# Environmental Product Declaration

In accordance with ISO 14025:2006, EN 15804:2012+A2:2019/AC:2021 and ISO 21930:2017 for:

## C30/37 - CEM III ready-mixed concrete

from

**Duna-Dráva Cement Ltd.**

| | |
|---|---|
| Programme: | The International EPD System, www.environdec.com |
| Programme operator: | EPD International AB |
| Type of EPD: | EPD of a single product from a manufacturer |
| EPD registration number: | EPD-IES-0028809:001 |
| Version date: | 2026-02-19 |
| Validity date: | 2031-02-18 |
| | *An EPD may be updated or depublished if conditions change. To find the latest version of the EPD and to confirm its validity, see www.environdec.com* |

# GENERAL INFORMATION

| Programme Information | |
|---|---|
| **Programme:** | The International EPD® System |
| **Address:** | EPD International AB<br>Box 210 60<br>SE-100 31 Stockholm<br>Sweden |
| **Website:** | www.environdec.com |
| **E-mail:** | support@environdec.com |

| Product Category Rules (PCR) |
|---|
| **CEN standard EN 15804 and ISO standard ISO 21930 serve as the core Product Category Rules (PCR)** |
| **Product Category Rules (PCR):** Construction Products (PCR 2019:14, version 2.0.1) |
| **PCR review was conducted by:** Rob Rouwette (review panel chair, start2see Pty Ltd) and Noa Meron (review panel co-chair, thinkstep-anz), they may be contacted through the Programme Operator at support@environdec.com. |
| **c-PCR:** Concrete and concrete elements (EN 16757) (c-PCR-003, version 1.0.0), UN CPC 375**.** |
| **c-PCR review was conducted by:** This PCR was developed within CEN standardisation and adopted as a c-PCR by the International EPD System. There was thus no additional open consultation period and no additional review in addition to those within standardisation. |

| Third-party Verification |
|---|
| Independent third-party verification of the declaration and data, according to ISO 14025:2006, via:<br><br>☒ **Individual EPD verification without a pre-verified LCA/EPD tool**<br>Third-party verifier: Dr.-Ing. Nikolay Minkov, greentability Ltd.<br>Approved by: International EPD System |
| Procedure for follow-up of data during EPD validity involves third party verifier:<br><br>☐ Yes ☒ No |

The EPD owner has the sole ownership, liability, and responsibility for the EPD.
EPDs within the same product category but published in different EPD programmes, may not be comparable. For two EPDs to be comparable, they shall be based on the same PCR (including the same first-digit version number) or be based on fully aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have identical scope in terms of included life-cycle stages (unless the excluded life-cycle stage is demonstrated to be insignificant); apply identical impact assessment methods (including the same version of characterisation factors); and be valid at the time of comparison.
For further information about comparability, see EN 15804 and ISO 14025.

# INFORMATION ABOUT EPD OWNER

Owner of the EPD: Duna-Dráva Cement Ltd.

Address: 2600 Vác, Kőhídpart dülő 2.

Contact: Attila Magda
National RMC Sales Manager
magdaa@duna-drava.hu

Address and contact information of the LCA practitioner commissioned by the EPD owner:
Ágnes Farkas
Senior researcher
Bay Zoltán Nonprofit Ltd. for Applied Research
agnes.farkas@bayzoltan.hu

Description of the organisation:
Duna-Dráva Cement Ltd. (DDC) is a manufacturer of building materials in Hungary, a subsidiary of the German HeidelbergCement AG and the German SCHWENK Zement KG. DDC produces cement and ready-mix concrete, and its services cover the entire spectrum of concrete technology. DDC currently operates 2 cement plants and 30 ready-mix concrete plants in Hungary.

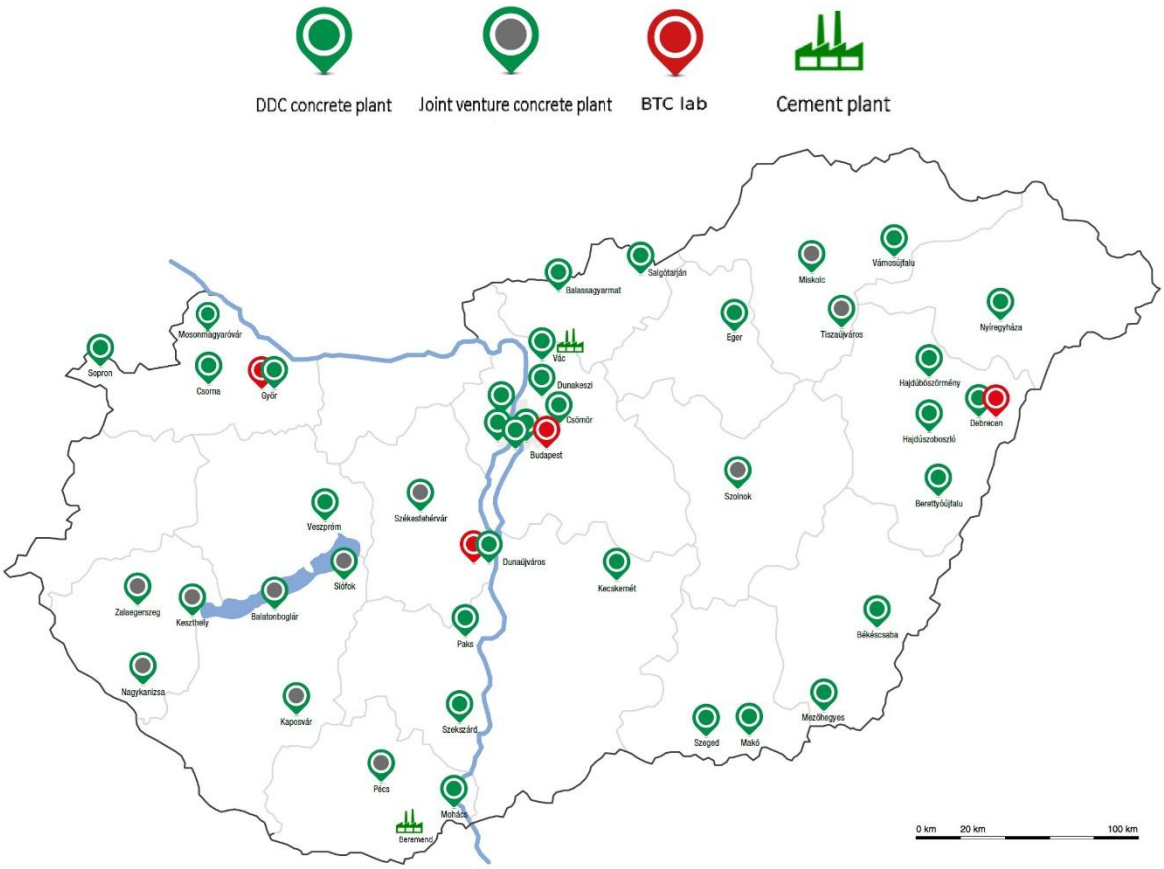



**Figure 1 - The plants and laboratories of Duna-Dráva Cement Ltd.**

DDC's concrete business unit, as the company's ready-mix concrete production unit, offers a wide range of products and serves its customers at the highest possible standards in many locations across the country. Standard and special concrete types are produced in modern concrete plants that fully meet the challenges of the time, using the most up-to-date control technology.
The business unit has a strong and secure background thanks to DDC, where in addition to ready-mix concrete production, the services also include on-site delivery and concrete pump. As part of our quality assurance activities, we operate an integrated quality management system for the control of manufactured concrete products, which covers ready-mix concrete production, product development and sales. For our concrete plants, the factory production control, as well as the aggregate, fresh concrete and hardened concrete tests, are carried out by Beton Technológia Centrum Ltd. (BTC). Continuous production control also includes the performance of tests with the required frequency and scope (sampling, quality tests), the testing of new concrete recipes and the expansion of our product range.
Product-related or management system-related certifications:
ISO 9001, ISO 14001, ISO 45001

# PRODUCT INFORMATION

Product name: C30/37 - CEM III
Product identification: The product is ready-mixed concrete according to its Declaration of Performance and complies with all applicable Hungarian regulations (MSZ 4798:2016; MSZ 4798:2016/1M:2017; MSZ 4798:2016/2M:2018; MSZ 4798:2016/3M:2021; MSZ 4798:2016/4M:2023).
UN CPC code: 375
Product description:
Ready-mixed concrete (RMC) is a pre-mixed, unhardened building material manufactured in batching plants. It consists of a blend of cement, water, and aggregates like sand and gravel, and admixtures to adjust properties according to customer requirements. A mixer or dump truck delivers the ready-mixed concrete to the place of use.


**Figure 2 – Visual representation of the product**

*Intended use:* Reinforced slab; ceiling; basement wall; pavement and carport; concrete watercourse; footing; fence; load-bearing external wall; concrete ring beam; monolithic tideover and slab coverconcrete; concrete beam; industrial floor for heavy load, column; pillar; reinforced balcony and staircase

*Technical properties:*

| Property | Standard | Measured value (unit) | Class | Value |
|---|---|---|---|---|
| Consistency - Slump | MSZ EN 12350-2:2019 - Slump test | Slump (mm) | S1 | 10-40 |
| | | | S2 | 50-90 |
| | | | S3 | 100-150 |
| | | | S4 | 160-210 |
| | | | S5 | ≥ 220 |
| Consistency - Flow | MSZ EN 12350-5:2019 - Flow table test | Flow (mm) | F1 | ≤ 340 |
| | | | F2 | 350-410 |
| | | | F3 | 420-480 |
| | | | F4 | 490-550 |
| | | | F5 | 560-620 |
| | | | F6 | ≥ 630 |
| Compressive strength | MSZ EN 12390-3:2019 - Compressive strength of test specimens | The average expected compressive strength of the concrete at the age of 28 days, with mixed storage ($N/mm^2$) | C30/37 | 46.7 |

*Manufacturing process:*

The raw materials (cement, supplementary materials, aggregates, admixtures) required for the production of concrete are transported to DDC's concrete plants by trucks, while water is provided from a network system or a drilled well. Based on the concrete recipes designed by the concrete technologist, the concrete plants produce concrete with a fully automated, computer-controlled system. After the raw materials are weighed, they leave the scales and go to the mixing level, specifically to the mixing drum, where all the components are mixed with an intensity and duration that depends on the concrete quality, at the end of the process the fresh concrete is ready. The homogeneous concrete produced in this way is finally loaded into mixer or dump trucks, which are taken to the construction site, where the concrete is delivered to the formwork, placed and post-treated.

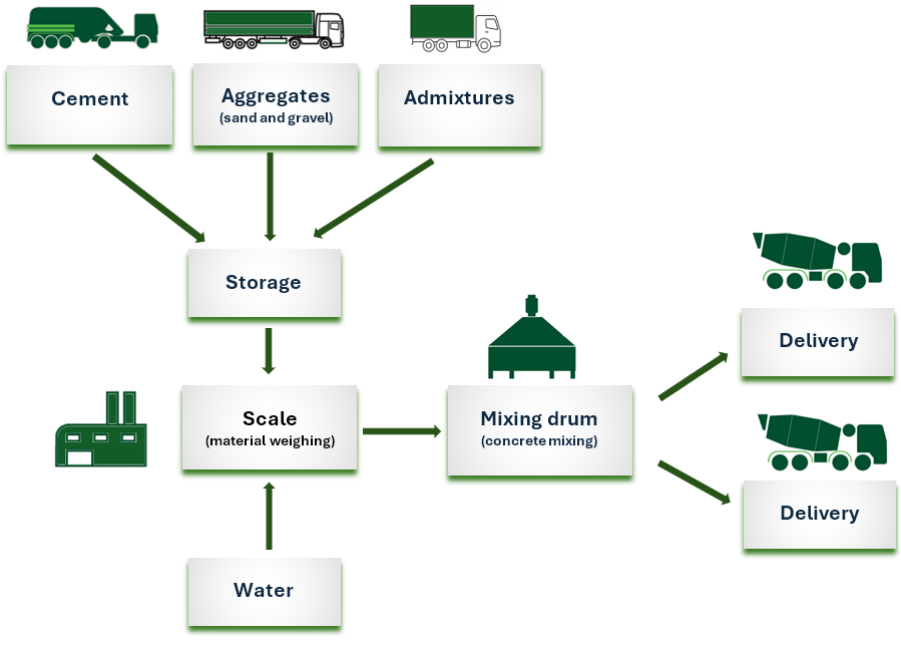



**Figure 3 – The ready-mixed concrete manufacturing process**

*Lifespan:* if the product is installed properly, its lifetime is equal to the built structure's lifetime, which can vary based on the structure.

Name and location of production sites:

| Name of the plant | Postal code | Town | Street, street number |
|---|---|---|---|
| Bojtár | 1037 | Budapest | Bojtár u. 76. |
| Dunakeszi | 2120 | Dunakeszi | Székesdűlő 8030. hrsz. |
| Csömör | 2141 | Csömör | Határ u. 019/38. hrsz. |
| Basa | 1107 | Budapest | Basa u. 22. |
| Csepel | 1214 | Budapest | II. Rákóczi Ferenc út. 277. |
| Bányalég | 1225 | Budapest | Bányalég u. 102. |
| Sopron | 9400 | Sopron | Ipar krt. 7. |
| Mosonmagyaróvár | 9200 | Mosonmagyaróvár | Éger u. 19. |
| Csorna, Mobil 9 | 9300 | Csorna | Vasutas u. 3. |
| Győr | 9028 | Győr | Fehérvári út 75. |
| Dunaújváros | 2400 | Dunaújváros | Lokomotív u. 2. |
| Paks | 7030 | Paks | Vasút u. 3584/18. hrsz. |
| Szekszárd | 7100 | Szekszárd | Tartsay u. 32. |
| Mohács | 7700 | Mohács | Budapesti országút 57. |
| Veszprém | 8200 | Veszprém | Tüzér u. 91. |
| Vác | 2600 | Vác | Derecske dűlő 0413/2. hrsz. |
| Balassagyarmat | 2660 | Balassagyarmat | Kóvári út 28. |
| Salgótarján | 3100 | Salgótarján | Kertész út 8. |
| Eger | 3300 | Eger | Homok u. 11. |
| Békéscsaba | 5600 | Békéscsaba | Ipari út 40. |
| Makó, Mobil 1 | 6900 | Makó | Újvárosi Vasútállomás útja 10546/2. hrsz. |
| Mezőhegyes | 5820 | Mezőhegyes | Külterület 0242/16 hrsz. |
| Szeged | 6728 | Szeged | Vásár u. 18. |
| Kecskemét | 6000 | Kecskemét | Könyves Kálmán krt. 20. |
| Hajdúszoboszló | 4200 | Hajdúszoboszló | Balmazújvárosi útfél, 0544/97. hrsz. |
| Hajdúböszörmény | 4220 | Hajdúböszörmény | Külső-Debreceni út 31. |
| Debrecen | 4002 | Debrecen | Vértesi út 1. |
| Berettyóújfalu | 4100 | Berettyóújfalu | Ipari Park 5818. |
| Nyíregyháza | 4405 | Nyíregyháza | Tünde u. 10/A. |
| Vámosújfalu, Mobil 8 | 3941 | Vámosújfalu | Külterület 066. hrsz. |

For further information about the product, visit https://www.ddcbeton.hu/en/concrete-products.

# CONTENT DECLARATION

The mass (weight) of one unit of a product per declared unit: 2 347 kg/m$^3$

| Product content | Mass, kg | Post-consumer recycled material, mass-% of product | Biogenic material, mass-% of product | Biogenic material, kg C/product or declared unit |
|---|---|---|---|---|
| Sand | 754 | 0 | 0 | 0 |
| Gravel | 1 108 | 0 | 0 | 0 |
| Cement | 374 | 0* | 0 | 0 |
| Limestone flour | 0.90 | 0 | 0 | 0 |
| Water | 106.4 | 0 | 0 | 0 |
| Admixtures | 3.17 | 0 | 0 | 0 |
| **TOTAL** | **2 347** | **0** | **0** | **0** |

**: Conservative assumption*

Information on the environmental and hazardous/toxic properties of a substances contained in the product: No substance listed under the REACH Regulation is present in this product, either above the limits for registration with the European Chemicals Agency or in excess of 0.1 weight-% of the product.

Packaging content declaration: The product has no packaging.

# LCA INFORMATION

Declared unit: **1 m³ of ready-mixed concrete** ready for distribution at the factory gate
Conversion factor to mass: 2 347 kg/m³

Reference service life: if the product is installed properly, its lifetime is equal to the built structure's lifetime, which can vary based on the structure.
Time representativeness: the reference year of the study is the calendar year 2024.
Geographical scope: the whole life cycle takes place in Hungary as ready-mixed concrete can't be transported for long distances.

LCA software used: LCA for Experts by Sphera, MS Excel
LCA databases used: Managed LCA content (Sphera, 2025.02 CUP), Ecoinvent 3.11

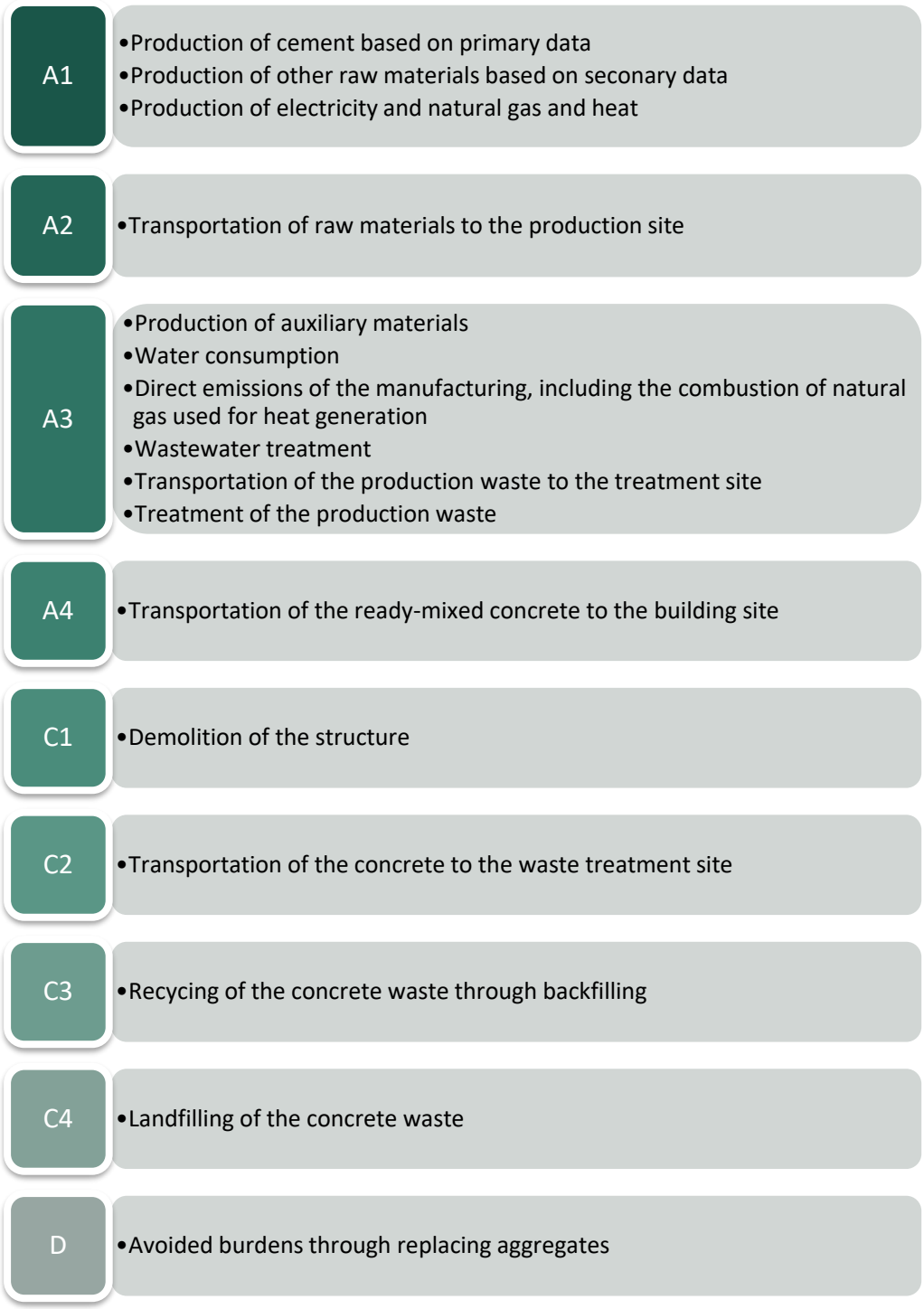
Description of system boundaries:
The system boundary is Cradle to gate with options, modules C1-C4, module D and with optional module A4. This is compliant with the requirements of EN 16757 (the ISO standard which is the basis of the EPD International c-PCR).
Module A5 is outside of the system boundary since the installation possibilities are very wide and depend on the party responsible for the construction itself. Modules B1-B7 are outside of the system boundary since it also highly depends on the exact application of the product. This also means that carbonation is not considered in any part of the study and not calculated for any of the modules.
The infrastructure, capital goods, business travel and commuting of personnel, and R&D activities are excluded from the system boundary. The packaging for the raw materials is considered negligible since the vast majority either arrives in bulk or in IBC tanks and are transferred to DDC's IBC tanks by pumps.

Modules declared, geographical scope, share of primary data (in GWP-GHG results) and data variation (in GWP-GHG results):

| | Product stage | | | Construc-tion process stage | | Use stage | | | | | | | End-of-life stage | | | | Benefits and loads beyond the system boundary |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Raw material supply | Transport | Manufacturing | Transport | Construction installation | Use | Maintenance | Repair | Replacement | Refurbishment | Operational energy use | Operational water use | Demolition | Transport | Waste processing | Disposal | Reuse, recovery, recycling potential |
| **Module** | **A1** | **A2** | **A3** | **A4** | **A5** | **B1** | **B2** | **B3** | **B4** | **B5** | **B6** | **B7** | **C1** | **C2** | **C3** | **C4** | **D** |
| Module declared | X | X | X | X | ND | ND | ND | ND | ND | ND | ND | ND | X | X | X | X | x |
| Geography | HU | HU | HU | HU | - | - | - | - | - | - | - | - | HU | HU | HU | HU | HU |
| Share of primary data | 87.72% | | | | | | | | | | | | | | | | |
| Variation - products | 0% | | | | | | | | | | | | | | | | |
| Variation - sites | -31.91% 17.18% | | | | | | | | | | | | | | | | |

When a module is accounted for, the cell in the "Module declared" row is marked with an "X".
When a module is not accounted for, the cell in the "Module declared" row is marked with "ND", not declared.

Process flow diagram:




More information:

**Allocation:**

- Cement production: economic allocation was used for the co-products that are consumed by the cement production. As these co-products can be assumed to contribute less than 1% to the total revenue of the producers, they can be considered negligible and are assumed to enter the cement production system burden-free. This is in line with the currently available cement c-PCR (EN16908+A1). Based on reference datasets where both economically allocated and burden-

free versions are available, the GWP-total impact could be 1-2.5% higher per unit of cement if economic allocation was applied.

- Concrete production: In some of the plants the waste concrete was treated as a by-product with negligible market value and local building projects (for example road building projects) used up these materials as filler. Due to the negligible market value, these co-products received 0% of the impacts of the production through economic allocation, which is a conservative assumption for the concrete product, since 100% of the production's impacts are allocated to it.

**Cut-off:** None of the flows were cut-off.

**Data quality assessment:**

| Name | Source type | Source | Reference year | Data category | Share of primary data, of GWP-GHG results for A1-A3 |
|---|---|---|---|---|---|
| Cement production | Collected data | EPD owner | 2024 | Primary data | 76.14% |
| Production of other raw materials (gravel, sand, water, admixtures) | Database | Sphera, Ecoinvent 3.11 | 2024 | Secondary data | 0.00% |
| Transportation of materials to the manufacturing site | Database | Sphera | 2024 | Primary data | 9.82% |
| Generation of electricity used in manufacturing | Database | Ecoinvent 3.11 | 2024 | Primary data | 1.76% |
| Total share of primary data, of GWP-GHG results for A1-A3 | | | | | 87.72% |

The share of primary data is calculated based on GWP-GHG results. It is a simplified indicator for data quality that supports the use of more primary data, to increase the representativeness of and comparability between EPDs. Note that the indicator does not capture all relevant aspects of data quality and is not comparable across product categories.
In the case of some admixtures proxy datasets were used in the modelling due to lack of presentative datasets, which means that for these datasets the technological representativeness was classified as poor. The contribution of these datasets was 2.47% to the GWP-GHG results of A1-A3.

**Electricity source:**
DDC is using electricity from the grid, so the Hungarian residual mix was applied from the Ecoinvent database for the A3 life cycle phase.

Database: Ecoinvent 3.11
GWP-GHG: 0.423 kg $CO_2$eq/kWh

**Scenarios for the downstream life cycle phases:**
*A4 – Transportation of the ready-mixed concrete to the building site*
The following parameters were assumed for the distribution life cycle phase, based on primary data:

| Parameter | Value |
|---|---|
| Vehicle | Mixer truck (EURO 4) |
| Fuel | Diesel |
| Transport distance | 11.4 km |
| Payload capacity | 15.3 t |
| Returns | Empty returns |

*C1 – Demolition of the structure*
The fuel consumption of the machines used in the demolition of the concrete structure is assumed to be 70 MJ per ton of concrete based on literature sources[i].
It is also assumed that 100% of the concrete waste is collected for waste treatment.

*C2 – Transportation of the concrete to the waste treatment site*
The parameters for this scenario were determined based on reasonable assumptions.

| Parameter | Value |
|---|---|
| Vehicle | Truck (average EURO mix) |
| Total weight | 22 t |
| Fuel | Diesel |
| Transport distance | 50 km |
| Utilization rate | based on Sphera assumption (61%) |

*C3 – Waste processing*
The majority of mineral demolition waste generated in Hungary is used as backfilling of roads according to Eurostat[ii]. Concrete waste belongs to this flow but it was not quantified separately so it was assumed that the concrete is reused at the same rate as mineral demolition wastes in general.
In 2022 the total mineral demolition waste in Hungary was 3 794 kilotonne and 3 735 kilotonne of this quantity was recovered. Since the majority of the recovered quantity was used as backfilling (2 891 kilotonne), backfilling is the assumed recovery option in the default scenario. More recent reliable data was not available. Based on the above-mentioned values and assumptions, 98.4% of the concrete waste was used as backfilling. The collected concrete waste needs to be further crushed to be used as backfilling, which is included in the selected waste treatment process developed by Ecoinvent. At this stage the material reached the end-of-waste stage and does not require further processing.
In the 100% recycling scenario, it is assumed that 100% of the waste is used as backfilling and none of it is landfilled.

*C4 – Disposal*
Based on the same Eurostat database and the same assumptions as above, the rest of the concrete waste (59 kilotonne) was sent to landfill in Hungary, which is 1.6% of the total concrete waste.
In the 100% landfilling scenario, it is assumed that 100% of the waste is landfilled and none of it is recycled.

*D – Reuse, recovery, recycling potential*
As backfilling, the concrete waste can substitute gravel, so gravel production was avoided.
The quality adjustment factor was assumed to be 1 as it has been assessed to be functionally equivalent to gravel in this context by multiple studies [iii] [iv] [v].
In the 100% recycling scenario the D module was also calculated and for the 100% landfilling scenario there were no benefits.

**Characterization methods:** EN 15804 based on EF 3.1 reference package.

# ENVIRONMENTAL PERFORMANCE

## LCA results of the product(s) - main environmental performance results

The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks.
The results of the end-of-life stage (modules C1-C4) should be considered when using the results of the product stage (modules A1-A3).

### Mandatory impact category indicators according to EN 15804:2012+A2:2019/ AC:2021

| Results per declared unit | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Indicator** | **Unit** | **A1-A3** | **A4** | **C1** | **C2** | **C3** | **C4** | **D** |
| GWP-fossil | kg CO2 eq. | 1.65E+02 | 3.11E+00 | 1.65E+01 | 1.21E+01 | 1.02E+01 | 5.74E-01 | -4.68E+00 |
| GWP-biogenic | kg CO2 eq. | 2.46E+01 | 1.60E-02 | 3.35E-03 | 0.00E+00 | 2.06E-03 | 0.00E+00 | 0.00E+00 |
| GWP-luluc | kg CO2 eq. | 2.16E-01 | 3.31E-02 | 1.69E-03 | 1.28E-01 | 1.04E-03 | 2.35E-03 | -2.83E-02 |
| GWP-total | kg CO2 eq. | 1.89E+02 | 3.16E+00 | 1.65E+01 | 1.22E+01 | 1.02E+01 | 5.74E-01 | -4.62E+00 |
| ODP | kg CFC 11 eq. | 7.64E-07 | 5.33E-13 | 2.45E-07 | 1.47E-12 | 1.51E-07 | 1.60E-12 | -3.55E-11 |
| AP | mol H+ eq. | 2.35E-01 | 2.26E-02 | 1.48E-01 | 7.65E-02 | 9.08E-02 | 4.06E-03 | -2.43E-02 |
| EP-freshwater | kg P eq. | 7.05E-03 | 8.66E-06 | 5.33E-04 | 3.36E-05 | 3.27E-04 | 8.54E-07 | -1.18E-05 |
| EP-marine | kg N eq. | 1.76E-01 | 1.13E-02 | 6.89E-02 | 3.80E-02 | 4.23E-02 | 1.06E-03 | -8.74E-03 |
| EP-terrestrial | mol N eq. | 1.32E+00 | 1.23E-01 | 7.53E-01 | 4.13E-01 | 4.63E-01 | 1.16E-02 | -9.54E-02 |
| POCP | kg NMVOC eq. | 2.24E-01 | 2.14E-02 | 2.25E-01 | 7.03E-02 | 1.38E-01 | 3.18E-03 | -2.30E-02 |
| ADP-minerals&metals* | kg Sb eq. | 9.45E-05 | 2.14E-07 | 5.90E-06 | 8.26E-07 | 3.63E-06 | 3.55E-08 | -5.07E-07 |
| ADP-fossil* | MJ | 1.06E+03 | 4.12E+01 | 2.13E+02 | 1.59E+02 | 1.31E+02 | 7.53E+00 | -7.04E+01 |
| WDP* | m3 | 7.83E+00 | 1.47E-02 | 6.53E-01 | 4.99E-02 | 4.01E-01 | 6.21E-02 | -5.12E-01 |

** 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 experienced with the indicator.*

### Additional mandatory impact category indicators

| Results per declared unit | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Indicator** | **Unit** | **A1-A3** | **A4** | **C1** | **C2** | **C3** | **C4** | **D** |
| GWP-GHG | kg CO2 eq. | 1.65E+02 | 3.14E+00 | 1.65E+01 | 1.22E+01 | 1.02E+01 | 5.74E-01 | -4.62E+00 |

## Additional voluntary impact category indicators

| Results per declared unit | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Indicator** | **Unit** | **A1-A3** | **A4** | **C1** | **C2** | **C3** | **C4** | **D** |
| Particulate matter | Disease indicences | 4.31E-06 | 9.53E-08 | 4.17E-06 | 4.88E-07 | 1.17E-05 | 5.05E-08 | -1.39E-06 |
| Ionising radiation, human health | kBq U235 eq. | 1.47E+01 | 1.12E-02 | 9.18E-02 | 2.90E-02 | 5.64E-02 | 8.86E-03 | -7.55E-01 |
| Ecotoxicity, freshwater | CTUe | 4.00E+02 | 5.35E+01 | 1.14E+01 | 2.06E+02 | 7.00E+00 | 5.82E+00 | -5.41E+01 |
| Human toxicity, cancer | CTUh | 1.35E-08 | 7.22E-10 | 1.78E-09 | 2.78E-09 | 1.10E-09 | 1.00E-10 | -1.20E-09 |
| Human toxicity, non-cancer | CTUh | 1.82E-06 | 4.04E-08 | 2.71E-08 | 1.56E-07 | 1.67E-08 | 3.75E-09 | -5.42E-08 |
| Land use | Pt | 2.03E+02 | 1.82E+01 | 1.41E+01 | 7.05E+01 | 8.69E+00 | 1.86E+00 | -2.23E+01 |

## Resource use indicators

| Results per declared unit | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Indicator** | **Unit** | **A1-A3** | **A4** | **C1** | **C2** | **C3** | **C4** | **D** |
| PERE | MJ | 8.33E+01 | 3.10E+00 | 1.36E+00 | 1.17E+01 | 8.34E-01 | 1.45E+00 | -2.54E+01 |
| PERM | MJ | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| PERT | MJ | 8.33E+01 | 3.10E+00 | 1.36E+00 | 1.17E+01 | 8.34E-01 | 1.45E+00 | -2.54E+01 |
| PENRE | MJ | 1.06E+03 | 4.12E+01 | 2.13E+02 | 1.59E+02 | 1.31E+02 | 7.53E+00 | -7.04E+01 |
| PENRM | MJ | 1.24E+01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| PENRT | MJ | 1.07E+03 | 4.12E+01 | 2.13E+02 | 1.59E+02 | 1.31E+02 | 7.53E+00 | -7.04E+01 |
| SM | kg | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| RSF | MJ | 2.61E+02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| NRSF | MJ | 2.97E+02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| FW | m3 | 3.79E-01 | 1.53E-03 | 1.52E-02 | 5.63E-03 | 9.34E-03 | 1.82E-03 | -2.06E-02 |

*The primary energy use indicators were calculated according to option B of the PCR.*

## Waste indicators

| Results per declared unit | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Indicator** | **Unit** | **A1-A3** | **A4** | **C1** | **C2** | **C3** | **C4** | **D** |
| Hazardous waste disposed | kg | 6.46E-01 | 1.65E-09 | 1.91E-01 | 5.75E-09 | 1.17E-01 | 1.65E-09 | -4.16E-08 |
| Non-hazardous waste disposed | kg | 8.37E+01 | 5.75E-03 | 1.41E+00 | 2.09E-02 | 8.68E-01 | 3.76E+01 | -9.62E+01 |
| Radioactive waste disposed | kg | 7.71E-03 | 7.77E-05 | 0.00E+00 | 2.09E-04 | 0.00E+00 | 7.99E-05 | -4.64E-03 |

### Output flow indicators

| Results per declared unit | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Indicator** | **Unit** | **A1-A3** | **A4** | **C1** | **C2** | **C3** | **C4** | **D** |
| Components for re-use | kg | 5.81E-05 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Material for recycling | kg | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 2.31E+03 | 0.00E+00 | 0.00E+00 |
| Materials for energy recovery | kg | 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 | 3.06E-03 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Exported energy, thermal | MJ | 3.88E-03 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |

## Additional LCA results (other environmental performance results) of the product(s)

### Results for additional scenarios for modules A3-D

#### Mandatory impact category indicators according to EN 15804:2012+A2:2019/ AC:2021

| Results per declared unit | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Indicator** | **Unit** | **100% recycling scenario** | | | **100% landfilling scenario** | | |
| | | **C3** | **C4** | **D** | **C3** | **C4** | **D** |
| GWP-fossil | kg CO2 eq. | 1.03E+01 | 0.00E+00 | -4.76E+00 | 0.00E+00 | 3.59E+01 | 0.00E+00 |
| GWP-biogenic | kg CO2 eq. | 2.09E-03 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| GWP-luluc | kg CO2 eq. | 1.06E-03 | 0.00E+00 | -2.88E-02 | 0.00E+00 | 1.47E-01 | 0.00E+00 |
| GWP-total | kg CO2 eq. | 1.03E+01 | 0.00E+00 | -4.70E+00 | 0.00E+00 | 3.59E+01 | 0.00E+00 |
| ODP | kg CFC 11 eq. | 1.53E-07 | 0.00E+00 | -3.61E-11 | 0.00E+00 | 9.99E-11 | 0.00E+00 |
| AP | mol H+ eq. | 9.23E-02 | 0.00E+00 | -2.46E-02 | 0.00E+00 | 2.54E-01 | 0.00E+00 |
| EP-freshwater | kg P eq. | 3.33E-04 | 0.00E+00 | -1.20E-05 | 0.00E+00 | 5.34E-05 | 0.00E+00 |
| EP-marine | kg N eq. | 4.30E-02 | 0.00E+00 | -8.88E-03 | 0.00E+00 | 6.63E-02 | 0.00E+00 |
| EP-terrestrial | mol N eq. | 4.70E-01 | 0.00E+00 | -9.69E-02 | 0.00E+00 | 7.23E-01 | 0.00E+00 |
| POCP | kg NMVOC eq. | 1.41E-01 | 0.00E+00 | -2.34E-02 | 0.00E+00 | 1.99E-01 | 0.00E+00 |
| ADP-minerals&metals* | kg Sb eq. | 3.68E-06 | 0.00E+00 | -5.15E-07 | 0.00E+00 | 2.22E-06 | 0.00E+00 |
| ADP-fossil* | MJ | 1.33E+02 | 0.00E+00 | -7.15E+01 | 0.00E+00 | 4.71E+02 | 0.00E+00 |
| WDP* | m3 | 4.07E-01 | 0.00E+00 | -5.20E-01 | 0.00E+00 | 3.88E+00 | 0.00E+00 |

** 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 experienced with the indicator.*

#### Additional mandatory impact category indicators

| Results per declared unit | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Indicator** | **Unit** | **100% recycling scenario** | | | **100% landfilling scenario** | | |
| | | **C3** | **C4** | **D** | **C3** | **C4** | **D** |
| GWP-GHG | kg CO2 eq. | 1.03E+01 | 0.00E+00 | -4.70E+00 | 0.00E+00 | 3.59E+01 | 0.00E+00 |

## Additional voluntary impact category indicators

| Results per declared unit | | | | | | | |
|---|---|---|---|---|---|---|---|
| Indicator | Unit | 100% recycling scenario | | | 100% landfilling scenario | | |
| | | C3 | C4 | D | C3 | C4 | D |
| Particulate matter | Disease indicences | 1.19E-05 | 0.00E+00 | -1.42E-06 | 0.00E+00 | 3.16E-06 | 0.00E+00 |
| Ionising radiation, human health | kBq U235 eq. | 5.73E-02 | 0.00E+00 | -7.67E-01 | 0.00E+00 | 5.54E-01 | 0.00E+00 |
| Ecotoxicity, freshwater | CTUe | 7.11E+00 | 0.00E+00 | -5.50E+01 | 0.00E+00 | 3.64E+02 | 0.00E+00 |
| Human toxicity, cancer | CTUh | 1.11E-09 | 0.00E+00 | -1.22E-09 | 0.00E+00 | 6.26E-09 | 0.00E+00 |
| Human toxicity, non-cancer | CTUh | 1.69E-08 | 0.00E+00 | -5.51E-08 | 0.00E+00 | 2.34E-07 | 0.00E+00 |
| Land use | Pt | 8.83E+00 | 0.00E+00 | -2.27E+01 | 0.00E+00 | 1.16E+02 | 0.00E+00 |

## Resource use indicators

| Results per declared unit | | | | | | | |
|---|---|---|---|---|---|---|---|
| Indicator | Unit | 100% recycling scenario | | | 100% landfilling scenario | | |
| | | C3 | C4 | D | C3 | C4 | D |
| PERE | MJ | 8.47E-01 | 0.00E+00 | -2.58E+01 | 0.00E+00 | 9.08E+01 | 0.00E+00 |
| PERM | MJ | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| PERT | MJ | 8.47E-01 | 0.00E+00 | -2.58E+01 | 0.00E+00 | 9.08E+01 | 0.00E+00 |
| PENRE | MJ | 1.33E+02 | 0.00E+00 | -7.15E+01 | 0.00E+00 | 4.71E+02 | 0.00E+00 |
| PENRM | MJ | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| PENRT | MJ | 1.33E+02 | 0.00E+00 | -7.15E+01 | 0.00E+00 | 4.71E+02 | 0.00E+00 |
| 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 | m3 | 9.49E-03 | 0.00E+00 | -2.10E-02 | 0.00E+00 | 1.14E-01 | 0.00E+00 |

*The primary energy use indicators were calculated according to option B of the PCR.*

## Waste indicators

| Results per declared unit | | | | | | | |
|---|---|---|---|---|---|---|---|
| Indicator | Unit | 100% recycling scenario | | | 100% landfilling scenario | | |
| | | C3 | C4 | D | C3 | C4 | D |
| Hazardous waste disposed | kg | 1.19E-01 | 0.00E+00 | -4.23E-08 | 0.00E+00 | 1.03E-07 | 0.00E+00 |
| Non-hazardous waste disposed | kg | 8.82E-01 | 0.00E+00 | -9.78E+01 | 0.00E+00 | 2.35E+03 | 0.00E+00 |
| Radioactive waste disposed | kg | 0.00E+00 | 0.00E+00 | -4.72E-03 | 0.00E+00 | 5.00E-03 | 0.00E+00 |

## Output flow indicators

| Results per declared unit | | | | | | | |
|---|---|---|---|---|---|---|---|
| Indicator | Unit | 100% recycling scenario | | | 100% landfilling scenario | | |
| | | C3 | C4 | D | 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 |
| Material for recycling | kg | 2.35E+03 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Materials for energy recovery | kg | 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 |
| Exported energy, thermal | MJ | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |

# ABBREVIATIONS

| Abbreviation | Definition |
|---|---|
| EN | European Norm (Standard) |
| EF | Environmental Footprint |
| GPI | General Programme Instructions |
| ISO | International Organization for Standardization |
| CEN | European Committee for Standardization |
| CPC | Central product classification |
| SVHC | Substances of Very High Concern |
| ND | Not Declared |
| DDC | Duna-Dráva Cement Ltd. |
| RMC | Ready-mixed concrete |
| GWP-fossil | Global Warming Potential fossil fuels |
| GWP-biogenic | Global Warming Potential biogenic |
| GWP-luluc | Global Warming Potential land use and land use change |
| ODP | Depletion potential of the stratospheric ozone layer |
| AP | Acidification potential, Accumulated Exceedance |
| EP-freshwater | Eutrophication potential, fraction of nutrients reaching freshwater end compartment |
| EP-marine | Eutrophication potential, fraction of nutrients reaching marine end compartment |
| EP-terrestrial | Eutrophication potential, Accumulated Exceedance |
| POCP | Formation potential of tropospheric ozone |
| ADP-minerals&metals | Abiotic depletion potential for non-fossil resources |
| ADP-fossil | Abiotic depletion for fossil resources potential |
| WDP | Water (user) deprivation potential, deprivation-weighted water consumption |
| GWP-GHG | This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. |
| 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 re-sources |
| SM | Use of secondary material |
| RSF | Use of renewable secondary fuels |
| NRSF | Use of non-renewable secondary fuels |
| FW | Use of net fresh water |

# REFERENCES

- ISO 14025:2006. Labels and environmental declarations – Type III Environmental declarations – Principles and procedures.
- EN 15804:2012+A2:2019+AC:2021, Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products.
- ISO 21930:2017 – Sustainability in building construction – Environmental declaration of building products.
- Construction Products (PCR 2019:14, version 2.0.1)
- c-PCR-001 – Cement and building lime (EN 16908:2017+A1:2022) 1.0.0
- c-PCR-003 - Concrete and concrete elements (EN 16757) 1.0.0
- General Program Instructions (GPI) for the International EPD system; version 5.0.1

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[i] Dos Santos Gervasio, H. and Dimova, S., Model for Life Cycle Assessment (LCA) of buildings , EUR 29123 EN, Publications Office of the European Union, 2018, ISBN 978-92-79-79974-7 (print),978-92-79-79973-0 (pdf), doi:10.2760/10016 (online),10.2760/789069 (print), JRC110082.

[ii] https://ec.europa.eu/eurostat/databrowser/view/env_wastrt__custom_19541475/default/table

[iii] Tolsma, S. and Torfgård, I. (2018). Recycling of concrete for sustainable road construction: Why are proven methods not currently used? Degree project. Uppsala University, Uppsala. Available at: http://www.diva-portal.org/smash/get/diva2:1230504/FULLTEXT01.pdf

[iv] Behera, M., Bhattacharyya, S.K., Minocha, A.K., Deoliya, R. and Maiti, S. (2014). Recycled concrete aggregate as road base, Waste Management, 34(3), pp. 677–687

[v] Mazhar, M. A., Alam, P., Ahmed, S., Khan, M. S., & Adam, F. A. (2023). Sustainable usage of demolished concrete waste as a sub-base material in road pavement. Frontiers in Sustainability, 4.

# VERSION HISTORY

**Original Version of the EPD, 2026-02-19**

EPD
INTERNATIONAL EPD SYSTEM
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