



ENVIRONMENTAL PRODUCT DECLARATION

In accordance with EN 15804+A2 & ISO 14025

Rectangular paving stones

RTS_456_26

Scope of the declaration

This environmental product declaration covers the environmental impact of rectangular paving stones manufactured in Finland.

The environmental declaration has been prepared in accordance with standards EN15804:2012+A2:2019 and ISO 14025. The RTS PCR method guide (Finnish version, 12.2.2024) has been used as additional guidance.

The environmental declaration describes the stages of the product's life cycle from cradle to gate with options

xx.xx.2025

Rakennustieto RTS Building Information
Foundation
Malminkatu 16 A
00100 Helsinki
<https://www.rakennustieto.fi/>





General information, purpose of the declaration and verification

1. Owner of the declaration

Kivi ry,
Paraatikatu 1, 15700 LAHTI
Sini Laine, Executive Director
+358 50 330 1630
sini.laine@kivi.info

2. Product name and number

Rectangular paving stones manufactured in Finland.

3. Data period

January 1, 2024–January 31, 2024

4. Place of production and manufacturers

Place of production: Finland

Manufacturers: Loimaan Kivi Oy, Tampereen Kovakivi Oy, Kymen Granite Oy, Ikikivi Oy, Kurun Kivi Oy, Interrock Oy, Iitin Graniitti Oy

5. EPD averaging

The EPD statement for rectangular paving stones is a production volume-weighted average of the manufacturing data reported by seven different manufacturers.

6. Further information

<https://kivi.info/>

7. Product category rules and scope of the declaration

The EPD has been prepared in accordance with standards EN 15804+A2:2019 and ISO 14025. The RTS PCR method guide (Finnish version, 12.2.2024) has been used in its preparation.

The scope of the EPD is from cradle to gate with options (A1-A4, and C1-C4, D).

The geographical representativeness is Finland.

The manufacturer has sole ownership and responsibility for the EPD. EPDs belonging to the same product group but prepared with different programs are not necessarily comparable. EPDs for construction products are not necessarily comparable if they are not in accordance with EN 15804 and if they are not compared in a construction context.

8. Author of the life cycle assessment and declaration

Olivia Kuronen and Sanni Mallat
Sitowise Oy
www.sitowise.com
Date of study: August 5, 2025

9. Verification

Independent, third-party verification of the environmental product declaration has been carried out in accordance with EN ISO 14025:2010, EN 15804+A2:2019 and RTS PCR standards. The impartial verifier is Valtteri Kainila, Ramboll Finland Oy.
Verification date. **xx.xx.2025.**



10. Date of issue and validity of the environmental declaration

xx.xx.2025 Valid: xx.xx.xx- xx.xx.xx

European standard EN 15804+A2:2019 serves as the core PCR
An independent verification body in accordance with the international standard EN ISO 14025:2010 is Internal ☐ External ☒
Third-party verification has been carried out by: Valtteri Kainila Ramboll Finland Oy

Product information

11. Product description

This EPD represents average rectangular paving stones manufactured in Finland.

12. Declared unit

1 ton of rectangular paving stones.

13. Technical description of the product and its use

Rectangular paving stones are manufactured from Finnish natural stone and are used, for example, for paving yards, market squares and streets, and for traffic circles.

The raw material used for rectangular paving stones is natural stone, specifically a side stream stone. The further processing of the raw material is a simple process, and there are two manufacturing methods: splitting and sawing. First, the stone is split into blocks, for example, using an electric pneumatic drill. If the production is done by splitting, two electric splitting machines with hydraulic presses (larger and smaller) are often used. If the production is done by sawing, the sides of the stone are sawn with an electric saw and one surface is burned.

14. Product standard

SFS-EN 1342:2013, Rectangular paving stones, natural paving stones for outdoor use

15. Physical properties

The size of the stones may vary. The typical size for rectangular paving stones is 140x200x140 +/-15 mm and for paving stones 100x100x100 mm.

16. Product raw materials

Main raw materials	Share	Usability			Origin
		Renewable	Non-renewable	Recycled	
Natural stone	100		X		Finland



17. Biogenic carbon

Biogenic carbon content of the product per unit declared, as reported at the factory gate.

Biogenic carbon contained in the product kg C	0
Biogenic carbon contained in the product packaging kg C	0 kg

18. List of REACH SVHC substances contained in the product according to the European Chemicals Agency (ECHA)

The product does not contain any SVHC substances listed in the REACH Regulation.

19. Environmental impacts per 1 kg of product

Impact category	Unit	A1-A3	A	C	C2	C3	C4	D
GWP – total ¹⁾	kg CO ₂ eq.	2,51E-02	2,37E-02	0,00E+00	6,09E-03	6,20E-05	1,56E-03	-2,31E-02
ADP-minerals & metals ⁴⁾	kg Sbe	1,37E-07	6,61E-08	0,00E+00	1,70E-08	1,49E-10	2,48E-09	-3,49E-08
ADP-fossil resources	MJ	3,56E-01	3,44E-01	0,00E+00	8,83E-02	1,42E-03	3,83E-02	-3,09E-01
Water use ⁵⁾	m ³ e depr.	2,21E-03	1,70E-03	0,00E+00	4,36E-04	3,63E-05	1,11E-04	-5,31E-03
Biogenic carbon content in the product	kg C	0,00E+00	NA	NA	NA	NA	NA	NA
Biogenic carbon content in the packaging	kg C	0,00E+00	NA	NA	NA	NA	NA	NA
Use of secondary material	kg/kg	0,00E+00	NA	NA	NA	NA	NA	NA



System boundary

The modules whose information is presented in this report are marked with a tick below. Mandatory items to be reported are marked in blue in the table. The report type is "cradle to gate with options".

Product phase			Construction phase		Use phase							End of life				Impacts outside the life cycle		
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	D	D
X	X	X	X	NR	NR	NR	NR	NR	NR	NR	NR	X	X	X	X	X	X	X
Raw material supply	Transport	Manufacturing	Transport	Construction - installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction, demolition	Transport	Waste processing	Disposal	Reuse	Recovery	Recycling

NR= not relevant

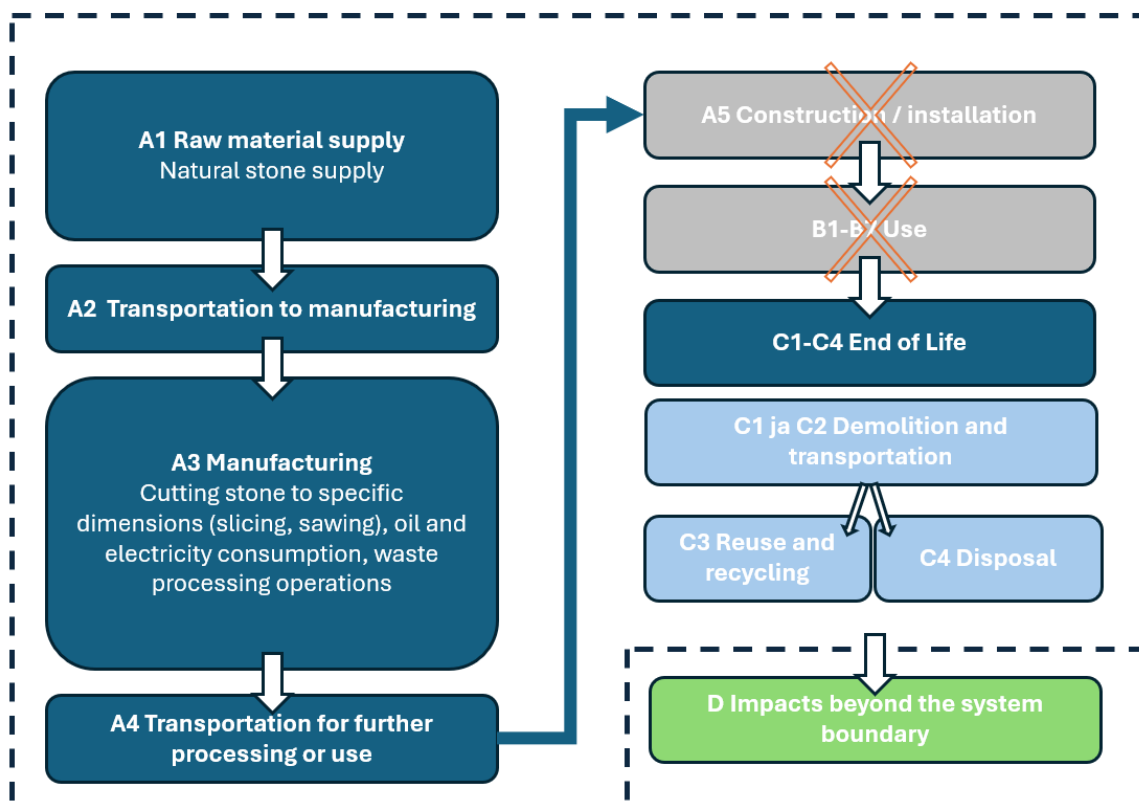
Mandatory modules

Mandatory in accordance with the rules and conditions in section 5.2 of the RTS EPD Methodology Guide

Optional modules based on scenarios

20. Production process

The steps involved in manufacturing the product include sawing or splitting the raw stone. The system boundaries of the process are presented below.



21. Cut off criteria

The study does not exclude any modules or processes that are mandatory based on the applied standards and the PCR. The study does not exclude hazardous materials or substances. The study takes into account all significant raw material and energy consumption. All inputs and outputs of unit processes for which data is available are included in the calculation, with the exception of the following auxiliary materials, which account for less than 0.1% of the mass of the final product:

- Liquefied petroleum gas
- Lubricating oil
- Oxygen
- Packaging materials

22. Allocation, estimates, and assumptions

Allocation is necessary if, for example, data on certain materials, energy, water, or waste cannot be measured separately for the product under investigation. In this study, allocation was used when the production data of different operators were averaged using a weighted average per reported unit.

Since some producers only manufacture rectangular paving stones, while others also manufacture other processed stone products, there is some difference in the allocation of source data from the annual level to the product level. For producers who only manufacture the products covered in this report, tonnage-specific production data was compiled by dividing annual consumption figures by annual production figures. For producers who also manufacture other products, it was not possible to separate all flows by product, and allocation had to be made between several products. In such cases, the flows were allocated between rectangular other manufactured stone products using a coefficient created on the basis of product production volumes and sales prices. Due to



this difference in allocation methods, there may be some variation in the flows of different producers.

If a producer has reported that the production process generates waste that has value and is sold on as waste rock, the environmental impacts allocated to waste rock have been taken into account in the processing of the input data reported by the producer.

Rectangular paving stones are typically produced from waste rock. This study assumes that all raw material is a side stream of natural stone production and the raw material thus comes in to the process without environmental burden.

23.Averages and variation

The product consists of production data reported by seven different producers, and the size and weight of the final product may vary. Raw materials per ton produced have been calculated using the weighted average principle.

24.LCA software and bibliography

This EPD was created using the One Click LCA EPD Generator software. The LCA and EPD were prepared in accordance with standards and ISO 14040/14044. The EPD Generator uses the Ecoinvent v3.10.1 database (allocation, Cut-off, EN 15804+A2) from 2024 as its source of environmental data.



Environmental impact data

The impacts are presented per declared unit, 1 ton of rectangular paving stones. The environmental impacts consist mainly of emissions from the energy used in the production phase. The results are presented in scientific form, example of data interpretation: $3.54\text{E-}2 = 3.54 \cdot 10^{-2} = 0.0354$.

The producer-specific environmental impacts of products vary between -3% and +257% compared to the average.

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

Impact category	Unit	A1-A3	A	C	C	C3	C4	D
GWP – total ¹⁾	kg CO ₂ e	2,51E+01	2,37E+01	0,00E+00	6,09E+00	6,20E-02	1,56E+00	-2,31E+01
GWP – fossil	kg CO ₂ e	2,51E+01	2,37E+01	0,00E+00	6,08E+00	6,17E-02	1,56E+00	-2,31E+01
GWP – biogenic	kg CO ₂ e	0,00E+00	5,36E-03	0,00E+00	1,38E-03	1,33E-04	-4,96E-04	-4,29E-03
GWP – LULUC	kg CO ₂ e	9,46E-03	1,06E-02	0,00E+00	2,72E-03	1,83E-04	8,92E-04	-7,26E-03
Ozone depletion pot.	kg CFC-11e	3,64E-07	3,50E-07	0,00E+00	8,98E-08	1,03E-09	4,52E-08	-3,20E-07
Acidification potential	mol H ⁺ e	1,50E-01	8,07E-02	0,00E+00	2,07E-02	3,11E-04	1,11E-02	-1,64E-01
EP-freshwater ²⁾	kg Pe	5,66E-03	1,84E-03	0,00E+00	4,73E-04	5,29E-05	1,28E-04	-2,96E-03
EP-marine	kg Ne	5,58E-02	2,65E-02	0,00E+00	6,81E-03	5,47E-05	4,22E-03	-6,79E-02
EP-terrestrial	mol Ne	6,43E-01	2,89E-01	0,00E+00	7,41E-02	4,82E-04	4,61E-02	-7,48E-01
POCP (“smog”) ³⁾	kg NMVOCe	1,87E-01	1,19E-01	0,00E+00	3,06E-02	1,63E-04	1,65E-02	-2,25E-01
ADP-minerals & metals ⁴⁾	kg Sbe	1,37E-04	6,61E-05	0,00E+00	1,70E-05	1,49E-07	2,48E-06	-3,49E-05
ADP-fossil resources	MJ	3,56E+02	3,44E+02	0,00E+00	8,83E+01	1,42E+00	3,83E+01	-3,09E+02
Water use ⁵⁾	m ³ e depr.	2,21E+00	1,70E+00	0,00E+00	4,36E-01	3,63E-02	1,11E-01	-5,31E+00

1) GWP = Global Warming Potential; 2) EP = Eutrophication potential. Required characterisation method and data are in kg P-eq. Multiply by 3,07 to get PO₄e; 3) POCP = Photochemical ozone formation; 4) ADP = Abiotic depletion potential; 5) 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 experience with the indicator.



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

Impact category	Unit	A1-A3	A4	C1	C2	C3	C4	D
Particulate matter	Incidence	3,38E-06	2,37E-06	0,00E+00	6,09E-07	1,41E-09	2,52E-07	-4,11E-06
Ionizing radiation ⁶⁾	kBq U235e	2,19E+00	2,99E-01	0,00E+00	7,69E-02	3,84E-02	2,41E-02	-1,31E+00
Ecotoxicity (freshwater)	CTUe	6,59E+01	4,86E+01	0,00E+00	1,25E+01	1,57E-01	3,21E+00	-3,33E+01
Human toxicity, cancer	CTUh	4,60E-09	3,91E-09	0,00E+00	1,00E-09	2,27E-11	2,88E-10	-3,57E-09
Human tox. non-cancer	CTUh	1,88E-07	2,22E-07	0,00E+00	5,71E-08	1,06E-09	6,61E-09	-9,65E-08
SQP ⁷⁾	-	1,44E+02	3,46E+02	0,00E+00	8,89E+01	2,44E-01	7,54E+01	-8,34E+01

6) 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; 7) SQP = Land use related impacts/soil quality.

USE OF NATURAL RESOURCES

Impact category	Unit	A1-A3	A4	C1	C2	C3	C4	D
Renew. PER as energy ⁸⁾	MJ	1,03E+01	4,71E+00	0,00E+00	1,21E+00	3,22E-01	3,70E-01	-9,07E+00
Renew. PER as material	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of renew. PER	MJ	1,03E+01	4,71E+00	0,00E+00	1,21E+00	3,22E-01	3,70E-01	-9,07E+00
Non-re. PER as energy	MJ	3,49E+02	3,44E+02	0,00E+00	8,83E+01	1,42E+00	3,83E+01	-3,04E+02
Non-re. PER as material	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of non-re. PER	MJ	3,49E+02	3,44E+02	0,00E+00	8,83E+01	1,42E+00	3,83E+01	-3,04E+02
Secondary materials	kg	1,15E-01	1,46E-01	0,00E+00	3,76E-02	8,73E-04	9,63E-03	-1,48E-01
Renew. secondary fuels	MJ	4,81E-03	1,86E-03	0,00E+00	4,77E-04	9,48E-07	1,99E-04	-3,76E-03
Non-ren. secondary fuels	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of net fresh water	m ³	1,86E-01	5,08E-02	0,00E+00	1,30E-02	1,16E-03	3,98E-02	-1,85E-01

8) PER = Primary energy resources.



END OF LIFE – WASTE

Impact category	Unit	A1-A3	A4	C1	C2	C3	C4	D
Hazardous waste	kg	1,21E+00	5,82E-01	0,00E+00	1,50E-01	3,83E-03	4,23E-02	-1,02E+00
Non-hazardous waste	kg	3,26E+01	1,08E+01	0,00E+00	2,77E+00	2,61E-01	5,00E+02	-2,36E+01
Radioactive waste	kg	5,10E-04	7,33E-05	0,00E+00	1,88E-05	9,87E-06	5,87E-06	-3,10E-04

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1-A3	A4	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	2,50E+02
Materials for recycling	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,50E+02	0,00E+00	-1,03E-02
Materials for energy rec	kg	2,57E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-1,11E-01
Exported energy	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy – Electricity	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy – Heat	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Scenario documentation and technical information

25.Manufacturing energy scenario documentation

Parameter	Value
Origin of electricity	Electricity, medium voltage, residual mix (Reference product: electricity, high voltage), Ecoinvent
Electricity CO ₂ -eq. /kWh	0.67 kgCO ₂ eq. /kWh
Fuel oil	Diesel, burned in building machine (Reference product: diesel, burned in building machine), Ecoinvent
Fuel oil kg CO ₂ eq. /MJ	0.1 kg CO ₂ eq. / MJ



26. Additional technical information, transport to the construction site

Parameter	Value	Data source and quality
Specific emissions from transport	0.11 kg CO ₂ eq. /tkm	Transport, freight, lorry >32 metric tons, EURO5. Ecoinvent 3.10.
Average transport distance for A4	220 km	Average product transport distance

27. End of life process description

Process description	Unit	Value kg/tonne
Demolition process for the product and the amount of construction waste generated, broken down as follows:	kg collected as sorted	500
	kg collected as mixed construction waste	500
The construction waste recovery process and the construction waste generated, broken down as follows:	kg components for reuse (same purpose)	250
	kg for material recycling	250
	kg energy recovery	0
Construction waste disposal process and amount of waste to be disposed of	kg of product or material for final disposal	500
Waste transportation	km	The estimated transportation distance is 113 kilometers.



28. Review of producer-specific results

To ensure the transparency required by the program operator, it is important to indicate when presenting average results if the total global warming potential (GWP total A1-A3) of an individual product differs by more than 10 percent from the GWP result of the average product. To meet this requirement and to ensure the reliability of the results, a comprehensive sensitivity analysis has been carried out in the work. For the sensitivity analysis, a separate version of the LCA model has been created for each producer in the One Click LCA software, in which the flows of the A1-A3 stages have been adjusted to correspond to the producer-specific values.

It should be noted that since the average output data has been calculated by weighting the production volumes reported by different producers, the output data reported by individual producers for their products and thus the GWP results may differ significantly from the average of the main model. An individual producer may also not utilize all the material or resource flows used in the manufacturing of the average product.

The following table presents the producer-specific GWP values of the participating producers in relation to the average value, as well as a brief explanation of the differences in the producer-specific models.

Producer:	GWP total (kg CO ₂ e/ 1 t of stone)	Difference from average (%)	Reason for difference:
Average result	2,51E+01		
Loimaan Kivi Oy	2,27E+01	-3 %	Most significant difference: lower electricity consumption, higher fuel oil consumption than average.
Tampereen Kovakivi Oy	6,45+01	176 %	Most significant difference: higher electricity consumption than average.
Kymen Granite Oy	4,13E+01	76 %	Most significant difference: Higher electricity consumption than average. Lower light fuel oil consumption than average.
Ikikivi Oy	6,30E+01	169 %	Most significant difference: Higher electricity and fuel oil consumption than average.
Interrock Oy	1,02E+01	-56 %	Most significant difference: Lower electricity and fuel oil consumption than the average.
Iitin Graniitti Oy	5,43E+01	132 %	Most significant difference: More quarry stone and electricity are used in production. Wood is also used for heating. Fuel oil consumption is lower than average.
Ylämaan massive granit Oy	8,35E+01	257 %	Most significant difference: More electricity is used in production.



29. References

Ecoinvent Database version 3.10.1 (allocation, Cut-off, EN 15804+A2), 2024.

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

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.

LCA background report for stone products 5.8.2025.