Environmental Product Declaration

CaNaDry NL Hergebruik

EXIE

Publisher:	EXIE
Programme operator:	Stichting NMD
Calculation number:	ReTHiNK-90327
Generation on:	30-06-2025
Issue date:	30-06-2025
Valid until:	30-06-2030
Status:	verified

R<THiNK



powered by nibe

1 General information

1.1 PRODUCT

CaNaDry NL Hergebruik

1.2 VALIDITY

Issue date: 30-06-2025

Valid until: 30-06-2030

1.3 OWNER OF THE DECLARATION

Manufacturer: EXIE

Address: Bekenholstraat 1, 9550 Oudenaarde

E-mail: axel@exih2.be

Website: https://www.exie.be/en

Production location: Herzele

Address production location: Bekenholstraat 1, 9550 Herzele

1.4 VERIFICATION OF THE DECLARATION

The independent verification is in accordance with the ISO 14025:2011. The LCA is in compliance with ISO 14040:2006 and ISO 14044:2006. The EN 15804+A2:2019 serves as the core PCR.

☐ Internal ☒ External



Nibe: Mantijn van Leeuwen (Super admin), NIBE

1.5 PRODUCT CATEGORY RULES

NMD Determination method Environmental performance Construction works v1.1 March 2022

1.6 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+A2:2019. For the evaluation of the comparability, the following aspects have to be considered in particular: PCR used, functional or declared unit, geographical reference, the 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 EPD program operators may differ. Comparability needs to be evaluated. For further guidance, see EN 15804+A2:2019 and ISO 14025.

1.7 CALCULATION BASIS

LCA method R<THINK: NMD Determination method v 1.2 | set1+2

LCA software*: Simapro 9.6

Characterization method: R<THINK characterization method (see references for more details)

LCA database profiles: ecoinvent (for version see references)

Version database: v3.19 (20250306)

** Simapro is used for calculating the characterized results of the Environmental profiles within R<THINK.*

1 General information

1.8 LCA BACKGROUND REPORT

This EPD is generated on the basis of the LCA background report 'CaNaDry NL Hergebruik' with the calculation identifier ReTHiNK-90327.

2 Product

2.1 PRODUCT DESCRIPTION

CaNaDry is a thermal insulation material made from hemp shiv, hydrated lime, and a binder. Each hemp particle is individually coated with lime and an additive. The product has a granular texture.

2.2 APPLICATION (INTENDED USE OF THE PRODUCT)

The insulation material can be used in floors, walls, and roofs. More specifically, it is suitable for the thermal or acoustic insulation of flat and pitched roofs, internal and external walls, as well as the thermal insulation of ground floors and intermediate floors.

2.3 REFERENCE SERVICE LIFE

RSL PRODUCT

Based on Totem, same as in B-EPD, page 10 in project documentation.

USED RSL (YR) IN THIS LCA CALCULATION:

60

RSL PARTS

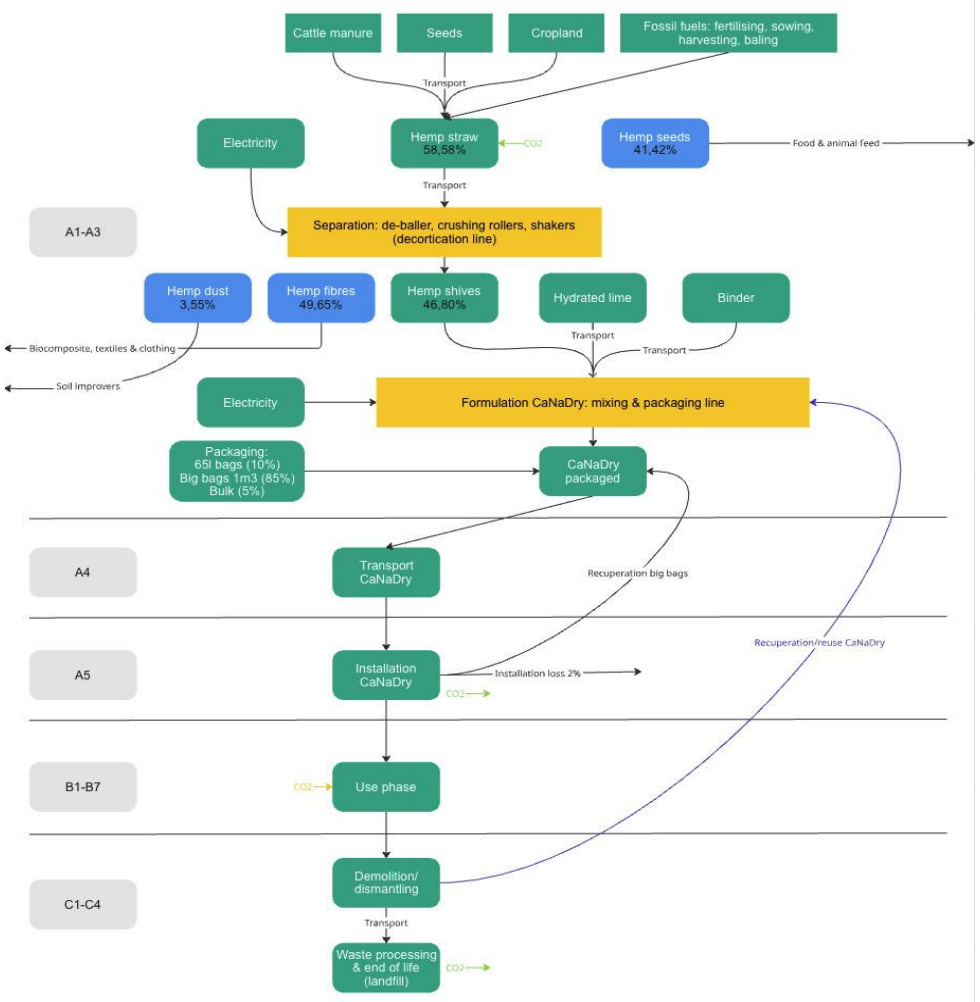
No deviation reference service life is applicable for one of the raw materials / components.

2.4 TECHNICAL DATA

The functional unit is defined as 1m2 of loose wall insulation with a thermal resistance of 4.5 m2.K/W, a thickness of 24 cm, and a lambda value of 0.054 W/m.K. Packaging is included. The weight per reference stream is 42.53 kg. The product has a density of 175 kg / m^3, and the volume of the reference stream is 0.243 m3.

2.5 DESCRIPTION PRODUCTION PROCESS

The production process of CaNaDry is as follows:



2 Product

2.6 CONSTRUCTION DESCRIPTION

Fastening, installation and assembly materials are excluded to maintain uniformity across various applications in floors, walls and roofs. The most common delivery method for CaNaDry, using 175kg big bags, requires a crane to unload the big bags from the truck. This energy consumption is excluded from the impact calculations. The material is installed manually for all applications (floor, wall, roof), eliminating the need for additional on-site energy consumption. No additional materials are required for installation on site. An additional installation loss of 2% is accounted for.

3 Calculation rules

3.1 FUNCTIONAL UNIT

Isolatielagen buitenmuur

Een vierkante meter isolatiemateriaal toegepast in een spouwmuur of als ondergrond voor een pleisterlaag. Schaling gebeurd o.b.v. isolatiewaarde (m^2K/W), de isolatiewaarde heeft alleen betrekking op het isolatiemateriaal.

Reference unit:

3.2 CONVERSION FACTORS

Description	Value	Unit
Reference unit	1	m2
Weight per reference unit	42.520	kg
Conversion factor to 1 kg	0.023518	m2

3.3 SCOPE OF DECLARATION AND SYSTEM BOUNDARIES

This is a Cradle to grave EPD. The life cycle stages included are as shown below:

(X = module included, ND = module not declared)

A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

The modules of the EN 15804 contain the following:

Module A1 = Raw material supply	Module B5 = Refurbishment
Module A2 = Transport	Module B6 = Operational energy use
Module A3 = Manufacturing	Module B7 = Operational water use
Module A4 = Transport	Module C1 = De-construction / Demolition
Module A5 = Construction - Installation process	Module C2 = Transport
Module B1 = Use	Module C3 = Waste Processing
Module B2 = Maintenance	Module C4 = Disposal
Module B3 = Repair	Module D = Benefits and loads beyond the product system boundaries
Module B4 = Replacement	

3.4 REPRESENTATIVENESS

This EPD is representative for CaNaDry NL Hergebruik, a product of EXIE. The results of this EPD are representative for Netherlands.

3.5 CUT-OFF CRITERIA

In the Life cycle assessment the following cut-off criteria are applied:

3 Calculation rules

PRODUCT STAGE (A1-A3)

All input flows (e.g. raw materials, transportation, energy use, packaging, etc.) and output flows (e.g. production waste) are considered in this LCA. The total neglected input flows do therefore not exceed the limit of 5% of energy use and mass.

CONSTRUCTION PROCESS STAGE (A4-A5)

All input flows (e.g. transportation to the construction site, additional raw material use for construction, installation energy (use)of energy use for assembly , etc.) and output flows (e.g. construction waste, packaging waste, etc.) are considered in this LCA. The total neglected input flows do therefore not exceed the limit of 5% of energy use and mass.

USE STAGE (B1-B7)

All (known) input flows (e.g. raw materials, transportation, energy use, packaging, etc.) and output flows (e.g. emissions to soil, air and water, construction waste, packaging waste, end-of-life waste, etc.) related to the building fabric are considered in this LCA. The total neglected input flows do therefore not exceed the limit of 5% of energy use and mass.

END OF LIFE STAGE (C1-C4)

All input flows (e.g. energy use for demolition or disassembly, transport to waste processing, etc.) and output flows (e.g. end-of-life waste processing of the product, etc.) are considered in this LCA. The total neglected input flows do therefore not exceed the limit of 5% of energy use and mass.

BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY (D)

All benefits and loads beyond the system boundary resulting from reusable products, recyclable materials and/or useful energy carriers leaving the product system are considered in this LCA.

3.6 ALLOCATION

Allocation has not been applied in this LCA.

3.7 DATA COLLECTION & REFERENCE PERIOD

The average product composition, production waste, energy use, raw material and suppliers are based on data from the reference year 2023 (January-December). Data collection was conducted in 2023.

4 Scenarios and additional technical information

4.1 TRANSPORT TO CONSTRUCTION SITE (A4)

For the transport from production place to assembly/user, the following scenario is assumed for module A4 of this EPD.

	Value and unit
Vehicle type used for transport	(ei3.6) Lorry (Truck) 16-32t, EURO6 | market for (EU)
Fuel type and consumption of vehicle	not available
Distance	210 km
Capacity utilisation (including empty returns)	50 % (loaded up and return empty)
Bulk density of transported products	inapplicable
Volume capacity utilisation factor	1

4.2 ASSEMBLY (A5)

The following information describes the scenarios for flows entering the system and flows leaving the system at module A5.

FLOWS ENTERING THE SYSTEM

There are no significant environment impacts as a result of materials or energy used in the construction stage (A5).

FLOWS LEAVING THE SYSTEM

The following output flows leaving the system at module A5 are assumed.

Description	Value	Unit
Output materials as result of loss during construction	2	%
Output materials as result of waste processing of materials used for installation/assembly at the building site	0.000	kg
Output materials as result of waste processing of used packaging	0.121	kg

4.3 USE STAGE (B1)

Emissions to air/soil/water are applicable, the scenario accounted in module B1 is as follows in the table below:

Description	Cycle (yr)	Number of cycles	Amount per cycle	Total Amount	Unit
Carbonation during service life	60	1	-3420000	-3420000	mg

4 Scenarios and additional technical information

4.4 MAINTENANCE (B2)

For maintenance no input or output flows are modelled.

4.5 REPAIR (B3)

Repairs are not applicable within the functional unit and to achieve the reference service life.

4.6 OPERATIONAL ENERGY USE (B6)

Description	Service cycle (yr)	Number of cycles (n)	Amount per cycle	Total Amount	Unit

4.7 OPERATIONAL WATER USE (B7)

Description	Service cycle (yr)	Number of cycles (n)	Amount per cycle	Total Amount	Unit

4.8 DE-CONSTRUCTION, DEMOLITION (C1)

The following information describes the scenario for demolition at end of life.

Description	Amount	Unit
(ei3.6) Diesel, burned in machine (incl. emissions)	0.052	l

4.9 TRANSPORT END-OF-LIFE (C2)

The following distances and transport conveyance are assumed for transportation during end of life for the different types of waste processing.

Waste Scenario	Transport conveyance	Not removed (stays in work) [km]	Landfill [km]	Incineration [km]	Recycling [km]	Re-use [km]
organic material, other (i.a. insulation) (NMD ID 52) (Waste concrete hergebruik)	(ei3.6) Lorry (Truck), unspecified (default) | market group for (GLO)	0	100	150	50	50
		0	100	150	50	50

4 Scenarios and additional technical information

Waste Scenario	Transport conveyance	Not removed (stays in work) [km]	Landfill [km]	Incineration [km]	Recycling [km]	Re-use [km]
organic material, other (i.a. insulation) (NMD ID 52) (Waste concrete default)	(ei3.6) Lorry (Truck), unspecified (default) | market group for (GLO)					
organic material, other (i.a. insulation) (NMD ID 52) (Waste wood hergebruik)	(ei3.6) Lorry (Truck), unspecified (default) | market group for (GLO)	0	100	150	50	50
organic material, other (i.a. insulation) (NMD ID 52) (Waste wood default)	(ei3.6) Lorry (Truck), unspecified (default) | market group for (GLO)	0	100	150	50	50

The transport conveyance(s) used in the scenario(s) for transport during end of life has the following characteristics.

	Value and unit
Vehicle type used for transport	(ei3.6) Lorry (Truck), unspecified (default) | market group for (GLO)
Fuel type and consumption of vehicle	not available
Capacity utilisation (including empty returns)	50 % (loaded up and return empty)
Bulk density of transported products	inapplicable
Volume capacity utilisation factor	1

4.10 END OF LIFE (C3, C4)

The scenario(s) assumed for end of life of the product are given in the following tables. First the assumed percentages per type of waste processing are displayed, followed by the assumed amounts.

Waste Scenario	Region	Not removed (stays in work) [%]	Landfill [%]	Incineration [%]	Recycling [%]	Re-use [%]
organic material, other (i.a. insulation) (NMD ID 52) (Waste concrete hergebruik)	NL	0	0	0	0	100
organic material, other (i.a. insulation) (NMD ID 52) (Waste concrete default)	NL	0	5	95	0	0
organic material, other (i.a. insulation) (NMD ID 52) (Waste wood hergebruik)	NL	0	0	0	0	100
organic material, other (i.a. insulation) (NMD ID 52) (Waste wood default)	NL	0	5	95	0	0

4 Scenarios and additional technical information

Waste Scenario	Not removed (stays in work) [kg]	Landfill [kg]	Incineration [kg]	Recycling [kg]	Re-use [kg]
organic material, other (i.a. insulation) (NMD ID 52) (Waste concrete hergebruik)	0.000	0.000	0.000	0.000	12.390
organic material, other (i.a. insulation) (NMD ID 52) (Waste concrete default)	0.000	0.206	3.924	0.000	0.000
organic material, other (i.a. insulation) (NMD ID 52) (Waste wood hergebruik)	0.000	0.000	0.000	0.000	19.500
organic material, other (i.a. insulation) (NMD ID 52) (Waste wood default)	0.000	0.325	6.175	0.000	0.000
Total	**0.000**	**0.531**	**10.098**	**0.000**	**31.890**

4.11 BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY (D)

The presented Benefits and loads beyond the system boundary in this EPD are based on the following calculated Net output flows in kilograms and Energy recovery displayed in MJ Lower Heating Value.

Waste Scenario	Net output flow [kg]	Energy recovery [MJ]
organic material, other (i.a. insulation) (NMD ID 52) (Waste concrete hergebruik)	0.000	0.000
organic material, other (i.a. insulation) (NMD ID 52) (Waste concrete default)	0.000	0.000
organic material, other (i.a. insulation) (NMD ID 52) (Waste wood hergebruik)	0.000	0.000
organic material, other (i.a. insulation) (NMD ID 52) (Waste wood default)	0.000	102.727
Total	**0.000**	**102.727**

5 Results

For the impact assessment long-term emissions (>100 years) are not considered. The results of the impact assessment are only relative statements that do not make any statements about end-points of the impact categories, exceedance of threshold values, safety margins or risks. The following tables show the results of the indicators of the impact assessment, of the use of resources as well as of waste and other output flows.

5.1 ENVIRONMENTAL IMPACT INDICATORS PER M2

CORE ENVIRONMENTAL IMPACT INDICATORS EN 15804+A2

Abbr.	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-total	kg CO_2 eq.	-2.50E+1	1.54E+0	3.61E+0	-1.98E+1	1.46E+0	6.98E-1	-3.42E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.70E-1	4.27E-1	3.81E+1	4.86E-1	-9.26E+0
GWP-f	kg CO_2 eq.	1.35E+1	1.54E+0	3.72E+0	1.88E+1	1.46E+0	7.00E-1	-3.42E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.70E-1	4.27E-1	1.25E-1	4.69E-3	-9.25E+0
GWP-b	kg CO_2 eq.	-3.85E+1	6.75E-4	1.43E-3	-3.85E+1	5.84E-4	2.07E-4	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	3.09E-5	1.72E-4	3.80E+1	4.81E-1	-5.94E-3
GWP-luluc	kg CO_2 eq.	1.41E-3	6.47E-4	7.63E-4	2.82E-3	5.20E-4	9.42E-5	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.34E-5	1.57E-4	4.03E-5	2.20E-6	-6.27E-3
ODP	kg CFC 11 eq.	8.51E-7	3.42E-7	1.17E-7	1.31E-6	3.33E-7	4.44E-8	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	3.68E-8	9.42E-8	2.43E-8	1.54E-9	-7.54E-7
AP	mol H+ eq.	1.86E-2	4.42E-3	4.01E-2	6.31E-2	4.20E-3	1.58E-3	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.78E-3	2.48E-3	2.40E-3	4.11E-5	-4.34E-2
EP-fw	kg P eq.	5.28E-5	1.38E-5	4.50E-5	1.12E-4	1.16E-5	3.46E-6	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	6.18E-7	4.30E-6	2.27E-6	1.13E-7	-9.64E-5
EP-m	kg N eq.	3.37E-3	8.40E-4	2.55E-2	2.97E-2	8.32E-4	6.89E-4	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	7.86E-4	8.73E-4	1.05E-3	2.28E-5	-1.78E-2
EP-T	mol N eq.	3.86E-2	9.46E-3	1.84E-1	2.32E-1	9.30E-3	5.70E-3	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	8.63E-3	9.62E-3	1.20E-2	1.48E-4	-1.76E-1

GWP-total=Global Warming Potential total (GWP-total) | **GWP-f**=Global Warming Potential fossil fuels (GWP-fossil) | **GWP-b**=Global Warming Potential biogenic (GWP-biogenic) | **GWP-luluc**=Global Warming Potential land use and land use change (GWP-luluc) | **ODP**=Depletion potential of the stratosperic ozon layer (ODP) | **AP**=Acidification potential, Accumulated Exceedance (AP) | **EP-fw**=Eutrophication potential, fraction of nutrients reaching freshwater end compartment (EP-freshwater) | **EP-m**=Eutrophication potential, fraction of nutrients reaching marine end compartment (EP-marine) | **EP-T**=Eutrophication potential, Accumulated Exceedance (EP-terrestrial) | **POCP**=Formation potential of tropospheric ozone (POCP) | **ADP-mm**=Abiotic depletion potential for non fossil resources (ADP mm) | **ADP-f**=Abiotic depletion for fossil resources potential (ADP fossil) | **WDP**=Water (user) deprication potential, deprivation-weighted water consumption (WDP)

5 Results

Abbr.	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
POCP	kg NMVOC eq.	1.44E-2	3.62E-3	1.25E-2	3.05E-2	3.56E-3	9.21E-4	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	2.37E-3	2.74E-3	3.21E-3	5.04E-5	-2.63E-2
ADP-mm	kg Sb-eq.	7.25E-6	5.35E-5	9.42E-6	7.01E-5	4.04E-5	2.87E-6	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	2.61E-7	1.08E-5	1.65E-6	1.46E-8	-3.88E-5
ADP-f	MJ	6.03E+1	2.30E+1	1.99E+1	1.03E+2	2.21E+1	2.93E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	2.34E+0	6.44E+0	1.92E+0	1.15E-1	-5.61E+1
WDP	m3 world eq.	6.18E-1	6.99E-2	3.32E-1	1.02E+0	6.26E-2	3.67E-2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	3.14E-3	2.30E-2	-2.42E-3	5.13E-3	-5.35E-1

GWP-total=Global Warming Potential total (GWP-total) | **GWP-f**=Global Warming Potential fossil fuels (GWP-fossil) | **GWP-b**=Global Warming Potential biogenic (GWP-biogenic) | **GWP-luluc**=Global Warming Potential land use and land use change (GWP-luluc) | **ODP**=Depletion potential of the stratosperic ozon layer (ODP) | **AP**=Acidification potential, Accumulated Exceedance (AP) | **EP-fw**=Eutrophication potential, fraction of nutrients reaching freshwater end compartment (EP-freshwater) | **EP-m**=Eutrophication potential, fraction of nutrients reaching marine end compartment (EP-marine) | **EP-T**=Eutrophication potential, Accumulated Exceedance (EP-terrestrial) | **POCP**=Formation potential of tropospheric ozone (POCP) | **ADP-mm**=Abiotic depletion potential for non fossil resources (ADP mm) | **ADP-f**=Abiotic depletion for fossil resources potential (ADP fossil) | **WDP**=Water (user) deprication potential, deprivation-weighted water consumption (WDP)

ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS EN 15804+A2

Abbr.	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PM	disease incidence	7.53E-8	8.62E-8	3.03E-7	4.64E-7	9.31E-8	1.37E-8	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	4.72E-8	3.83E-8	2.94E-8	7.66E-10	-4.07E-7
IR	kBq U235 eq.	2.67E-1	1.01E-1	8.56E-2	4.54E-1	9.67E-2	1.27E-2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.00E-2	2.70E-2	6.42E-3	4.53E-4	-2.31E-1
ETP-fw	CTUe	8.48E+1	1.93E+1	1.16E+1	1.16E+2	1.78E+1	6.40E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.41E+0	5.74E+0	3.10E+0	8.31E-2	-1.92E+2
HTP-c	CTUh	9.51E-10	5.84E-10	6.08E-10	2.14E-9	4.96E-10	1.49E-10	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	4.93E-11	1.86E-10	1.92E-9	2.49E-12	-2.58E-9
HTP-nc	CTUh	9.69E-8	1.96E-8	4.57E-8	1.62E-7	1.88E-8	5.04E-9	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.22E-9	6.29E-9	7.40E-9	9.98E-11	-1.32E-7

PM=Potential incidence of disease due to PM emissions (PM) | **IR**=Potential Human exposure efficiency relative to U235 (IRP) | **ETP-fw**=Potential Comparative Toxic Unit for ecosystems (ETP-fw) | **HTP-c**=Potential Comparative Toxic Unit for humans (HTP-c) | **HTP-nc**=Potential Comparative Toxic Unit for humans (HTP-nc) | **SQP**=Potential soil quality idex (SQP)

5 Results

Abbr.	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
SQP	Pt	1.10E+1	1.41E+1	6.50E+1	9.01E+1	1.55E+1	2.39E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	2.99E-1	5.58E+0	2.19E+0	2.62E-1	-9.57E+2

PM=Potential incidence of disease due to PM emissions (PM) | **IR**=Potential Human exposure efficiency relative to U235 (IRP) | **ETP-fw**=Potential Comparative Toxic Unit for ecosystems (ETP-fw) | **HTP-c**=Potential Comparative Toxic Unit for humans (HTP-c) | **HTP-nc**=Potential Comparative Toxic Unit for humans (HTP-nc) | **SQP**=Potential soil quality idex (SQP)

CLASSIFICATION OF DISCLAIMERS TO THE DECLARATION OF CORE AND ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS

ILCD classification	Indicator	Disclaimer
ILCD type / level 1	Global warming potential (GWP)	None
	Depletion potential of the stratospheric ozone layer (ODP)	None
	Potential incidence of disease due to PM emissions (PM)	None
ILCD type / level 2	Acidification potential, Accumulated Exceedance (AP)	None
	Eutrophication potential, Fraction of nutrients reaching freshwater end compartment (EP-freshwater)	None
	Eutrophication potential, Fraction of nutrients reaching marine end compartment (EP-marine)	None
	Eutrophication potential, Accumulated Exceedance (EP-terrestrial)	None
	Formation potential of tropospheric ozone (POCP)	None
	Potential Human exposure efficiency relative to U235 (IRP)	1
ILCD type / level 3	Abiotic depletion potential for non-fossil resources (ADP-minerals&metals)	2
	Abiotic depletion potential for fossil resources (ADP-fossil)	2
	Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	2
	Potential Comparative Toxic Unit for ecosystems (ETP-fw)	2
	Potential Comparative Toxic Unit for humans (HTP-c)	2
	Potential Comparative Toxic Unit for humans (HTP-nc)	2
	Potential Soil quality index (SQP)	2

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.

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.

5 Results

CORE ENVIRONMENTAL IMPACT INDICATORS EN15804+A1

Abbr.	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
ADPE	kg Sb eq.	7.25E-6	5.35E-5	9.42E-6	7.01E-5	4.04E-5	2.87E-6	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	2.61E-7	1.08E-5	1.65E-6	1.46E-8	-3.88E-5
GWP	kg CO_2 eq.	1.34E+1	1.53E+0	3.39E+0	1.83E+1	1.45E+0	6.90E-1	-3.42E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.69E-1	4.23E-1	1.23E-1	2.56E-2	-9.02E+0
ODP	kg CFC 11 eq.	6.91E-7	2.74E-7	1.11E-7	1.08E-6	2.66E-7	3.78E-8	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	2.92E-8	7.49E-8	2.02E-8	1.23E-9	-6.41E-7
POCP	kg ethene eq.	3.22E-3	7.37E-4	-1.54E-3	2.41E-3	7.23E-4	8.60E-5	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.72E-4	2.55E-4	3.22E-4	8.90E-6	-2.56E-3
AP	kg SO_2 eq.	1.53E-2	3.64E-3	2.35E-2	4.24E-2	3.45E-3	1.10E-3	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.27E-3	1.86E-3	1.66E-3	3.14E-5	-2.87E-2
EP	Kg PO43- eq.	1.84E-3	5.52E-4	1.63E-2	1.87E-2	5.35E-4	4.19E-4	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	2.89E-4	3.67E-4	4.06E-4	1.09E-5	-1.16E-2

ADPE=Depletion of abiotic resources-elements | **GWP**=Global warming | **ODP**=Ozone layer depletion | **POCP**=Photochemical oxidants creation | **AP**=Acidification of soil and water | **EP**=Eutrophication

NATIONAL ANNEX NMD

Abbr.	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
ADPF	kg Sb eq.	2.88E-2	1.09E-2	8.26E-3	4.79E-2	1.05E-2	1.38E-3	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.11E-3	3.11E-3	9.73E-4	5.48E-5	-2.64E-2
HTP	kg 1,4 DB eq.	1.37E+0	5.72E-1	2.64E-1	2.21E+0	5.82E-1	8.45E-2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	6.24E-2	1.78E-1	2.01E-1	2.27E-3	-1.81E+0
FAETP	kg 1,4 DB eq.	3.42E-2	1.57E-2	1.06E-2	6.06E-2	1.61E-2	2.88E-3	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	8.68E-4	5.20E-3	1.93E-3	4.25E-5	-4.44E-2
MAETP	kg 1,4 DB eq.	1.68E+2	5.94E+1	1.83E+1	2.45E+2	6.16E+1	9.90E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	3.02E+0	1.87E+1	5.62E+0	1.71E-1	-1.35E+2
TETP		5.13E-3	2.21E-3	6.65E-3	1.40E-2	2.07E-3	3.94E-4	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.03E-4	6.29E-4	3.02E-4	7.81E-6	-1.15E-2

ADPF=Depletion of abiotic resources-fossil fuels | **HTP**=Human toxicity | **FAETP**=Ecotoxicity. fresh water | **MAETP**=Ecotoxicity. marine water | **TETP**=Ecotoxicity. terrestric

5 Results

Abbr.	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
	kg 1,4 DB eq.																		

ADPF=Depletion of abiotic resources-fossil fuels | **HTP**=Human toxicity | **FAETP**=Ecotoxicity. fresh water | **MAETP**=Ecotoxicity. marine water | **TETP**=Ecotoxicity. terrestric

5.2 INDICATORS DESCRIBING RESOURCE USE AND ENVIRONMENTAL INFORMATION BASED ON LIFE CYCLE INVENTORY (LCI)

PARAMETERS DESCRIBING RESOURCE USE

Abbr.	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	MJ	3.84E+0	3.82E-1	2.37E+0	6.59E+0	3.17E-1	9.33E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.27E-2	8.06E-2	4.58E+2	2.89E-3	-1.17E+2
PERM	MJ	4.33E+2	0.00E+0	0.00E+0	4.33E+2	0.00E+0	8.65E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	-1.99E+2
PERT	MJ	4.36E+2	3.82E-1	2.37E+0	4.39E+2	3.17E-1	8.81E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.27E-2	8.06E-2	4.68E-2	2.89E-3	-3.15E+2
PENRE	MJ	6.41E+1	2.44E+1	1.60E+1	1.05E+2	2.35E+1	3.77E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	2.49E+0	6.83E+0	1.74E+3	1.22E-1	-5.71E+1
PENRM	MJ	0.00E+0	0.00E+0	5.12E+0	5.12E+0	0.00E+0	1.02E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	-2.53E+0
PENRT	MJ	6.41E+1	2.44E+1	2.11E+1	1.10E+2	2.35E+1	3.11E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	2.49E+0	6.83E+0	2.05E+0	1.22E-1	-5.97E+1
SM	Kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
RSF	MJ	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
NRSF	MJ	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
FW	m^3	1.94E-2	2.70E-3	8.63E-3	3.07E-2	2.36E-3	1.16E-3	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.21E-4	7.84E-4	2.53E-3	1.23E-4	-1.58E-2

PERE=Use of renewable primary energy excluding renewable primary energy resources used as raw materials | **PERM**=Use of renewable primary energy resources used as raw materials | **PERT**=Total use of renewable primary energy resources | **PENRE**=Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials | **PENRM**=Use of non-renewable primary energy resources used as raw materials | **PENRT**=Total use of non-renewable primary energy resources | **SM**=Use of secondary material | **RSF**=Use of renewable secondary fuels | **NRSF**=Use of non-renewable secondary fuels | **FW**=Net use of fresh water

5 Results

OTHER ENVIRONMENTAL INFORMATION DESCRIBING WASTE CATEGORIES

Abbr.	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	Kg	3.25E-2	6.16E-5	1.95E-5	3.26E-2	5.79E-5	6.54E-4	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	6.39E-6	1.63E-5	4.32E-6	1.15E-7	-1.50E-2
NHWD	Kg	4.85E-1	9.42E-1	5.22E-2	1.48E+0	1.08E+0	2.75E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	2.77E-3	4.08E-1	4.02E+0	5.31E-1	-8.84E-1
RWD	Kg	3.89E-4	1.56E-4	8.93E-5	6.34E-4	1.50E-4	1.78E-5	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.63E-5	4.24E-5	9.44E-6	7.00E-7	-3.27E-4

HWD=Hazardous waste disposed | **NHWD**=Non-hazardous waste disposed | **RWD**=Radioactive waste disposed

ENVIRONMENTAL INFORMATION DESCRIBING OUTPUT FLOWS

Abbr.	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
CRU	Kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	6.38E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	3.19E+1	0.00E+0	0.00E+0
MFR	Kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	6.15E-3	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
MER	Kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
EE	MJ	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.07E+2
EET	MJ	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	3.39E+1
EEE	MJ	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.97E+1

CRU=Components for re-use | **MFR**=Materials for recycling | **MER**=Materials for energy recovery | **EE**=Exported energy | **EET**=Exported Energy, Thermic | **EEE**=Exported Energy, Electric

5 Results

5.3 INFORMATION ON BIOGENIC CARBON CONTENT PER M2

BIOGENIC CARBON CONTENT

The following Information describes the biogenic carbon content in (the main parts of) the product at the factory gate per m2:

Biogenic carbon content	Amount	Unit
Biogenic carbon content in the product	10.49	kg C
Biogenic carbon content in accompanying packaging	0	kg C

UPTAKE OF BIOGENIC CARBON DIOXIDE

The following amount of carbon dioxide uptake is taken into account. Related uptake and release of carbon dioxide in downstream processes are not taken into account in this number although they do appear in the presented results. One kilogram of biogenic Carbon content is equivalent to 44/12 kg of biogenic carbon dioxide uptake.

Uptake Biogenic Carbon dioxide	Amount	Unit
product	38.48	kg CO2 (biogenic)

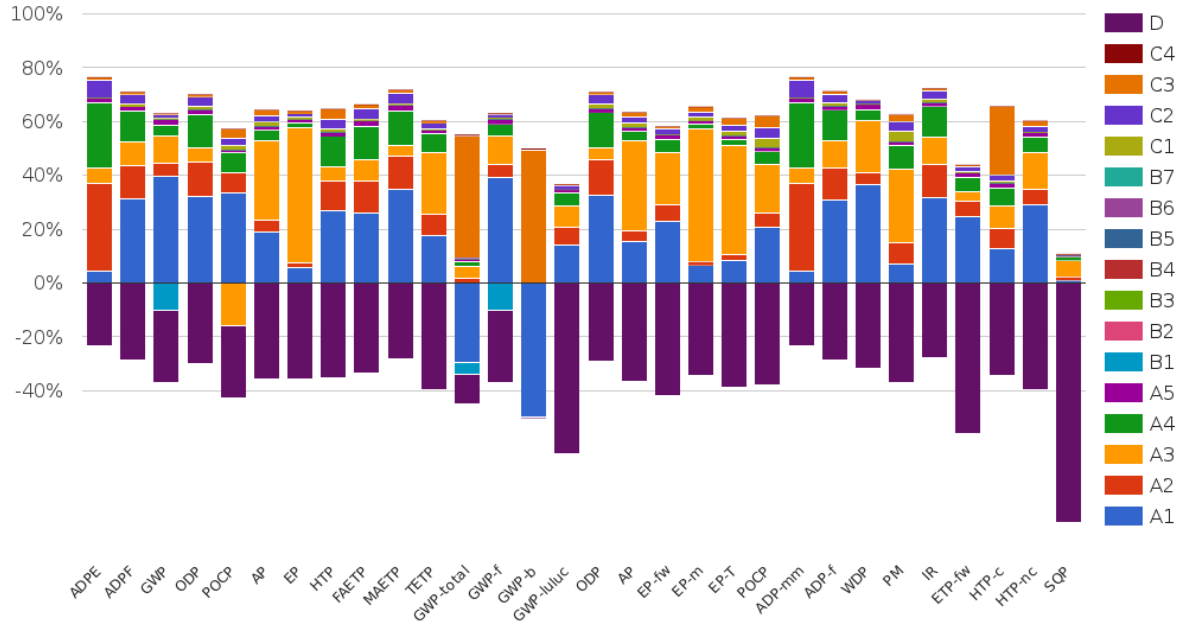
5 Results

5.4 ENVIRONMENTAL COST INDICATOR NL PER M2

Using the environmental cost indicator (ECI) method, which is presented in the NMD Determination Method (2020), the results are aggregated to the single-point score. The ECI is a relevant valuation method, especially in the Dutch construction sector. In the Netherlands, it is a prerequisite for public tenders. The aim of the indicator is to show the shadow price for environmental impacts of a product or project. The application of single-point scores is an additional assessment tool for eco-balance results. However, it must be pointed out that weightings are always based on a value maintenance and not on a scientific basis (EN 14040). The ECI results are shown in the following table.

Module EN15804	ECI NL 2010	Share in total (%)
A1 Raw Materials Supply	€ 0.90	115,5 %
A2 Transport	€ 0.16	20,2 %
A3 Manufacturing	€ 0.43	55,8 %
A4 Transport from the gate to the site	€ 0.15	19,7 %
A5 Construction - Installation process	€ 0.05	6,6 %
B1 Use	€ -0.17	-21,9 %
B2 Maintenance	€ 0.00	0,0 %
B3 Repair	€ 0.00	0,0 %
B4 Replacement	€ 0.00	0,0 %
B5 Refurbishment	€ 0.00	0,0 %
B6 Operational Energy Use	€ 0.00	0,0 %
B7 Operational Water Use	€ 0.00	0,0 %
C1 De-construction / demolition	€ 0.02	2,9 %
C2 Transport	€ 0.05	6,5 %
C3 Waste processing	€ 0.04	4,6 %
C4 Disposal	€ 0.00	0,2 %
D Benefits and loads beyond the product system boundary	€ -0.86	-110,1 %
ECI NL 2010 per functional unit	**€ 0.78**	

6 Interpretation of results



The negative bar in the climate change impact category (biogenic) by A1 is attributed to the biogenic CO2 uptake by the hemp shives. The contributions of A1 to other impact categories are primarily due to hydrated lime. Additionally, the transport of hemp straw in A2 and the transport from the production hall to site in A4 contribute significantly to the depletion of abiotic resource-elements. A3, representing the production of CaNaDry, has a substantial contribution to the environmental impact category of Eutrophication potential. The contribution of A5 is relatively small as no energy consumption is associated with the installation of CaNaDry. A5 includes only installation losses and the treatment of waste streams generated during the process.

B1 accounts solely for the uptake of CO2, which is absorbed through carbonation over the lifetime of the insulation material.

6 Interpretation of results

C1 covers the energy consumption for the demolition of a dwelling, resulting in a relatively minor contribution to impact categories. C2 addresses the transport of CaNaDry for waste disposal, distributed across standard distances established in the Netherlands. Similar to other transport modules, C2 primarily contributes to the depletion of abiotic resource-elements. C3 incorporates the environmental impact of CaNaDry's waste treatment. The largest relative impact here is linked to the treatment of hemp shives, which, at 26 kg, form the largest component of the insulation material. Significant impact in C3 is observed in the categories of climate change, eutrophication and human toxicity. For the water use category, a negative impact is observed for the hemp shives component, as water recovery may occur during waste disposal. In C4, a small portion of the organic insulation material ends up in landfill, leading to minor contributions to impact categories.

D includes the advantages and disadvantages outside the system boundaries. The most significant benefit is the recovery of electrical and thermal energy from the hemp shives.

7 References

ISO 14040
ISO 14040:2006-10, Environmental management - Life cycle assessment - Principles and framework; EN ISO 14040:2006

ISO 14044
ISO 14044:2006-10, Environmental management - Life cycle assessment - Requirements and guidelines; EN ISO 14044:2006

ISO 14025
ISO 14025:2011-10, Environmental labels and declarations — Type III environmental declarations — Principles and procedures

EN 15804+A2
EN 15804:2012+A2:2019/AC:2021, Sustainability of Buildings - Environmental Product Declarations - Framework Development Rules by Product Category

Ecoinvent
ecoinvent Version 3.9.1, December 2022

R<THINK characterization method
ecoinvent 3.6: EN 15804+A1 indicators (CML-IA Baseline v3.06), EN 15804+A2 indicators (EF 3.0)
ecoinvent 3.9.1: EN 15804+A1 indicators (CML-IA Baseline v3.09), EN 15804+A2 indicators (EF 3.1)

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