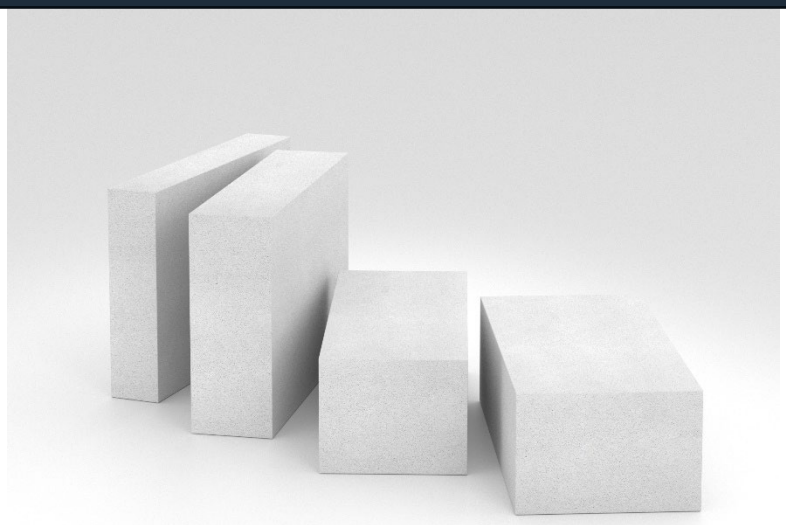
ENVIRONMENTAL PRODUCT DECLARATION

PRODUCT GROUP PRE-EPD
IN ACCORDANCE WITH EN 15804+A2 & ISO 14025

Owner of declaration	Bauroc AS
Program operator	Rakennustieto Oy
Declaration number	RTS_376_25
Publishing date	1.4.2025
EPD valid until	30.9.2026

BAUROC GREEN BLOCKS

LCA SUPPORT



bauroc

GENERAL INFORMATION

The EPD owner has the sole ownership, liability, and responsibility for the EPD. Construction products EPDs may not be comparable if they do not comply with EN 15804 and if they are not compared in a building context.

EPDs within the same product category but from different programmes may not be comparable.

EPD program operator
Rakennustieto Oy
Malminkatu 16 A, 00100 Helsinki, Finland
https://ymparisto.rakennustieto.fi/en/rakennustieto-epds

Publishing date
1.4.2025

Valid until
30.9.2026

Product category rules
The CEN standard EN 15804 serves as the core PCR. In addition, the RTS PCR (English version, 26.8.2020) is used.

EPD author
Anni Oviir
LCA Support
operated by Rangi Maja OÜ
www.lcasupport.com

EPD verifier
Sigita Židonienė
Vesta Consulting UAB
www.vestaconsulting.lt

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Independent verification of this EPD and data, according to ISO 14025:2010:
☐ Internal ☑ External

Manufacturer
Bauroc AS

Address
Andja, Rakvere vald, 44209 Lääne-Virumaa, Estonia

Contact details
toomas.nilson@bauroc.eu

Website
https://bauroc.ee/

Place of production
Estonia, Andja

Products
bauroc GREEN blocks

Declared unit
1 m3

Mass of declared unit
475 kg

Data period
2021 and 2024

Jukka Seppänen
RTS EPD Committee Secretary

Laura Apilo
Managing Director

PRODUCT INFORMATION

Product name	bauroc GREEN blocks
Place of production	Estonia, Andja

PRODUCT DESCRIPTION AND APPLICATION

bauroc GREEN product is made from natural raw minerals - sand and gypsum, practically inexhaustible in nature and secondary raw material – oil shale ash, mixed with water and using an aerating agent, the aluminium. Mixed slurry formulation is poured into the casting moulds. After expansion of the mixture in pre-curing room during several hours, the aerated concrete blocks are cut and then they are put into the autoclave in groups for steam curing.
bauroc GREEN products is produced with average density of 475 kg/m3.
bauroc GREEN is extremely strong and durable despite its lightweight. Solidity of autoclaved aerated concrete (AAC) comes from the calcium silicate that encloses its millions of air pores and from the process of curing in a pressurised steam chamber, an autoclave.
bauroc GREEN blocks are used in single and multi-family houses, social and public buildings as well as commercial and industrial buildings, providing economy, quality, comfort and speed in constructions, where the goal is to have the lowest possible environmental impact (and the building is being applied for a BREAAM, LEED or other sustainable building certificate). The use of secondary raw materials in the bauroc GREEN recipe has brought the environmental impact to a record low level.
The products are used as interior or exterior wall material in both load-bearing and non-load bearing constructions. Having a porous structure, bauroc GREEN products provide a high level of thermal insulation and have excellent resistance to fire. It is an ideal material that offers significant savings in the initial outlay and running costs of heating or cooling buildings as well as opportunity for exploiting other potential benefits.
All bauroc AAC products are classified as non-combustible and have Class A1 reaction to fire. A 150 mm thick bauroc block wall is fire resistant up to 4 hours in non-loadbearing situations and 2 hours in loadbearing situations. AAC inhibits heat transfer through a wall several times better than normal concrete.

TECHNICAL SPECIFICATIONS AND PRODUCT STANDARDS

Product properties can be found on the manufacturer website at https://bauroc.eu/products.
Further information can be found at https://bauroc.ee/.
Packaging composition (mass-%): 95% wooden pallet and 5% of plastic film.

PRODUCT RAW MATERIAL COMPOSITION PER DECLARED UNIT

Raw material category	Amount, mass- % and material origin
Metals	0%
Minerals	100%*, EU
Fossil materials	0%
Bio-based materials	0%
Total	100%

* Oil shale ash is classified under minerals.

Product components (at moisture content of 5%)	Amount, mass- % and recycled content**
Oil shale ash	60%, recycled content 100%
Sand	32%, recycled content 0%
Gypsum	4%, recycled content 0%
Water	5%, recycled content 5%
Additives and other materials	<0.1%, recycled content 0%
Total	100%

** Order of magnitude, not exact composition. All values are rounded.

Biogenic carbon content in product	0
Biogenic carbon content in packaging	3.82

Note. 1 kg biogenic carbon is equivalent to 44/12 kg of biogenic CO2.

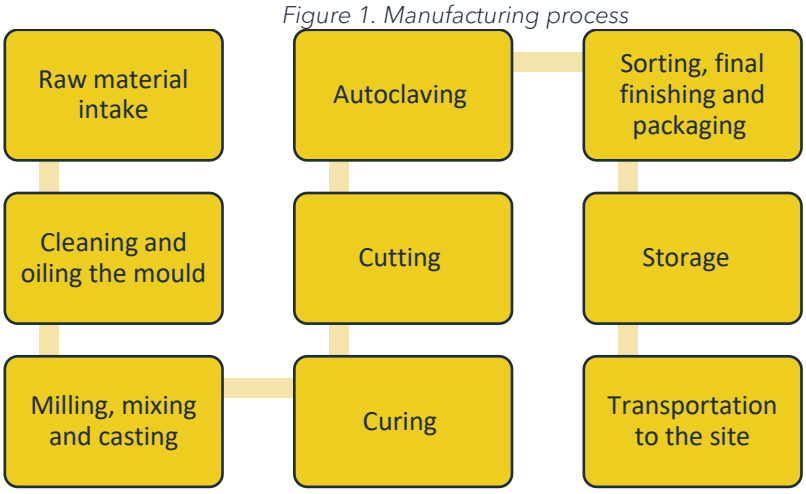
SUBSTANCES, REACH - VERY HIGH CONCERN

The product does not contain any REACH SVHC substances in amounts greater than 0.1 % (1000 ppm).

MANUFACTURING PROCESS

Key ingredient for manufacturing bauroc AAC products is silica rich sand. Sand is mixed with gypsum and water and grinds finally in the ball mill converting it into sand slurry. Sand slurry is pumped into a separate container/tank. Similarly, oil shale ash powder is transported into individual containers using screw conveyors. Once the required amount of each ingredient is reached, control system releases all ingredients into mixing drum.
A small amount of aluminium suspension is added separately. Once the mixture has settled, it is ready to be poured into moulds using the dosing unit. Before casting, moulds are coated with a thin layer of oil. This is done in order to ensure that green-cake does not stick to moulds.
While slurry is mixed and poured into oiled moulds, aluminium reacts with Calcium Hydroxide and water to form Hydrogen.
Millions of tiny hydrogen bubbles are released due to this reaction. This leads to the formation of tiny unconnected cells causing the slurry mix to expand. This process is called rising. These cells are the reason behind the lightweight and insulating properties of bauroc blocks.
Once the rising process is over, green-cake is allowed to settle and cure for some time. This ensures the cutting strength required for wire cutting. Usually rising and the pre-curing process takes around 4-6 hours. At end of the precuring process, green-cake will achieve cutting strength and will be sent by a crane to cutting-line using flat-cake technology and two cutting machines.
During cutting process, the top and side layers will be removed of crust in the green stage. This crust is recycled and afterwards reused in production process. After cutting, the blocks are transported into the autoclave (a large pressure vessel), where the curing process is completed. Autoclaving is required to achieve the desired structural properties and dimensional stability. The process takes about 10 to 12 hours under a high pressure and a temperature.
The final manufacturing process stage is sorting and packaging blocks on wooden pallets and covering with plastic wrap.
Eventually, the elements are moved out and transported to the construction site.

Figure 1. Manufacturing process



ABOUT THE MANUFACTURER

Bauroc is the largest producer of aircrete i.e. autoclaved aerated concrete (AAC) products in Northern Europe.
The family-owned group, established in 2001, operates three state-of-the-art AAC factories, one in each Baltic country, and a calcium silicate factory in Lithuania. The company sells its AAC products in the Baltic and Nordic countries, but also in Iceland, Poland, Germany and Switzerland under "bauroc" and "roclite" brand names. Calcium silicate units (CSU) are sold under the "silroc" brand.
The company has shown continuous progress in product development, significantly diversifying its product mix over the years. Initially focusing on a narrow selection of light aircrete products, Bauroc's portfolio now includes a broad array of block products, reinforced lintels, roof and wall panels, instruments, dry mixes, and installation accessories.
Our identity and brand name "bauroc" reflects the large portfolio of building materials produced from AAC. "bauroc" products can be used everywhere in construction – from private houses to multistory, agricultural, and industrial buildings. The name "bauroc" combines "bau," meaning "construction" in German, with "roc," signifying that all our products are made from ecological stone material.

In addition to manufacturing AAC and CSU products, Bauroc also offers the delivery and assembly of stone house packages under the JÄMERÄ brand. JÄMERÄ is a functional and energy-efficient stone house concept built from AAC

products and tailored to the Nordic climate, providing an exceptionally healthy indoor environment. Established in 1974, JÄMERÄ is the oldest and most sold stone house brand in Finland.
Bauroc is a proud, long-standing member of the European Autoclaved Aerated Concrete Association (EAACA).

PRODUCT LIFE-CYCLE AND LIFE-CYCLE ASSESSMENT

Period for data	2021 and 2024
Declared unit	1 m^3
Mass per declared unit	475 kg
Mass of packaging	8.08 kg

The data period is 2021 and 2024. The data for production composition and suppliers is from 2024. The products have not been produced for a full year. Therefore, the production data for a similar product is used as a proxy. The data is from an already published EPD: RTS_120_21, which has been based on data from 2020. There haven't been any major changes in the production process and the data can be consired representative.
The study does not exclude any modules or processes which are stated mandatory in the EN 15804:2012+A2:2019 and the applied PCR. The study does not exclude any hazardous materials or substances.
The study includes all major raw material and energy consumption. All inputs and outputs of the unit processes, for which data is available for, are included in the calculation. There is no neglected unit process more than 1% of total mass or energy flows. The module specific total neglected input and output flows also do not exceed 5% of energy usage or mass.
Co-product allocation has not been used.
The data sources for the study are Ecoinvent 3.10.1 (2024) and EPDs. The tools used for the study were One Click LCA and Open LCA. The EN 15804 reference package used is based on EF 3.1.

SYSTEM BOUNDARY

The scope of the EPD is cradle to gate with options (A4-A5), modules C1-C4 and D.

Product stage			Assembly stage		Use stage							End of life stage				Beyond the system boundaries		
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	D	D
x	x	x	x	x	MND	MND	MND	MND	MND	MND	MND	x	x	x	x	x	x	x
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction /demolition	Transport	Waste processing	Disposal	Reuse	Recovery	Recycling

Modules not declared = MND.

MANUFACTURING AND PACKAGING (A1-A3)

The environmental impacts considered for the product stage cover the manufacturing of raw materials used in the production as well as packaging materials and other ancillary materials.
Vehicle capacity utilization volume factor is assumed to be 1, which means full load. In reality, it may vary but as role of transportation emission in total results is small and so the variety in load is assumed to be negligible. Empty returns are not taken into account as it is assumed that return trip is used by transportation company to serve the needs of other clients.
Fuels used by machines, and handling of waste formed in the production processes at the manufacturing facilities are included in this stage. All fuel and energy use was allocated based on production volume. The electricity used in the plant is renewable energy and this has been modelled using origin certificates. The study also considers the material losses occurring during the manufacturing processes as well as losses during electricity transmission.

Electricity data source and quality	Electricity production, wind, <1MW turbine, onshore. (78%) Electricity production, photovoltaic, 570kWp open ground installation. (22%) Source: Ecoinvent 3.10.1. Region: Estonia
Specific emissions (GWP-fossil, CO2e/kWh)	0.019 (wind) 0.082 (photovoltaic)
Heating data source and quality	Heat production, natural gas, at industrial furnace >100kW. Source: Ecoinvent 3.10.1. Region: Europe
Specific emissions (GWP-fossil, CO2e/kWh)	0.28

TRANSPORT AND INSTALLATION (A4-A5)

Transportation impacts occurred from final products delivery to construction site (A4) cover fuel direct exhaust emissions, environmental impacts of fuel production, as well as related infrastructure emissions.
The transportation distance is defined according to RTS PCR - from the place of manufacture to Latvia, the most likely scenario. According to the manufacturer, transportation doesn't cause losses as products are packaged properly. The final product is transported 364 km. Data for transport is calculated for an average load factor, including empty return trips included in the Ecoinvent dataset.

Vehicle type used for transport and distance	Market for transport, freight, lorry >32 metric ton, EURO5
Specific transport emissions (GWP-fossil, CO2e/tkm)	0.11
Capacity utilisation (including empty returns)	per the Ecoinvent dataset
Volume capacity utilisation factor	1

The environmental impacts considered for A5 module cover the manufacturing of ancillary materials used in installation and processing of any waste generated. The pallets are re-use and plastic film is incinerated.

Ancillary materials for installation	Mortar (25 kg) and Murfor® reinforcement (0.05 kg)
Water use	0.006 m3
Other resource use	-
Quantitative description of energy type (regional mix)	-
Waste materials on the building site before waste	Packaging (plastic film and pallets)
Output materials as result of waste processing at the building site e.g. of collection for recycling, for energy recovery, disposal (specified by route)	Plastic film is incenerated. Pallets are re-used by Bauroc.
Direct emissions to ambient air, soil and water	-

PRODUCT USE AND MAINTENANCE (B1-B7)

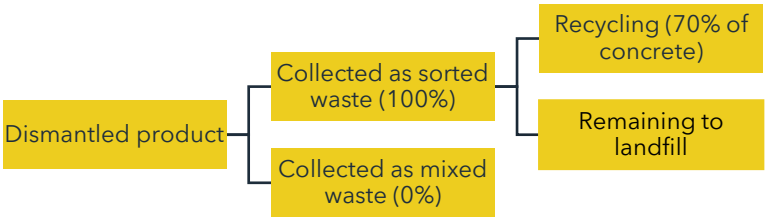
This EPD does not cover the use phase.
Air, soil, and water impacts during the use phase have not been studied.

PRODUCT END OF LIFE (C1-C4, D)

It is assumed that 70% of the waste product is collected, sorted and sent to recycling facilities. The rest (30%) is assumed to be collected, sorted and sent to landfill. 70% was based on the Waste Framework Directive 2008/98/EC, which aims to have 70% of Construction and Demolition waste recycled.
Demolition is assumed to require 10 kWh per 1 tonne of product.

The waste product is crushed and used as aggregate in module D.
End-of-life and module D geography is Europe.

Figure 2. EOL scenarios



	EOL mass of product	475 kg
Collection	**Collected separately**	475 kg
	Collected with mixed waste	0 kg
Recovery	**Re-use**	0 kg
	Recycling	333 kg
	Incineration with energy recovery	0 kg
Disposal	**Incineration without energy recovery**	0 kg
	Landfill	143 kg
	Total	475 kg
Scenario assumptions e.g. transportation		End-of-life product is transported 50 km with an average lorry

Note. All values in the table are rounded.

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BAUROC GREEN BLOCKS (1 m3)

ENVIRONMENTAL IMPACTS – CORE INDICATORS, EN 15804+A2, PEF

Impact category	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
Global warming potential – total	kg CO2e	3.14E+1	3.43E+1	1.80E+1	4.51E-1	2.56E+0	1.46E+0	8.90E-1	-3.31E+0
Global warming potential – fossil	kg CO2e	4.46E+1	3.42E+1	4.76E+0	4.51E-1	2.56E+0	1.45E+0	8.90E-1	-3.31E+0
Global warming potential – biogenic	kg CO2e	-1.32E+1	0.00E+0	1.32E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	-3.30E+0
Global warming potential – LULUC	kg CO2e	1.26E-2	1.17E-2	1.53E-3	4.62E-5	1.14E-3	1.49E-4	5.08E-4	0.00E+0
Ozone depletion pot.	kg CFC-11e	1.63E-6	4.07E-6	2.22E-7	6.90E-9	3.77E-8	2.23E-8	2.58E-8	-3.15E-3
Acidification potential	mol H+e	7.89E-2	1.26E-1	1.88E-2	4.07E-3	8.71E-3	1.31E-2	6.31E-3	-2.65E-8
Eutrophication potential - freshwater	kg Pe	2.17E-3	1.64E-3	8.61E-5	1.30E-5	1.99E-4	4.20E-5	7.31E-5	-2.01E-2
Eutrophication potential - marine	kg Ne	2.71E-2	4.02E-2	4.43E-3	1.89E-3	2.86E-3	6.09E-3	2.40E-3	-1.05E-3
Eutrophication potential - terrestrial	mol Ne	2.92E-1	4.41E-1	4.99E-2	2.07E-2	3.12E-2	6.67E-2	2.63E-2	-4.74E-3
Photochemical ozone formation ("smog")	kg NMVOCe	1.33E-1	1.68E-1	1.34E-2	6.16E-3	1.28E-2	1.99E-2	9.41E-3	-5.71E-2
Abiotic depletion potential - minerals & metals	kg Sbe	7.31E-5	3.18E-4	2.12E-4	1.57E-7	6.96E-6	5.07E-7	1.39E-6	-1.58E-2
Abiotic depletion potential - fossil resources	MJ	7.03E+2	5.07E+2	3.07E+1	5.85E+0	3.66E+1	1.89E+1	2.16E+1	-1.72E-5
Water use	m3e depr.	3.45E+0	2.28E+0	8.53E-1	1.47E-2	1.83E-1	4.75E-2	6.30E-2	-3.53E+1

EN 15804+A2 disclaimer for Abiotic depletion and Water use and optional indicators except Particulate matter and Ionizing radiation, human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

USE OF NATURAL RESOURCES

Impact category	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
Renewable primary energy resources as energy	MJ	6.51E+01	7.45E+00	2.35E+00	3.73E-02	5.09E-01	1.21E-01	2.11E-01	-4.06E+01
Renewable primary energy resources as material	MJ	5.73E+01	0.00E+00	-5.73E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-3.94E+00
Total use of renewable primary energy resources	MJ	1.22E+02	7.45E+00	-5.50E+01	3.73E-02	5.09E-01	1.21E-01	2.11E-01	0.00E+00
Non-renewable primary energy resources as energy	MJ	6.89E+02	5.13E+02	1.48E+01	5.89E+00	3.71E+01	1.90E+01	2.18E+01	-3.94E+00
Non-renewable primary energy resources as material	MJ	2.25E+01	0.00E+00	-2.25E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-4.05E+01
Total use of non-renewable primary energy resources	MJ	7.12E+02	5.13E+02	-7.70E+00	5.89E+00	3.71E+01	1.90E+01	2.18E+01	0.00E+00
Secondary materials	kg	3.23E+02	1.16E-01	1.35E-02	2.45E-03	1.58E-02	7.91E-03	5.49E-03	1.00E+01
Renewable secondary fuels	MJ	1.53E+00	1.46E-03	1.31E-05	6.40E-06	2.00E-04	2.07E-05	1.14E-04	-4.43E-02
Non-renewable secondary fuels	MJ	3.39E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-2.99E-04
Use of net fresh water	m3	6.82E-01	9.05E-02	1.39E-01	3.90E-04	5.49E-03	1.26E-03	2.27E-02	0.00E+00

END OF LIFE – WASTE

Impact category	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
Hazardous waste	kg	7.44E-01	6.26E-01	1.50E-01	6.56E-03	6.29E-02	2.12E-02	2.41E-02	-1.16E-01
Non-hazardous waste	kg	2.71E+01	3.41E+01	4.45E+00	8.94E-02	1.16E+00	2.89E-01	5.51E-01	-3.07E-01
Radioactive waste	kg	1.77E-04	1.76E-03	1.24E-04	6.47E-07	8.04E-06	2.09E-06	3.40E-06	-5.73E+00

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1-A3	A4	A5	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	0.00E+00	0.00E+00	-7.83E-05
Materials for recycling	kg	1.02E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.33E+02	0.00E+00	0.00E+00
Materials for energy recovery	kg	6.52E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy	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

KEY INFORMATION PER KG

Impact category	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
Global warming potential – total	kg CO2e	6.61E-02	7.21E-02	3.78E-02	9.49E-04	5.38E-03	3.07E-03	1.87E-03	-6.97E-03
Global warming potential – fossil	kg CO2e	9.38E-02	7.21E-02	1.00E-02	9.49E-04	5.38E-03	3.05E-03	1.87E-03	-6.97E-03
Global warming potential – biogenic	kg CO2e	-2.78E-02	0.00E+00	2.78E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-6.95E-03
Abiotic depletion potential - minerals & metals	kg Sbe	1.54E-07	6.69E-07	4.47E-07	3.31E-10	1.47E-08	1.07E-09	2.93E-09	-3.33E-05
Abiotic depletion potential - fossil	MJ	1.48E+00	1.07E+00	6.46E-02	1.23E-02	7.70E-02	3.98E-02	4.55E-02	-3.62E-08
Water use	m3e depr.	7.27E-03	4.80E-03	1.80E-03	3.09E-05	3.85E-04	1.00E-04	1.33E-04	-7.44E-02
Secondary materials	kg	6.79E-01	2.44E-04	2.85E-05	5.16E-06	3.33E-05	1.67E-05	1.16E-05	2.11E-02
Biogenic carbon in product (A3)	kg C	0.00E+00	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Biogenic carbon in packaging (A3)	kg C	2.80E-02	N/A	N/A	N/A	N/A	N/A	N/A	N/A

The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks.