epd-norway
Global Program Operator

Environmental Product Declaration

In accordance with 14025 and EN15804 +A2

Owner of the declaration:
Comrod AS

Product name:
Comrod Utility pole

Declared unit:
1 kg of Comrod Utility pole, moduels A1-A3, A4, C1-C4 and D

Product category /PCR:
EN15804 and NPCR Part A for Construction products and services

Program holder and publisher:
The Norwegian EPD foundation

Declaration number:
NEPD-5647-4941-EN

Registration Number:
NEPD-5647-4941-EN

Issue date:

09.01.2024

Valid to:

09.01.2029

COMROD

The Norwegian
EPD Foundation

General information

Product:
Comrod Utility pole

Program Operator:
The Norwegian EPD Foundation
Post Box 5250 Majorstuen, 0303 Oslo, Norway
Tlf: +47 23 08 80 00
e-mail: post@epd-norge.no

Declaration Number:
NEPD-5647-4941-EN

This declaration is based on Product Category Rules:
EN15804 and NPCR Part A:2021 Construction products and services Ver 2.

Statements:
The owner of the declaration shall be liable for the underlying information and evidence. EPD Norway shall not be liable with respect to manufacturer, life cycle assessment data and evidences.

Declared unit with option:
1 kg of Comrod Utility pole, modules A1-A3, A4, C1-C4 and D

Functional unit:
N/A

Verification:
Independent verification of the declaration and data, according to ISO14025:2010

internal ☐ external ■

Ellen Soldal
Independent verifier approved by EPD Norway

Owner of the declaration:
Comrod AS
Contact person: Hedda Tomine Berg
Phone: +47 5174 0500
e-mail: info@comrod.com

Manufacturer:
Comrod AS
Fiskaavegen 1, 4120 Tau, Norway
Phone: +47 5174 0500
e-mail: info@comrod.com

Place of production:
Tau, Norway

Management system:

Organisation no:
934 335 724

Issue date:
09.01.2024

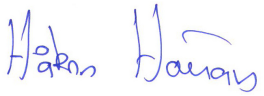
Valid to:
09.01.2029

Year of study:
2023

Comparability:
EPDs from other programmes than EPD-Norge may not be comparable.

The EPD has been worked out by:
Kristine Bjordal, energy- and environmental consultant at Asplan Viak

Approved



Manager of EPD Norway

Product

Product description:

Comrod Utility pole of glassfiber. The Compole system is a module-based set of composite poles for overhead power transmission structures, including technology and equipment for embedding the poles in rock by use of drilling.

The poles consist of conical GRP (Glass-Reinforced Plastic) sections that fit onto each other to produce poles of desired lengths and stiffness. The pole sections are made by filament winding on large rotating mandrels with a machine controlled winding program to produce an accurate and consistent laminate.

The pole system is modular-based where the poles are joined together to the desired length. A module set is a combination of several pole sections into a complete pole. Pole sections in the same string, can be joined together.

Product specification:

The Comrod Utility mast system consists of modules ranging from Ø230 to Ø1079mm in the sections. The modules are joined together before craning into position. The results in the current EPD are given for an average of the above mentioned diameter range with the following material composition per kg Comrod Utility pole .

Materials	KG	%
Glass fiber	0,668	66,8 %
Epoxy-resin	0,314	31,4 %
Laquer	0,018	1,8 %
Total weight	1,00	100 %
Packaging film LDPE	0,02	
Total weight incl. packaging	1,02	

Technical data:

There are a large variation for the Compole system. The diameter of the largest bottom section is 1079 mm while the smallest diameter of the thinnest section is 230 mm. The entire production over a year was analyzed and thus the reported values represent an average pole.

Technical data	Unit	Value
Inner diameter, bottom and top	mm	208 - 1063
Outer diameter, bottom and top	mm	1079 - 230
Thickness of laminat, bottom and top	mm	8 – 13
Thickness of paint layer	µm	250

Market:

Nordics

Reference service life, product:
200 years

Reference service life, building:
N/A

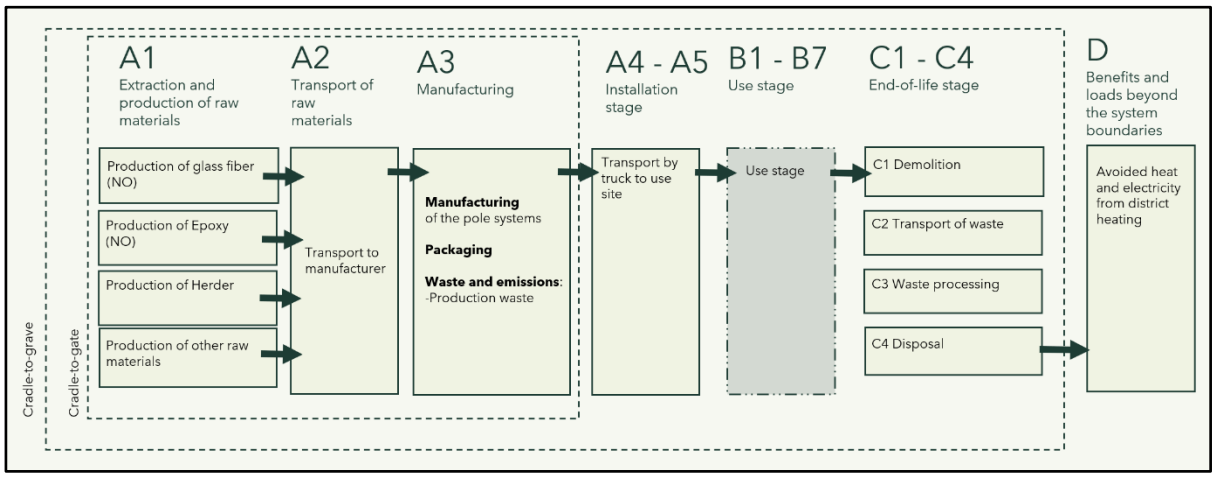
LCA: Calculation rules

Declared unit:
1 kg of Comrod Utility pole, modules A1-A3, A4, C1-C4 and D.

Data quality:
Data has been collected in 2023 and is representative for 2022. Data for the raw material and production and transport (A1-A3 and A4) is based on specific consumption data and technical data sheets from the suppliers for the factory in Tau, Norway. The yearly averages for 2022 are referred to. End of life scenarios have been established based on information from Comrod, but there are little information about this as no products have reached their end of life. Generic data is from ecoinvent v3.9, Allocation, Cut-Off by classification, SimaPro v 9.4.0.2. Characterization factors from EN15804: 2012 + A2: 2019.

Allocation:
The allocation is made in accordance with the provisions of EN 15804. Incoming energy and water and waste production in-house is allocated equally among all products through mass allocation. Effects of primary production of recycled materials allocated to the main product in which the material was used.

System boundary:
The system boundary is from cradle to gate with options, A1-A3, A4, C1, C2, C3, C4 and D. The flow chart for production, transport and end of life is shown in the figure below.



Cut-off criteria:

All major raw materials and all the essential energy is included. The production process for raw materials and energy flows that are included with very small amounts (<1%) are not included. This cut-off rule does not apply for hazardous materials and substances.

LCA: Scenarios and additional technical information

The following information describes the scenarios in the different modules of the EPD.

Scenarios have been developed to account for downstream processes such as demolition and waste treatment in accordance with the requirements of EN 15804 and NPCR PART A.

Transport from production place to assembly/user (A4)

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance KM	Fuel/Energy consumption	value (l/t)
Truck	85 %	Lorry 28 metric ton, EURO6	300	0,0494 l/tkm	14,8

The scenario for transportation to use site follows the default scenario provided in NPCR Part A.

End of Life (C1, C3, C4)

	Unit	Value
Hazardous waste disposed	Kg	-
Collected as mixed construction waste	Kg	-
Reuse	Kg	-
Recycling	Kg	-
Energy recovery	Kg	1,0
To landfill	Kg	0,668

Due to a lack of reliable data for the removal of the pole from use, C1 is based on available literature. The scenario for end-of-life treatment of the pole follows a conservative scenario with municipal incineration with energy recovery (C3). Ashes and solids after incineration are landfilled (C4). Recovered energy from C3 is assumed to substitute electricity and district heating (D).

Transport to waste processing (C2)

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance KM	Fuel/Energy consumption	value (l/t)
Truck	85 %	Lorry 28 metric ton, EURO6	50	0,0494 l/tkm	14,8

It is assumed that the waste is transported 50 km to the local waste incineration facility.

Benefits and loads beyond the system boundaries (D)

	Unit	Value
Substitution of delivered electricity	0,24	MJ

Substitution of delivered district heating	7,02	MJ

Exported energy replaces the Norwegian district heating mix and electricity mix. All conversion factors for efficiencies and losses from waste to delivered energy are included.

Additional technical information

Not relevant.

LCA: Results

The LCA results are presented below for the declared unit defined on page 2 of the EPD document. Impact assessment results are presented with core and additional impact indicators presented in EN15804+A2. Reading example: 9,0 E-03 = 9,0*10-3 = 0,009.

System boundaries (X=included, MND= module not declared, MNR=module not relevant)

Product stage			Assembly stage		Use stage							End of life stage				Benefits & loads beyond system boundary
Raw materials	Transport	Manufacturing	Transport	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	X	MND	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X

Core environmental impact indicators

Indicator	Unit	A1	A2	A3	A1-A3	A4
GWP-total	kg CO2 eq.	2,90E+00	3,92E-02	4,38E-01	3,38E+00	6,84E-02
GWP-fossil	kg CO2 eq.	2,88E+00	3,91E-02	4,20E-01	3,34E+00	6,83E-02
GWP-biogenic	kg CO2 eq.	1,96E-02	7,36E-05	1,69E-02	3,66E-02	7,46E-05
GWP-LULUC	kg CO2 eq.	2,05E-03	1,91E-05	9,13E-04	2,98E-03	1,25E-05
ODP	kg CFC11 eq.	2,23E-07	8,55E-10	4,11E-09	2,28E-07	1,50E-09
AP	mol H^+ eq.	1,80E-02	1,28E-04	9,01E-04	1,90E-02	1,19E-04
EP-freshwater	kg P eq.	6,36E-05	3,14E-07	6,36E-06	7,03E-05	2,64E-07
EP-marine	kg N eq.	3,48E-03	3,36E-05	1,81E-04	3,70E-03	3,17E-05
EP-terrestial	mol N eq.	3,81E-02	3,57E-04	2,26E-03	4,07E-02	3,23E-04
POCP	kg NMVOC eq.	1,38E-02	1,77E-04	6,46E-04	1,46E-02	2,11E-04

ADP-M&M	kg Sb eq.	2,54E-04	1,04E-07	6,51E-06	2,61E-04	5,46E-08
ADP-fossil	MJ	4,87E+01	5,75E-01	2,95E+00	5,22E+01	9,56E-01
WDP	m³	8,40E-01	2,65E-03	1,08E-01	9,50E-01	2,49E-03

Indicator	Unit	C1	C2	C3	C4	D
GWP-total	kg CO2 eq.	1,50E-01	1,12E-02	1,00E+00	1,11E-02	-6,46E-02
GWP-fossil	kg CO2 eq.	1,50E-01	1,12E-02	1,00E+00	1,10E-02	-4,17E-02
GWP-biogenic	kg CO2 eq.	5,99E-05	1,22E-05	1,92E-03	5,58E-05	-2,28E-02
GWP-LULUC	kg CO2 eq.	1,64E-05	2,05E-06	2,87E-06	3,80E-06	-1,70E-04
ODP	kg CFC11 eq.	2,31E-09	2,45E-10	3,47E-10	2,71E-10	-1,09E-09
AP	mol H^+ eq.	6,77E-04	1,95E-05	1,30E-04	5,59E-05	-3,99E-04
EP-freshwater	kg P eq.	5,24E-07	4,31E-08	1,68E-07	3,05E-07	-2,22E-06
EP-marine	kg N eq.	2,95E-04	5,18E-06	5,97E-05	2,36E-05	-1,31E-04
EP-terrestial	mol N eq.	3,19E-03	5,28E-05	6,62E-04	2,42E-04	-1,49E-03
POCP	kg NMVOC eq.	1,02E-03	3,44E-05	1,70E-04	9,16E-05	-4,10E-04
ADP-M&M	kg Sb eq.	5,06E-08	8,93E-09	2,25E-08	2,32E-08	-1,23E-06
ADP-fossil	MJ	1,90E+00	1,56E-01	9,35E-02	2,09E-01	-6,12E-01
WDP	m³	3,88E-03	4,07E-04	2,13E-03	9,64E-04	-1,26E-02

GWP-total: *Global Warming Potential;* ***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:*** *Depletion potential of the stratospheric ozone layer;* ***AP:*** *Acidification potential, Accumulated Exceedance;* ***EP-freshwater:*** *Eutrophication potential, fraction of nutrients reaching freshwater end compartment; See "additional Norwegian requirements" for indicator given as PO4 eq.* ***EP-marine:*** *Eutrophication potential, fraction of nutrients reaching freshwater end compartment;* ***EP-terrestial:*** *Eutrophication potential, Accumulated Exceedance;* ***POCP****: Formation potential of tropospheric ozone;* ***ADP-M&M****: Abiotic depletion potential for non-fossil resources (minerals and metals);* ***ADP-fossil:*** *Abiotic depletion potential for fossil resources;* ***WDP:*** *Water deprivation potential, deprivation weighted water counsumption*

Additional environmental impact indicators

Indicator	Unit	A1	A2	A3	A1-A3	A4
PM	Disease incidence	1,41E-07	2,79E-09	9,38E-09	1,53E-07	2,73E-09
IRP	kBq U235 eq.	5,96E-02	2,72E-04	5,31E-02	1,13E-01	2,96E-04
ETP-fw	CTUe	3,65E+01	3,01E-01	1,29E+00	3,81E+01	4,68E-01
HTP-c	CTUh	3,36E-09	1,69E-11	2,14E-10	3,60E-09	1,38E-11
HTP-nc	CTUh	1,37E-07	5,11E-10	6,00E-09	1,44E-07	5,29E-10

SQP	Dimensionless	6,81E+00	5,68E-01	1,86E+00	9,24E+00	4,96E-01

Indicator	Unit	C1	C2	C3	C4	D
PM	Disease incidence	8,67E-09	4,46E-10	1,74E-09	1,14E-09	-2,42E-08
IRP	kBq U235 eq.	3,88E-04	4,84E-05	8,33E-05	1,11E-04	-5,22E-03
ETP-fw	CTUe	9,66E-01	7,64E-02	4,09E-02	3,16E-01	-3,26E-01
HTP-c	CTUh	1,16E-10	2,26E-12	2,14E-11	2,12E-11	-5,96E-11
HTP-nc	CTUh	8,31E-10	8,64E-11	3,15E-10	7,93E-10	-2,89E-09
SQP	Dimensionless	1,27E-01	8,10E-02	2,19E-02	3,21E-01	-1,01E+01

PM: *Particulate matter emissions;* ***IRP:*** *Ionising radiation, human health;* ***ETP-fw:*** *Ecotoxicity (freshwater);* ***ETP-c:*** *Human toxicity, cancer effects;* ***HTP-nc:*** *Human toxicity, non-cancer effects;* ***SQP:*** *Land use related impacts / soil quality*

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 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

Resource use

Parameter	Unit	A1	A2	A3	A1-A3	A4
RPEE	MJ	6,77E+00	8,29E-03	1,63E+01	2,31E+01	7,70E-03
RPEM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
TPE	MJ	6,77E+00	8,29E-03	1,63E+01	2,31E+01	7,70E-03
NRPE	MJ	4,87E+01	5,75E-01	2,95E+00	5,22E+01	9,56E-01
NRPM	MJ	1,09E+01	0,00E+00	0,00E+00	1,09E+01	0,00E+00
TRPE	MJ	5,96E+01	5,75E-01	2,95E+00	6,31E+01	9,56E-01
SM	kg	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
NRSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
W	m^3	5,68E-02	8,31E-05	1,15E-01	1,72E-01	8,61E-05

Parameter	Unit	C1	C2	C3	C4	D
RPEE	MJ	1,08E-02	1,26E-03	3,67E-03	4,46E-03	-3,60E+00
RPEM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
TPE	MJ	1,08E-02	1,26E-03	3,67E-03	4,46E-03	-3,60E+00
NRPE	MJ	1,90E+00	1,56E-01	9,35E-02	2,09E-01	-6,13E-01
NRPM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
TRPE	MJ	1,90E+00	1,56E-01	9,35E-02	2,09E-01	-6,13E-01
SM	kg	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
NRSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
W	m^3	1,34E-04	1,41E-05	1,99E-04	1,18E-04	-1,04E-02

RPEE Renewable primary energy resources used as energy carrier; RPEM Renewable primary energy resources used as raw materials; TPE Total use of renewable primary energy resources; NRPE Non renewable primary energy resources used as energy carrier; NRPM Non renewable primary energy resources used as materials; TRPE Total use of non renewable primary energy resources; SM Use of secondary materials; RSF Use of renewable secondary fuels; NRSF Use of non renewable secondary fuels; W Use of net fresh water

End of life - Waste

Parameter	Unit	A1	A2	A3	A1-A3	A4
HW	KG	7,02E-03	2,93E-05	2,57E-01	2,64E-01	3,32E-05
NHW	KG	3,31E-01	4,88E-02	1,18E-01	4,98E-01	4,07E-02
RW	KG	5,95E-05	3,63E-06	1,98E-05	8,29E-05	6,42E-06

Parameter	Unit	C1	C2	C3	C4	D
HW	KG	2,69E-04	2,41E-06	2,53E-04	7,81E-01	-3,51E-04
NHW	KG	1,23E-02	6,68E-03	2,74E-03	1,02E-02	-1,40E-02
RW	KG	6,36E-05	2,94E-08	2,03E-07	1,22E-06	-2,66E-06

HW Hazardous waste disposed; NHW Non hazardous waste disposed; RW Radioactive waste disposed

End of life – output flow

Parameter	Unit	A1	A2	A3	A1-A3	A4
CR	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MR	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MER	kg	0,00E+00	0,00E+00	2,73E-01	2,73E-01	0,00E+00
EEE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
ETE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Parameter	Unit	C1	C2	C3	C4	D
CR	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MR	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MER	kg	0,00E+00	0,00E+00	1,00E+00	0,00E+00	0,00E+00
EEE	MJ	0,00E+00	0,00E+00	2,40E-01	0,00E+00	0,00E+00
ETE	MJ	0,00E+00	0,00E+00	7,02E+00	0,00E+00	0,00E+00

CR Components for reuse; MR Materials for recycling; MER Materials for energy recovery; EEE Exported electric energy; ETE Exported thermal energy

Reading example: 9,0 E-03 = 9,0*10-3 = 0,009

Information describing the biogenic carbon content at the factory gate

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

Additional Norwegian requirements

Greenhous gas emission from the use of electricity in the manufacturing phase

National production mix from import, medium voltage (production of transmission lines, in addition to direct emissions and losses in grid) of applied electricity for the manufacturing

prosess (A3). The elctricity is reported in A3 according to ISO 21930, and not in A1 as in EN15804.

National electricity grid	Unit	Value
Norwegian mix (market for electricity, ecoinvent 3.9)	kg CO2 -eq/kWh	0,032

Additional environmental impact indicators required in NPCR Part A for construction products

In order to increase the transparency of biogenic carbon contribution to climate impact, the indicator GWP-IOBC is required as it declares climate impacts calculated according to the principle of instantanious oxidation. GWP-IOBC is also referred to as GWP-GHG in context to Swedish public procurement legislation. This is however not relevant to calculate in this EPD as there are no biogenic carbon used in the foreground system.

Indicator	Unit	A1	A2	A3	A1-A3	A4
GWP-IOBC	kg CO2 eq.	2,88E+00	3,91E-02	4,20E-01	3,34E+00	6,83E-02

Indicator	Unit	C1	C2	C3	C4	D
GWP-IOBC	kg CO2 eq.	1,50E-01	1,12E-02	1,00E+00	1,10E-02	-4,17E-02

GWP-IOBC *Global warming potential calculated according to the principle of instantanious oxidation.*

Hazardous substances

The declaration is based upon reference to threshold values and/or test results and/or material safety data sheets provided to EPD verifiers. Documentation available upon request to EPD owner.

- ✓ The product contains no substances given by the REACH Candidate list or the Norwegian priority list.
- ☐ The product contains substances given by the REACH Candidate list or the Norwegian priority list that are less than 0,1 % by weight.
- ☐ The product contain dangerous substances, more then 0,1% by weight, given by the REACH Candidate List or the Norwegian Priority list, see table.
- ☐ The product contains no substances given by the REACH Candidate list or the Norwegian priority list. The product is classified as hazardous waste (Avfallsforskiften, Annex III), see table.

Name	CAS no.	Amount

Indoor environment

Not relevant. No tests have been carried out on the product concerning indoor climate.

Carbon footprint

Carbon footprint has not been worked out for the product.

Bibliography

ISO 14025:2010	Environmental labels and declarations - Type III environmental declarations - Principles and procedures
ISO 14044:2006	Environmental management - Life cycle assessment - Requirements and guidelines
EN 15804:2012+A2:2019	Sustainability of construction works - Environmental product declaration - Core rules for the product category of construction products
ISO 21930:2007	Sustainability in building construction - Environmental declaration of building products
ecoinvent v3	Allocation, cut-off by classification, Swiss Centre of Life Cycle Inventories.
SimaPro	LCA software, developed by PRé Sustainability
NPCR PART A Ver 2	Construction Products and Services
Bjordal, Kristine, 2023	LCA Report for Comrod Utility pole by Comrod AS

epd-norway Global Program Operator	**Program Operator**	tlf	+47 23 08 80 00
	The Norwegian EPD Foundation		
	Post Box 5250 Majorstuen, 0303 Oslo	e-post:	post@epd-norge.no
	Norway	web	www.epd-norge.no
epd-norway Global Program Operator	**Publisher**	tlf	+47 23 08 80 00
	The Norwegian EPD Foundation		
	Post Box 5250 Majorstuen, 0303 Oslo	e-post:	post@epd-norge.no
	Norway	web	www.epd-norge.no
COMROD	**Owner of the decleration**	tlf	+47 5174 0500
	Comrod AS	Fax	
	Fiskaavegen 1, 4120 Tau	e-post:	info@comrod.com
	Norway	web	www.comrod.com
asplan viak	**Author of the life cycle assesment**	tlf	+47 41 79 94 17
	Kristine Bjordal	Fax	
	Asplan Viak AS	e-post:	asplanviak@asplanviak.no
	Abels gate 9, 7030 Trondheim, Norway	web	www.asplanviak.no
ECO PLATFORM EPD VERIFIED	ECO Platform ECO Portal	web web	www.eco-platform.org ECO Portal

EPD for the best environmental decision

The Norwegian EPD foundation
www.epd-norge.no

epd-norway
Global Program Operator