

# GlobalEPD

A VERIFIED ENVIRONMENTAL DECLARATION



Environmental  
Product  
Declaration

EN ISO 14025:2010

EN 15804:2012+A2:2019

# AENOR

## CRYSTALLINE PHOTOVOLTAIC SOLAR GLASS

G/GM07244  
G/GM07211  
G/GM03644  
G/GM01688A

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## ONYX SOLAR ENERGY S.L.



The EPD holder is responsible for the content of the Declaration, as well as keeping the records and documents supporting the content of the Declaration during the period of validity.



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AENOR is a founding member of ECO Platform, the European Association of Environmental Declarations verification Programmes.

Standard EN 15804:2012+A2:2019 serves as the core PCR .

Independent verification of the declaration and data, according to  
EN ISO 14025:2010

Interna

Externa

Verification body

**AENOR**

Certification body accredited by ENAC 1/C-PR468

## 1. General information

### 1.1. The organization

ONYX SOLAR ENERGY S.L., hereinafter referred to as Onyx Solar, founded in 2009, is a global leader in photovoltaic glass for buildings.

Onyx Solar offers multifunctional constructive solutions that integrate perfectly into buildings, providing great advantages to the building, as they allow the entry of natural light and provide a personalized and innovative design and the most remarkable thing is that they produce solar energy.

The company's main objective is to achieve the progressive replacement of conventional glass used in building envelopes with glass capable of generating the electricity that each building needs, thus reducing the environmental impact. Onyx Solar is distinguished by the customisation of the product to the needs of the building project, generating a high added value for the building.

Onyx Solar has offices in Spain, the USA and China, although it has a single production plant with a surface area of 20,000 m<sup>2</sup> with the most advanced technology for the production of amorphous and crystalline silicon photovoltaic glass, located in Vicolozano (Ávila).

The certifications of the International Electrotechnical Commission (IEC), Underwriters Laboratories (UL) and ISO 9001 assure its total quality system, as well as the Environmental Management System certified under the ISO 14001 standard.

### 1.2. Scope of the Declaration

This Environmental Product Declaration, hereafter EPD, is a specific EPD, providing information on the results of the potential environmental impact related to the life cycle of the product CRYSTALLINE SOLAR PHOTOVOLTAIC SOLAR GLASS, Onyx Solar® for each of its models. A "cradle to gate" type scope with modules C1-C4 and D.

This Environmental Statement includes the following life cycle stages:

### Limits of the system. Information modules considered

Product stage	A1	Supply of raw materials	X
	A2	Transport to the factory	X
	A3	Manufacturing	X
Construction	A4	Transport to site	MNA
	A5	Installation / construction	MNA
Use stage	B1	Use	MNA
	B2	Maintenance	MNA
	B3	Repair	MNA
	B4	Replacement	MNA
	B5	Rehabilitation	MNA
	B6	In-service energy use	MNA
	B7	In-service water use	MNA
End of life	C1	Deconstruction / demolition	X
	C2	Transport	X
	C3	Waste treatment	X
	C4	Elimination	X
D	Potential for reuse, recovery and/or recycling	X	
X = Module included; MNA = Module not assessed			

### 1.3. Life cycle and compliance.

This EPD has been developed and verified in accordance with ISO 14025:2010 Environmental labels and declarations. Environmental declarations type III. Principles and procedures; EN 5804:2012+A2:2019, Sustainability of construction works. Environmental product declarations. Core rules for the product category of construction products.

This EPD may not be comparable with those developed in other Programmes or according to different reference documents. Similarly, this EPD may not be comparable if the origin of the data is different (e.g. databases), not all relevant information modules are included or not based on the same scenarios.

The comparison of construction products must be made on the same function, the same functional unit and at building level (engineering or architectural work), including the performance of the product throughout its life cycle, and the specifications of section 6.7.2 of UNE-EN ISO 14025.



## 2. The product

### 2.1. Product identification

UN CPC: 3711

The product covered by this EPD is Onyx Solar®, a crystalline silicon photovoltaic glass for the building sector.

The product is made of heat-treated safety glass and can be installed as a façade, curtain wall, skylight, pergola, furniture, parking, roof tiles and walkable floors, among other architectural applications.

The crystalline silicon photovoltaic glass is 100% customised according to the needs of each project, with 4x2 m being the largest dimensions manufactured at the Vicolozano plant (Ávila).



The product, covered by this Declaration, comes in four models: G/GM07244, G/GM07211, G/GM03644 and G/GM01688A, which comply with the following standards for flat glass photovoltaic panels and modules:

- UL-1703 and ULC / ORD-C1703: 2018
- IEC61215: 2005
- IEC61730 2011
- UNE-EN 14449: 2006

### 2.2. Product performance

Crystalline silicon photovoltaic glass offers high energy output per installed surface area. From a mechanical point of view, it behaves in the same way as conventional architectural glass, but provides much more value by generating solar energy.

#### Product performance

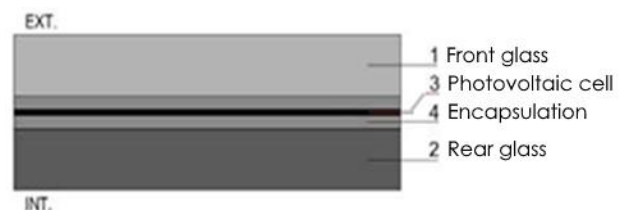
PARAMETER	STANDARD	VALUE
Salt Corrosion	IEC 61701	LEVEL 5
Fire resistance and reaction	UL790; ASTM E84; EN 13823: 2010 + A1: 2014, EN ISO 11925-2: 2010; EN 13501-1: 2007 + A1: 2009	ClasS A
Impact resistance	UNE-EN 12600: 2003	✓
Manual attack	UNE-EN 356: 2001	✓
High temperature	UNE-EN ISO 12543- 4: 2011	✓
Humidity	UNE-EN ISO 12543-4: 2011	✓
Boiling and impact	ANSI Z97.1-2015	✓
<b>Photovoltaic Floor</b>		
Slip resistance	UNE ENV 12633	Class 3
	DIN 51130	R-12
	DIN 51097	Class B
Friction Coefficient	ASTMC 1028-07	DRY ≥ 0.7
		WET ≥ 0.6
Scratch hardness	EN101:91 MOHS	4 point scale

### 2.3. Product composition

The system product of this study is a sandwich of crystalline glass with photovoltaic material (solar cells) and a bonding core (EVA). The product is available in various thicknesses from 4x4 mm to 10x10 mm as standard values, but can be customised. In the scope of this EPD the models considered have the following size and thickness.

MODEL	SIZE (mm)	GLASS (mm)
G/GM07244	2000 X 1000	e = 4 +4mm
G/GM07211	2000 X 1000	e = 10 +10 mm
G/GM03644	1650 X 850	e = 4+ 4 mm
G/GM01688A	750 X 750	e = 8 + 8 mm

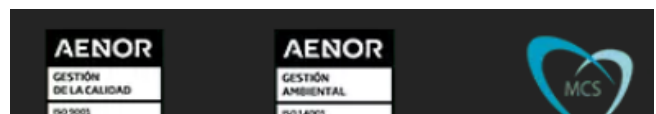
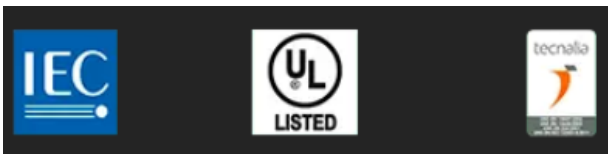
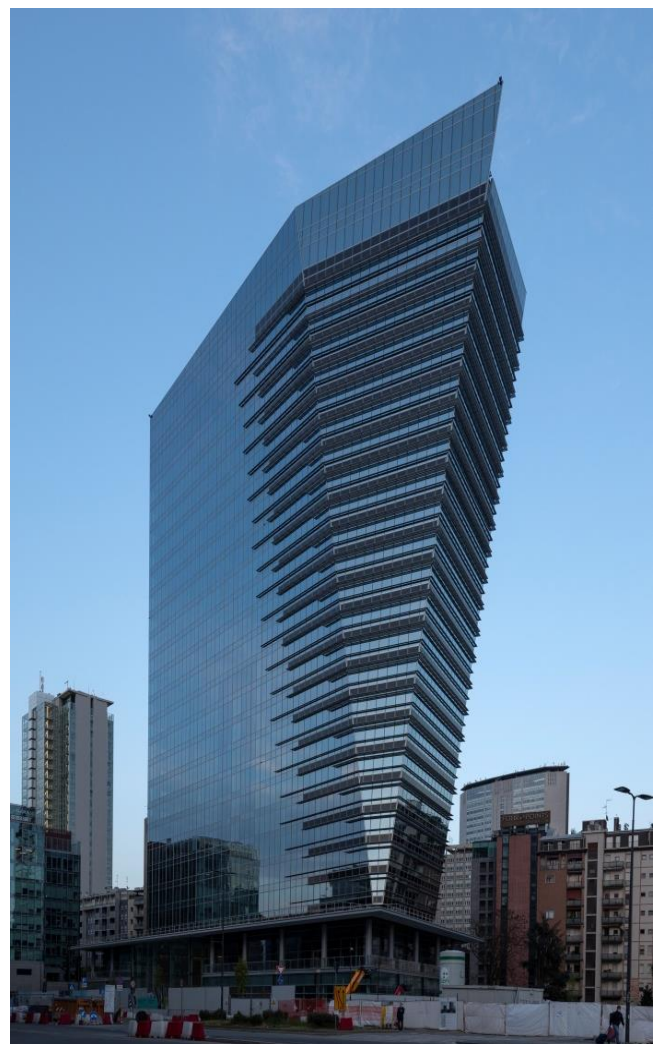
The composition declared by the manufacturer is as follows:



Product composition

MATERIAL	COMPOSITION
Glass	80 – 95%
EVA	4 – 10%
Silicon	0,5 – 2%
Copper	< 0,5%
Tin	< 0,5%
Lead	< 0,5%
Silver	< 0,01%

The manufacturer declares that none of the components of the final product is included in the "Candidate list of substances of very high concern for authorisation" (SVHC) of the REACH regulation in a percentage higher than 0,1% of the weight of the product.



### 3. LCA information

#### 3.1. Life Cycle Assessment

The Life Cycle Assessment Report supporting this EPD has been developed by CTME, in accordance with ISO 14040:2006 and ISO 14044:2006, with a retrospective attributional approach, applying the principle of "modularity" and the "polluter pays" principle.

This EPD has been prepared following the General Rules of the GlobalEPD programme and the EN 15804:2012+A2:2019, as product category rules.

The LCA has a "cradle-to-gate" scope with options, including modules A1-A3, C1- C4 and D.

#### 3.2. Declared unit

The declared unit is **1 m<sup>2</sup> of crystalline photovoltaic glass**, including the corresponding part of the packaging.

#### 3.3. Reference service life (RSL)

The reference useful life is set at 30 years (EN 17074:2019), although given the scope of this EPD, it does not affect the environmental impact parameters of the LCA.

#### 3.4. Allocation

As far as possible, unit processes have been divided in order to avoid load allocation. However, where this has not been possible, the allocation is made on the basis of the physical surface area ratio (m<sup>2</sup>).

#### 3.5. Cut-off rules

All inputs and outputs of the unit processes for which data are available are included.

The mass cut-off rule is only applied for the waste streams of contaminated material, waste oil, spent batteries and aerosols, as they account for 0,45% of the waste and are subject to recovery treatment.

#### 3.6. Representativeness and quality data

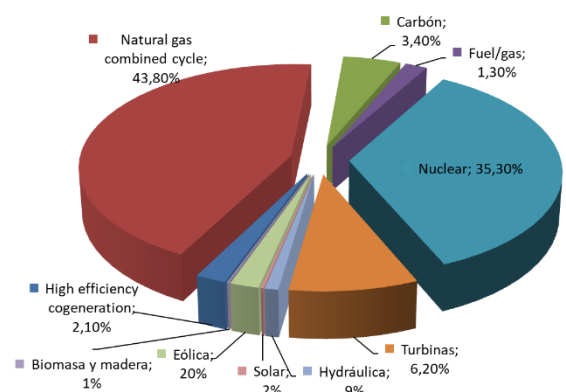
The LCA has been carried out on the basis of specific data for the year 2022, provided by Onyx Solar for the only production centre located in Vicolozano (Ávila).

The generic data source was the SimaPro v 9.5.0.1 software together with the Ecoinvent database version 3.9.1. In the evaluation method the characterisation factors of the EC-JRC in version EF3.1 were applied.

Applying the criteria of the UN global environmental guidelines on the development of LCA databases, the result of the data quality assessment is:

- The geographical scope of the data corresponds to average data from the largest area in which the studied area is included. Ranking: Good.
- Both primary and generic data are representative of photovoltaic glass production technology. Ranking: Good.
- The age of the specific data is from the year prior to the study, in order to have data for a full productive year. Therefore, it is not possible to have more current data at the time of drafting this EPD. Likewise, in relation to the generic data, data updated to January 2023 have been taken. Classification: Good.

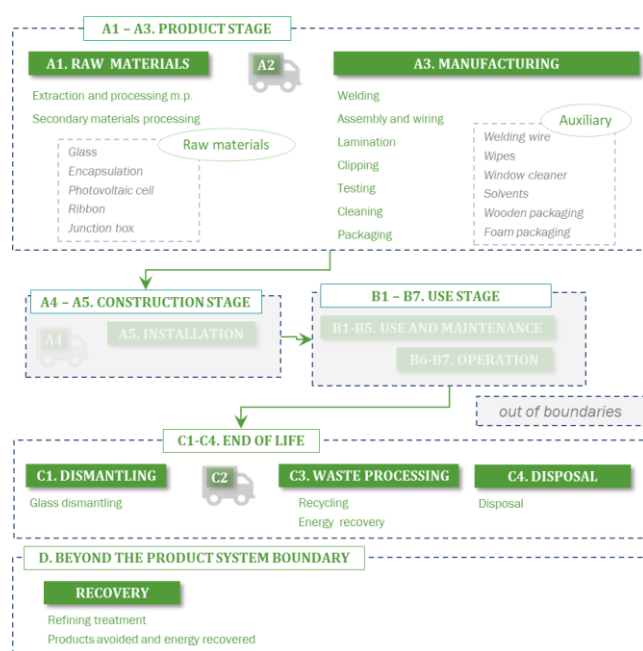
The residual electrical profile has been taken from the supplier for door-to-door processes.



Residual electricity mix of supplier

## 4. System boundaries, scenarios and additional information

The establishment of the product system boundaries follows the principle of modularity referenced in the UNE-EN 15804+A2 standard, thus all environmental aspects and impacts are declared at the stage of the life cycle in which they appear. This EPD includes the processes product stage, end-of-life stage and benefits and burdens beyond the system boundaries, given the type of EPD "cradle to gate with modules C1-C4 and D".



### System Boundaries

These processes are excluded:

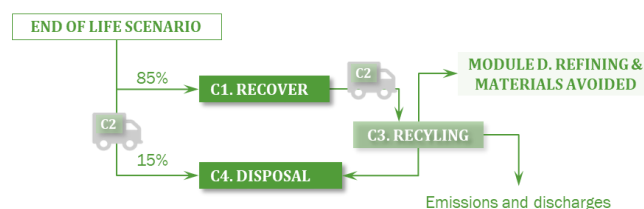
- The modules: transport to site, installation, use, repair and maintenance of the product.
- Infrastructure, consumption related to human activities, such as lighting, heating, cleaning of workshops, administration and transport of employees, according to EN 17074:2019.

### 4.1. Product stage (A1-A3)

This stage includes the extraction of resources from nature and the treatment of raw materials (module A1), together with their transport to the manufacturer (module A2), i.e. transport to the factory gate and internal transport. It also includes the door-to-door stage (module A3), which covers all manufacturing operations and consumables used during production, as well as the treatment of waste until the end of the waste status.

### 4.2. End of life stage (C1-C4)

This stage evaluates the downstream processes that the end-of-life scenario of the product in the building envisages. Module C1, starts when the product is replaced or dismantled and has no additional functionality. It includes on-site disassembly and sorting operations. The solar photovoltaic glass is manually disassembled from the building and transported (module C2) for recycling, assuming 550 km as the transport distance (UNE EN 17074:2020). Module C3 includes the collection of waste fractions, as well as the treatment of material flows that are to be recycled or subject to energy recovery, and finally final disposal in landfill (module C4), quantified at 15% (Directive 2012/19/EU).



### End of Life Scenario

PARAMETER	SCENARIO
Collection process, specified by type	85% collected separately.
Recycling	Glass, 98% recovered & recycled Silicon, 95% Copper, 33% Other metals, 95%
Recovery energy	Electricity 0,25 kWh/t glass Thermal 0,50 MJ /t glass
Disposal	15% for landfill
Transport scenarios	550 km Transport, freight, lorry 16-32 metric ton, EURO6 {RER}

### 4.3. Benefits and loads beyond the system boundary, (módulo D)

This module includes the recovery charges which are carried out through a chemical process by extraction with acid leaching, electrolysis and neutralisation, as well as the benefits corresponding to the secondary materials (glass, copper, silicon, silver, lead and tin).

## 5. Declaration of the environmental parameters of the LCA and LCI

### Environmental impact indicators for 1 m<sup>2</sup> de G/GM07244

LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks

IMPACT CATEGORY	UNIT	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
GWP-total	kg CO2 eq	1,29E+02	1,64E+01	5,31E+00	1,51E+02	0,00E+00	1,71E+00	8,61E-02	2,40E-02	-1,95E+01
GWP-fossil	kg CO2 eq	1,27E+02	1,64E+01	9,02E+00	1,52E+02	0,00E+00	1,71E+00	8,61E-02	2,50E-02	-1,90E+01
GWP-biogenic	kg CO2 eq	1,72E+00	3,76E-03	-3,72E+00	-2,00E+00	0,00E+00	5,17E-04	1,85E-05	-1,04E-03	-5,62E-01
GWP-luluc	kg CO2 eq	1,93E-01	4,23E-04	6,42E-03	2,00E-01	0,00E+00	3,35E-05	3,52E-06	8,37E-05	-1,60E-02
ODP	kg CFC11 eq	1,25E-05	3,05E-07	2,43E-07	1,30E-05	0,00E+00	3,70E-08	1,36E-09	3,83E-10	-4,30E-07
AP	mol H+ eq	7,52E-01	6,80E-02	3,33E-02	8,53E-01	0,00E+00	2,15E-03	8,24E-04	1,83E-04	-1,55E-01
EP-freshwater	kg PO4 eq	8,31E-03	1,23E-05	2,04E-04	8,53E-03	0,00E+00	1,34E-06	8,32E-08	5,01E-07	-6,74E-04
EP-marine	kg N eq	1,43E-01	2,69E-02	7,28E-03	1,77E-01	0,00E+00	5,34E-04	3,87E-04	7,36E-05	-1,65E-02
EP-terrestrial	mol N eq	1,47E+00	2,90E-01	8,11E-02	1,84E+00	0,00E+00	5,20E-03	4,21E-03	8,00E-04	-2,03E-01
POCP	Kg NMVOC eq	6,13E-01	1,01E-01	3,42E-02	7,48E-01	0,00E+00	4,04E-03	1,24E-03	2,52E-04	-6,99E-02
ADP-minerals& metals <sup>2</sup>	kg Sb eq	8,61E-03	6,04E-07	1,29E-05	8,62E-03	0,00E+00	5,88E-08	3,63E-09	1,89E-09	-1,20E-03
ADP-fossil <sup>2</sup>	MJ	1,77E+03	2,17E+02	2,27E+02	2,21E+03	0,00E+00	2,28E+01	1,13E+00	3,11E-01	-2,45E+02
WDP <sup>2</sup>	m <sup>3</sup>	1,25E+02	2,31E-01	4,01E+00	1,29E+02	0,00E+00	2,08E-02	1,40E-03	1,92E-03	-9,46E+00

**GWP - total:** Global Warming Potential total; **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; **APD-fossil:** Abiotic depletion for fossil resources potential; **WDP:** Water (user) deprivation potential, deprivation-weighted water consumption.



### Additional environmental impact indicators for 1 m<sup>2</sup> de G/GM07244

IMPACT CATEGORY	UNIT	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
PM	Disease incidence	6,47E-06	8,84E-07	2,39E-07	7,59E-06	0,00E+00	1,03E-07	2,32E-08	4,59E-09	-1,62E-06
IRP <sup>1</sup>	kBq U235 eq	6,52E+00	2,92E-02	1,95E+00	8,50E+00	0,00E+00	3,62E-03	1,34E-04	2,57E-04	-6,39E-01
ETP-fw <sup>2</sup>	CTUe	7,11E+02	1,03E+02	2,24E+01	8,37E+02	0,00E+00	1,11E+01	5,60E-01	1,28E-01	-2,70E+02
HTP-c <sup>2</sup>	CTUh	5,29E-08	1,03E-08	1,83E-08	8,15E-08	0,00E+00	1,09E-10	4,83E-12	3,81E-11	-1,56E-08
HTP-nc <sup>2</sup>	CTUh	5,58E-06	1,06E-07	4,15E-08	5,72E-06	0,00E+00	1,22E-08	1,21E-10	8,44E-11	-8,82E-08
SQP <sup>2</sup>	-	2,94E+02	4,00E-01	1,50E+02	4,44E+02	0,00E+00	4,33E-02	2,15E-03	6,91E-01	-8,45E+01

**PM:** Potential incidence of disease due to PM emissions (PM); **IRP:** Potential Human exposure efficiency relative to U235; **ETP-fw** : Potential Comparative Toxic Unit for ecosystems; **HTP-c** : Potential Comparative Toxic Unit for humans; **HTP-nc:** Potential Comparative Toxic Unit for humans; **SQP:** Potential soil quality index.

**Disclaimer 1** – 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 nor due to 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** – The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

Parameters describing resource use for 1 m<sup>2</sup> de G/GM07244

PARAMETER	UNIT	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
PERE	MJ	3,62E+02	4,67E-01	3,54E+01	3,98E+02	0,00E+00	5,98E-02	4,48E+00	3,26E-02	-6,93E+01
PERM	MJ	0,00E+00	0,00E+00	4,38E+01	4,38E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	3,62E+02	4,67E-01	7,91E+01	4,41E+02	0,00E+00	5,98E-02	4,48E+00	3,26E-02	-6,93E+01
PENRE	MJ	1,77E+03	2,17E+02	2,27E+02	2,21E+03	0,00E+00	2,28E+01	1,13E+00	3,11E-01	-2,45E+02
PENRM	MJ	1,27E+02	0,00E+00	4,43E-01	1,27E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,87E+01
PENRT	MJ	1,77E+03	2,17E+02	2,27E+02	2,21E+03	0,00E+00	2,28E+01	1,13E+00	3,11E-01	-2,16E+02
SM	kg	4,20E+00	0,00E+00	0,00E+00	4,20E+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	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	0,00E+00	0,00E+00
FW	m <sup>3</sup>	1,25E+02	2,31E-01	4,01E+00	1,29E+02	0,00E+00	2,08E-02	1,40E-03	1,92E-03	-9,46E+00

**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 (primary energy and primary energy resources used as raw materials); **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 resources (primary energy and primary energy resources used as raw materials); **SM:** Use of secondary material; **RSF:** Use of renewable secondary fuels; **NRSF:** Use of non-renewable secondary fuels; **FW:** Net use of fresh water

Waste categories for 1 m<sup>2</sup> de G/GM07244

PARAMETER	UNIT	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
HWD	kg	1,25E-02	1,49E-03	4,96E-04	0,014506	0,00E+00	1,50E-04	7,57E-06	3,49E-02	8,73E-01
NHWD	kg	5,35E+00	1,18E-02	2,05E-01	5,5708995	0,00E+00	1,11E-03	8,47E-05	3,42E+00	5,34E+00
RWD	kg	4,70E-03	1,41E-05	1,25E-03	0,005963	0,00E+00	1,95E-06	5,55E-08	1,64E-07	-4,06E-04

**HWD:** Hazardous waste disposed; **NHWD:** Non-hazardous waste disposed; **RWD:** Radioactive waste disposed

Output flows for 1 m<sup>2</sup> de G/GM07244

PARAMETER	UNIT	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
CRU	kg	0,00E+00	0,00E+00	3,09E+00	3,09E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MFR	kg	0,00E+00	0,00E+00	3,43E+00	3,43E+00	0,00E+00	0,00E+00	2,10E+01	0,00E+00	0,00E+00
MER	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,15E+00	0,00E+00	0,00E+00
EE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,87E+01

**CRU:** Components for re-use; **MFR:** Materials for recycling; **MER:** Materials for energy recovery; **EE:** Exported energy

Information describing the biogenic carbon content for 1 m<sup>2</sup> de G/GM07244

BIOGENIC CARBON CONTENT	UNIT (expressed per declared unit)
Biogenic carbon content in product	0,00E+00 Kg C
Biogenic carbon content in accompanying packaging	1,36E+00 Kg C



## Environmental impact indicators for 1 m2 de G/GM07211

LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks

IMPACT CATEGORY	UNIT	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
GWP-total	kg CO2 eq	1,57E+02	1,71E+01	4,07E+00	1,78E+02	0,00E+00	4,22E+00	2,12E-01	5,91E-02	-3,48E+01
GWP-fossil	kg CO2 eq	1,55E+02	1,71E+01	9,66E+00	1,82E+02	0,00E+00	4,22E+00	2,12E-01	6,15E-02	-3,41E+01
GWP-biogenic	kg CO2 eq	2,03E+00	3,96E-03	-5,59E+00	-3,56E+00	0,00E+00	1,27E-03	4,55E-05	-2,57E-03	-6,52E-01
GWP-luluc	kg CO2 eq	1,99E-01	4,36E-04	7,37E-03	2,07E-01	0,00E+00	8,26E-05	8,68E-06	2,06E-04	-1,66E-02
ODP	kg CFC11 eq	1,32E-05	3,19E-07	2,64E-07	1,38E-05	0,00E+00	9,11E-08	3,34E-09	9,43E-10	-8,87E-07
AP	mol H+ eq	1,02E+00	6,88E-02	3,72E-02	1,13E+00	0,00E+00	5,30E-03	2,03E-03	4,51E-04	-3,02E-01
EP-freshwater	kg PO4 eq	8,68E-03	1,28E-05	2,36E-04	8,93E-03	0,00E+00	3,31E-06	2,05E-07	1,23E-06	-9,18E-04
EP-marine	kg N eq	1,86E-01	2,71E-02	8,39E-03	2,21E-01	0,00E+00	1,32E-03	9,54E-04	1,82E-04	-2,64E-02
EP-terrestrial	mol N eq	2,00E+00	2,92E-01	9,42E-02	2,39E+00	0,00E+00	1,28E-02	1,04E-02	1,97E-03	-3,44E-01
POCP	Kg NMVOC eq	7,58E-01	1,03E-01	3,96E-02	9,01E-01	0,00E+00	9,95E-03	3,05E-03	6,21E-04	-1,17E-01
ADP-minerals& metals <sup>2</sup>	kg Sb eq	8,63E-03	6,27E-07	1,30E-05	8,64E-03	0,00E+00	1,45E-07	8,93E-09	4,66E-09	-1,21E-03
ADP-fossil <sup>2</sup>	MJ	2,07E+03	2,26E+02	2,40E+02	2,54E+03	0,00E+00	5,61E+01	2,79E+00	7,67E-01	-4,47E+02
WDP <sup>2</sup>	m <sup>3</sup>	1,31E+02	2,39E-01	4,60E+00	1,36E+02	0,00E+00	5,13E-02	3,45E-03	4,72E-03	-1,26E+01

**GWP - total:** Global Warming Potential total; **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; **APD-fossil:** Abiotic depletion for fossil resources potential; **WDP:** Water (user) deprivation potential, deprivation-weighted water consumption.

## Additional environmental impact indicators for 1 m2 de G/GM07211

IMPACT CATEGORY	UNIT	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
PM	Disease incidence	9,22E-06	9,34E-07	3,11E-07	1,05E-05	0,00E+00	2,54E-07	5,73E-08	1,13E-08	-3,47E-06
IRP <sup>1</sup>	kBq U235 eq	6,82E+00	3,06E-02	1,98E+00	8,83E+00	0,00E+00	8,93E-03	3,29E-04	6,34E-04	-8,46E-01
ETP-fw <sup>2</sup>	CTUe	9,85E+02	1,08E+02	2,63E+01	1,12E+03	0,00E+00	2,74E+01	1,38E+00	3,15E-01	-4,62E+02
HTP-c <sup>2</sup>	CTUh	5,46E-08	1,04E-08	2,68E-08	9,18E-08	0,00E+00	2,68E-10	1,19E-11	9,39E-11	-1,51E-08
HTP-nc <sup>2</sup>	CTUh	5,63E-06	1,11E-07	4,70E-08	5,79E-06	0,00E+00	3,00E-08	2,98E-10	2,08E-10	-1,15E-07
SQP <sup>2</sup>	-	3,46E+02	4,17E-01	2,22E+02	5,68E+02	0,00E+00	1,07E-01	5,30E-03	1,70E+00	-1,11E+02

**PM:** Potential incidence of disease due to PM emissions (PM); **IRP:** Potential Human exposure efficiency relative to U235; **ETP-fw** : Potential Comparative Toxic Unit for ecosystems; **HTP-c** : Potential Comparative Toxic Unit for humans; **HTP-nc:** Potential Comparative Toxic Unit for humans; **SQP:** Potential soil quality index.

**Disclaimer 1** – 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 nor due to 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** – The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

## Parameters describing resource use for 1 m2 de G/GM07211

PARAMETER	UNIT	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
PERE	MJ	3,74E+02	4,90E-01	4,88E+01	4,23E+02	0,00E+00	1,47E-01	1,10E+01	8,03E-02	-9,92E+01
PERM	MJ	0,00E+00	0,00E+00	6,56E+01	6,56E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	3,74E+02	4,90E-01	1,14E+02	4,88E+02	0,00E+00	1,47E-01	1,10E+01	8,03E-02	-9,92E+01
PENRE	MJ	2,07E+03	2,26E+02	2,40E+02	2,54E+03	0,00E+00	5,61E+01	2,79E+00	7,67E-01	-4,47E+02
PENRM	MJ	1,35E+02	0,00E+00	6,64E-01	1,36E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,06E+01
PENRT	MJ	2,07E+03	2,26E+02	2,40E+02	2,54E+03	0,00E+00	5,61E+01	2,79E+00	7,67E-01	-3,77E+02
SM	kg	1,05E+01	0,00E+00	0,00E+00	1,05E+01	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	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	0,00E+00	0,00E+00
FW	m <sup>3</sup>	1,31E+02	2,39E-01	4,60E+00	1,36E+02	0,00E+00	5,13E-02	3,45E-03	4,72E-03	-1,26E+01

**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 (primary energy and primary energy resources used as raw materials); **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 resources (primary energy and primary energy resources used as raw materials); **SM:** Use of secondary material; **RSF:** Use of renewable secondary fuels; **NRSF:** Use of non-renewable secondary fuels; **FW:** Net use of fresh water

## Waste categories for 1 m2 de G/GM07211

PARAMETER	UNIT	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
HWD	kg	1,37E-02	1,55E-03	5,34E-04	1,58E-02	0,00E+00	3,70E-04	1,86E-05	8,59E-02	2,15E+00
NHWD	kg	6,22E+00	1,22E-02	2,20E-01	6,45E+00	0,00E+00	2,73E-03	2,09E-04	8,43E+00	1,46E+01
RWD	kg	4,93E-03	1,48E-05	1,27E-03	6,21E-03	0,00E+00	4,81E-06	1,37E-07	4,04E-07	-5,67E-04

**HWD:** Hazardous waste disposed; **NHWD:** Non-hazardous waste disposed; **RWD:** Radioactive waste disposed

## Output flows for 1 m2 de G/GM07211

PARAMETER	UNIT	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
CRU	kg	0,00E+00	0,00E+00	4,64E+00	4,64E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MFR	kg	0,00E+00	0,00E+00	3,44E+00	3,44E+00	0,00E+00	0,00E+00	5,10E+01	0,00E+00	0,00E+00
MER	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,15E+00	0,00E+00	0,00E+00
EE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,06E+01

**CRU:** Components for re-use; **MFR:** Materials for recycling; **MER:** Materials for energy recovery; **EE:** Exported energy

## Information describing the biogenic carbon content for 1 m2 de G/ GM07211

BIOGENIC CARBON CONTENT	UNIT (expressed per declared unit)
Biogenic carbon content in product	0,00E+00 Kg C
Biogenic carbon content in accompanying packaging	1,36E+00 Kg C



## Environmental impact indicators for 1 m2 de G/GM03644

LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks

IMPACT CATEGORY	UNIT	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
GWP-total	kg CO2 eq	9,96E+01	1,48E+01	5,31E+00	1,20E+02	0,00E+00	1,73E+00	8,69E-02	2,42E-02	-1,68E+01
GWP-fossil	kg CO2 eq	9,82E+01	1,48E+01	9,02E+00	1,22E+02	0,00E+00	1,73E+00	8,68E-02	2,52E-02	-1,64E+01
GWP-biogenic	kg CO2 eq	1,26E+00	3,51E-03	-3,72E+00	-2,46E+00	0,00E+00	5,22E-04	1,86E-05	-1,05E-03	-4,19E-01
GWP-luluc	kg CO2 eq	1,41E-01	3,74E-04	6,42E-03	1,48E-01	0,00E+00	3,38E-05	3,55E-06	8,44E-05	-1,16E-02
ODP	kg CFC11 eq	9,09E-06	2,80E-07	2,43E-07	9,61E-06	0,00E+00	3,73E-08	1,37E-09	3,86E-10	-3,94E-07
AP	mol H+ eq	6,11E-01	6,15E-02	3,33E-02	7,06E-01	0,00E+00	2,17E-03	8,31E-04	1,84E-04	-1,38E-01
EP-freshwater	kg PO4 eq	6,14E-03	1,12E-05	2,04E-04	6,36E-03	0,00E+00	1,36E-06	8,40E-08	5,05E-07	-5,34E-04
EP-marine	kg N eq	1,13E-01	2,43E-02	7,28E-03	1,45E-01	0,00E+00	5,38E-04	3,91E-04	7,42E-05	-1,35E-02
EP-terrestrial	mol N eq	1,18E+00	2,62E-01	8,11E-02	1,52E+00	0,00E+00	5,24E-03	4,25E-03	8,07E-04	-1,70E-01
POCP	Kg NMVOC eq	4,75E-01	9,22E-02	3,42E-02	6,01E-01	0,00E+00	4,07E-03	1,25E-03	2,54E-04	-5,85E-02
ADP-minerals& metals <sup>2</sup>	kg Sb eq	6,51E-03	5,49E-07	1,29E-05	6,52E-03	0,00E+00	5,93E-08	3,66E-09	1,91E-09	-9,16E-04
ADP-fossil <sup>2</sup>	MJ	1,38E+03	1,96E+02	2,27E+02	1,80E+03	0,00E+00	2,30E+01	1,14E+00	3,14E-01	-2,13E+02
WDP <sup>2</sup>	m <sup>3</sup>	9,23E+01	2,05E-01	4,01E+00	9,65E+01	0,00E+00	2,10E-02	1,41E-03	1,93E-03	-7,37E+00

**GWP - total:** Global Warming Potential total; **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; **APD-fossil:** Abiotic depletion for fossil resources potential; **WDP:** Water (user) deprivation potential, deprivation-weighted water consumption.



### Additional environmental impact indicators for 1 m2 de G/GM03644

IMPACT CATEGORY	UNIT	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
PM	Disease incidence	5,26E-06	8,71E-07	2,39E-07	6,37E-06	0,00E+00	1,04E-07	2,34E-08	4,62E-09	-1,51E-06
IRP <sup>1</sup>	kBq U235 eq	4,80E+00	2,69E-02	1,95E+00	6,77E+00	0,00E+00	3,65E-03	1,35E-04	2,59E-04	-4,97E-01
ETP-fw <sup>2</sup>	CTUe	6,07E+02	9,30E+01	2,24E+01	7,23E+02	0,00E+00	1,12E+01	5,64E-01	1,29E-01	-2,31E+02
HTP-c <sup>2</sup>	CTUh	4,20E-08	1,02E-08	1,82E-08	7,05E-08	0,00E+00	1,10E-10	4,88E-12	3,84E-11	-1,10E-08
HTP-nc <sup>2</sup>	CTUh	4,23E-06	8,89E-08	4,15E-08	4,36E-06	0,00E+00	1,23E-08	1,22E-10	8,51E-11	-6,59E-08
SQP <sup>2</sup>	-	2,30E+02	3,72E-01	1,50E+02	3,81E+02	0,00E+00	4,36E-02	2,17E-03	6,97E-01	-6,53E+01

**PM:** Potential incidence of disease due to PM emissions (PM); **IRP:** Potential Human exposure efficiency relative to U235; **ETP-fw** : Potential Comparative Toxic Unit for ecosystems; **HTP-c** : Potential Comparative Toxic Unit for humans; **HTP-nc:** Potential Comparative Toxic Unit for humans; **SQP:** Potential soil quality index.

**Disclaimer 1** – 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 nor due to 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** – The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

Parameters describing resource use for 1 m<sup>2</sup> de G/GM03644

PARAMETER	UNIT	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
PERE	MJ	2,64E+02	4,34E-01	3,54E+01	3,00E+02	0,00E+00	6,03E-02	4,52E+00	3,29E-02	-5,55E+01
PERM	MJ	0,00E+00	0,00E+00	4,37E+01	4,37E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	2,64E+02	4,34E-01	7,91E+01	3,43E+02	0,00E+00	6,03E-02	4,52E+00	3,29E-02	-5,55E+01
PENRE	MJ	1,38E+03	1,96E+02	2,27E+02	1,81E+03	0,00E+00	2,30E+01	1,14E+00	3,14E-01	-2,13E+02
PENRM	MJ	9,01E+01	0,00E+00	4,44E-01	9,05E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,89E+01
PENRT	MJ	1,38E+03	1,96E+02	2,27E+02	1,81E+03	0,00E+00	2,30E+01	1,14E+00	3,14E-01	-1,85E+02
SM	kg	4,19E+00	0,00E+00	0,00E+00	4,19E+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	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	0,00E+00	0,00E+00
FW	m <sup>3</sup>	9,23E+01	2,05E-01	4,01E+00	9,65E+01	0,00E+00	2,10E-02	1,41E-03	1,93E-03	-7,37E+00

**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 (primary energy and primary energy resources used as raw materials); **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 resources (primary energy and primary energy resources used as raw materials); **SM:** Use of secondary material; **RSF:** Use of renewable secondary fuels; **NRSF:** Use of non-renewable secondary fuels; **FW:** Net use of fresh water

Waste categories for 1 m<sup>2</sup> de G/GM03644

PARAMETER	UNIT	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
HWD	kg	1,00E-02	1,35E-03	4,95E-04	0,0118526	0,00E+00	1,52E-04	7,64E-06	3,52E-02	8,81E-01
NHWD	kg	4,13E+00	1,06E-02	2,05E-01	4,3433274	0,00E+00	1,12E-03	8,54E-05	3,44E+00	5,68E+00
RWD	kg	3,46E-03	1,32E-05	1,25E-03	0,0047258	0,00E+00	1,97E-06	5,59E-08	1,65E-07	-3,22E-04

**HWD:** Hazardous waste disposed; **NHWD:** Non-hazardous waste disposed; **RWD:** Radioactive waste disposed

## Output flows for 1 m2 de G/GM03644

PARAMETER	UNIT	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
CRU	kg	0,00E+00	0,00E+00	3,09E+00	3,09E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MFR	kg	0,00E+00	0,00E+00	3,43E+00	3,43E+00	0,00E+00	0,00E+00	2,07E+01	0,00E+00	0,00E+00
MER	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,15E+00	0,00E+00	0,00E+00
EE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,89E+01

**CRU:** Components for re-use; **MFR:** Materials for recycling; **MER:** Materials for energy recovery; **EE:** Exported energy

## Information describing the biogenic carbon content for 1 m2 de G/ GM03644

BIOGENIC CARBON CONTENT	UNIT (expressed per declared unit)
Biogenic carbon content in product	0,00E+00 Kg C
Biogenic carbon content in accompanying packaging	1,36E+00 Kg C



### Environmental impact indicators for 1 m2 de G/GM01688A

LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks

IMPACT CATEGORY	UNIT	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
GWP-total	kg CO2 eq	1,28E+02	1,81E+01	5,05E+00	1,52E+02	0,00E+00	3,49E+00	1,75E-01	4,88E-02	-2,73E+01
GWP-fossil	kg CO2 eq	1,27E+02	1,81E+01	1,14E+01	1,56E+02	0,00E+00	3,48E+00	1,75E-01	5,08E-02	-2,67E+01
GWP-biogenic	kg CO2 eq	1,62E+00	4,10E-03	-6,32E+00	-4,69E+00	0,00E+00	1,05E-03	3,76E-05	-2,13E-03	-5,23E-01
GWP-luluc	kg CO2 eq	1,64E-01	4,69E-04	7,75E-03	1,72E-01	0,00E+00	6,83E-05	7,18E-06	1,70E-04	-1,38E-02
ODP	kg CFC11 eq	1,05E-05	3,34E-07	2,88E-07	1,12E-05	0,00E+00	7,53E-08	2,77E-09	7,79E-10	-7,03E-07
AP	mol H+ eq	8,88E-01	7,34E-02	4,40E-02	1,01E+00	0,00E+00	4,38E-03	1,68E-03	3,72E-04	-2,36E-01
EP-freshwater	kg PO4 eq	7,34E-03	1,34E-05	2,76E-04	7,63E-03	0,00E+00	2,74E-06	1,70E-07	1,02E-06	-7,66E-04
EP-marine	kg N eq	1,54E-01	2,90E-02	9,63E-03	1,92E-01	0,00E+00	1,09E-03	7,89E-04	1,50E-04	-1,98E-02
EP-terrestrial	mol N eq	1,67E+00	3,12E-01	1,08E-01	2,09E+00	0,00E+00	1,06E-02	8,58E-03	1,63E-03	-2,60E-01
POCP	Kg NMVOC eq	6,25E-01	1,09E-01	4,63E-02	7,81E-01	0,00E+00	8,22E-03	2,53E-03	5,13E-04	-8,97E-02
ADP-minerals& metals <sup>2</sup>	kg Sb eq	8,48E-03	6,61E-07	1,32E-05	8,50E-03	0,00E+00	1,20E-07	7,39E-09	3,85E-09	-1,30E-03
ADP-fossil <sup>2</sup>	MJ	1,73E+03	2,39E+02	2,80E+02	2,25E+03	0,00E+00	4,64E+01	2,31E+00	6,33E-01	-3,55E+02
WDP <sup>2</sup>	m <sup>3</sup>	1,07E+02	2,56E-01	5,98E+00	1,13E+02	0,00E+00	4,24E-02	2,86E-03	3,91E-03	-1,06E+01

**GWP - total:** Global Warming Potential total; **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; **APD-fossil:** Abiotic depletion for fossil resources potential; **WDP:** Water (user) deprivation potential, deprivation-weighted water consumption.

### Additional environmental impact indicators for 1 m2 de G/GM01688A

IMPACT CATEGORY	UNIT	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
PM	Disease incidence	7,58E-06	9,35E-07	3,96E-07	8,91E-06	0,00E+00	2,10E-07	4,74E-08	9,33E-09	-2,73E-06
IRP <sup>1</sup>	kBq U235 eq	5,58E+00	3,19E-02	1,99E+00	7,60E+00	0,00E+00	7,38E-03	2,72E-04	5,24E-04	-6,99E-01
ETP-fw <sup>2</sup>	CTUe	9,56E+02	1,14E+02	2,84E+01	1,10E+03	0,00E+00	2,26E+01	1,14E+00	2,60E-01	-3,81E+02
HTP-c <sup>2</sup>	CTUh	5,91E-08	1,05E-08	3,04E-08	9,99E-08	0,00E+00	2,22E-10	9,85E-12	7,76E-11	-1,19E-08
HTP-nc <sup>2</sup>	CTUh	5,50E-06	1,21E-07	5,10E-08	5,67E-06	0,00E+00	2,48E-08	2,47E-10	1,72E-10	-8,91E-08
SQP <sup>2</sup>	-	3,03E+02	4,34E-01	2,50E+02	5,54E+02	0,00E+00	8,81E-02	4,38E-03	1,41E+00	-8,77E+01

**PM:** Potential incidence of disease due to PM emissions (PM); **IRP:** Potential Human exposure efficiency relative to U235; **ETP-fw** : Potential Comparative Toxic Unit for ecosystems; **HTP-c** : Potential Comparative Toxic Unit for humans; **HTP-nc:** Potential Comparative Toxic Unit for humans; **SQP:** Potential soil quality index.

**Disclaimer 1** – 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 nor due to 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** – The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

Parameters describing resource use for 1 m<sup>2</sup> de G/GM01688A

PARAMETER	UNIT	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
PERE	MJ	3,04E+02	5,09E-01	5,43E+01	3,58E+02	0,00E+00	1,22E-01	9,14E+00	6,64E-02	-8,24E+01
PERM	MJ	0,00E+00	0,00E+00	7,43E+01	7,43E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	3,04E+02	5,09E-01	1,29E+02	4,33E+02	0,00E+00	1,22E-01	9,14E+00	6,64E-02	-8,24E+01
PENRE	MJ	1,73E+03	2,39E+02	2,80E+02	2,25E+03	0,00E+00	4,64E+01	2,31E+00	6,33E-01	-3,55E+02
PENRM	MJ	3,93E+01	0,00E+00	1,43E+01	5,36E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,84E+01
PENRT	MJ	1,73E+03	2,39E+02	2,80E+02	2,25E+03	0,00E+00	4,64E+01	2,31E+00	6,33E-01	-2,97E+02
SM	kg	8,21E+00	0,00E+00	0,00E+00	8,21E+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	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	0,00E+00	0,00E+00
FW	m <sup>3</sup>	1,07E+02	2,56E-01	5,98E+00	1,13E+02	0,00E+00	4,24E-02	2,86E-03	3,91E-03	-1,06E+01

**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 (primary energy and primary energy resources used as raw materials); **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 resources (primary energy and primary energy resources used as raw materials); **SM:** Use of secondary material; **RSF:** Use of renewable secondary fuels; **NRSF:** Use of non-renewable secondary fuels; **FW:** Net use of fresh water

Waste categories for 1 m<sup>2</sup> de G/GM01688A

PARAMETER	UNIT	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
HWD	kg	1,40E-02	1,63E-03	5,50E-04	1,62E-02	0,00E+00	3,06E-04	1,54E-05	7,10E-02	1,78E+00
NHWD	kg	5,43E+00	1,29E-02	2,44E-01	5,69E+00	0,00E+00	2,26E-03	1,73E-04	6,93E+00	1,20E+01
RWD	kg	4,02E-03	1,53E-05	1,28E-03	5,32E-03	0,00E+00	3,97E-06	1,13E-07	3,34E-07	-4,65E-04

**HWD:** Hazardous waste disposed; **NHWD:** Non-hazardous waste disposed; **RWD:** Radioactive waste disposed

## Output flows for 1 m2 de G/GM01688A

PARAMETER	UNIT	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
CRU	kg	0,00E+00	0,00E+00	5,24E+00	5,24E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MFR	kg	0,00E+00	0,00E+00	3,85E+00	3,85E+00	0,00E+00	0,00E+00	3,99E+01	0,00E+00	0,00E+00
MER	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,15E+00	0,00E+00	0,00E+00
EE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,84E+01

**CRU:** Components for re-use; **MFR:** Materials for recycling; **MER:** Materials for energy recovery; **EE:** Exported energy

## Information describing the biogenic carbon content for 1 m2 de G/GM01688A

BIOGENIC CARBON CONTENT	UNIT (expressed per declared unit)
Biogenic carbon content in product	0,00E+00 Kg C
Biogenic carbon content in accompanying packaging	1,36E+00 Kg C



## 6. Additional information

In this section, it is worth highlighting a particular feature of the product that has not been included in the LCA study, namely the capacity to generate electricity, which for each model is shown in the table per unit area.

Energy performance	
MODEL	POWER
G/GM07244	176,97 Wp.h/m <sup>2</sup>
G/GM07211	166,35 Wp.h/m <sup>2</sup>
G/GM03644	126,18 Wp.h/m <sup>2</sup>
G/GM01688A	118,00 Wp.h/m <sup>2</sup>

The amount of electrical energy that a solar photovoltaic glass can generate depends on several factors, such as the efficiency of the glass, the geographical location, the inclination and orientation, as well as the local climatic conditions. In this sense, Onyx Solar, based on solar radiation, has estimated the amount of electrical energy that each m<sup>2</sup> of our crystalline silicon photovoltaic glass installed in different constructive solutions and with different degrees of transparency will provide. Thus, 7 different construction solutions and 4 orientations have been studied.

Available feasibility studies at

<https://onyxsolar.es/estudios-viabilidad>



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