STATEMENT

Statement No:	Initial Issuance Date:	Validity
C668938	29 December 2023	28 December 2028

This certifies that the organization:

NUOVA SIMA S.r.l.

Frazione Valtreara, 83 - 60040 Genga (AN) - ITALY

has issued the Environmental Product Declaration (EPD):

S-P-11597 HYDROFY G 5 rev. 29 December 2023

in compliance to the requirements of ISO 14025 Standard relative to type III Environmental Declarations and that the reported data and the information has been obtained by the organization following the rules and the requirements contemplated in the following International Standards:

- **EPD General Programme Instructions ver. 4.0**
- **PCR: 2020:01, version 1.0.1 Micronized stone from quarry**

UN CPC Code: 15320 - Pebbles, gravel, broken or crushed stone, macadam; granules, chippings and powder of stone

Place and date
Vimercate (MB), 29 December 2023

ACCREDIA
L'ENTE ITALIANO DI ACCREDITAMENTO

SGQ N° 003 A
SGA N° 003 D
SGE N° 007 M
SCR N° 004 F
EMAS N° 009 P
PRD N° 003 B
PRS N° 094 C
SSI N° 002 G

Membro di MLA EA per gli schemi di accreditamento SGQ, SGA, PRD, PRS, ISP, GHG, LAB e LAT, di MLA IAF per gli schemi di accreditamento SGQ, SGA, SSI, FSM e PRD e di MRA ILAC per gli schemi di accreditamento LAB, MED, LAT e ISP

For the Certification Body
DNV – Business Assurance
Via Energy Park, 14 – 20871 Vimercate - Italy

Claudia Baroncini
Management Representative

Lack of fulfilment of conditions as set out in the Certification Agreement may render this Certificate invalid.

Environmental Product Declaration

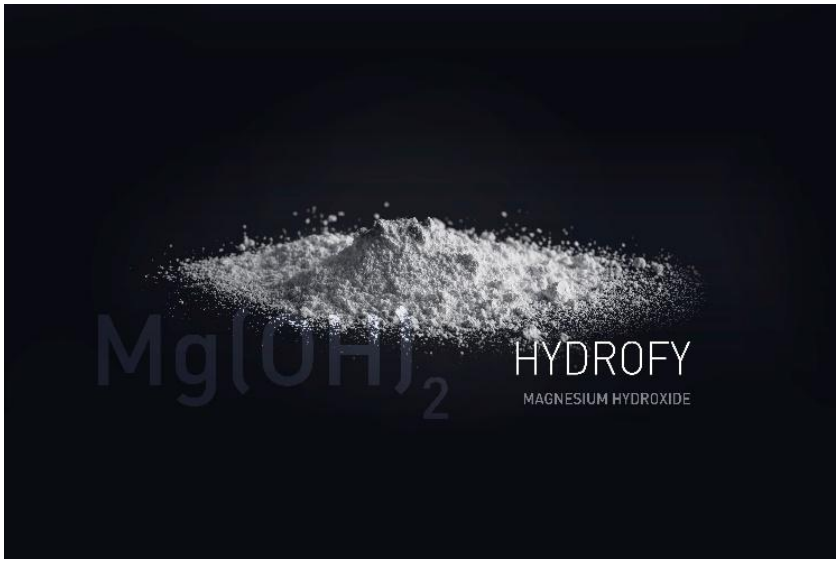
In accordance with ISO 14025:2006 for:

Hydrofy G 5

from

Nuova Sima srl

Programme:	The International EPD® System, www.environdec.com
Programme operator:	EPD International AB
EPD registration number:	S-P-11597
Publication date:	2023-12-29
Revision date:	2025-04-22
Valid until:	2028-12-28
	An EPD must provide current information and can be updated if conditions change. The stated validity is therefore subject to continuous registration and publication at www.environdec.com



Programme information

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

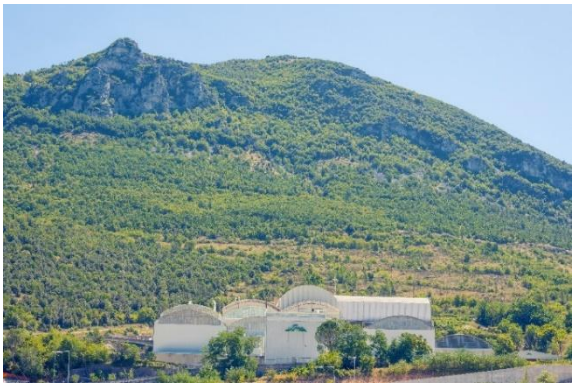
Accountabilities for PCR, LCA and independent, third-party verification
Product Category Rules (PCR)
PCR: *Micronized stone from quarry, 2020:01, version 1.0.1, valid until 2025-01-08.* *CPC code Ver.2: 15200 - Gypsum; anhydrite; limestone flux; limestone and other calcareous stone, of a kind used for the manufacture of lime or cement and 15320 - Pebbles, gravel, broken or crushed stone, macadam; granules, chippings and powder of stone*.
PCR review was conducted by: *The Technical Committee of the International EPD® System. A full list of members available on www.environdec.com. The review panel may be contacted via info@environdec.com. Review chair: Maurizio Fieschi*
Life Cycle Assessment (LCA)
LCA accountability: *INDACO2 srl,via Roma 21B 53034 Colle Val d'Elsa (SI) - ITALY*
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: *DNV Business Assurance Italy Srl* is an approved certification body accountable for the third-party verification The certification body is accredited by: Accredia
Procedure for follow-up of data during EPD validity involves third-party verifier: ☒ Yes ☐ No

Company information

Owner of the EPD: Nuova Sima s.r.l.; info@nuovasima.it

Description of the organisation: Nuova Sima is an experienced producer of fine milled fillers, Calcium Carbonate as general-purpose filler and Magnesium Carbonate, Magnesium Hydroxide, Aluminium Hydroxide as flame retardant fillers for plastic materials, rubbers and paints.
It is currently the biggest European producer of fine milled Natural Magnesium Hydroxide.
The commitment to research and innovation, and particular attention to the environmental impacts of its products, allows Nuova Sima to respond to the specific needs of its customers, and to improve consistently the quality of its results.
Nuova Sima exports the majority of its production volumes to customers worldwide. Its expertise and knowledge in logistic distribution grants a high-performance service to the customers.
Nuova Sima offers continuous technical assistance on the development of suitable formulations to maximize the performance of its products, while remaining in line with new market needs.
Natural flame retardant fillers do not involve any chemical step because they are obtained through a mechanical process.
Since 1998 Nuova Sima works according to a certified Quality System compliant with UNI EN ISO 9001.
The production plant is located at 60 Km from Ancona port, where the raw materials arrive in bulk with cargo ships.
With a capacity of 70,000 tons/y, Nuova Sima is able to produce a wide range of different mineral fillers.
The great flexibility of the plant allows satisfying the performance required for many applications in different market sectors.
Main product families are the followings:
HYDROFY, natural Magnesium Hydroxide grades
ALUFY ECO, natural Aluminium Hydroxide grades
ALUFY, fine milled synthetic Aluminium Hydroxide grades.
MAGFY, natural Magnesium Carbonate grades
HYDROMIX, a blend between Magnesium Hydroxide and Magnesium Carbonate.

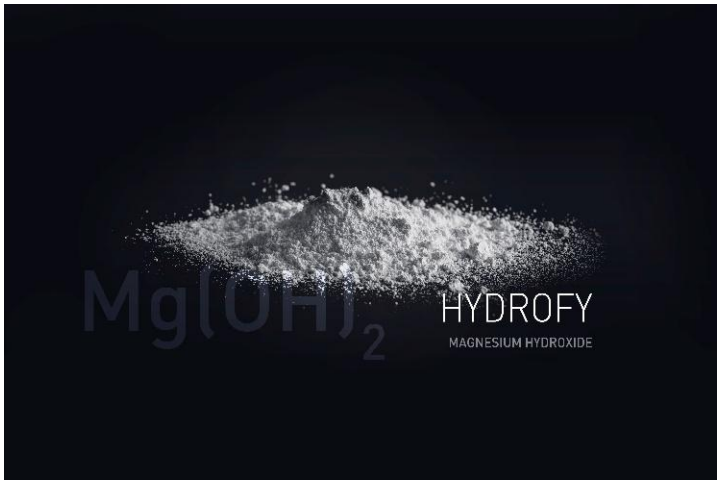
Name and location of production site: Frazione Valtreara, 83 60040 Genga AN Italy



Product information

Product name: Hydrofy G 5

Product identification and description: Hydrofy is the trademark of Magnesium Hydroxide flame retardant fillers. Nuova Sima has been one of the first companies in the world to manufacture Magnesium Hydroxide starting from natural minerals (i.e. brucite).
The use of Magnesium Hydroxide allows the production of Halogen Free Flame Retardant (HFFR) compounds with a very low emission of smoke. Thanks to its high thermal stability, it can be used in a wide range of polymers, especially for the production of HFFR (Halogen Free Flame Retardant), PVC, flame retardant rubber compounds as well as for ACP (Aluminium Composite Panels), dry scrubbers for exhaust gases from vessels and power stations, fertilizers.
In case of a fire accident, the endothermic dehydration of Hydrofy presents different advantages:
• Reduction of heat released by polymers during their combustion
• Dilution of oxygen with water vapour, with consequent flame reduction
• Formation of a hard char, which protects the polymers from fire
• Reduction of smoke density and acidity



UN CPC code: 15320 - Pebbles, gravel, broken or crushed stone, macadam; granules, chippings and powder of stone.

Geographical scope: Europe

Content declaration

Product

The raw material is brucite mineral. Tab.1 shows more details on the characteristics of the product.

Tab. 1 Content declaration of Hydrofy G 5

HYDROFY G 5		
PHYSICO-CHEMICAL PROPERTIES		
Density	g/cm^3	2.36
pH (of the aqueous suspension)	-Log[H$^+$]	about 10 (50 g/l, 20°C)
Electrical conductivity (of the aqueous suspension)	µS/cm	288 (10% w/w)
Water solubility	g/100 ml	0.00064 (25°C)
Physical state		solid (powder)
Colour		white
Odour		odourless
Median particle size (d50)	µm	6
CHEMICAL COMPOSITION		
Brucite, $Mg(OH)_2$	%	99.8
Ethylene glycol (CH2OH)2	%	0.2

Nuova Sima srl declares that their products are exempted from registration in accordance with Article 2 (7) of the REACH regulation, and do not contain any SVHC substances listed on “candidate list” updated at 2024/01/23.

Distribution/consumer packaging: the product is distributed in big bag of 1 ton.

LCA information

Time representativeness: 2023
Database used: Ecoinvent v3.8
LCA software used: SimaPro 9.6

The scope of this EPD document is to assess the potential environmental impacts generated by the production cycle of Hydrofy G 5 and make them explicit. A description follows with details on declared unit (DU), system boundaries, key assumptions and a flow chart describing the lifecycle stages of the product.

A comprehensive quantitative evaluation of the environmental performance of the Hydrofy G 5 production chain was based on the application of Life Cycle Assessment (LCA) methodology in accordance with UNI EN ISO 14040-14044, 14025, as well as PCR 2021:01 Micronized stone from quarry, valid until 2025-01-08. The life cycle includes all major processes from raw material sourcing to transportation to the company's customers.

Declared unit
The declared unit is 1t of Hydrofy G 5 in big bag, produced by NuovaSima. All inflows and outflows were referred to the declared unit.

Description of system boundaries

Based on a “from cradle to gate” approach, the Hydrofy G 5 lifecycle system boundaries concern:

Upstream Process: processes “from cradle to gate” involving the raw material extraction and the supply-chain of semi-processed products, transportation of major components along the supply-chain to the primary distribution point.
Specifically, processes included in the upstream phase are:
- production and transportation of the raw materials (e.g., brucite rock, glycol);
- production and transportation of the raw material packaging (e.g., PVC, PE, cardboard);
- production of machinery and vehicle components that are replaced for annual maintenance;
- production of the raw material of the packaging (e.g., PVC, wood);

The mining process was included in the upstream phase because it is not carried out by the company and not under the direct control of Nuova Sima. The brucite mineral is committed to the company as all other purchased products.

Core Process: it consists in processes within the production plant (from gate to gate) that includes:
- transport of raw materials including packaging from main suppliers to Nuova Sima s.r.l.;
- consumption of electricity from the grid, fuels (i.e., diesel and natural gas) and water in the company (including their production);
- direct air emissions in the production plant;
- end-of-life treatment of waste and packaging materials of the products used in the plant;

The Core process is divided into the following sub-phases:
0 - Materials transport to the company gate: transport of the raw brucite rock and chemicals used.
1 - Grinding: the brucite rock is loaded into the hopper and crushed using two mills (M104 and M106). The M104 mill feeds the type 1 milling line; the M106 mill feeds the type 2 milling line.
2 a - Type 1 milling: the brucite rock from M104 is reduced in size by using three mills (mill 1, 2 and 3). The product is dried with hot airflow. Before being loaded into the mill, additive (glycol) is added to the crushed rock. The final average size (d50) is 6 µm (Hydrofy G 5).

2 b - Type 2 milling: the brucite rock from M106 is reduced in size by using two mills. The product is dried with hot airflow. Before being loaded into the mill, additive (glycol) is added to the crushed rock. The final average size (d50) is 6 µm (Hydrofy G 5).
3 - Storage: The obtained product from the type 1 and 2 milling lines is stored in silos.
4 - Packaging: the product is transferred by conveyor tubes from storage silos to 1-ton big bag on a pallet.

The reference flow is the quantity of Hydrofy G 5 produced in one year.

Downstream Process: it consists in the "from gate to gate" process that includes:
- the transport of the finished product to other companies that process or blend the product to other ingredients.
- end-of-life processes of packaging waste.
The distribution scenario has been developed based on the company's customers average distances. Secondary transformation (e.g. by the company to which Hydrofy G 5 is sold), its transport to the end user and the use of the final product are out of system boundaries.

Figure 2 shows the flow chart and system boundaries diagram of the **Hydrofy G 5**, divided into Upstream, Core and Downstream

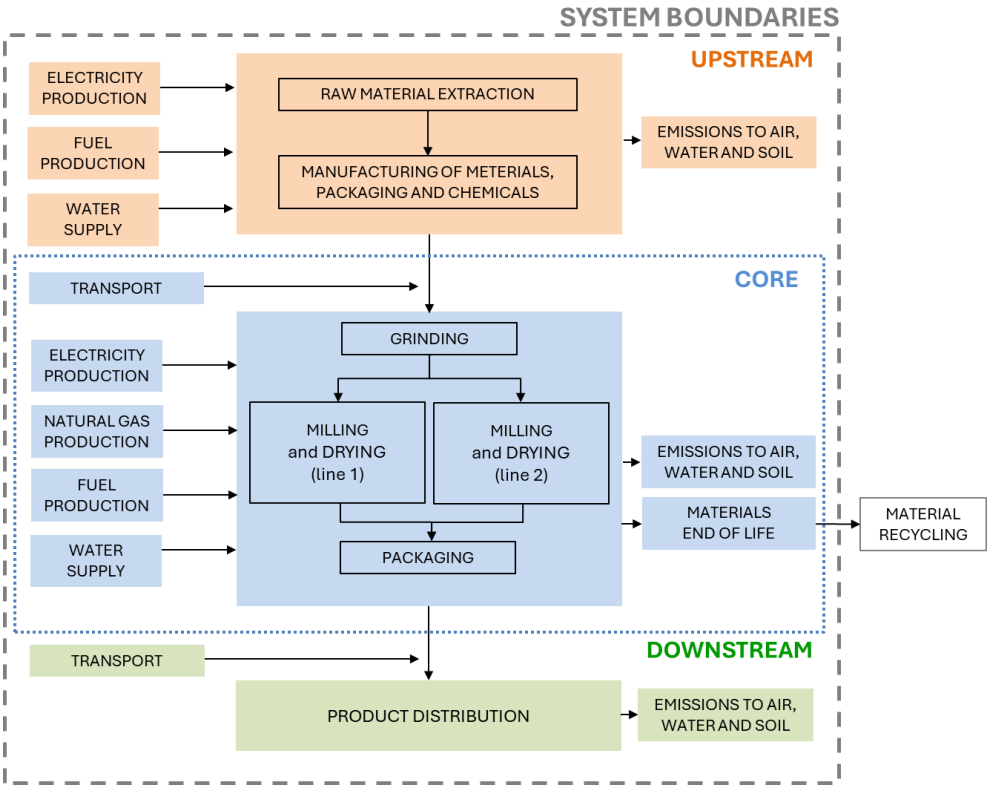


Fig. 2 Flow chart and system boundaries of **Hydrofy G 5** production

Excluded lifecycle stages: Based on the definition of system boundaries and cut-off criteria, a number of processes were considered not relevant or not directly referred to the Hydrofy G 5 lifecycle.
Excluded processes are the following:
- construction of buildings and machineries used in the production site;
- production and maintenance of machineries with more than 5 years estimated lifetime;
- activity and travels of employers;
- product secondary processing/blending with other materials
- transport to the end user

- use and end of life of the product.

Not significant data were neglected. The considered cut-off is under the threshold of relevance (1% of total inputs), in accordance with the maximum percentage for exclusion, recommended by the PCR 2020:01.

More information:

The LCA has been performed in compliance with ISO 14040:2021 and ISO 14044:2021, ISO 14025:2006 (Environmental labels and declarations - Type III) and the GPI (General Programme Instructions for the International EPD System), 2021-03-29 v.4.0. The LCA refers to the PCR 2020:01 for “Micronized stone” UN CPC 15200 and 15320.

Primary data have been collected in the Nuova Sima s.r.l. production plant of Genga (AN), Italy based on direct interviews with employers involved in production processes, during specific field-visits in different plant sections or derived from registered company reports. All quantities derive from primary data, as recommended by data quality requirements.
Environmental impacts due to the use of energy (electricity, natural gas), and water were based on data registered in company reports.
The electricity mix refers to the Italian residual mix (AIB, 2024).
Selected generic data refer to the Ecoinvent database v.3.8.
The LCA has been performed based on the software LCA SimaPro 9.6, selecting indicators and methods required in the default list V.2 at https://www.environdec.com/resources/indicators. Additional indicators required by the PCR as Human, Fresh-water and Marine Toxicity Potential (HTP, FAETP and MAETP, respectively) are calculated by selecting the method CML-IA baseline, Natural Land Transformation (NLR) the method ReCiPe2008 (Goedkoop et al., 2009).
No proxy data are used. The environmental impacts totally derived from primary or selected generic data. All primary and selected generic data, database and accounting models are compliant with the data quality requirements (PCR par 4.7).

The LCA study was performed by Gaia Esposito and Elena Neri (INDACO$_2$ srl, 2024).

Environmental performance

Potential environmental impact

The assessed potential environmental impacts are reported in table 3, detailed into upstream, core and downstream processes. Values refer to the functional unit (**1 t of Hydrofy G 5**).

Tab.3 Environmental Impact Potentials referred to the **Hydrofy G 5** production system per DU (2023).

IMPACT CATEGORY	UNIT	UPSTREAM	CORE	DOWNSTREAM	TOT
Climate change - Fossil	kg CO_2eq	2.58E+01	2.75E+02	1.20E+02	4.21E+02
Climate change - Biogenic	kg CO_2eq	2.21E+00	7.44E+00	1.25E+01	2.21E+01
Climate change - Land use and LU change	kg CO_2eq	3.43E-02	1.37E-01	4.70E-02	2.19E-01
Climate change	kg CO_2eq	2.81E+01	2.83E+02	1.32E+02	4.43E+02
Acidification	mol H+ eq	2.18E-01	5.67E+00	3.83E-01	6.27E+00
Eutrophication, freshwater	kg P eq	6.54E-03	2.34E-02	7.61E-03	3.76E-02
Eutrophication, marine	kg N eq	5.98E-02	1.37E+00	8.23E-02	1.51E+00
Eutrophication, terrestrial	mol N eq	8.01E-01	1.52E+01	8.95E-01	1.69E+01
Photochemical ozone formation	kg NMVOC eq	1.98E-01	3.97E+00	3.25E-01	4.50E+00
Ozone depletion	kg CFC11 eq	1.47E-06	5.10E-05	2.71E-05	7.96E-05
Resource use, minerals and metals	kg Sb eq	1.52E-04	4.64E-04	4.09E-04	1.03E-03
Resource use, fossils	MJ	5.56E+02	3.70E+03	1.77E+03	6.02E+03
Water use	m3 depriv.	1.06E+01	2.05E+01	5.36E+00	3.65E+01

Global Warming Potential: core processes generate the highest impact (64%), mainly due to emissions from the transport of brucite by ship and consumption of electricity. The downstream phase generates about 30% of the total impact, due to the transportation of the finished product. In the upstream phase (6%) the impacts are mainly due to the production of packaging of the final product.
Acidification Potential: the core processes generate highest impacts (90%), mainly due to emissions from the transport of brucite by ship. The downstream phase generates 6% of the total impact, due to road transport of the product. The upstream phase has a contribution of 4% to the total impact, due to the processes of brucite raw material extraction.
Eutrophication Potential: core processes generate the highest impact (62%), mainly due to emissions from electricity consumption and transport of brucite by ship. The upstream phase generates 18% of the total impact, due to processes of production of the packaging of final product. The downstream phase contributes for 20% to the total impact, due to road transport of the product.
Photochemical oxidant creation potential: core processes generate the highest impact (88%), mainly due to emissions from the transport of brucite by ship. The downstream phase accounts for 7% of the total impact, due to the road transport of the product. The upstream phase contributes for 5% to the total impact, mainly due to brucite mining.

The most relevant aspect in terms of environmental management is constituted by transportation processes, especially with regard to the GWP, AP, EP, and POFP indicators, beside electricity consumption.

Results for the GWP, AP, EP, and POFP indicators, detailed into upstream, core and downstream processes, are shown in Figure 2.

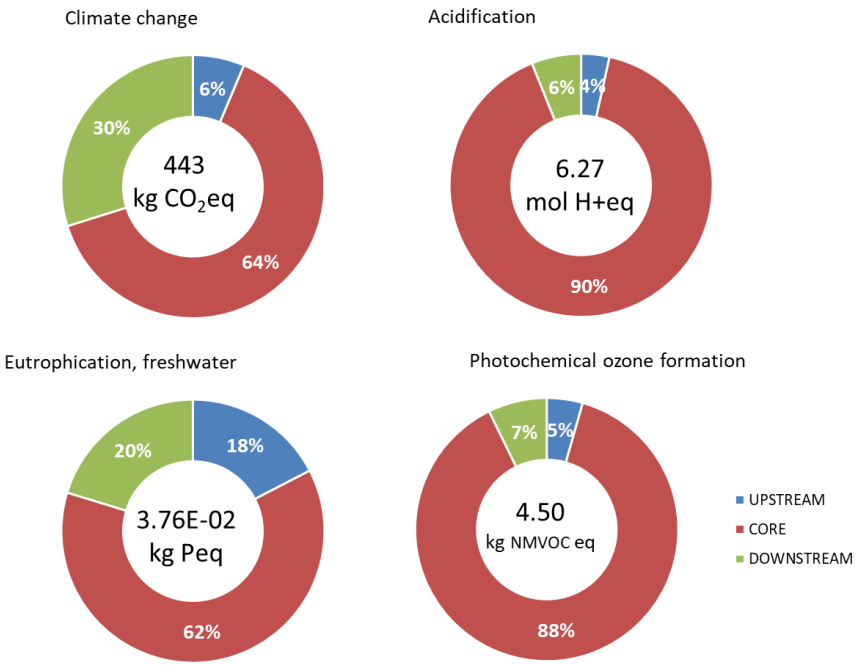


Fig.2 LCA based estimated values of environmental impacts of **1 t of Hydrofy G 5**

The hotspots highlighted by results constitute the starting point to identify and develop solutions to mitigate impacts and optimize the whole process, for a continuous improvement of environmental performances through company management.

Use of resources

Tab.4 Total renewable and non-renewable resources used in the **Hydrofy G 5** production system (2023)

PARAMETER		UNIT	UPSTREAM	CORE	DOWNSTREAM	TOTAL
Primary energy resources - RENEWABLE	Used as ENERGY carrier	MJ, net calorific value	3.34E+02	6.42E+01	2.50E+01	4.23E+02
	Used as RAW MATERIALS	MJ, net calorific value	5.29E+02	2.26E+01	8.40E+00	5.60E+02
	TOTAL	MJ, net calorific value	8.63E+02	8.68E+01	3.34E+01	9.83E+02
Primary energy resources - NON RENEWABLE	Used as ENERGY carrier	MJ, net calorific value	4.12E+02	3.94E+03	1.88E+03	6.24E+03
	Used as RAW MATERIALS	MJ, net calorific value	1.83E+02	0.00E+00	0.00E+00	1.83E+02
	TOTAL	MJ, net calorific value	5.95E+02	3.94E+03	1.88E+03	6.42E+03
Secondary Material		kg	0	0	0	0.00E+00
Renewable secondary fuels		MJ	0	0	0	0.00E+00
Non-Renewable secondary fuels		MJ	0	0	0	0.00E+00
Net use of fresh water		m3	2.74E-01	5.57E-01	2.00E-01	1.03E+00

Other environmental indicators

Other impact categories were considered in the analysis such as:
- *Human, Fresh-water, Marine and Terrestrial Toxicity Potential* (HTP, FAETP, MAETP inf. And TETP respectively)
- *Natural Land Transformation (NLR*).

Tab.5 Environmental Impact Potentials referred to the **Hydrofy G 5** production system per DU (2023). Other assessed impact categories.

IMPACT CATEGORY	UNIT	UPSTREAM	CORE	DOWNSTREAM	TOT
Human toxicity	kg 1,4-DB eq	4.96E+01	9.26E+01	4.74E+01	1.90E+02
Fresh water aquatic ecotox.	kg 1,4-DB eq	1.05E+01	4.31E+01	2.34E+01	7.70E+01
Marine aquatic ecotoxicity	kg 1,4-DB eq	2.46E+04	1.11E+05	4.04E+04	1.76E+05
Terrestrial ecotoxicity	kg 1,4-DB eq	4.17E-02	3.90E-01	1.49E-01	5.81E-01
Natural land transformation	m2	3.54E-03	7.77E-02	4.50E-02	1.26E-01

Differences vs previous version

- Data updated to 2023 production. In particular, data related to the update of the AIB energy mix from 2022 and 2023 determined variations on impact results >10%.

Glossary

Biogenic carbon: carbon which is contained in biomass [ISO 14067:2010]
Biogenic carbon dioxide (CO_2): CO_2 obtained by the oxidation of biogenic carbon [ISO 14067:2010]
Carbon dioxide equivalent (CO_2 equivalent): unit for comparing the radiative forcing of a greenhouse gas to carbon dioxide. The carbon dioxide equivalent is calculated using the mass of a given greenhouse gas multiplied by its global warming potential [ISO 14064:2006]
Carbon footprint: net amount of greenhouse gas emissions and greenhouse gas removals, expressed in carbon dioxide (CO_2) equivalents. The CO_2 equivalent is calculated using the mass of a given greenhouse gas multiplied by its global warming potential. [ISO 14067:2010]
Functional unit: quantified performance of a product system for use as a reference unit [ISO 14040:2006]
Global warming potential (GWP): factor describing the radiative forcing impact of one mass-based unit of a given greenhouse gas relative to an equivalent unit of carbon dioxide over a given period of time [ISO 14064:2006]
Life cycle assessment (LCA): compilation and evaluation of the inputs, outputs and the potential environmental impacts of a product system throughout its life cycle [ISO 14040:2006]
Raw material: primary or secondary material that is used to produce a product. Secondary material includes recycled material. [ISO 14040:2006]

Contact information:

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LCA author:	INDACO2 srl via Roma 21B IT 53034 Colle Val d'Elsa (Siena) www.indaco2.it Elena Neri – elena.neri@indaco2.it T/ +39 3471137901
Programme operator:	EPD International AB info@environdec.com

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ISO (2021), ISO 14044: 2006, Environmental management – Life cycle assessment – Requirements and guidelines.

ISO 14067:2018, Greenhouse gases – Carbon footprint of products – Requirements and guidelines for quantification and communication

PCR 2020:01 v1.0.1 “Micronized stone from quarry” available at www.environdec.com

Prè Consultant- SimaPro LCA software http://www.pre.nl/content/simapro-lca-software

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