

ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025 / ISO 21930

AALBORG WHITE® CEMENT

CEM I 52,5 R – SR 5

**AALBORG PORTLAND A/S,
CEMENTIR HOLDING**



GENERAL INFORMATION

MANUFACTURER INFORMATION

Manufacturer	Aalborg Portland A/S, Cementir Holding
Address	Aalborg Portland A/S, Rørdalsvej 44, 9220 Aalborg, Denmark
Contact details	cement@aalborgportland.dk
Website	www.aalborgportland.dk

PRODUCT IDENTIFICATION

Product name	Aalborg White® cement SR5 (EA)
Additional label(s)	CEM I 52,5 R
Product number / reference	0615-CPR-9806
Place(s) of production	Aalborg, Denmark



Kai Renholm

RTS EPD Committee secretary



Laura Apilo

Managing Director

EPD INFORMATION

EPDs of construction products may not be comparable if they do not comply with EN 15804 and if they are not compared in a building context.

EPD program operator	Rakennustietosäätiö RTS / Rakennustieto Oy Malminkatu 16 A, 00100 Helsinki http://cer.rts.fi
EPD standards	This EPD is in accordance with EN 15804+A2 and ISO 14025 standards.
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	Stefan Emil Danielsson, Research and Quality Center, Cementir Holding S.p.A Aalborg, Denmark
EPD verification	Independent verification of this EPD and data, according to ISO 14025: <input type="checkbox"/> Internal certification <input checked="" type="checkbox"/> External verification
Verification date	12.3.2021
EPD verifier	Silvia Vilčeková, Silcert, s.r.o.
EPD number	RTS_105_21
Publishing date	25.03.2021
EPD valid until	12.03.2026

PRODUCT INFORMATION

PRODUCT DESCRIPTION

Aalborg White® is a white Portland cement with a rapid hardening and a high early strength (2 days) and standard strength (28 days). It is produced with extremely pure limestone and fine-ground sand.

PRODUCT APPLICATION

Aalborg White® cement is often used in white or coloured dry mix for exterior walls. This gives a vivid facade surface that protects the masonry and satisfies the aesthetic sense of the observer. Aalborg White® cement is also used in concrete for panels, balconies, cornices, ornaments, paving stones, sculptures, in terrazzo, for swimming pools and in light mortar. The light-reflecting properties of Aalborg White® cement provide with additional safety when you produce kerbs, road-markings, medium barriers, tunnel linings and tunnel ramps.

TECHNICAL SPECIFICATIONS AND PHYSICAL PROPERTIES OF THE PRODUCT

Product sheet for the cement can be retrieved here:
<https://www.aalborgportland.dk/downloads/ydeevnedeklarationer/>

Further information can be found at www.aalborgportland.dk

PRODUCT STANDARDS

The Aalborg White® cement is manufactured according to the requirements in the European standard DS/EN 197-1

PRODUCT RAW MATERIAL COMPOSITION

Material	Amount %
Clinker	95,3
Gypsum (wet weight)	5,0
Additives	0,7

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass- %	Material origin
Metals	<1	EU (50%)
Minerals	>99	Denmark (100%)
Fossil materials	0	-
Bio-based materials	0	-

SUBSTANCES, REACH - VERY HIGH CONCERN

The product does not contain any REACH SVHC substances in amounts greater than 0,1% (1000 ppm).

PRODUCT LIFE-CYCLE

MANUFACTURING AND PACKAGING (A1-A3)

Portland cement is made by heating, in a cement kiln, a mixture of raw materials (mainly limestone or chalk and sand) to a calcining temperature of above 600°C and then to a fusion temperature, about 1450°C to sinter the materials into white clinker. The production process is a so-called wet process due to the wet limestone quarried from underground. To achieve the desired setting qualities in the finished product, a quantity of gypsum or anhydrite is added to the clinker. The mixture is finely ground and stored in silo ready to be shipped.

TRANSPORT AND INSTALLATION (A4-A5)

No distribution to end customers (A4) is declared. Installation processes (A5) are not declared either, as cement is an intermediate product used for concrete production.

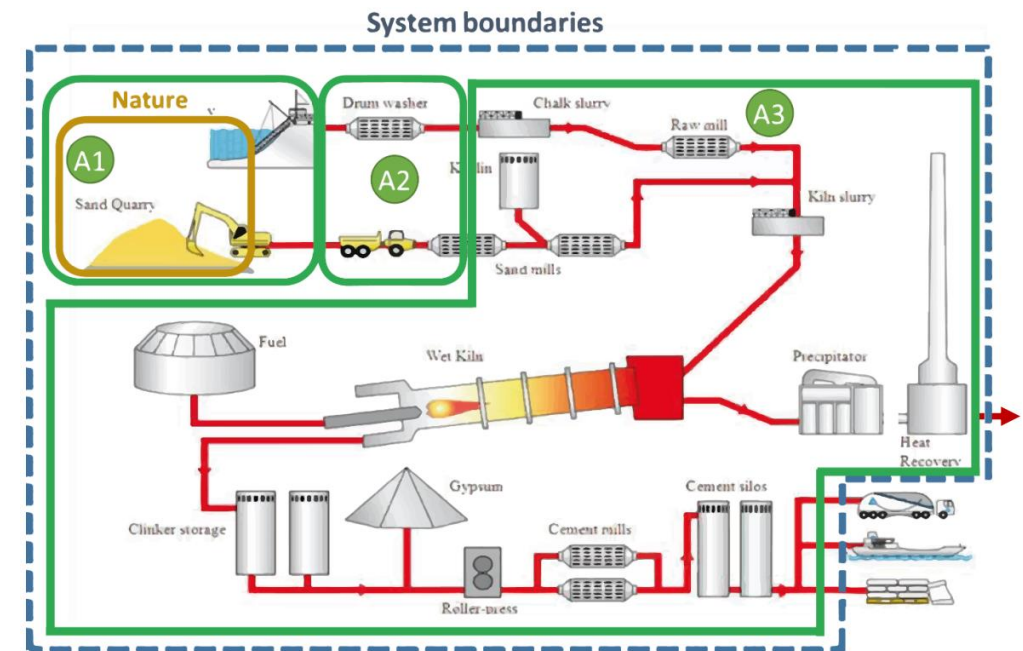
PRODUCT USE AND MAINTENANCE (B1-B7)

As cement is an intermediate product, no other lifecycle phases are relevant to cover. Air, soil and water impacts during the use phase have not been studied. As such they are marked as "Modules Not Relevant"

PRODUCT END OF LIFE (C1-C4, D)

The end-of-life modules (C1-C4, and D) are omitted as the material fulfils the exemption criteria based on EN 15804+A2.

MANUFACTURING PROCESS



LIFE-CYCLE ASSESSMENT

LIFE-CYCLE ASSESSMENT INFORMATION

Period for data	2020
Declared unit	1 tonne
Mass per declared unit	1000 kg

BIOGENIC CARBON CONTENT

The product and its packaging do not have biogenic carbon content, as the declared unit is bulk cement.

SYSTEM BOUNDARY

This EPD covers cradle-to-gate with options scope with following modules; A1 (Raw material supply), A2 (Transport) and A3 (Manufacturing). As cement is an intermediate product, no other lifecycle phases are relevant to cover.

Modules not declared = MND. Modules not relevant = MNR.

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

CUT-OFF CRITERIA

All major raw materials and essential energy flows are included. The 1% cut-off rule does not apply for hazardous materials and substances: as such, all flows with environmental significance are included. All solid waste emissions, including those that weight less than 1% of the sum of the masses of the inputs, are reported in the end-results.

The only noticeable inputs that have been omitted are:

- Infrastructure and capital goods at production facility, i.e. plant, buildings and machinery
- Water consumption at the raw meal preparation level: it is not a net uptake of water from the freshwater network.
- Packaging bags and wood pallets for transport: the relational context of this EPD is business-to-business, where the entirety of the cement volume is transported in bulk.

AVERAGES AND VARIABILITY

Essentially, for this EPD, minor inputs such as electricity, internal transport, and waste have been averaged over the entire white cement and clinker production of Aalborg Portland.

The data quality is generally high as most are retrieved directly from the Manufacturer and are well below the cut-off criteria. Additional background processes such as transportation and electricity consumption have been modelled using Ecoinvent v.3.6 LCI database, all with less than 2 years old data.

ALLOCATION, ESTIMATES AND ASSUMPTIONS

The allocation of co-products used in the cement production process is made in accordance with the provisions of EN 15804. It is either based on physical properties (energy or mass) when the difference in economic return between co-products is small, or on their economic values otherwise. For end-of-life waste used in the product system, the end-of-waste state starts with any necessary conditioning and preparation processes of the material to be suitable for reuse, as well as its supply.

The white Portland cement production is jointly supplying heat to the local district heat system. An allocation based on recovered energy is performed to preserve physical and energy relations as the local price for heat is not market-regulated.

The excess heat recovery unit that operates together with the production of white clinker supplies over 1,2 million GJ of heat to the district heat system of the Municipality of Aalborg (Denmark). This represents about one fifth of the local heat demand. The excess heat recovered in 2020 was 20% larger compared to the reference year 2015 of the previous EPD (published in 2018).

ENVIRONMENTAL IMPACT DATA

NOTE: ENVIRONMENTAL IMPACTS - EN 15804+A1, CML / ISO 21930 ARE PRESENTED IN ANNEX.

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Climate change – total	kg CO ₂ -eq	1,17E+01	2,45E+01	1,00E+03	1,04E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Climate change – fossil	kg CO ₂ -eq	1,17E+01	2,45E+01	1,00E+03	1,04E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Climate change – biogenic	kg CO ₂ -eq	6,18E-03	-2,22E-02	-2,83E+00	-2,85E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Climate change – LULUC	kg CO ₂ -eq	2,02E-02	1,77E-02	9,95E-02	1,37E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Ozone depletion	kg CFC11 _{-eq}	2,82E-06	4,77E-06	1,95E-05	2,71E-05	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Acidification	mol H ⁺ _{-eq}	9,21E-02	4,76E-01	4,53E+00	5,10E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Eutrophication, aquatic freshwater	kg PO ₄ -eq	6,00E-03	2,06E-03	2,00E-01	2,08E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Eutrophication, aquatic marine	kg N _{-eq}	1,21E-02	1,08E-01	5,31E-01	6,52E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Eutrophication, terrestrial	mol N _{-eq}	1,37E-01	1,20E+00	5,52E+00	6,85E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Photochemical ozone formation	kg NMVOC _{-eq}	3,62E-02	3,23E-01	2,91E+00	3,27E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Abiotic depletion, minerals &	kg Sb _{-eq}	2,85E-03	2,57E-04	3,68E-04	3,48E-03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Abiotic depletion of fossil resources	MJ	2,74E+02	3,22E+02	7,06E+03	7,66E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Water use	m ³ _{-eq} depr.	2,08E+02	2,05E+02	8,13E+03	8,54E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

EN 15804+A2 disclaimer for Abiotic depletion and Water use indicators and all 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.

ADDITIONAL (OPTIONAL) ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Particulate matter	Incidence	6,17E-07	1,07E-06	1,34E-05	1,50E-05	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Ionizing radiation, human health	kBq U235 _{-eq}	1,24E+00	1,37E+00	4,92E+00	7,53E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Eco-toxicity (freshwater)	CTU _{-eq}	2,45E+00	5,65E+00	5,49E+00	1,36E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Human toxicity, cancer effects	CTUh	8,26E-09	1,03E-08	3,62E-07	3,80E-07	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Human toxicity, non-cancer effects	CTUh	7,27E-07	3,08E-07	3,72E-06	4,76E-06	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Land use related impacts/soil quality	-	1,04E+02	1,25E+02	1,56E+02	3,85E+02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

EN 15804+A2 disclaimer for Ionizing radiation, human health. 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.

USE OF NATURAL RESOURCES

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Renewable PER used as energy	MJ	7,78E+00	3,86E+00	2,48E+02	2,59E+02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Renewable PER used as materials	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Total use of renewable PER	MJ	7,78E+00	3,86E+00	2,48E+02	2,59E+02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Non-renew. PER used as energy	MJ	2,98E+02	2,79E+02	1,96E+03	2,54E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Non-renew. PER used as materials	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Total use of non-renewable PER	MJ	2,98E+02	2,79E+02	1,96E+03	2,54E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Use of secondary materials	kg	5,84E-02	1,78E-01	4,29E-01	6,65E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Use of renewable secondary fuels	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Use of non-renew. secondary fuels	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Use of net fresh water	m ³	2,42E-01	4,41E-02	2,40E-01	5,26E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

PER abbreviation stands for primary energy resources

END OF LIFE – WASTE

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste	kg	9,18E-01	4,14E-01	1,31E+01	1,44E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Non-hazardous waste	kg	1,01E+01	1,31E+01	2,68E+02	2,91E+02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Radioactive waste	kg	1,28E-03	1,87E-03	1,96E-03	5,11E-03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Components for reuse	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Materials for recycling	kg	2,41E-03	0,00E+00	0,00E+00	2,41E-03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Materials for energy recovery	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Exported energy	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

KEY INFORMATION TABLE (RTS) – KEY INFORMATION PER KG OF PRODUCT

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Climate change – total	kg CO ₂ -eq	1,17E-02	2,45E-02	1,00E+00	1,04E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Abiotic depletion, minerals & metals	kg Sb _{-eq}	2,85E-06	2,57E-07	3,68E-07	3,48E-06	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Abiotic depletion of fossil resources	MJ	2,74E-01	3,22E-01	7,06E+00	7,66E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Water use	m ³ -eq	3,11E-04	5,02E-05	1,02E-03	1,38E-03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Use of secondary materials	kg	5,60E-05	2,58E-04	1,13E-03	1,45E-03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Biogenic carbon content in product	kg C	N/A	N/A	0,00E+00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Biogenic carbon content in packaging	kg C	N/A	N/A	0,00E+00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

SCENARIO DOCUMENTATION

Manufacturing energy scenario documentation

Scenario parameter	Value
Electricity data source and quality	Ecoinvent v.3.6 data has been applied as the only valid dataset
Electricity CO _{2-eq} / kWh	0,32
District heating data source and quality	n/a
District heating CO _{2-eq} / kWh	n/a

Transport scenario documentation

Scenario parameter	Value
Transport, freight, lorry 16-32 tonnes, EURO 5, kg CO _{2-eq} / t-km	Not declared
Transport, freight, sea, bulk carrier for dry goods, kg CO _{2-eq} / t-km	Not declared
A4 average transport CO _{2-eq} emissions, kg CO _{2-eq} / t-km	Not declared
A4 average transport distance, km	Not declared
Transport capacity utilization, %	Not declared
Bulk density of transported products, kg/m ³	2790
Volume capacity utilization factor for nested package products, %	Not declared

End of life scenario documentation

Scenario parameter	Value
Collection process – kg collected separately	n/a
Collection process – kg collected with mixed waste	n/a
Recovery process – kg for re-use	n/a
Recovery process – kg for recycling	n/a
Recovery process – kg for energy recovery	n/a
Disposal (total) – kg for final deposition	n/a
Scenario assumptions e.g. transportation	n/a

BIBLIOGRAPHY

ISO 14025:2010 Environmental labels and declarations – Type III environmental declarations. Principles and procedures.

ISO 14040:2006 Environmental management. Life cycle assessment. Principles and frameworks.

ISO 14044:2006 Environmental management. Life cycle assessment. Requirements and guidelines.

Ecoinvent database v3.6 and One Click LCA database.

EN 15804:2012+A2:2019 Sustainability in construction works – Environmental product declarations – Core rules for the product category of construction products.

RTS PCR EN 15804:2019 RTS PCR in line with EN 15804+A2. Published by the Building Information Foundation RTS (English version, 26.8.2020).

ABOUT THE MANUFACTURER

Aalborg Portland is the only cement factory in Denmark. The past 130 years it has been producing a wide variety of grey cements in its kiln and premium white cement in its six white cement kilns, where the main clinker raw material, limestone and sand, is sourced locally. Since 2004 it is owned by Cementir Group along with 10 other cement factories globally. The annual cement production is 2,4 million tons and the markets are both domestic, regional and global, and the domestic infrastructure is supported by seven Aalborg Portland owned silos across Denmark. In its Research and Quality Centre cements from all factories across the Group are being tested, and the development of low carbon cements is taking place, the latest one FUTURECEM™ launched in 2020 – a calcined clay cement with a 30% lower CO₂ footprint compared to traditional cements.

EPD AUTHOR AND CONTRIBUTORS

Manufacturer	Aalborg Portland, Cementir Holding
EPD author	Stefan Emil Danielsson, Research and Quality Center, Cementir Holding S.p.A Aalborg, Denmark
EPD verifier	Silvia Vilčeková, Silcert, s.r.o.
EPD program operator	Rakennustietosäätiö RTS / Rakennustieto Oy Malminkatu 16 A 00100 Helsinki http://cer.rts.fi
Background data	This EPD is based on Ecoinvent 3.6 (cut-off) and One Click LCA databases.
LCA software	The LCA and EPD have been created using One Click LCA Pre-Verified EPD Generator for Cementitious Products

ANNEX

ENVIRONMENTAL IMPACTS - EN 15804+A1, CML / ISO 21930

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Global warming potential	kg CO ₂ -eq	1,14E+01	2,43E+01	9,73E+02	1,01E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Depletion of stratospheric ozone	kg CFC-11-eq	2,52E-06	3,80E-06	1,89E-05	2,53E-05	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Acidification	kg SO ₂ -eq	8,04E-02	3,86E-01	4,09E+00	4,56E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Eutrophication	kg PO ₄ -eq	2,48E-02	4,46E-02	8,35E-01	9,04E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Photochemical ozone formation	kg C ₂ H ₄ -eq	3,32E-03	1,18E-02	2,68E-01	2,83E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Abiotic depletion of non-fossil res.	kg Sb-eq	2,85E-03	2,57E-04	3,68E-04	3,48E-03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Abiotic depletion of fossil resources	MJ	2,74E+02	3,22E+02	7,06E+03	7,66E+03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND