ENVIRONMENTAL PRODUCT DECLARATION

Lighting column by Nedal Aluminium

Stepped, HDPE groundpart, h 3100 mm, Ø 135 mm

Approval date: 15.03.2023 **Valid to:** 15.03.2028

Prepared by: LBP|SIGHT - H. Van der Leij MSc.

DIT PRODUCT IS OPGENOMEN IN
DE NATIONALE MILIEUDATABASE

General information

COMPANY NAME	Nedal Aluminium B.V.
ADDRESS	Groenewoudsedijk 1, 3528 BG, Utrecht
DECLARATION OWNER	Nedal Aluminium
WEBSITE	https://www.nedal.com/

Overview	
Product type	Lighting column
Product name	Nedal lighting column Faubourg
Product description	Stepped, HDPE groundpart, h 3100 mm, Ø 135 mm
Declared unit	1 piece - Aluminum Lighting column with HDPE groundpart, installed in the ground, produced by Nedal with a base diameter of 120 - 145 mm, a pole height of 3.1 - 9.0 m, with average length bracket. • Reference product for EPD: stepped lighting column, 135 mm base diameter, 3.1 m pole height, with average length bracket.
Reference service life (RSL)	50 years
Reference LCA study	LCA-rapportage categorie 1 productkaart voor de NMD (in Dutch), by H. Van der Leij MSc.
Product category rules (PCR)	In accordance with - NEN-EN 15804:2012+A1+A2 (2019), NMD Bepalingsmethode Milieuprestatie Bouwwerken (NMD Determination Method of construction works, Dutch PCR), version 1.1, March 2022. - ISO 14025 and EN 15804 EPD's of construction products may not be comparable if they do not comply with these standards.
Application	Lighting of outdoor areas
Scope of application of the EPD	Lighting columns, produced by Nedal Aluminium
Used background databases	Ecoinvent 3.6 (2019) and NMD 3.6 (2022)
LCIA method used	NMD 3.6, based on EN 15804:A2 (2019)
Program operator	This environmental declaration is included in the Nationale Milieudatabase, Visseringlaan 22b, 2288 ER Rijswijk, The Netherlands. ProductID: 94020
Third party reviewer (report)	Martijn van Hövell, SGS Search
Third party reviewer (EPD)	-
Data collection period	01/2021 – 01/2022

About Nedal Aluminium

Nedal Aluminium develops, produces and sells aluminium profiles and lighting columns. With 85 years of experience, Nedal provides products for challenging and demanding applications.

The Nedal product portfolio is characterized by a wide variety of products. These are products with a high weight per meter and precise tolerances, at the same time meeting the high requirements with respect to e.g. strength or electrical conductivity. It includes an extensive range of lighting columns, suitable for every location and every soil type. Nedal also produces other types of columns, such as traffic and passive safety columns and is able to make many types of customized products (specials).

The Nedal columns are suitable for private owned properties as well as municipal and road authorities. The columns are made entirely of aluminium and are protected against corrosion. The columns do not need any paint or coating, making sure that little or no residues end up in the local environment over the years. The service life of the columns is 50 years or more, with proper installation and use.

Product information

Lighting columns
Nedal produces mainly conical and stepped columns. In all cases, this concerns lighting columns that are extruded from a single piece of aluminum. The products are produced in accordance with EN 40-6 in terms of strength and stability.

Ground protection is a part of the lighting column that protects against corrosion caused by stray currents in the soil. A base made of aluminum coated with thermoplastic can protect against this, but for several years, base protection made of High-Density Polyethylene (HDPE) has also been used as an alternative. The Nedal columns are Cradle to Cradle and CE certified.

HDPE lighting column product family
The lighting columns can be manufactured in many sizes, of which the most used and most common sizes are included in the LCA study, exclusively with HDPE base. Application of scaling ensures that the environmental score is adjusted within the defined range of dimensions. These have a base diameter of 114 mm to 202 mm and a column height of 1.6 m to 15 m.

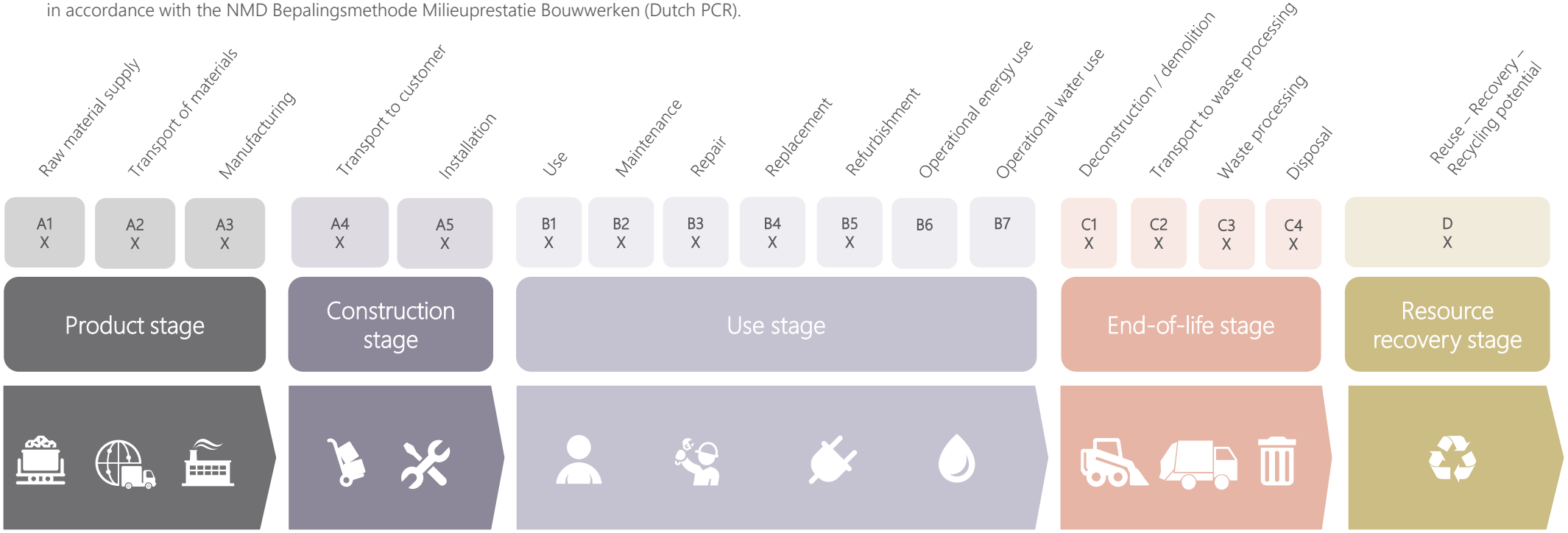
The columns can be supplied without, or with one or two brackets. In columns with two brackets, these are often smaller and lighter compared to a version with a single bracket. An average bracket is included in the study, based on sales data of Nedal in the reference year. This means that the environmental score is representative for lighting columns with (one or two) and without brackets.

Reference product
The reference product is a stepped lighting column with a height of 3100 mm and a base diameter of 135 mm, with average length bracket. The reference service life is 50 years.

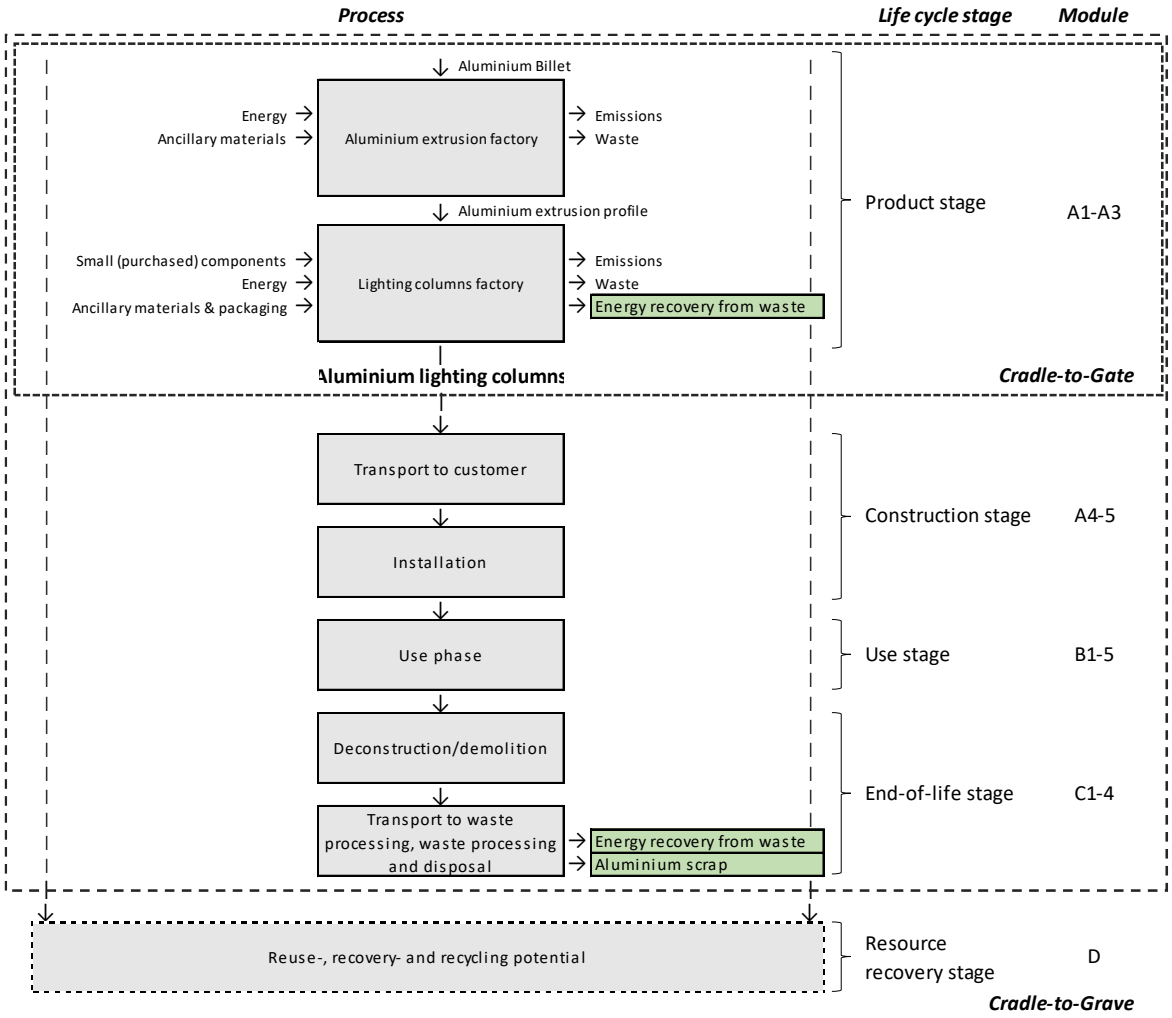
Declaration of material content of SVHC
The lighting columns by Nedal do not contain any substances from the Candidate List of Substances of Very High Concern for authorization.

System boundary

This LCA considers a cradle to grave system with module D (full life cycle).
The figure below shows which phases are considered in this analysis. Modules B6 and B7 are excluded in accordance with the NMD Bepalingsmethode Milieuprestatie Bouwwerken (Dutch PCR).



Life cycle information – Process tree



System boundaries

Production stage, A1-A3
In the extrusion factory, the input is formed by 'billets' (a solid rod) of aluminum, with alloying elements. The billets are extruded into aluminum tubes with a fixed diameter as a semi-finished product. For the lighting columns, Nedal uses billets with a high secondary aluminium content (>95%).

In the lighting column factory, the tubes are processed further until they have the desired dimensions (wall thickness, diameters and length) and they are 'aged' so that the strength properties of the lighting column are improved. A door is milled into the aluminum and the column is further assembled with purchased components necessary for connecting and mounting the light poles. A small amount of packaging material is used to prevent damage during transport to the project location.

Transport and construction process stage, A4-A5
A4: The lighting columns are transported to the customer by lorry over an average distance of 150 km (NMD prescribed transport mode and distance).

A5: The lighting columns are installed manually (small masts) or with cranes. Typically, no product losses occur during transport or installation, so no installation losses are included in the LCA. The packaging materials are processed as waste in this stage in accordance with the prescribed set of scenario values for the end-of-life stage by the Bepalingsmethode, as given in the table.

Use stage, B1-B5
There are no emissions or environmental impacts during the use stage. The use stage is declared as '0'.

End-of-life-stage, C1-C4
C1: The lighting columns are deinstalled manually (small masts) or with a crane.
C2-C4: The waste in this stage is also processed by the set of scenario values for the end-of-life-stage, as prescribed by the Bepalingsmethode and displayed in the table.

Resource and energy recovery stage, D
Aluminum scrap can be recycled with a high degree of value retention. Secondary aluminum is released in the form of post- or pre-consumer scrap. Pre-consumer aluminum scrap is mainly released by production companies.

Secondary aluminium can replace primary aluminium at a foundry after treatment. To reach the point of substitution after the end-of-waste point, it also needs to be transported to a foundry. Corresponding environmental impacts are included in the LCA.

The recycling loads and benefits of the packaging materials (A5) after reaching end-of-waste, are included in module D.

Applied end-of-life scenario's, in accordance with the NMD Bepalingsmethode			
	Landfill	Incineration	Recycling
Transport distance lorry (km)	100	150	50
Wood (packaging)	10%	85%	5%
Aluminium	0%	3%	97%
HDPE groundpart	0%	90%	10%
Small parts, steel	5%	5%	90%
Small parts, plastics	20%	80%	0%

Allocation

Closed loop recycling

Production scrap is allocated with the 'closed loop recycling' calculation method. With closed loop recycling, a correction is applied to the secondary content of the material based on the production scrap. The corrected secondary content is used for calculating module D impacts.

Cut-off rules

In line with paragraph 6.3.6 of the EN15804:A2 and NMD Determination Method, all significant input and output streams must be included in the calculations.

- A cut-off process may not contribute to more than 1% of the energy usage and may not exceed 1% of the mass. Processes excluded from the calculations may not contribute to more than 5% of the total energy usage or total mass.
- The sum of the processes excluded from the calculations, may not contribute to more than 5% of the total energy usage or total mass.
- Some of the smallest (purchased) components and some of the packaging is not included in the LCA. The (very small) weight of these components could not reliably be determined. Based on contribution analysis, the impact of these omissions is estimated to fall far below the cut-off criteria.

In line with EN 15804 the following processes are not considered within the system boundaries of this LCA.

- Overhead processes, like office departments, personal transportation, etc.
- Production, maintenance and the end-of-life stage of capital goods like buildings, machinery, etc.

It is not to be expected for the above-mentioned processes to contribute significantly to the environmental profile of lighting columns.

Life cycle assessment results

In accordance with EN15804/A1:2013 – NMD Determination method (set 1), for product unit: *1 piece of stepped lighting column, 135 mm base diameter, 3.1 m pole height, with average length bracket, reference service life 50 years.*

Environmental indicator	Unit	A1-A3	A4	A5	B1-B5	C1	C2	C3	C4	D
001. Abiotic depletion, non fuel (AD)	kg Sb eq.	5,35E-02	6,58E-06	1,64E-05	0,00E+00	1,61E-05	5,40E-06	1,52E-05	7,79E-08	2,31E-04
002. Abiotic depletion, fuel (AD)	kg Sb eq.	2,96E-01	1,89E-03	5,32E-02	0,00E+00	5,32E-02	1,55E-03	2,37E-03	3,81E-05	-5,29E-02
004. Global warming (GWP)	kg CO_2 eq.	3,31E+01	2,57E-01	7,80E+00	0,00E+00	7,79E+00	2,11E-01	7,92E+00	4,69E-03	-5,79E+00
005. Ozone layer depletion (ODP)	kg CFK-11 eq.	3,14E-06	4,57E-08	1,37E-06	0,00E+00	1,37E-06	3,75E-08	4,26E-08	7,90E-10	-5,59E-07
006. Photochemical oxidation (POCP)	kg ethyleen eq.	1,79E-02	1,55E-04	2,42E-03	0,00E+00	2,40E-03	1,27E-04	2,71E-04	4,48E-06	-1,48E-03
007. Acidification (AP)	kg SO_2 eq.	1,18E-01	1,13E-03	3,23E-02	0,00E+00	3,22E-02	9,28E-04	3,17E-03	2,03E-05	-1,02E-02
008. Eutrophication (EP)	kg PO_4- eq.	1,53E-02	2,22E-04	6,76E-03	0,00E+00	6,73E-03	1,82E-04	6,07E-04	3,86E-06	-1,14E-03
009. Human toxicity (HT)	kg 1,4-DCB eq.	1,87E+01	1,08E-01	2,40E+00	0,00E+00	2,39E+00	8,89E-02	5,78E-01	2,83E-03	-1,32E+00
010. Ecotoxicity, fresh water (FAETP)	kg 1,4-DCB eq.	3,79E-01	3,16E-03	4,59E-02	0,00E+00	4,58E-02	2,60E-03	9,18E-02	7,88E-05	-1,02E-02
012. Ecotoxicity, marine water (MAETP)	kg 1,4-DCB eq.	1,18E+03	1,14E+01	1,52E+02	0,00E+00	1,52E+02	9,34E+00	1,50E+02	1,76E-01	-6,37E+01
014. Ecotoxicity, terrestric (TETP)	kg 1,4-DCB eq.	6,59E-02	3,83E-04	2,32E-02	0,00E+00	2,31E-02	3,14E-04	1,38E-03	9,33E-06	-2,40E-03
MKI	**€**	**€ 4,17**	**€ 0,03**	**€ 0,83**	**€ 0,00**	**€ 0,83**	**€ 0,03**	**€ 0,49**	**€ 0,00**	**€ -0,48**

Life cycle assessment results

In accordance with EN15804/A2:2019 – NMD Determination method (set 2), for product unit: *1 piece of stepped lighting column, 135 mm base diameter, 3.1 m pole height, with average length bracket, reference service life 50 years.*

Environmental indicator	Unit	A1-A3	A4	A5	B1-B5	C1	C2	C3	C4	D
051. Climate change	kg CO_2 eq.	3,97E+01	2,60E-01	8,39E+00	0,00E+00	7,84E+00	2,13E-01	7,92E+00	4,92E-03	-5,88E+00
052. Climate change – Fossil	kg CO_2 eq.	3,38E+01	2,60E-01	7,84E+00	0,00E+00	7,83E+00	2,13E-01	7,93E+00	4,89E-03	-5,89E+00
053. Climate change – Biogenic	kg CO_2 eq.	5,91E+00	1,20E-04	5,45E-01	0,00E+00	7,94E-03	9,83E-05	-1,34E-02	3,00E-05	1,36E-02
054. Climate change - Land use and LU change	kg CO_2 eq.	7,44E-02	9,51E-05	1,17E-03	0,00E+00	1,17E-03	7,80E-05	3,34E-04	1,48E-06	-4,53E-03
055. Ozone depletion	kg CFC11 eq.	3,40E-06	5,73E-08	1,72E-06	0,00E+00	1,71E-06	4,70E-08	4,93E-08	9,81E-10	-6,31E-07
056. Acidification	mol H^+ eq.	1,46E-01	1,51E-03	4,36E-02	0,00E+00	4,35E-02	1,24E-03	4,09E-03	2,66E-05	-1,26E-02
057. Eutrophication, freshwater	kg P eq.	9,57E-04	2,62E-06	5,06E-05	0,00E+00	5,04E-05	2,15E-06	1,82E-05	6,92E-08	-4,79E-05
058. Eutrophication, marine	kg N eq.	3,05E-02	5,30E-04	1,66E-02	0,00E+00	1,66E-02	4,35E-04	1,17E-03	8,83E-06	-2,55E-03
059. Eutrophication, terrestrial	mol N eq.	3,47E-01	5,85E-03	1,83E-01	0,00E+00	1,82E-01	4,80E-03	1,31E-02	9,42E-05	-2,93E-02
060. Photochemical ozone formation	kg NMVOC eq.	1,09E-01	1,67E-03	4,74E-02	0,00E+00	4,72E-02	1,37E-03	3,46E-03	2,97E-05	-9,20E-03
061. Resource use, minerals and metals [2]	kg Sb eq.	5,35E-02	6,58E-06	1,64E-05	0,00E+00	1,61E-05	5,40E-06	1,52E-05	7,79E-08	2,31E-04
062. Resource use, fossils [2]	MJ	5,89E+02	3,91E+00	1,13E+02	0,00E+00	1,13E+02	3,21E+00	4,92E+00	7,72E-02	-9,75E+01
063. Water use [2]	m^3 depriv.	1,96E+01	1,40E-02	2,22E-01	0,00E+00	2,19E-01	1,15E-02	6,81E-02	-2,63E-03	-7,11E-01
064. Particulate matter	disease inc.	1,65E-06	2,33E-08	1,29E-07	0,00E+00	1,27E-07	1,91E-08	4,44E-08	8,76E-10	-1,14E-07
065. Ionising radiation [1]	kBq U-235 eq.	1,11E+00	1,64E-02	4,91E-01	0,00E+00	4,90E-01	1,35E-02	2,01E-02	2,86E-04	-4,68E-02
066. Ecotoxicity, freshwater [2]	CTUe	9,74E+02	3,49E+00	7,10E+01	0,00E+00	7,08E+01	2,86E+00	1,74E+01	1,50E+00	-3,84E+01
067. Human toxicity, cancer [2]	CTUh	3,64E-08	1,13E-10	1,37E-08	0,00E+00	1,36E-08	9,29E-11	7,13E-10	6,45E-12	-1,91E-09
068. Human toxicity, non-cancer [2]	CTUh	7,76E-07	3,82E-09	1,16E-07	0,00E+00	1,15E-07	3,13E-09	2,80E-08	1,60E-10	-3,09E-08
069. Land use [2]	Pt	1,03E+03	3,39E+00	1,55E+01	0,00E+00	1,54E+01	2,79E+00	7,43E+00	1,13E-01	-3,07E+01

[1] *Disclaimer 1 – This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.*

[2] *Disclaimer 2 – The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.*

Life cycle assessment results

Material use, waste and outputs for product unit: *1 piece of stepped lighting column, 135 mm base diameter, 3.1 m pole height, with average length bracket, reference service life 50 years.*

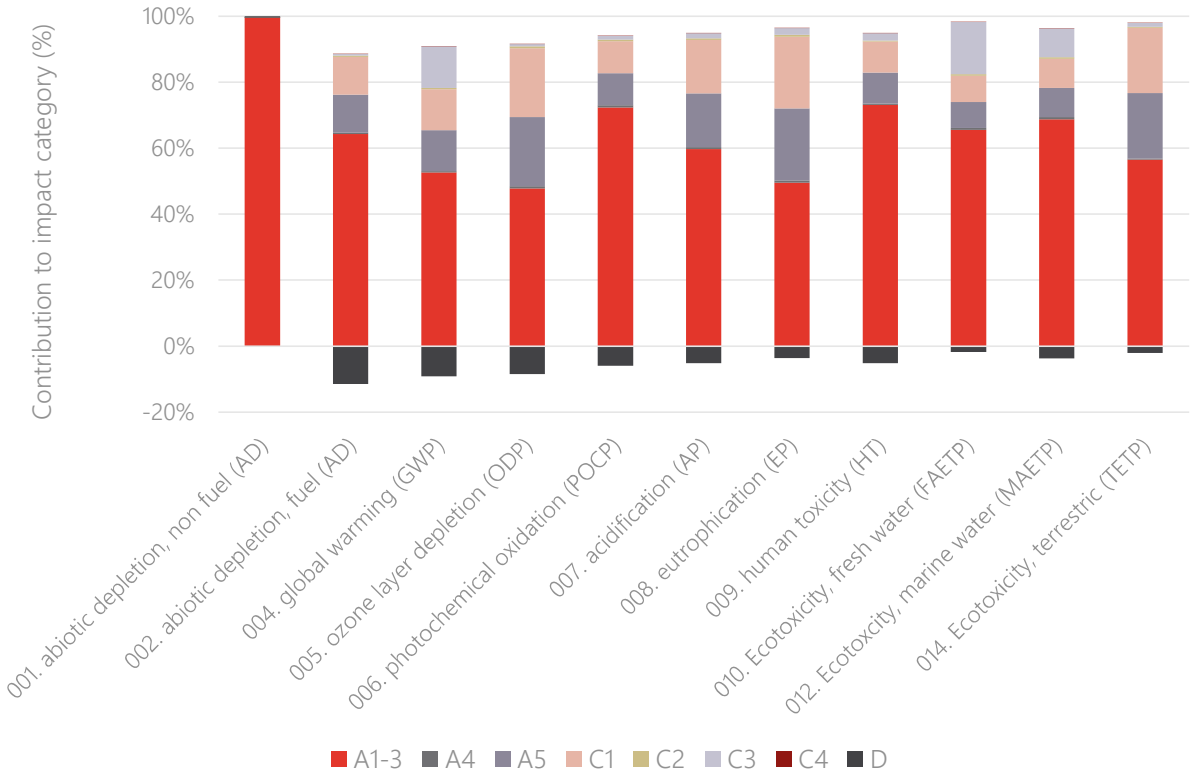
Environmental indicator	Unit	A1-A3	A4	A5	B1-B5	C1	C2	C3	C4	D
111. Energy, primary, renewable, excluding usage as material	MJ	7,96E+01	4,90E-02	1,29E+00	0,00E+00	1,29E+00	4,02E-02	5,68E-01	1,38E-03	-7,35E+00
113. Energy, primary, renewable, used as material	MJ	6,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
101. Energy, primary, renewable (MJ)	MJ	8,56E+01	4,90E-02	1,29E+00	0,00E+00	1,29E+00	4,02E-02	5,68E-01	1,38E-03	-7,35E+00
112. Energy, primary, non-renewable, excluding usage as material	MJ	4,82E+02	4,16E+00	1,20E+02	0,00E+00	1,20E+02	3,41E+00	5,24E+00	8,21E-02	-1,07E+02
114. Energy, primary, non-renewable, used as material	MJ	1,53E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
102. Energy, primary, non-renewable (MJ)	MJ	6,35E+02	4,16E+00	1,20E+02	0,00E+00	1,20E+02	3,41E+00	5,24E+00	8,21E-02	-1,07E+02
108. Secondary material (kg)	kg	1,40E+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
109. Secondary fuel, renewable (kg)	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
110. Secondary fuel, non-renewable (kg)	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
104. Water, fresh water use (m3)	m^3	5,98E-01	4,77E-04	8,99E-03	0,00E+00	8,79E-03	3,91E-04	2,84E-03	-5,82E-05	-1,48E-02
106. Waste, hazardous (kg)	kg	2,03E-02	9,92E-06	2,97E-04	0,00E+00	2,97E-04	8,14E-06	1,88E-05	1,62E-07	3,77E-04
105. Waste, non hazardous (kg)	kg	4,37E+00	2,48E-01	3,30E-01	0,00E+00	2,77E-01	2,04E-01	2,12E-01	1,08E-02	-2,51E-01
107. Waste, radioactive (kg)	kg	1,05E-03	2,57E-05	7,69E-04	0,00E+00	7,68E-04	2,11E-05	2,42E-05	4,40E-07	-6,02E-05
120. Components for re-use (kg)	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
121. Materials for recycling (kg)	kg	1,34E-01	0,00E+00	2,15E-02	0,00E+00	0,00E+00	0,00E+00	9,58E+00	0,00E+00	0,00E+00
122. Materials for energy recovery (kg)	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
123. Exported energy, electric (MJ)	MJ	5,73E+00	0,00E+00	9,18E-01	0,00E+00	0,00E+00	0,00E+00	1,92E+01	0,00E+00	0,00E+00
124. Exported energy, thermal (MJ)	MJ	9,86E+00	0,00E+00	1,58E+00	0,00E+00	0,00E+00	0,00E+00	3,30E+01	0,00E+00	0,00E+00

Contribution analysis of reference product

Most of the impact categories are dominated by the production (A1-A3) of the aluminium in the lighting column. Another significant impact is formed by (de)installation efforts. These are relatively high in comparison to production, because the high secondary aluminium content makes lighting column production relatively environmentally friendly.

In turn, the high secondary aluminium content lowers net benefits of recycling, leading to a low contribution of benefits in module D.

Other end-of-life processing and transportation impacts have a low relevance regarding the considered impact categories.



Material composition & packaging

This table lists the material composition that comprises the Nedal reference product and the packaging mass.

Material	Mass based amounts	Unit
Aluminium in column / bracket	75-80	%
HDPE groundpart	20-25	%
Small components, various plasctics	<1	%
Small components, aluminium	<1	%
Small components, chromium steel	<1	%
Packaging (wood)	4.29E-01	kg

Biogenic content

Lighting columns by Nedal do not contain biogenic material. The wooden packaging materials do contain biogenic carbon.

Biogenic carbon	Biogenic carbon mass [kg]	Embodied CO_2-content [kg CO_2- eq.]
Biogenic carbon in the product	-	-
Biogenic carbon in the packaging	1,89E-01	6,92E-01
NOTE 1 kg biogenic carbon equals to 44/12 kg of CO_2. Carbon content wood 0.5 kg/kg wood, 12% moisture content assumed.		

Nedal® ALUMINIUM