



Environmental Product Declaration

as per ISO 14025 and EN 15804

Owner of the declaration:	Naue GmbH & Co. KG
Publisher:	Kiwa-Ecobility Experts
Programme operator:	Kiwa-Ecobility Experts
Registration number:	EPD-Kiwa-EE-000320-EN
Issue date:	16.11.2023
Valid to:	16.11.2028



Secutex® Green G1

100% bio-degradable, mechanically bonded nonwoven geosynthetic product

Secutex® Green

1. General information

Naue GmbH & Co. KG

Programme operator:

Kiwa-Ecobility Experts
Kiwa GmbH, Ecobility Experts
Wattstraße 11-13
13355 Berlin
Germany

Registration number:

EPD-Kiwa-EE-000320-EN

This declaration is based on the Product**Category Rules:**

Kiwa-Ecobility Experts (Kiwa-EE) – Product Category Rules for Geosynthetic Products, EPD programme, Version 2, 2023-07-21

Issue date:

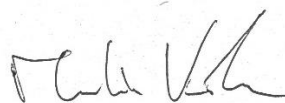
16.11.2023

Valid to:

16.11.2028



Raoul Mancke
(Head of programme operations, Kiwa-Ecobility Experts)



Martin Koehrer
(Verification body, Kiwa-Ecobility Experts)

Secutex® Green

Owner of the declaration:

Naue GmbH & Co. KG
Gewerbestraße 2
32339 Espelkamp
Germany

Declared product / declared unit:

1 m² Geotextile

Scope:

This EPD (type: Cradle-to-gate with modules C1-C4 and module D (A1-A3, C, D)) is based on the life cycle assessment of the Secutex® Green G1 Geotextile produced by Naue GmbH & Co. KG. This EPD is for 5 different variations of the product, based on a scaling method.

Kiwa-Ecobility Experts assumes no liability for manufacturer's information, LCA data and evidence.

Verification:

The European standard EN 15804+A2:2019 serves as the core PCR.

Independent verification of the declaration and data according to ISO 14025:2006.

internal

external



Elisabet Amat Guasch
(Third party verifier)

2. Product

2.1 Product description

Secutex® Green is a 100% biodegradable, mechanically bonded nonwoven. Its biodegradability is certified, which means that residues of the product cause no harm to the environment. It is UV-resistant and can therefore be used in uncovered applications. It is a temporary solution, and vegetation and their roots take over the desired filter properties after its service life. No plastic is entered into the environment during the installation, operation, or renaturation of the product, and after its service life it can remain onsite or as composting after renaturation.

Due to the industrial production of the fibres and the constant needling process, a continuous and reproducible quality of the nonwoven is ensured. This also ensure that the product can be assigned to a geotextile robustness class (GRK). The GRK (the abbreviation for the German word Geotextilerobustheitsklasse) is a German classification system to indicate the robustness of a nonwoven, and they are assigned to a geotextile robustness class according to their mass per unit area (gramage) in conjunction with the stamp penetration force. This classification is only used and recognized in Germany, so the product names without this behind it are used internationally (and will be used throughout this background report). The product is available in the robustness classes GRK 2 to GRK 5, and in widths of 2m, 4m, and 6m in standard. Variations from this are available on request (see also 3.1).

Secutex® Green is available in the following standard grades:

- Secutex® Green 30G1 GRK 2 / Secutex® Green 30G1
- Secutex® Green 40G1 GRK 3 / Secutex® Green 40G1
- Secutex® Green 60G1 GRK 4 / Secutex® Green 60G1
- Secutex® Green 90G1 GRK 5 / Secutex® Green 90G1
- Secutex® Green120G1 GRK 5 / Secutex® Green 120G1

2.2 Application

Secutex® Green is, for example, suitable to protect soils, as erosion protection, for separating soils, and as a filter against unwanted soil particle transport. It can be used in the following fields of application (among others):

- Gardening and landscaping
- Temporary road and path construction
- Bank protection/natural watercourse development, coastal protection, and scour protection

2.3 Technical data

The technical data of Secutex® Green G1 is listed below in Table 1. The value is shown in a range that covers all 5 products included in the Secutex® Green G1 group.

Table 1. Technical data for Secutex Green G1, standard

Characteristic	Unit	Value
Raw material	NAUE GreenLine (organic fibre G1)	-
Mass per unit area	300 – 1200	g/m ²
Roll length / diameter (approx.)	75 / 0.6 – 50 / 0.6	m
Roll weight at width of 2 / 4 / 6m (approx.)	50 / 100 / 150 – 125 / 250 / 375	kg

2.4 Placing on the market/ Application rules

For quality assurance purposes, geotextiles for use in earthworks and foundation engineering are regulated according to EN13249 ff. and marked with a CE mark by the manufacturer. For the placing on the market the regulation (EU) No. 305/2011 of March 9, 2011 applies. For the use of the products the national regulations apply.

2.5 Base materials / Ancillary materials

Secutex® Green consists of NAUE GreenLine (organic fibre G1).

Component	Percentage [%]
Organic fibre	100

The product does not contain any substances from the candidate list of substances of very high concern for authorisation (SVHC).

2.6 Manufacturing

The manufacturing location of Secutex® Green is Gewerbestr. 2, 32339 Espelkamp, Germany. The raw material is brought there, and the nonwoven is produced by carding and needle punching. Then, the product is packaged and internally transported into stock. Afterwards, the product is transported to the building site and installed there.

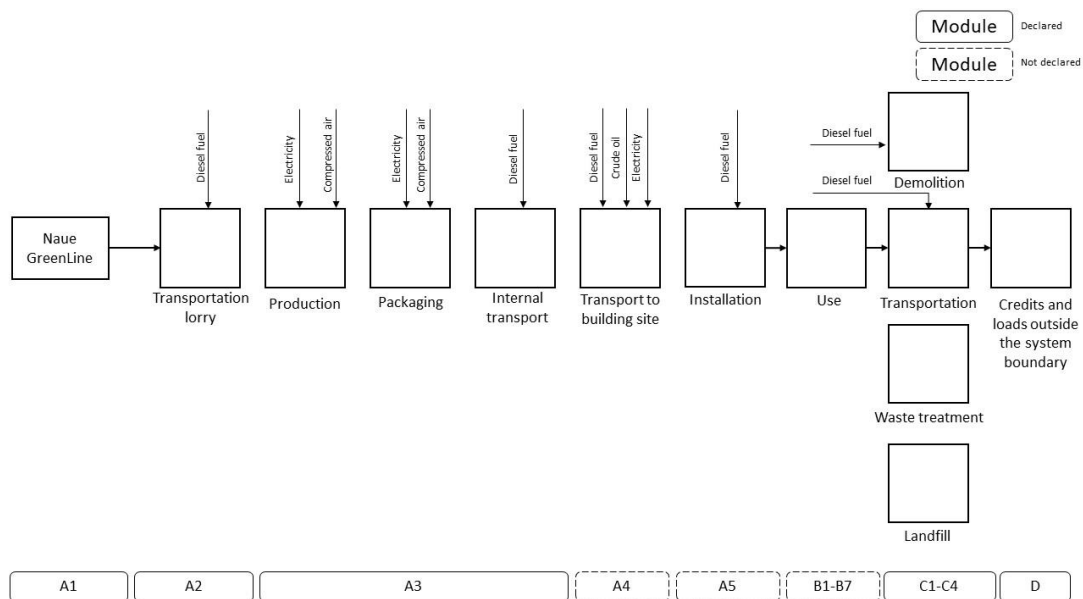


Figure 1. Process flow chart for Secutex® Green

2.7 Packaging

Packaging is carried out by rolling the goods onto paper core tubes and then wrapping them in Polyethylene (PE) foil. The tube is closed with a PE plug and a Polypropylene (PP) disk.

2.8 Reference Service Life (RSL)

Secutex® Green has an expected service life of 3 years. However, this depends largely on the soil water and climate conditions of the site. Next to that, the range of applications and maintenance of the function also depend on the biological activity of the environment.

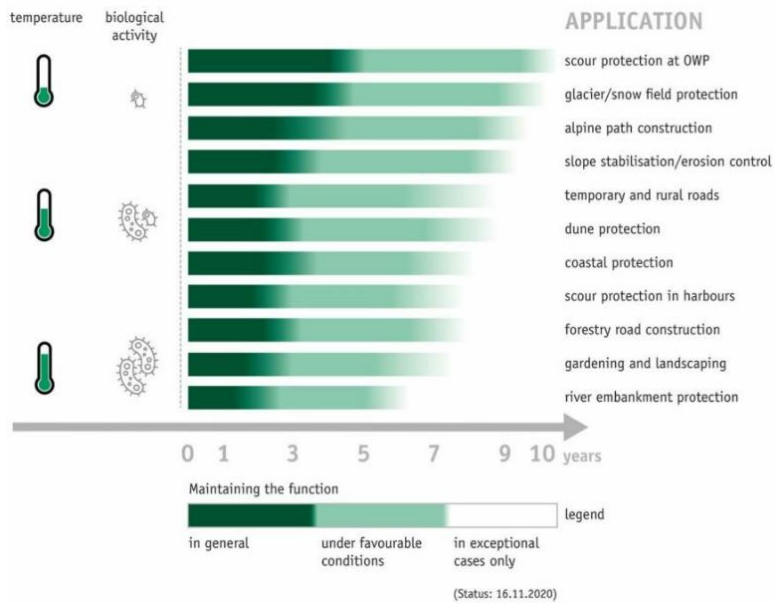


Figure 2. Estimated preservation of the reference service life of Secutex® Green according to application and expectable environmental conditions

2.9 Other Information

Further information on the product can be found on the manufacturer's website (<https://www.naue.com>).

3. LCA: Calculation rules

3.1 Declared unit

In accordance with the PCR B 1 m² geotextile is chosen as the declared unit.

Table 2. Declared unit and conversion factors to 1 kg

Product	Unit weight [g/m ²]	Unit weight [kg/m ²]	Conversion factor to 1 kg
Secutex® Green 30G1	300	0,3	3,3
Secutex® Green 40G1	400	0,4	2,5
Secutex® Green 60G1	600	0,6	1,67
Secutex® Green 90G1	900	0,9	1,1
Secutex® Green 120G1	1200	1,2	0,83

3.2 System boundary

This EPD-type is Cradle to gate with options, modules C1-C4 and module D.

Table 3. System boundary

Module	Module declared ¹	Within the system boundary	Outside the system boundary
A1 Raw Material	X	Raw materials	

¹ X = module declared; MND = module not declared

A2 Transport	X	Transport from the supplier to the production place	
A3 Manufacturing	X	Electricity, auxiliary materials, packaging	
A4 Transport	MND		
A5 Installation	MND		
B1 Use Phase	MND		
B2 Maintenance	MND		
B3 Repair	MND		
B4 Replacement	MND		
B5 Refurbishment	MND		
B6 Operational energy use	MND		
B7 Operational water use	MND		
C1 Deconstruction	X	Biodegradability of the product	
C2 Transport	X	-	
C3 Waste treatment	X	-	
C4 Landfill	X	-	
D Considered loads and benefits outside of the system boundary in Module D	X	Recycling of packaging	

3.3 Estimates and assumptions

Since the raw material is supplied by one supplier, the distances for transport could be accurately determined. However, since no specific transport information is available, for all truck transports (suppliers, disposal transports and internal transports) a payload factor of 50%, is used for large HGVs (loading capacity '>32t'), which effectively corresponds to delivering full and going back empty. The return journey and the payload factor have already been incorporated into the Ecoinvent transport processes.

The supplier of the raw material has provided a confidential Life Cycle Assessment report for the purpose of conducting an EPD for Secutex® Green V01 that includes the necessary data on environmental impact categories. The results of that report, created by Quantis, are grouped into three principal categories, which are the raw materials, the production of the fiber, and the waste generated during the production process. All three of these categories have also been considered in this LCA.

The electricity mix was chosen according to the geographical reference area (Germany) and time reference. As only the conventional electricity mix is used, no other energy sources were considered. No CO2 certificates were taken into account.

The product can be left in the soil, which is why no inputs are necessary or have been considered for Module C1.

3.4 Cut-off criteria

Potential environmental impacts were assigned to the material flows based on the Ecoinvent database version 3.6. All flows contributing to more than 1 percent of the total mass, energy or environmental impacts of the system were considered in the LCA. It can be assumed that the neglected processes would have contributed less than 5 percent to the impact categories considered.

Other operating resources and the corresponding waste were not considered part of the product system and accordingly not included in the balancing.

3.5 Period under review and geographical reference area

All product- and process-specific data were collected for the operating year 2021 and are therefore up-to-date. The geographical reference area is Germany.

3.6 Data quality

For all processes primary data was collected and provided by Naue and the supplier of the raw material. For the data, which is not influenced by the manufacturer, generic data was used. The secondary data was taken from the database Ecoinvent (version 3.6, 2019; version 3.8 2021). The database is maintained on a regular basis and thus meets the requirements of EN 15804 (background data not older than 10 years). The data quality is very good, because all process specific data could be documented and modelled by using the generic data.

R<THiNK EPD web application from the company NIBE was used to model the life cycle for the production and disposal of the declared product systems. To ensure that the results are comparable, consistent background data from the international database Ecoinvent (version 3.6) was used in the LCA (e.g. data records on energy, transport, auxiliary materials and supplies). Almost all consistent data sets contained in the Ecoinvent database are documented and can be viewed online.

In order to use the right Environmental Profile for the used material, the provider of the main raw material used for Secutex® Green has been contacted and provided supporting documents.

3.7 Allocation

Specific information on allocations within the background data can be found in the documentation of the Ecoinvent database version 3.6 datasets.

3.8 Comparability

In principle, a comparison or assessment of the environmental impacts of different products is only possible if they have been prepared in accordance with EN 15804. For the evaluation of the comparability, the following aspects have to be considered in particular: PCR used, functional or declared unit, geographical reference, definition of the system boundary, declared modules, data selection (primary or secondary data, background database, data quality), scenarios used for use and disposal phases, and the life cycle inventory (data collection, calculation methods, allocations, validity period). PCRs and general program instructions of different EPDs programs may differ. A comparability needs to be evaluated. For further guidance see EN 15804+A2 (5.3 Comparability of EPD for construction products) and ISO 14025 (6.7.2 Requirements for comparability).

4. LCA: Scenarios and additional technical information

A scaling method has been used to calculate the LCA results for the various Secutex® Green G1 products. The scaling has been done on the basis of the mass per unit weight (linear scaling). This scaling method has been used on the raw material, the lubricating oil, and the electricity. For the packaging materials, a scaling method could not be used, and therefore an average amount has been taken for these inputs. To determine the scaling function, the LCA values and the basis weight of the individual

products were compared according to SBK 2019 (page 34 ff). A linear dependency with a coefficient of determination (R²-value) of more than 0.97 was determined for all scalable parts. According to SBK 2019, all R² values of over 0.90 are acceptable.

For disposal (modules C1-C4), no waste scenario has been applied to this product. The Secutex® Green G1 products are 100% biodegradable and can be left in the soil at the end of its service life. Therefore, for these products, a waste scenario with 100% To be left has been created.

5. LCA: Results

The following tables show the results of the impact assessment indicators, resource use, waste and other output streams. The results presented here refer to the declared average product.

Disclaimer on ADP-e, ADP-f, WDP, ETP-fw, HTP-c, HTP-nc, SQP: The results of these environmental impact indicators must be used with caution, as the uncertainties in these results are high or as there is limited experience with the indicator.

Disclaimer on IR: This impact category mainly addresses the potential effect of low dose ionizing radiation on human health in the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents and occupational exposures, nor does it consider radioactive waste disposal in underground facilities. Potential ionizing radiation from soil, radon, and some building materials is also not measured by this indicator.

As a result of the scaling done for this LCA, there are results for both the fixed and the scalable part of the scaling function. The fixed part means that this number is the same for each product in the product group, and the scalable part is the part that depends on the mass per unit area of the product. The results of the LCA are shown based on the scaling function (meaning both a fixed and a scalable part), in this chapter, as well as for the Secutex® Green 60G1 (GRK 4) product, in Chapter 7.

In order to calculate the correct number of each environmental impact category for each of the products in the product group, the following calculation should be done:

$$[number\ solid\ part] + ([tensile\ strength] * [number\ scalable\ part])$$

The example has been given of Secutex® Green 60G1 (GRK 4). For example, the correct number for the Global warming potential (total) of module A1 for the product Secutex® Green 60G1, which has a mass of 600 grams (or 0,6kg), can be calculated as follows:

$$1,60E - 15 + (0,6 * 3,32E + 00) = 1,99E + 00$$

The number 1,60E-15 can be found in Table 5 in the row 'Global warming potential (GWP-total)' in the column named A1, and the number 3,32E+00 can be found in Table 7 in the row 'Global warming potential (GWP-total)' in the column named A1. The outcome, 1,99E+00, can also be found in Table 9 in the row 'Global warming potential (GWP-total)' in the column named A1.

Table 4. Description of the system boundary

Description of the system boundary																
Product stage			Construction process stage		Use stage							End of life stage				Benefits and loads beyond the system boundaries
Raw material supply	Transport	Manu- facturing	Transport from manu- facturer to place of use	Construction -installation process	Use	Main- tenance	Repair	Replacement	Refur- bishmen	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	MND	MND	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X

X=Module declared | MND=Module not declared

Table 5. Results fixed part 1 m² Secutex Green G1 – Part I

LCA results - Indicators describing environmental impacts based on the impact assessment (LCIA): 1 m ² Secutex Green fixed part (EN 15804+A2)									
Parameter	Unit	A1	A2	A3	C1	C2	C3	C4	D
Core environmental impact indicators (EN 15804+A2)									
GWP-total	kg CO2 eqv.	1,60E-15	1,00E-16	8,20E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
GWP-f	kg CO2 eqv.	1,60E-15	1,00E-16	2,36E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
GWP-b	kg CO2 eqv.	0,00E+00	0,00E+00	-1,56E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
GWP-luluc	kg CO2 eqv.	0,00E+00	0,00E+00	1,93E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
ODP	kg CFC 11 eqv.	0,00E+00	0,00E+00	2,92E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
AP	mol H+ eqv.	0,00E+00	0,00E+00	1,57E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EP-fw	kg P eqv.	0,00E+00	0,00E+00	2,44E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EP-m	kg N eqv.	0,00E+00	0,00E+00	4,16E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EP-T	mol N eqv.	0,00E+00	0,00E+00	4,46E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
POCP	kg NMVOC eqv.	0,00E+00	0,00E+00	1,23E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
ADP-mm	kg Sb-eqv.	0,00E+00	0,00E+00	3,61E-07	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
ADP-f	MJ	2,51E-14	8,00E-16	3,90E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
WDP	m3 world eqv.	0,00E+00	0,00E+00	1,08E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Additional environmental impact indicators (EN 15804+A2)									
PM	disease incidence	0,00E+00	0,00E+00	5,19E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
IR	kBq U235 eqv.	1,42E-01	6,76E-03	3,91E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
ETP-fw	CTUe	7,00E-16	7,00E-16	1,38E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
HTP-c	CTUh	2,59E-08	4,66E-11	5,26E-10	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
HTP-nc	CTUh	1,85E-07	1,57E-09	4,00E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
SQP	Pt	3,42E+02	1,40E+00	7,36E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
<p>ADP-mm= Abiotic depletion potential for non-fossil resources ADP-f=Abiotic depletion for fossil resources potential AP= Acidification potential, Accumulated Exceedance EP-fw = Eutrophication potential, fraction of nutrients reaching freshwater end compartment EP-m= Eutrophication potential, fraction of nutrients reaching marine end compartment EP-T= Eutrophication potential, Accumulated Exceedance GWP-b=Global Warming Potential biogenic GWP-f=Global Warming Potential fossil fuels GWP-luluc=Global Warming Potential land use and land use change GWP-total=Global Warming Potential total ODP=Depletion potential of the stratospheric ozone layer POCP=Formation potential of tropospheric ozone WDP=Water (user) deprivation potential, deprivation- weighted water consumption ETP-fw=Potential Comparative Toxic Unit for ecosystems HTP-c=Potential Toxic Unit for Humans toxicity, cancer HTP-nc= Potential Toxic Unit for humans, non-cancer IRP=Potential Human exposure efficiency relative to U235, human health PM=Potential incidence of disease due to Particulate Matter emissions SQP=Potential soil quality index</p>									

Table 6. Results fixed part 1 m² Secutex Green G1 – Part II

LCA results - Indicators describing resource use and environmental information derived from life cycle inventory (LCI): 1 m ² Secutex Green fixed part (EN 15804+A2)									
Parameter	Unit	A1	A2	A3	C1	C2	C3	C4	D
PERE	MJ	0,00E+00	0,00E+00	2,38E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERM	MJ	0,00E+00	0,00E+00	6,11E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	0,00E+00	0,00E+00	8,49E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRE	MJ	0,00E+00	8,00E-16	2,04E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRM	MJ	0,00E+00	0,00E+00	2,12E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	0,00E+00	8,00E-16	4,16E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
SM	Kg	0,00E+00	0,00E+00	4,30E-02	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
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
FW	M3	0,00E+00	0,00E+00	3,71E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
HWD	Kg	0,00E+00	0,00E+00	4,47E-07	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NHWD	Kg	0,00E+00	1,00E-16	5,28E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RWD	Kg	0,00E+00	0,00E+00	1,83E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
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
MFR	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
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
EET	MJ	0,00E+00	0,00E+00	2,15E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EEE	MJ	0,00E+00	0,00E+00	1,25E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+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 | 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=Use of fresh water | 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 | EET=Exported energy, thermal | EE=Exported energy, electrical

Table 7. Results **scalable** part 1 m² Secutex Green G1 - Part I

LCA results - Indicators describing environmental impacts based on the impact assessment (LCIA): 1 m ² Secutex Green scalable part (EN 15804+A2)									
Parameter	Unit	A1	A2	A3	C1	C2	C3	C4	D
Core environmental impact indicators (EN 15804+A2)									
GWP-total	kg CO2 eqv.	3,32E+00	1,07E-01	9,35E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
GWP-f	kg CO2 eqv.	3,27E+00	1,07E-01	8,69E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
GWP-b	kg CO2 eqv.	4,10E-02	4,94E-05	6,33E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
GWP-luluc	kg CO2 eqv.	6,43E-03	3,92E-05	1,49E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
ODP	kg CFC 11 eqv.	7,60E-07	2,36E-08	1,68E-08	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
AP	mol H+ eqv.	2,00E-02	6,20E-04	5,22E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EP-fw	kg P eqv.	2,28E-04	1,08E-06	5,96E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EP-m	kg N eqv.	3,84E-03	2,19E-04	9,64E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EP-T	mol N eqv.	4,07E-02	2,41E-03	1,24E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
POCP	kg NMVOC eqv.	1,19E-02	6,88E-04	2,94E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
ADP-mm	kg Sb-eqv.	1,65E-06	2,71E-06	2,62E-07	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
ADP-f	MJ	5,12E+01	1,61E+00	1,34E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
WDP	m3 world eqv.	4,90E-02	5,77E-03	2,11E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Additional environmental impact indicators (EN 15804+A2)									
PM	disease incidence	1,07E-07	9,62E-09	2,93E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
IR	kBq U235 eqv.	1,42E-01	6,76E-03	3,91E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
ETP-fw	CTUe	1,45E+00	1,44E+00	6,58E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
HTP-c	CTUh	2,59E-08	4,66E-11	5,26E-10	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
HTP-nc	CTUh	1,85E-07	1,57E-09	4,00E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
SQP	Pt	3,42E+02	1,40E+00	7,36E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
<p>ADP-mm= Abiotic depletion potential for non-fossil resources ADP-f=Abiotic depletion for fossil resources potential AP= Acidification potential, Accumulated Exceedance EP-fw = Eutrophication potential, fraction of nutrients reaching freshwater end compartment EP-m= Eutrophication potential, fraction of nutrients reaching marine end compartment EP-T= Eutrophication potential, Accumulated Exceedance GWP-b=Global Warming Potential biogenic GWP-f=Global Warming Potential fossil fuels GWP-luluc=Global Warming Potential land use and land use change GWP-total=Global Warming Potential total ODP=Depletion potential of the stratospheric ozone layer POCP=Formation potential of tropospheric ozone WDP=Water (user) deprivation potential, deprivation- weighted water consumption ETP-fw=Potential Comparative Toxic Unit for ecosystems HTP-c=Potential Toxic Unit for Humans toxicity, cancer HTP-nc= Potential Toxic Unit for humans, non-cancer IRP=Potential Human exposure efficiency relative to U235, human health PM=Potential incidence of disease due to Particulate Matter emissions SQP=Potential soil quality index</p>									

Table 8. Results **scalable** part 1 m² Secutex Green G1 - Part II

LCA results - Indicators describing resource use and environmental information derived from life cycle inventory (LCI): 1 m ² Secutex Green scalable part (EN 15804+A2)									
Parameter	Unit	A1	A2	A3	C1	C2	C3	C4	D
PERE	MJ	0,00E+00	2,02E-02	1,92E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+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
PERT	MJ	0,00E+00	2,02E-02	1,92E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRE	MJ	0,00E+00	1,71E+00	3,28E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRM	MJ	0,00E+00	0,00E+00	1,39E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	0,00E+00	1,71E+00	3,29E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
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
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
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
FW	M3	5,97E-02	1,96E-04	1,28E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
HWD	Kg	0,00E+00	4,09E-06	6,00E-07	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NHWD	Kg	0,00E+00	1,02E-01	7,25E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RWD	Kg	0,00E+00	1,06E-05	1,40E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
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
MFR	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
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
EET	MJ	0,00E+00	0,00E+00	4,30E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EEE	MJ	0,00E+00	0,00E+00	2,50E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+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 | 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=Use of fresh water | 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 | EET=Exported energy, thermal | EE=Exported energy, electrical

LCA results - Information on biogenic carbon content at the factory gate: 1 m ² Secutex® Green (EN 15804+A2)		
Parameter	Unit	Value
biogenic carbon content in product	kg C	0
biogenic carbon content in accompanying packaging	kg C	0

NOTE 1 kg biogenic carbon is equivalent to 44/12 kg CO₂

6. LCA: Interpretation

For easier understanding, the results are presented graphically in order to be able to see correlations and connections between the data more clearly. The following Figure 3 shows the shares of the different product life phases in the environmental impacts.

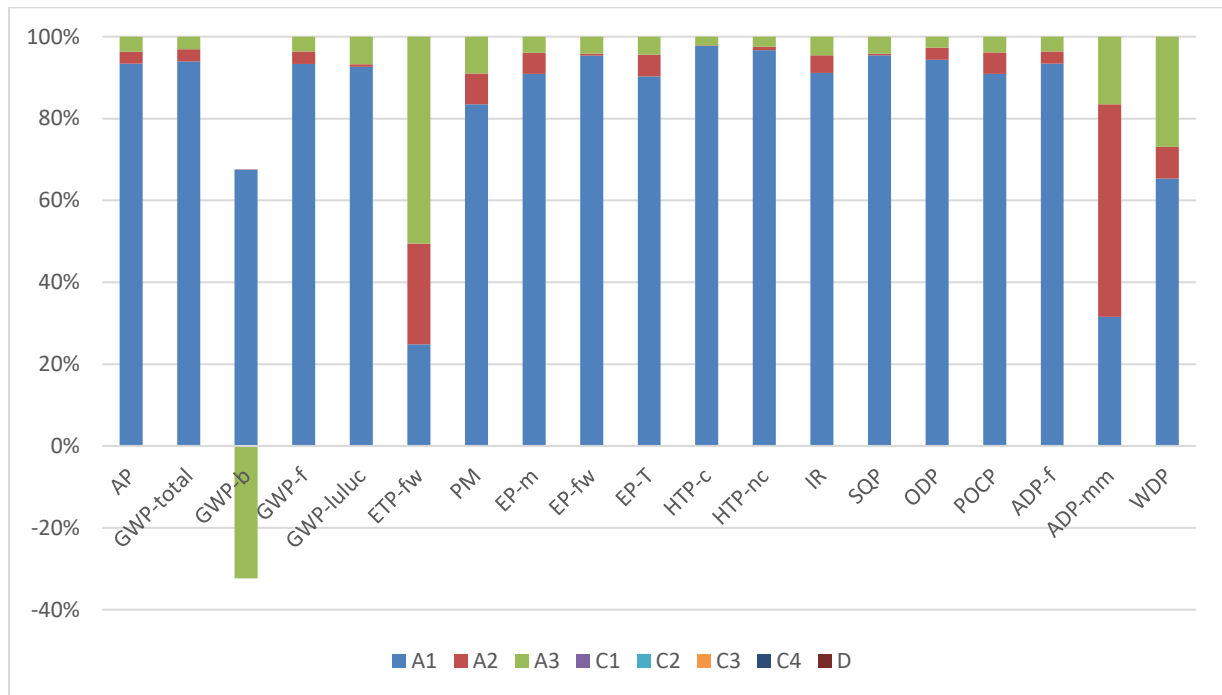


Figure 3. Shares of the product life phases in the environmental impacts for 1m² Secutex® Green 60G1

As can be seen in the graph, raw material provision (module A1) dominates in the production phase in almost all environmental impacts. Only in the environmental impact category Ecotoxicity, freshwater (ETP-fw) module A3 has the biggest influence, and in the environmental impact category Resource use, minerals and metals (ADP-mm) module A2 has the biggest influence out of all modules.

Note: The majority of the CO₂ emissions within the impact category GWP-biogenic (GWP-b) originate from the packaging. Since module A5, which includes the waste processing of packaging, is not declared there seems to be a disbalance of biogenic CO₂ emissions. Normally, these biogenic CO₂ emissions would be accounted for and balance out in module A5, and the alleged disbalance can thus be explained by the fact that module A5 is not included in the EPD declaration.

7. Scaling method Secutex Green 60G1 (GRK4)

Table 9. Results 1 m² Secutex Green 60G1 (GRK4) - Part I

LCA results - Indicators describing environmental impacts based on the impact assessment (LCIA): 1 m ² Secutex Green 60G1 (GRK 4) (EN 15804+A2)									
Parameter	Unit	A1	A2	A3	C1	C2	C3	C4	D
Core environmental impact indicators (EN 15804+A2)									
GWP-total	kg CO2 eqv.	1,99E+00	6,42E-02	6,43E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
GWP-f	kg CO2 eqv.	1,96E+00	6,42E-02	7,58E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
GWP-b	kg CO2 eqv.	2,46E-02	2,96E-05	-1,18E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
GWP-luluc	kg CO2 eqv.	3,86E-03	2,35E-05	2,82E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
ODP	kg CFC 11 eqv.	4,56E-07	1,42E-08	1,30E-08	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
AP	mol H+ eqv.	1,20E-02	3,72E-04	4,71E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EP-fw	kg P eqv.	1,37E-04	6,47E-07	6,02E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EP-m	kg N eqv.	2,31E-03	1,31E-04	9,94E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EP-T	mol N eqv.	2,44E-02	1,45E-03	1,19E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
POCP	kg NMVOC eqv.	7,12E-03	4,13E-04	2,99E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
ADP-mm	kg Sb-eqv.	9,88E-07	1,63E-06	5,18E-07	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
ADP-f	MJ	3,07E+01	9,68E-01	1,19E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
WDP	m3 world eqv.	2,94E-02	3,46E-03	1,21E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Additional environmental impact indicators (EN 15804+A2)									
PM	disease incidence	6,44E-08	5,77E-09	6,94E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
IR	kBq U235 eqv.	8,53E-02	4,05E-03	4,23E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
ETP-fw	CTUe	8,71E-01	8,63E-01	1,77E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
HTP-c	CTUh	1,55E-08	2,80E-11	3,35E-10	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
HTP-nc	CTUh	1,11E-07	9,44E-10	2,82E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
SQP	Pt	2,05E+02	8,39E-01	8,90E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

ADP-mm= Abiotic depletion potential for non-fossil resources | **ADP-f**=Abiotic depletion for fossil resources potential | **AP**= Acidification potential, Accumulated Exceedance | **EP-fw** = Eutrophication potential, fraction of nutrients reaching freshwater end compartment | **EP-m**= Eutrophication potential, fraction of nutrients reaching marine end compartment| **EP-T**= Eutrophication potential, Accumulated Exceedance | **GWP-b**=Global Warming Potential biogenic | **GWP-f**=Global Warming Potential fossil fuels | **GWP-luluc**=Global Warming Potential land use and land use change | **GWP-total**=Global Warming Potential total| **ODP**=Depletion potential of the stratospheric ozone layer | **POCP**=Formation potential of tropospheric ozone | **WDP**=Water (user) deprivation potential, deprivation- weighted water consumption | **ETP-fw**=Potential Comparative Toxic Unit for ecosystems | **HTP-c**=Potential Toxic Unit for Humans toxicity, cancer | **HTP-nc**= Potential Toxic Unit for humans, non-cancer | **IRP**=Potential Human exposure efficiency relative to U235, human health | **PM**=Potential incidence of disease due to Particulate Matter emissions | **SQP**=Potential soil quality index

Table 10. Results 1 m² Secutex Green 60G1 (GRK4) - Part II

LCA results - Indicators describing resource use and environmental information derived from life cycle inventory (LCI): 1 m ² Secutex Green 60G1 (GRK 4) (EN 15804+A2)									
Parameter	Unit	A1	A2	A3	C1	C2	C3	C4	D
PERE	MJ	0,00E+00	1,21E-02	3,53E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERM	MJ	0,00E+00	0,00E+00	6,11E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	0,00E+00	1,21E-02	9,64E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRE	MJ	0,00E+00	1,03E+00	4,01E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRM	MJ	0,00E+00	0,00E+00	2,13E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	0,00E+00	1,03E+00	6,13E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
SM	Kg	0,00E+00	0,00E+00	4,30E-02	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
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
FW	M3	3,58E-02	1,18E-04	1,14E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
HWD	Kg	0,00E+00	2,45E-06	8,07E-07	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NHWD	Kg	0,00E+00	6,14E-02	9,63E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RWD	Kg	0,00E+00	6,35E-06	2,67E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
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
MFR	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
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
EET	MJ	0,00E+00	0,00E+00	2,58E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EEE	MJ	0,00E+00	0,00E+00	1,50E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+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 | 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=Use of fresh water | 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 | EET=Exported energy, thermal | EE=Exported energy, electrical

8. References

Ecoinvent 2019	Ecoinvent Datenbank Version 3.6 (2019)
EN 15804	EN 15804:2012+A2:2019: Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products
ISO 14025	ISO 14025:2006 Environmental labels and declarations — Type III environmental declarations — Principles and procedures EN 13249
ISO 14040	ISO 14040:2006 Environmental management - Life cycle assessment - Principles and framework
ISO 14044	ISO 14044:2006 Environmental management - Life cycle assessment - Requirements and guidelines
NMD 2019	Nationale Milieudatabase (NMD). Environmental Performance Assessment Method for Construction; Version 1.1 (March 2022); Rijswijk
PCR A	Kiwa-Ecobility Experts, Berlin, 2022: PCR A – General Program Category Rules for Construction Products from the EPD programme of Kiwa-Ecobility Experts; Version 2.1
PCR B	Kiwa-Ecobility Experts (Kiwa-EE) – Product Category Rules for Geosynthetic Products, EPD programme, Version 2, 2023-07-21
R<THiNK 2023	R<THiNK; Online-EPD-Tool by NIBE B.V.
SimaPro Software	Industry data LCA library; website: https://simapro.com/databases/industry-data-lca-library/

	Publisher Kiwa-Ecobility Experts Kiwa GmbH, Ecobility Experts Wattstraße 11-13 13355 Berlin Germany	Mail Web	DE.Ecobility.Experts@kiwa.com https://www.kiwa.com/de/de/themes/ecobility-experts/ecobility-experts/
	Programme operator Kiwa-Ecobility Experts Kiwa GmbH, Ecobility Experts Wattstraße 11-13 13355 Berlin Germany	Mail Web	DE.Ecobility.Experts@kiwa.com https://www.kiwa.com/de/de/themes/ecobility-experts/ecobility-experts/
	LCA Practitioner Kiwa GmbH, Ecobility Experts Wattstraße 11-13 13355 Berlin Germany	Tel. Mail Web	+49 30 467761 43 DE.Nachhaltigkeit@kiwa.com www.kiwa.com
	Owner of the declaration Naue GmbH & Co. KG Gewerbestraße 2 32339 Espelkamp Deutschland	Tel. Mail Web	+49 5743 41 0 info@naue.com https://www.naue.com

Kiwa-Ecobility Experts -
 established member of

