



# Casone

## DOLOMITIC MONOGENIC BRECCIA CLADDING FIRENZUOLA (FI)

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

### ENVIRONMENTAL PRODUCT DECLARATION

PROGRAM OPERATOR

**EPDItaly**

PUBLISHER

**EPDItaly**

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## GENERAL INFORMATION

### EPD OWNER

Company Name	Casone Group s.r.l.
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### PROGRAM OPERATOR

EPDItaly	Via Gaetano De Castilia n° 10 20124 Milano, Italy
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### EPD INFORMATION

Product Name	Dolomitic Monogenic Breccia Cladding
Manufacturing Site	Casone Group s.r.l. Via Imolese, 98 50033 Firenzuola (FI), Italy Tel. (+39) 055 8199005 Fax. (+39) 055 8199006 <a href="http://www.casonegroup.com/it/">http://www.casonegroup.com/it/</a>
Product Description and Technical Information	Dolomitic monogenic breccia cladding, commercially called "Ceppo di Grè", with surface finishes in thicknesses 2 and 3 cm. -cladding slab filled, honing and cut to size in thickness 2 cm; -cladding slab filled, bush-hammering and cut to size in thickness 2 cm; -cladding slab filled, micro-bush-hammering and cut to size in thickness 2 cm; -cladding slab filled, micro-sandblasting and cut to size in thickness 2 cm; -cladding slab filled, honing and cut to size in thickness 3 cm; -cladding slab filled, bush-hammering and cut to size in thickness 3 cm; -cladding slab filled, micro-bush-hammering and cut to size in thickness 3 cm; -cladding slab filled, micro-sandblasting and cut to size in thickness 3 cm.
Scope of Application	The dolomitic monogenic breccia product used in this study can be applied as both a floor and wall cladding and is designed to be installed in indoor/outdoor residential, non-residential and commercial settings
Product Reference Name	UNI EN 1341:2013 Regolamento 305/2011 del 09/03/11
CPC Code (number) <a href="https://unstats.un.org/unsd/classifications/Econ">https://unstats.un.org/unsd/classifications/Econ</a>	151 – MONUMENTAL AND BUILDING STONES

PCR – Product Category Rules (title, version, date of publication or update)	PCR ICMQ-001/15 rev. 3 del 02.12.2019
EPDItaly regulation (version, date of publication or update)	Regulation EPD Italy 5.2 del 16.02.2022
Project Report LCA	Report LCA v. 1
Independent Verification	PCR review performed by XXXX – <a href="mailto:info@epditaly.it">info@epditaly.it</a> . Independent verification of the statement and the data carried out according to ISO 14025:2010. <input type="checkbox"/> Internal <input checked="" type="checkbox"/> External Third-party verification performed by: ICMQ S.p.A., via Gaetano De Castilia n° 10 - 20124 Milano, Italia. Accredited by Accredia
Comparability	Environmental Declarations Published within the same product category but from different programs may not be comparable. In particular, EPDs of construction products may not be comparable if they do not comply with EN 15804:2012+A2:2019
Responsibility	Casone Group s.r.l. releases EPDItaly from any non-compliance with environmental legislation. The holder of the declaration will be responsible for supporting information and evidence. EPDItaly disclaims any responsibility regarding the information, data and results provided by Casone Group s.r.l. for the life cycle assessment





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## COMPANY PROFILE

Casone Group s.r.l. is a company engaged in the processing of ornamental stone from both its own quarries (Pietra Forte Fiorentina) and other quarrying sites (marble, granite, onyx and travertine). Founded in 1962, Casone Group operates in Firenzuola (Florence), a quarrying area in the Tuscan-Emilian Appennines, with stone deposits also in Verona and Carrara districts. Internationally known, it has always collaborated with nationally and internationally renowned architects, managing all stages of processing up to the final project: from the extraction of the block to in-situ realization.



### COMPANY CERTIFICATIONS

EPD Pietra Serena di Firenzuola  
(Registration Number EPDItaly: EPDITALY0065)





Casone Group follows very strict criteria in the selection of raw materials, carrying out constant research on both the characteristics of lithic materials and related finishing using manual techniques and advanced technology.

The raw material comes directly from its own quarries, as well as from other mining sites, and is processed carefully and meticulously at the production site in Firenzuola (FI).

After extraction, the stone is coded and subjected to continuous quality control, and is then subject to laser guidance for cutting and numerically controlled (CNC) machining, as well as waterjet shaping to achieve precision edges and an accurate surface finish.

In addition, in order to support the client in achieving optimal execution, Casone Group provides the Dry Lay service. This consists in the pre-installation of the elements following the project layout. In this way, the material is approved before shipment, and the in-situ assembly diagrams ensure correct final installation.



## PRODUCT DESCRIPTION

The lithic material under analysis is a dolomitic monogenic breccia, a conglomerate of grey-blue colour with varying tones from light to dark. Also known as "Pietra Originale della Bergamasca", commercially it is named "Ceppo di Grè" and is cultivated in the municipality of Solto Collina (BG) on the north-west shore of Lake Iseo. It is a porous and heterogeneous natural stone with a grain consisting of irregularly shaped clasts of varying grain size (from a few centimetres up to a few decimetres) cemented in a carbonate microcrystalline matrix (mainly calcitic). Such lithic products can be used as wall coverings, pavements and additions both in construction and street furniture.

### Technical Features

The stone products covered by this EPD are intended for applications such as floor and wall coverings – interior and exterior – and ventilated facades, in accordance with the suitability for use provided by harmonized reference standards for the natural stone sector:

- UNI EN 1341:2013;
- UNI EN 1342:2013;
- UNI EN 1343:2013;
- UNI 1469:2015;
- UNI EN 12057:2015;
- UNI EN 12058:2015
- UNI EN 771-6:2015.

Physical, performance and mechanical properties are shown in Table 1.

Requirement	Parameter	Reference Standards	M.U.	Test Result
Density	/		ton/m <sup>3</sup>	2.4
Water absorption at atmospheric pressure	Immersion in water at atmospheric pressure	UNI EN 13755	%	3.00
Compressive Strength	Perpendicular to the direction in the dry state	UNI EN 1926	MPa	52
Compressive Strength after Freeze/Thaw	Perpendicular to the Direction after 48 cycles of gelation	UNI EN 12371	MPa	50
Flexural Strength Under Concentrated Load	Specimen size [180x60x30]mm Distance Supports [150]mm	UNI EN 12372	MPa	6
Flexural Strength Under Concentrated Load after Freeze/Thaw	After 48 freezing cycles specimen size [180x60x30]mm Distance Supports [150]mm	UNI EN 12371	MPa	5
Freeze/Thaw	Objective Exam	UNI EN 1341/1342/1343	/	Durable
Abrasion Resistance	/	UNI EN 1341	mm	22.00
Slip Resistance	/	UNI EN 14231	USRV	65

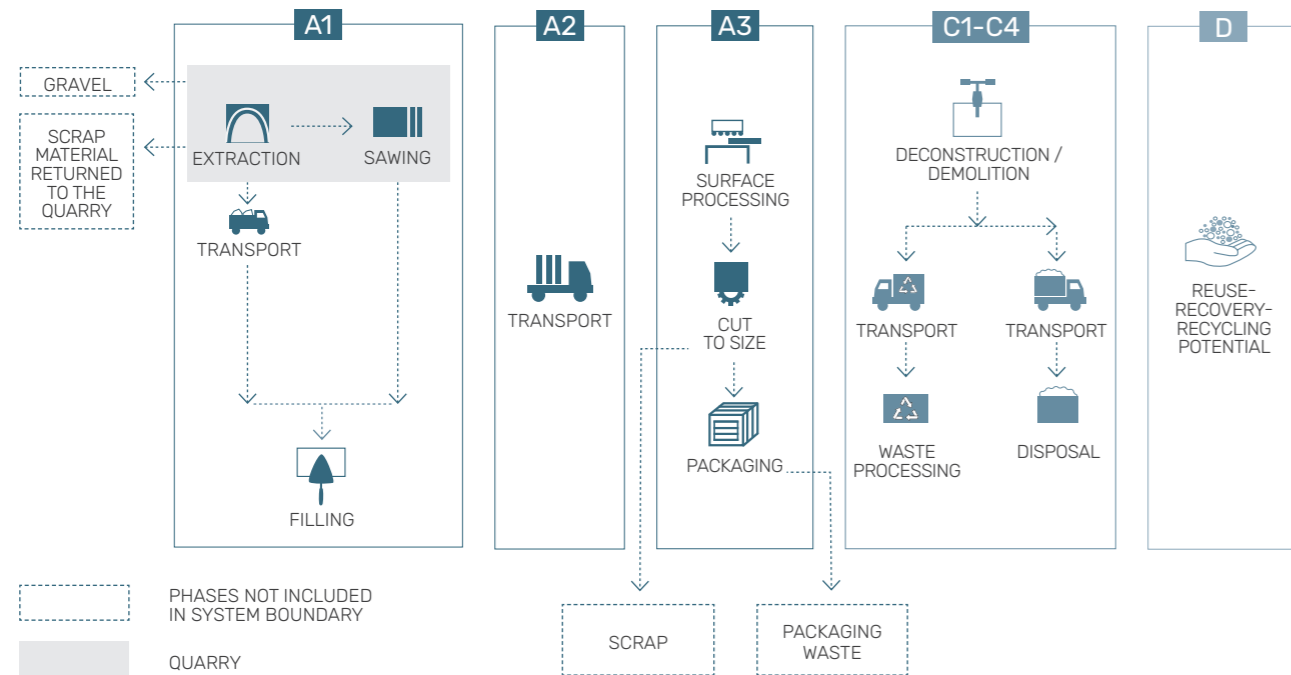
Table 1 - Physical, performance and mechanical properties



## EPD PURPOSE AND TYPE

This product-specific EPD is of the "Cradle to Gate with Option" type and, in accordance with the framework defined by UNI EN 15804:2012+A2:2019, includes the following modules (phases):

- A1** RAW MATERIALS
- A2** TRANSPORT
- A3** MANUFACTURING
- C1** DE-CONSTRUCTION/DEMOLITION
- C2** TRANSPORT
- C3** WASTE PROCESSING
- C4** DISPOSAL
- D** RE-USE, RECOVERY, RECYCLING POTENTIAL

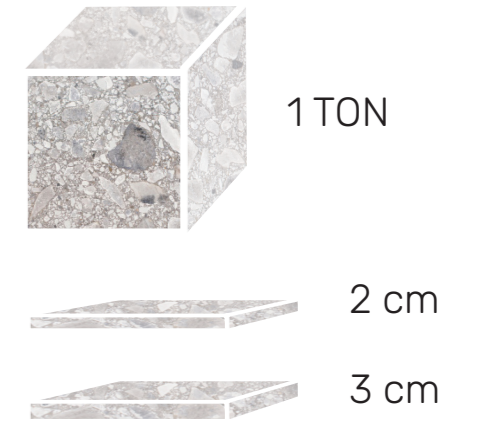


## LCA STUDY

The Life Cycle Assessment (LCA) was conducted according to UNI EN ISO 14040:2021 UNI EN ISO 14044:2021 standards, while the environmental product declaration (EPD) is in accordance with UNI EN ISO 14025:2010 and UNI EN 15804:2012+A1:2013/A2:2019.

### FUNCTIONAL UNIT (F.U.)

1 ton of monogenic dolomitic breccia (Ceppo di Grè) cladding for walls and floors, filled and trimmed, with different surface finishes (honing, bush-hammering, micro-bush-hammering and sanblasting) and three different cut to size in thicknesses of 2 and 3 cm. Produced at the Fiorenzuola (FI) plant and disposed of at the end of its 60 years useful life.



### SYSTEM BOUNDARIES

MODULE	PRODUCTION STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE						END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES	
	RAW MATERIAL SUPPLY	TRANSPORT	MANUFACTURING	TRANSPORT FROM THE GATE TO THE SITE	ASSEMBLY	USE	MAINTENANCE	REPAIR	REPLACEMENT	REFURBISHMENT	OPERATIONAL ENERGY USE	OPERATIONAL WATER USE	DE-CONSTRUCTION/DEMOLITION	TRANSPORT	WASTE PROCESSING		DISPOSAL
DECLARED MODULE	✓	✓	✓	MND	MND	MND	MND	MND	MND	MND	MND	MND	✓	✓	✓	✓	✓

MND = Module not declared



**DATA  
QUALITY**

Where possible, production process-specific data collected at the Firenzuola (FI) plant and/or at cultivation sites were used in the study. In the absence of primary data, generic data from the Ecoinvent v3.8 databases were used.

**YEAR  
OF STUDY**

The data used in the study refer to the year 2022. The evaluation was conducted in the year 2023.

**CUT-OFF  
CRITERIA**

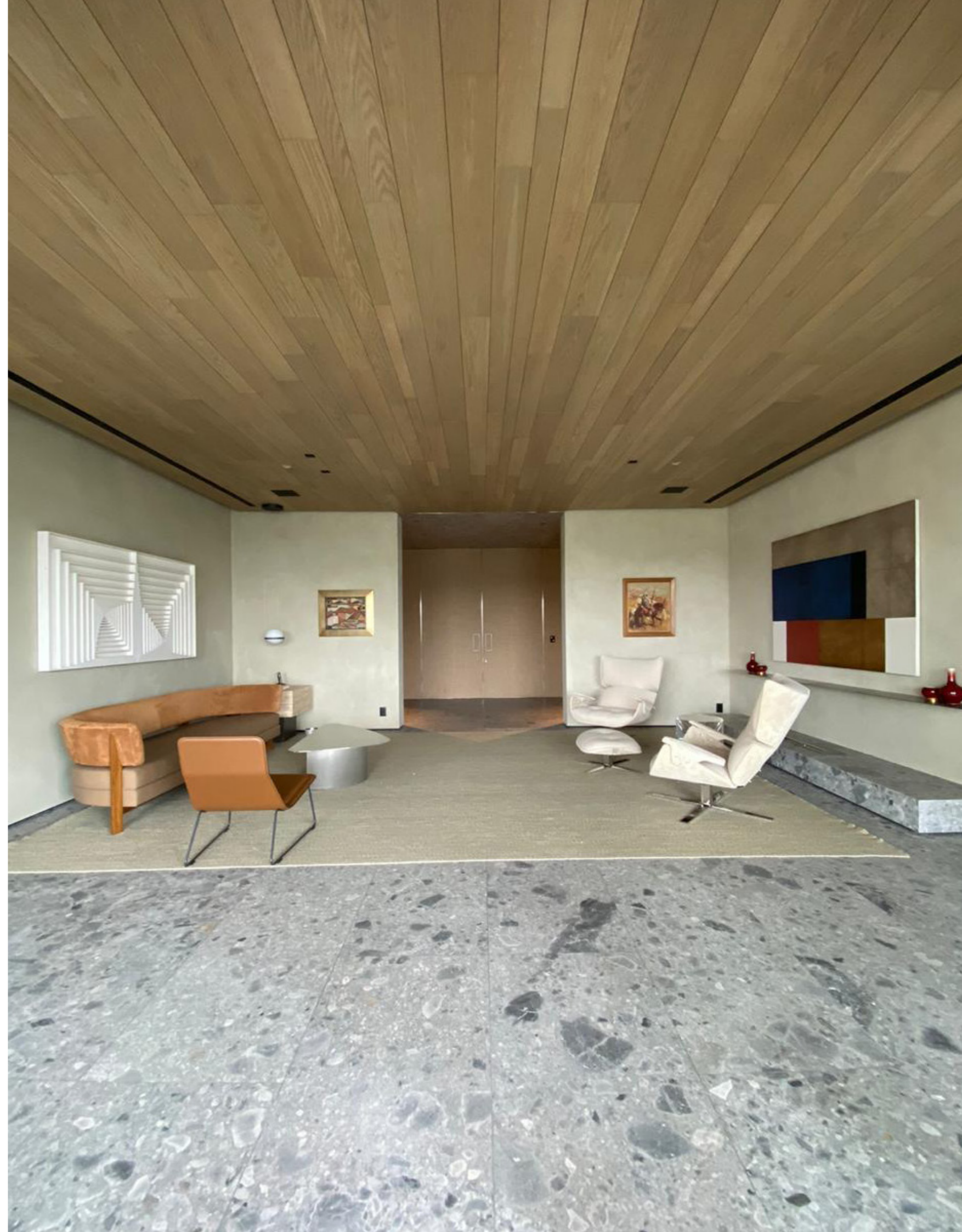
The study analysed all process inputs and outputs included in the system boundary outlined in Figure 1, excluding only those processes, input and/or output streams less than 1% of the total mass. However, personnel-related activities, energy and water consumption related to business management and sales activities are not included in the study.

**ALLOCATION**

In accordance with UNI EN 15804:2012+A2:2019, the allocation rules used are specific to each material, and the criterion used is that identified as most relevant to the type of processing performed.

The allocation criteria used were:

- Allocation by processed area (surface processing, cut to size);
- Allocation by mass (extraction and sawing of blocks, transportation, internal handling, packaging, recycling and disposal).





# LCA: SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION

**A1**  
 - EXTRACTION  
 - BLOCK SAWING  
 - INTERNAL TRANSPORT  
 - GROUTING

The Production cycle of Module A1 consists in the extraction of material from the underground quarry by chain-sawing machine, and the subsequent sawing of the blocks (dim. 3x1.5x1.8 m) into slabs of different thicknesses. These are subsequently transported and cut at the neighbouring plant (approx. 0.85 km away). The process ends with the filling of the slabs. Handling and internal transport of the blocks are done by heavy-duty trucks, Euro 3 category with a maximum load capacity exceeding 20 tons, and 100% utilization capacity

**A2**  
 - TRANSPORT TO THE PLANT

The transport of the slabs from the quarry to the Casone Group s.r.l. processing (213 km) and finishing plant is carried out by newly manufactured heavy-duty vehicles, Euro 5 category, with maximum capacity exceeding 20 tons, 80% utilization capacity

**A3**  
 - SURFACE MACHINING  
 - CUTTING  
 - PACKAGING

Slab processing and finishing activities carried out at Casone Group's production site are divided into 3 main stages:

- Surface processing (which consists of bush-hammering, micro-bush-hammering, micro-sandblasting and honing);
- Trimming and cutting to size;
- Packaging of the finished product in pallets or crates of wood

**C1**  
 - DEMOLITION

The End of Life cycle of the C1 module covers the process when materials have exceeded the reference useful life of 50 years. The lithic product finds application in different solutions (such as flooring on a bed of mortar, dry use as a ventilated wall, etc.) and, depending on the type of installation, can be demolished in different ways. In this scenario, it was assumed that to demolish 1 sq m of cladding laid on mortar, requires a demolition hammer with 2 kW power for a time frame of use from 1 to 3 minutes, varying according to function of the thickness (Table 4)

Table 4. Scenario assumed in the evaluation of the C1 module

Thickness (m)	Weight per square meter (t)	Usage Time (min)	Consumption (kWh)
0,02	0,048	1	0,694
0,03	0,072	1,5	0,694

**C2**  
 - WASTE TRANSPORT

Module C2 examines the transport of the demolished coating in C1 to a recycling (70% F.U.) or disposal (30% F.U.) process, assuming a total round trip distance of 100 km. The transport vehicle assumed in the analysis is a heavy-duty vehicle, Euro 5 category, with a maximum load capacity of 32 tons and 80% utilization capacity

**C3**  
 - RECYCLING

The post-demolition lining recycling scenario was only planned for 70% of the total mass (0.7 tons) and involves storing the demolished product and then crushing it into inert material

**C4**  
 - DISPOSAL

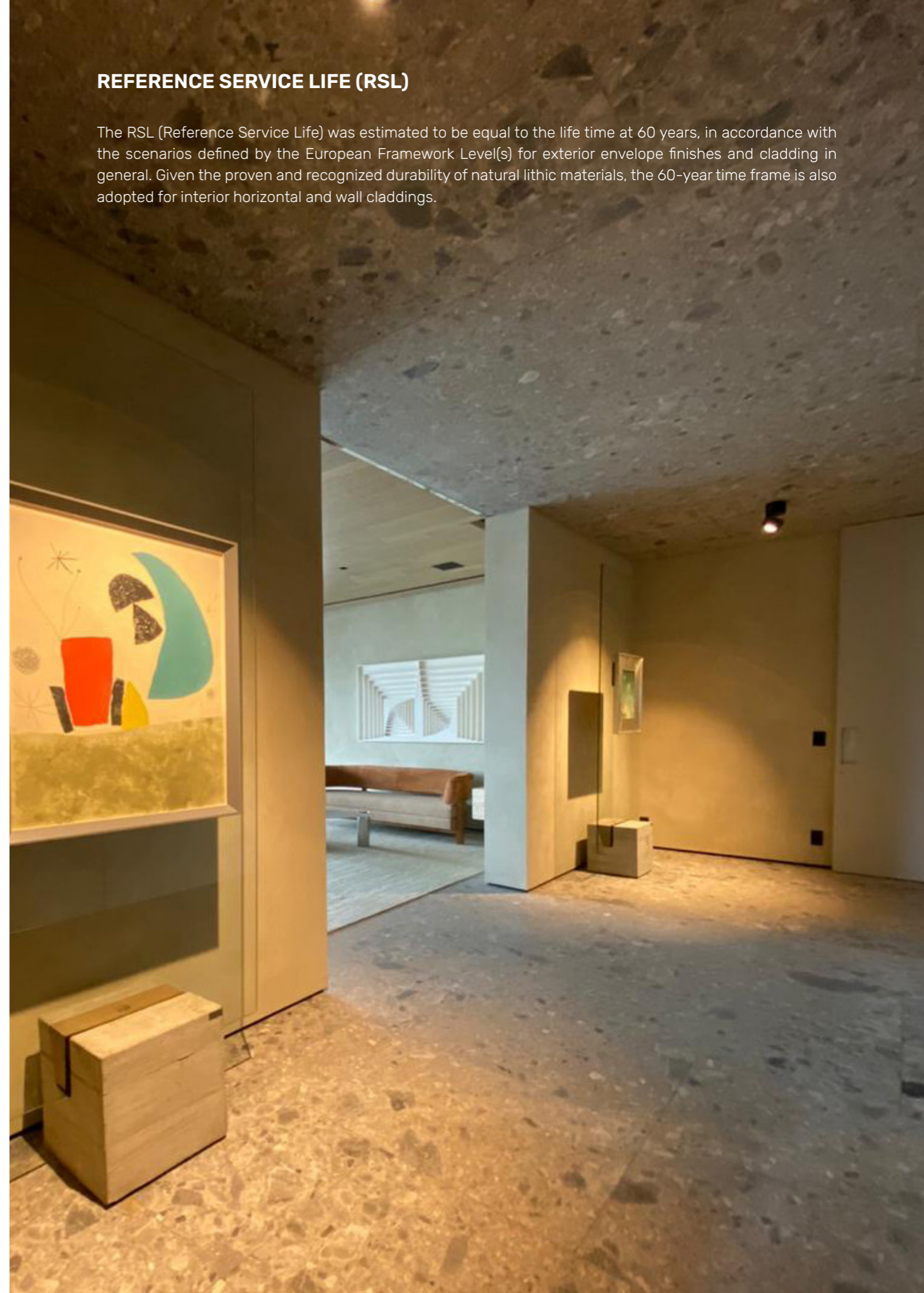
Landfill disposal was assumed for the remaining 30% of the coating

**D**  
 - REUSE RECOVERY  
 RECYCLING POTENTIAL

In accordance with the assumptions adopted in C3, module D, estimates an environmental benefit related to the unrequired production of 0.7 ton of virgin aggregates, referring only to the recycling of lithic slabs (excluding packaging)

## REFERENCE SERVICE LIFE (RSL)

The RSL (Reference Service Life) was estimated to be equal to the life time at 60 years, in accordance with the scenarios defined by the European Framework Level(s) for exterior envelope finishes and cladding in general. Given the proven and recognized durability of natural lithic materials, the 60-year time frame is also adopted for interior horizontal and wall claddings.



## LCA RESULTS

Indicators of environmental impact, resource consumption and waste flow, related to the dolomitic monogenic breccia cladding, commercially called Ceppo di Grè, are given in the following tables and refer to 1 ton of finished product (thicknesses 2 and 3 cm) and various surface finishes.

**LEV**= Slab filled, honed and cut to size

**BOC**= Slab filled, bush-hammered and cut to size

**MBC**= Slab filled, microbush-hammered and cut to size

**MSB**= Slab filled, micro-sandblasted and cut to size



THICKNESS 2CM

### 1 TON CLADDING SLAB FILLED, HONING AND CUT TO SIZE IN THICKNESS 2 CM

#### ENVIRONMENTAL IMPACTS

INDICATORS	U. M.	A1	A2	A3 LEV	C1	C2	C3	C4	D
GWP total	kg CO <sub>2</sub> eq	3.02E+01	3.55E+01	6.36E+01	3.98E-01	8.15E+00	6.32E+00	1.58E+00	-8.15E+00
GWP fossil	kg CO <sub>2</sub> eq	2.98E+01	3.55E+01	8.22E+01	3.89E-01	8.14E+00	6.29E+00	1.58E+00	-8.09E+00
GWP biogenic	kg CO <sub>2</sub> eq	4.35E-01	3.03E-02	-1.87E+01	9.39E-03	7.03E-03	1.36E-02	1.57E-03	-2.16E-02
GWP luluc	kg CO <sub>2</sub> eq	6.26E-03	1.39E-02	3.2E-02	3.48E-05	3.26E-03	1.32E-02	1.49E-03	-2.85E-02
ODP	kg CFC 11 eq	4.42E-06	8.22E-06	1.19E-05	5.96E-08	1.89E-06	1.77E-06	6.39E-07	-1.30E-06
AP	mol H <sup>+</sup> eq	1.62E-01	1.44E-01	3.62E-01	1.49E-03	2.31E-02	5.54E-02	1.49E-02	-5.93E-02
EP freshwater	kg P eq	3.09E-03	2.29E-03	1.23E-02	6.17E-05	5.34E-04	6.55E-04	1.45E-04	-1.47E-03
EP marine	kg N eq	5.39E-02	4.34E-02	8.40E-02	2.42E-04	4.70E-03	2.12E-02	5.16E-03	-1.84E-02
EP terrestrial	mol N eq	5.90E-01	4.74E-01	9.12E-01	2.63E-03	5.12E-02	2.31E-01	5.65E-02	-2.02E-01
POCP	kg NMV OC eq	1.67E-01	1.45E-01	2.94E-01	7.85E-04	1.97E-02	6.53E-02	1.65E-02	-5.75E-02
ADPM*	kg Sb eq	5.11E-05	1.23E-04	1.59E-04	2.34E-06	2.89E-05	1.30E-05	3.60E-06	-5.56E-05
ADPE*	MJ	3.74E+02	5.37E+02	1.33E+03	5.86E+00	1.23E+02	1.26E+02	4.41E+01	-1.11E+02
WDP*	m <sup>3</sup> depriv.	4.33E+01	1.61E+00	8.89E+01	1.20E-01	3.76E-01	3.44E+00	1.99E+00	-4.25E+01

#### ADDITIONAL ENVIRONMENTAL IMPACTS

INDICATORS	U. M.	A1	A2	A3 LEV	C1	C2	C3	C4	D
PM	Disease inc.	2.76E-06	3.07E-06	3.50E-06	5.63E-09	6.56E-07	4.86E-06	2.99E-07	-9.15E-07
IRP**	kBq U235 eq.	2.10E+00	2.76E+00	7.33E+00	3.67E-02	6.36E-01	6.66E-01	1.96E-01	-6.51E-01
ETP-fw	CTUe	3.51E+02	4.19E+02	6.79E+02	3.37E+00	9.69E+01	8.50E+01	2.79E+01	-1.27E+02
HTP-c	CTUh	5.03E-08	1.36E-08	4.47E-08	1.14E-10	3.12E-09	2.82E-09	7.07E-10	-6.55E-09
HTP-nc	CTUh	1.59E-06	4.40E-07	4.42E-07	2.56E-09	9.79E-08	6.62E-08	1.83E-08	-1.28E-07
SQP	Pt	1.84E+02	3.69E+02	1.92E+03	7.95E-01	8.60E+01	1.75E+02	9.26E+01	-1.02E+02



# LCA RESULTS



## RESOURCES USE

INDICATORS	U. M.	A1	A2	A3 LEV	C1	C2	C3	C4	D
PERE	MJ	8.27E+00	7.57E+00	4.30E+01	3.02E-01	1.76E+00	2.00E+00	3.76E-01	-4.16E+00
PERM	MJ	0.00E+00	0.00E+00	3.19E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	8.27E+00	7.57E+00	3.62E+02	3.02E-01	1.76E+00	2.00E+00	3.76E-01	-4.16E+00
PENRE	MJ	4.02E+02	5.7E+02	1.32E+03	6.35E+00	1.31E+02	1.34E+02	4.69E+01	-1.18E+02
PENRM	MJ	4.02E+02	5.70E+02	1.32E+03	6.35E+00	1.31E+02	1.34E+02	4.69E+01	-1.18E+02
PERNRT	MJ	4.02E+02	5.70E+02	1.44E+03	6.35E+00	1.31E+02	1.34E+02	4.69E+01	-1.18E+02
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
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
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
FW	m <sup>3</sup>	9.00E-01	1.84E-03	1.06E-03	2.65E+00	2.15E-02	3.25E-02	4.54E-01	-6.55E-02

## OUTPUT

INDICATORS	U. M.	A1	A2	A3 LEV	C1	C2	C3	C4	D
HWD	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
NHWD	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
RWD	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
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
MFR	kg	0.00E+00	0.00E+00	2.00E+03	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	0.00E+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
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







### 1 TON CLADDING SLAB FILLED, BUSH-HAMMERED AND CUT TO SIZE IN THICKNESS 2 CM

#### ENVIRONMENTAL IMPACTS

INDICATORS	U. M.	A1	A2	A3 BOC	C1	C2	C3	C4	D
GWP total	kg CO <sub>2</sub> eq	3.02E+01	3.55E+01	5.39E+01	3.98E-01	8.15E+00	6.32E+00	1.58E+00	-8.15E+00
GWP fossil	kg CO <sub>2</sub> eq	2.98E+01	3.55E+01	7.27E+01	3.89E-01	8.14E+00	6.29E+00	1.58E+00	-8.09E+00
GWP biogenic	kg CO <sub>2</sub> eq	4.35E-01	3.03E-02	-1.89E+01	9.39E-03	7.03E-03	1.36E-02	1.57E-03	-2.16E-02
GWP luluc	kg CO <sub>2</sub> eq	6.26E-03	1.39E-02	3.13E-02	3.48E-05	3.26E-03	1.32E-02	1.49E-03	-2.85E-02
ODP	kg CFC 11 eq	4.42E-06	8.22E-06	1.04E-05	5.96E-08	1.89E-06	1.77E-06	6.39E-07	-1.30E-06
AP	mol H <sup>+</sup> eq	1.62E-01	1.44E-01	3.27E-01	1.49E-03	2.31E-02	5.54E-02	1.49E-02	-5.93E-02
EP freshwater	kg P eq	3.09E-03	2.29E-03	1.09E-02	6.17E-05	5.34E-04	6.55E-04	1.45E-04	-1.47E-03
EP marine	kg N eq	5.39E-02	4.34E-02	7.82E-02	2.42E-04	4.70E-03	2.12E-02	5.16E-03	-1.84E-02
EP terrestrial	mol N eq	5.90E-01	4.74E-01	8.49E-01	2.63E-03	5.12E-02	2.31E-01	5.65E-02	-2.02E-01
POCP	kg NMV OC eq	1.67E-01	1.45E-01	2.69E-01	7.85E-04	1.97E-02	6.53E-02	1.65E-02	-5.75E-02
ADPM*	kg Sb eq	5.11E-05	1.23E-04	1.45E-04	2.34E-06	2.89E-05	1.30E-05	3.60E-06	-5.56E-05
ADPE*	MJ	3.74E+02	5.37E+02	1.19E+03	5.86E+00	1.23E+02	1.26E+02	4.41E+01	-1.11E+02
WDP*	m <sup>3</sup> depriv.	4.33E+01	1.61E+00	7.82E+01	1.20E-01	3.76E-01	3.44E+00	1.99E+00	-4.25E+01

#### ADDITIONAL ENVIRONMENTAL IMPACTS

INDICATORS	U. M.	A1	A2	A3 BOC	C1	C2	C3	C4	D
PM	Disease inc.	2.76E-06	3.07E-06	3.38E-06	5.63E-09	6.56E-07	4.86E-06	2.99E-07	-9.15E-07
IRP**	kBq U235 eq.	2.10E+00	2.76E+00	6.44E+00	3.67E-02	6.36E-01	6.66E-01	1.96E-01	-6.51E-01
ETP-fw	CTUe	3.51E+02	4.19E+02	6.12E+02	3.37E+00	9.69E+01	8.50E+01	2.79E+01	-1.27E+02
HTP-c	CTUh	5.03E-08	1.36E-08	4.28E-08	1.14E-10	3.12E-09	2.82E-09	7.07E-10	-6.55E-09
HTP-nc	CTUh	1.59E-06	4.40E-07	4.04E-07	2.56E-09	9.79E-08	6.62E-08	1.83E-08	-1.28E-07
SQP	Pt	1.84E+02	3.69E+02	1.91E+03	7.95E-01	8.60E+01	1.75E+02	9.26E+01	-1.02E+02





THICKNESS 2CM

## RESOURCES USE

INDICATORS	U. M.	A1	A2	A3 BOC	C1	C2	C3	C4	D
PERE	MJ	8.27E+00	7.57E+00	4.00E+01	3.02E-01	1.76E+00	2.00E+00	3.76E-01	-4.16E+00
PERM	MJ	0.00E+00	0.00E+00	3.19E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	8.27E+00	7.57E+00	3.59E+02	3.02E-01	1.76E+00	2.00E+00	3.76E-01	-4.16E+00
PENRE	MJ	4.02E+02	5.7E+02	1.16E+03	6.35E+00	1.31E+02	1.34E+02	4.69E+01	-1.18E+02
PENRM	MJ	4.02E+02	5.70E+02	1.16E+03	6.35E+00	1.31E+02	1.34E+02	4.69E+01	-1.18E+02
PERNRT	MJ	4.02E+02	5.70E+02	1.28E+03	6.35E+00	1.31E+02	1.34E+02	4.69E+01	-1.18E+02
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
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
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
FW	m <sup>3</sup>	9.00E-01	1.84E-03	1.10E-03	2.65E+00	2.15E-02	3.25E-02	4.54E-01	-6.55E-02

## OUTPUT

INDICATORS	U. M.	A1	A2	A3 BOC	C1	C2	C3	C4	D
HWD	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
NHWD	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
RWD	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
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
MFR	kg	0.00E+00	0.00E+00	2.00E+03	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	0.00E+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
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



## LCA RESULTS



THICKNESS 2CM

**1 TON CLADDING SLAB FILLED, MICRO-BUSH-HAMMERED AND CUT TO SIZE IN THICKNESS 2 CM**

## ENVIRONMENTAL IMPACTS

INDICATORS	U. M.	A1	A2	A3 MBC	C1	C2	C3	C4	D
GWP total	kg CO <sub>2</sub> eq	3.02E+01	3.55E+01	3.37E+01	3.98E-01	8.15E+00	6.32E+00	1.58E+00	-8.15E+00
GWP fossil	kg CO <sub>2</sub> eq	2.98E+01	3.55E+01	5.31E+01	3.89E-01	8.14E+00	6.29E+00	1.58E+00	-8.09E+00
GWP biogenic	kg CO <sub>2</sub> eq	4.35E-01	3.03E-02	-1.94E+01	9.39E-03	7.03E-03	1.36E-02	1.57E-03	-2.16E-02
GWP luluc	kg CO <sub>2</sub> eq	6.26E-03	1.39E-02	2.99E-02	3.48E-05	3.26E-03	1.32E-02	1.49E-03	-2.85E-02
ODP	kg CFC 11 eq	4.42E-06	8.22E-06	7.42E-06	5.96E-08	1.89E-06	1.77E-06	6.39E-07	-1.30E-06
AP	mol H <sup>+</sup> eq	1.62E-01	1.44E-01	2.55E-01	1.49E-03	2.31E-02	5.54E-02	1.49E-02	-5.93E-02
EP freshwater	kg P eq	3.09E-03	2.29E-03	8.11E-03	6.17E-05	5.34E-04	6.55E-04	1.45E-04	-1.47E-03
EP marine	kg N eq	5.39E-02	4.34E-02	6.62E-02	2.42E-04	4.70E-03	2.12E-02	5.16E-03	-1.84E-02
EP terrestrial	mol N eq	5.90E-01	4.74E-01	7.19E-01	2.63E-03	5.12E-02	2.31E-01	5.65E-02	-2.02E-01
POCP	kg NMV OC eq	1.67E-01	1.45E-01	2.30E-01	7.85E-04	1.97E-02	6.53E-02	1.65E-02	-5.75E-02
ADPM*	kg Sb eq	5.11E-05	1.23E-04	1.17E-04	2.34E-06	2.89E-05	1.30E-05	3.60E-06	-5.56E-05
ADPE*	MJ	3.74E+02	5.37E+02	8.92E+02	5.86E+00	1.23E+02	1.26E+02	4.41E+01	-1.11E+02
WDP*	m <sup>3</sup> depriv.	4.33E+01	1.61E+00	7.10E+01	1.20E-01	3.76E-01	3.44E+00	1.99E+00	-4.25E+01

## ADDITIONAL ENVIRONMENTAL IMPACTS

INDICATORS	U. M.	A1	A2	A3 MBC	C1	C2	C3	C4	D
PM	Disease inc.	2.76E-06	3.07E-06	3.12E-06	5.63E-09	6.56E-07	4.86E-06	2.99E-07	-9.15E-07
IRP**	kBq U235 eq.	2.10E+00	2.76E+00	4.58E+00	3.67E-02	6.36E-01	6.66E-01	1.96E-01	-6.51E-01
ETP-fw	CTUe	3.51E+02	4.19E+02	4.74E+02	3.37E+00	9.69E+01	8.50E+01	2.79E+01	-1.27E+02
HTP-c	CTUh	5.03E-08	1.36E-08	3.89E-08	1.14E-10	3.12E-09	2.82E-09	7.07E-10	-6.55E-09
HTP-nc	CTUh	1.59E-06	4.40E-07	3.26E-07	2.56E-09	9.79E-08	6.62E-08	1.83E-08	-1.28E-07
SQP	Pt	1.84E+02	3.69E+02	1.88E+03	7.95E-01	8.60E+01	1.75E+02	9.26E+01	-1.02E+02





THICKNESS 2CM

RESOURCES USE

INDICATORS	U. M.	A1	A2	A3 MBC	C1	C2	C3	C4	D
PERE	MJ	8.27E+00	7.57E+00	3.2E+01	3.02E-01	1.76E+00	2.00E+00	3.76E-01	-4.16E+00
PERM	MJ	0.00E+00	0.00E+00	3.19E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	8.27E+00	7.57E+00	3.51E+02	3.02E-01	1.76E+00	2.00E+00	3.76E-01	-4.16E+00
PENRE	MJ	4.02E+02	5.7E+02	8.43E+02	6.35E+00	1.31E+02	1.34E+02	4.69E+01	-1.18E+02
PENRM	MJ	4.02E+02	5.70E+02	8.43E+02	6.35E+00	1.31E+02	1.34E+02	4.69E+01	-1.18E+02
PERNRT	MJ	4.02E+02	5.70E+02	9.62E+02	6.35E+00	1.31E+02	1.34E+02	4.69E+01	-1.18E+02
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
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
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
FW	m <sup>3</sup>	9.00E-01	1.84E-03	9.52E-02	2.65E+00	2.15E-02	3.25E-02	4.54E-01	-6.55E-02

OUTPUT

INDICATORS	U. M.	A1	A2	A3 MBC	C1	C2	C3	C4	D
HWD	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
NHWD	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
RWD	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
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
MFR	kg	0.00E+00	0.00E+00	2.00E+03	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	0.00E+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
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





THICKNESS 2CM

### 1 TON CLADDING SLAB FILLED, MICRO-SANDBLASTED AND CUT TO SIZE IN THICKNESS 2 CM

#### ENVIRONMENTAL IMPACTS

INDICATORS	U. M.	A1	A2	A3 MSB	C1	C2	C3	C4	D
GWP total	kg CO <sub>2</sub> eq	3.02E+01	3.55E+01	3.62E+01	3.98E-01	8.15E+00	6.32E+00	1.58E+00	-8.15E+00
GWP fossil	kg CO <sub>2</sub> eq	2.98E+01	3.55E+01	5.55E+01	3.89E-01	8.14E+00	6.29E+00	1.58E+00	-8.09E+00
GWP biogenic	kg CO <sub>2</sub> eq	4.35E-01	3.03E-02	-1.93E+01	9.39E-03	7.03E-03	1.36E-02	1.57E-03	-2.16E-02
GWP luluc	kg CO <sub>2</sub> eq	6.26E-03	1.39E-02	3.01E-02	3.48E-05	3.26E-03	1.32E-02	1.49E-03	-2.85E-02
ODP	kg CFC 11 eq	4.42E-06	8.22E-06	7.80E-06	5.96E-08	1.89E-06	1.77E-06	6.39E-07	-1.30E-06
AP	mol H <sup>+</sup> eq	1.62E-01	1.44E-01	2.64E-01	1.49E-03	2.31E-02	5.54E-02	1.49E-02	-5.93E-02
EP freshwater	kg P eq	3.09E-03	2.29E-03	8.46E-03	6.17E-05	5.34E-04	6.55E-04	1.45E-04	-1.47E-03
EP marine	kg N eq	5.39E-02	4.34E-02	6.77E-02	2.42E-04	4.70E-03	2.12E-02	5.16E-03	-1.84E-02
EP terrestrial	mol N eq	5.90E-01	4.74E-01	7.35E-01	2.63E-03	5.12E-02	2.31E-01	5.65E-02	-2.02E-01
POCP	kg NMV OC eq	1.67E-01	1.45E-01	2.35E-01	7.85E-04	1.97E-02	6.53E-02	1.65E-02	-5.75E-02
ADPM*	kg Sb eq	5.11E-05	1.23E-04	1.20E-04	2.34E-06	2.89E-05	1.30E-05	3.60E-06	-5.56E-05
ADPE*	MJ	3.74E+02	5.37E+02	9.29E+02	5.86E+00	1.23E+02	1.26E+02	4.41E+01	-1.11E+02
WDP*	m <sup>3</sup> depriv.	4.33E+01	1.61E+00	7.19E+01	1.20E-01	3.76E-01	3.44E+00	1.99E+00	-4.25E+01

#### ADDITIONAL ENVIRONMENTAL IMPACTS

INDICATORS	U. M.	A1	A2	A3 MSB	C1	C2	C3	C4	D
PM	Disease inc.	2.76E-06	3.07E-06	3.15E-06	5.63E-09	6.56E-07	4.86E-06	2.99E-07	-9.15E-07
IRP**	kBq U235 eq.	2.10E+00	2.76E+00	4.81E+00	3.67E-02	6.36E-01	6.66E-01	1.96E-01	-6.51E-01
ETP-fw	CTUe	3.51E+02	4.19E+02	4.91E+02	3.37E+00	9.69E+01	8.50E+01	2.79E+01	-1.27E+02
HTP-c	CTUh	5.03E-08	1.36E-08	3.93E-08	1.14E-10	3.12E-09	2.82E-09	7.07E-10	-6.55E-09
HTP-nc	CTUh	1.59E-06	4.40E-07	3.36E-07	2.56E-09	9.79E-08	6.62E-08	1.83E-08	-1.28E-07
SQP	Pt	1.84E+02	3.69E+02	1.89E+03	7.95E-01	8.60E+01	1.75E+02	9.26E+01	-1.02E+02



RESOURCES USE

INDICATORS	U. M.	A1	A2	A3 MSB	C1	C2	C3	C4	D
PERE	MJ	8.27E+00	7.57E+00	3.32E+01	3.02E-01	1.76E+00	2.00E+00	3.76E-01	-4.16E+00
PERM	MJ	0.00E+00	0.00E+00	3.19E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	8.27E+00	7.57E+00	3.52E+02	3.02E-01	1.76E+00	2.00E+00	3.76E-01	-4.16E+00
PENRE	MJ	4.02E+02	5.7E+02	8.81E+02	6.35E+00	1.31E+02	1.34E+02	4.69E+01	-1.18E+02
PENRM	MJ	4.02E+02	5.70E+02	8.81E+02	6.35E+00	1.31E+02	1.34E+02	4.69E+01	-1.18E+02
PERNRT	MJ	4.02E+02	5.70E+02	1.00E+03	6.35E+00	1.31E+02	1.34E+02	4.69E+01	-1.18E+02
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
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
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
FW	m <sup>3</sup>	9.00E-01	1.84E-03	9.65E-02	2.65E+00	2.15E-02	3.25E-02	4.54E-01	-6.55E-02

OUTPUT

INDICATORS	U. M.	A1	A2	A3 MSB	C1	C2	C3	C4	D
HWD	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
NHWD	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
RWD	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
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
MFR	kg	0.00E+00	0.00E+00	2.00E+03	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	0.00E+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
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





THICKNESS 3CM

### 1 TON CLADDING SLAB FILLED, HONING AND CUT TO SIZE IN THICKNESS 3 CM

#### ENVIRONMENTAL IMPACTS

INDICATORS	U. M.	A1	A2	A3 LEV	C1	C2	C3	C4	D
GWP total	kg CO <sub>2</sub> eq	3.02E+01	3.55E+01	4.42E+01	3.98E-01	8.15E+00	6.32E+00	1.58E+00	-8.15E+00
GWP fossil	kg CO <sub>2</sub> eq	2.98E+01	3.55E+01	5.48E+01	3.89E-01	8.14E+00	6.29E+00	1.58E+00	-8.09E+00
GWP biogenic	kg CO <sub>2</sub> eq	4.35E-01	3.03E-02	-1.25E+01	9.39E-03	7.03E-03	1.36E-02	1.57E-03	-2.16E-02
GWP luluc	kg CO <sub>2</sub> eq	6.26E-03	1.39E-02	2.13E-02	3.48E-05	3.26E-03	1.32E-02	1.49E-03	-2.85E-2
ODP	kg CFC 11 eq	4.42E-06	8.22E-06	7.94E-06	5.96E-08	1.89E-06	1.77E-06	6.39E-07	-1.30E-06
AP	mol H <sup>+</sup> eq	1.62E-01	1.44E-01	2.41E-01	1.49E-03	2.31E-02	5.54E-02	1.49E-02	-5.93E-02
EP freshwater	kg P eq	3.09E-03	2.29E-03	8.18E-03	6.17E-05	5.34E-04	6.55E-04	1.45E-04	-1.47E-03
EP marine	kg N eq	5.39E-02	4.34E-02	5.61E-02	2.42E-04	4.70E-03	2.12E-02	5.16E-03	-1.84E-02
EP terrestrial	mol N eq	5.90E-01	4.74E-01	6.08E-01	2.63E-03	5.12E-02	2.31E-01	5.65E-02	-2.02E-01
POCP	kg NMV OC eq	1.67E-01	1.45E-01	1.92E-01	7.85E-04	1.97E-02	6.53E-02	1.65E-02	-5.75E-02
ADPM*	kg Sb eq	5.11E-05	1.23E-04	1.06E-04	2.34E-06	2.89E-05	1.30E-05	3.60E-06	-5.56E-05
ADPE*	MJ	3.74E+02	5.37E+02	8.88E+02	5.86E+00	1.23E+02	1.26E+02	4.41E+01	-1.11E+02
WDP*	m <sup>3</sup> depriv.	4.33E+01	1.61E+00	5.93E+01	1.20E+01	3.76E+01	3.44E+00	1.99E+00	-4.25E+01

#### ADDITIONAL ENVIRONMENTAL IMPACTS

INDICATORS	U. M.	A1	A2	A3 LEV	C1	C2	C3	C4	D
PM	Disease inc.	2.76E-06	3.07E-06	2.34E-06	5.63E-09	6.56E-07	4.86E-06	2.99E-07	-9.15E-07
IRP**	kBq U235 eq.	2.10E+00	2.76E+00	5.14E+00	3.67E-02	6.36E-01	6.66E-01	1.96E-01	-6.51E-01
ETP-fw	CTUe	3.51E+02	4.19E+02	4.57E+02	3.37E+00	9.69E+01	8.50E+01	2.79E+01	-1.27E+02
HTP-c	CTUh	5.03E-08	1.36E-08	2.89E-08	1.14E-10	3.12E-09	2.82E-09	7.07E-10	-6.55E-09
HTP-nc	CTUh	1.59E-06	4.40E-07	3.04E-07	2.56E-09	9.79E-08	6.62E-08	1.83E-08	-1.28E-07
SQP	Pt	1.84E+02	3.69E+02	1.30E+03	7.95E-01	8.60E+01	1.75E+02	9.26E+01	-1.02E+02



THICKNESS 3CM

## RESOURCES USE

INDICATORS	U. M.	A1	A2	A3 LEV	C1	C2	C3	C4	D
PERE	MJ	8.27E+00	7.57E+00	-7.70E+01	3.02E-01	1.76E+00	2.00E+00	3.76E-01	-4.16E+00
PERM	MJ	0.00E+00	0.00E+00	3.19E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	8.27E+00	7.57E+00	2.42E+02	3.02E-01	1.76E+00	2.00E+00	3.76E-01	-4.16E+00
PENRE	MJ	4.02E+02	5.70E+02	8.41E+02	6.35E+00	1.31E+02	1.34E+02	4.69E+01	-1.18E+02
PENRM	MJ	0.00E+00	0.00E+00	1.19E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERNRT	MJ	4.02E+02	5.70E+02	9.60E+02	6.35E+00	1.31E+02	1.34E+02	4.69E+01	-1.18E+02
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
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
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
FW	m <sup>3</sup>	9.00E-01	1.84E-03	1.56E-03	2.65E+00	2.15E-02	3.25E-02	4.54E-01	-6.55E-02

## OUTPUT

INDICATORS	U. M.	A1	A2	A3 LEV	C1	C2	C3	C4	D
HWD	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
NHWD	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
RWD	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
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
MFR	kg	0.00E+00	0.00E+00	2.00E+03	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	0.00E+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
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





THICKNESS 3CM

### 1 TON CLADDING SLAB FILLED, BUSH-HAMMERED AND CUT TO SIZE IN THICKNESS 3 CM

#### ENVIRONMENTAL IMPACTS

INDICATORS	U. M.	A1	A2	A3 BOC	C1	C2	C3	C4	D
GWP total	kg CO <sub>2</sub> eq	3.02E+01	3.55E+01	3.59E+01	3.98E-01	8.15E+00	6.32E+00	1.58E+00	-8.15E+00
GWP fossil	kg CO <sub>2</sub> eq	2.98E+01	3.55E+01	4.85E+01	3.89E-01	8.14E+00	6.29E+00	1.58E+00	-8.09E+00
GWP biogenic	kg CO <sub>2</sub> eq	4.35E-01	3.03E-02	-1.26E+01	9.39E-03	7.03E-03	1.36E-02	1.57E-03	-2.16E-02
GWP luluc	kg CO <sub>2</sub> eq	6.26E-03	1.39E-02	2.09E-02	3.48E-05	3.26E-03	1.32E-02	1.49E-03	-2.85E-2
ODP	kg CFC 11 eq	4.42E-06	8.22E-06	6.97E-06	5.96E-08	1.89E-06	1.77E-06	6.39E-07	-1.30E-06
AP	mol H <sup>+</sup> eq	1.62E-01	1.44E-01	2.18E-01	1.49E-03	2.31E-02	5.54E-02	1.49E-02	-5.93E-02
EP freshwater	kg P eq	3.09E-03	2.29E-03	7.28E-03	6.17E-05	5.34E-04	6.55E-04	1.45E-04	-1.47E-03
EP marine	kg N eq	5.39E-02	4.34E-02	5.22E-02	2.42E-04	4.70E-03	2.12E-02	5.16E-03	-1.84E-02
EP terrestrial	mol N eq	5.90E-01	4.74E-01	5.66E-01	2.63E-03	5.12E-02	2.31E-01	5.65E-02	-2.02E-01
POCP	kg NMV OC eq	1.67E-01	1.45E-01	1.79E-01	7.85E-04	1.97E-02	6.53E-02	1.65E-02	-5.75E-02
ADPM*	kg Sb eq	5.11E-05	1.23E-04	9.68E-05	2.34E-06	2.89E-05	1.30E-05	3.60E-06	-5.56E-05
ADPE*	MJ	3.74E+02	5.37E+02	7.93E+02	5.86E+00	1.23E+02	1.26E+02	4.41E+01	-1.11E+02
WDP*	m <sup>3</sup> depriv.	4.33E+01	1.61E+00	5.22E+01	1.20E+01	3.76E+01	3.44E+00	1.99E+00	-4.25E+01

#### ADDITIONAL ENVIRONMENTAL IMPACTS

INDICATORS	U. M.	A1	A2	A3 BOC	C1	C2	C3	C4	D
PM	Disease inc.	2.76E-06	3.07E-06	2.27E-06	5.63E-09	6.56E-07	4.86E-06	2.99E-07	-9.15E-07
IRP**	kBq U235 eq.	2.10E+00	2.76E+00	4.39E+00	3.67E-02	6.36E-01	6.66E-01	1.96E-01	-6.51E-01
ETP-fw	CTUe	3.51E+02	4.19E+02	4.16E+02	3.37E+00	9.69E+01	8.50E+01	2.79E+01	-1.27E+02
HTP-c	CTUh	5.03E-08	1.36E-08	2.88E-08	1.14E-10	3.12E-09	2.82E-09	7.07E-10	-6.55E-09
HTP-nc	CTUh	1.59E-06	4.40E-07	2.74E-07	2.56E-09	9.79E-08	6.62E-08	1.83E-08	-1.28E-07
SQP	Pt	1.84E+02	3.69E+02	1.27E+03	7.95E-01	8.60E+01	1.75E+02	9.26E+01	-1.02E+02

# LCA RESULTS



THICKNESS 3CM

## RESOURCES USE

INDICATORS	U. M.	A1	A2	A3 BOC	C1	C2	C3	C4	D
PERE	MJ	8.27E+00	7.57E+00	-8.01E+01	3.02E-01	1.76E+00	2.00E+00	3.76E-01	-4.16E+00
PERM	MJ	0.00E+00	0.00E+00	3.19E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	8.27E+00	7.57E+00	2.39E+02	3.02E-01	1.76E+00	2.00E+00	3.76E-01	-4.16E+00
PENRE	MJ	4.02E+02	5.70E+02	7.37E+02	6.35E+00	1.31E+02	1.34E+02	4.69E+01	-1.18E+02
PENRM	MJ	0.00E+00	0.00E+00	1.19E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERNRT	MJ	4.02E+02	5.70E+02	8.56E+02	6.35E+00	1.31E+02	1.34E+02	4.69E+01	-1.18E+02
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
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
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
FW	m <sup>3</sup>	9.00E-01	1.84E-03	1.60E-03	2.65E+00	2.15E-02	3.25E-02	4.54E-01	-6.55E-02

## OUTPUT

INDICATORS	U. M.	A1	A2	A3 BOC	C1	C2	C3	C4	D
HWD	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
NHWD	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
RWD	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
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
MFR	kg	0.00E+00	0.00E+00	2.00E+03	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	0.00E+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
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





## LCA RESULTS



THICKNESS 3CM

**1 TON CLADDING SLAB FILLED, MICRO-BUSH-HAMMERED AND CUT TO SIZE IN THICKNESS 3 CM**

## ENVIRONMENTAL IMPACTS

INDICATORS	U. M.	A1	A2	A3 MBC	C1	C2	C3	C4	D
GWP total	kg CO <sub>2</sub> eq	3.02E+01	3.55E+01	2.25E+01	3.98E-01	8.15E+00	6.32E+00	1.58E+00	-8.15E+00
GWP fossil	kg CO <sub>2</sub> eq	2.98E+01	3.55E+01	3.54E+01	3.89E-01	8.14E+00	6.29E+00	1.58E+00	-8.09E+00
GWP biogenic	kg CO <sub>2</sub> eq	4.35E-01	3.03E-02	-1.29E+01	9.39E-03	7.03E-03	1.36E-02	1.57E-03	-2.16E-02
GWP luluc	kg CO <sub>2</sub> eq	6.26E-03	1.39E-02	1.99E-02	3.48E-05	3.26E-03	1.32E-02	1.49E-03	-2.85E-2
ODP	kg CFC 11 eq	4.42E-06	8.22E-06	4.95E-06	5.96E-08	1.89E-06	1.77E-06	6.39E-07	-1.30E-06
AP	mol H <sup>+</sup> eq	1.62E-01	1.44E-01	1.70E-01	1.49E-03	2.31E-02	5.54E-02	1.49E-02	-5.93E-02
EP freshwater	kg P eq	3.09E-03	2.29E-03	5.41E-03	6.17E-05	5.34E-04	6.55E-04	1.45E-04	-1.47E-03
EP marine	kg N eq	5.39E-02	4.34E-02	4.42E-02	2.42E-04	4.70E-03	2.12E-02	5.16E-03	-1.84E-02
EP terrestrial	mol N eq	5.90E-01	4.74E-01	4.79E-01	2.63E-03	5.12E-02	2.31E-01	5.65E-02	-2.02E-01
POCP	kg NMV OC eq	1.67E-01	1.45E-01	1.53E-01	7.85E-04	1.97E-02	6.53E-02	1.65E-02	-5.75E-02
ADPM*	kg Sb eq	5.11E-05	1.23E-04	7.80E-05	2.34E-06	2.89E-05	1.30E-05	3.60E-06	-5.56E-05
ADPE*	MJ	3.74E+02	5.37E+02	5.95E+02	5.86E+00	1.23E+02	1.26E+02	4.41E+01	-1.11E+02
WDP*	m <sup>3</sup> depriv.	4.33E+01	1.61E+00	4.74E+01	1.20E+01	3.76E+01	3.44E+00	1.99E+00	-4.25E+01

## ADDITIONAL ENVIRONMENTAL IMPACTS

INDICATORS	U. M.	A1	A2	A3 MBC	C1	C2	C3	C4	D
PM	Disease inc.	2.76E-06	3.07E-06	2.06E-06	5.63E-09	6.56E-07	4.86E-06	2.99E-07	-9.15E-07
IRP**	kBq U235 eq.	2.10E+00	2.76E+00	2.91E+00	3.67E-02	6.36E-01	6.66E-01	1.96E-01	-6.51E-01
ETP-fw	CTUe	3.51E+02	4.19E+02	3.07E+02	3.37E+00	9.69E+01	8.50E+01	2.79E+01	-1.27E+02
HTP-c	CTUh	5.03E-08	1.36E-08	2.65E-08	1.14E-10	3.12E-09	2.82E-09	7.07E-10	-6.55E-09
HTP-nc	CTUh	1.59E-06	4.40E-07	2.42E-07	2.56E-09	9.79E-08	6.62E-08	1.83E-08	-1.28E-07
SQP	Pt	1.84E+02	3.69E+02	1.25E+03	7.95E-01	8.60E+01	1.75E+02	9.26E+01	-1.02E+02



THICKNESS 3CM

## RESOURCES USE

INDICATORS	U. M.	A1	A2	A3 MBC	C1	C2	C3	C4	D
PERE	MJ	8.27E+00	7.57E+00	-8.52E+01	3.02E-01	1.76E+00	2.00E+00	3.76E-01	-4.16E+00
PERM	MJ	0.00E+00	0.00E+00	3.19E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	8.27E+00	7.57E+00	2.34E+02	3.02E-01	1.76E+00	2.00E+00	3.76E-01	-4.16E+00
PENRE	MJ	4.02E+02	5.70E+02	5.22E+02	6.35E+00	1.31E+02	1.34E+02	4.69E+01	-1.18E+02
PENRM	MJ	0.00E+00	0.00E+00	1.19E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERNRT	MJ	4.02E+02	5.70E+02	6.41E+02	6.35E+00	1.31E+02	1.34E+02	4.69E+01	-1.18E+02
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
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
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
FW	m <sup>3</sup>	9.00E-01	1.84E-03	1.02E-01	2.65E+00	2.15E-02	3.25E-02	4.54E-01	-6.55E-02

## OUTPUT

INDICATORS	U. M.	A1	A2	A3 MBC	C1	C2	C3	C4	D
HWD	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
NHWD	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
RWD	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
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
MFR	kg	0.00E+00	0.00E+00	2.00E+03	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	0.00E+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
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



## LCA RESULTS



THICKNESS 3CM

**1 TON CLADDING SLAB FILLED, MICRO-SANDBLASTED AND CUT TO SIZE IN THICKNESS 3 CM**

## ENVIRONMENTAL IMPACTS

INDICATORS	U. M.	A1	A2	A3 MSB	C1	C2	C3	C4	D
GWP total	kg CO <sub>2</sub> eq	3.02E+01	3.55E+01	2.42E+01	3.98E-01	8.15E+00	6.32E+00	1.58E+00	-8.15E+00
GWP fossil	kg CO <sub>2</sub> eq	2.98E+01	3.55E+01	3.70E+01	3.89E-01	8.14E+00	6.29E+00	1.58E+00	-8.09E+00
GWP biogenic	kg CO <sub>2</sub> eq	4.35E-01	3.03E-02	-1.29E+01	9.39E-03	7.03E-03	1.36E-02	1.57E-03	-2.16E-02
GWP luluc	kg CO <sub>2</sub> eq	6.26E-03	1.39E-02	2.01E-02	3.48E-05	3.26E-03	1.32E-02	1.49E-03	-2.85E-02
ODP	kg CFC 11 eq	4.42E-06	8.22E-06	5.20E-06	5.96E-08	1.89E-06	1.77E-06	6.39E-07	-1.30E-06
AP	mol H <sup>+</sup> eq	1.62E-01	1.44E-01	1.76E-01	1.49E-03	2.31E-02	5.54E-02	1.49E-02	-5.93E-02
EP freshwater	kg P eq	3.09E-03	2.29E-03	5.65E-03	6.17E-05	5.34E-04	6.55E-04	1.45E-04	-1.47E-03
EP marine	kg N eq	5.39E-02	4.34E-02	4.52E-02	2.42E-04	4.70E-03	2.12E-02	5.16E-03	-1.84E-02
EP terrestrial	mol N eq	5.90E-01	4.74E-01	4.90E-01	2.63E-03	5.12E-02	2.31E-01	5.65E-02	-2.02E-01
POCP	kg NMV OC eq	1.67E-01	1.45E-01	1.56E-01	7.85E-04	1.97E-02	6.53E-02	1.65E-02	-5.75E-02
ADPM*	kg Sb eq	5.11E-05	1.23E-04	8.04E-05	2.34E-06	2.89E-05	1.30E-05	3.60E-06	-5.56E-05
ADPE*	MJ	3.74E+02	5.37E+02	6.20E+02	5.86E+00	1.23E+02	1.26E+02	4.41E+01	-1.11E+02
WDP*	m <sup>3</sup> depriv.	4.33E+01	1.61E+00	4.80E+01	1.20E+01	3.76E+01	3.44E+00	1.99E+00	-4.25E+01

## ADDITIONAL ENVIRONMENTAL IMPACTS

INDICATORS	U. M.	A1	A2	A3 MSB	C1	C2	C3	C4	D
PM	Disease inc.	2.76E-06	3.07E-06	2.09E-06	5.63E-09	6.56E-07	4.86E-06	2.99E-07	-9.15E-07
IRP**	kBq U235 eq.	2.10E+00	2.76E+00	3.09E+00	3.67E-02	6.36E-01	6.66E-01	1.96E-01	-6.51E-01
ETP-fw	CTUe	3.51E+02	4.19E+02	3.19E+02	3.37E+00	9.69E+01	8.50E+01	2.79E+01	-1.27E+02
HTP-c	CTUh	5.03E-08	1.36E-08	2.60E-08	1.14E-10	3.12E-09	2.82E-09	7.07E-10	-6.55E-09
HTP-nc	CTUh	1.59E-06	4.40E-07	2.19E-07	2.56E-09	9.79E-08	6.62E-08	1.83E-08	-1.28E-07
SQP	Pt	1.84E+02	3.69E+02	1.26E+03	7.95E-01	8.60E+01	1.75E+02	9.26E+01	-1.02E+02

# LCA RESULTS

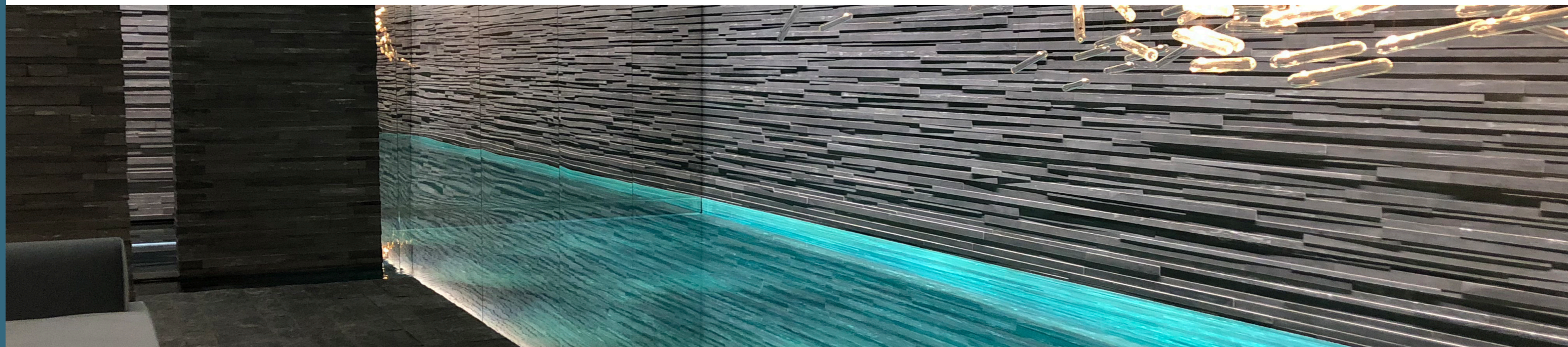


## RESOURCES USE

INDICATORS	U. M.	A1	A2	A3 MSB	C1	C2	C3	C4	D
PERE	MJ	8.27E+00	7.57E+00	-8.44E+01	3.02E-01	1.76E+00	2.00E+00	3.76E-01	-4.16E+00
PERM	MJ	0.00E+00	0.00E+00	3.19E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	8.27E+00	7.57E+00	2.35E+02	3.02E-01	1.76E+00	2.00E+00	3.76E-01	-4.16E+00
PENRE	MJ	4.02E+02	5.70E+02	5.49E+02	6.35E+00	1.31E+02	1.34E+02	4.69E+01	-1.18E+02
PENRM	MJ	0.00E+00	0.00E+00	1.19E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERNRT	MJ	4.02E+02	5.70E+02	6.68E+02	6.35E+00	1.31E+02	1.34E+02	4.69E+01	-1.18E+02
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
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
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
FW	m³	9.00E-01	1.84E-03	1.15E-01	2.65E+00	2.15E-02	3.25E-02	4.54E-01	-6.55E-02

## OUTPUT

INDICATORS	U. M.	A1	A2	A3 MSB	C1	C2	C3	C4	D
HWD	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
NHWD	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
RWD	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
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
MFR	kg	0.00E+00	0.00E+00	2.00E+03	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	0.00E+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
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





## ACRONYMS

### ENVIRONMENTAL IMPACTS

<b>GWP total</b>	Global Warming Potential total
<b>GWP fossil</b>	Global Warming Potential fossil fuels
<b>GWP biogenic</b>	Global Warming Potential biogenic;
<b>GWP luluc</b>	Global Warming Potential land use and land use change
<b>ODP</b>	Depletion potential of the stratospheric ozone layer
<b>AP</b>	Acidification potential
<b>EP freshwater</b>	Eutrophication potential, fraction of nutrients reaching freshwater and compartment
<b>EP marine</b>	Eutrophication potential, fraction of nutrients reaching marine end compartment
<b>EP terrestrial</b>	Eutrophication potential
<b>POCP</b>	Formation potential of tropospheric ozone
<b>ADPM</b>	Abiotic depletion potential for non-fossil resources
<b>ADPE</b>	Abiotic depletion for fossil resources potential

\*Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

### ADDITIONAL ENVIRONMENTAL IMPACTS

<b>PM</b>	Potential incidence of disease due to PM emissions
<b>IRP</b>	Potential Human exposure efficiency relative to U235
<b>ETP-fw</b>	Potential Comparative Toxic Unit for ecosystems
<b>HTP-c</b>	Potential Comparative Toxic Unit for humans
<b>HTP-nc</b>	Potential Comparative Toxic Unit for humans
<b>SQP</b>	Potential soil quality index

\*\*Disclaimer: 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.

### RESOURCES USE

<b>PERE</b>	Use of renewable primary energy excluding renewable primary energy resources used as raw materials
<b>PERM</b>	Use of renewable primary energy resources used as raw materials
<b>PERT</b>	Total use of renewable primary energy resources
<b>PENRE</b>	Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials
<b>PENRM</b>	Use of non-renewable primary energy resources used as raw materials
<b>PERNRT</b>	Use of non-renewable primary energy resources used as raw materials
<b>SM</b>	Use of secondary material
<b>RSF</b>	Use of renewable secondary fuels
<b>NRSF</b>	Use of non-renewable secondary fuels
<b>FW</b>	Use of net fresh water

### OUTPUT

<b>HWD</b>	Hazardous waste disposed
<b>NHWD</b>	Non-hazardous waste disposed
<b>RWD</b>	Radioactive waste disposed
<b>CRU</b>	Components for re-use
<b>MFR</b>	Materials for recycling
<b>MER</b>	Materials for energy recovery
<b>EEE</b>	Exported electrical energy
<b>EET</b>	Exported thermal energy

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