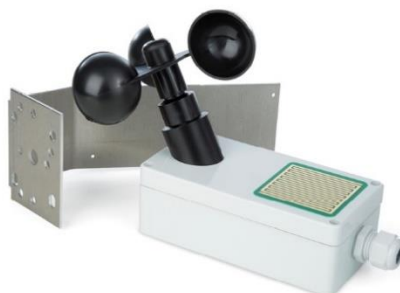


Owner: WindowMaster A/S  
No.: MD-23161-EN  
Issued: 08-09-2023  
Valid to: 08-09-2028

3<sup>rd</sup> PARTY VERIFIED

**EPD**

VERIFIED ENVIRONMENTAL PRODUCT DECLARATION | ISO 14025 & EN 15804



**Owner of declaration**

WindowMaster International A/S  
Skelstedet 13  
2950 Vedbæk  
DK13827532



**Issued:**

08-09-2023

**Valid to:**

08-09-2028

**Programme**

EPD Danmark  
[www.epddanmark.dk](http://www.epddanmark.dk)



- Industry EPD  
 Product EPD

**Basis of calculation**

This EPD is developed in accordance with the European standard EN 15804+A2.

**Comparability**

EPDs of construction products may not be comparable if they do not comply with the requirements in EN 15804. EPD data may not be comparable if the datasets used are not developed in accordance with EN 15804 and if the background systems are not based on the same database.

**Validity**

This EPD has been verified in accordance with ISO 14025 and is valid for 5 years from the date of issue.

**Use**

The intended use of an EPD is to communicate scientifically based environmental information for construction products, for the purpose of assessing the environmental performance of buildings.

**Declared product(s)**

Control Panels:  
WCC 310/320

**Keypads:**

WSK 102/103/110/120/300

**Sensor:**

WWS 100

**Wind and rain sensors:**

WLA 330/331/340

Number of declared datasets/product variations: 14

**Production site**

WindowMaster Industries GmbH  
Hellerweg 180  
D-32052 Herford

**Product(s) use**

Control panels and accessories for natural ventilation systems.

**Declared/ functional unit**

1 piece

**Year of production site data (A3)**

2022

**EPD version**

Version no. 1

CEN standard EN 15804 serves as the core PCR
Independent verification of the declaration and data, according to EN ISO 14025 <input type="checkbox"/> internal <input checked="" type="checkbox"/> external
Third party verifier:  Guangli Du, Aalborg University

  
Martha Katrine Sørensen  
EPD Danmark

**Life cycle stages and modules (MND = module not declared)**

Product			Construction process		Use								End of life				Beyond the system boundary
Raw material supply	Transport	Manufacturing	Transport	Installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Re-use, recovery and recycling potential	
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
<b>X</b>	<b>X</b>	<b>X</b>	MND	MND	MND	MND	MND	MND	MND	MND	MND	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	

# Product information

## Product description

The range of the main product components are shown in the table below.

Material	Weight-% of control panel	Weight-% of Wind and rain sensor	Weight-% of indoor room sensor	Weight-% of keypad
Cables	2-4	-	-	-
PCBA	2-12	12-17	84	-
Battery	0-1	-	-	-
Other plastic components	1-3	31-39	16	56
Other metal components	21-70	26-42	-	-
Other	20-24	8-15	-	44

To get the impact for the entire natural ventilation system the results for the products must be added.

## Product packaging:

The product packaging is not included in accordance with the cut-off.

## Representativity

This declaration, including data collection and the modeled foreground system including results, represents the production of control panels and accessories for natural ventilation systems on the production site located in Germany. Product specific data are based on average values collected in the period 2022. Background data are based on the LCA for experts database version 2022.2 and ecoinvent 3.8 and are less than 10 years old. Generally, the used background

datasets are of high quality, and the majority of the datasets are only a couple of years old.

## Hazardous substances

All products comply with REACH and ROHS legislation. Some of the PCBAs will have components with content of lead above 0,1%, which is a Substances of very high concern. These products are registered in the SCIP database. An updated declaration can always be found on [Quality and approvals \(windowmaster.com\)](http://www.windowmaster.com)

The products do not contain substances listed on the "Candidate List of Substances of Very High Concern for authorisation"

(<http://echa.europa.eu/candidate-list-table>)

## Essential characteristics

Products for natural ventilation systems cannot be CE marked according to the Construction Product regulation 305/2011.

Further technical information incl declaration of conformity DOC to relevant EU product legislation can be obtained by contacting the manufacturer or on the manufacturer's website:

<https://www.windowmaster.com/>

## Reference Service Life (RSL)

No reference service life (RSL) is defined for the products because the use stage modules are not declared in the EPD. See additional information for manufacturers guidance on RSL.

Picture of product(s) – from left: wind and rain sensor, keypad, indoor room sensor, and control panel



# LCA background

## Declared unit

The LCI and LCIA results in this EPD relate to Control Panels (WCC 310), keypads (WSK 102), indoor room sensors (WWS 100), and wind and rain sensors (WLA 340).

Name	Value	Unit
Declared unit	1	piece

## Functional unit

Not defined

## PCR

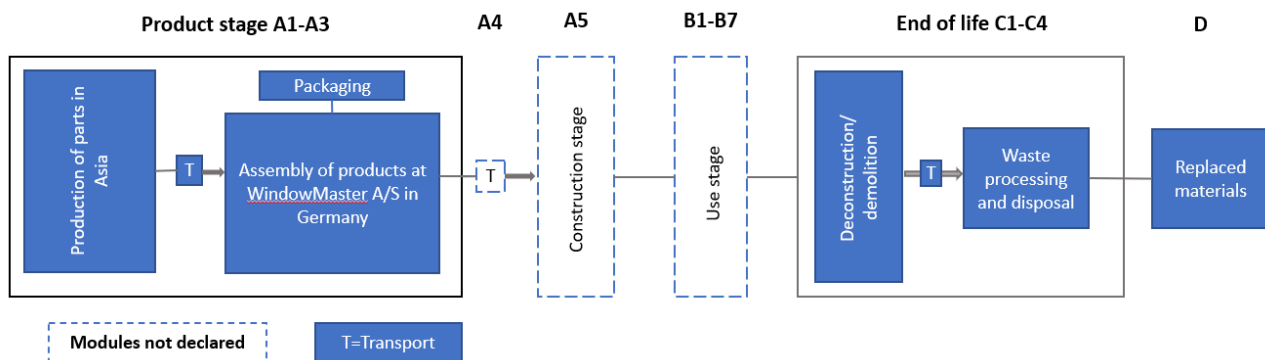
This EPD is developed according to the core rules for the product category of construction

products in EN 15804, and the PCR for Building-Related Products and Services, Part B: Requirements on the EPD for Drive systems for automatic doors and gates, version 1.6. From the range of Environmental Product Declarations of Institute Construction and Environment e.V. (IBU).

## Guarantee of Origin – certificates

Not applicable.

## Flowdiagram



## System boundary

This EPD is based on a cradle-to-gate LCA, in which 99-100 weight-% has been accounted for.

The general rules for the exclusion of inputs and outputs follows the requirements in EN 15804, 6.3.5, where the total of neglected input flows per module shall be a maximum of 5 % of energy usage and mass and 1 % of energy usage and mass for unit processes.

### Product stage (A1-A3) includes:

A1 – Extraction and processing of raw materials

A2 – Transport to the production site

A3 – Manufacturing processes

The product stage comprises the acquisition of all raw materials, products and energy, transport to the production site, and waste processing up to the "end-of-waste" state or final disposal. The LCA results are declared in aggregated form for the product stage, which means, that the sub-modules A1, A2 and A3 are declared as one module A1-A3.

Parts and materials are sourced from a network of suppliers primarily in Asia, transported to Europe and assembled and tested in WindowMaster own facilities in Herford Germany.

Assembly consists of traditional electro-mechanical operations with no problematic emissions to air, water or soil. All waste from the production is sorted and handled according to local requirements.

Some products must have a potted PCB (printed circuit board) to obtain a longer durability. In these cases, a PUR (polyurethane rigid foam) potting process in a closed system is used. Potting is only applied where needed.

Economic allocation of the energy consumption at the production site was performed.

### Construction process stage (A4-A5) includes:

Not included in the study. See Additional information for manufacturers guidance on scenarios.

### Use stage (B1-B7) includes:

Not included in the study. See Additional information for manufacturers guidance on scenarios.

### End of Life (C1-C4) includes:

The products are dismantled manually and transported to the waste processing facilities, where the parts are shredded, disposed, recycled, or incinerated depending on the type of material, as well as handled as hazardous waste.

The End-of-Life scenario includes batteries disposed as hazardous waste, cables, PCBs, and metals being recycled, plastics parts being incinerated, and magnets are landfilled.

### Re-use, recovery, and recycling potential (D) includes:

For the materials that are incinerated (plastics), there is a production of heat and power, which is accounted for in this module. Also, the avoided production of the materials that are recycled is included in this module.

## LCA results – Control Panels

ENVIRONMENTAL IMPACTS PER PIECE										
Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
GWP-total	[kg CO <sub>2</sub> eq.]	5.62E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.27E-02	5.87E-01	1.40E-03	-3.71E+00
GWP-fossil	[kg CO <sub>2</sub> eq.]	5.53E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.29E-02	5.86E-01	1.41E-03	-3.72E+00
GWP-biogenic	[kg CO <sub>2</sub> eq.]	7.49E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-4.59E-04	5.81E-04	-1.65E-05	1.86E-02
GWP-luluc	[kg CO <sub>2</sub> eq.]	8.87E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.01E-04	1.46E-04	2.24E-06	-3.75E-03
ODP	[kg CFC 11 eq.]	2.38E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.84E-15	4.29E-09	2.09E-15	-5.57E-12
AP	[mol H <sup>+</sup> eq.]	4.33E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.90E-05	6.62E-04	3.87E-06	-2.31E-02
EP-freshwater	[kg P eq.]	2.82E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.18E-07	3.32E-05	2.39E-07	-2.06E-06
EP-marine	[kg N eq.]	6.49E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.32E-05	1.85E-04	9.05E-07	-2.51E-03
EP-terrestrial	[mol N eq.]	6.93E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.60E-04	1.97E-03	9.99E-06	-2.80E-02
POCP	[kg NMVOC eq.]	2.50E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.35E-05	4.76E-04	2.84E-06	-7.99E-03
ADPm <sup>1</sup>	[kg Sb eq.]	7.58E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.09E-09	8.29E-07	4.12E-11	-9.41E-05
ADPf <sup>1</sup>	[MJ]	8.04E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.41E-01	1.97E+00	2.03E-02	-4.57E+01
WDP <sup>1</sup>	[m <sup>3</sup> world eq. deprived]	2.14E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.74E-04	1.85E-01	-1.60E-05	-1.27E+00
Caption	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 = Ozone Depletion; AP = Acidification; EP-freshwater = Eutrophication – aquatic freshwater; EP-marine = Eutrophication – aquatic marine; EP-terrestrial = Eutrophication – terrestrial; POCP = Photochemical zone formation; ADPm = Abiotic Depletion Potential – minerals and metals; ADPf = Abiotic Depletion Potential – fossil fuels; WDP = water use									
	The numbers are declared in scientific notation, fx 1,95E+02. This number can also be written as: 1,95*10 <sup>2</sup> or 195, while 1,12E-11 is the same as 1,12*10 <sup>-11</sup> or 0,0000000000112.									
Disclaimer	<sup>1</sup> The results of this environmental indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.									

ADDITIONAL ENVIRONMENTAL IMPACTS PER PIECE										
Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
PM	[Disease incidence]	4.10E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.59E-10	4.53E-09	3.71E-11	-3.54E-07
IRP <sup>2</sup>	[kBq U235 eq.]	4.66E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.26E-05	1.58E-02	3.27E-05	-6.41E-02
ETP-fw <sup>1</sup>	[CTUe]	2.93E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.08E-01	7.02E+00	1.88E-02	-3.48E+01
HTP-c <sup>1</sup>	[CTUh]	4.27E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.27E-12	1.83E-10	8.35E-13	-6.31E-09
HTP-nc <sup>1</sup>	[CTUh]	2.48E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.32E-10	1.19E-08	6.87E-11	-2.10E-08
SQP <sup>1</sup>	-	2.74E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.84E-01	2.23E+00	2.35E-03	-4.81E+00
Caption	PM = Particulate Matter emissions; IRP = Ionizing radiation – human health; ETP-fw = Eco toxicity – freshwater; HTP-c = Human toxicity – cancer effects; HTP-nc = Human toxicity – non cancer effects; SQP = Soil Quality (dimensionless)									
	The numbers are declared in scientific notation, fx 1,95E+02. This number can also be written as: 1,95*10 <sup>2</sup> or 195, while 1,12E-11 is the same as 1,12*10 <sup>-11</sup> or 0,0000000000112.									
Disclaimers	<sup>1</sup> The results of this environmental indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.									
	<sup>2</sup> 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.									

RESOURCE USE PER PIECE										
Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
PERE	[MJ]	1.04E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.12E-02	2.90E+00	1.79E-03	-7.81E+00
PERM	[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
PERT	[MJ]	1.04E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.12E-02	2.90E+00	1.79E-03	-7.81E+00
PENRE	[MJ]	8.00E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.42E-01	6.10E+00	2.03E-02	-4.57E+01
PENRM	[MJ]	4.22E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-4.13E+00	0.00E+00	0.00E+00
PENRT	[MJ]	8.04E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.42E-01	1.97E+00	2.03E-02	-4.57E+01
SM	[kg]	2.08E+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
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> ]	5.16E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.44E-05	4.43E-03	3.22E-07	-3.91E-02
Caption	<p>PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Net use of fresh water</p> <p>The numbers are declared in scientific notation, fx 1,95E+02. This number can also be written as: 1,95*10<sup>2</sup> or 195, while 1,12E-11 is the same as 1,12*10<sup>-11</sup> or 0,0000000000112.</p>									

WASTE CATEGORIES AND OUTPUT FLOWS PER PIECE										
Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
HWD	[kg]	5.89E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.64E-12	-1.11E-09	1.56E-12	-1.29E-09
NHWD	[kg]	1.82E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.38E-05	1.62E-01	1.79E-02	-2.71E-01
RWD	[kg]	7.98E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.72E-07	4.31E-05	2.21E-07	-4.16E-04
CRU	[kg]	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
MFR	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.84E+00	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	0.00E+00	0.00E+00	0.00E+00
EEE	[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	6.17E-01
EET	[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	1.11E+00
Caption	<p>HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy</p> <p>The numbers are declared in scientific notation, fx 1,95E+02. This number can also be written as: 1,95*10<sup>2</sup> or 195, while 1,12E-11 is the same as 1,12*10<sup>-11</sup> or 0,0000000000112.</p>									

BIOGENIC CARBON CONTENT PER PIECE		
Parameter	Unit	At the factory gate
Biogenic carbon content in product	[kg C]	0.00E+00
Biogenic carbon content in accompanying packaging	[kg C]	0.00E+00
Note	1 kg biogenic carbon is equivalent to 44/12 kg of CO <sub>2</sub>	

# LCA results – Keypads

ENVIRONMENTAL IMPACTS PER PIECE										
Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
GWP-total	[kg CO <sub>2</sub> eq.]	1.44E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.25E-04	1.13E-01	0.00E+00	-4.27E-02
GWP-fossil	[kg CO <sub>2</sub> eq.]	1.38E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.27E-04	1.13E-01	0.00E+00	-4.26E-02
GWP-biogenic	[kg CO <sub>2</sub> eq.]	6.01E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-7.35E-06	9.42E-06	0.00E+00	-5.04E-05
GWP-luluc	[kg CO <sub>2</sub> eq.]	1.74E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.82E-06	3.44E-06	0.00E+00	-2.62E-06
ODP	[kg CFC 11 eq.]	8.42E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.56E-17	5.52E-11	0.00E+00	-2.07E-13
AP	[mol H <sup>+</sup> eq.]	8.93E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.26E-07	2.06E-05	0.00E+00	-4.47E-05
EP-freshwater	[kg P eq.]	1.32E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.90E-09	7.79E-07	0.00E+00	-2.21E-08
EP-marine	[kg N eq.]	1.64E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.12E-07	4.70E-06	0.00E+00	-1.45E-05
EP-terrestrial	[mol N eq.]	1.80E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.57E-06	7.04E-05	0.00E+00	-1.56E-04
POCP	[kg NMVOC eq.]	4.97E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.38E-07	1.29E-05	0.00E+00	-4.12E-05
ADPm <sup>1</sup>	[kg Sb eq.]	3.66E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.36E-11	2.45E-08	0.00E+00	-1.24E-09
ADPf <sup>1</sup>	[MJ]	2.28E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.08E-03	4.79E-02	0.00E+00	-8.15E-01
WDP <sup>1</sup>	[m <sup>3</sup> world eq. deprived]	4.48E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.00E-06	9.96E-03	0.00E+00	-1.78E-03
Caption	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 = Ozone Depletion; AP = Acidification; EP-freshwater = Eutrophication – aquatic freshwater; EP-marine = Eutrophication – aquatic marine; EP-terrestrial = Eutrophication – terrestrial; POCP = Photochemical zone formation; ADPm = Abiotic Depletion Potential – minerals and metals; ADPf = Abiotic Depletion Potential – fossil fuels; WDP = water use									
	The numbers are declared in scientific notation, fx 1,95E+02. This number can also be written as: 1,95*10 <sup>2</sup> or 195, while 1,12E-11 is the same as 1,12*10 <sup>-11</sup> or 0,0000000000112.									
Disclaimer	<sup>1</sup> The results of this environmental indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.									

ADDITIONAL ENVIRONMENTAL IMPACTS PER PIECE										
Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
PM	[Disease incidence]	6.57E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.16E-12	1.37E-10	0.00E+00	-3.99E-10
IRP <sup>2</sup>	[kBq U235 eq.]	1.52E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.32E-06	3.69E-04	0.00E+00	-1.08E-02
ETP-fw <sup>1</sup>	[CTUe]	1.24E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.94E-03	7.62E-02	0.00E+00	-1.35E-01
HTP-c <sup>1</sup>	[CTUh]	1.50E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-13	3.17E-12	0.00E+00	-5.09E-12
HTP-nc <sup>1</sup>	[CTUh]	5.98E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.32E-12	1.56E-10	0.00E+00	-2.38E-10
SQP <sup>1</sup>	-	6.93E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.95E-03	3.97E-02	0.00E+00	-6.30E-02
Caption	PM = Particulate Matter emissions; IRP = Ionizing radiation – human health; ETP-fw = Eco toxicity – freshwater; HTP-c = Human toxicity – cancer effects; HTP-nc = Human toxicity – non cancer effects; SQP = Soil Quality (dimensionless)									
	The numbers are declared in scientific notation, fx 1,95E+02. This number can also be written as: 1,95*10 <sup>2</sup> or 195, while 1,12E-11 is the same as 1,12*10 <sup>-11</sup> or 0,0000000000112.									
Disclaimers	<sup>1</sup> The results of this environmental indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.									
	<sup>2</sup> 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.									



RESOURCE USE PER PIECE										
Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
PERE	[MJ]	2.05E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.01E-04	4.77E-02	0.00E+00	-6.39E-02
PERM	[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
PERT	[MJ]	2.05E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.01E-04	4.77E-02	0.00E+00	-6.39E-02
PENRE	[MJ]	2.15E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.09E-03	1.25E+00	0.00E+00	-8.15E-01
PENRM	[MJ]	1.24E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-1.20E+00	0.00E+00	0.00E+00
PENRT	[MJ]	2.28E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.09E-03	4.79E-02	0.00E+00	-8.15E-01
SM	[kg]	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
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> ]	1.13E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.52E-07	2.35E-04	0.00E+00	-1.07E-04
Caption	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Net use of fresh water									
	The numbers are declared in scientific notation, fx 1,95E+02. This number can also be written as: 1,95*10 <sup>2</sup> or 195, while 1,12E-11 is the same as 1,12*10 <sup>-11</sup> or 0,0000000000112.									

WASTE CATEGORIES AND OUTPUT FLOWS PER PIECE										
Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
HWD	[kg]	-2.34E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.63E-14	-1.67E-11	0.00E+00	-8.94E-11
NHWD	[kg]	5.98E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.02E-06	5.26E-04	0.00E+00	-1.97E-04
RWD	[kg]	3.49E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.17E-09	9.31E-07	0.00E+00	-7.18E-05

CRU	[kg]	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
MFR	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.10E-02	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	0.00E+00	0.00E+00	0.00E+00
EEE	[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	1.79E-01
EET	[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	3.19E-01
Caption	HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy									
	The numbers are declared in scientific notation, fx 1,95E+02. This number can also be written as: 1,95*10 <sup>2</sup> or 195, while 1,12E-11 is the same as 1,12*10 <sup>-11</sup> or 0,0000000000112.									

BIOGENIC CARBON CONTENT PER PIECE		
Parameter	Unit	At the factory gate
Biogenic carbon content in product	[kg C]	0.00E+00
Biogenic carbon content in accompanying packaging	[kg C]	0.00E+00
Note	1 kg biogenic carbon is equivalent to 44/12 kg of CO <sub>2</sub>	

## LCA results – Indoor room sensor

ENVIRONMENTAL IMPACTS PER PIECE										
Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
GWP-total	[kg CO <sub>2</sub> eq.]	4.44E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.18E-04	5.62E-02	1.92E-03	-2.22E-02
GWP-fossil	[kg CO <sub>2</sub> eq.]	3.84E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.19E-04	5.62E-02	1.94E-03	-2.22E-02
GWP-biogenic	[kg CO <sub>2</sub> eq.]	5.99E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-3.05E-06	1.07E-05	-2.27E-05	-2.62E-05
GWP-luluc	[kg CO <sub>2</sub> eq.]	4.16E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E-06	6.86E-07	3.08E-06	-1.36E-06
ODP	[kg CFC 11 eq.]	1.02E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.89E-17	4.53E-12	2.88E-15	-1.08E-13
AP	[mol H <sup>+</sup> eq.]	9.26E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.60E-07	9.52E-06	5.33E-06	-2.32E-05
EP-freshwater	[kg P eq.]	9.95E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.88E-10	7.72E-08	3.29E-07	-1.15E-08
EP-marine	[kg N eq.]	2.14E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.82E-08	2.72E-06	1.25E-06	-7.56E-06
EP-terrestrial	[mol N eq.]	2.35E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.07E-06	3.86E-05	1.38E-05	-8.13E-05
POCP	[kg NMVOC eq.]	6.07E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.23E-07	7.11E-06	3.91E-06	-2.15E-05
ADPm <sup>1</sup>	[kg Sb eq.]	4.11E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.39E-11	1.04E-09	5.67E-11	-6.46E-10
ADPf <sup>1</sup>	[MJ]	6.25E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.94E-03	2.53E-02	2.79E-02	-4.24E-01
WDP <sup>1</sup>	[m <sup>3</sup> world eq. deprived]	3.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.49E-06	5.59E-03	-2.20E-05	-9.26E-04
Caption	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 = Ozone Depletion; AP = Acidification; EP-freshwater = Eutrophication – aquatic freshwater; EP-marine = Eutrophication – aquatic marine; EP-terrestrial = Eutrophication – terrestrial; POCP = Photochemical zone formation; ADPm = Abiotic Depletion Potential – minerals and metals; ADPf = Abiotic Depletion Potential – fossil fuels; WDP = water use									
	The numbers are declared in scientific notation, fx 1,95E+02. This number can also be written as: 1,95*10 <sup>2</sup> or 195, while 1,12E-11 is the same as 1,12*10 <sup>-11</sup> or 0,0000000000112.									
Disclaimer	<sup>1</sup> The results of this environmental indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.									

ADDITIONAL ENVIRONMENTAL IMPACTS PER PIECE										
Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
PM	[Disease incidence]	1.01E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.73E-12	6.19E-11	5.10E-11	-2.08E-10
IRP <sup>2</sup>	[kBq U235 eq.]	2.12E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.50E-07	1.18E-04	4.50E-05	-5.60E-03
ETP-fw <sup>1</sup>	[CTUe]	1.49E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.05E-03	4.37E-02	2.59E-02	-7.03E-02
HTP-c <sup>1</sup>	[CTUh]	2.84E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.17E-14	2.79E-12	1.15E-12	-2.65E-12
HTP-nc <sup>1</sup>	[CTUh]	3.59E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.21E-12	1.39E-10	9.45E-11	-1.24E-10
SQP <sup>1</sup>	-	2.01E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.23E-03	4.92E-02	3.23E-03	-3.28E-02
Caption	PM = Particulate Matter emissions; IRP = Ionizing radiation – human health; ETP-fw = Eco toxicity – freshwater; HTP-c = Human toxicity – cancer effects; HTP-nc = Human toxicity – non cancer effects; SQP = Soil Quality (dimensionless)									
	The numbers are declared in scientific notation, fx 1,95E+02. This number can also be written as: 1,95*10 <sup>2</sup> or 195, while 1,12E-11 is the same as 1,12*10 <sup>-11</sup> or 0,0000000000112.									
Disclaimers	<sup>1</sup> The results of this environmental indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.									
	<sup>2</sup> 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.									

RESOURCE USE PER PIECE										
Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
PERE	[MJ]	2.56E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.08E-04	6.91E-02	2.47E-03	-3.32E-02
PERM	[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
PERT	[MJ]	2.56E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.08E-04	6.91E-02	2.47E-03	-3.32E-02
PENRE	[MJ]	5.15E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.95E-03	1.02E+00	2.79E-02	-4.24E-01
PENRM	[MJ]	1.10E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-9.91E-01	0.00E+00	0.00E+00
PENRT	[MJ]	6.25E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.95E-03	2.53E-02	2.79E-02	-4.24E-01
SM	[kg]	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
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> ]	1.26E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.29E-07	1.33E-04	4.44E-07	-5.55E-05
Caption	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Net use of fresh water									
	The numbers are declared in scientific notation, fx 1,95E+02. This number can also be written as: 1,95*10 <sup>2</sup> or 195, while 1,12E-11 is the same as 1,12*10 <sup>-11</sup> or 0,0000000000112.									

WASTE CATEGORIES AND OUTPUT FLOWS PER PIECE										
Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
HWD	[kg]	-1.66E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.09E-14	-2.72E-11	2.15E-12	-4.65E-11
NHWD	[kg]	8.47E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.24E-07	2.52E-02	2.47E-02	-1.02E-04
RWD	[kg]	2.56E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.81E-09	6.12E-07	3.04E-07	-3.73E-05
CRU	[kg]	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
MFR	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.70E-03	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	0.00E+00	0.00E+00	0.00E+00
EEE	[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	9.29E-02
EET	[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	1.66E-01
Caption	HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy									
	The numbers are declared in scientific notation, fx 1,95E+02. This number can also be written as: 1,95*10 <sup>2</sup> or 195, while 1,12E-11 is the same as 1,12*10 <sup>-11</sup> or 0,0000000000112.									

BIOGENIC CARBON CONTENT PER PIECE		
Parameter	Unit	At the factory gate
Biogenic carbon content in product	[kg C]	0.00E+00
Biogenic carbon content in accompanying packaging	[kg C]	0.00E+00
Note	1 kg biogenic carbon is equivalent to 44/12 kg of CO <sub>2</sub>	

## LCA results – Wind and rain sensors

ENVIRONMENTAL IMPACTS PER PIECE										
Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
GWP-total	[kg CO <sub>2</sub> eq.]	7.62E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.06E-03	7.53E-01	2.33E-03	-1.60E+00
GWP-fossil	[kg CO <sub>2</sub> eq.]	7.54E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.09E-03	7.53E-01	2.35E-03	-1.60E+00
GWP-biogenic	[kg CO <sub>2</sub> eq.]	7.58E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-7.10E-05	1.21E-04	-2.93E-05	4.99E-04
GWP-luluc	[kg CO <sub>2</sub> eq.]	4.39E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.65E-05	1.09E-05	3.87E-06	-3.60E-04
ODP	[kg CFC 11 eq.]	8.88E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.40E-16	1.13E-10	3.58E-15	-3.08E-12
AP	[mol H <sup>+</sup> eq.]	3.77E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.04E-06	2.91E-04	6.83E-06	-5.45E-03
EP-freshwater	[kg P eq.]	5.05E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.83E-08	1.69E-06	3.85E-07	-7.93E-07
EP-marine	[kg N eq.]	6.30E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.05E-06	1.22E-04	1.61E-06	-9.65E-04
EP-terrestrial	[mol N eq.]	6.81E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.48E-05	1.47E-03	1.78E-05	-1.05E-02
POCP	[kg NMVOC eq.]	1.92E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.19E-06	3.13E-04	5.04E-06	-2.87E-03
ADPm <sup>1</sup>	[kg Sb eq.]	1.46E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.24E-10	1.18E-08	7.03E-11	-4.80E-06
ADPf <sup>1</sup>	[MJ]	9.48E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.83E-02	3.19E-01	3.38E-02	-2.30E+01
WDP <sup>1</sup>	[m <sup>3</sup> world eq. deprived]	2.40E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.79E-05	6.78E-02	-1.65E-05	-1.40E-01
Caption	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 = Ozone Depletion; AP = Acidification; EP-freshwater = Eutrophication – aquatic freshwater; EP-marine = Eutrophication – aquatic marine; EP-terrestrial = Eutrophication – terrestrial; POCP = Photochemical zone formation; ADPm = Abiotic Depletion Potential – minerals and metals; ADPf = Abiotic Depletion Potential – fossil fuels; WDP = water use									
	The numbers are declared in scientific notation, fx 1,95E+02. This number can also be written as: 1,95*10 <sup>2</sup> or 195, while 1,12E-11 is the same as 1,12*10 <sup>-11</sup> or 0,0000000000112.									
Disclaimer	<sup>1</sup> The results of this environmental indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.									

ADDITIONAL ENVIRONMENTAL IMPACTS PER PIECE										
Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
PM	[Disease incidence]	8.11E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.01E-11	1.17E-09	6.70E-11	-6.22E-08
IRP <sup>2</sup>	[kBq U235 eq.]	1.89E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.28E-05	1.53E-03	5.41E-05	-3.26E-01
ETP-fw <sup>1</sup>	[CTUe]	6.70E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.76E-02	4.13E-01	3.10E-02	-8.13E+00
HTP-c <sup>1</sup>	[CTUh]	2.14E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.69E-13	2.47E-11	1.44E-12	-8.08E-10
HTP-nc <sup>1</sup>	[CTUh]	1.19E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.13E-11	1.21E-09	1.21E-10	-1.34E-08
SQP <sup>1</sup>	-	1.63E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.85E-02	4.11E-01	4.06E-03	-1.68E+00
Caption	PM = Particulate Matter emissions; IRP = Ionizing radiation – human health; ETP-fw = Eco toxicity – freshwater; HTP-c = Human toxicity – cancer effects; HTP-nc = Human toxicity – non cancer effects; SQP = Soil Quality (dimensionless)									
	The numbers are declared in scientific notation, fx 1,95E+02. This number can also be written as: 1,95*10 <sup>2</sup> or 195, while 1,12E-11 is the same as 1,12*10 <sup>-11</sup> or 0,0000000000112.									
Disclaimers	<sup>1</sup> The results of this environmental indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.									
	<sup>2</sup> 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.									

RESOURCE USE PER PIECE										
Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
PERE	[MJ]	1.49E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.83E-03	5.66E-01	3.07E-03	-5.93E+00
PERM	[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
PERT	[MJ]	1.49E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.83E-03	5.66E-01	3.07E-03	-5.93E+00
PENRE	[MJ]	8.78E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.84E-02	7.02E+00	3.38E-02	-2.30E+01
PENRM	[MJ]	7.06E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-6.70E+00	0.00E+00	0.00E+00
PENRT	[MJ]	9.48E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.84E-02	3.19E-01	3.38E-02	-2.30E+01
SM	[kg]	2.14E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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> ]	6.25E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.32E-06	1.61E-03	8.02E-07	-1.27E-02
Caption	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Net use of fresh water									
	The numbers are declared in scientific notation, fx 1,95E+02. This number can also be written as: 1,95*10 <sup>2</sup> or 195, while 1,12E-11 is the same as 1,12*10 <sup>-11</sup> or 0,0000000000112.									

WASTE CATEGORIES AND OUTPUT FLOWS PER PIECE										
Parameter	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
HWD	[kg]	1.44E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.53E-13	-2.08E-10	2.54E-12	-1.23E-09
NHWD	[kg]	7.34E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.87E-06	5.54E-02	3.45E-02	-2.66E-01
RWD	[kg]	1.74E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.85E-08	6.98E-06	3.69E-07	-1.65E-03
CRU	[kg]	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
MFR	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.43E-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	0.00E+00	0.00E+00	0.00E+00
EEE	[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	1.00E+00
EET	[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	1.79E+00
Caption	HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy									
	The numbers are declared in scientific notation, fx 1,95E+02. This number can also be written as: 1,95*10 <sup>2</sup> or 195, while 1,12E-11 is the same as 1,12*10 <sup>-11</sup> or 0,0000000000112.									

BIOGENIC CARBON CONTENT PER PIECE		
Parameter	Unit	At the factory gate
Biogenic carbon content in product	[kg C]	0.00E+00
Biogenic carbon content in accompanying packaging	[kg C]	0.00E+00
Note	1 kg biogenic carbon is equivalent to 44/12 kg of CO <sub>2</sub>	

# Additional information

## LCA interpretation

The following main conclusions apply:

- The production and preassembly of purchased components are dominating the results, although the long transport distances from Asia/China is also significant for some of the environmental indicators.
- The electrical parts such as PCB's, cables, and power supply are significant for the results.
- The production stage is generally not very important.

## Technical information on scenarios

### Reference Service Life

WindowMaster Natural Ventilation Systems are flexible, repairable, and upgradeable. See cases on our website regarding reference service life.

### Construction product stage (A4-A5)

Products are installed using hand power tools. Access to the installation site can require the use of lift or ladder.

### Use stage (B1-B7)

B1 Information regarding power consumption of products and scenarios for opening cycles etc can be found on [www.windowmaster.com](http://www.windowmaster.com)

B2-B5 see information regarding RSL.

B6 Information regarding natural ventilation systems impact on operational energy use etc can be found on [www.windowmaster.com](http://www.windowmaster.com)

### End of life (C1-C4)

Scenario information	Control panels	Keypads	Indoor room sensor	Wind and rain sensor	Unit
Collected separately	4.2	0.071	0.114	0.9	kg
Collected with mixed waste	-	-	-	-	kg
For reuse	-	-	-	-	kg
For recycling	1.84	0.031	0.005	0.143	kg
For energy recovery	-	-	-	-	kg
For final disposal	0.18	0.0005	0.05	0.09	kg

### Re-use, recovery and recycling potential (D)

Scenario information/Materiel	Control panels	Keypads	Indoor room sensor	Wind and rain sensor	Unit
Displaced material	0.629	-	-	0.092	kg
Energy recovery from waste incineration	1.727	0.498	0.259	2.79	MJ

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**Indoor air**

No WindowMaster product is intended to release any substances or require a safety data sheet.

**Soil and water**

No WindowMaster product is intended to release any substances or require a safety data sheet.

## References

<b>Publisher</b>	 epddanmark <a href="http://www.epddanmark.dk">www.epddanmark.dk</a> <small>Template version 2022.2</small>
<b>Programme operator</b>	Danish Technological Institute Buildings & Environment Gregersensvej DK-2630 Taastrup <a href="http://www.teknologisk.dk">www.teknologisk.dk</a>
<b>LCA-practitioner</b>	Mie Ostenfeldt FORCE Technology Park Allé 345 2605 Brøndby <a href="http://www.forcetechnology.com">www.forcetechnology.com</a>
<b>LCA software / background data</b>	Sphera LCA for Experts version 10.7.0.183 incl. database, version 2022.2 <a href="https://sphera.com/">https://sphera.com/</a> ecoinvent database version 3.8 <a href="https://ecoinvent.org/">https://ecoinvent.org/</a>
<b>3<sup>rd</sup> party verifier</b>	Guangli Du Aalborg University A.C. Meyers Vænge 15 2450 København SV <a href="http://www.aau.dk">www.aau.dk</a>

### General programme instructions

General Programme Instructions, version 2.0, spring 2020  
[www.epddanmark.dk](http://www.epddanmark.dk)

### EN 15804

DS/EN 15804 + A2:2019 - "Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products"

### PCR for Building-Related Products and services

The Product Category Rules for Building-Related Products and Services, Part B: Requirements on the EPD for Drive systems for automatic doors and gates, version 1.6

### EN 15942

DS/EN 15942:2011 – " Sustainability of construction works – Environmental product declarations – Communication format business-to-business"

### ISO 14025



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DS/EN ISO 14025:2010 – “ Environmental labels and declarations – Type III environmental declarations – Principles and procedures”

**ISO 14040**

DS/EN ISO 14040:2008 – “ Environmental management – Life cycle assessment – Principles and framework”

**ISO 14044**

DS/EN ISO 14044:2008 – “ Environmental management – Life cycle assessment – Requirements and guidelines”