PROJECT **LCA RPR RETENTION PANELS PRODUCED BY CEYES B.V.**

Purpose	LCA based on the SBK Assessment Method
Commissioner	Ceyes B.V.
Executed by	SGS Search Consultancy, Martijn Weening
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Contents

1. GENERAL

1.1. Introduction

This report is the result of a life cycle analysis (LCA). The report consists of the following chapters which correspond to the phases of a LCA.

- Goal and scope definition
- Life cycle inventory
- Impact assessment
- Interpretation

1.2. Company information / declaration owner

Manufacturer:	Ceyes B.V.
Address:	Tappersweg 14, Office 48 2031 EV, Haarlem
E-mail:	leovdongen@ceyes.eu
Website:	www.ceyes.eu

1.3. EPD information

EPD for:	Ceyes B.V. RPR retention panels
PCR:	SBK bepalingsmethode v2.0, including Wijzigingsblad overgang naar EcoInvent v3.3 1 juni 2017
Date of issue:	18-03-2019
End of validity:	18-03-2024

1.4. Calculation basis

LCA Method	Bepalingsmethode
LCA Software	Simapro 8.5
Characterization method	SBK Bepalingsmethode, 25 oktober 2018 (na NMD 2.2) V3.04 / MKI-SBK single-score
LCA database profiles	EcoInvent version 3.4, Nationale Milieudatabase v2.2

1.5. Project team

The project team consists of the following persons:

Martijn Weening, SGS Search Consultancy
Leo van Dongen, Ceyes

1.6. Used abbreviations

EPD	Environmental Product Declaration
SBK	Stichting Bouwkwaliteit
NMD	Nationale Milieu Database (Dutch National Environmental Profile Database)
RSL	Reference Service Life
LCA	Life Cycle Assessment

2. GOAL AND SCOPE DEFINITION

2.1. Purpose and target groups

The purpose of this LCA is to compile environmental data of materials and products used in the built environment. The environmental data can be used in calculations of buildings and civil works. The purpose of this report is to draw up a review dossier for the product based on the SBK Assessment Method Environmental Performances Constructions and Civil Engineering Works (GWW) (SBK Bepalingsmethode, 01 januari 2019 (V3.0). This document defines a standardized method for a LCA in the Netherlands, of a product used in the build environment, in accordance with EN 15804.

The target groups of this LCA study are:
- Users of the NMD or programs that use this database;
- Ceyes B.V., which gains insight in the environmental performance of its products;
- Users of verified environmental data, such as procurers, designers and construction firms.

2.2. Declared unit

The complete life cycle (Cradle-to-Grave) of one square meter (1 m^2) of the following Ceyes RPR retention panels:
- RPR0600 0800 030 = Retention Panel Rubber 600mmx800mmx30mm;
- RPR0600 0800 045 = Retention Panel Rubber 600mmx800mmx45mm;
- RPR0600 0800 060 = Retention Panel Rubber 600mmx800mmx60mm.

2.3. Scope of declaration

This is a Cradle to Grave EPD. Table 1 shows the life cycle stages that are included:

Table 1 Declared phases of the EN15804 standard

A1	A2	A3	A4	A5	B1-B7	C1	C2	C3-C4	D
Declared	Declared	Declared	Declared	Declared	Declared	Declared	Declared	Declared	Declared

2.4. Reference service life

The Reference Service Life (RSL) is 75 years, as confirmed by Ceyes.

2.5. Cut-off criteria

All product stages are included in this study. There is no indication that relevant inputs or outputs are missing.

2.6. Status of the report

Final, externally verified report.

2.7. Report overview

The chapters of this report are:

- Chapter 1: General
- Chapter 2: Goal and scope definition
- Chapter 3: Product description and Life Cycle Inventory
- Chapter 4: Life Cycle Impact Analysis & Results
- Chapter 5: Life Cycle Interpretation

The following appendices are included:

- Appendix A contains the environmental profiles per product
- Appendix B contains the SBK review documents

3. PRODUCT DESCRIPTION AND LIFE CYCLE INVENTORY

3.1. Description of product

This LCA report describes retention panels. On green roofs, roofs with vegetation, retention panels are used for water storage and drainage. The retention layer of the system exists of a filter, drainage layer and a protective layer, in addition a retention layer can be placed on top to store more water[1]. Figure 1 displays the layers of a green roof system. This LCA, however, is limited to the drainage layer which can be seen in Figure 2.

Moreover, the Ceyes RPR retention panels (Figure 2) are dimensionally stable and therefore heavily loadable. Ceyes retention panels are designed to retain sufficient amounts of water to nurture vegetation and drain excess water to avoid redundant stress on the roof constructions.

The three types of Ceyes RPR retention panels, as described in paragraph 2.2, differ in height. The materials used are the same for the three products.

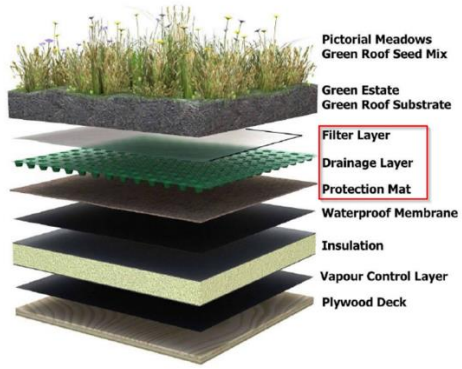


Figure 1 The layers of a green roof system

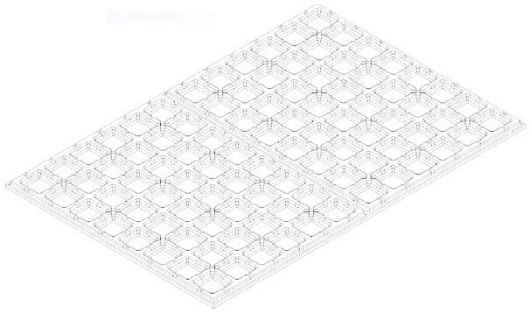


Figure 2 The Ceyes RPR retention panel (drainage layer)

3.2. Description of production process

The Ceyes RPR retention panels will be locally manufactured at a "CEYES molding HUB" (not in use yet during LCA project) and made of rubber granulate, which is bonded together with a polyurethane binder during the cold-cure manufacturing process at the "CEYES molding HUB".

The rubber granulate has been used as infill on artificial grass on sport fields.

All suppliers were asked if they had an EPD or LCA that is in line with EN15804 or similar. None of the suppliers could supply a LCA for the requested products.

The materials are matched to EcoInvent processes, this was done in cooperation with Ceyes B.V. and their suppliers. The binder is supplied by Vervit (Italy) and the rubber granulate by Grond Bank Nederland in Waddinxveen. The "CEYES molding HUB" is located in Venlo.

The composition of the PUR binder is discussed with the supplier and the EcoInvent process used in this LCA is adjusted to what was stated by the supplier.

[1] Bianchini, F., & Hewage, K. (2012). How "green" are the green roofs? Lifecycle analysis of green roof materials. *Building and environment*, *48*, 57-65.

3.3. Process tree

The flow diagram below (Figure 3) provides a schematic overview of the process flow included in scope.

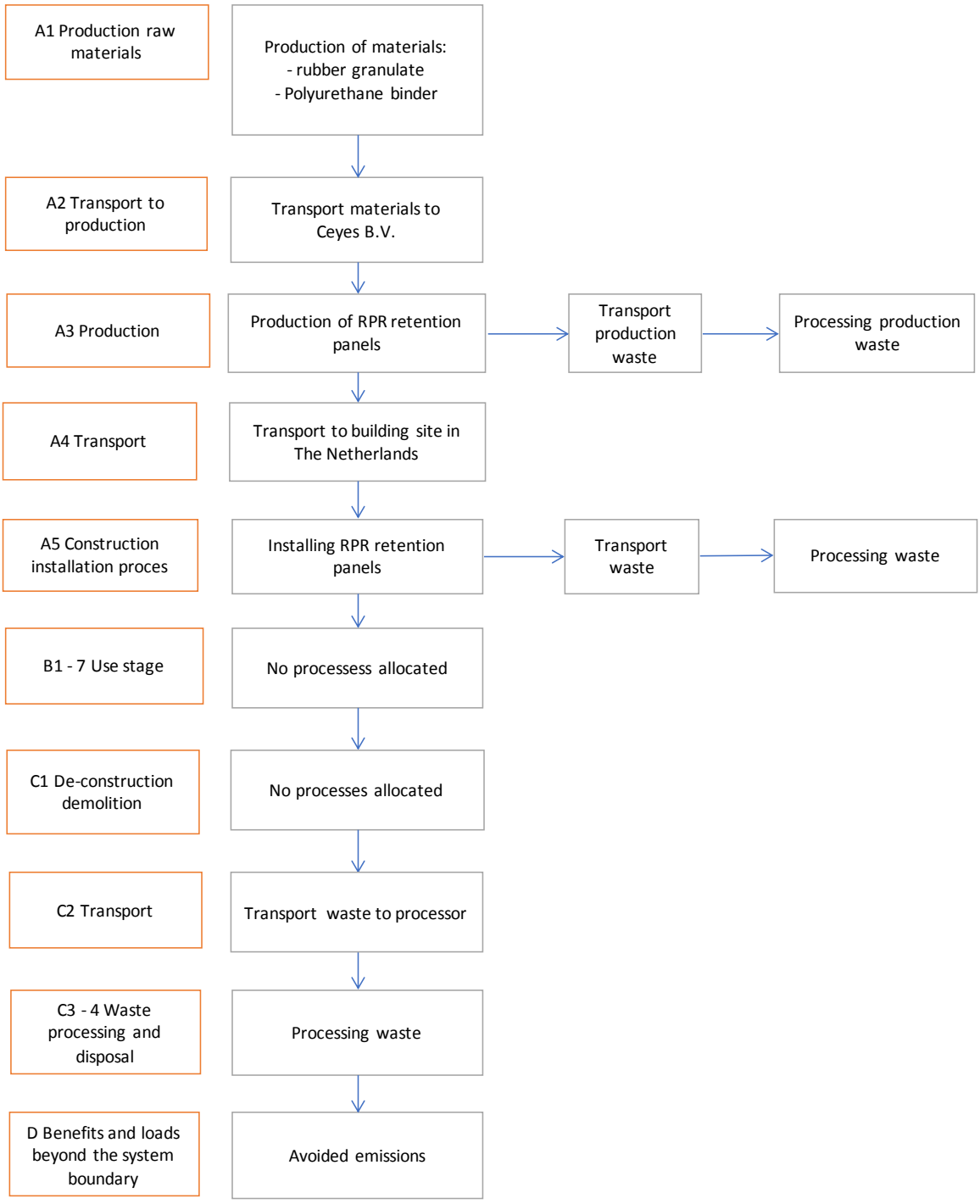


Figure 3 Process flow diagram

3.4. Production of materials (A1)

The LCA includes all the materials used to produce the RPR retention panels. This includes the following main components:

- Rubber granulate;
- Polyurethane binder.

Table 2 provides an overview of the materials, weights and reference profiles included in the scope. It should be noted that the rubber granulate, which is the main component of this product, is derived from sport fields where is served as a infill material. It is removed from the sport fields as waste and cleaned by the supplier, after which it reaches end of waste statutes. No other processes are needed to make the material suitable for use by Ceyes. Therefore, it is free of burden and included in this LCA as an empty process.

Furthermore, the composition of the EcoInvent process for PUR (Polyurethane, rigid foam {RER}| production | Cut-off, U) was adjusted in consultation with the supplier. Methylene diphenyl diisocyanate {GLO}| market for | Cut-off, U has been set to 0.3 kg/kg, whereas this is 00616 in the standard process. Pentane {GLO}| market for | Cut-off, U has been set to 0 kg/kg and was 0.054. Polyol {GLO}| market for | Cut-off, U has been set to 0,7 kg/kg, while the standard process uses 0.386 kg/kg.

Table 2 Material overview

Process	Unit	Amount per m^2 RPR - 030	Amount per m^2 RPR - 045	Amount per m^2 RPR - 060	Reference EcoInvent 3.4	Comment
Rubber granulate	kg	11.7	16.7	22.8	No emissions counted, 100% recycled content	Processes to reach end of waste status (cleaning) has been allocated to the previous life cycle. No processes are required for Ceyes.
Polyurethane binder	kg	0.92	1.33	1.82	Polyurethane, rigid foam {RER}| production	Cut-off, U, adjusted for Ceyes	

3.5. Transport (A2)

Table 3 shows the transport modalities and the distances for the supply from suppliers to Ceyes B.V. of all components. Transport of raw materials to the suppliers is included in the “market for” profiles and therefore not counted separately.

The supplier of the rubber granulate is situated in Amsterdam (the Netherlands) and the producer of the polyurethane binder by Vervit in Rovereto (Italy).

Table 3 Transport modalities and distances

Partname	Weight (kg) RPR -030	Weight (kg) RPR-045	Weight (kg) RPR-060	Distance (km)	Reference profile	Weight* Distance (ton.km) RPR-030	Weight* Distance (ton.km) RPR-045	Weight* Distance (ton.km) RPR-060
Rubber granulate	11,7	16,7	22,8	214	Transport, freight, lorry 7.5-16 metric ton, EURO6 {GLO}| market for	Cut-off, S	2,49	3,57	4,88
Polyurethane binder	0,927	1,33	1,82	950	Transport, freight, lorry 7.5-16 metric ton, EURO6 {GLO}| market for	Cut-off, S	0,881	1,27	1,73

3.6. Production (A3)

The base components are assembled at the production location in Venlo. Electricity use is calculated by the energy demand of the used equipment i.e. batch mixer and press. These values are, however, theoretical values derived from the machine its specifications. Calculated was that one mixer and two presses produce 12,48 m2 panels per hour and use 18 and 80 kW (40 kW per press) respectively. Corrected for a 30% duty cycle, the values as shown in Table 4 have been calculated.

Table 4 electricity usage for manufacturing 1m² RPR retention panels

Process	Usage per hour in kWh	Production per hour in m²	Energy usage per m² retention panel in kWh	Reference profile
Electricity usage (kWh)	29,4	12,48	2.36	Electricity, low voltage, at grid/NL U (Groene stroom)

Production waste is according to the manufacturer 0,3% and disposed of as described in C3-4 and D i.e. 95% recycling and 5% incineration. Transport distances are based on the default values from De Bepalingsmethode. Only the transport to the recycling facility is set to 500 meters, recycling of the rubber waste will take place at VS rubber recycling which is 500 meter from Ceyes its production site.

3.7. Transport to construction site (A4)

Table 5 below shows the weights of one square meter of RPR panel, distance from producer to construction site and the conversion to ton kilometres. The default distance of 150 km has been used (as prescribed by the SBK bepalingsmethode).

Table 5 Transport to construction site

Product	Weight (kg) RPR -030	Weight (kg) RPR-045	Weight (kg) RPR-060	Distance (km)	Reference profile	Weight* Distance (ton.km) RPR-030	Weight* Distance (ton.km) RPR-045	Weight* Distance (ton.km) RPR-060
RPR retention panel	12,62	18,03	24,62	150	Transport, freight, lorry, unspecified {GLO}| market for | Cut-off, S	1,89	2,7	3,69

3.8. Construction phase (A5)

The retention panels are lifted to the rooftop by hydraulic crane and by manual labour. For the crane is assumed that it will take 3 minutes on average to lift one pallet. Table 6 displays the work per square meter of retention panels.

Table 6 Instalation processes at construction site

Process	per m² RPR -030	per m² RPR-045	per m² RPR-060	Reference profile
Telescopic crane	0.001 hours	0.00125 hours	0.00167 hours	SBK Kraan hydr.tele. band (gemiddeld)

Concerning packaging for transport to the construction site, the retention panels will be stacked on wooden pallets (EPAL) and fasted with cord straps and a metal seal. The RPR30 are stacked per 50 on a pallet and 16 meter strap is used, the RPR45 fit per 40 on a pallet and use 18 meter of strap, and the RPR60 fir per 30 on a pallet and 18 meters strap is used. For all types of panels three metal seals are used. No material is used to cover the product. Table 7 shows the amounts of packaging matererial per square meter of retention panels.

Table 7 Packaging for transport per square meter of retention panel

Product	per m² RPR -030	per m² RPR-045	per m² RPR-060	Reference profile
Palet (EPAL)	0.02 pieces	0.025 pieces	0.00167 pieces	EUR-flat pallet {RER}| production | Cut-off, S
Strap cord	0.32 metre	0.45 metre	0.6 metre	Not declared
Metal seal	0.06 pieces	0.075 pieces	0.1 pieces	Not declared

Packaging of the products is disposed of after delivery at the construction site. The disposal scenario conservative assumptions are made based on publication about the pallet industry from CE Delft[2]. Assumed is that 98% of the pallets are reused and 2% are incinerated with energy recovery. The weight of the pallet (EPAL) is 25 kg[3]. Furthermore, transport of used pallets and energy recovery are based on De Bepalingsmethode.

Waste from construction is negligible considering the size of the green roof is based on the size of the retention panels. In case this doesn't meet the size if the roof, a gap will be left open or filled with other materials e.g. gravel.

3.9. Use phase (B1-7)

The retention panels do not need any maintenance during the life span. Therefore, the environmental impact of this process phase is regarded negligible and not accounted for.

3.10. Deconstruction (C1)

The retention panels are not fixed to the roof. They can be manually removed. Therefore, the environmental impact of this process phase is regarded negligible and not accounted for.

3.11. Transport to sorting installation (C2)

Table 8 displays the transport to the waste processer, indicating weights of one square meter of RPR panel, distance from construction site to waste processer and the conversion to ton kilometres. The default distance of 50 km has been used (as described by the SBK bepalingsmethode).

Table 8 Transport to waste processer

Product	Weight (kg) RPR -030	Weight (kg) RPR-045	Weight (kg) RPR-060	Distance (km)	Reference profile	Weight* Distance (ton.km) RPR-030	Weight* Distance (ton.km) RPR-045	Weight* Distance (ton.km) RPR-060
RPR retention panel	12,62	18,03	24,62	50	Transport, freight, lorry, unspecified {GLO}| market for | Cut-off, S	0,63	0,9	1,23

For both end of life scenarios as described in the next paragraph, the default distance of 100 km has been used to account for transport from the waste sorting facility to the waste processing (as described by De bepalingsmethode).

Table 9 Transport to waste processing

Product	Weight (kg) RPR -030	Weight (kg) RPR-045	Weight (kg) RPR-060	Distance (km)	Reference profile	Weight* Distance (ton.km) RPR-030	Weight* Distance (ton.km) RPR-045	Weight* Distance (ton.km) RPR-060
RPR retention panel	12,62	18,03	24,62	100	Transport, freight, lorry, unspecified {GLO}| market for | Cut-off, S	1,26	1,8	2,46

[2] Second opinion LCA-resultaten kunststof en houten pallets 2016, https://www.ce.nl/publicaties/1765/second-opinion-lca-resultaten-kunststof-en-houten-pallets
[3] Standaard Afmetingen Europallet, https://www.123pallets.nl/europallet/afmeting-europallet

3.12. Waste processing (C3-4)

The products are designed for recyclability and can be included in the recycling process of rubber products (such as car tyres). As the products are easily separated, not fixed and easily recyclable. It is assumed that a large percentage (95%) will be recycled. 5% is assumed to go to incineration. This assumption has been confirmed with two large waste processing companies (see sensitivity analysis). There is no statistical information available and therefore, this assumption is based on best judgment by SGS Search.

Table 10 below shows the end of life scenarios for the materials and the corresponding processes. Recycling processes are declared in C3 and incineration in C4, the benefits and loads beyond the system boundaries are calculated in D for both processes.

Table 10 End of life scenarios

Process	Weight (kg) RPR -030	Weight (kg) RPR-045	Weight (kg) RPR-060	Waste scenario	Reference default of NMD used
Recycling	12	17.1	23.4	95% recycling	SBK 006r recycling elastomeren (o.a. epdm) (o.a. dakbedekkingen, folies)
Rubber incineration	0.583	0.835	1.140	5% incineration	Waste rubber, unspecified {RoW}| treatment of, municipal incineration | Cut-off, S
PUR incineration	0.0465	0.0667	0.0912	5% incineration	Waste polyurethane {RoW}| treatment of, municipal incineration | Cut-off, S

3.13. Benefits and loads beyond system boundary (D)

The incineration process of the retention panels produces heat and electricity. Recovered energy is calculated according to De Bepalingsmethode v3.0 which states that 31% of the lower heating value (LHV) of the incinerated product can be recovered as heat and 18% as electricity. For these calculations a LHV of 27.19 MJ/kg was used, this figure is derived from the EcoInvent 3.4 database.

Concerning the recycling, only primary materials are accounted for. Thus, the mass per m^2 x 95% recycling - the total amount of secondary material. Avoided emissions from recycling are calculated using synthetic rubber as raw material equivalent. Since the binder cannot be separated from the rubber granulate and is not expected to change the physical properties of the product, synthetic rubber resembles the used retention panels the most.

Moreover, since secondary material is taken from the system, the amount of incinerated secondary rubber is compensated with the production of new rubber. It should be noted that this only applies to the rubber and not to the binder. The figure is calculated by the same formula as described in the previous paragraph. Seeing that, the figures will be negative when less material is recycled than amount of secondary material used.

Table 11 Benefits and loads beyond the system boundary

Process	Weight (kg) RPR -030	Weight (kg) RPR-045	Weight (kg) RPR-060	Waste scenario	Reference, default of NMD used
Avoided emissions by production of heat and electricity at incineration	0,63	0,83	1,23	5% incineration	Electricity, high voltage {NL}| heat and power co-generation, natural gas, combined cycle power plant, 400MW electrical | Cut-off, S (4,894 MJ/kg) Heat, district or industrial, natural gas {Europe without Switzerland}| heat production, natural gas, at industrial furnace >100kW | Cut-off, S (8,429 MJ/kg)

Process	Weight (kg) RPR -030	Weight (kg) RPR-045	Weight (kg) RPR-060	Waste scenario	Reference, default of NMD used
Avoided emissions due to the recycling of PUR (only the recycling of primary materials may be used for avoided materials)	0,33	0,43	0,59	95% recycling	Synthetic rubber {RER} production | cut-off, U (production processes are set to 0, as these are not avoided by the use of secondary material)
Primary materials lost due to the incineration of secondary material	0,58	0,90	1,13	5% incineration	Synthetic rubber {RER} production | cut-off, U (production processes are set to 0)

4. LIFE CYCLE IMPACT ANALYSIS & RESULTS

This chapter includes the Cradle to Grave environmental profiles of the RPR retention panels. The results represent the environmental profile in MKI value (Milieu Kosten Indicator). The MKI value is an aggregated single score value based on 11 environmental parameters calculated with the method: SBK Bepalingsmethode, 20-9-2016(NMD 2.0) 29-9-2017 V3.03 / MKI-SBK single-score.

The MKI parameter is a Dutch calculation method and not part of the ISO14040, ISO14044 or EN15804 standards.

As indicated in paragraph Scope of declaration 2.3, the LCA score has been calculated for three products.

4.1. MKI results per material per unit

The following table indicates the MKI value in Euros and the global warming potential (GWP) in CO_2 eq. impact per square meter of panel for all process stages. A full overview of the environmental profiles is included in Appendix B.

Table 12 MKI and CO_2 eq. values RPR retention panels

Product	Unit	Total	A1	A2	A3	A4	A5	B	C1	C2	C3	C4	D
RPR 0600 0800 030	Euro	0,574	0,339	0,067	0,112	0,029	-0,003	0,000	0,000	0,029	0,000	0,102	-0,102
RPR 0600 0800 045	Euro	0,785	0,488	0,097	0,112	0,042	-0,002	0,000	0,000	0,042	0,000	0,146	-0,140
RPR 0600 0800 060	Euro	1,039	0,667	0,132	0,113	0,057	0,003	0,000	0,000	0,057	0,000	0,199	-0,191
RPR 0600 0800 030	kg CO2 eq.	5,89E +00	3,99E +00	6,53E-01	2,13E-01	2,49E-01	-1,95E-01	0,00E +00	0,00E +00	2,49E-01	0,00E +00	1,96E +00	-1,24E +00
RPR 0600 0800 045	kg CO2 eq.	8,52E +00	5,74E +00	9,36E-01	2,17E-01	3,56E-01	-1,77E-01	0,00E +00	0,00E +00	3,56E-01	0,00E +00	2,81E +00	-1,72E +00
RPR 0600 0800 060	kg CO2 eq.	1,17E +01	7,85E +00	1,28E +00	2,31E-01	4,86E-01	-1,39E-01	0,00E +00	0,00E +00	4,86E-01	0,00E +00	3,84E +00	-2,35E +00

5. LIFE CYCLE INTERPRETATION

5.1. Completeness and consistency

As far as SGS can determine, there are no relevant inputs or outputs missing in the calculation.

5.2. Completeness and consistency

The table below shows the individual contribution of each process phase. The table clearly indicates that most emissions (59 – 64%) originate in the process phase A1. As no emissions were allocated to the rubber granulate, this contribution is completely caused by the production of the Polyurethane binder.

The waste processing (C4) contributes significantly as well. Further analyses show that this is mainly caused (92%) by the incineration of rubber granulate (assumption is that 5% of the product will go to incineration). The incineration of the Polyurethane binder contributes for the remaining 8%.

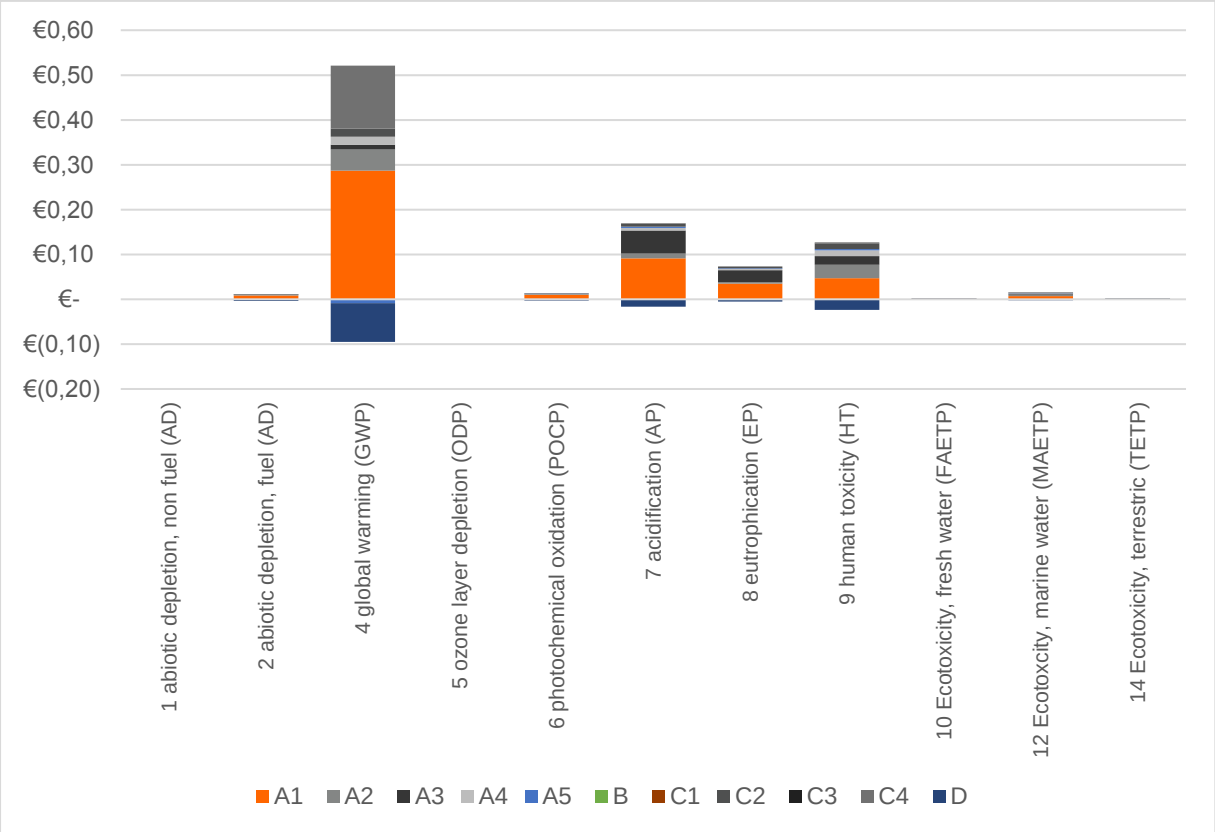
Table 13 MKI and CO2eq values RPR retention panels

Product	Unit	Total	A1	A2	A3	A4	A5	B	C1	C2	C3	C4	D
RPR 0600 0800 030	Euro	100%	59%	12%	19%	5%	-1%	0%	0%	5%	0%	18%	-18%
RPR 0600 0800 045	Euro	100%	62%	12%	14%	5%	0%	0%	0%	5%	0%	19%	-18%
RPR 0600 0800 060	Euro	100%	64%	13%	11%	6%	0%	0%	0%	6%	0%	19%	-18%
RPR 0600 0800 030	kg CO2 eq.	100%	68%	11%	4%	4%	-3%	0%	0%	4%	0%	33%	-21%
RPR 0600 0800 045	kg CO2 eq.	100%	67%	11%	3%	4%	-2%	0%	0%	4%	0%	33%	-20%
RPR 0600 0800 060	kg CO2 eq.	100%	67%	11%	2%	4%	-1%	0%	0%	4%	0%	33%	-20%

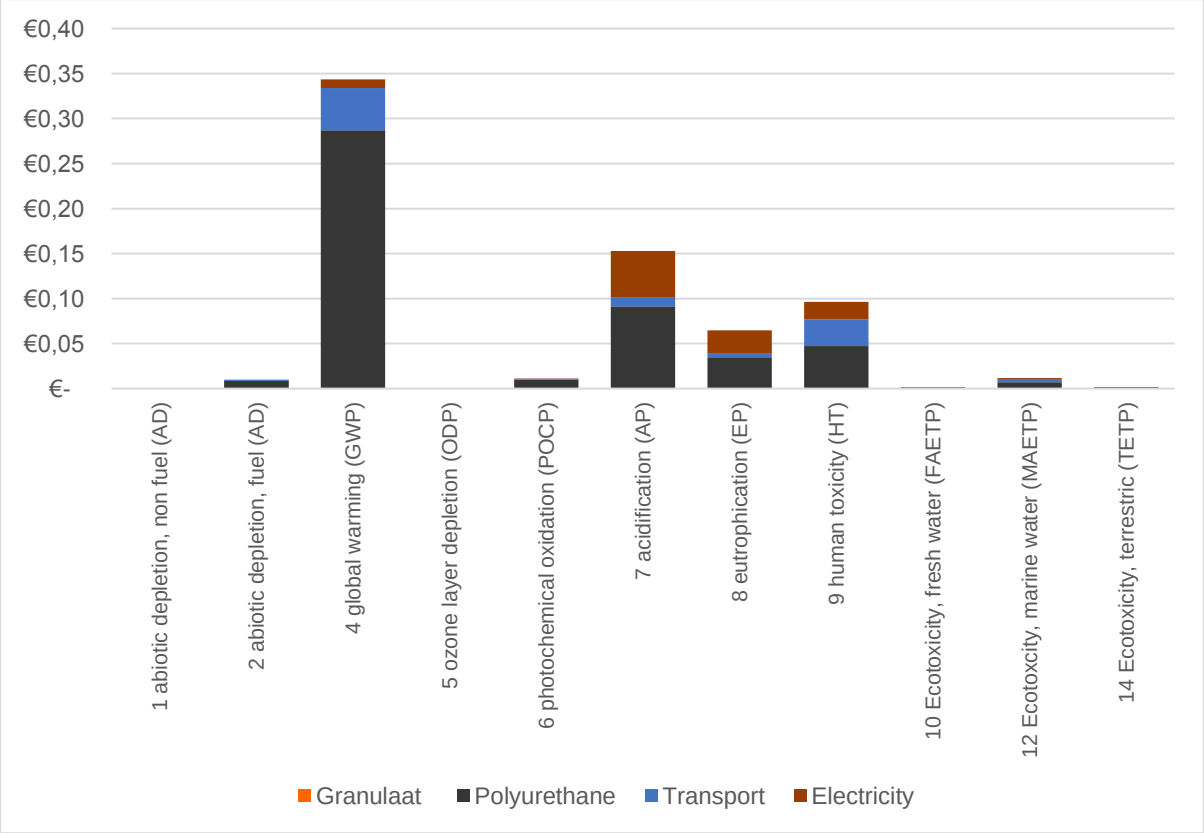
Graph 1 and Graph 2 below show the contribution of the various process stages and environmental impacts to the MKI value for the product RPR 0600 0800 045. The contribution analyses indicate that the Global Warming impact is mainly caused in the production phase (A1-3). In addition, the production of the Polyurethane binder, as can be seen from Graph 2, has the greatest contribution in this phase.

Moreover, the environmental impact of global warming contributes for 54% and acidification contributes 20% to the total MKI. Human toxicity contributes 13% and eutrophication contributes 9%. The contribution of other environmental impacts is small (<2%).

As the composition of the products in this LCA study is similar, the major contribution analyses on other products show similar results.



Graph 1 Contribution analysis per process phase of the RPR 0600 0800 045



Graph 2 Contribution analysis per process phase (A1-3) RPR 0600 0800 045

5.3. Sensitivity Analyses

Table 14 shows the results of the sensitivity analyses.

Table 14 Sensitivity analyses

Subject	Explanation
Variation on group average	The study focuses on individual products, no sensitivity analyses on this subject required.
Geographical variation	The products in this study are produced in one location. However, it is possible that the product will be produced in other locations in the future. Considering the low contribution of the transport phase A2, no major impact is expected should the production location change.
Technological variation	The composition of the products is fixed.
Variation in composition	The composition of the products is fixed.
Waste scenarios	The waste scenario is the main assumption within this study. There are no records available on the waste scenarios of this specific product. As the product is easily removable, and can be recycled in regular rubber recycling facilities, it is assumed that 95% of the product will be recycled and a small fraction (5%) will go to incineration. This assumption has been confirmed with two large waste processing companies. Other waste scenarios with a lower recycling grade will have a major impact on the study e.g. if 90% recycled and 10% incinerated, then the total MKI value would increase with approx. 30%.
Influence of allocation	Energy usage at the production facility (A3) has been allocated. As the production has not started, this has been done based on the indicated energy usage of the machines in comparison to the production time per m^2). This allocation has been done conservatively and as the total contribution of electricity use is marginal, errors are not expected to influence the results significantly.
Use of non-verified data	See waste scenario's. No other non-verified data is used.

5.4. Significant issues

No significant issues were encountered during the project.

5.5. Conclusions, limitations and recommendations

The production of the Polyurethane binder contributes significantly to the total MKI value (50-54%). For an accurate understanding of the environmental performance of the product it is, therefore, vital to discuss with the supplier if they can provide environmental LCA profiles and discuss possibilities for optimization.

Main assumption is the waste scenario. It is assumed that the tiles are largely recycled. As the life span of the product is long (75 years), there is no method to verify this assumption.

6. LITERATURE REFERENCES

[1] LCI Input Ceyes, 2018
[2] ISO, 2006. “Environmental management. Life cycle assessment - Principles and framework”. ISO 14040:2006;
[3] ISO, 2006. “Environmental management. Life cycle assessment – Requirements and Guidelines”. ISO 14044:2006;
[4] International Organization for Standardization, ISO/TR 14025, “Environmental labels and declarations – Type III environmental declarations”, ISO/TR 14025:2000;
[5] SBK Bepalingsmethode, 01 januari 2019 v3.0

APPENDIX A. ENVIRONMENTAL PROFILES

The following tables shows the environmental profile of the panels.

Figure 4 environmental profile RPR0600 0800 030 (MKI value)

Calculation:	Analyze
Results:	Impact assessment
Product:	1 m2 _Totaal RPR 0600 0800 030 (of project _Ceyes)
Method:	SBK Bepalingsmethode, 25 mei 2018 (NMD 2.2) V3.04 / MKI-SBK single-score
Indicator:	Weighting
Skip categories:	Never
Default units:	Yes
Exclude infrastructure processes:	No
Exclude long-term emissions:	Yes
Sorted on item:	Impact category
Sort order:	Ascending

Impact category	Unit	Total	A1	A2	A3	A4	A5	B	C1	C2	C3	C4	D
Total	Euro	€ 0,57	€ 0,34	€ 0,07	€ 0,11	€ 0,03	€ -0,00	€ -	€ -	€ 0,03	€ -	€ 0,10	€ -0,10
1 abiotic depletion, non fuel (AD)	Euro	€ -0,00	€ 0,00	€ 0,00	€ 0,00	€ 0,00	€ 0,00	€ -	€ -	€ 0,00	€ -	€ 0,00	€ -0,00
2 abiotic depletion, fuel (AD)	Euro	€ 0,00	€ 0,01	€ 0,00	€ 0,00	€ 0,00	€ -0,00	€ -	€ -	€ 0,00	€ -	€ 0,00	€ -0,00
4 global warming (GWP)	Euro	€ 0,29	€ 0,20	€ 0,03	€ 0,01	€ 0,01	€ -0,01	€ -	€ -	€ 0,01	€ -	€ 0,10	€ -0,06
5 ozone layer depletion (ODP)	Euro	€ 0,00	€ 0,00	€ 0,00	€ 0,00	€ 0,00	€ -0,00	€ -	€ -	€ 0,00	€ -	€ 0,00	€ -0,00
6 photochemical oxidation (POCP)	Euro	€ 0,01	€ 0,01	€ 0,00	€ 0,00	€ 0,00	€ 0,00	€ -	€ -	€ 0,00	€ -	€ 0,00	€ -0,00
7 acidification (AP)	Euro	€ 0,12	€ 0,06	€ 0,01	€ 0,05	€ 0,00	€ 0,00	€ -	€ -	€ 0,00	€ -	€ 0,00	€ -0,01
8 eutrophication (EP)	Euro	€ 0,06	€ 0,02	€ 0,00	€ 0,03	€ 0,00	€ 0,00	€ -	€ -	€ 0,00	€ -	€ 0,00	€ -0,00
9 human toxicity (HT)	Euro	€ 0,08	€ 0,03	€ 0,02	€ 0,02	€ 0,01	€ 0,00	€ -	€ -	€ 0,01	€ -	€ 0,00	€ -0,02
10 Ecotoxicity, fresh water (FAETP)	Euro	€ 0,00	€ 0,00	€ 0,00	€ 0,00	€ 0,00	€ 0,00	€ -	€ -	€ 0,00	€ -	€ 0,00	€ -0,00
12 Ecotoxcity, marine water (MAETP)	Euro	€ 0,01	€ 0,00	€ 0,00	€ 0,00	€ 0,00	€ 0,00	€ -	€ -	€ 0,00	€ -	€ 0,00	€ -0,00
14 Ecotoxicity, terrestric (TETP)	Euro	€ 0,00	€ 0,00	€ 0,00	€ 0,00	€ 0,00	€ 0,00	€ -	€ -	€ 0,00	€ -	€ 0,00	€ -0,00
101 Energy, primary, renewable (MJ)	Euro	0	0	0	0	0	0	0	0	0	0	0	0
102 Energy, primary, non-renewable (MJ)	Euro	0	0	0	0	0	0	0	0	0	0	0	0
103 Energy, primary (MJ)	Euro	0	0	0	0	0	0	0	0	0	0	0	0
104 Water, fresh water use (m3)	Euro	0	0	0	0	0	0	0	0	0	0	0	0
105 Waste, non hazardous (kg)	Euro	0	0	0	0	0	0	0	0	0	0	0	0
106 Waste, hazardous (kg)	Euro	0	0	0	0	0	0	0	0	0	0	0	0

Figure 5 environmental profile RPR0600 0800 030 (characterization)

Calculation:	Analyze
Results:	Impact assessment
Product:	1 m2 _Totaal RPR 0600 0800 030 (of project _Ceyes)
Method:	SBK Bepalingsmethode, 25 mei 2018 (NMD 2.2) V3.04 / MKI-SBK single-score
Indicator:	Characterization
Skip categories:	Never
Exclude infrastructure processes:	No
Exclude long-term emissions:	Yes
Sorted on item:	Impact category
Sort order:	Ascending

Impact category	Unit	Total	A1	A2	A3	A4	A5	B	C1	C2	C3	C4	D
1 abiotic depletion, non fuel (AD)	kg Sb eq	-1,28E-05	4,95E-06	2,45E-06	4,76E-06	7,09E-07	2,95E-08	0,00E+00	0,00E+00	7,09E-07	0,00E+00	4,56E-08	-2,65E-05
2 abiotic depletion, fuel (AD)	kg Sb eq	2,89E-02	3,76E-02	4,71E-03	7,77E-04	1,84E-03	-1,99E-03	0,00E+00	0,00E+00	1,84E-03	0,00E+00	1,64E-04	-1,60E-02
4 global warming (GWP)	kg CO2 eq	5,89E+00	3,99E+00	6,53E-01	2,13E-01	2,49E-01	-1,95E-01	0,00E+00	0,00E+00	2,49E-01	0,00E+00	1,96E+00	-1,24E+00
5 ozone layer depletion (ODP)	kg CFC-11 eq	1,70E-08	4,14E-08	1,16E-07	1,48E-08	4,59E-08	-1,67E-08	0,00E+00	0,00E+00	4,59E-08	0,00E+00	3,85E-09	-2,34E-07
6 photochemical oxidation (POCP)	kg C2H4	3,37E-03	3,45E-03	3,22E-04	2,91E-04	1,47E-04	7,25E-05	0,00E+00	0,00E+00	1,47E-04	0,00E+00	1,17E-05	-1,07E-03
7 acidification (AP)	kg SO2 eq	3,06E-02	1,59E-02	1,82E-03	1,28E-02	1,08E-03	5,93E-04	0,00E+00	0,00E+00	1,08E-03	0,00E+00	2,82E-04	-3,00E-03
8 eutrophication (EP)	kg PO4--- eq	6,19E-03	2,69E-03	3,04E-04	2,91E-03	2,16E-04	1,55E-04	0,00E+00	0,00E+00	2,16E-04	0,00E+00	9,92E-05	-3,96E-04
9 human toxicity (HT)	kg 1,4-DB eq	8,67E-01	3,65E-01	2,29E-01	2,19E-01	9,97E-02	3,22E-02	0,00E+00	0,00E+00	9,97E-02	0,00E+00	1,51E-02	-1,94E-01
10 Ecotoxicity, fresh water (FAETP)	kg 1,4-DB eq	4,31E-02	2,93E-02	6,37E-03	5,31E-03	2,93E-03	5,01E-04	0,00E+00	0,00E+00	2,93E-03	0,00E+00	7,85E-04	-4,93E-03
12 Ecotoxcity, marine water (MAETP)	kg 1,4-DB eq	9,42E+01	4,89E+01	2,42E+01	1,40E+01	1,06E+01	1,02E+00	0,00E+00	0,00E+00	1,06E+01	0,00E+00	2,33E+00	-1,73E+01
14 Ecotoxicity, terrestric (TETP)	kg 1,4-DB eq	2,93E-02	6,38E-03	8,92E-04	2,16E-02	3,53E-04	2,76E-05	0,00E+00	0,00E+00	3,53E-04	0,00E+00	1,54E-04	-4,58E-04
101 Energy, primary, renewable (MJ)	MJ	2,00E+01	3,75E+00	1,32E-01	1,59E+01	5,25E-02	2,37E-01	0,00E+00	0,00E+00	5,25E-02	0,00E+00	1,26E-02	-2,17E-01
102 Energy, primary, non-renewable (MJ)	MJ	7,07E+01	9,00E+01	1,04E+01	1,56E+00	4,10E+00	-4,24E+00	0,00E+00	0,00E+00	4,10E+00	0,00E+00	3,41E-01	-3,56E+01
103 Energy, primary (MJ)	MJ	9,06E+01	9,38E+01	1,06E+01	1,75E+01	4,15E+00	-4,01E+00	0,00E+00	0,00E+00	4,15E+00	0,00E+00	3,54E-01	-3,58E+01
104 Water, fresh water use (m3)	m3	6,57E-02	6,17E-02	1,70E-03	9,42E-04	7,38E-04	1,41E-04	0,00E+00	0,00E+00	7,38E-04	0,00E+00	2,88E-03	-3,16E-03
105 Waste, non hazardous (kg)	kg	1,20E+00	2,10E-01	4,23E-01	5,86E-02	2,36E-01	5,43E-03	0,00E+00	0,00E+00	2,36E-01	0,00E+00	5,84E-02	-2,88E-02
106 Waste, hazardous (kg)	kg	1,03E-04	4,37E-05	7,19E-05	3,67E-05	2,83E-05	1,36E-06	0,00E+00	0,00E+00	2,83E-05	0,00E+00	2,59E-06	-1,10E-04

Figure 6 environmental profile RPR0600 0800 045 (MKI value)

Calculation:	Analyze
Results:	Impact assessment
Product:	1 m2 _Totaal RPR 0600 0800 045 (of project _Ceyes)
Method:	SBK Bepalingsmethode, 25 mei 2018 (NMD 2.2) V3.04 / MKI-SBK single-score
Indicator:	Weighting
Skip categories:	Never
Default units:	Yes
Exclude infrastructure processes:	No
Exclude long-term emissions:	Yes
Sorted on item:	Impact category
Sort order:	Ascending

Impact category	Unit	Total	A1	A2	A3	A4	A5	B	C1	C2	C3	C4	D
Total	Euro	€ 0,78	€ 0,49	€ 0,10	€ 0,11	€ 0,04	€ -0,00	€ -	€ -	€ 0,04	€ -	€ 0,15	€ -0,14
1 abiotic depletion, non fuel (AD)	Euro	€ -0,00	€ 0,00	€ 0,00	€ 0,00	€ 0,00	€ 0,00	€ -	€ -	€ 0,00	€ -	€ 0,00	€ -0,00
2 abiotic depletion, fuel (AD)	Euro	€ 0,01	€ 0,01	€ 0,00	€ 0,00	€ 0,00	€ -0,00	€ -	€ -	€ 0,00	€ -	€ 0,00	€ -0,00
4 global warming (GWP)	Euro	€ 0,43	€ 0,29	€ 0,05	€ 0,01	€ 0,02	€ -0,01	€ -	€ -	€ 0,02	€ -	€ 0,14	€ -0,09
5 ozone layer depletion (ODP)	Euro	€ 0,00	€ 0,00	€ 0,00	€ 0,00	€ 0,00	€ -0,00	€ -	€ -	€ 0,00	€ -	€ 0,00	€ -0,00
6 photochemical oxidation (POCP)	Euro	€ 0,01	€ 0,01	€ 0,00	€ 0,00	€ 0,00	€ 0,00	€ -	€ -	€ 0,00	€ -	€ 0,00	€ -0,00
7 acidification (AP)	Euro	€ 0,15	€ 0,09	€ 0,01	€ 0,05	€ 0,01	€ 0,00	€ -	€ -	€ 0,01	€ -	€ 0,00	€ -0,02
8 eutrophication (EP)	Euro	€ 0,07	€ 0,03	€ 0,00	€ 0,03	€ 0,00	€ 0,00	€ -	€ -	€ 0,00	€ -	€ 0,00	€ -0,00
9 human toxicity (HT)	Euro	€ 0,10	€ 0,05	€ 0,03	€ 0,02	€ 0,01	€ 0,00	€ -	€ -	€ 0,01	€ -	€ 0,00	€ -0,02
10 Ecotoxicity, fresh water (FAETP)	Euro	€ 0,00	€ 0,00	€ 0,00	€ 0,00	€ 0,00	€ 0,00	€ -	€ -	€ 0,00	€ -	€ 0,00	€ -0,00
12 Ecotoxcity, marine water (MAETP)	Euro	€ 0,01	€ 0,01	€ 0,00	€ 0,00	€ 0,00	€ 0,00	€ -	€ -	€ 0,00	€ -	€ 0,00	€ -0,00
14 Ecotoxicity, terrestric (TETP)	Euro	€ 0,00	€ 0,00	€ 0,00	€ 0,00	€ 0,00	€ 0,00	€ -	€ -	€ 0,00	€ -	€ 0,00	€ -0,00
101 Energy, primary, renewable (MJ)	Euro	0	0	0	0	0	0	0	0	0	0	0	0
102 Energy, primary, non-renewable (MJ)	Euro	0	0	0	0	0	0	0	0	0	0	0	0
103 Energy, primary (MJ)	Euro	0	0	0	0	0	0	0	0	0	0	0	0
104 Water, fresh water use (m3)	Euro	0	0	0	0	0	0	0	0	0	0	0	0
105 Waste, non hazardous (kg)	Euro	0	0	0	0	0	0	0	0	0	0	0	0
106 Waste, hazardous (kg)	Euro	0	0	0	0	0	0	0	0	0	0	0	0

Figure 7 environmental profile RPR0600 0800 045 (characterization)

Calculation:	Analyze
Results:	Impact assessment
Product:	1 m2 _Totaal RPR 0600 0800 045 (of project _Ceyes)
Method:	SBK Bepalingsmethode, 25 mei 2018 (NMD 2.2) V3.04 / MKI-SBK single-score
Indicator:	Characterization
Skip categories:	Never
Exclude infrastructure processes:	No
Exclude long-term emissions:	Yes
Sorted on item:	Impact category
Sort order:	Ascending

Impact category	Unit	Total	A1	A2	A3	A4	A5	B	C1	C2	C3	C4	D
1 abiotic depletion, non fuel (AD)	kg Sb eq	-1,79E-05	7,12E-06	3,51E-06	4,60E-06	1,01E-06	2,99E-08	0,00E+00	0,00E+00	1,01E-06	0,00E+00	6,54E-08	-3,53E-05
2 abiotic depletion, fuel (AD)	kg Sb eq	4,33E-02	5,40E-02	6,74E-03	7,65E-04	2,63E-03	-1,86E-03	0,00E+00	0,00E+00	2,63E-03	0,00E+00	2,34E-04	-2,19E-02
4 global warming (GWP)	kg CO2 eq	8,52E+00	5,74E+00	9,36E-01	2,17E-01	3,56E-01	-1,77E-01	0,00E+00	0,00E+00	3,56E-01	0,00E+00	2,81E+00	-1,72E+00
5 ozone layer depletion (ODP)	kg CFC-11 eq	4,33E-08	5,96E-08	1,66E-07	1,39E-08	6,56E-08	-1,32E-08	0,00E+00	0,00E+00	6,56E-08	0,00E+00	5,51E-09	-3,20E-07
6 photochemical oxidation (POCP)	kg C2H4	4,79E-03	4,97E-03	4,61E-04	2,90E-04	2,10E-04	7,54E-05	0,00E+00	0,00E+00	2,10E-04	0,00E+00	1,67E-05	-1,44E-03
7 acidification (AP)	kg SO2 eq	3,84E-02	2,29E-02	2,60E-03	1,29E-02	1,54E-03	6,56E-04	0,00E+00	0,00E+00	1,54E-03	0,00E+00	4,04E-04	-4,04E-03
8 eutrophication (EP)	kg PO4--- eq	7,61E-03	3,86E-03	4,36E-04	2,91E-03	3,09E-04	1,66E-04	0,00E+00	0,00E+00	3,09E-04	0,00E+00	1,42E-04	-5,34E-04
9 human toxicity (HT)	kg 1,4-DB eq	1,15E+00	5,25E-01	3,29E-01	2,19E-01	1,42E-01	2,82E-02	0,00E+00	0,00E+00	1,42E-01	0,00E+00	2,16E-02	-2,62E-01
10 Ecotoxicity, fresh water (FAETP)	kg 1,4-DB eq	6,00E-02	4,21E-02	9,12E-03	5,33E-03	4,18E-03	5,49E-04	0,00E+00	0,00E+00	4,18E-03	0,00E+00	1,12E-03	-6,60E-03
12 Ecotoxcity, marine water (MAETP)	kg 1,4-DB eq	1,30E+02	7,03E+01	3,47E+01	1,40E+01	1,51E+01	1,17E+00	0,00E+00	0,00E+00	1,51E+01	0,00E+00	3,34E+00	-2,32E+01
14 Ecotoxicity, terrestric (TETP)	kg 1,4-DB eq	3,27E-02	9,17E-03	1,28E-03	2,16E-02	5,05E-04	2,98E-05	0,00E+00	0,00E+00	5,05E-04	0,00E+00	2,21E-04	-6,22E-04
101 Energy, primary, renewable (MJ)	MJ	2,17E+01	5,39E+00	1,90E-01	1,59E+01	7,50E-02	2,96E-01	0,00E+00	0,00E+00	7,50E-02	0,00E+00	1,80E-02	-2,91E-01
102 Energy, primary, non-renewable (MJ)	MJ	1,05E+02	1,29E+02	1,50E+01	1,54E+00	5,86E+00	-3,94E+00	0,00E+00	0,00E+00	5,86E+00	0,00E+00	4,88E-01	-4,88E+01
103 Energy, primary (MJ)	MJ	1,27E+02	1,35E+02	1,52E+01	1,75E+01	5,94E+00	-3,65E+00	0,00E+00	0,00E+00	5,94E+00	0,00E+00	5,06E-01	-4,91E+01
104 Water, fresh water use (m3)	m3	9,37E-02	8,87E-02	2,44E-03	1,02E-03	1,05E-03	-3,66E-04	0,00E+00	0,00E+00	1,05E-03	0,00E+00	4,12E-03	-4,33E-03
105 Waste, non hazardous (kg)	kg	1,69E+00	3,01E-01	6,06E-01	5,93E-02	3,37E-01	1,04E-03	0,00E+00	0,00E+00	3,37E-01	0,00E+00	8,36E-02	-3,88E-02
106 Waste, hazardous (kg)	kg	1,41E-04	6,29E-05	1,03E-04	3,63E-05	4,05E-05	3,48E-06	0,00E+00	0,00E+00	4,05E-05	0,00E+00	3,71E-06	-1,49E-04

Figure 8 environmental profile RPR0600 0800 060 (MKI value)

Calculation:	Analyze
Results:	Impact assessment
Product:	1 m2 _Totaal RPR 0600 0800 060 (of project _Ceyes)
Method:	SBK Bepalingsmethode, 25 mei 2018 (NMD 2.2) V3.04 / MKI-SBK single-score
Indicator:	Weighting
Skip categories:	Never
Default units:	Yes
Exclude infrastructure processes:	No
Exclude long-term emissions:	Yes
Sorted on item:	Impact category
Sort order:	Ascending

Impact category	Unit	Total	A1	A2	A3	A4	A5	B	C1	C2	C3	C4	D
Total	Euro	€ 1,04	€ 0,67	€ 0,13	€ 0,11	€ 0,06	€ 0,00	€ -	€ -	€ 0,06	€ -	€ 0,20	€ -0,19
1 abiotic depletion, non fuel (AD)	Euro	€ -0,00	€ 0,00	€ 0,00	€ 0,00	€ 0,00	€ 0,00	€ -	€ -	€ 0,00	€ -	€ 0,00	€ -0,00
2 abiotic depletion, fuel (AD)	Euro	€ 0,01	€ 0,01	€ 0,00	€ 0,00	€ 0,00	€ -0,00	€ -	€ -	€ 0,00	€ -	€ 0,00	€ -0,00
4 global warming (GWP)	Euro	€ 0,58	€ 0,39	€ 0,06	€ 0,01	€ 0,02	€ -0,01	€ -	€ -	€ 0,02	€ -	€ 0,19	€ -0,12
5 ozone layer depletion (ODP)	Euro	€ 0,00	€ 0,00	€ 0,00	€ 0,00	€ 0,00	€ -0,00	€ -	€ -	€ 0,00	€ -	€ 0,00	€ -0,00
6 photochemical oxidation (POCP)	Euro	€ 0,01	€ 0,01	€ 0,00	€ 0,00	€ 0,00	€ 0,00	€ -	€ -	€ 0,00	€ -	€ 0,00	€ -0,00
7 acidification (AP)	Euro	€ 0,19	€ 0,13	€ 0,01	€ 0,05	€ 0,01	€ 0,00	€ -	€ -	€ 0,01	€ -	€ 0,00	€ -0,02
8 eutrophication (EP)	Euro	€ 0,08	€ 0,05	€ 0,01	€ 0,03	€ 0,00	€ 0,00	€ -	€ -	€ 0,00	€ -	€ 0,00	€ -0,01
9 human toxicity (HT)	Euro	€ 0,13	€ 0,06	€ 0,04	€ 0,02	€ 0,02	€ 0,00	€ -	€ -	€ 0,02	€ -	€ 0,00	€ -0,03
10 Ecotoxicity, fresh water (FAETP)	Euro	€ 0,00	€ 0,00	€ 0,00	€ 0,00	€ 0,00	€ 0,00	€ -	€ -	€ 0,00	€ -	€ 0,00	€ -0,00
12 Ecotoxcity, marine water (MAETP)	Euro	€ 0,02	€ 0,01	€ 0,00	€ 0,00	€ 0,00	€ 0,00	€ -	€ -	€ 0,00	€ -	€ 0,00	€ -0,00
14 Ecotoxicity, terrestric (TETP)	Euro	€ 0,00	€ 0,00	€ 0,00	€ 0,00	€ 0,00	€ 0,00	€ -	€ -	€ 0,00	€ -	€ 0,00	€ -0,00
101 Energy, primary, renewable (MJ)	Euro	0	0	0	0	0	0	0	0	0	0	0	0
102 Energy, primary, non-renewable (MJ)	Euro	0	0	0	0	0	0	0	0	0	0	0	0
103 Energy, primary (MJ)	Euro	0	0	0	0	0	0	0	0	0	0	0	0
104 Water, fresh water use (m3)	Euro	0	0	0	0	0	0	0	0	0	0	0	0
105 Waste, non hazardous (kg)	Euro	0	0	0	0	0	0	0	0	0	0	0	0
106 Waste, hazardous (kg)	Euro	0	0	0	0	0	0	0	0	0	0	0	0

Figure 9 environmental profile RPR0600 0800 060 (characterization)

Calculation:	Analyze
Results:	Impact assessment
Product:	1 m2 _Totaal RPR 0600 0800 060 (of project _Ceyes)
Method:	SBK Bepalingsmethode, 25 mei 2018 (NMD 2.2) V3.04 / MKI-SBK single-score
Indicator:	Characterization
Skip categories:	Never
Exclude infrastructure processes:	No
Exclude long-term emissions:	Yes
Sorted on item:	Impact category
Sort order:	Ascending

Impact category	Unit	Total	A1	A2	A3	A4	A5	B	C1	C2	C3	C4	D
1 abiotic depletion, non fuel (AD)	kg Sb eq	-2,59E-05	9,73E-06	4,79E-06	4,84E-06	1,38E-06	4,60E-08	0,00E+00	0,00E+00	1,38E-06	0,00E+00	8,93E-08	-4,82E-05
2 abiotic depletion, fuel (AD)	kg Sb eq	6,00E-02	7,39E-02	9,21E-03	9,06E-04	3,59E-03	-1,60E-03	0,00E+00	0,00E+00	3,59E-03	0,00E+00	3,20E-04	-2,99E-02
4 global warming (GWP)	kg CO2 eq	1,17E+01	7,85E+00	1,28E+00	2,31E-01	4,86E-01	-1,39E-01	0,00E+00	0,00E+00	4,86E-01	0,00E+00	3,84E+00	-2,35E+00
5 ozone layer depletion (ODP)	kg CFC-11 eq	6,71E-08	8,14E-08	2,27E-07	1,54E-08	8,96E-08	-6,56E-09	0,00E+00	0,00E+00	8,96E-08	0,00E+00	7,53E-09	-4,37E-07
6 photochemical oxidation (POCP)	kg C2H4	6,47E-03	6,79E-03	6,30E-04	3,04E-04	2,87E-04	1,14E-04	0,00E+00	0,00E+00	2,87E-04	0,00E+00	2,28E-05	-1,97E-03
7 acidification (AP)	kg SO2 eq	4,79E-02	3,13E-02	3,56E-03	1,29E-02	2,11E-03	9,37E-04	0,00E+00	0,00E+00	2,11E-03	0,00E+00	5,52E-04	-5,52E-03
8 eutrophication (EP)	kg PO4--- eq	9,34E-03	5,28E-03	5,96E-04	2,92E-03	4,22E-04	2,30E-04	0,00E+00	0,00E+00	4,22E-04	0,00E+00	1,94E-04	-7,30E-04
9 human toxicity (HT)	kg 1,4-DB eq	1,49E+00	7,18E-01	4,49E-01	2,21E-01	1,95E-01	4,25E-02	0,00E+00	0,00E+00	1,95E-01	0,00E+00	2,95E-02	-3,58E-01
10 Ecotoxicity, fresh water (FAETP)	kg 1,4-DB eq	8,01E-02	5,75E-02	1,25E-02	5,42E-03	5,71E-03	7,89E-04	0,00E+00	0,00E+00	5,71E-03	0,00E+00	1,54E-03	-9,02E-03
12 Ecotoxcity, marine water (MAETP)	kg 1,4-DB eq	1,74E+02	9,61E+01	4,74E+01	1,42E+01	2,06E+01	1,81E+00	0,00E+00	0,00E+00	2,06E+01	0,00E+00	4,57E+00	-3,17E+01
14 Ecotoxicity, terrestric (TETP)	kg 1,4-DB eq	3,68E-02	1,25E-02	1,75E-03	2,16E-02	6,89E-04	5,53E-05	0,00E+00	0,00E+00	6,89E-04	0,00E+00	3,01E-04	-8,49E-04
101 Energy, primary, renewable (MJ)	MJ	2,38E+01	7,37E+00	2,59E-01	1,59E+01	1,02E-01	3,98E-01	0,00E+00	0,00E+00	1,02E-01	0,00E+00	2,46E-02	-3,98E-01
102 Energy, primary, non-renewable (MJ)	MJ	1,46E+02	1,77E+02	2,05E+01	1,87E+00	8,00E+00	-3,36E+00	0,00E+00	0,00E+00	8,00E+00	0,00E+00	6,67E-01	-6,67E+01
103 Energy, primary (MJ)	MJ	1,70E+02	1,84E+02	2,07E+01	1,78E+01	8,11E+00	-2,96E+00	0,00E+00	0,00E+00	8,11E+00	0,00E+00	6,91E-01	-6,71E+01
104 Water, fresh water use (m3)	m3	1,28E-01	1,21E-01	3,34E-03	1,13E-03	1,44E-03	-3,13E-04	0,00E+00	0,00E+00	1,44E-03	0,00E+00	5,62E-03	-5,91E-03
105 Waste, non hazardous (kg)	kg	2,28E+00	4,12E-01	8,28E-01	6,06E-02	4,60E-01	1,91E-03	0,00E+00	0,00E+00	4,60E-01	0,00E+00	1,14E-01	-5,30E-02
106 Waste, hazardous (kg)	kg	1,84E-04	8,60E-05	1,41E-04	3,72E-05	5,53E-05	7,49E-06	0,00E+00	0,00E+00	5,53E-05	0,00E+00	5,06E-06	-2,03E-04

APPENDIX B. EXTERNAL REVIEW

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CEYES B.V.
Leo van Dongen
Tappersweg 14
Office 48
2031EV Haarlem

Betreft: toetsing LCA dossier retention panels

Amsterdam, 18 maart 2019

Geachte heer Van Dongen,

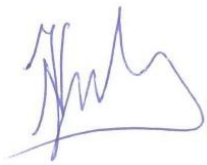
Het LCA rapport “LCA RPR retention panels produced by Ceyes B.V.”, opgesteld door Martijn Weening van SGS Search, is ons toegestuurd ter verificatie op 14 februari 2019. Als SBK-erkende LCA-deskundige heb ik het LCA-dossier getoetst volgens de ‘Bepalingsmethode Milieuprestatie gebouwen en GWW werken’ versie 3.0, januari 2019.

Op een eerste versie van het rapport heb ik commentaar geleverd, dat vervolgens door de LCA-uitvoerder naar tevredenheid is verwerkt in de definitieve versie van het rapport (11 maart 2019).

Daarom is mijn conclusie: de methodologie, dataverzameling en rapportage voldoen aan de eisen van de “Bepalingsmethode Milieuprestatie Gebouwen en GWW-werken”, met onderliggende normen ISO 14040/44, ISO 14025, ISO 21930 en NEN 8006. De resultaten kunnen worden opgenomen in de Nationale Milieudatabase.

De ingevulde beoordelingstabel uit bijlage A van het Toetsingsprotocol is apart bijgevoegd.

Met vriendelijke groet,



Niels Jonkers, Ecochain Technologies

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