ENVIRONMENTAL PRODUCT DECLARATION

as per *ISO 14025* and *EN 15804+A2*

Owner of the Declaration	**NedZink B.V.**
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-NED-20200256-IBA1-EN
Issue date	22.03.2022
Valid to	21.03.2027

NedZink NATUREL

NedZink B.V.

Institut Bauen und Umwelt e.V.

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ECO PLATFORM EPD VERIFIED

1. General Information

NedZink B.V.

Programme holder
IBU – Institut Bauen und Umwelt e.V.
Panoramastr. 1
10178 Berlin
Germany

Declaration number
EPD-NED-20200256-IBA1-EN

This declaration is based on the product category rules:
Building metals, 11.2017
(PCR checked and approved by the SVR)

Issue date
22.03.2022

Valid to
21.03.2027

Dipl. Ing. Hans Peters
(chairman of Institut Bauen und Umwelt e.V.)

Dr. Alexander Röder
(Managing Director Institut Bauen und Umwelt e.V.))

NedZink NATUREL

Owner of the declaration
NedZink B.V.
Hoofdstraat 1
6024 AA, Budel-Dorplein
Netherlands

Declared product / declared unit
1kg NedZink® NATUREL, bright-rolled titanium zinc

Scope:
The Life Cycle Assessment (LCA) was carried out according to *ISO 14040*, *ISO 14044* and *EN 15804*.
The LCA is performed for NedZink® NATUREL manufactured by NedZink B.V. in Budel-Dorplein, Netherlands.
The natural rolled zinc from NedZink covered by this EPD can be used in buildings as roof, façade or rainwater systems.
The LCA was carried out for the manufacturing phase of the declared product, containing information on raw and secondary material production, transport and packaging (cradle to gate). Possible credits after the end of life phase (module D), demolition (C1), transport to waste processing and disposal (C2), waste processing (C3) and waste disposal (C4) are also included.

The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.
The EPD was created according to the specifications of *EN 15804+A2*. In the following, the standard will be simplified as *EN 15804*.

Verification

The standard *EN 15804* serves as the core PCR
Independent verification of the declaration and data according to *ISO 14025:2010*
☐ internally ☒ externally

Mr Olivier Muller
(Independent verifier)

2. Product

2.1 Product description/Product definition

NedZink® NATUREL is titanium zinc produced by NedZink according to *EN 988*.
Small quantities, as specified in *EN 988*, of the alloy elements copper, titanium and aluminium are added to electrolytically refined zinc (with a purity of min. 99,995% Zn, Z1 according to *EN 1179*).
The chemical composition, mechanical and physical properties and measurement tolerances are determined in the *KOMO product certificate* and certified as NedZink NTZ® by *Lloyd's Register Product certificate (approval No QIS 122)*.
The defined material properties are checked by an independent and neutral research institute. This product certification and the *ISO 9001* certificate for the quality management system at NedZink assure a constant and uniform high-quality standard.

For the placing on the market of the product in the European Union/European Free Trade Association (EU/EFTA) (with the exception of Switzerland) *Regulation (EU) No. 305/2011* (CPR) applies. The product needs a Declaration of Performance taking into consideration *EN 14782*:2006, Self-supporting metal sheet for roofing, external cladding and internal lining, or *EN 14783*:2013, Fully supported metal sheet and strip for roofing, external cladding and internal lining, and the CE-marking.
For the application and use the respective national provisions apply.

2.2 Application

NedZink® NATUREL titanium zinc coils, sheets, strips and profiles are used for:
- roof and façade cladding (CE-marked based on *EN14782*:2006, Self-supporting metal sheet for roofing, external cladding and internal lining or *EN14783*:2013, Fully supported metal sheet and strip for roofing, external cladding and internal lining)
- interior use
- roof drainage systems (gutters, downpipes and accessories according to *EN612*)
- ornaments

2.3 Technical Data

The main constructional data are presented in the following table:

Constructional data

Name	Value	Unit
Coefficient of thermal expansion	22	$10^{-6}K^{-1}$
Tensile strength	≥ 150	N/mm^2
Compressive strength	Not relevant	N/mm^2
Modulus of elasticity	≥ 80000	N/mm^2
Melting point	420	°C
Thermal conductivity	110	W/(mK)
Electrical conductivity at 20°C	17000000	$\Omega^{-1}m^{-1}$
Density	7200	kg/m^3

Required testing standards are described in *EN 988*.

Performance data of the product in accordance with the declaration of performance with respect to its essential characteristics according to *EN 14782* and *EN 14783* respectively.

2.4 Delivery status

NedZink material is delivered in thicknesses from 0.5 to 1.5 mm. As average production data is considered, the LCIA results reflect the environmental profile of weighted average product thickness: 0.727 mm.
The maximum width of sheets, coils and strips is 1000 mm.
The standard sheets are delivered in 1000 x 2000 mm, 1000 x 2250 mm and 1000 x 3000 mm.
Finished products are delivered to customer specification.

Application rules:
EN988:1996, Zinc and zinc alloys - Specifications for rolled flat products for buildings
EN612:2005, Eaves gutters with bead stiffened fronts and rainwater pipes with seamed joints made of metal sheet

2.5 Base materials/Ancillary materials

Components of NedZink alloy

The composition of bright rolled zinc from NedZink is in accordance with *EN988*:
- Special-High-Grade zinc 99.995% (Z1 according to *EN 1179*)
- Copper: 0.08 - 0.17%
- Titanium: 0.07 - 0.12%
- Aluminium: ≤ 0.015%

Auxiliary substances

Lubricant oil: 0.65 kg/t zinc.

None of the components included in the final product is listed in the *Candidate List of Substances of Very High Concern for Authorisation* (SVHC) dated 01/2018. The product does not contain substances with carcinogenic mutagenic reprotoxic (CMR) properties >0.1%.

This product/article/at least one partial article contains substances listed in the candidate list (dated 01/2018) exceeding 0.1 percentage by mass: **no**

This product/article/at least one partial article contains other CMR substances in categories 1A or 1B which are not on the candidate list, exceeding 0.1 percentage by mass**: no**

Biocide products were added to this construction product or it has been treated with biocide products (this then concerns a treated product as defined by the (EU) Ordinance on Biocide Products No. 528/2012): **no**

2.6 Manufacture

The manufacturing process of high grade rolled zinc includes the following steps:

Pre-alloy:
In order to improve the properties of zinc, and for energy saving purposes, a pre-alloy with titanium, copper and aluminium is prepared in an induction furnace. This pre-alloy is poured into ingots.

Melting:
In the melting furnace the Special High Grade (SHG) zinc and the ingots are mixed homogeneously. Zinc with the right composition is pumped to the casting furnace.

Casting:
Casting takes place from the casting furnace into a vertical casting installation. The zinc is cast into blocks, cooled down with a closed water system and stored for further processing.

Rolling and coiling:
Blocks coming from the casting installation are homogeneous pre-heated for the “hot rolling” process. This takes place in a gas-fired continuous oven. During the hot rolling on a reversible rolling machine the blocks are processed to a predefined thickness. At the end of the rolling installation the zinc is coiled and stored to cool off.
On the reversible cold-rolling mill the coils are rolled to the desired final thickness. For cooling and lubrication of the process a special emulsion is used

Stretching and cutting:
Tension in the coils is released by a stretching- and straightening process. The zinc is uniquely marked and slitted and cut to the desired width and length.

Quality control:
During the entire process extensive quality checks are conducted by the manufacturer and Lloyd's Register. Quality Management according to *ISO 9001*.
Product quality is checked by Lloyd's Register and approved with an Industrial Quality Scheme Approval Certificate *QIS122.*

Additionally, the quality control is audited by Kiwa and certified with *KOMO product certificates*:
- BRL2034, KOMO K7054/04 zinc sheets

- BRL2035, KOMO K7057/04 zinc gutters
- BRL2044, KOMO K7063/04 zinc downpipes

2.7 Environment and health during manufacturing

The manufacturing process is carried out according to the rules as laid down in the environmental permit. NedZink's policy follows the Total Quality Management (TQM).
The directives of the Environmental Management System *ISO14001* are an integral part of the Quality Management System *ISO9001*.

2.8 Product processing/Installation

Basic principles:
NedZink material must be stored under dry and ventilated conditions. This applies to storage in warehouses, on building sites, on installation sites as well as during transportation. Coils are to be stored on their original pallets.

Transportation should only be done in enclosed vehicles.

Temperature deviations have to be avoided as it can result in varying humidity levels.
All contact between zinc and moisture (wet surface, rain or dew) during handling and transportation must be avoided. Wet surfaces (with or without protective film) may not directly be covered.

The material is to be processed without tension.

The thermal expansion has to be taken into account when installing/handling the product.

Mechanical deformation of zinc should be avoided in case the zinc temperature is not at least 7°C.

Further installation rules are listed on www.nedzink.com.

2.9 Packaging

The packaging material in use are wooden pallets, paper/cardboard and plastics (films and wires). All packaging materials are reusable and/or recyclable, if gathered separately.
The take-back and recycling of our packaging in Germany is organized by Interseroh.

2.10 Condition of use

NedZink material develops a protective patina layer, which darkens the material slightly over time due to a reaction with oxygen and carbon dioxide (air and water). This layer is responsible for the high resistance of titanium zinc against corrosion.
Zinc in contact with air creates a zinc-oxide. Due to the influence of water a zinc-hydroxide is developed. In the final step a reaction with carbon dioxide creates a non-water-soluble coating of basic zinc carbonate, being the patina. Therefore NedZink material does not require any maintenance and cleaning during the period of use. If the surface is slightly damaged, this naturally formed patina layer will heal itself.

NedZink material is UV-resistant, non-flammable and resistant to radiating heat. Direct contact with chemical substances, especially those containing acids, has to be avoided. A list of substances to be avoided can be found on www.nedzink.com.

The material has a repellent effect to electrosmog (electromagnetic radiation) and the effects of rain and snow may be neglected.

2.11 Environment and health during use

Environment
The due to air and water formed patina (zinc carbonate) is a natural protection layer. Due to this patina the transfer of zinc ions via rain water is constantly reduced, because this protection layer is non-water-soluble.
Further transfer of zinc ions is mainly related to the air pollution with SO_2. Due to the reduction of SO_2 concentration in the air, the zinc-concentration of precipitation in the rainwater has subsequently been reduced to one fifth of the former values during the last thirty years.
As a result of all environmental regulations this amount will reduce even more in the future, due to the reduction of SO_2 concentration in the air. The transfer of zinc ions via rain water is constantly reduced due to the development of a natural protection layer of zinc carbonate.

In aquatic systems only a small part of the total zinc concentration is available for organisms (bioavailable). It is related to the physical-chemical conditions of the receiving water body.

Health
When used according to their designated function, NedZink products will have no health effects.
Zinc is an essential metal, necessary for living organisms. Zinc does not accumulate in the body.
The recommended daily intake of zinc (in the correct form) according to the WHO is 15mg/day for men and12mg/day for women.

2.12 Reference service life

The service life depends on the correct application according to the guidelines for processing and installation. The theoretical lifetime according to the available literature is > 100 years.
Service lifetime according to *Bundesinstitut für Bau-Stadt- und Raumforschung (BBSR)*: > 50 years.

As the EPD scope is a cradle-to-gate with options, no reference service life is declared in the LCA.

The standard *ISO 15686* has not been considered.

2.13 Extraordinary effects

Fire
The NedZink® products comply with *EN13501-1*: the requirements of building material Class A1 "non-combustible". (*96/603/EC*)

Fire protection

Name	Value
Building material class EN13501 DIN4102	A1
Burning droplets EN13501	D0
Smoke gas development EN13501	-

Smoke production
Vaporization as zinc oxide (ZnO) occurs when heated above 650 °C. The produced ZnO smoke may cause zinc fever (diarrhoea, dry throat, feverish) when inhaled over some (period of) time. The effects disappear completely in 1 to 2 days after the

inhalation.

Water
Zinc is not classified as hazardous for the aquatic environment.

Mechanical destruction
Given the metallic nature of the product, there will be no environmental effect.

2.14 Re-use phase

Disassembly:
During disassembly of a building construction or renovations, NedZink material should be separated from other materials. Zinc can then easily be collected for re-use and/or recycling.

Re-use/Recycling:
Scrap produced during the manufacturing process from NedZink material are 100% remelted and fed back completely into NedZink's production process. A small amount of residue (skimmings, dross, dust), which is no longer valuable for the internal production process, is completely recycled by a third party (European Waste Code 10.05.01).

The scrap from demolition and renovation work on building sites is collected and sold either directly to secondary smelting works or via a scrap metal dealer. The recycling rate for zinc sheets is over 95%. Credits for this recycling are appointed in module D. These credits are based on a recycling percentage of 95% (European recycling rate for rolled zinc).

2.15 Disposal

Due to the effective recycling process, a maximum of 5% zinc has to be disposed.
The European Waste Code for collected zinc after disassembly is 17.04.04.

2.16 Further information

Additional information, optional details, references, data sheets can be obtained at: www.nedzink.com

3. LCA: Calculation rules

3.1 Declared Unit

The declared unit is 1 kg of NedZink NATUREL, bright-rolled titanium zinc.

Declared unit

Name	Value	Unit
Declared unit	1	kg
conversion factor [Mass/Declared Unit]	1	-
Gross density	7200	kg/m^3

3.2 System boundary

Type of the EPD: Cradle-to-Gate with options. Modules A1, A2 and A3 contain information on the raw- and secondary material extraction, transport to the manufacturer, manufacturing and packaging.
Module C1 - C4 (end of life) and module D (applicable to the aforementioned modules) are declared. Modules A4, A5 and B1-B7 are not declared.

3.3 Estimates and assumptions

No major assumptions and estimations were necessary for the LCA.

3.4 Cut-off criteria

No major cut-offs were applied to specific manufacturing data from Nedzink. Production impacts of packaging for raw materials are not known and excluded, waste processing of this packaging is known and included. For upstream data a background database (*Ecoinvent V3.6*) was used, which can contain additional cut-offs.

3.5 Background data

Background processes are taken from the *Ecoinvent V3.6* database (2019), with the “allocation, cut-off by classification” system model.
Life cycle inventory data for the production of zinc concentrate and SHG Zinc in the *Ecoinvent V3.6* database is updated with the most recent LCA report (*Zinc Environmental Profile - 2015 Update*) on primary Zinc by the *International Zinc Association (IZA)*.

The environmental impact of the SHG Zinc was then calculated using *SimaPro V9.0*. Site-specific data was provided by NedZink and verified against earlier studies.

3.6 Data quality

The data used for this study was both of high quality and recent. The specific data was collected by the manufacturer, The generic data that is used is less than 10 years old or has been updated within this period. This is in compliance with the data quality requirements of *EN 15804*.

3.7 Period under review

Site-specific data for the years 2019 and 2020 was used in this study. Background data is taken from the *Ecoinvent V3.6* database (2019) and varies in age.

3.8 Allocation

Allocation was avoided in this study, as required in *EN 15804*. However, in the background database, allocation can be applied.

3.9 Comparability

Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to *EN 15804* and the building context, respectively the product-specific characteristics of performance, are taken into account.

The used background database is *Ecoinvent V3.6* database (2019).

4. LCA: Scenarios and additional technical information

Characteristic product properties
Information on biogenic Carbon
The biogenic carbon content quantifies the amount of biogenic carbon in a construction product leaving the factory gate, and it shall be separately declared for the product and for any accompanying packaging. If the total mass of biogenic carbon-containing materials is less than 5 % of the total mass of the product and accompanying packaging, the declaration of biogenic carbon content may be omitted. The mass of packaging containing biogenic carbon shall always be declared. Note: 1 kg biogenic Carbon is equivalent to 44/12 kg of CO2

Modules A4, A5, B1-B7 are not considered in this study. The possible credits given in Module D are based on 100% recyclability of zinc products. After the collection (a collection rate of 95% is taken), zinc scrap is re-melted and converted to secondary zinc. This is not done by NedZink but by third parties. The possible credit for the zinc gained through re-melting is calculated using the dataset of the primary zinc production. The remaining zinc (5%) is landfilled (module C4).

End of life (C4) / Recycling potentials (D)

Name	Value	Unit
Recycling	95%	kg
Landfilling	5%	kg

5. LCA: Results

Disclaimer:
EP-freshwater: This indicator has been calculated as “kg P eq” as required in the characterization model (EUTREND model, Struijs et al., 2009b, as implemented in ReCiPe; http://eplca.jrc.ec.europa.eu/LCDN/developerEF.xhtml)

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; ND = MODULE OR INDICATOR NOT DECLARED; MNR = MODULE NOT RELEVANT)

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	ND	ND	ND	ND	MNR	MNR	MNR	ND	ND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 kg of NEDZINK natural

Core Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Global warming potential - total	[kg CO_2-Eq.]	3.22E+0	1.73E-4	6.92E-3	5.73E-2	2.64E-4	-2.50E+0
Global warming potential - fossil fuels	[kg CO_2-Eq.]	3.11E+0	1.73E-4	6.91E-3	5.72E-2	2.63E-4	-2.39E+0
Global warming potential - biogenic	[kg CO_2-Eq.]	9.82E-2	4.82E-8	4.20E-6	3.09E-5	5.22E-7	-1.04E-1
GWP from land use and land use change	[kg CO_2-Eq.]	9.86E-3	1.37E-8	2.45E-6	9.83E-6	7.34E-8	-8.17E-3
Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	2.46E-7	3.74E-11	1.59E-9	1.19E-8	1.08E-10	-1.77E-7
Acidification potential, accumulated exceedance	[mol H^+-Eq.]	2.85E-2	1.81E-6	3.94E-5	5.84E-4	2.50E-6	-2.36E-2
Eutrophication, fraction of nutrients reaching freshwater end compartment	[kg PO_4-Eq.]	3.26E-4	6.31E-10	5.69E-8	3.48E-7	2.95E-9	-2.81E-4
Eutrophication, fraction of nutrients reaching marine end compartment	[kg N-Eq.]	6.10E-3	8.01E-7	1.41E-5	2.54E-4	8.60E-7	-5.08E-3
Eutrophication, accumulated exceedance	[mol N-Eq.]	6.89E-2	8.78E-6	1.55E-4	2.79E-3	9.48E-6	-5.73E-2
Formation potential of tropospheric ozone photochemical oxidants	[kg NMVOC-Eq.]	1.75E-2	2.42E-6	4.44E-5	7.67E-4	2.75E-6	-1.43E-2
Abiotic depletion potential for non-fossil resources	[kg Sb-Eq.]	6.78E-2	2.66E-10	1.79E-7	9.37E-8	2.41E-9	-6.30E-2
Abiotic depletion potential for fossil resources	[MJ]	4.54E+1	2.39E-3	1.06E-1	7.85E-1	7.36E-3	-3.55E+1
Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	[m^3 world-Eq deprived]	2.81E+0	3.20E-6	3.26E-4	1.43E-3	3.30E-4	-2.59E+0

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 kg of NEDZINK natural

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Renewable primary energy as energy carrier	[MJ]	6.10E+0	1.29E-5	1.52E-3	8.27E-3	5.95E-5	-4.83E+0
Renewable primary energy resources as material utilization	[MJ]	2.64E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Total use of renewable primary energy resources	[MJ]	6.37E+0	1.29E-5	1.52E-3	8.27E-3	5.95E-5	-4.83E+0
Non-renewable primary energy as energy carrier	[MJ]	4.84E+1	2.53E-3	1.13E-1	8.34E-1	7.82E-3	-3.78E+1
Non-renewable primary energy as material utilization	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Total use of non-renewable primary energy resources	[MJ]	4.84E+1	2.53E-3	1.13E-1	8.34E-1	7.82E-3	-3.78E+1
Use of secondary material	[kg]	1.33E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	8.15E-1
Use of renewable secondary fuels	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Use of non-renewable secondary fuels	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Use of net fresh water	[m^3]	8.64E-2	1.23E-7	1.20E-5	5.87E-5	7.86E-6	-7.70E-2

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 kg of NEDZINK natural

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Hazardous waste disposed	[kg]	8.63E-3	6.50E-9	2.71E-7	2.06E-6	1.10E-8	-8.14E-3
Non-hazardous waste disposed	[kg]	4.40E-1	2.83E-6	6.57E-3	1.06E-3	5.00E-2	-3.51E-1
Radioactive waste disposed	[kg]	2.19E-4	1.66E-8	7.21E-7	5.32E-6	4.83E-8	-1.84E-4
Components for re-use	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Materials for recycling	[kg]	0.00E+0	0.00E+0	0.00E+0	9.50E-1	0.00E+0	0.00E+0
Materials for energy recovery	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Exported electrical energy	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Exported thermal energy	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0

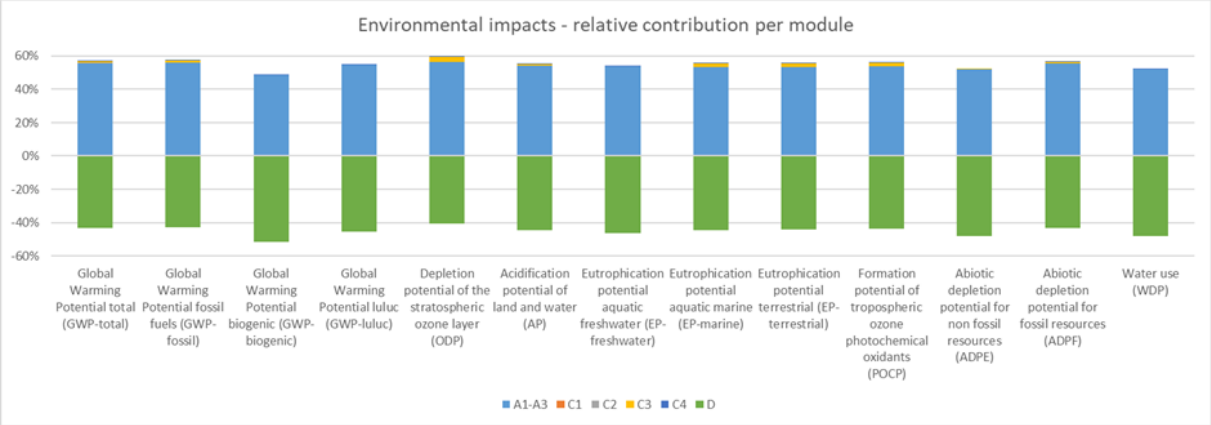
RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional: 1 kg of NEDZINK natural

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Potential incidence of disease due to PM emissions	[Disease Incidence]	1.16E-7	4.80E-11	6.24E-10	1.52E-8	4.85E-11	-8.07E-8
Potential Human exposure efficiency relative to U235	[kBq U235-Eq.]	3.00E-1	1.02E-5	4.64E-4	3.37E-3	3.02E-5	-2.65E-1
Potential comparative toxic unit for ecosystems	[CTUe]	6.20E+2	1.44E-3	8.61E-2	5.04E-1	4.77E-3	-5.69E+2
Potential comparative toxic unit for humans - cancerogenic	[CTUh]	1.52E-8	5.03E-14	3.07E-12	1.68E-11	1.10E-13	-1.40E-8
Potential comparative toxic unit for humans - not cancerogenic	[CTUh]	4.55E-7	1.24E-12	1.03E-10	4.19E-10	3.41E-12	-4.13E-7
Potential soil quality index	[-]	2.36E+1	3.05E-4	9.07E-2	1.16E-1	1.54E-2	-1.83E+1

Disclaimer 1 – for the indicator IRP:
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.

Disclaimer 2 – for the indicators ADPE, ADPF, WDP, ETP-fw, HTP-c, HTP-nc, SQP:
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 experience with the indicator.

6. LCA: Interpretation



The main impact categories for 1 kg of Nedzink NATUREL

Life cycle inventory data for the production of zinc concentrate and Special High-Grade Zinc (SHG Zinc) in the background database *Ecoinvent V3.6* is aligned with data from the IZA 2015 LCA report (*Zinc Environmental Profile - 2015 Update,* see also section 3.5 Background Data).

The contribution of SHG Zinc is the dominating factor in all of the impact categories, with contributions >80% in for all indicators.

The remaining contributions mainly consist of energy usage (electricity and gas) with a small contribution from the remaining metal components (Cu, Ti, Al).

Because of the high contribution of SHG Zinc and the high recyclability that is assumed, the amount of credits gained in module D for each impact category is very high, at least 75% or higher compared to the initial impact value.

7. Requisite evidence

In a literature study *TNO-MEP-99/441* of TNO (Dutch Organisation for Applied Scientific Research) the emissions from corrosion of zinc to water have been evaluated. This corrosion rate refers to the loss of metallic zinc.
The run-off rate is the wash-off of zinc from the patina layer. This run-off rate is generally lower than the corrosion rate.

During the built-up of the zinc patina layer the run-off is lower than the corrosion rate. The growth of the patina layer delays the corrosion.
The run-off rate is influenced by the atmospheric conditions, of which the SO_2 concentration is the most important variable. With the decreasing of the SO_2 concentration, the corrosion rate is also decreasing.

In areas with higher SO_2-concentration a run-off rate of 3 g/m^2.yr can be calculated and 2 g/m^2.yr in areas with lower concentration.

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