epddanmark

ECO PLATFORM EPD VERIFIED

Owner:	Carlo A/S
No.:	MD-22083-EN_rev1
Issued:	22-02-2024
Revised:	30-09-2026
Valid to:	22-02-2029

3rd PARTY **VERIFIED**

EPD

VERIFIED ENVIRONMENTAL PRODUCT DECLARATION | **ISO 14025 & EN 15804+A2**

Owner of declaration
Carlo A/S
Kastbjergvej 15, 8585 Glesborg
75906811

Programme
EPD Danmark
www.epddanmark.dk

☐ Industry EPD
☒ Product EPD

Declared product(s)
Thatched roof, including reed material, fireproofing membrane, and fastening system.

Number of declared datasets/product variations: 1

Production site
Kastbjergvej 15, 8585 Glesborg, Denmark

Product(s) use

The thatched roof is used as roof covering on pitched roofs.

Declared unit
1m2

Year of production site data (A3)
2022

Version:
Version 2: Presentation of results swapped to fit with template.

Issued: 22-02-2024
Valid to: 22-02-2029

Basis of calculation
This EPD is developed in accordance with the European standard EN 15804+A2.

Comparability
EPDs of construction products may not be comparable if they do not comply with the requirements in EN 15804. EPD data may not be comparable if the datasets used are not developed in accordance with EN 15804 and if the background systems are not based on the same database.

Validity
This EPD has been verified in accordance with ISO 14025 and is valid for 5 years from the date of issue.

Use
The intended use of an EPD is to communicate scientifically based environmental information for construction products, for the purpose of assessing the environmental performance of buildings.

EPD type
☐Cradle-to-gate with modules C1-C4 and D
☒Cradle-to-gate with options, modules C1-C4 and D
☐Cradle-to-grave and module D
☐Cradle-to-gate
☐Cradle-to-gate with options

CEN standard EN 15804 serves as the core PCR

Independent verification of the declaration and data, according to EN ISO 14025

☐ internal ☒ external

Third party verifier:

Mirko Miseljic

Martha Katrine Sørensen
EPD Danmark

Life cycle stages and modules (MND = module not declared)																
Product			Construction process		Use							End of life				Beyond the system boundary
Raw material supply	Transport	Manufacturing	Transport	Installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Re-use, recovery and recycling potential
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	MND	MND	X	X	X	X	X

Product information

Product description

The main product components are shown in the table below.

Material	Weight-% of declared product
Reed	97.32
Thatching screws	0.28
Steel rods for fastening	0.84
Sepatec fireproofing (glass fleece)	1.56
Total	100

Product packaging:

The composition of the sales- and transport packaging of the product is shown in the table below.

Material	Weight-% of packaging
Nylon String	0.2
Steel Band	0.795
PE-Film	0,005
Total	**100**

Representativity

This declaration, including data collection and the modeled foreground system including results, represents the production of Thatched roof, including reed material, fireproofing membrane, and fastening system on the production site located Glesborg. Product specific data are based on average values collected in the period 2022.

The LCA results portray an average amount of reed and the number of screws per functional unit. This variability arises from the diverse methods employed by different thatchers during installation. The reed averages were derived from data obtained from 16 distinct thatchers, spanning a range from 30 to 54 kg/m2.

It is worth noting that this data was gathered in 2016, and it is still regarded as valid today. This validation is supported by the fact that there have been no alterations to the installation procedures carried out by the primary manufacturer since that time.

Background data primarily rely on the Ecoinvent 3.9.1 database, with additional information drawn from EF. Background datasets maintain high standards of quality.

Hazardous substances

Thatched roof does not contain substances listed on the ”Candidate List of Substances of Very High Concern for authorisation”

(http://echa.europa.eu/candidate-list-table)

Essential characteristics

Thatched roofs do not fall within the purview of any standardized technical specifications (hEN or EAD) as stipulated by the construction products regulation (EU regulation 305/2011). Consequently, there are no prescribed essential characteristics specified for these roofs.

Further technical information can be obtained by contacting the manufacturer or on the manufacturers website:

https://carloas.dk/

Reference Service Life (RSL)

The Danish Thatcher Guild (Dansk Tækkemandslaug) has published "Veludført stråtag", which are the industry guidelines for thatched roofs. According to the guidelines, a correctly installed thatched roof has a technical lifespan of 50 years. This information is based on the manufacturer's specifications and the collective experience of the industry, which has been systematically collected and processed over several decades. The 50-year reference service life (RSL) is defined as the result of a well-executed roof that adheres to the technical guidelines described in the guidelines

LCA background

Declared unit

The LCI and LCIA results in this EPD relates to 1m2

Name	Value	Unit
Declared unit	1	$1m^2$
Density	45.8	kg/m^2
Conversion factor to 1 kg.	0.0218	-

Functional unit

Not defined

PCR

This EPD is developed according to the core rules for the product category of construction products in EN 15804, and C-PCR-006 (EB16485:2014)

Guarantee of Origin – certificates

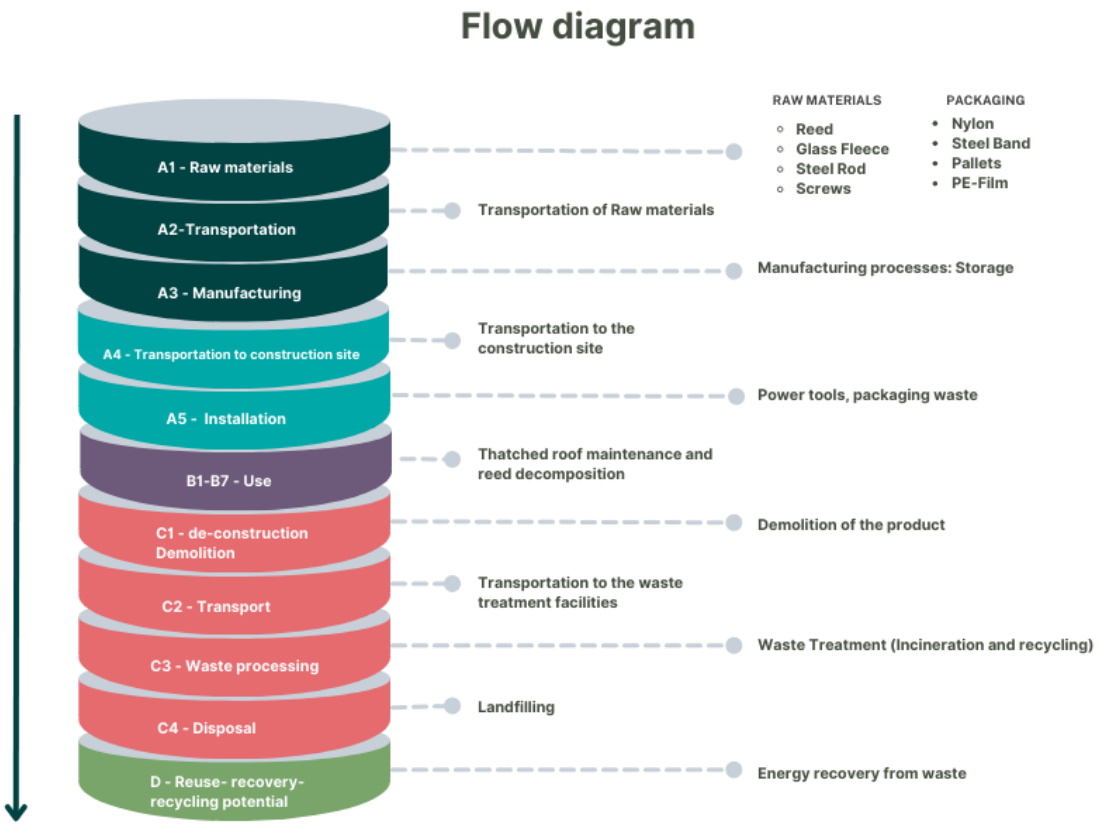
Foreground system:

The product is produced using Danish energy mix in where the energy is used, typically "production".

Background system:

Upstream processes are modelled using D type. Downstream processes are modelled using mix type.

Flowdiagram



System boundary

This EPD is based on a cradle-to-gate LCA, in which 100 weight-% has been accounted for. B6 and B7 are assessed to be not relevant.

The general rules for the exclusion of inputs and outputs follows the requirements in EN 15804, 6.3.5, where the total of neglected input flows per module shall be a maximum of 5 % of energy usage and mass and 1 % of energy usage and mass for unit processes.

Product stage (A1-A3) includes:

A1 – Extraction and processing of raw materials

A2 – Transport to the production site

A3 – Manufacturing processes

The product stage encompasses everything from procuring raw materials and energy, transporting them to the production site, handling packaging, to managing waste, including processing it until it reaches the "end-of-waste" state or is finally disposed of. The Life Cycle Assessment (LCA) results are presented in a consolidated manner for the product stage, combining sub-modules A1, A2, and A3 into a single module called A1-A3.

The manufacturer may occasionally store, re-package, and subsequently sell individual materials. These materials are then assembled at the construction site. Consequently, the product is documented as being installed within the building.

Construction process stage (A4-A5) includes:

A4- transportation to the construction site

The A4 stage specifically addresses the transportation of the product to the market or end consumer, focusing on the environmental impacts associated with this logistic phase. For instance, in scenarios where the main sales activities are in Denmark, assuming an average transportation distance of 200km by truck helps standardize the assessment of environmental impacts related to distribution within this geographical context.

This encompasses the supply of all materials, products, and energy required for the construction process, along with the management of waste until it reaches the "end-of-waste" state or is finally disposed of. These informational modules also encompass all environmental impacts and factors associated with any losses that may occur during the construction process stage.

A5 – Installation

The A5 stage includes the energy consumption of handheld power tools used during the installation or construction phase of a product's life cycle.

Use stage (B1-B7) includes:

The B1 stage encompasses the use or application of the installed product, specifically accounting for the decomposition of reeds over the lifecycle of a thatched roof, with an assumption that 50% of the reed will decompose.

The B2 stage covers maintenance activities, including the use of a detergent mixed with water to prolong and refresh the appearance of the reed roof.

These information modules include provision and transport of all materials, products, as well as energy and water provisions, waste processing up to the end-of-waste state or disposal of final residues during this part of the use stage.

End of Life (C1-C4) includes:

The end-of-life stage includes:
C1 - de-construction, demolition
Deconstruction can be done manually not requiring any of the machinery
C2 - transport to waste processing
C3 - waste processing for reuse, recovery and/or recycling
C4 – disposal

Re-use, recovery and recycling potential (D) includes:

Module D includes the reuse, recovery and/or recycling potentials, expressed as net impacts and benefits.

LCA results

ENVIRONMENTAL IMPACTS PER DECLARED UNIT											
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-total	kg CO2 eq.	-3,94E+01	1,69E+00	1,84E-03	4,02E+01	2,32E-02	0,00E+00	6,78E-01	3,40E+01	1,55E-02	-8,75E+01
GWP-fossil	kg CO2 eq.	2,28E+01	1,69E+00	1,71E-03	0,00E+00	2,03E-02	0,00E+00	6,78E-01	4,96E-01	1,40E-02	-1,24E+01
GWP-biogenic	kg CO2 eq.	-6,22E+01	1,55E-03	1,20E-04	4,02E+01	-1,57E-02	0,00E+00	1,60E-04	3,35E+01	1,53E-03	-7,51E+01
GWP-luluc	kg CO2 eq.	1,10E-02	8,36E-04	5,43E-06	0,00E+00	1,87E-02	0,00E+00	1,31E-04	1,68E-04	2,46E-05	-6,72E-03
ODP	kg CFC 11 eq.	3,90E-07	3,69E-08	3,69E-11	0,00E+00	3,42E-10	0,00E+00	4,72E-09	9,36E-09	2,89E-10	-5,47E-07
AP	mol H+ eq.	2,27E-01	3,70E-03	6,72E-06	0,00E+00	1,02E-04	0,00E+00	1,31E-03	4,42E-03	7,82E-05	-1,80E-01
EP-freshwater	kg P eq.	1,46E-03	1,20E-04	1,36E-06	0,00E+00	3,48E-06	0,00E+00	1,98E-05	1,67E-04	1,95E-06	-4,02E-03
EP-marine	kg N eq.	6,02E-02	9,33E-04	1,62E-06	0,00E+00	9,30E-05	0,00E+00	5,16E-04	2,41E-03	2,81E-05	-1,15E-02
EP-terrestrial	mol N eq.	6,58E-01	9,48E-03	1,85E-05	0,00E+00	3,28E-04	0,00E+00	5,34E-03	2,20E-02	2,99E-04	-4,89E-01
POCP	kg NMVOC eq.	2,28E-01	5,74E-03	4,36E-06	0,00E+00	9,84E-05	0,00E+00	1,84E-03	5,89E-03	1,08E-04	-6,06E-02
ADPm1	kg Sb eq.	5,44E-05	5,53E-06	1,13E-08	0,00E+00	1,20E-07	0,00E+00	6,73E-07	1,06E-06	3,54E-08	-5,23E-05
ADPf1	MJ	3,37E+02	2,40E+01	2,85E-02	0,00E+00	2,64E-01	0,00E+00	3,83E+00	5,17E+00	2,54E-01	-1,08E+02
WDP1	m3 world eq. deprived	1,23E+00	9,91E-02	2,73E-04	0,00E+00	3,20E-02	0,00E+00	3,61E-02	-2,53E-01	-3,91E-03	-8,26E-01
Caption	GWP-total = Global Warming Potential - total; GWP-fossil = Global Warming Potential - fossil fuels; GWP-biogenic = Global Warming Potential - biogenic; GWP-luluc = Global Warming Potential - land use and land use change; ODP = Ozone Depletion; AP = Acidifcation; EP-freshwater = Eutrophication – aquatic freshwater; EP-marine = Eutrophication – aquatic marine; EP-terrestrial = Eutrophication – terrestrial; POCP = Photochemical zone formation; ADPm = Abiotic Depletion Potential – minerals and metals; ADPf = Abiotic Depletion Potential – fossil fuels; WDP = water use										
Disclaimer	1 The results of this environmental indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.										

ADDITIONAL ENVIRONMENTAL IMPACTS PER m2											
Parameter	**Unit**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**C1**	**C2**	**C3**	**C4**	**D**
PM	[Disease incidence]	1,78E-06	1,26E-07	4,77E-11	0,00E+00	2,27E-09	0,00E+00	3,48E-08	6,14E-08	2,64E-09	-1,50E-06
IRP2	[kBq U235 eq.]	3,27E-01	3,25E-02	6,43E-04	0,00E+00	3,89E-04	0,00E+00	2,72E+00	1,85E-02	1,45E-01	-4,91E+01
ETP-fw1	[CTUe]	1,27E+02	1,15E+01	5,06E-03	1,63E-02	2,15E-01	0,00E+00	1,06E+00	4,96E+01	2,57E-04	-3,90E-01
HTP-c1	[CTUh]	1,61E-07	7,71E-10	8,40E-13	0,00E+00	1,98E-11	0,00E+00	1,49E-10	3,33E-09	2,03E-11	-7,23E-10
HTP-nc1	[CTUh]	4,62E-07	1,71E-08	2,37E-11	2,90E-10	3,42E-10	0,00E+00	3,39E-09	1,17E-07	1,23E-10	-1,39E-07
SQP1	-	1,07E+02	1,45E+01	3,92E-02	0,00E+00	9,90E-01	0,00E+00	1,89E+00	4,27E+00	3,56E-01	-1,12E+02
Caption	PM = Particulate Matter emissions; IRP = Ionizing radiation – human health; ETP-fw = Eco toxicity – freshwater; HTP-c = Human toxicity – cancer effects; HTP-nc = Human toxicity – non cancer effects; SQP = Soil Quality										
Disclaimers	1 The results of this environmental indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator. 2 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.										

RESOURCE USE PER DECLARED UNIT											
Parameter	**Unit**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	[MJ]	3,30E+01	9,30E-02	8,74E-03	1,65E+01	3,57E-01	0,00E+00	1,26E-02	0,00E+00	1,43E-03	-6,96E+02
PERM	[MJ]	6,69E+02	0,00E+00	0,00E+00	3,35E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,35E+02
PERT	[MJ]	7,02E+02	9,30E-02	8,74E-03	3,51E+02	3,57E-01	0,00E+00	1,26E-02	6,89E-02	1,43E-03	-3,62E+02
PENRE	[MJ]	3,56E+02	2,56E+01	3,00E-02	0,00E+00	2,81E-01	0,00E+00	4,07E+00	3,76E+02	2,70E-01	-1,27E+02
PENRM	[MJ]	5,60E+00	0,00E+00	5,60E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,60E+00
PENRT	[MJ]	3,62E+02	2,56E+01	5,63E+00	0,00E+00	2,81E-01	0,00E+00	4,07E+00	3,76E+02	2,70E-01	-1,22E+02
SM	[kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	[MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF	[MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	[m3]	2,50E-01	3,46E-03	5,35E-05	0,00E+00	1,10E-03	0,00E+00	1,14E-03	2,61E-02	-7,44E-05	-2,28E-02

Caption

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

WASTE CATEGORIES AND OUTPUT FLOWS PER DECLARED UNIT											
Parameter	**Unit**	**A1-A3**	**A4**	**A5**	B1	**B2**	**C1**	**C2**	**C3**	**C4**	**D**
HWD	[kg]	5,37E-03	6,02E-04	2,65E-06	0,00E+00	1,66E-05	0,00E+00	5,39E-03	5,15E+00	8,07E-01	-3,29E-03
NHWD	[kg]	2,03E+01	1,19E+00	4,50E-01	0,00E+00	1,58E-02	0,00E+00	6,36E-01	1,28E+00	2,37E-02	-1,43E+00
RWD	[kg]	1,72E-03	7,90E-06	1,51E-07	0,00E+00	9,43E-08	0,00E+00	7,39E-07	4,67E-06	6,18E-08	-9,56E-05
CRU	[kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MFR	[kg]	0,00E+00	0,00E+00	8,62E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,13E-01	0,00E+00	1,38E+00
MER	[kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,34E+01
EEE	[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	1,30E+02
EET	[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	1,86E+02

Caption

HWD = Hazardous waste disposed; NHWD = Non hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Eksporteret elektrisk energi; EET = Eksporteret termisk energi

BIOGENIC CARBON CONTENT PER m2		
Parameter	**Unit**	**At the factory gate**
Biogenic carbon content in product	[kg C]	20,92
Biogenic carbon content in accompanying packagaing	[kg C]	0
Note	1 kg biogenic carbon is equivalent to 44/12 kg of CO_2	

Additional information

Technical information on scenarios

Transport to the building site (A4)

Scenario information	Value	Unit
Fuel type	Diesel	-
Vehicle type	Lorry 16-32 metric ton, EURO6	-
Transport distance	200	km
Capacity utilisation (including empty runs)	0.85	%

Installation of the product in the building (A5)

Scenario information	Value	Unit
Hand tools electricity	0.03	kWh
Waste materials		
• Reed for incineration	0.446	kg
• Steel for recycling	0.691	kg
• PE-film for incineration	0.0044	kg

Use (B1-B2)

Scenario information	Value	Unit
B1		
Decomposition of reed material	22.3	kg
B2		
Detergent	0.005	kg
Water	0.495	kg

Reference service life

RSL information		Unit
Reference service Life	50	Years
Assumed quality of work		Following the technical guidelines published by the The Danish Thatcher Guild (Dansk Tækkemandslaug) "

Use (B1-B7)

Scenario information	Value	Unit
B1 – Use		
Decomposition of reed material	22.3	kg
B2 - Maintenance		
Maintenance process	Detergent against moss	-
Maintenance cycle	0.02	/year
Net freshwater consumption during maintenance	0.000005	m^3

End of life (C1-C4)

Scenario information	Value	Unit
Collected separately	23.528	kg
Steel for recycling	0.513	kg
For final disposal		
Glass Fleece for landfill	0.715	kg
Reed for incineration	22.3	kg

Re-use, recovery, and recycling potential (D)

Scenario information/Materiel	Value	Unit
Displaced material	23.528	kg
Energy recovery from waste incineration	334.5	MJ

Indoor air

The EPD does not give information on release of dangerous substances to indoor air because the horizontal standards on the relevant measurements are not available. Read more in EN15804+A1 chapter 7.4.1.

Soil and water

The EPD does not give information on release of dangerous substances to soil and water because the horizontal standards on the relevant measurements are not available. Read more in EN15804+A1 chapter 7.4.2.

References

Publisher	www.epddanmark.dk Template version 2023.1
Programme operator	Danish Technological Institute Buildings & Environment Gregersensvej DK-2630 Taastrup www.teknologisk.dk
LCA-practitioner	Green Survey Skovgaardsgade 5C, 8000 Aarhus C Att: Augustas Sudaras
LCA software /background data	*SimaPro 9.5.0* *Ecoinvent database v.3.9.3* *EF (By Shpera) database v. 3.1*
3rd party verifier	Mirko Miseljic - Force Technology

General programme instructions
General Programme Instructions, version 2.0, spring 2020
www.epddanmark.dk

EN 15804
DS/EN 15804 + A2:2019 - "Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products"

EN 16485
DS/EN 16485:2014 wood and wood-based products for use in contruction

EN 15942
DS/EN 15942:2011 – " Sustainability of construction works – Environmental product declarations – Communication format business-to-business"

ISO 14025
DS/EN ISO 14025:2010 – " Environmental labels and declarations – Type III environmental declarations – Principles and procedures"

ISO 14040
DS/EN ISO 14040:2008 – " Environmental management – Life cycle assessment – Principles and framework"

ISO 14044
DS/EN ISO 14044:2008 – ” Environmental management – Life cycle assessment – Requirements and guidelines”

Tækkelauget. (January 2019). *https://straatagetskontor.dk/.* Hentet fra Straatagets Kontor: https://straatagetskontor.dk/wp-content/uploads/2019/01/6848_Taekkelaug_Veludfort-straatag2019_15012019_enkeltsidet.pdf

Ecoinvent 3.9.1
Ecoinvent 3.9.1 Ecoinvent data base 2023 version 3.9.1 http://www.ecoinvent.org

ÖKOBAUDAT
ÖKOBAUDAT (current version 2023-I from 15.06.2023 - www.oekobaudat.de

Background LCA report

LCA report on Carlo F. Christensen of thatched roof. January 2024