0.0.           0         0.0.           0         0.0.           0         0.0.           0         0.0.           0         0.0.           0         0.0.           5         4.1           1         2.           0         0.0	C1 44E+1 00E+0 44E+1 85E+2 00E+0 85E+2 00E+0	vith Ma C2 1.96E+* 0.00E+( 1.96E+* 2.84E+2 0.00E+( 2.84E+2 0.00E+(	gnelis gnelis 1 1.1.1 2 2.0 0 0.0 2 2.2 0 0.0 0 0.0	C3           38E+1           00E+0           38E+1           68E+1           00E+0           90E-8           90E-8           90E-2           95E-3           00E+0	c4           5.86E           0.00E+           5.86E           3.91E+           0.00E+           3.91E+           0.00E+	D           1         5.87E+1           00         0.00E+0           1         5.87E+1           00         0.00E+0           1         5.87E+1           0         -4.08E+2           0         0.00E+0           +0         -4.08E+2           +0         2.76E+1           +0         0.00E+0           +0         0.00E+0           +0         0.00E+0           +0         0.00E+0           +0         0.00E+0           +0         2.02E-8           +1         -7.70E-1           -5         6.74E-3           +0         0.00E+0
Result	0® Ren newable Total u Non-ren Total use	evable p primary ise of rer enewable p of non-r Use of non-r Non-ha Co	d and India primary ere energy re enewable p e primary er enewable e of secon renewable of secon renewable n-renewable se of net IELCA cycleo India ardous wa azardous wa oactive w omponemi laterials fo	Reney ator ergy as e sources a rimary en energy as r e primary dary mate e seconda ble second ble second ble second fresh wate d and cator aste dispo waste disp ts for re-up or recyclin	wably F energy cara as materia ergy resous energy resous energy resous erial ary fuels dary fuels dary fuels er ASTE C Renew posed osed osed osed osed osed	Produ rier I utilizatio urces arrier lization sources ATEC ably	Geed h	ot dip Unit [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ]	galvar galvar A1-A3 2.06E+ 0.00E+ 2.06E+ 9.27E+ 0.00E+ 9.27E+ 0.00E+ 9.27E+ 0.00E+ 0.00E+ 4.26E+ 0.00E+ 2.87E- 0.00E+ 2.87E- 0.00E+	A         4.4.           0         0.0.           4         4.4.           3         5.3.           2         0.0.           0         0.0.           0         0.0.           0         0.0.           0         0.0.           0         0.0.           0         0.0.           0         0.1.           0         0.1.           5         4.           1         1.           1         2.           0         0.0.           0         0.0.           0         0.0.	C1 44E+1 00E+0 44E+1 85E+2 00E+0 85E+2 00E+0 85E+2 00E+0 00E+0 00E+0 00E+0 00E+0 03E-1 07E-9 03E-1 00E+0 00E+0	C2           1.96E+*           0.00E+(           1.96E+*           0.00E+(           2.84E+2           0.00E+(           0.00E+(           0.00E+(           0.00E+(           0.00E+(           0.00E+(           0.00E+(           0.00E+(           0.00E+(           1.50E-§           4.63E-2           5.27E+4           0.00E+(           0.00E+(	gnelis gnelis 1 1.1.1 2 2.0 0 0.0 2 2.2 0 0.0 0 0.0 00	C3 38E+1 00E+0 38E+1 68E+1 00E+0 68E+1 00E+0 00E+0 00E+0 00E+0 00E+0 32E-2 C3 90E-8 90E-8 90E-8 90E-2 90E-8 90E-4 9	cting           c4           5.86E           0.00E+           5.86E           3.91E+           0.00E+           3.91E+           0.00E+	D           1         5.87E+1           +0         0.00E+0           -1         5.87E+1           +0         -4.08E+2           +0         0.00E+0           +0         -4.08E+2           +0         0.00E+0           +0         2.76E+1           +0         0.00E+0           +0         0.00E+0           +0         0.00E+0           +0         0.00E+0           +0         0.00E+0           +0         0.202E-8           +1         -7.70E+1           -5         6.74E-3           +0         0.00E+0           +0         0.00E+0
RESU 1 ton	0® Ren newable Total us Non-ren Total use	ewable p primary ise of rer enewable ewable p of non-r Use Use of no Use of no Use of non- tase of non- tase Use of non- tase Non-ha Radi Co	d and Indic Drimary er energy re enewable p e primary er enewable e of secon enewable e of secon enewable e newable n-renewable e of secon enewable se of net IE LCA Indic ardous wa azardous wo oncactive wo omponent laterials for rials for en	Renev ator bergy as e sources a rimary en- energy as n- energy reco	wably f energy car as materia as materia lergy reso s energy c energy reso energy reso energy reso energy reso raterial any fuels dary fuels dary fuels dary fuels car <b>STE C</b> <b>Renew</b> beed sposed se osed se overy	Produ rier I utilizatio urces arrier lization sources ATEC ably	BORIE Produ	ot dip Unit MJ MJ MJ MJ MJ MJ MJ MJ MJ MJ MJ MJ MJ	galvan A1-A3 2.06E+ 0.00E+ 2.06E+ 9.27E+ 0.00E+ 9.27E+ 9.27E+ 0.00E+ 9.22E+ 0.00E+ 0.00E+ 2.87E- 0.00E+ 2.87E- 0.00E+ 2.87E- 0.00E+ 2.87E- 0.00E+ 2.87E- 0.00E+ 2.87E- 0.00E+ 2.87E- 0.00E+ 2.87E- 0.00E+ 2.0	hized s           4         4.4.           0         0.1           4         4.4.           3         5.3           2         0.0           0         0.1           2         0.0           0         0.1           0         0.1           0         0.1           0         0.1           0         0.1           0         0.1           0         0.1           1         1.2           0         0.1           0         0.1           0         0.1	C1 44E+1 00E+0 44E+1 85E+2 00E+0 85E+2 00E+0 00E+0 00E+0 00E+0 00E+0 00E+0 00E+1 00E+1 00E+1 00E+0 00E+0 00E+0 00E+0	C2           1.96E+'           0.00E+(           1.96E+'           0.00E+(           1.96E+'           0.00E+(           2.84E+2           0.00E+(           0.00E+(           0.00E+(           0.00E+(           0.00E+(           0.00E+(           0.00E+(           1.50E-S           3.accort           1.50E-S           5.27E-4           0.00E+(           0.00E+(           0.00E+(           0.00E+(           0.00E+(	gnelis gnelis 1 1.1.1 2 2.0 0 0.0 2 2.2 0 0.0 2 0.0 0	C3           38E+1           00E+0           38E+1           68E+1           00E+0           68E+1           00E+0           00E+0           32E-2           00E+0           32E-2           00E+0           32E-2           00E+0           390E-8           90E-8           90E-2           300E+0           80E+2           00E+0	cting           c4           5.86E           0.00E           3.91E           0.00E           3.91E           0.00E           3.91E           0.00E           3.91E           0.00E           9.93E           15804           © coa           c4           0.00E           2.00E           0.00E           4.35E           0.00E           0.00E           0.00E	D           1         5.87E+1           +0         0.00E+0           -1         5.87E+1           +0         -4.08E+2           +0         0.00E+0           +0         2.76E+1           +0         2.76E+1           +0         0.00E+0           +0         2.76E+1           +0         0.00E+0           +0         0.00E+0           +0         0.00E+0           +0         2.02E-8           +1         -7.70E-1           -5         6.74E-3           +0         0.00E+0           +0         0.00E+0           +0         0.00E+0           +0         0.00E+0
RESU	08 Ren newable Total u Non-ren Total use	ewable p primary ise of rerenewable ewable p of non-r Use of no Use of n Jse of no Use of n Use of n C OF TH b ® Re Haz Non-ha Radi C C M Mate Exp	d and Indic orimary er energy re enewable p a primary er enewable a of secon enewable of secon energination en	Reney ator hergy as e sources a rimary en energy as nergy as n energy as nergy reco co trical energy as nergy reco co trical energy as nergy reco trical energy as nergy as nergy	wably F energy car as materia lergy resous s energy ce material util energy resous s energy resous material util energy resous any fuels er NSTE C Renew Ssed sposed osed se g overy ergy rgy	Produ rier I utilizatio urces arrier lization sources	GORIE Produ	ot dip Unit [M] [M] [M] [M] [M] [M] [M] [M] [M] [M]	galvar galvar A1-A3 2.06E+ 0.00E+ 2.06E+ 9.27E+ 0.00E+ 9.27E+ 0.00E+ 9.27E+ 0.00E+ 0.00E+ 2.66E+ 2.66E+ 2.66E+ 2.66E+ 2.66E+ 0.00E+	hized s           4         4.4           0         0.1           4         4.4           3         5.3           2         0.0           0         0.1           3         5.3           2         0.0           0         0.1           3         5.3           2         0.0           0         0.1           0         0.1           0         0.1           5         4.1           1         2.           0         0.1           0         0.1           0         0.1           0         0.1           0         0.1           0         0.1	C1 44E+1 00E+0 44E+1 85E+2 00E+0 85E+2 00E+0 00E+0 00E+0 00E+0 00E+0 00E+0 00E+0 00E+0	vith Ma c2 1.96E+' 0.00E+( 1.96E+' 2.84E+2 0.00E+(	gnelis gnelis 1 1.1 0 0.0 1 1.3 2 2.0 0 0.0 2 2.0 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0 0 7. 1 ding t th Ma	C3           38E+1           00E+0           38E+1           68E+1           00E+0           68E+1           00E+0           00E+0           32E-2           00E+0           32E-2           00E+0           32E-2           00E+0           32E-2           00E+0           390E-8           90E-8           90E-2           95E-3           00E+0           00E+0           00E+0           00E+0           00E+0	ating           c4           5.86E           0.00E           5.86E           0.00E           3.91E           0.00E           3.91E           0.00E           0.00E           9.93E           158041           © coa           0.00E           2.00E           4.35E           0.00E           0.00E           0.00E           0.00E           0.00E           0.00E	D           1         5.87E+1           +0         0.00E+0           -1         5.87E+1           +0         -4.08E+2           +0         0.00E+0           +0         2.76E+1           +0         2.76E+1           +0         0.00E+0           +0         2.76E+1           +0         0.00E+0           4         -3.52E-2           +A2:
RESU	D® Ren newable Total L Non-ren Total use	evycle ewable p primary ise of ren- use ise of non- Use of non- Mazi Ca Mate Exp Exp OF TH	d and Indic primary ere newable pe ewable pe primary ere newable of secon renewable n-renewable n-renewable n-renewable of net <b>IELCA</b> Indic ardous wa azardous wa azardous wa azardous wa ported ele ported the <b>IELCA</b>	Reney ator ergy as e sources a rimary en energy as energy energy record energy record energy record energy record energy record energy record energy as energy record energy as energy as	wably f energy car as materia lergy resous s energy c material util energy resous erial any fuels indary fuels er ASTE C Renew Dised posed posed posed see ig overy ergy rgy ditiona	Produ rier I utilizatic urces arrier lization sources	GORIE Produ	ot dip Unit [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ]	galvar all all all all all all all all all all	A         4.4.0           0         0.0.0           4         4.4.3           5.3         5.3           2         0.0.0           0         0.0.0           0         0.0.0           0         0.0.0           0         0.0.0           0         0.0.0           0         0.0.0           0         0.0.0           5         4.4.1           1         1.1           1         2.0           0         0.0.0           0         0.0.0           0         0.0.0           0         0.0.0           0         0.0.0           0         0.0.0           0         0.0.0           0         0.0.0           0         0.0.0           0         0.0.0           0         0.0.0           0         0.0.0           0         0.0.0           0         0.0.0	ct           steel           ct           44E+1           00E+0           44E+1           85E+2           00E+0           00E+0           00E+0           00E+0           00E+0           00E+0           00E+0           00E+0           04E-2           LOWS           nized           C1           07E-9           03E-1           86E-3           00E+0	C2           1.96E+*           0.00E+(           1.96E+*           0.00E+(           2.27E-2           3 accord           steel with           C2           1.50E-6           4.63E-2           5.27E-4           0.00E+(	gnelis gnelis 1 1.1 0 0.0 1 1.1 2 2.2 0 0.0 0 0.0 2 2.1 0 0.0 0 0.0 2 1.1 ding t th Ma 0 7. 2 1.1 3 3 0 0.0 0 9.0 0 9.0 0 9.0 0 0.0 1 4.2 1 1.3 1	B         CO3           38E+1         00E+0           38E+1         00E+0           00E+0         00E+0           00E+0         00E+0           00E+0         32E-2           co         gnelis           c3         90E-8           90E-8         90E-2           95E-3         00E+0           00E+2         00E+0           00E+0         00E+0           00E+0         00E+0           00E+0         00E+0           00E+0         00E+0           00E+0         00E+0           00E+0         00E+0	c4           5.86E           0.00E           3.91E           0.00E           3.91E           0.00E           3.91E           0.00E           3.91E           0.00E           3.91E           0.00E           9.93E           9.93E           0.00E	D           1         5.87E+1           00         0.00E+0           1         5.87E+1           00         4.08E+2           00         0.00E+0           1         5.87E+1           00         4.08E+2           00         0.00E+0           00         2.76E+1           00         0.00E+0           00         0.00E+0           00         0.00E+0           00         0.00E+0           00         0.00E+0           00         2.02E-8           11         -7.70E-1           -5         6.74E-3           00         0.00E+0
XCarl Re Re RESU Tion RESU Tion RESU Tion	D® Ren Renue Total u Non-ren Total use ULTS ( XCarl ULTS ( XCarl	ecycle ewable p primary ise of ren- enewable weable p of non- Use of non- Use of no Use of no Use of no Use of no Use of no Use of no Use of no USE Use OF USE USE OF USE USE USE OF USE USE USE USE USE USE USE USE USE USE	d and Indic orimary er energy re newable p e primary er enewable of secon renewable n-renewable n-renewable n-renewable <b>in CCA</b> <b>indic</b> ardous wa azardous wa azardous wa azardous wa pomponeni faterials for er ported the ported the	Reney ator bergy as e sources a rimary en- energy as energy as energy as energy as energy as energy as energy as esconda ble seconda ble seconda cator aste dispo waste disp waste disp recyclim hergy reco chical ene armal ene and d and d and	wably f energy car as materia lergy resous s energy resous s energy resous s energy resous rerial any fuels charge fuels er ASTE O Renew psed sposed ses g povery rgy rgy ditiona Renew	Produ rier Iutilizatio urces arrier lization sources	GORIE Produ	ot dip Unit [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ]	galvar galvar A1-A3 2.06E+ 0.00E+ 2.06E+ 9.27E+ 9.27E+ 9.52E+ 0.00E+ 9.27E+ 9.52E+ 0.00E+ 0.00E+ 2.06E+ 2.87E- 0.00E+	hized s           4         4.4           0         0.1           4         4.3           5.3         5.3           2         0.1           3         5.3           2         0.1           0         0.1           3         5.3           2         0.1           0         0.1           0         0.1           0         0.1           5         4.1           1         2.           0         0.1           0         0.1           0         0.1           0         0.1           0         0.1           0         0.1           0         0.1           0         0.1           0         0.1           0         0.1           0         0.1	C1 44E+1 00E+0 44E+1 85E+2 00E+0 85E+2 00E+0 00E+0 00E+0 00E+0 00E+0 00E+0 00E+0 00E+0 00E+0 00E+0 00E+0 00E+0 00E+0 00E+0 00E+0 00E+0 00E+0 00E+0 10E 00E+0	vith Ma c2 1.96E+* 0.00E+( 1.96E+* 2.84E+2 0.00E+(	gnelis gnelis 1 1.1. 0 0.0 1 1.3 2 2.0 0 0.0 2 2.0 0 0.0 2 2.0 0 0.0 2 2.0 0 0.0 2 2.0 0 0.0 0 0.0 2 2.0 0 0.0 0 0	C3           38E+1           00E+0           38E+1           00E+0           38E+1           00E+0           00E+0           00E+0           00E+0           32E-2           00E+0           32E-2           00E+0           00E+0           32E-2           00E+0           90E-8           90E-8           90E-2           95E-3           00E+0	C4           5.86E           0.00E           5.86E           0.00E           3.91E           0.00E           3.91E           0.00E	D           1         5.87E+1           +0         0.00E+0           -1         5.87E+1           +0         -4.08E+2           +0         2.76E+1           +0         2.76E+1           +0         0.00E+0           +0         2.76E+1           +0         0.00E+0
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RESU RESU 1 ton	D® Ren Ren Inewable Total use ILTS ( XCarl ILTS ( XCarl Potential	ewable p primary ise of rer enewable ewable p of non-r Use of no Use of n Jse of no U OF TH b® Re Haz Non-h- Radi CC M Mate Exp Exp Exp DF TH b® Re	d and Indic primary er energy re newable p e primary er enewable of secon renewable n-renewable n-renewable n-renewable n-renewable n-renewable n-renewable n-renewable cyclec Indic ardous wa azardous wa azardou	Renew ator bergy as e sources a rimary en- energy as energy as energy as energy as energy as energy as energy as energy as esconda ble seconda ble seconda chanda ator aste dispo ator aste dispo aste	wably f energy car as materia lergy resous s energy resous s energy resous erial ary fuels idary fuels er ASTE O Renew osed sposed osed se g povery rgy ditiona Renew	Produ rier I utilization urces amier lization sources ATEC ably limp ably sions	act ca Produ	ot dip Unit [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ]	galvar galvar A1-A3 2.06E+ 0.00E+ 2.06E+ 9.27E+ 9.27E+ 9.52E+ 0.00E+ 9.27E+ 9.52E+ 0.00E+	ized s         4       4.4         0       0.1         4       4.3         5       5.3         2       0.1         3       5.3         2       0.1         0       0.1         3       5.3         2       0.1         0       0.1         0       0.1         0       0.1         5       4.1         1       2.2         0       0.1	c1           44E+1           00E+0           44E+1           85E+2           00E+0           85E+2           00E+0           00E+0           00E+0           04E-2           LOWS           1ized           07E-9           03E-1           86E-3           00E+0           01E+0           01E           01Zed           C1           ND	C2           1.96E+*           0.00E+(           1.96E+*           0.00E+(           1.96E+*           0.00E+(           0.00	gnelis gnelis 1 1.1 0 0.0 1 1.3 2 2.0 0 0.0 2 2.0 0 0.0 2 2.0 0 0.0 2 2.0 0 0.0 0 0.0 0 0.0 2 1. ding t th Ma 0 0.0 0 9.7 2 11 4 3.0 0 0.0 0 9.4 0 0.0 0 9.4 0 0.0 1 + A2-0 th Ma	C3           38E+1           00E+0           38E+1           68E+1           00E+0           68E+1           00E+0           32E-2           00E+0           32E-2           00E+0           32E-2           00E+0           32E-2           00E+0           32E-2           90E-8           90E-8           90E-2           95E-3           00E+0	C4           5.86E           0.00E           5.86E           0.00E           3.91E           0.00E           3.91E           0.00E	D           1         5.87E+1           +0         0.00E+0           -1         5.87E+1           +0         -4.08E+2           +0         2.76E+1           +0         2.76E+1           +0         2.76E+1           +0         0.00E+0           +0         2.76E+1           +0         0.00E+0           +0         0.00E+0           +0         0.00E+0           +0         0.00E+0           +0         2.02E-8           +1         -7.70E-1           -5         6.74E-3           +0         0.00E+0
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Note: 952 kg of scrap are used in the manufacturing of 1 metric ton of XCarb® RRP hot dip galvanized steel with Magnelis® coating. After use, 980 kg steel are recycled, and 20 kg are landfilled. The potential environmental impact calculated for module D depends on the net amount of scrap left in the system, which is 980-952 = 28 kg. This means that the system has a net output of 28 kg of scrap, which is shown in module D as an environmental credit or burden depending on the impact category.

The additional and optional impact categories in accordance with *EN 15804-A2* have not been declared, as this is not required in accordance with *PCR Part A*.

Disclaimer 1 - for the indicator "Potential Human exposure efficiency relative to U235".

This impact category deals mainly with the eventual impact of low-dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure or radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

Disclaimer 2 – for the indicators "abiotic depletion potential for nonfossil resources", "abiotic depletion potential for fossil resources", "water (user) deprivation potential, deprivation-weighted water consumption",

"potential comparative toxic unit for ecosystems", "potential comparative toxic unit for humans – cancerogenic",

"Potential comparative toxic unit for humans not cancerogenic", "potential soil quality index".

The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high as there is limited experienced with the indicator.

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