Environmental Product Declaration

In accordance with ISO 14025 and EN 15804:2012+A2:2019 for:

Medium Density Fibreboard, MDF

from

Norbord Europe Ltd

Programme:	The International EPD® System, www.environdec.com
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An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com

General information

Programme information

Programme:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	www.environdec.com
E-mail:	info@environdec.com

CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product category rules (PCR): *Product Category Rules (PCR): Construction products and construction services. PCR 2012:01 Version 2.3 (IEPDS, 2018)* *SUB-PCR to PCR 2012:01: Wood and wood-based products for use in construction. PCR 2012:01-SUB-PCR-E (IEPDS, 2018)*
PCR review was conducted by: <*name and organisation of the review chair, and information on how to contact the chair through the programme operator*>
Independent third-party verification of the declaration and data, according to ISO 14025:2006: ☐ EPD process certification ☐ EPD verification
Third party verifier: <*name and organisation of the third party verifier*> *In case of accredited certification bodies:* Accredited by: <*name of the accreditation body and accreditation number, where applicable*>. *In case of recognised individual verifiers:* Approved by: The International EPD® System
Procedure for follow-up of data during EPD validity involves third party verifier: ☐ Yes ☐ No

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804. For further information about comparability, see EN 15804 and ISO 14025.

Company information

Owner of the EPD: Norbord Europe Ltd

Contact: alan.kirkpatrick@westfraser.com

Description of the organisation: Norbord is the UK's largest manufacturer of wood panel boards and have supplied the construction industry for over five decades. Norbord places customers, standards of excellence, control of costs, safety and environmental concerns at the heart of its business. Brands include SterlingOSB Zero, CaberBoard Flooring and CaberWood MDF, and are manufactured to the highest standards. This backed up by a support team which assists customers with product and technical assistance. Norbord supplies more than 70 key items across our three product ranges and is committed to quality and customer service.

Product-related or management system-related certifications: These products conform to the BS EN 5268 standard for structural timber design and hold certifications from the Forestry Stewardship Council (FSC), the British Board of Agrément (BBA) and the Conformité Européan (CE) mark (British Board of Agreement, 2015; BM Trada, 2015; Trada, 2007). These products are also UKCA certified.

Name and location of production site(s):
Norbord Europe Ltd, Station Road, Cowie, FK7 7BQ, United Kingdom.

Product information

Product name: Medium Density Fibre Board (MDF), engineered wood-based panel products.

Product description: Medium density fibreboard (MDF) products are manufactured from lignocellulose fibres extracted from wood that has been harvested from forest thinning. They are bonded with synthetic resins at high pressure and temperature to create the finished product. The structural integrity of MDF boards is not compromised by changes in humidity or temperature, making them homogenous and reliable products for use as a raw material in the construction industry.
MDF is suitable for use in a wide range of construction and related applications including: shop fitting, general purpose joinery, furniture, wall panelling, architectural mouldings, door manufacture, fire surrounds, exhibition displays, staircases, etc.

UN CPC code: 31441 Medium density fibreboard (MDF)

Product identification: This EPD relates to MDF products made by Norbord Europe Ltd at their production site in Cowie, UK. MDF thickness ranges from 6-30mm with variable measurements on the end-use applications.
The typical material composition of Norbord MDF is given below.

Table 1: Typical material composition of Norbord MDF

Component	Composition
Wood chips	~86%
Resin	~7%
Wax	0%
Water	~7%
Others	<1%

Technical data

The key technical characteristics of Norbord MDF are provided below.

Table 2: Key technical characteristics of Norbord MDF

Technical Properties	Unit	Specification	Relevant EN Standard
Thermal conductivity 'K' Value	W/(m.K)	0.13	EN 13986
Linear expansion (65-85% relative humidity)	%	0.15	
Moisture content	%	2-12	EN 322
Modulus of elasticity in bending – major axis	N/mm2	3500	EN 310
Modulus of elasticity in bending – minor axis	N/mm2	1400	EN 310
Internal bond (IB)	N/mm2	0.29-0.34	EN 319
Thickness swelling (24 hr immersion)	%	15	EN 317
Reaction to fire (BS EN 135 01-1)		D	EN 13986
Formaldehyde	mg/100 g	<8	EN 120

LCA information

Functional unit / declared unit: The declared quantifies and describes the products and is used as the basis for reporting results. This EPD relates to the range of MDF products made by Norbord Europe Ltd that are supplied to global customers.

The declared unit for MDF and particleboard products is typically based on volume. Hence, the declared unit for MDF is: 1 m^3 of MDF with density of 650 kg/m^3. To convert from 1 m^3 to 1 kg MDF the results should be divided by the density of 650 kg/m^3.

Time representativeness: All primary data were collected for the year 2020. All secondary data come from the GaBi 2021 databases and are representative of the years 2017-2020.

Database(s) and LCA software used: GaBi 2021 database and GaBi 10 Software are used

Description of system boundaries: The scope of this EPD covers the MDF production process and upstream burdens associated with production and transport of raw materials and generation of energy. It also accounts for the burdens associated with distributing the finished product out to customers (485 km) and packaging treatment. These activities relate to modules A1-A5, according to EN 15804+A2, as shown in Table 3 below. No reference service life is reported, as the use-stage modules (B1-B5) have not been declared. In the end-of-life stage a manual dismantling (module C1) and transport to the waste treatment facility (module C2) has been accounted for (100 km). Module C3 contains environmental loads related to the thermal treatment of the product. For the incineration process, an efficiency of greater 60% has been assumed (R1 – value > 0.6). For calculating the credits, for the substitution of thermal energy and electricity, European scenario datasets have been used. Module D contains credits for substitution of thermal energy and electricity by energy generation from thermal treatment of product (Module C3) and packaging (Module A5). The EPD type is “cradle-to-gate with options”.

Figure 2 shows the process steps and activities included within the system boundaries of the EPD study.

System diagram:

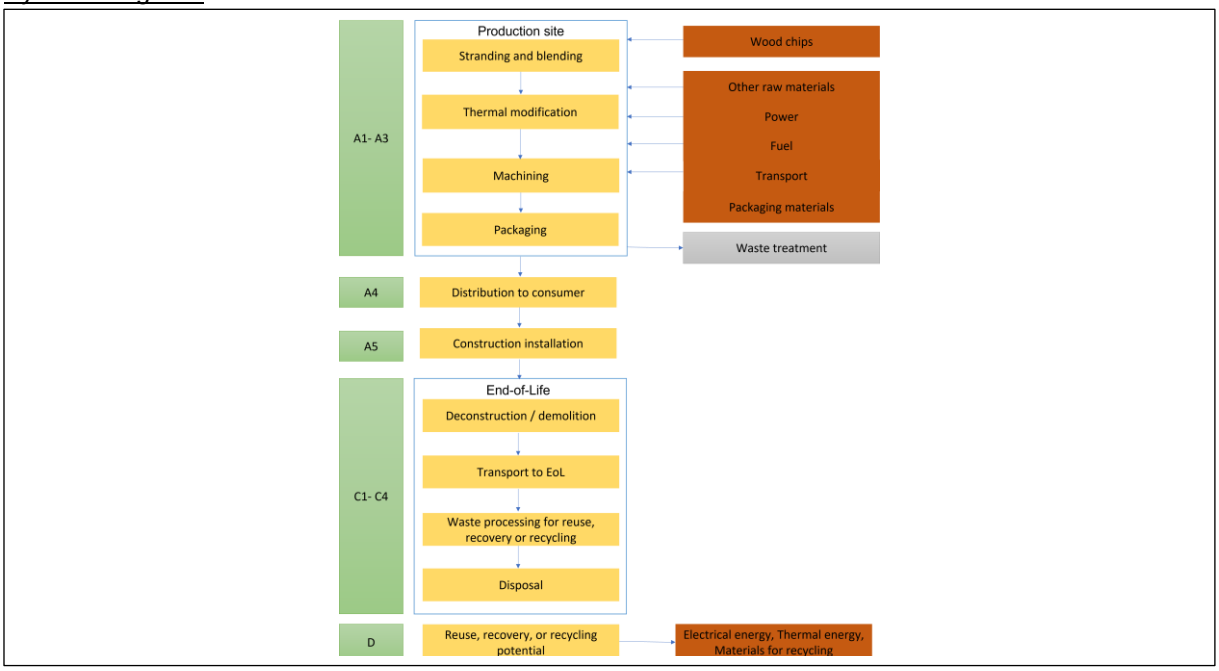

Figure 2: Process flow diagram showing the production and distribution of Norbord MDF

Table 3: Modules of the production life cycle included in the EPD (X = declared module; MND = module not declared)

	Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
Module	**A1**	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Modules declared	X	X	X	X	X	MND	MND	MND	MND	MND	MND	MND	X	X	X	MND	X
Geogrpahy	EU-28	GLO	GB	GLO	EU-28	MND	MND	MND	MND	MND	MND	MND	-	GLO	EU-28	MND	EU-28
Specific data used	>90%			-	-	MND	MND	MND	MND	MND	MND	MND	-	-	-	-	-
Variation-products	Not relevant			-	-	MND	MND	MND	MND	MND	MND	MND	-	-	-	-	-
Variation-sites	Not relevant			-	-	MND	MND	MND	MND	MND	MND	MND	-	-	-	-	-

Content information

Product components	Weight, kg	Post-consumer material, weight-%	Renewable material, weight-%
Wood chips	526.5	0%	100%
Polymeric diphenyl methane diisocyanate (PMDI) resin	46.6	0%	0%
Wax	0	0%	0%
Urea	0.7	0%	0%
Green Dye	0.3	0%	0%
Water content	75.8	0%	0%
TOTAL	650	0%	92%
Packaging materials	**Weight, kg**	**Weight-% (versus the product)**	
Cardboard	0.5	0.07%	
Plastic	0.2	0.03%	
Battens-wood	5.2	0.80%	
TOTAL	5.9	0.9%	

Environmental Information

Potential environmental impact – mandatory indicators according to EN 15804

LCA results per 1m³ MDF board (650kg/m³) at Cowie													
Indicator	**Unit**	**A1**	**A2**	**A3**	**Tot. A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-fossil	kg CO2 eq.	8.49E+01	6.40E+01	1.02E+02	2.51E+02	2.32E+01	7.05E-01	ND	0.00E+00	4,79E+00	3,48E+02	ND	-3,10E+02
GWP-biogenic	kg CO2 eq.	-1.30E+03	1.56E+00	2.71E+02	-1.03E+03	5.96E-01	8.80E+00	ND	0.00E+00	1,23E-01	1,02E+03	ND	-2,52E+00
GWP- luluc	kg CO2 eq.	8.11E-02	8.90E-03	9.24E-03	9.92E-02	3.39E-03	2.14E-05	ND	0.00E+00	6.98E-04	6.60E-03	ND	-4.15E-01
GWP- total	kg CO2 eq.	-1.22E+03	6.55E+01	3.72E+02	-7.83E+02	2.38E+01	9.50E+00	ND	0.00E+00	4,91E+00	1,37E+03	ND	-3,13E+02
ODP	kg CFC 11 eq.	1.73E-13	1.06E-14	4.35E-13	6.19E-13	3.94E-15	3.28E-16	ND	0.00E+00	8.12E-16	2.49E-13	ND	-7.01E-12
AP	mol H^+ eq.	4.19E-01	1.77E-01	3.81E-01	9.77E-01	1.96E-02	8.33E-04	ND	0.00E+00	4.03E-03	8.12E-01	ND	-6.20E-01
EP-freshwater	kg P eq.	1.08E-04	2.05E-05	2.41E-04	3.70E-04	7.56E-06	3.76E-08	ND	0.00E+00	1.56E-06	1.78E-05	ND	-7.86E-04
EP-marine	kg N eq.	1.46E-01	4.98E-02	1.12E-01	3.08E-01 0.00E+00	6.34E-03	3.58E-04	ND	0.00E+00	1.31E-03	3.64E-01	ND	-1.49E-01
EP-terrestrial	mol N eq.	1.87E+00	5.49E-01	1.23E+00	3.65E+00	7.10E-02	4.36E-03	ND	0.00E+00	1.46E-02	4.41E+00	ND	-1.57E+00
POCP	kg NMVOC eq.	2.23E-01	1.40E-01	3.50E-01	7.13E-01	1.79E-02	9.21E-04	ND	0.00E+00	3.68E-03	9.31E-01	ND	-4.06E-01
ADP-minerals&metals*	kg Sb eq.	3.46E-05	2.31E-06	4.78E-06	4.17E-05	8.46E-07	4.42E-09	ND	0.00E+00	1.74E-07	3.05E-06	ND	-8.70E-05
ADP-fossil*	MJ	1.69E+03	8.76E+02	1.81E+03	4.38E+03	3.20E+02	5.84E-01	ND	0.00E+00	6.60E+01	4.63E+02	ND	-5.50E+03
WDP	m^3	8.27E+00	7.33E-02	3.12E+00	1.15E+01	2.61E-02	2.10E-01	ND	0.00E+00	5.38E-03	1.60E+02	ND	-4.70E+01
Acronyms	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; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption												

** Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.*

Potential environmental impact – additional mandatory and voluntary indicators

LCA results per 1m³ MDF board (650kg/m³) at Cowie													
Indicator	**Unit**	**A1**	**A2**	**A3**	**Tot. A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-GHG[1]	kg CO_2 eq.	-1.22E+03	6.55 E+01	3.72E+02	-7.83E+02	2.38E+01	9.50 E+00	ND	0.00 E+00	4,91 E+00	1,37E+03	ND	-3,13 E+02

Resource use, primary energy

LCA results per 1m³ MDF board (650kg/m³) at Cowie													
Indicator	**Unit**	**A1**	**A2**	**A3**	**Tot. A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	4.64E+03	2.03E+01	7.62E+01	4.74E+03	7.73E+00	7.38E+01	ND	0.00 E+00	1.59 E+00	9.53E+03	ND	-2.40E+03
PERM	MJ	9.45E+03	0.00E+00	7.37E+01	9.52E+03	0.00E+00	-7.37E+01	ND	0.00 E+00	0.00 E+00	-9.45E+03	ND	0.00E+00
PERT	MJ	1.41E+04	2.03E+01	1.50E+02	1.43E+04	7.73E+00	1.06E-01	ND	0.00 E+00	1.59 E+00	8.21E+01	ND	-2.40E+03
PENRE	MJ	1.69E+03	8.77E+02	1.81E+03	4.38E+03	3.21E+02	8.28E+00	ND	0.00 E+00	6.61 E+01	4.63E+02	ND	-5.51E+03
PENRM	MJ.	0.00E+00	0.00E+00	7.70E+00	7.70E+00	0.00E+00	-7.70E+00	ND	0.00 E+00	0.00 E+00	0.00E+00	ND	0.00E+00
PENRT	MJ	1.69E+03	8.77E+02	1.81E+03	4.38E+03	3.21E+02	5.84E-01	ND	0.00 E+00	6.61 E+01	4.63E+02	ND	-5.51E+03
SM	kg	0.00E+00	0.00E+00	5.22E-01	5.22E-01	0.00E+00	0.00E+00	ND	0.00 E+00	0.00 E+00	0.00E+00	ND	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	0.00 E+00	0.00 E+00	0.00E+00	ND	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	ND	0.00 E+00	0.00 E+00	0.00E+00	ND	0.00E+00
FW	m^3	2.84E-01	5.34E-03	5.14E-01	8.03E-01	1.96E-03	4.96E-03	ND	0.00 E+00	4.04 E-04	3.76E+00	ND	-2.34E+00

[1] The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus almost equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

Acronyms	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 re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water

Waste production and output flows

Waste production

LCA results per 1m³ MDF board (650kg/m³) at Cowie

Indicator	Unit	A1	A2	A3	Tot. A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
Hazardous waste disposed	kg	5.34E-07	9.22E-09	2.22E-07	7.65E-07	3.41 E-09	9.59E-11	ND	0.00E +00	7.04E-10	7.05E-08	ND	-1.43 E-06
Non-hazardous waste disposed	kg	4.81E-01	2.66E-02	6.95E +00	7.46E+00	8.61 E-03	2.95E-02	ND	0.00E +00	1.78E-03	1.06E +01	ND	-3.76 E+00
Radioactive waste disposed	kg	2.61E-02	1.03E-03	6.05E-02	8.76E-02	3.76 E-04	2.67E-05	ND	0.00E +00	7.74E-05	1.98E-02	ND	-7.76 E-01

Output flows

LCA results per 1m³ MDF board (650kg/m³) at Cowie

Indicator	Unit	A1	A2	A3	Tot. A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
Components for re-use	kg	0.00E +00	0.00E+00	0.00E +00	0.00E+00	0.00E+00	4,48E+00	ND	0.00 E+00	0.00E +00	0.00E +00	ND	0.00E+00
Material for recycling	kg	0.00E +00	0.00E+00	0.00E +00	0.00E+00	0.00E+00	0.00E+00	ND	0.00 E+00	0.00E +00	0.00E +00	ND	0.00E+00
Materials for energy recovery	kg	0.00E +00	0.00E+00	0.00E +00	0.00E+00	0.00E+00	0.00E+00	ND	0.00 E+00	0.00E +00	0.00E +00	ND	0.00E+00
Exported energy, electricity	MJ	0.00E +00	0.00E+00	0.00E +00	0.00E+00	0.00E+00	4.13E+00	ND	0.00 E+00	0.00E +00	2.65E +03	ND	0.00E+00
Exported energy, thermal	MJ	0.00E +00	0.00E+00	0.00E +00	0.00E+00	0.00E+00	2.27E+00	ND	0.00 E+00	0.00E +00	2.59E +02	ND	0.00E+00

The result tables shall only contain values or the letters "ND" (Not Declared). It is not possible to specify ND for mandatory indicators. ND shall only be used for voluntary parameters that are not quantified because no data is available.

Information on biogenic carbon content

LCA results per 1m³ MDF board (650kg/m³) at Cowie

BIOGENIC CARBON CONTENT	Unit	QUANTITY
Biogenic carbon content in product	kg C	3.74E+03
Biogenic carbon content in packaging	kg C	3.23E+01

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO_2.

References

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