

Environmental Product Declaration

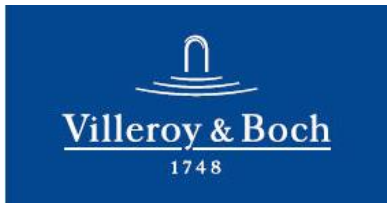


In accordance with ISO 14025 and EN 15804:2012+A2:2019 for:

Quaryl Bathtub and Shower Tray Products

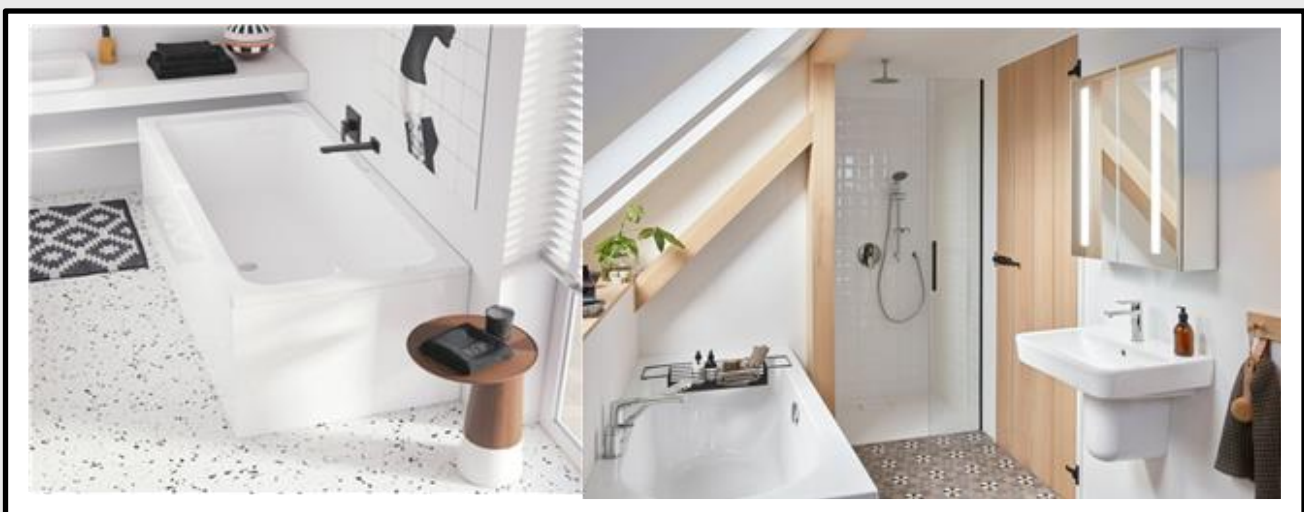
from

Villeroy and Boch AG.
Saaruferstraße, 66693 Mettlach (Germany)



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General information

Programme information

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CEN standard EN 15804 serves as the Core Product Category Rules (PCR)

Product category rules (PCR): *Construction products, 2019:14, version 1.11*

PCR review was conducted by: Martin Erlandsson, IVL Swedish Environmental Research Institute, martin.erlandsson@ivl.se

Independent third-party verification of the declaration and data, according to ISO 14025:2006:

EPD process certification EPD verification

Third party verifier:

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Yes No



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Company information

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Description of the organisation:

This EPD study on 'Quaryl bathtub and shower tray products' was commissioned by Villeroy & Boch (V&B), one of the largest providers of "Bathroom, Wellness and Tableware" related products in Europe. With its head office based in Germany (Saaruferstraße, 66693 Mettlach) V&B is a major manufacturer of sanitary ware products, which are sold in around 125 countries.

Product-related or management system-related certifications:

DIN EN ISO 9001:2015 – Quality Management System

DIN EN ISO 14001:2015 – Environmental Management System

DIN EN ISO 50001 :2018 – Energy Management System

DIN EN ISO 45001:2018 – Occupational Health and Safety Management System

Name and location of production site:

The Quaryl products assessed in this study are manufactured in Netherlands at Villeroy & Boch Wellness, Dwazziewegen 13, 9301 ZR Roden.

Product information

Product name:

Quaryl bathtub and shower tray products

Product identification:

The bathtubs and shower trays assessed in this report are part of the Quaryl product series. Villeroy & Boch's exclusive Quaryl® material is made from a carefully developed blend of quartz and sanitary acrylic that is very impact-resistant, shock-resistant and scratchproof. The material's great malleability allows for a very wide range of designs options for bathtubs and shower trays. The non-slip surface ensures a secure grip in the bath or shower. [Figure 1](#) **Fehler! Verweisquelle konnte nicht gefunden werden.**below illustrates a typical bathtub from the range of products available from V&B.

Figure 1: Typical Quaryl bathtub product – Finion Free-standing bath (1700 x 700 mm)



UN CPC Code:

36930 Baths, wash-basins, lavatory pans and covers, flushing cisterns and similar sanitary ware, of plastics.

Product description:

The typical composition of Quaryl products is given below.

Table 1: Typical material composition of Quaryl products

Materials	Percentage composition in material (%)
Silica Sand	62%
Methyl Methacrylate (MMA)	32%
Other e.g. additives, pigments	6%
Total	100%

Packaging

Packaging has been assessed for both inbound raw materials and for the outbound finished bathtub and shower tray products.

Recycled material:

No externally sourced recycled material is used in the final product.

LCA information

Functional unit / declared unit:

The declared unit for Quaryl products is typically based on finished pieces, however since the focus of this study is the material itself rather than a specific product, the declared unit is:

“1 kg of Quaryl product and associated packaging, excluding fixtures and fittings”

As this is a ‘cradle-to-gate (A1-A3+C+D)’ study and B1 – B7 steps are not included, the declaration of the reference service life (RSL) is not applicable.

Reference service life:

Not applicable

Time representativeness:

LCA calculations were subject to client-specific data from 2020 and based on one-year averaged data.

Geographic representativeness:

The upstream supply chain has been modelled based on production from the V&B manufacturing site in Roden, Netherlands and supplier locations used to make the Quaryl product. It has been assumed that the product will be sold in the EU and the end of life stage will also take place in the EU.

Databases and LCA software used

All primary data used were based on the manufacturer’s specific data inventory. Modelling was carried out using GaBi software (version 10.5.1.124). Background life cycle inventory data were primarily sourced from the GaBi 2021 databases, supplemented with data from ecoinvent v3.7, where this was deemed more representative. Country specific data for fuels and energy were used where possible. It was more challenging to find country-specific data for raw materials; if these could not be obtained, European average data were used where available. If the country specific data were not available, the most representative dataset from another location was used.

Description of system boundaries:

System boundary: cradle-to-gate study (A1-A3+C+D).

The LCA addresses the environmental aspects and potential environmental impacts from the point at which raw materials are extracted from the environment through to finished product. The end of life stage is also considered, from removal of the used Quaryl products through to the final disposal along with potential benefits and loads beyond the system boundary.

Life cycle stage descriptions are shown below in Table 2 and Figure 2.

Table 2: Description of the system boundary according to the PCR

Life cycle stage	Individual stages	Module Code	Use	Geography	Specific Data
Product stage	Raw material	A1	X	Belgium	Villeroy & Boch Site Specific Manufacturing Data (Accounting for raw materials, energy and waste which is > 90% of total)
	Transport	A2	X	Global	
	Manufacturing	A3	X	EU-28	
Construction process stage	Transport	A4	MND	EU-28	-
	Construction Installation	A5	MND	EU-28	-
Use stage	Use	B1	MND	EU-28	-
	Maintenance	B2	MND	EU-28	-
	Repair	B3	MND	EU-28	-
	Replacement	B4	MND	EU-28	-
	Refurbishment	B5	MND	EU-28	-
	Operational energy use	B6	MND	EU-28	-
	Operational water use	B7	MND	EU-28	-
End of life stage	De-construction & demolition	C1	X	GLO	-
	Transport	C2	X	GLO	-
	Waste processing	C3	X	GLO	-
	Disposal	C4	X	EU-28	-
Resource recovery stage	Reuse-Recovery-Recycling-potential	D	X	GLO	-

X = declared modules, MND = module not declared

Figure 2: System Diagram

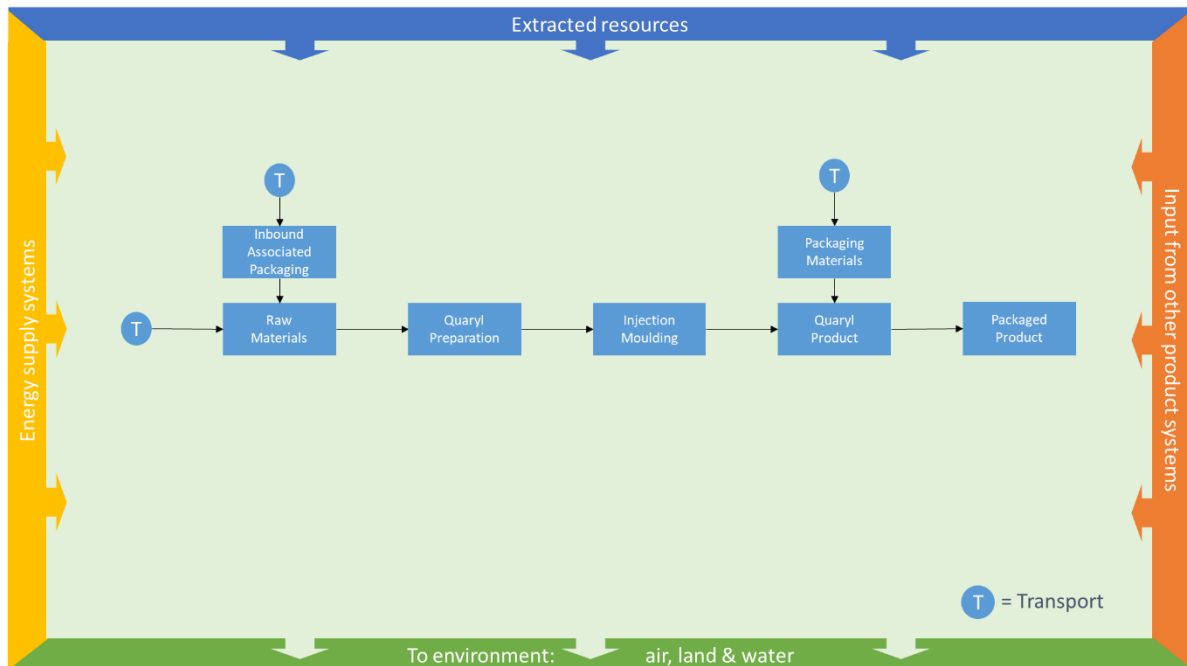


Table 3 summarises those life cycle aspects that have been included within and excluded from the study.

Table 3: Components inclusion/ exclusion

Included	Excluded
<ul style="list-style-type: none"> ▪ Raw material acquisition ▪ Processing of raw materials ▪ Transport of raw materials to V&B manufacturing site ▪ Energy used in production at manufacturing facilities ▪ Assembly of finished product ▪ Transport and disposal/recycling of wastes ▪ Transportation of components to assembly site ▪ Product packaging of final product 	<ul style="list-style-type: none"> ▪ Construction activities, capital equipment and infrastructure ▪ Human labour, employee commute and business travel

Description of production process

The manufacturing process of Quarryl products begins with the transportation of raw materials and their associated packaging. In this case, the dominant raw materials are silica sand and methyl methacrylate resin (MMA). Optional painting and assembly of system bath processes are excluded from this study.

The raw materials are mixed into a slurry and distributed to the casting machines in the production area, where it is injected into the moulds and cured using a heating process. After curing, the product is taken from the mould, holes for water outlet and overflow are made and the edges are smoothed. Then the finished product is inspected and packed.

End of life scenario

It has been assumed that, at end of life, the Quarryl products would be manually dismantled from where it has been installed during the use stage. Hence no burdens have been allocated to module C1.

It has also been assumed that the dismantled Quarryl products would be sent to landfill and this is would be 50 km from the location of the building where it was installed. This journey has been modelled using a 32 tonne gross weight truck.

Given their composite nature and choice of materials, Quarryl products are not currently suitable for recycling. It is possible that they could be sent for energy recovery but considering the size and nature of the products it is more likely that they would be disposed to landfill.

No externally sourced recycled content is used in manufacturing Quarryl products and at end of life no materials from the Quarryl products are recycled or sent for energy recovery. The product is inert in landfill (not producing landfill gas that can be burnt to produce electricity). As such, no potential benefits or loads beyond the system boundary have been identified or modelled.

Data Quality

Data collection followed the guidance provided in ISO 14044:2006, clause 4.3.2. All producer-specific data are from 2020 and are based on one-year averaged data.

ERM collected site-specific data from V&B’s operations using structured questionnaires. The data received were cross-checked for completeness and plausibility using mass balances and stoichiometry, as well as internal and external benchmarking.



All background data were obtained from the databases contained within the Gabi 10.5.1.123 software: most data were sourced from the Gabi 2021 database from Sphera, supplemented with data from ecoinvent v3.7. Datasets from these databases have been used worldwide for many years in many critically reviewed studies in industrial and scientific applications. The vast majority of data were sourced from 2017-2020, although a few datasets were older.

Cut-off criteria

EN 15804 requires that where there are data gaps or insufficient input data for a unit process, the cut-off criteria shall be 1% of renewable and non-renewable primary energy usage and 1% of the total mass of this unit process. The total neglected flows from a product stage must be no more than 5% of product inputs by mass or 5% of primary energy contribution.

All emissions and their environmental impact contributing greater than 1% to the total must be recorded.

In this assessment, all information gathered from data collection for the production of the Quaryl products has been modelled, ie all raw materials used, the electrical energy and other fuels used, use of ancillary materials and all direct production waste. Transport data on input and output flows have also considered.

Allocation

V&B's manufacturing site in Roden only produces Quaryl products, with no co- or by-products. As such, no allocation has been necessary.

Assumptions and Limitations

This EPD does not assess the installation and use stages associated with the Quaryl life cycle. The end of life of Quaryl products has been modelled based on what is currently the most likely scenario, but this may not be representative of the end of life of a newly installed product that would be disposed of some years in the future, eg if recycling of post-consumer composite materials were to become more widespread.

Further Information

Additional information on Quaryl products can be found at:

<https://www.villeroyboch-group.com/en.html>

<https://www.villeroy-boch.com/bath-and-wellness/products.html>

<https://pro.villeroy-boch.com/us/us/bathroom-and-wellness.html>

Environmental Information

Potential environmental impact

	A1	A2	A3	C1	C2	C3	C4	D	TOTAL
GWP - total [kg CO2 eq.]	3.47E+00	3.91E-02	4.92E-03	0.00E+00	1.67E-02	0.00E+00	2.04E-01	0.00E+00	3.73E+00
GWP - fossil [kg CO2 eq.]	3.69E+00	3.88E-02	3.93E-03	0.00E+00	1.65E-02	0.00E+00	2.37E-02	0.00E+00	3.77E+00
GWP – biogenic [kg CO2 eq.]	-2.23E-01	-4.32E-05	9.78E-04	0.00E+00	-2.12E-05	0.00E+00	1.81E-01	0.00E+00	-4.11E-02
GWP - luluc [kg CO2 eq.]	9.98E-03	3.15E-04	7.33E-06	0.00E+00	1.36E-04	0.00E+00	5.13E-05	0.00E+00	1.05E-02
ODP [kg CFC-11 eq.]	6.68E-08	4.95E-18	5.16E-17	0.00E+00	2.13E-18	0.00E+00	7.85E-17	0.00E+00	6.68E-08
AP [Mole of H+ eq.]	1.19E-02	5.24E-05	1.46E-05	0.00E+00	1.49E-05	0.00E+00	1.51E-04	0.00E+00	1.21E-02
EP - freshwater [kg P eq.]	5.41E-04	1.14E-07	1.18E-06	0.00E+00	4.94E-08	0.00E+00	7.36E-07	0.00E+00	5.43E-04
EP - marine [kg N eq.]	2.44E-03	1.57E-05	8.50E-06	0.00E+00	4.30E-06	0.00E+00	4.76E-05	0.00E+00	2.52E-03
EP - terrestrial [Mole of N eq.]	2.48E-02	1.84E-04	4.55E-05	0.00E+00	5.32E-05	0.00E+00	4.66E-04	0.00E+00	2.55E-02
POCP [kg NMVOC eq.]	6.79E-03	4.34E-05	1.18E-05	0.00E+00	1.24E-05	0.00E+00	1.80E-04	0.00E+00	7.04E-03
ADPF [MJ]	7.56E+01	5.17E-01	5.55E-02	0.00E+00	2.21E-01	0.00E+00	3.20E-01	0.00E+00	7.67E+01
ADPE [kg Sb eq.]	1.30E-06	2.94E-09	7.27E-10	0.00E+00	1.27E-09	0.00E+00	1.99E-09	0.00E+00	1.31E-06
WDP [m³ world equiv.]	9.07E+00	3.34E-04	4.69E-04	0.00E+00	1.44E-04	0.00E+00	2.27E-03	0.00E+00	9.07E+00

Caption: GWP - total = global warming potential; GWP - fossil = global warming potential (fossil fuel only); GWP - biogenic = global warming potential (biogenic); GWP - luluc = global warming potential (land use only); ODP = ozone depletion; AP = acidification terrestrial and freshwater; EP - freshwater = eutrophication potential (freshwater); EP - marine = eutrophication potential (marine); EP- terrestrial = eutrophication potential (terrestrial); POCP = photochemical ozone formation; ADPE = abiotic depletion potential (element), ADPF = abiotic depletion potential (fossil); WDP = water scarcity.

Potential environmental impact - describing GWP-GHG based on EN 15804:2012+A1:2013 (previous version)

	A1	A2	A3	C1	C2	C3	C4	Total
Total [kg CO2 eq.]	3.36E+00	3.81E-02	4.71E-03	0.00E+00	1.62E-02	0.00E+00	1.55E-01	3.57E+00

Use of resources

	A1	A2	A3	C1	C2	C3	C4	D	TOTAL
PERE [MJ]	1.17E+01	2.86E-02	1.62E-02	0.00E+00	1.24E-02	0.00E+00	3.57E-02	0.00E+00	1.18E+01
PERM [MJ]	2.43E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.43E+00
PERT [MJ]	1.41E+01	2.86E-02	1.62E-02	0.00E+00	1.24E-02	0.00E+00	3.57E-02	0.00E+00	1.42E+01
PENRE [MJ]	6.59E+01	5.17E-01	5.56E-02	0.00E+00	2.22E-01	0.00E+00	3.20E-01	0.00E+00	6.70E+01
PENRM [MJ]	9.71E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.71E+00
PENRT [MJ]	7.56E+01	5.17E-01	5.56E-02	0.00E+00	2.22E-01	0.00E+00	3.20E-01	0.00E+00	7.67E+01
SM [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	0.00E+00
RSF [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	0.00E+00
NRSF [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	0.00E+00
FW [m3]	2.22E-01	3.27E-05	1.96E-05	0.00E+00	1.41E-05	0.00E+00	6.80E-05	0.00E+00	2.22E-01

Caption: 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 resources; 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

	A1	A2	A3	C1	C2	C3	C4	D	TOTAL
HWD [kg]	2.70E-06	2.59E-11	1.13E-11	0.00E+00	1.12E-11	0.00E+00	4.27E-11	0.00E+00	2.70E-06
NHWD [kg]	1.11E-01	7.66E-05	7.36E-02	0.00E+00	3.29E-05	0.00E+00	1.08E+00	0.00E+00	1.26E+00
RWD [kg]	7.01E-04	6.25E-07	3.68E-06	0.00E+00	2.68E-07	0.00E+00	3.48E-06	0.00E+00	7.09E-04
CRU [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	0.00E+00
MER [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E+00	0.00E+00
MFR [kg]	2.17E-03	0.00E+00	1.02E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.02E+00
EEE [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	0.00E+00
EET [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	0.00E+00

Caption: HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy

Information on biogenic carbon content

	A1	A2	A3	C1	C2	C3	C4	D	TOTAL
Biogenic carbon content in product [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	0.00E+00
Biogenic carbon content in packaging [kg]	6.90E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.90E-02

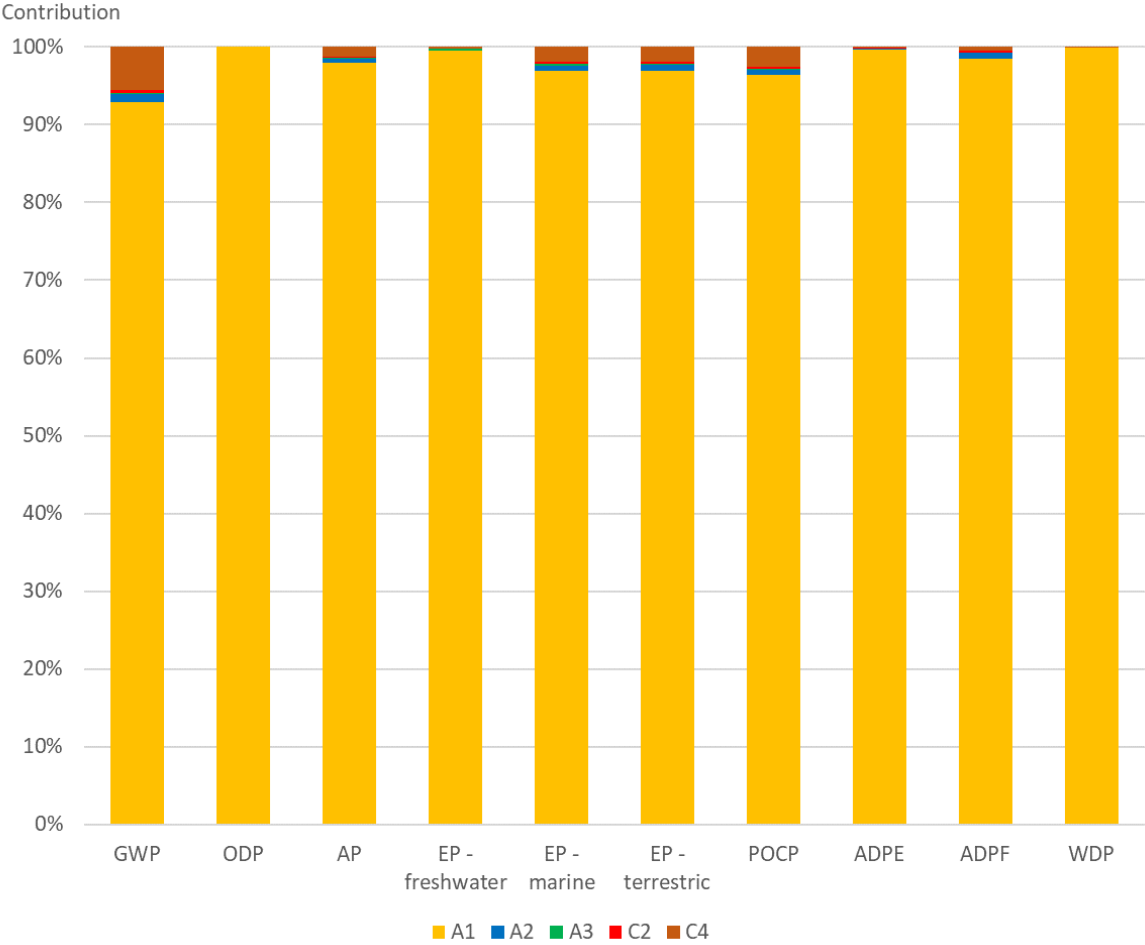
Other environmental indicators

	A1	A2	A3	C1	C2	C3	C4	D	TOTAL
PM [Disease incidences]	1.12E-07	4.79E-10	1.75E-10	0.00E+00	9.40E-11	0.00E+00	1.75E-09	0.00E+00	1.14E-07
IR [kBq U235 eq.]	2.37E-01	8.95E-05	5.50E-04	0.00E+00	3.84E-05	0.00E+00	4.19E-04	0.00E+00	2.38E-01
ETF-fw [CTUe]	4.61E+01	3.73E-01	1.95E-01	0.00E+00	1.60E-01	0.00E+00	1.94E-01	0.00E+00	4.70E+01
HTP-c [CTUh]	2.25E-09	7.53E-12	7.01E-12	0.00E+00	3.23E-12	0.00E+00	2.19E-11	0.00E+00	2.29E-09
HTP-nc [CTUh]	4.93E-08	3.88E-10	7.11E-10	0.00E+00	1.66E-10	0.00E+00	2.49E-09	0.00E+00	5.31E-08
SQP [Pt]	5.13E+01	1.76E-01	1.68E-02	0.00E+00	7.61E-02	0.00E+00	4.86E-02	0.00E+00	5.16E+01

Caption: PM = Particulate matter emissions; IR = Ionizing radiation, human health; ETF-fw = Eco-toxicity (freshwater); HTP-c = Human toxicity, cancer effects; HTP-nc = Human toxicity, non-cancer effects; SQP = Soil quality potential/ Land use related impacts

Interpretation

Figure 3: Contribution of modules (A1, A2, A3, C2 and C4) to environmental impact categories for Quarryl products.



The results show that module A1 (raw material supply) is the dominant contributor to the majority of environmental impact categories, accounting for 90% or above, of burdens for every impact category. Burdens associated with module A3 are the next most significant, but to a much lesser extent than A1, and is negligible for several impact categories. Similarly, Module A2 also has a reasonable contribution to some impact categories but a minor contribution in others.

Modules associated with end of life have a negligible contribution to the overall life cycle burdens.

References

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

Demolition Energy Analysis of Office Building Structural Systems, Athena Sustainable Materials Institute, 1997

ecoinvent. (2021). ecoinvent Databases. Retrieved from ecoinvent web site:
<https://www.ecoinvent.org/login-databases.html>

Environmental profile of building elements, OVAM, 2020

General Programme Instructions of the International EPD® System. Version 3.01.

ISO 14025 - Environmental labels and declarations - Type III environmental declarations - Principles and procedures, 2006

NBR ISO 14020 - Environmental labels and declarations - General Principles, 2002

NBR ISO 14040 - Environmental management - Life cycle assessment - Principles and framework, 2009

NBR ISO 14044 - Environmental management – Life cycle assessment – Requirements and guidelines, 2009

Product Category Rule (PCR 2019:14, v1.11): “Construction products”, International EPD® System, 2019

Sphera Solutions Inc. (2021). GaBi LCA Databases. Retrieved from Sphera - GaBi Solutions web site:
<http://www.gabi-software.com/databases/gabi-databases/>

