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AENOR

Olive pit biochar

Environmental Product Declaration

EN ISO 14025:2010
EN 15804:2012+A2:2019/AC:2021

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CARBOLIVA Biochar

Carboliva SLU

The holder of this Declaration is responsible for its content, as well as for keeping the supporting documentation that justifies the data and statements included during the period of validity.

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The European Standard EN 15804:2012+A2:2019/ AC 2021 serves as a CPR
Independent verification of the declaration and data in accordance with EN ISO 14025: 2010 ☐Internal ☒External
Verification body AENOR Product certification body accredited by ENAC with accreditation No. 1/C-PR468

1. General information

1.1. The organisation

Carboliva is a company based in Osuna (Seville), dedicated to the valorization of olive grove biomass, from which they produce high quality sustainable vegetable charcoal, made with innovative and environmentally friendly processes.

At Carboliva, they strive for sustainability in everything they do, using the latest innovation and the most demanding quality systems. This has made Carboliva a profitable business with the capacity of distributing its products worldwide.

1.2. Scope of the Declaration

This environmental product declaration describes the environmental information relating to the cradle-to-gate life cycle, C1-C4 modules and D module (A1-A3 + C + D) of olive pit biochar produced by Carboliva at its plant in Puente del Obispo (Jaén - Spain).

1.3. Life cycle and compliance

This EPD has been developed and verified in accordance with the EN ISO 14025:2010 and EN 15804:2012+A2:2020 Standards and the following Category Rules:

Table 1-1. 1s Information

PCR	Sustainability of construction works. Environmental product declarations. Core rules for the product category of construction products
Registration code and version	EN 15804:2012+A2:2019 /AC: 2021
Publication date	2020-03
Compliance	EN 15804:2012+A2:2019 /AC: 2021
Programme administrator	AENOR

This Environmental declaration includes the following stages of the life cycle:

Table 1-2 System boundaries. Information modules considered

Product stage	A1	Raw material supply	X
	A2	Transport to factory	X
	A3	Manufacturing	X
Construction	A4	Transport to site	MNE
	A5	Distribution / installation	MNE
Use stage	B1	Use	MNE
	B2	Maintenance	MNE
	B3	Repair	MNE
	B4	Replacement	MNE
	B5	Refurbishment	MNE
	B6	Operational energy use	MNE
	B7	Operational water use	MNE
End of life stage	C1	Deconstruction / demolition	X
	C2	Transport	X
	C3	Waste processing	X
	C4	Disposal	X
Beyond product life cycle	D	Reuse/recovery/ recycling potential	X

X = Module included in the LCA; NR = Module not relevant; MNE = Module not evaluated

This EPD may not be comparable with those developed in other programmes or according to different reference documents; in particular, it may not be comparable with EPDs not developed according to EN 15804+A2.

Similarly, this EPD may not be comparable if the origin of the data is different (e.g. databases), not all relevant information modules are included, or they are not based on the same scenarios.

The comparison of construction products should be done on the same function, applying the same functional unit and at the level of the building (or architectural or engineering work), i.e. including the behaviour of the product throughout its life cycle, as well as the specifications of section 6.7.2 of the UNE-EN ISO 14025 standard.

1.4. Differences from previous versions of this EPD

There are no versions prior to this EPD.

2. The product

2.1. Identification of the product

Biochar is a high-quality plant-based charcoal obtained from biomass of olive pits and pulp through pyrolysis, a process that thermally decomposes organic matter in the absence of oxygen. This process transforms biomass into a stable form of charcoal with several potential applications in agriculture and industrial sectors, helping reduce carbon footprint.

The product has the following properties:

- Stability: It is highly stable and can last on the ground or in an infrastructure for hundreds of years.
- Porosity: the porous structure allows it to retain nutrients and water, improving the properties of the soil.
- Ion exchange: It has a high ion exchange ability, which means it can retain and release nutrients efficiently.

Table 2-11 Properties

Moisture content	8 - 12% max.
Ash content	3 - 5%
Density	400 - 500 kg/m^3
Volatile substances content	15 - 20%
Fixed carbon content	75 - 85%
Granulometry	2mm sieve: 30% 3mm sieve: 35% 4mm sieve: 35%
Calorific power	7,500-8,000 kcal/kg with a 5% margin (33.5 MJ)
Composition	Clean and dry olive pit charred in a continuous rotary oven
pH	Alkaline
Organoleptic characteristics	Appearance: black colour, no smell and no taste
Porosity	High porosity high specific surface area
Recalcitrant	It can last for hundreds of years without decomposing.
Storage and expiration	Store in a dry place. No expiration date. Avoid airstreams

CPC Code: 34510 – Charcoal.

2.2. Product composition

The product studied is 100% vegetable charcoal made from olive pits, which is a by-product of olive pomace oil production.

No hazardous substances listed in the "*Candidate List of Substances of Very High Concern (SVHC) for authorisation*" are used during the product's life cycle in a percentage greater than 0.1% of the product weight.

2.3. Packaging

The product is distributed in bulk.

3. Information regarding the LCA

3.1. Life Cycle Assessment

The Life Cycle Assessment Report for the EPD of biochar from Carboliva SLU, dated January 2026, was developed by the company Abaleo SL.

The LCA study follows the recommendations and requirements of EN ISO 14040:2006, EN ISO 14044:2006 and EN 15804:2012+A2:2019 /AC:2021 standards.

The characterization factors are based on EF 3.1.

3.2. Declared unit

The declared unit is one kilogram (1 kg) of product for bulk distribution

3.3. Reference Service Life (RSL)

Not applicable.

3.4. Allocation criteria

An allocation of the system's inputs and outputs has been made based on economic criteria, between biochar and steam.

3.5. Cut off criteria

The LCA includes gross weight/volume of all materials used in the manufacturing process, so that at least 99% of the environmental impacts are obtained.

There has been no exclusion of energy consumption.

3.6. Representativeness, quality and selection of data

Specific production data from the Puente del Obispo plant were used for modelling the manufacturing process of the product under study. Data on material and energy consumption, as well as process emissions, were obtained from this factory.

When necessary, Ecoinvent 3.11 database (March 2025) was used, which is the latest version available at the time of the LCA. For inventory data, modelling of LCA, and calculations of the environmental impact categories required by the reference standard, SimaPro 10.3.0.1 software was used, which is the latest version available at the time of the study.

To assess the quality of the primary data used in the LCA, the semi-quantitative data quality assessment criteria proposed by the European Union in its Guide to the Environmental Footprint of Products and Organizations were applied. The following results were obtained:

- Very good integrity. Score 1.
- Good methodological suitability and coherence. Score 2.
- Reasonable time representativeness: Score 3.
- Very good technological representativeness. Score 1.
- Very good geographical scope. Score 1.
- Low data uncertainty. Score 2.

According to the above data, the Data Quality Rating (DQR) results in the following value: 1.67, which means that the quality of the data is very good.

To better understand the data quality assessment performed, the score for each of the criteria varies from 1 to 5 (the lower the score, the higher the quality). The following table is applied to obtain the final score:

Overall Data Quality Rate (DQR)	Overall data quality level
≤ 1.6	Excellent quality
1.6 to 2.0	Very good quality
2.0 to 3.0	Good quality
3.0 to 4.0	Reasonable quality
> 4	Insufficient quality

3.7. Biogenic carbon content

The biogenic carbon content of the biochar is

Table 3.11 Biogenic carbon

Parameter	kg biogenic C (per declared unit)
Product biogenic carbon content - KgC	8,26E-01
Biogenic carbon content packaging - KgC	-

3.8. Electricity mix applied

The residual electricity mix of the electricity trading company, of the year 2024, obtained from the CNMC annual report has been used.

Table 3-22 Energy mix

Mix -	GWP - kgCO_2eq /kWh
Mix	0.275

3.9. Gas consumption

Natural gas accounts for less than 30 % of the total energy use in stage A1-A3.

3.10. Scope of the study

The scope of this EPD is cradle-to-gate with options, modules C and D (A1-A3 + C + D) of Carboliva's charcoal.

Specific data of the production process were obtained from the Carboliva plant located in Puente del Obispo (Jaén) and corresponds to the production data from December 2024 to March 2025, which is considered representative.

The product is manufactured in Spain, although the LCA calculation was modelled for Europe.

The following have not been included in the LCA:

- All equipment with service life longer than 3 years.
- The construction of the factory buildings, nor other capital goods.
- Work-related travel by staff; nor commuting.
- Research and development activities.
- Long-term emissions.

4. System boundaries, scenarios, and additional technical information

Module A1: Raw material supply

This module includes the raw material production process, which considers:

- Extraction of resources and production of raw materials.
- Transport to the processing/production centres of raw materials.
- Energy and fuel consumption during the production of raw materials.
- Consumption of other resources (such as water) during the production of raw materials.
- Generation of waste and emissions to air and spills into water and soil, during the production of raw materials.
- Generation of electricity used in the manufacturing process.

Module A2: Transport

Operation of the loading shovels that carry the pit to the oven hoppers (internal plant transport). Olive pit is supplied by the extractor to the pyrolysis plant (located within the extractor's plant), so they only need to be loaded into the oven using shovels.

Transport of natural gas and diesel used in the plant, are modelled with "market for" processes of Ecoinvent database.

Module A3: Product manufacturing

At this stage, the following has been considered:

- The production of natural gas used to support the start-up of the pyrolysis furnace.
- The production of the water consumed for the cooling of biochar. The steam boiler operates in a closed cycle and water replacements are negligible.
- Emissions from the operation of the biomass boiler, estimated from OCA measurements.
- Fugitive methane emissions from the boiler estimated.
- Production of auxiliary materials: PP big bags for internal transport within the factory, lubrication grease, graphite seals, loader diesel and bulls.
- Loader and bull loader operation.
- Transport of big bags, diesel, grease and graphite to the plant.
- Waste transport at the point of management. Wastes are recycled.

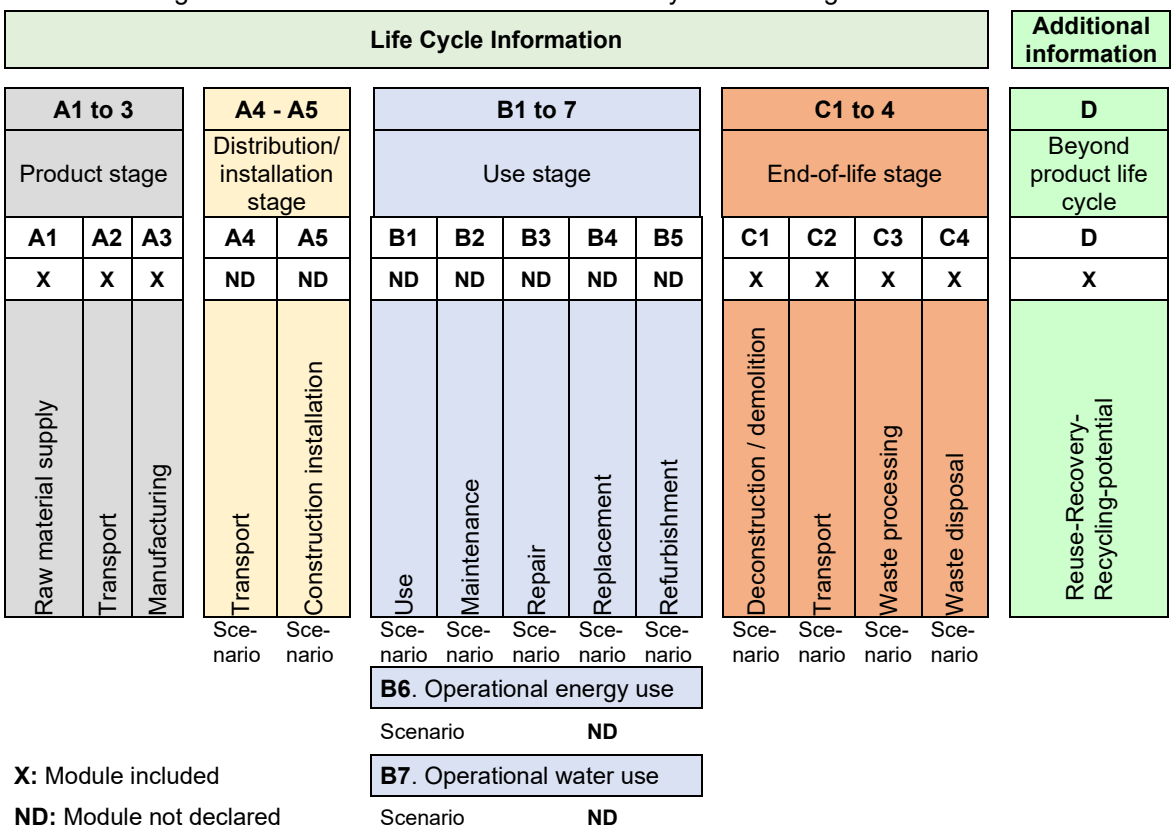
Module C1 – Deconstruction / demolition

End-of-life scenario assumes that the product under study was part of precast concrete as an aggregate element. To represent demolition, default values defined by *Erlandsson et al. (2015)* for building demolition are used.

Module C2: Transport to the waste processing/recovery site

To represent the end-of-life transports of the waste of the products studied, a 50 km transport is used by Euro5 truck (16-32 tons).

Table 4-1. Stages and information modules of the Life Cycle according to UNE-EN 15804.



Module C3 - Waste processing and Module C4 - Waste Disposal

At the end of its service life, it is estimated that 80% of the product is recycled and 20% is sent to landfill.

Table 4-22s

Parameter	Value (per declared unit)
Demolition	1 kg
Collection process, specified by type	0 kg collected separately 1 kg collected with a mixture of construction waste.
Recovery system, specified by type	0 kg for reuse 0.80 kg for recycling
Disposal, specified by type	0.20 kg for final disposal in landfill. 0 kg for incineration material
Assumptions for scenario development	Transport waste to processing site: - EURO5 truck 16-32 ton: 50 km

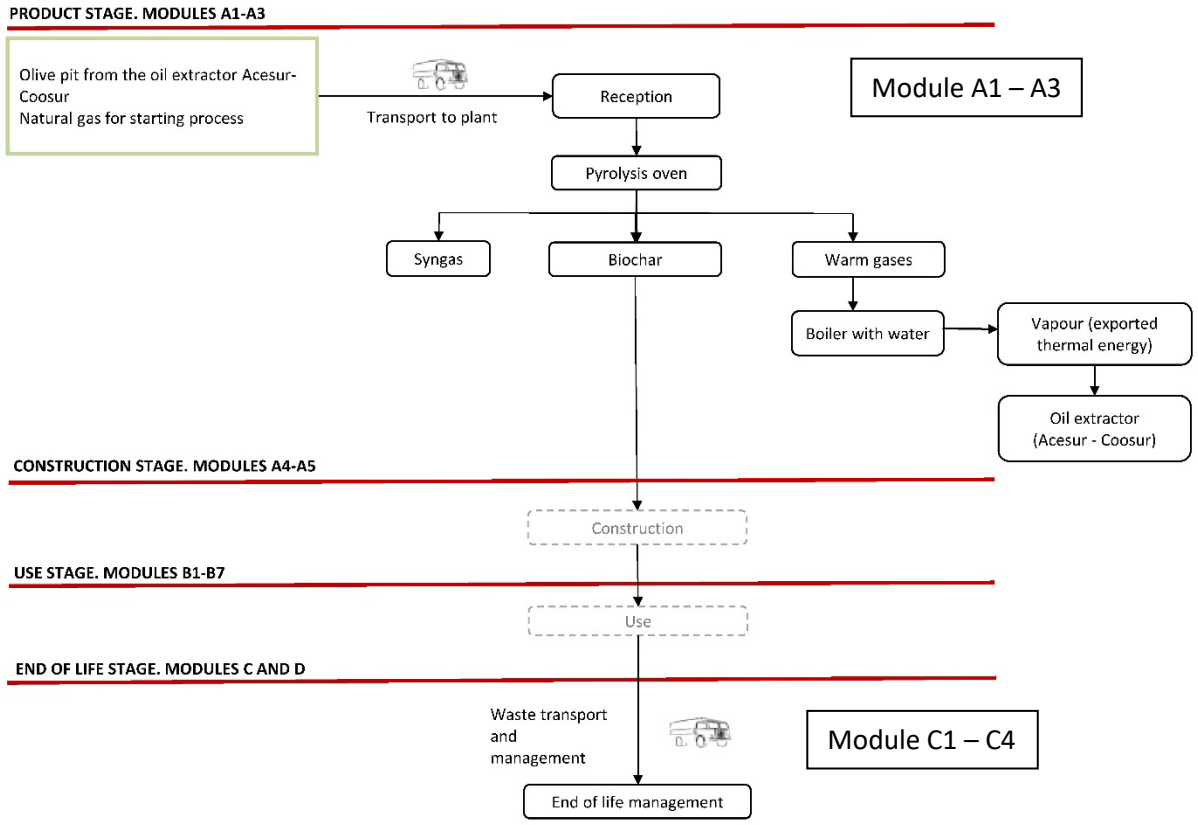
4.1. Benefits and burdens beyond the system

Module D: Beyond product life cycle

Module D declares the potential burdens and benefits related to the secondary material recovered upon leaving the product system, which is 80%.

Biochar does not use secondary raw materials in its manufacturing (olive pit is a by-product of very low economic value compared to the main product).

4.2. Manufacturing process diagram



Biochar is obtained from olive pits delivered by Coosur, located in the same facilities.

Decomposition of organic matter is achieved in the absence of oxygen by a continuous pyrolytic oven, generating on the one hand, thermal energy in the form of water vapor that is used in the process of extracting the pomace oil; and, at the same time, olive pit biochar.

The LCA considered fugitive emissions of CH_4 during pyrolysis, estimated by means of a mass balance.

The olive pit is a by-product of the pomace factory, with a very low economic value (less than 0.5%), so it has been considered that it arrives at Carboliva's facilities free of environmental load from the pomace factory.

5. Declaration of LCA and LCI environmental parameters.

The results of the end-of-life stages (modules C1-C4) should be considered when using the results of the product stage (modules A1-A3).

The estimated impact results are relative and do not indicate the final value of the impact categories, nor do they refer to threshold values, safety margins or risks.

The EN 15804 characterization factors are based on EF 3.1.

Mandatory impact category indicators according to EN 15804

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
GWP-total	kg CO_2 eq	-2.98E+00	4.14E-03	7.49E-03	2.42E+00	6.07E-01	-8.87E-04
GWP-fossil	kg CO_2 eq	4.90E-02	4.13E-03	7.49E-03	2.73E-04	1.14E-03	-8.87E-04
GWP-biogenic	kg CO_2 eq	-3.03E+00	2.07E-07	2.60E-07	2.42E+00	6.06E-01	-5.07E-07
GWP-luluc	kg CO_2 eq	2.49E-05	1.70E-07	1.18E-07	1.85E-08	4.27E-08	-1.23E-07
ODP	kg CFC11 eq	1.30E-09	6.29E-11	1.70E-10	6.53E-12	2.20E-11	-1.19E-11
AP	mol H^+ eq	4.64E-04	3.82E-05	9.30E-06	2.26E-06	7.39E-06	-7.46E-06
EP-freshwater	kg P eq	9.49E-07	3.89E-09	4.63E-09	3.26E-10	8.85E-10	-2.34E-09
EP-marine	kg N eq	1.38E-03	1.80E-05	2.09E-06	1.06E-06	3.39E-06	-3.45E-06
EP-terrestrial	mol N eq	3.55E-03	1.97E-04	2.28E-05	1.16E-05	3.72E-05	-3.78E-05
POCP	Kg NMVOC eq	3.90E-03	5.89E-05	1.83E-05	3.47E-06	1.14E-05	-1.15E-05
ADPminerals&metals[2]	kg Sb eq	1.87E-08	1.45E-10	1.95E-10	3.34E-11	3.44E-11	-1.73E-10
ADP-fossil [2]	MJ	1.71E+00	5.41E-02	9.96E-02	1.25E-02	1.51E-02	-8.47E-03
WDP[2]	m^3 world eq depriv	4.36E-02	4.44E-05	3.28E-05	8.17E-05	9.72E-06	-1.53E-03

GWP - Total: Global Warming Potential; **GWP - fossil**: Global warming potential of fossil fuels; **GWP - biogenic**: Biogenic Global Warming Potential; **GWP - luluc** : Global warming potential of land use and land use change; **ODP:** Stratospheric Ozone Depletion Potential; **AP:** Acidification potential, accumulated surplus; **EP-freshwater:** Eutrophication potential, fraction of nutrients that reach the final freshwater compartment; **EP-marine:** Eutrophication potential, fraction of nutrients that reach the final compartment of seawater; **EP-terrestrial:** Eutrophication potential, cumulative surplus; **POCP:** tropospheric ozone formation potential; **ADP-minerals&metals**: Abiotic resource depletion potential for non-fossil resources; **APD-fossil:** Abiotic Resource Depletion Potential for fossil resources; **WDP:** Water deprivation potential (user), weighted water deprivation consumption. **NR:** Not relevant

.

Additional environmental impacts

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
PM	disease incidence	2.68E-09	4.82E-09	4.49E-10	3.04E-09	1.92E-10	2.74E-09
IRP[1]	kBq U235 eq	9.89E-03	4.49E-06	9.57E-06	2.58E-04	3.13E-06	8.64E-05
ETP-fw[2]	CTUe	4.80E-02	1.55E-03	3.59E-03	1.20E-04	5.15E-04	-5.06E-04
HTP-c[2]	CTUh	1.04E-11	2.21E-13	4.63E-13	1.82E-14	1.38E-13	-8.26E-14
HTP-nc[2]	CTUh	1.52E-10	4.06E-12	5.00E-11	4.28E-13	5.65E-12	-1.56E-12
SQP[2]	-	6.70E-02	9.18E-05	1.27E-04	3.52E-04	8.49E-03	-2.08E-02

PM: Potential incidence of diseases due to particulate matter (PM) emissions**; IRP:** Human Potential Exposure Efficiency Relative to U235; **ETP-fw:** Comparative Ecosystem Toxic Unit Potential - Freshwater; **HTP-c:** Comparative Ecosystem Toxic Unit Potential - Carcinogenic Effects**; HTP-nc:** Comparative Ecosystem Toxic Unit Potential - Non-Carcinogenic Effects**; SQP:** Soil quality potential index; NR: Not relevant

Notice 1: This impact category deals mainly with the eventual impacts of low doses of ionizing radiation on human health, from the nuclear fuel cycle. It does not consider the effects due to possible nuclear accidents or occupational exposure due to the disposal of radioactive waste in underground facilities. The ionizing radiation potential of the ground, due to radon or from some construction materials, is not measured with this parameter either.

Warning 2: The results of this indicator of environmental impact should be used with caution, since the uncertainties of the results are high and the experience with this parameter is limited.

Use of resources

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
PERE	MJ	4.06E-02	1.16E-04	2.45E-04	9.43E-03	3.96E-04	2.60E-03
PERM	MJ	2.31E+01	0.00E+00	0.00E+00	-1.84E+01	-4.61E+00	0.00E+00
PERT	MJ	2.31E+01	1.16E-04	2.45E-04	-1.84E+01	-4.61E+00	2.60E-03
PENRE	MJ	1.71E+00	5.41 E-02	9.96 E-02	1.25E-02	1.51E-02	-8.47E-03
PENRM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	1.71E+00	5.41 E-02	9.96 E-02	1.25E-02	1.51E-02	-8.47E-03
SM	kg	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
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	6.28E-04	1.64E-06	1.93E-06	2.64E-05	1.18E-06	-9.93E-04

PERE: Use of renewable primary energy excluding primary renewable energy resources used as raw material; **PERM:** Use of primary renewable energy used as raw material; **PERT:** Total use of primary renewable energy; **PENRE**: Use of non-renewable primary energy, excluding non-renewable primary energy resources used as raw materials; **PENRM**: Use of non-renewable primary energy used as raw material; **PENRT**: Total use of non-renewable primary energy; **SM:** Use of secondary materials; **RSF:** Use of renewable secondary fuels; **NRSF**: Use of non-renewable secondary fuels; **FW:** Net use of running water resources; **NR:** Not relevant

Waste Categories

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
HWD	kg	6.42E-06	3.71E-07	6.63E-07	2.35E-08	1.01E-07	-7.88E-08
NHWD	kg	2.18E-04	1.93E-06	3.35E-06	1.11E-06	2.00 E-01	-1.09E-05
RWD	kg	6.26E-06	2.52E-09	6.01E-09	1.34E-07	2.32E-09	4.49E-08

HWD: Hazardous Waste Disposed; **NHWD:** Non-hazardous waste disposed of; **RWD:** Radioactive waste disposed of; **NR:** Not relevant.

Output flows

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	1.83E-04	0.00E+00	0.00E+00	8.00 E-01	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
EE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

CRU: Components for reuse; **MFR:** Materials for recycling; **MER:** Materials for energy recovery**; EE:** Exported energy**; NR:** Not relevant

6. Additional environmental information

6.1. Other indicators

The production of biochar generates water vapor as a co-product for use in the pomace plant.

Water vapor	
kg/declared unit	8.07E+00
MJ/ declared unit	2.31E+01

6.2. Indoor air emissions

The product studied does not generate emissions into the indoor air during its service life.

6.3. Emissions to soil and water

The product studied does not generate significant emissions to the soil or water during its service life.

References

[1] EN 15804:2012+A2:2019 /AC:2021. Sustainability of construction works. Environmental product declarations. Core rules for the product category of construction products.

[2] General Instructions of the GlobalEPD Program, 3rd revision. AENOR. October 2023.

[3] EN ISO 14025:2010 Environmental labels and declarations. Type III environmental declarations. Principles and procedures. (ISO 14025:2006).

[4] EN ISO 14040:2006/A1:2021. Environmental Management. Life Cycle Assessment. Principles and framework. Amendment 1. (ISO 14040:2006/ Amd 1:2020).

[5] EN ISO 14044:2006/A2:2021. Environmental Management. Life cycle assessment. Requirements and guidelines. Amendment 2. (ISO 14044:2006/ Amd 2:2020).

[6] Life Cycle Assessment Report for Environmental Product Declarations of biochar from olive pulp and pit, May 2026. Version 3.

[7] Databases and methodologies for environmental impact assessment applied using SimaPro 10.3.0.1.

[8] Erlandsson M, Peterson D, 2015. Klimatpåverkan för byggnader med olika energiprestanda. Underlagsrapport till kontrollstation 2015. IVL Swedish Environmental Research Institute report number U5176, May 27th, 2015.

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A verified environmental declaration

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