ENVIRONMENTAL PRODUCT DECLARATION

In accordance with EN 15804 and ISO 14025

Dry Laid Glass Veil

Date of publication: 2021-12-06
Validity: 5 years
Valid until: 2026-12-05

Based on PCR 2012:01 Construction products and construction services v 2.33 (EN 15804:2012+A1)

UN CPC CODE: 37129

Scope of the EPD®: EUROPE

EPD VERIFIED

The environmental impacts of this product have been assessed over its whole life cycle. Its Environmental Product Declaration has been verified by an independent third party.

ADFORS
SAINT-GOBAIN

Registration number
The International EPD® System:
S-P-04732

EPD®

ECO PLATFORM
EPD
VERIFIED

General information

Manufacturer: ADFORS – GORLICE & ETTEN-LEUR Plants
Programme used: The International EPD® System. More information at www.environdec.com
EPD® registration number: S-P-04732
PCR identification: PCR 2012:01 Construction products and construction services v 2.33 (EN 15804:2012+A1)
UN CPC CODE: 37129
Owner of the declaration: ADFORS Saint- Gobain
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Declaration issued: 2021-12-06, **valid until**: 2026-12-05

CEN standard EN 15804 served as the core PCR Accredited or approved by: The International EPD® System	
EPD program operator	The International EPD® System. Operated by EPD® International AB. www.environdec.com.
PCR review conducted by	The Technical Committee of the International EPD® System
LCA and EPD® performed by EANDO AB	
Independent verification of the environmental declaration and data according to standard EN ISO 14025:2010 Internal ☐ External ☒	
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Product description

Product description and description of use:

This Environmental Product Declaration (EPD®) describes the environmental impacts of 1 m² of a glass veil product with weight of 62 grams

This is a product based on the weighted average of the full range of dry laid glass veil that ADFORS offers in the range of 30 g/m² to 450 g/m² produced in Gorlice and Etten-leur plants. The weighting factor was based on quantity produced in year 2020 by both plants.

Both production sites use natural and abundant raw materials (sand) and recycled materials (cullet), using fusion and fiberising techniques to produce glass mat. Glass veil is composition of randomly positioned glass fibers that are bonded with an organic binder. Fibers are continuous filaments dispersed by steam (proprietary process) covered under cascade with specific binders. Polymerization of binder is done by proper heating in curing oven to provide proper shape and properties of material. Edge trim is post-curing process to obtain proper width of tissue. Material is winded of paper tube and finally packed according to customer specification.
The dry laid glass veil products are designed to be used as exterior substrate or sheathing for weather barriers for applications such as: Roofings, floorings, acoustic purposes, insulation, and fire-proofing purposes.

Technical data/physical characteristics (for a thickness of 2,5 mm):

Material Chemically bounded glass non-woven	Total weighed average of products in range 30-450 g/m^2
Weight	62 g/m^2

Description of the main components and/or materials for 1 m^2 of product for the calculation of the EPD®:

PARAMETER	VALUE
Quantity of wool for 1 m^2 of product	62 g (Glass veil + Binder + yarn)
Surfacing	No surfacing
Packaging for the transportation and distribution	**(Average)** Cardboard: 0,97 g/m^2 Paper label: 0,0008 g/m^2 Tape: 0,2 g/m^2 Stretch film / hood: 0,14 g/m^2 PE: 0,3 g/m^2 Wood Pallet: 2,2 g/m^2
Product used for the Installation	None

During the life cycle of the product no hazardous substance listed in the "Candidate List of Substances of Very High Concern (SVHC) for authorization[1]" has been used in a percentage higher than 0.1% of the weight of the product.

The verifier and the program operator do not make any claim nor have any responsibility of the legality of the product.

[1] http://echa.europa.eu/chem_data/authorisation_process/candidate_list_table_en.asp

LCA calculation information

DECLARED UNIT	The declared unit is 1 m^2 of dry laid glass veil with an equivalent weight of 62 grams (weighed average)
SYSTEM BOUNDARIES	Cradle to Gate with options: stages A1 – 3, A4 – A5, B1 – 7, C1 – 4 and D
REFERENCE SERVICE LIFE (RSL)	50 Years (as long as building life part because it is a foil embedded between scredd and structure)
CUT-OFF RULES	In the case that there is not enough information, the process energy and materials representing less than 1% of the whole energy and mass used can be excluded (if they do not cause significant impacts). The addition of all the inputs and outputs excluded cannot be bigger than the 5% of the whole mass and energy used, as well of the emissions to environment occurred. Flows related to human activities such as employee transport are excluded. The construction of plants, production of machines and transportation systems are excluded since the related flows are supposed to be negligible compared to the production of the building product when compared at these systems lifetime level.
ALLOCATIONS	Allocation criteria are based on mass The polluter pays and modularity principles have been followed
GEOGRAPHICAL COVERAGE AND TIME PERIOD	Europe Gorlice Plant (Poland) production 2020 Etten-Leur Plant (Netherlands) production 2020

- “EPDs of construction products may be not comparable if they do not comply with EN 15804:2013"
- “Environmental Product Declarations within the same product category from different programs may not be comparable”
- This EPD is addressed for business-to-business communication.

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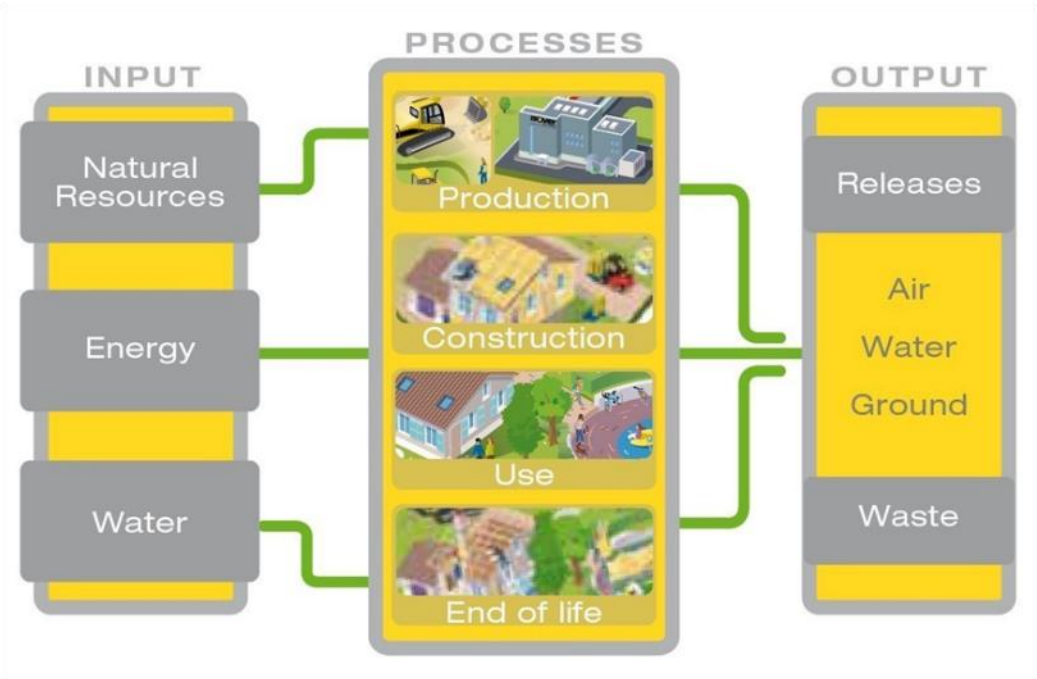
Life cycle stages

Flow diagram of the Life Cycle



Product stage, A1-A3

Description of the stage: the product stage of the glass mat products is subdivided into 3 modules A1, A2 and A3 respectively “Raw material supply”, “transport” and “manufacturing”.

The aggregation of the modules A1, A2 and A3 is a possibility considered by the EN 15 804 standard. This rule is applied in this EPD.

Description of the scenarios and other additional technical information:

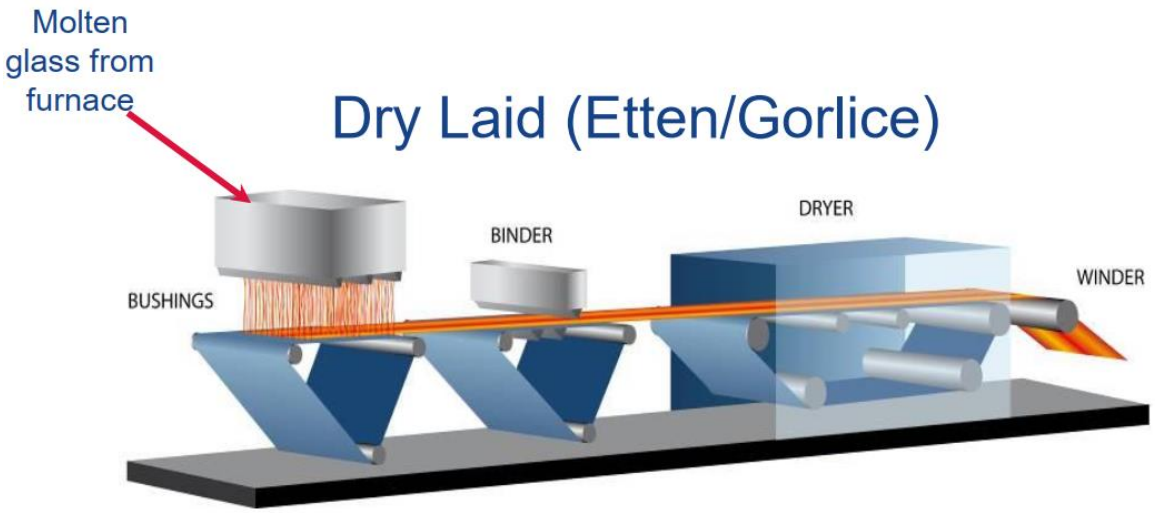
A1, Raw materials supply
This module takes into account the extraction and processing of all raw materials and energy which occur upstream to the studied manufacturing process. The manufacturing of packaging material is also included.

Specifically, the raw material supply covers production of binder components and sourcing (quarry) of raw materials for fiber production, e.g. sand and borax for glass mat. Besides these raw materials, recycled materials (agglomerates) are also used as input.

A2, Transport to the manufacturer
The raw materials are transported to the manufacturing site. In this case, the modeling include: road (average values) of each raw material.

A3, Manufacturing
This module includes the manufacturing of the product and packaging. Specifically, it covers the manufacturing of glass, resin, and glass veil (including the processes of fusion and fiberizing showed in the flow diagram).

Manufacturing process flow diagram



Construction process stage, A4-A5

Description of the stage: the construction process is divided into 2 modules: A4, transport to the building site and A5, installation in the building.

A4, Transport to the building site: this module includes transport from the production gate to the building site. A weighed average was calculated per plant based on 2020 sales.
Transport is calculated on the basis of a scenario with the parameters described in the following table.

PARAMETER	VALUE/DESCRIPTION
Fuel type and consumption of vehicle or vehicle type used for transport e.g. long distance truck, boat, etc.	Average truck trailer (27 t payload) with a real 3,84 t payload, diesel consumption 38 liters for 100 km
Distance	860 km (Gorlice) & 532 km (Etten leur)
Capacity utilisation (including empty returns)	50 % of the capacity in volume 30 % of empty returns
Bulk density of transported products*	92 kg/m^3
Volume capacity utilisation factor	1

A5, Installation in the building: this module includes:

No additional accessory was taken into account for the implementation phase insulation of the product.

PARAMETER	VALUE/DESCRIPTION
Wastage of materials on the building site before waste processing, generated by the product's installation (specified by type)	5 %
Distance	3 km (Gorlice) & 32 km (Etten-Leur) to landfill by truck
Output materials (specified by type) as results of waste processing at the building site e.g. of collection for recycling, for energy recovering, disposal (specified by route)	Packaging wastes are 100 % collected and modeled as landfilled Glass veil losses are landfilled

Use stage (excluding potential savings), B1-B7

Description of the stage: the use stage is divided into the following modules:

- B1: Use
- B2: Maintenance
- B3: Repair
- B4: Replacement
- B5: Refurbishment
- B6: Operational energy use
- B7: Operational water use

Description of the scenarios and additional technical information:

Once installation is complete, no actions or technical operations are required during the use stages until the end of life stage. Therefore, glass mat products have no impact on this stage.

End of Life Stage, C1-C4

Description of the stage: this stage includes the next modules:

C1, Deconstruction, demolition
The de-construction and/or dismantling of Glass mat products take part of the demolition of the entire building. In our case, the environmental impact is assumed to be very small and can be neglected

C2, Transport to waste processing
The model use for the transportation (see A4, transportation to the building site) is applied.

C3, Waste processing for reuse, recovery and/or recycling
The product is considered to be landfilled without reuse, recovery or recycling.

C4, Disposal
The glass veil is assumed to be 100% landfilled.

Description of the scenarios and additional technical information:

End of life:

PARAMETER	VALUE/DESCRIPTION
Collection process specified by type	The entire product is collected alongside any mixed construction waste 62 g of glass veil (collected with mixed construction waste)
Recovery system specified by type	There is no recovery, recycling or reuse of the product once it has reached its end of life phase.
Disposal specified by type	The product alongside the mixed construction waste from demolishing will go to landfill 62 g of glass wool are landfilled
Assumptions for scenario development (e.g. transportation)	We assume that the waste going to landfill will be transported by truck with 24 tons payload, using diesel as a fuel consuming 38 liters per 100km. Distance covered is 3 km

Reuse/recovery/recycling potential, D

Description of the stage: As product and packaging are considered to be landfilled the module D does not contain any benefit nor impact.

LCA results

LCA model, aggregation of data and environmental impact are calculated from the Gabi software. Impact method based on EN15804:2013 has been used, together with Gabi database (2021) and ECOINVENT 3.7 database to obtain the inventory of generic data.

Raw materials and energy consumption, as well as transport distances have been taken directly from the manufacturing plant (Production data according 2020 and transport data according 2020)

System boundaries (X=included, MND=module not declared)

Product stage			Construction installation stage		Use stage							End of life stage				Beyond the system boundaries
Raw materials	Transport	Manufacturing	Transport	Construction installation stage	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
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

ENVIRONMENTAL IMPACTS

Parameters	Product stage	Construction stage		Use stage							End of life stage				D Reuse, recovery, recycling
	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	
Global Warming Potential (GWP) - *kg CO2 equiv/FU*	5,66E-01	2,05E-03	2,41E-03	0	0	0	0	0	0	0	0	2,92E-04	0	8,45E-04	0
	The global warming potential of a gas refers to the total contribution to global warming resulting from the emission of one unit of that gas relative to one unit of the reference gas, carbon dioxide, which is assigned a value of 1.														
Ozone Depletion (ODP) *kg CFC 11 equiv/FU*	3,45E-09	4,58E-19	5,38E-19	0	0	0	0	0	0	0	0	7,65E-20	0	4,70E-18	0
	Destruction of the stratospheric ozone layer which shields the earth from ultraviolet radiation harmful to life. This destruction of ozone is caused by the breakdown of certain chlorine and/or bromine containing compounds (chlorofluorocarbons or halons), which break down when they reach the stratosphere and then catalytically destroy ozone molecules.														
Acidification potential (AP) *kg SO2 equiv/FU*	5,40E-04	7,87E-06	6,74E-07	0	0	0	0	0	0	0	0	1,14E-06	0	5,37E-06	0
	Acid depositions have negative impacts on natural ecosystems and the man-made environment incl, buildings. The main sources for emissions of acidifying substances are agriculture and fossil fuel combustion used for electricity production, heating and transport.														
Eutrophication potential (EP) *kg (PO4)3- equiv/FU*	2,43E-04	1,93E-06	3,11E-06	0	0	0	0	0	0	0	0	2,77E-07	0	6,04E-07	0
	Excessive enrichment of waters and continental surfaces with nutrients, and the associated adverse biological effects.														
Photochemical ozone creation (POPC) *kg Ethene equiv/FU*	3,56E-05	-3,49E-06	5,92E-07	0	0	0	0	0	0	0	0	-4,93E-07	0	4,07E-07	0
	Chemical reactions brought about by the light energy of the sun. The reaction of nitrogen oxides with hydrocarbons in the presence of sunlight to form ozone is an example of a photochemical reaction.														
Abiotic depletion potential for non-fossil resources (ADP-elements) - *kg Sb equiv/FU*	4,02E-07	7,40E-11	1,17E-11	0	0	0	0	0	0	0	0	1,06E-11	0	8,57E-11	0
Abiotic depletion potential for fossil resources (ADP-fossil fuels) - *MJ/FU*	8,67E-01	2,77E-02	2,32E-03	0	0	0	0	0	0	0	0	3,95E-03	0	1,20E-02	0
	Consumption of non-renewable resources, thereby lowering their availability for future generations.														

RESOURCE USE															
Parameters	Product stage	Construction process stage		Use stage							End of life stage				D Reuse, recovery, recycling
	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	
Use of renewable primary energy excluding renewable primary energy resources used as raw materials - *MJ/FU*	2,41E-01	2,0E-03	2,4E-03	0	0	0	0	0	0	0	0	2,9E-04	0	8,5E-04	0
Use of renewable primary energy used as raw materials *MJ/FU*	1,70E-01	4,6E-19	5,4E-19	0	0	0	0	0	0	0	0	7,6E-20	0	4,7E-18	0
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials) *MJ/FU*	2,41E-01	7,9E-06	6,7E-07	0	0	0	0	0	0	0	0	1,1E-06	0	5,4E-06	0
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials - *MJ/FU*	9,20E-01	1,9E-06	3,1E-06	0	0	0	0	0	0	0	0	2,8E-07	0	6,0E-07	0
Use of non-renewable primary energy used as raw materials *MJ/FU*	4,57E-02	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials) - *MJ/FU*	9,66E-01	2,8E-02	2,4E-03	0	0	0	0	0	0	0	0	4,0E-03	0	1,2E-02	0
Use of secondary material *kg/FU*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Use of renewable secondary fuels- *MJ/FU*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Use of non-renewable secondary fuels - *MJ/FU*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Use of net fresh water - *m3/FU*	1,29E-03	1,7E-07	1,2E-05	0	0	0	0	0	0	0	0	1,2E-07	0	3,1E-06	0

WASTE CATEGORIES

Parameters	Product stage	Construction process stage		Use stage							End-of-life stage				D Reuse, recovery, recycling
	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	
Hazardous waste disposed *kg/FU*	2,28E-07	2,98E-13	3,20E-13	0	0	0	0	0	0	0	0	1,10E-14	0	1,88E-10	0
Non-hazardous waste disposed *kg/FU*	5,46E-03	7,52E-07	3,17E-03	0	0	0	0	0	0	0	0	1,19E-07	0	6,20E-02	0
Radioactive waste disposed *kg/FU*	-1,08E-10	3,45E-11	2,41E-11	0	0	0	0	0	0	0	0	5,11E-12	0	1,51E-10	0

OTHER OUTPUT FLOWS

Parameters	Product stage	Construction process stage		Use stage							End-of-life stage				D Reuse, recovery, recycling
	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstructio	C2 Transport	C3 Waste processing	C4 Disposal	
Components for re-use *kg/FU*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Materials for recycling *kg/FU*	2,45E-03	1,71E-07	0	0	0	0	0	0	0	0	0	0	0	0	0
Materials for energy recovery *kg/FU*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Exported energy *MJ/FU*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LCA interpretation

[1] This indicator corresponds to the abiotic depletion potential of fossil resources.
[2] This indicator corresponds to the total use of primary energy.
[3] This indicator corresponds to the use of net fresh water.
[4] This indicator corresponds to the sum of hazardous, non-hazardous and radioactive waste disposed.

Global Warming Potential (Climate Change) (GWP)
When analyzing the above figure for GWP, it can clearly be seen that the majority of contribution to this environmental impact is from the production modules (A1 – A3). This is primarily because the sources of greenhouse gas emissions are predominant in this part of the life cycle. CO2 is generated upstream from the production of electricity and is also released on site by the combustion of natural gas. We can see that other sections of the life cycle also contribute to the GWP; however the production modules contribute to over 85 % of the contribution

Non-renewable resources consumptions
We can see that the consumption of non – renewable resources is once more found to have the highest value in the production modules. This is because a large quantity of natural gas is consumed within the factory, and non – renewable fuels such as natural gas and coal are used to generate the large amount of electricity we use. The contribution to this impact from the other modules is very small and primarily due to the non – renewable resources consumed during transportation.

Energy Consumptions
As we can see, modules A1 – A3 have the highest contribution to total energy consumption. Energy in the form of electricity and natural gas is consumed in a vast quantity during the manufacture of glass mineral wool so we would expect the production modules to contribute the most to this impact category.

Water Consumption
In modules A4 – A5, B1 – B7, C1 – C4), we can see that there is negligible contribution to water consumption. For the production phase, water is used within the manufacturing facility and therefore we see the highest contribution here. However, we recycle a lot of the water on site so the contribution is still relatively low.

Waste Production

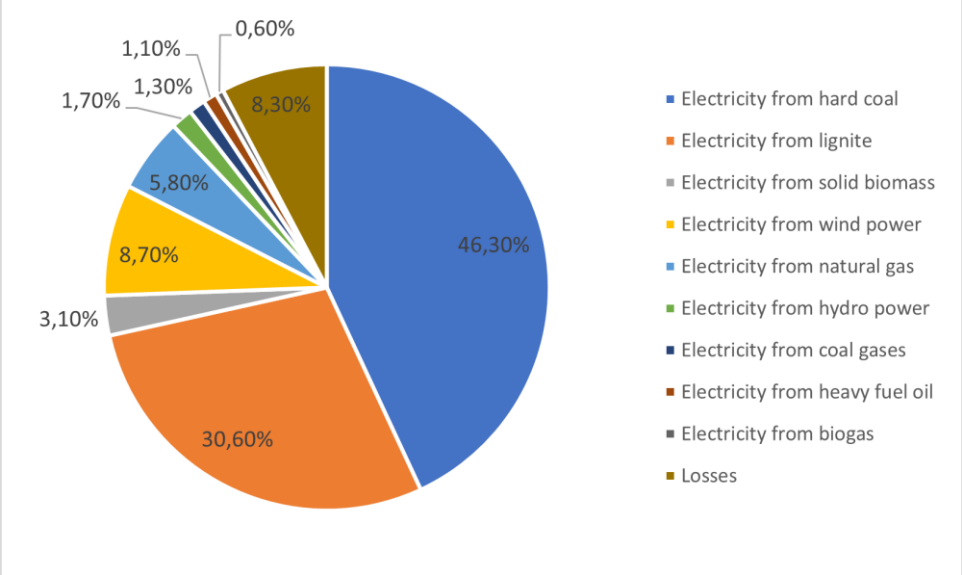
Waste production does not follow the same trend as the above environmental impacts. The largest contributor is the end of life module. This is because the entire product is sent to landfill once it reaches the end of life state. However, there is a still an impact associated with the production module since we do generate waste on site. The very small impact associated with installation is due to the loss rate of product during implementation.

Additional information

. **Electricity Production - Poland**

TYPE OF INFORMATION	DESCRIPTION
Location	**Representative of average production in Poland (2017)**
Geographical representativeness description	Split of energy sources in POLAND Electricity from hard coal 46,3% Electricity from lignite 30,6% Electricity from solid biomass 3,1% Electricity from wind power 8,7% Electricity from natural gas 5,8% Electricity from hydro power 1,7% Electricity from coal gases 1,3% Electricity from heavy fuel oil 1,1% Electricity from biogas 0,6% **Losses 8,3 %**
Reference year	**2017**
Type of data set	**Cradle to gate**
Source	**Thinkstep**

Poland



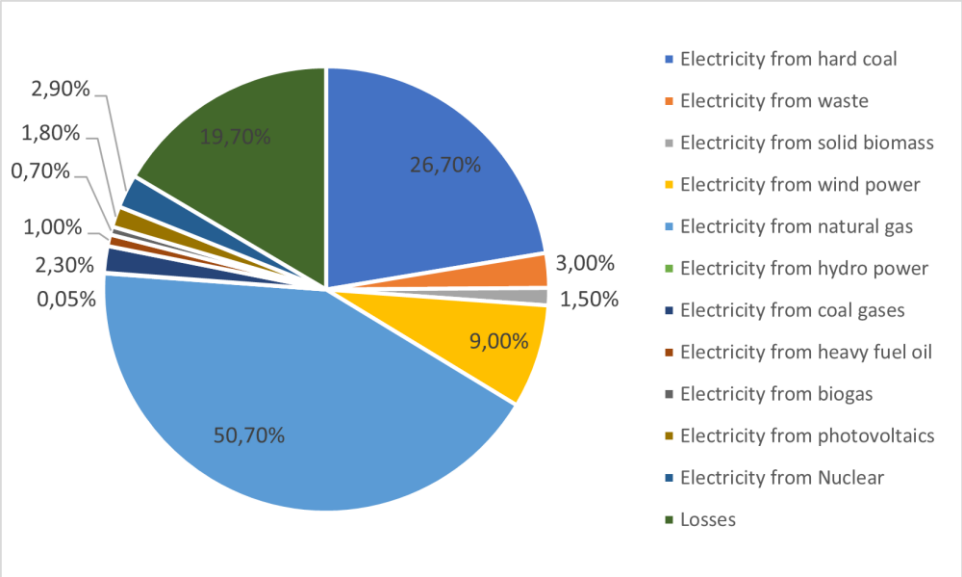
The dataset used to model the electricity mix used for these calculations come from ecoinvent database.

DATA SOURCE	AMOUNT	UNIT
Thinkstep 2017	0,927	kg CO2 eq / MJ

. **Electricity Production - Netherlands**

TYPE OF INFORMATION	DESCRIPTION
Location	**Representative of average production in Netherlands (2017)**
Geographical representativeness description	Split of energy sources in NETHERLANDS Electricity from hard coal 26,7% Electricity from waste 3,0% Electricity from solid biomass 1,5% Electricity from wind power 9,0% Electricity from natural gas 50,7% Electricity from hydro power 0,05% Electricity from coal gases 2,3% Electricity from heavy fuel oil 1,0% Electricity from biogas 0,7% Electricity from photovoltaics 1,8% Electricity from Nuclear 2,9% **Losses 19,7 %**
Reference year	**2017**
Type of data set	**Cradle to gate**
Source	**Thinkstep**

Netherlands



The dataset used to model the electricity mix used for these calculations come from ecoinvent database.

DATA SOURCE	AMOUNT	UNIT
Thinkstep 2017	0,50	kg CO2 eq / MJ

Bibliography

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- ISO 14044:2006: Environmental Management-Life Cycle Assessment-Requirements and guidelines.
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- EN 15978 Sustainability of construction works - Assessment of environmental performance of buildings - Calculation method