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The Norwegian EPD Foundation

ENVIRONMENTAL PRODUCT DECLARATION

in accordance with ISO 14025, ISO 21930 and EN 15804

Owner of the declaration: Program operator:	H-vinduet Magnor AS The Norwegian EPD Foundation
Publisher:	The Norwegian EPD Foundation
Declaration and registration number:	NEPD-2224-1022-EN
ECO Platform registration number:	-
Issue date:	02.06.2020
Valid to:	02.06.2025

H-vinduet 1.23 m x 1.48 m Type AT450SE

H-vinduet Magnor AS

MagnorVinduet
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General information

Product:
H-vinduet 1.23 m x 1.48 m Type AT450SE

Owner of the declaration:
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Manufacturer:
H-vinduet Magnor AS
Furumoen 61, 2240 Magnor, Norway

Declaration number:
NEPD-2224-1022-EN

Place of production:
Furumoen 61, 2240 Magnor, Norway

ECO Platform registration number:

Management system:
Certified according to NDVK (Norsk Dør- og VindusKontroll)

This declaration is based on Product Category Rules:
CEN Standard EN 15804 serves as core PCR NPCR014:2019 version 3.0 for Windows and doors

Org. no.:
NO 932239000 MVA

Declaration of responsibility:
The owner of the declaration shall be responsible for the underlying information and evidence. EPD Norway shall not be responsible with regard to manufacturer information, life cycle data and evidence.

Issue date:
02.06.2020

Valid to:
02.06.2025

Declared unit:

Year of study:
2020

Declared unit with option:

Comparability:
EPD of construction products may not be comparable if they are not comply with NS-EN 15804 and seen in a building context.

Functional unit:
1 triple glazed window measuring 1.23 m x 1.48 m (reference window based on EN 14351-1) with a reference service life of 60 years with an essential parameter of U-value from 0,63.

The EPD has been worked out by:

Vegard Ruttenborg
Norsk Treteknisk Institutt

Verification:

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

☐ internal ☑ external

Third party verifier:
Ellen Soldal, forsker
(Independent verifier approved by EPD Norway)

Approved
Håkon Hauan
Managing Director of EPD-Norway

Product

Product description:
H-window, type AT450SE, is a fixed window for installation in exterior walls. The window can be supplied in various widths and heights. Approx. 92% of the window opening is glass. The window frame consists of an outside layer of aluminum, multi-isolator composite material and a layer of wood on the side facing inside.

Different types of glass and dimensions of the interior wood can be used, so that one can get an overall U-value for the whole window of 0,63 W/m2K and up. Dimensions presented by the functional unit are put out by PCR and is not the real dimensions that H-vinduet Magnor AS supplies.

Technical data:
Weight: 66,15 kg/FU
The product complies with the requirements of the Norwegian Door and Window control (NDVK).

Market:
Norway and parts of Europe. Scenarios are calculated for the Norwegian market.

Product specification:
The product contains the following materials:

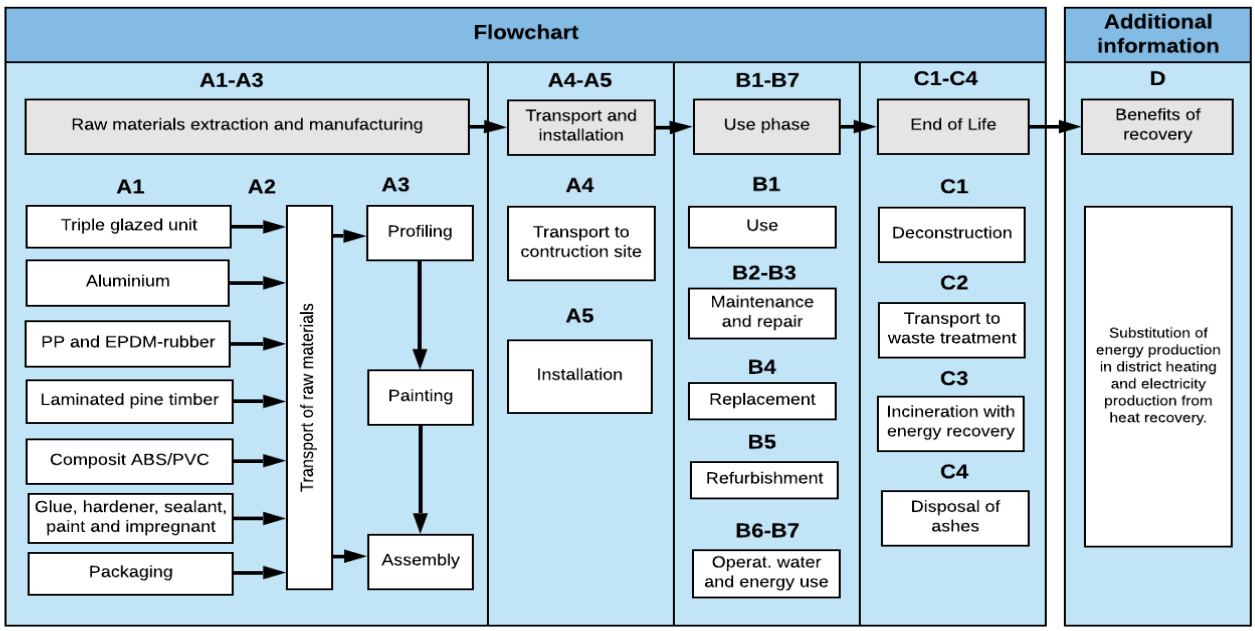
Materials	kg	%
Glass unit	48.40	73.17
Glass	*47.67*	
Spacer	*0.49*	
Dessicant	*0.16*	
Butyl	*0.08*	
Laminated pine timber	9.74	14.72
Composit ABS/PVC	3.46	5.23
Aluminium profiles (85 % resirc.)	3.50	5.29
EPDM-rubber	0.28	0.42
Paint and powder coating	0.42	0.63
Impregnant	0.07	0.11
Plastic (PP)	0.12	0.18
Adhesive and hardener	0.06	0.09
Sealant MS Polymer	0.10	0.15
Total weight of the product	***66.15***	***100.00***
Wood packaging	2.52	
Steel packaging	0.07	
Plastic packaging	0.07	
Total weight with packaging	***68.81***	

Reference service life:
Expected service life is 60 years, which is the same as the building.

LCA: Calculation rules

Functional unit:
1 triple glazed window measuring 1.23 m x 1.48 m (reference window based on EN 14351-1) with a reference service life of 60 years with an essential parameter of U-value from 0,63.

System boundary:
Modules A1-A5, B1-B7, C1-C4 og D are included according to the PCR.



Data quality
Data for energy use, water use, transport of raw materials and waste were collected from H-vinduet Magnor AS in 2019 for the year 2018. Some processes are based on Ecoinvent v3.2, but all upstream processes are v3.5. Remaining data is based on Ecoinvent v3.5 "Allocation cut-off by classification" (2018), but adjusted to improve representativeness. Modelling and calculation of LCA results is carried out with SimaPro version 9.0.0.48.

Cut-off criteria:
All important raw materails and energy use is included. In the production process, raw materials and energy of low amounts are not included (<1%). These cut-off rules do not apply to dangerous substances.

Allocation:
Allocation is done in accordance with the provisions of EN 15804. Energy use, water consumption and waste to waste treatment from production is allocated between the different product groups by using economic allocation. Within a product group these flows are allocated equally to each unit produced. For upstream production of raw materials, the allocation is by default in Ecoinvent v3.5, cut-off by classification. In the value chain of the laminated wood for the frame, economic allocation is used with standard values in Ecoinvent v3.5.

Calculations of biogenic carbon:
Sequestration and release of biogenic carbon is included according to EN 16485:2014.This is based on the modularity princinple in EN 15804:2012 that specifies that the emissions shall be accounted in the module that they occur. The amount of carbon dioxide is calculated according to NS-EN 16449:2014. Timber comes from sustainable forestry and has PEFC certified traceability.

LCA: Scenarios and additional technical information

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

Transport from production to the building site is assumed to be carried out by truck and a total distance of 430 km. It is assumed 400 km with a large truck and 30 km with a medium sized truck.

Transport from production place to assembly/user (A4)

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance km	Fuel/Energy consumption pr tkm	Fuel/Energy consumption pr km
Truck	53 %	EURO5, >32 tonn	400	0,023 l/tkm	0,31 l/km
Truck	26 %	EURO5, 16-32 tonn	30	0,045 l/tkm	0,25 l/km

Installation (A5)

	Unit	Value
Auxiliary	kg	0
Water consumption	m^3	0
Electricity consumption	MJ	0
Other energy carriers	MJ	0
Material loss	kg	0
Output materials from waste treatment	kg	2.66
Dust in the air	kg	0

According to the report from EPD-Norge 'Harmonising the documentation of scenarios beyond cradle to gate, EN 15804' there is no loss on site during construction activities. The window in this EPD is painted and surface treated in the production and not at the building site. Therefore, there are only two items left in this module. 1) Waste treatment of packaging, which is considered in the EPD calculations. 2) Energy use during installation. This can be varied depending on the floor, type of building and several other unknown parameters, and is therefore ignored in the calculation.

Maintenance (B2) / Repair (B3)

	Unit	Value
Detergents	kg	9
Water consumption	l	180
Paint	kg	0.30
Glazing unit	p	1.00
Synthetic rubber	kg	0.28

The maintenance scenario includes cleaning and painting. Cleaning is performed three times per year. It is calculated with 1,5 dl of detergent and 3 litres of water each year. The product is assumed to be painted twice during their lifetime. It is assumed that the glazing unit is changed once during the lifetime. There is assumed no need for repair during the product lifetime.

Replacement (B4)/ Refurbishment (B5)

	Unit	Value
Replacement cycle	yr	60
Electricity consumption	kWh	0

Replacement cycle is number or RSL (Reference Service Life). RSL of windows with exterior aluminium = RSL of a building. So, the assumption is that there will be no replacement of the window. However, replacement of the IGU is modelled in B2. It is assumed no need for refurbishment during the product lifetime.

The transport of window as waste is based on generic data from Ecoinvent v3.5 with a distance of 50 km.

Transport to waste processing (C2)

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance km	Fuel/Energy consumption pr tkm	Fuel/Energy consumption pr km
Truck	44 %	Unspecified	50	0,03 l/tkm	0,28 l/km

As there is no data of good quality for the deconstruction (C1), in this study it is assumed that there are no activities related to this module. The windows are assumed to be treated as mixed waste and sent to incineration. The combustible materials are then energy recovered, while glass is assumed to end up in the bottom ash and then landfilled. The metals are usually sorted out of the bottom ash and then recycled, but there is no data of the share which are recycled and a conservative estimate of 50 % is used.

End of Life (C1, C3, C4)

	Enhet	Verdi
Hazardous waste disposed	kg	0.00
Collected as mixed construction waste	kg	66.15
Reuse	kg	0
Recycling	kg	1.65
Energy recovery	kg	64.50
To landfill	kg	0

The benefits beyond the life cycle has been modelled based on the output flows from the C3. This includes energy from incineration and scrap metal recovered from the ashes. The amount recovered metal is assumed to avoid production of primary metals in accordance to 6.4.3.3 in EN 15804. The exported energy is substituting Norwegian district heating mix (SSB 2018a,b) and electricity mix. Inventory processes causing substitution of avoided virgin raw materials has be constructed for each material.

Benefits and loads beyond the system boundaries (D)

	Enhet	Verdi
Substitution of electricity	MJ	32.6
Substitution of thermal energy	MJ	224.5
Substitution of raw materials	kg	1.65

LCA: Results

Global warming potential in A1-A3 includes sequestration of 19.4 kg CO_2 as carbon in the wood in the product and packaging. According to the modularity principle, 3,7 kg CO2-eq. is released to air from incineration of packaging in module A5. The remaining 15,7 kg CO2-eq is released to air from incineration of the product in C3. View table in page 8 for complementary information.

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

Product stage			Construction and installation stage		Use stage							End of Life stage				Beyond the system boundaries
Raw materials	Transport	Manufacturing	Transport	Construction installation stage	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	X	X	X	X	X	X	X	X	X	X	X	X	X

Environmental impact

Parameter	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5
GWP	kg CO_2 -ekv	1.13E+02	2.72E+00	3.70E+00	0.00E+00	9.41E+01	0.00E+00	0.00E+00	0.00E+00
ODP	kg CFC11-ekv	1.07E-05	5.32E-07	0.00E+00	0.00E+00	7.64E-06	0.00E+00	0.00E+00	0.00E+00
POCP	kg C_2H_4 -ekv	4.37E-02	4.35E-04	0.00E+00	0.00E+00	2.83E-02	0.00E+00	0.00E+00	0.00E+00
AP	kg SO_2 -ekv	8.95E-01	8.78E-03	0.00E+00	0.00E+00	6.58E-01	0.00E+00	0.00E+00	0.00E+00
EP	kg PO_4^{3-}-ekv	9.06E-02	1.48E-03	0.00E+00	0.00E+00	6.57E-02	0.00E+00	0.00E+00	0.00E+00
ADPM	kg Sb-ekv	5.08E-04	5.66E-06	0.00E+00	0.00E+00	3.74E-04	0.00E+00	0.00E+00	0.00E+00
ADPE	MJ	1.62E+03	4.52E+01	0.00E+00	0.00E+00	1.20E+03	0.00E+00	0.00E+00	0.00E+00

Environmental impact

Parameter	Unit	B6	B7	C1	C2	C3	C4		D
GWP	kg CO_2 -ekv	0.00E+00	0.00E+00	0.00E+00	4.18E-01	3.27E+01	5.70E-01		-2.97E+01
ODP	kg CFC11-ekv	0.00E+00	0.00E+00	0.00E+00	7.88E-08	1.03E-07	1.52E-07		-9.53E-07
POCP	kg C_2H_4 -ekv	0.00E+00	0.00E+00	0.00E+00	6.92E-05	3.14E-04	1.32E-04		-1.06E-02
AP	kg SO_2 -ekv	0.00E+00	0.00E+00	0.00E+00	1.63E-03	5.12E-03	3.20E-03		-1.63E-01
EP	kg PO_4^{3-}-ekv	0.00E+00	0.00E+00	0.00E+00	2.92E-04	1.45E-03	5.92E-04		-1.44E-02
ADPM	kg Sb-ekv	0.00E+00	0.00E+00	0.00E+00	1.18E-06	1.53E-06	1.14E-06		-5.01E-05
ADPE	MJ	0.00E+00	0.00E+00	0.00E+00	6.89E+00	2.18E+02	1.46E+01		-2.87E+02

GWP Global warming potential; ODP Depletion potential of the stratospheric ozone layer; POCP Formation potential of tropospheric photochemical oxidants; AP Acidification potential of land and water; EP Eutrophication potential; ADPM Abiotic depletion potential for non fossil resources; ADPE Abiotic depletion potential for fossil resources

Resource use

Parameter	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5
RPEE	MJ	4.07E+02	7.17E-01	0.00E+00	0.00E+00	7.03E+01	0.00E+00	0.00E+00	0.00E+00
RPEM	MJ	2.07E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TPE	MJ	6.14E+02	7.17E-01	0.00E+00	0.00E+00	7.03E+01	0.00E+00	0.00E+00	0.00E+00
NRPE	MJ	1.70E+03	4.64E+01	0.00E+00	0.00E+00	1.27E+03	0.00E+00	0.00E+00	0.00E+00
NRPM	MJ	1.96E+02	0.00E+00	0.00E+00	0.00E+00	1.29E+00	0.00E+00	0.00E+00	0.00E+00
TRPE	MJ	1.90E+03	4.64E+01	0.00E+00	0.00E+00	1.27E+03	0.00E+00	0.00E+00	0.00E+00
SM	kg	3.90E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.32E-01	0.00E+00
RSF	MJ	5.93E-02	0.00E+00	0.00E+00	0.00E+00	1.12E-01	0.00E+00	8.14E-08	0.00E+00
NRSF	MJ	3.96E-02	0.00E+00	0.00E+00	0.00E+00	7.49E-02	0.00E+00	7.15E-05	0.00E+00
W	m^3	1.70E+01	9.02E-03	0.00E+00	0.00E+00	1.01E+00	0.00E+00	1.69E-03	0.00E+00

Resource use

Parameter	Unit	B6	B7	C1	C2	C3	C4		D
RPEE	MJ	0.00E+00	0.00E+00	0.00E+00	7.06E-02	1.65E+02	2.07E-01		-1.90E+02
RPEM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-1.65E+02	0.00E+00		0.00E+00
TPE	MJ	0.00E+00	0.00E+00	0.00E+00	7.06E-02	8.20E-01	2.07E-01		-1.90E+02
NRPE	MJ	0.00E+00	0.00E+00	0.00E+00	7.00E+00	2.18E+02	1.50E+01		-2.99E+02
NRPM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-2.12E+02	0.00E+00		0.00E+00
TRPE	MJ	0.00E+00	0.00E+00	0.00E+00	7.00E+00	6.22E+00	1.50E+01		-2.99E+02
SM	kg	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	4.95E-01	0.00E+00		-3.38E+01
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.30E-01	0.00E+00		-2.25E+01
W	m^3	0.00E+00	0.00E+00	0.00E+00	1.13E-03	1.59E-02	1.26E-02		-9.03E-01

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-A3	A4	A5	B1	B2	B3	B4	B5
HW	kg	3.27E+00	2.78E-03	0.00E+00	0.00E+00	5.37E+01	0.00E+00	0.00E+00	0.00E+00
NHW	kg	3.42E+01	3.60E+00	0.00E+00	0.00E+00	1.75E+01	0.00E+00	0.00E+00	0.00E+00
RW	kg	5.08E-03	3.06E-04	0.00E+00	0.00E+00	3.59E-03	0.00E+00	0.00E+00	0.00E+00

End of life-Waste

Parameter	Unit	B6	B7	C1	C2	C3	C4		D
HW	kg	0.00E+00	0.00E+00	0.00E+00	4.88E-04	7.49E-02	5.45E+01		-1.15E-01
NHW	kg	0.00E+00	0.00E+00	0.00E+00	4.10E-01	2.45E-01	4.32E-01		-4.85E+00
RW	kg	0.00E+00	0.00E+00	0.00E+00	4.45E-05	2.10E-05	8.69E-05		-4.30E-04

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

End of life- Output flow

Parameter	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5
CR	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
MR	kg	1.78E+00	0.00E+00	1.40E-01	0.00E+00	2.59E-01	0.00E+00	0.00E+00	0.00E+00
MER	kg	1.74E-04	0.00E+00	2.52E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE	MJ	1.46E+00	0.00E+00	0.00E+00	0.00E+00	3.95E+00	0.00E+00	0.00E+00	0.00E+00
ETE	MJ	1.65E+01	0.00E+00	0.00E+00	0.00E+00	2.71E+01	0.00E+00	0.00E+00	0.00E+00

End of life- Output flow

Parameter	Unit	B6	B7	C1	C2	C3	C4		D
CR	kg	0.00E+00	0.00E+00	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	1.34E+00	0.00E+00		-1.65E+00
MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		0.00E+00
EEE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.07E+01	0.00E+00		-3.26E+01
ETE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.11E+02	0.00E+00		-2.24E+02

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

Norwegian additional requirements

Greenhouse gas emissions from the use of electricity in the production phase

National market mix with low-voltage imports, including production of transmission lines and grid losses, has been used for electricity in the production process (A3).

Data source	Quantity	Unit
Ecoinvent v3.5 (2018)	31.7	gram CO_2-ekv./kWh

Hazardous substances

- ☐ The product contains no substances from REACH Candidate List or the Norwegian Priority List
- ☑ The product contains substances below 0.1% by weight on the REACH Candidate List
- ☐ The product contains substances from REACH Candidate List or the Norwegian Priority List, see table under Specific Norwegian requirements.
- ☐ The product does not contain any substances on the REACH Candidate List or the Norwegian Priority List. The product can be characterized as hazardous waste (according to the Waste Shift, Appendix III), see table under Specific Norwegian requirements.

Transport

Transport from production site to construction site according to scenario in A 430 km

Indoor air quality

The product has not been tested for emission to the indoor environment.

Carbon footprint

To increase the transparency of the climate impacts, the GWP indicator has been divided into sub-indicators:

GWP-IOBC Climate impacts calculated according to instant oxidation principle

GWP-BCIP Climate impacts calculated from the net impacts of sequestration and emission of biogenic carbon

Climate impact

Parameter	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5
GWP-IOBC	kg CO_2-ekv	1.32E+02	2.72E+00	0.00E+00	0.00E+00	9.41E+01	0.00E+00	0.00E+00	0.00E+00
GWP-BCIP	kg CO_2-ekv	-1.94E+01	0.00E+00	3.70E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
GWP	kg CO_2-ekv	1.13E+02	2.72E+00	3.70E+00	0.00E+00	9.41E+01	0.00E+00	0.00E+00	0.00E+00

Climate impact

Parameter	Unit	B6	B7	C1	C2	C3	C4		D
GWP-IOBC	kg CO_2-ekv	0.00E+00	0.00E+00	0.00E+00	4.18E-01	1.70E+01	5.70E-01		-2.97E+01
GWP-BCIP	kg CO_2-ekv	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.57E+01	0.00E+00		0.00E+00
GWP	kg CO_2-ekv	0.00E+00	0.00E+00	0.00E+00	4.18E-01	3.27E+01	5.70E-01		-2.97E+01

Bibliografi

NS-EN ISO 14025:2010	*Environmental labels and declarations - Type III environmental declarations - Principles and procedures*
NS-EN ISO 14044:2006	*Miljøstyring - Livsløpsvurderinger - Krav og retningslinjer*
NS-EN 15804:2012+A1:2013	*Bærekraftig byggverk - Miljødeklarasjoner - Grunnleggende produktkategoriregler for byggevarer*
ISO 21930:2007	*Sustainability in building construction - Environmental declaration of building products*
Ruttenborg, V. 2020	*LCA-report H-vindet Magnor AS. Report nr. 325069-01 from the Norwegian Institute of Wood Technology, Oslo, Norway*
NPCR014 (04/2019)	*Product category rules for windows and doors, rev3, April 2019*
NS-EN 16485:2014	*Tømmer og skurlast - Miljødeklarasjoner - Produktkategoriregler for tre og trebaserte produkter til bruk i byggverk*
NS-EN 16449:2014	*Tre og trebaserte produkter - Beregning av biogent karboninnhold i tre og omdanning til karbondioksid*
Ecoinvent v3.5	*Ecoinvent database version 3.5. Centre for Life Cycle Inventories.*
Statistisk sentralbyrå, 2018a	*Tabell 04727: Fjernvarmebalansen, 2017*
Statistisk sentralbyrå, 2018b	*Tabell 09469: Nettoproduksjon av fjernvarme, 2017*

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