

ENVIRONMENTAL PRODUCT DECLARATION

in accordance with ISO 14025, ISO 21930 and EN 15804

Owner of the declaration:	Norgesvinduet Kompetanse AS
Program operator:	The Norwegian EPD Foundation
Publisher:	The Norwegian EPD Foundation
Declaration number:	NEPD-2102-952-EN
Registration number:	NEPD-2102-952-EN
ECO Platform registration number:	-
Issue date:	21.04.2020
Valid to:	21.04.2025

Opening Window with aluminium cladding

Norgesvinduet Kompetanse AS

www.epd-norge.no



General information

Product:

Opening Window with aluminium cladding

Program holder:

The Norwegian EPD Foundation
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Declaration number:

NEPD-2102-952-EN

ECO Platform registration number:

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

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.

Declared unit:

Declared unit with option:

Functional unit:

1 opening window measuring 1.23 m x 1.48 m with wood frame and aluminium cladding (reference window based on EN 14351-1) with U-value= 0.78 W/m²K for 4S-18ar-4-18ar-4S, and an expected service life of 60 years.

Verification:

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

internal external

Third party verifier:

Clara Valente

Clara Valente, Research Scientist, Østfoldforskning
(Independent verifier approved by EPD Norway)

Owner of the declaration:

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Manufacturer:

Norgesvinduet Bjørlo AS
Øyane 1, 6770 Nordfjordeid

Norgesvinduet Svenningdal AS
Industriveien 1, 8680 Trofors
Place of production:
Norgesvinduet Bjørlo: Nordfjordeid, Norge
Norgesvinduet Svenningdal: Trofors, Norge

Management system:

NS-EN ISO 9001:2015, NS-EN ISO 14001:2015

Org. no.:

959189412

Issue date:

21.04.2020

Valid to:

21.04.2025

Year of study:

2019

Comparability:

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

The EPD has been worked out by:

Roja Modaresi
Norsk Treteknisk Institutt

Roja

Treteknisk 

Approved

Håkon Hauan

Håkon Hauan
Managing Director of EPD-Norway

Product

Product description:

Opening window in laminated pine and aluminium cladding, for use in exterior walls of domestic and commercial buildings. All weather exposed parts are made of heartwood as standard.

Product specification:

The calculations in this study applies to all opening windows produced by Norgesvinduet, including sliding hinged, bottom/side hinged, casement windows, inside side hinge, French window, side swing and top hinged. Without aluminium cladding.

Technical data:

The product weight is 68.3 kg.

The product complies with the requirements of the Norwegian Door and Window control (NDVK). the product has a SINTEF Teknisk Godkjenning: Nr. 20447. fire classification= E 30 and EI 30 according to NS-EN 13501-2, noise reduction= 26-42 dB

Market:

Norway, scenarios are calculated for the Norwegian market.

Reference service life:

Expected service life is 60 years for windows with alu clad.

Materials	kg	%
Triple glazed unit	42.05	61.57
Glass	41.40	
Spacer	0.45	
Dessicant	0.14	
Butyl	0.06	
Laminated pine timber	16.57	24.26
Steel parts	4.47	6.54
Aluminium parts	0.44	0.64
Plastic parts	0.45	0.66
Paint and glue	1.01	1.48
Aluminium for cladding	3.09	4.52
Plastic parts for cladding	0.22	0.32
Total weight of the product	68.3	100
Wood packaging	2.99	
Steel packaging	0.04	
Plastic packaging	0.03	
Paper, cardboard packaging	0.01	
Total weight with packaging	71.4	

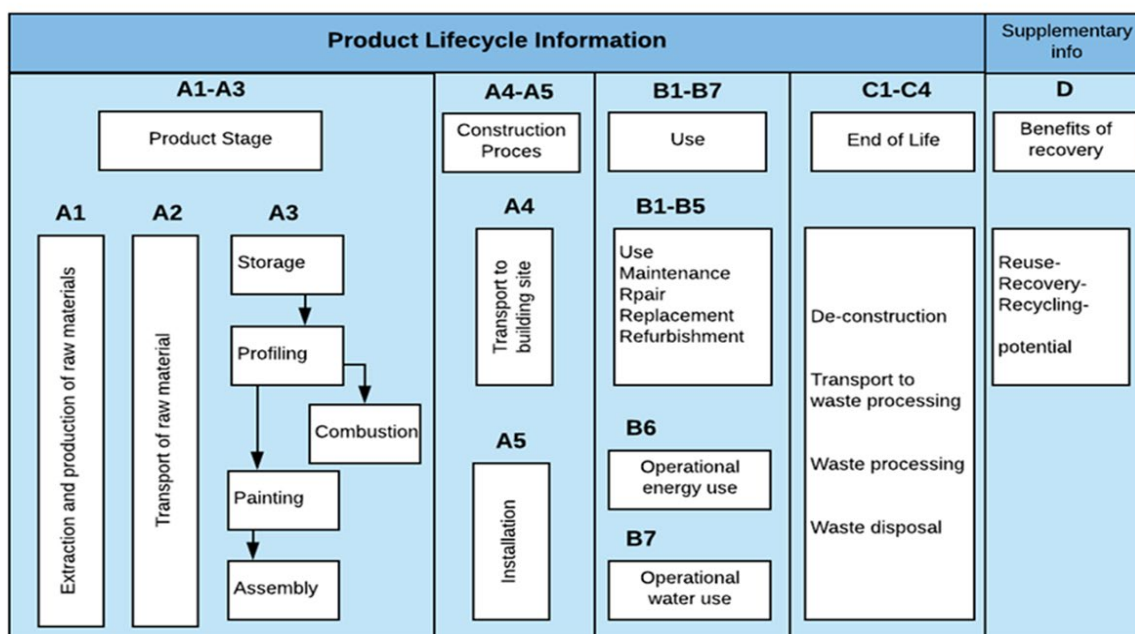
LCA: Calculation rules

Functional unit:

1 opening window measuring 1.23 m x 1.48 m with wood frame and aluminium cladding (reference window based on EN 14351-1) with U-value= 0.78 W/m²K for 4S-18ar-4-18ar-4S, and an expected service life of 60 years.

System boundary:

All the modules are included according to the PCR. Below is a technical flowchart for the production line at Norgesvinduet.



Data quality

Data for energy use, transport of raw materials and waste is an average for Norgesvinduet Bjørlo and Svenningdal in 2018 and was collected in 2019. Material use per functional unit is calculated based on weighted average of the two production site. This includes for paint, glue and laminated profiles, which have different processes or materials in the two sites and therefore weighted average is used. Some processes are based on Ecoinvent v3.1 (2014) and v3.2 (2015), but all upstream processes are v3.4. Remaining data is based on Ecoinvent v3.4 "Allocation cut-off by classification" (2017) but adjusted to improve representativeness.

Allocation:

Allocation is done in accordance with the provisions of EN 15804. Allocation of energy, water and waste from production is calculated by an economic allocation factor. For waste produced at the manufacturing, the burdens for reuse, recycling and recovery is allocated by using this allocation factor.

Cut-off criteria:

Raw materials and energy use is included. Where data were available for infrastructure from Ecoinvent, it is included. example is 'metal working factory construction'. 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.

Calculations of biogenic carbon:

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

LCA: Scenarios and additional technical information

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

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	300	0.023 l/tkm	0.31 l/km
Truck	26%	EURO5, 16-32 tonn	30	0.045 l/tkm	0.25 l/km

Truck is used for transport from manufacturing to building site. Norgesvinduet has its own truck that is used to transport windows to the building sites and also other building materials on the return trip.

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	3.06
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 products in this EPD are painted and surface treated in the production and not at the building site. Therefore, there is only 2 items left in this module. 1) Waste treatment of packaging which is considered in the EPD calculations. 1) Energy use during installation. This can be varied depending on the floor, type of building and several other unknown parameters, and therefore ignored in the calculation.

Maintenance (B2) / Repair (B3)

	Unit	Value
Detergents	kg	9
Water consumption	l	180
Lubricating oil	kg	0.30
Paint	kg	1.0
Glazing unit	m ²	1.42
Synthetic rubber	kg	0.10

The maintenance scenario included 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 products are assumed to be painted and cleaned during their lifetime. The interior of the windows with aluminium cladding are assumed to be painted ones during its lifetime of 60 years. It is assumed that 5 gr of lubricating oil is used every year for fittings and moving parts. It is assumed that the glazing unit is changed once during the lifetime. There is no need for repair during the product lifetime.

Replacement (B4)/ Refurbishment (B5)

	Unit	Value
Replacement cycle*	yr	60
Electricity consumption	kWh	0

* Number or RSL (Reference Service Life). RSL of windows with alu-cladding is= RSL of a building. So, assumption is no replacement of the window. However, replacement of IGU is simulated in B2. There is no need for refurbishment during the product lifetime.

The transport of window as waste is calculated based on a scenario with 50 km distance.

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 are no data for de-construction, it is assumed no activities in C1 in this study. 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 therefore standard values from Ecoinvent is utilized.

End of Life (C1, C3, C4)

	Enhet	Verdi
Hazardous waste disposed	kg	0
Collected as mixed construction waste	kg	68.30
Reuse	kg	0
Recycling	kg	0.00
Energy recovery	kg	68.30
To landfill	kg	0

The benefits beyond life cycle has been modelled based on the output flows from module 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 and electricity mix. Inventory processes causing substitution of avoided virgin raw materials has been constructed for each material.

Benefits and loads beyond the system boundaries (D)

	Enhet	Verdi
Substitution of electricity	MJ	32.9
Substitution of thermal energy	MJ	225.9
Substitution of raw materials	kg	4.0

LCA: Results

Global warming potential in A1-A3 includes sequestration of 30,8 kg CO₂-eq. as carbon in the wood in the product and packaging. According to the modularity principle, 4.4 kg CO₂-eq. is released to air from incineration of packaging in module A5. The remaining 26.4 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)

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	1.30E+02	2.27E+00	4.39E+00	0.00E+00	8.86E+01	0.00E+00	0.00E+00	0.00E+00
ODP	kg CFC11-ekv	1.29E-05	4.35E-07	0.00E+00	0.00E+00	7.68E-06	0.00E+00	0.00E+00	0.00E+00
POCP	kg C ₂ H ₄ -ekv	6.04E-02	3.70E-04	0.00E+00	0.00E+00	2.73E-02	0.00E+00	0.00E+00	0.00E+00
AP	kg SO ₂ -ekv	1.04E+00	7.48E-03	0.00E+00	0.00E+00	6.14E-01	0.00E+00	0.00E+00	0.00E+00
EP	kg PO ₄ ³⁻ -ekv	1.16E-01	1.24E-03	0.00E+00	0.00E+00	6.17E-02	0.00E+00	0.00E+00	0.00E+00
ADPM	kg Sb-ekv	2.78E-03	4.66E-06	0.00E+00	0.00E+00	3.49E-04	0.00E+00	0.00E+00	0.00E+00
ADPE	MJ	1.76E+03	3.78E+01	0.00E+00	0.00E+00	1.17E+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	4.32E-01	3.53E+01	5.21E-01	-3.64E+01
ODP	kg CFC11-ekv	0.00E+00	0.00E+00	0.00E+00	8.14E-08	5.41E-08	1.39E-07	-1.29E-06
POCP	kg C ₂ H ₄ -ekv	0.00E+00	0.00E+00	0.00E+00	7.15E-05	4.09E-04	2.13E-04	-1.46E-02
AP	kg SO ₂ -ekv	0.00E+00	0.00E+00	0.00E+00	1.69E-03	6.66E-03	2.94E-03	-1.96E-01
EP	kg PO ₄ ³⁻ -ekv	0.00E+00	0.00E+00	0.00E+00	3.01E-04	1.64E-03	5.41E-04	-1.85E-02
ADPM	kg Sb-ekv	0.00E+00	0.00E+00	0.00E+00	1.22E-06	1.53E-06	1.03E-06	-8.88E-05
ADPE	MJ	0.00E+00	0.00E+00	0.00E+00	7.11E+00	8.03E+01	1.34E+01	-3.67E+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	6.51E+02	3.77E-01	0.00E+00	0.00E+00	7.13E+01	0.00E+00	0.00E+00	0.00E+00
RPEM	MJ	2.26E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TPE	MJ	8.77E+02	3.77E-01	0.00E+00	0.00E+00	7.13E+01	0.00E+00	0.00E+00	0.00E+00
NRPE	MJ	1.93E+03	3.84E+01	0.00E+00	0.00E+00	1.23E+03	0.00E+00	0.00E+00	0.00E+00
NRPM	MJ	8.11E+01	0.00E+00	0.00E+00	0.00E+00	2.37E+00	0.00E+00	0.00E+00	0.00E+00
TRPE	MJ	2.01E+03	3.84E+01	0.00E+00	0.00E+00	1.23E+03	0.00E+00	0.00E+00	0.00E+00
SM	kg	3.17E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	1.30E-01	0.00E+00	0.00E+00	0.00E+00	1.75E-02	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	8.69E-02	0.00E+00	0.00E+00	0.00E+00	1.17E-02	0.00E+00	0.00E+00	0.00E+00
W	m ³	1.81E+01	6.54E-03	0.00E+00	0.00E+00	9.74E-01	0.00E+00	0.00E+00	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	7.29E-02	2.78E+02	1.89E-01	-1.74E+02
RPEM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-2.77E+02	0.00E+00	0.00E+00
TPE	MJ	0.00E+00	0.00E+00	0.00E+00	7.29E-02	8.57E-01	1.89E-01	-1.74E+02
NRPE	MJ	0.00E+00	0.00E+00	0.00E+00	7.22E+00	8.07E+01	1.37E+01	-3.80E+02
NRPM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-7.47E+01	0.00E+00	0.00E+00
TRPE	MJ	0.00E+00	0.00E+00	0.00E+00	7.22E+00	6.00E+00	1.37E+01	-3.80E+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	1.86E+00	0.00E+00	-4.20E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.24E+00	0.00E+00	-2.80E+00
W	m ³	0.00E+00	0.00E+00	0.00E+00	1.17E-03	4.49E-02	1.16E-02	-7.45E-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	C2	B3	B4	B5
HW	kg	3.41E+00	2.37E-03	0.00E+00	0.00E+00	4.72E+01	0.00E+00	0.00E+00	0.00E+00
NHW	kg	4.88E+01	2.87E+00	0.00E+00	0.00E+00	2.09E+01	0.00E+00	0.00E+00	0.00E+00
RW	kg	6.73E-03	2.46E-04	0.00E+00	0.00E+00	3.68E-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	5.04E-04	8.03E-02	5.05E+01	-2.16E-01
NHW	kg	0.00E+00	0.00E+00	0.00E+00	4.23E-01	3.63E-01	4.09E-01	-5.74E+00
RW	kg	0.00E+00	0.00E+00	0.00E+00	4.59E-05	2.10E-05	7.96E-05	-5.46E-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	C2	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	2.61E-01	0.00E+00	7.00E-02	0.00E+00	2.27E-01	0.00E+00	0.00E+00	0.00E+00
MER	kg	3.37E-04	0.00E+00	2.99E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE	MJ	6.91E+00	0.00E+00	0.00E+00	0.00E+00	3.05E+00	0.00E+00	0.00E+00	0.00E+00
ETE	MJ	8.08E+01	0.00E+00	0.00E+00	0.00E+00	2.10E+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	3.55E+00	0.00E+00	-4.01E+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	2.92E+01	0.00E+00	-3.29E+01
ETE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E+02	0.00E+00	-2.26E+02

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

Reading example: $9,0 \text{ E-03} = 9,0 \cdot 10^{-3} = 0,009$

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 v3.4 (october 2017)	31	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 A4 330 km

Indoor air quality

The product has not been tested for emissions to indoor environments.

Klimapåvirkning

Parameter	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5
GWP-IOBC	kg CO ₂ -ekv	1.61E+02	2.27E+00	0.00E+00	0.00E+00	8.86E+01	0.00E+00	0.00E+00	0.00E+00
GWP-BCIP	kg CO ₂ -ekv	-3.08E+01	0.00E+00	4.39E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
GWP	kg CO ₂ -ekv	1.30E+02	2.27E+00	4.39E+00	0.00E+00	8.86E+01	0.00E+00	0.00E+00	0.00E+00

Klimapåvirkning

Parameter	Unit	B6	B7	C1	C2	C3	C4		D
GWP-IOBC	kg CO ₂ -ekv	0.00E+00	0.00E+00	0.00E+00	4.32E-01	8.90E+00	5.21E-01		-3.64E+01
GWP-BCIP	kg CO ₂ -ekv	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.64E+01	0.00E+00		0.00E+00
GWP	kg CO ₂ -ekv	0.00E+00	0.00E+00	0.00E+00	4.32E-01	3.53E+01	5.21E-01		-3.64E+01

Bibliografi

NS-EN ISO 14025:2010	<i>Miljømerker og deklarasjoner - Miljødeklarasjoner type III - Prinsipper og prosedyrer.</i>
NS-EN ISO 14044:2006	<i>Miljøstyring - Livsløpsvurderinger - Krav og retningslinjer</i>
NS-EN 15804:2012+A1:2013	<i>Bærekraftig byggverk - Miljødeklarasjoner - Grunnleggende produktkategoriregler for byggevarer</i>
ISO 21930:2007	<i>Sustainability in building construction - Environmental declaration of building products</i>
Ruttenborg, V. 2018	<i>LCA-report for Norgesvinduet LCA-report nr. 325019-1 from Norwegian Institute of Wood Technology, Oslo, Norway.</i>
NPCR014 (04/2019)	<i>Product category rules for windows and doors, rev3, April 2019</i>
NS-EN 16485:2014	<i>Tømmer og skurlast - Miljødeklarasjoner - Produktkategoriregler for tre og trebaserte produkter til bruk i byggverk</i>
NS-EN 16449:2014	<i>Tre og trebaserte produkter - Beregning av biogent karboninnhold i tre og omdanning til karbondioksid</i>
Ecoinvent	<i>Ecoinvent database version 3.1, 3.2, 3.4 and 3.5 Centre for Life Cycle Inventories.</i>
Statistisk sentralbyrå	<i>Tabell 04727: Fjernvarmebalansen, 2018</i>
Statistisk sentralbyrå	<i>Tabell 09469: Nettoproduksjon av fjernvarme, 2018</i>
NEPD-307-179-NO	<i>EPD for skurlast av gran eller furu. Treindustrien</i>
Byggforskserien 733.301	Vedlikehold av vinduer og ytterdører
Byggforskserien 700.320	Intervaller for vedlikehold og utskiftning av bygningsdeler.
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SINTEF (2015)	<i>SINTEF Teknisk Godkjenning Nr. 20447. Norgesvinduet - vinduer og vindusdører.</i>

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