

TMR MRTS70 Cast-in-place piles - 32 MPa (Exp B1)

Country Region - North Queensland

QUEENSLAND - NORTH QUEENSLAND

Environmental Product Declaration

In Accordance with Environdec c-PCR-003 Concrete, concrete elements (EN 16757:2022), ISO 14025, and EN 15804:2012+A2:2019/AC:2021

Program: The International EPD System, www.environdec.com

Programme Operator: EPD International AB

Regional Programme: EPD Australasia

EPD Owner: Heidelberg Materials Australia

This is a single company, single product EPD based on multiple manufacturing sites. 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.

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Heidelberg Materials





Contents

1. **General Information**
2. **Information about EPD owner**
3. **Product Information**
4. **Content Declaration**
5. **LCA Information**
6. **Environmental Performance**
7. **Abbreviations**
8. **Version History**
9. **References**



1. General Information

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.

Heidelberg Materials Australia Pty Ltd has sole ownership, liability, and responsibility for the EPD.

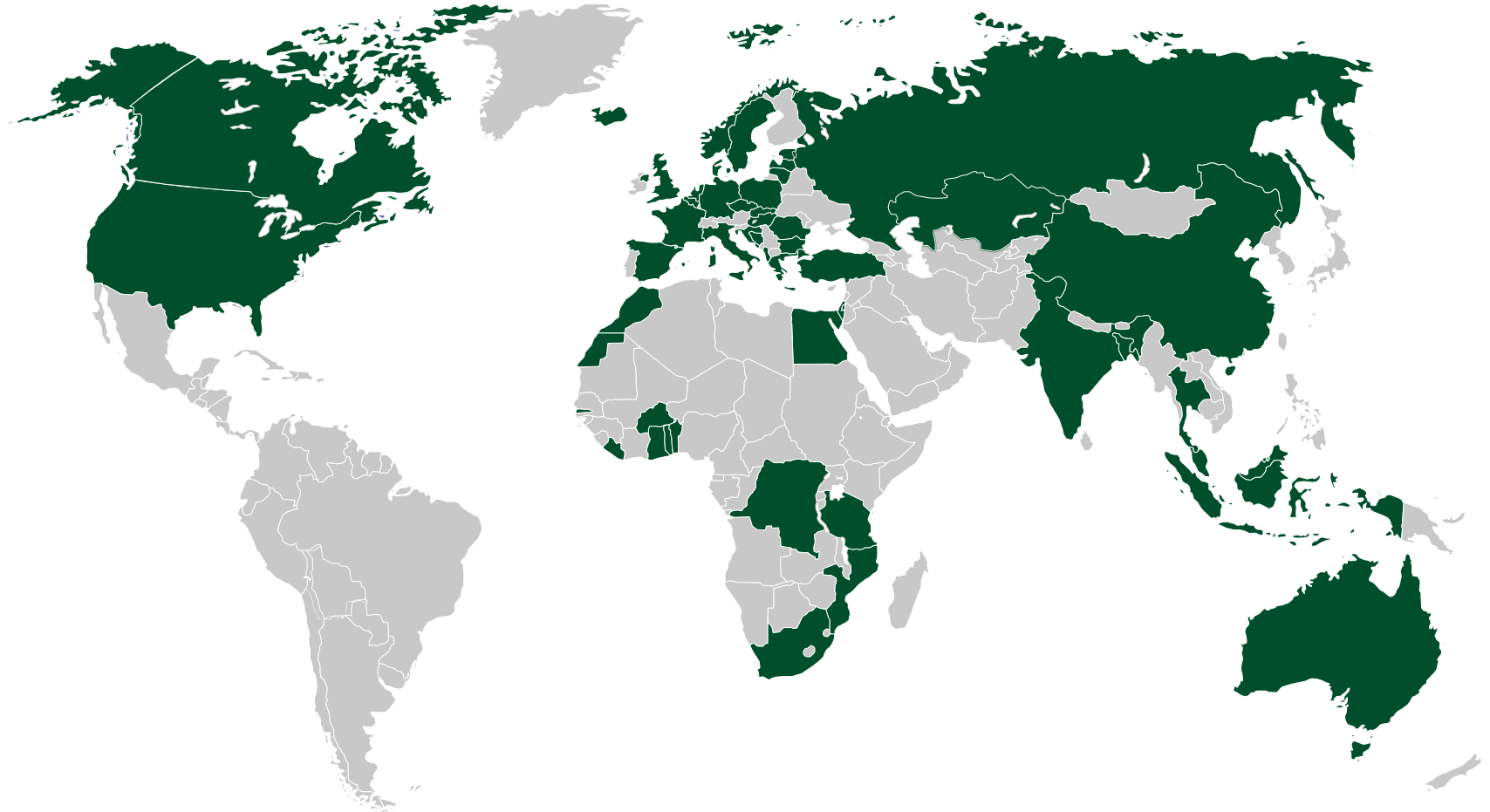
| | | |
|------------------------------------|--|---|
| Programme Operator | EPD International AB, Box 210 60, SE-100 31 Stockholm, Sweden Online: www.environdec.com Email: support@environdec.com |  THE INTERNATIONAL EPD® SYSTEM |
| Regional Programme Operator | EPD Australasia Limited, 6 Cube Court, Richmond, Tasman 7020 New Zealand Online: epd-australasia.com Email: info@epd-Australasia.com |  AUSTRALASIA EPD® |
| EPD Registration Number | EPD-IES-0019015:001 | |
| Published | 2026-02-16 | Valid until: 2031-02-16 |
| Reference year for data: | 2025 | |

| | |
|-------------------------------------|---|
| Product Category Rules: | CEN standard EN 15804 serves as the core Product Category Rules (PCR). |
| PCR: | PCR 2019:14 Construction Products, Version 2.0.1, 2025-06-05 (valid until 2030-04-07) |
| PCR review was conducted by: | The Technical Committee of the International EPD® System. See www.environdec.com for a list of members. Review chair: Rob Rouwette start2see (chair), Noa Meron thinkstep-anz (co-chair). The review panel may be contacted via the Secretariat www.environdec.com/contact . |
| C-PCR: | Environdec c-PCR-003 Concrete, concrete elements, version 2025-04-08 (EN 16757:2023) served as sub-PCR. |

| | | |
|---|--|---|
| Verification: | External and independent ('third-party') verification of the declaration and data, according to ISO 14025:2006, via EPD verification through: <input checked="" type="checkbox"/> EPD process certification* with a pre-verified LCA/EPD tool | |
| Process certifier: | Epsten Group, Inc. 101 Marietta St. NW, Suite 2600, Atlanta, Georgia 30303, USA www.epstengroup.com A2LA, Certificate #3142.03 |  |
| Accredited by: | Megan Blizzard |  |
| Pre-verified LCA Tool: | Industry EPD tool for Clinker, Cement, Aggregates, Concrete and Precast products version 5.2 (GCCA Tool) | |
| Third-party verifier, accountable for the tool verification: | Elia Rillo Studio Fieschi & soci Sri Società con Socio Unico Società soggetta a direzione e coordinamento di Tinexta S.p.A. |  |
| Tool verifier approved by: | The International EPD System |  |
| Procedure for follow-up of data during EPD validity involves third-party verifier: | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | |

2. Information about EPD owner

Heidelberg Materials is one of the world's largest building materials companies focused on producing materials to build our future.



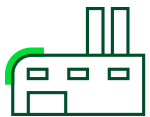
50 countries



51,000 employees



3,000 locations



Leading market positions in cement, aggregates and ready-mixed concrete.



Revenue in 2023 – 21.2 Billion Euro

EPD Owner

Heidelberg Materials Australia Pty Ltd
L14, 35 Clarence St, Sydney NSW 2000
Phone: 1300 136 464
Online: www.heidelbergmaterials.com.au



Global expertise, Local experience

With more than 4,000 employees across 300 sites, we have an extensive production and logistics network across Australia.

We think global and act local - we benefit from global research and development enhanced by national collaboration to offer a comprehensive range of high-quality concrete, aggregates, road base, sand and asphalt products. We also produce a wide range of sustainable and recycled construction materials for civil construction and infrastructure projects.

We are driven by excellence and high performance and together we will shape Australia's construction materials industry building a legacy for generations to come.



Our sustainability charter



The Heidelberg Materials Australia group of companies are leaders in the heavy construction materials industry. However, we never take it for granted. We help to build the infrastructure of communities by working with them and being a part of them. While we are known for our “we’ll make it happen” attitude, we are conscious of our socio-economic and environmental impacts.

One of our strategic goals is to drive operational excellence and innovation, which means we are always looking for new ways of working to help preserve and protect our planet’s natural resources.

Heidelberg Materials sustainability commitments 2030 serve as a guiding principle for our sustainability strategy.

The strategy is comprised of four strategic pillars and supports initiatives that focus on CO₂ Emissions, Sustainable Products, Biodiversity, Water and Corporate Social Responsibility.

To realise these sustainability goals, individual plans will be developed for our operations, addressing their unique sustainability challenges. We will also build sustainability targets into everyone’s roles, recruit sustainability champions and invest in resources and projects that support our sustainability plans. Our plans and commitments align directly with each of our core values: Care, Collaboration and Ownership.

Committing to these goals as a team is an important part of being a truly sustainable business.

I look forward to working together to realise better outcomes for our people, our communities and our planet.

Phil Schacht
Chief Executive
Heidelberg Materials Australia

“Driven by excellence and high performance, together we will shape Australia’s construction materials industry, building a legacy for generations to come”



Product Information

Heidelberg Materials Concrete

Heidelberg Materials manufactures concrete, asphalt and aggregates, ranging in specification and application. Heidelberg Materials offers a full range of concrete products ranging from standard, to low carbon, or decorative concrete; see our website for details.

Product Information

Concrete products consist of a mixture of aggregates, cementitious binder, supplementary cementitious materials, natural and/or manufactured sand, and admixtures.

This EPD covers QM322CP35 concrete, manufactured by Heidelberg Materials in Cairns, Innisfail, Port Douglas, Tully, Townsville, and Woree, in North Queensland, QLD, Australia.

Technical Compliance

Heidelberg Materials concrete products comply with relevant technical specifications as per the below:

- UN CPC 375 – Articles of concrete, cement and plaster
- ANZSIC Classification 2033 Ready Mix Concrete Manufacturing

Geographical Information

The activities described in modules A1 to A3 have been modeled to reflect concrete production taking place in QUEENSLAND - NORTH QUEENSLAND, Australia. The raw materials used are sourced domestically, and the product's end-of-life stage (module C) is also based on typical Australian conditions, following the default scenario in the EPD Tool (GCCA Tool, v5.2).



Product Information

The product included in this EPD, it's strength grade, density, application and other relevant information is shown below:

| | |
|--------------------------------|---|
| Product identification | TMR MRTS70 Cast-in-place piles - 32 MPa (Exp B1) |
| EPD Registration Number | EPD-IES-0019015:001 |
| Production site(s) | North Queensland, QLD |
| Compressive strength | 32 |
| Density | 2338.5 kg/m³ |
| Reference service life | 50 Years |
| Recycling Rate At EoL | 81% |
| Declared unit | 1 m³ |
| Scope | A1-A3 + A4-A5 + B1-B7 + C1-C4 + D, cradle-to-grave |
| Methodology | GCCA's Industry EPD Tool for Cement and Concrete (V5.2), International version |
| Reference Year | 2025 |



Product Information

The EPD values presented are indicative of local material performance at the time of publishing and are subject to change based on material availability and seasonal factors.

| Product Identification | EPD Registration Number | Compressive strength [MPa] | A1-A3 GWP-tot ¹ [kg CO ₂ eq./m ³] | Application |
|---|-------------------------|----------------------------|---|-------------|
| CoreMasta 20 MPa | EPD-IES-0018989:001 | 20 | 297 | Blockfill |
| CoreMasta 25 MPa | EPD-IES-0018990:001 | 25 | 321 | Blockfill |
| CoreMasta 32 MPa | EPD-IES-0018991:001 | 32 | 354 | Blockfill |
| ImageCrete Colour 25 MPa | EPD-IES-0019002:001 | 25 | 274 | Decorative |
| ImageCrete Colour 32 MPa | EPD-IES-0019003:001 | 32 | 310 | Decorative |
| ImageCrete Exposed 25 MPa | EPD-IES-0019004:001 | 25 | 259 | Decorative |
| ImageCrete Exposed 32 MPa | EPD-IES-0019005:001 | 32 | 294 | Decorative |
| ImageCrete Polished 32 MPa | EPD-IES-0019006:001 | 32 | 307 | Decorative |
| ImageCrete Polished 40 MPa | EPD-IES-0019007:001 | 40 | 356 | Decorative |
| 32 MPa with 4.6kg/m ³ Blended Polyfibre | EPD-IES-0018994:001 | 32 | 315 | Footpath |
| Enrich-30 Normal-Class 20 MPa | EPD-IES-0018992:001 | 20 | 244 | General |
| Enrich-30 Normal-Class 25 MPa | EPD-IES-0018993:001 | 25 | 262 | General |
| Enrich-30 Normal-Class 32 MPa | EPD-IES-0018995:001 | 32 | 292 | General |
| Enrich-30 Normal-Class 40 MPa | EPD-IES-0019000:001 | 40 | 339 | General |
| Enrich-30 Normal-Class 50 MPa | EPD-IES-0019001:001 | 50 | 410 | General |
| Kerb Machine-Placed Minimum 280kg/m ³ Cementitious | EPD-IES-0019008:001 | No guaranteed strength | 227 | Kerb |
| Kerb Machine-Placed Minimum 320kg/m ³ Cementitious | EPD-IES-0019009:001 | No guaranteed strength | 254 | Kerb |
| Lean Mix 10:1 (Mass) | EPD-IES-0019010:001 | No guaranteed strength | 178 | Lean Mix |
| Enrich-30 Piling 40 MPa | EPD-IES-0019011:001 | 40 | 364 | Piling |
| Enrich-30 Piling 50 MPa | EPD-IES-0019012:001 | 50 | 445 | Piling |

¹ More detailed information is provided in the mix-specific tables and assumptions covered in Life Cycles & Processes section.



Product Information

The EPD values presented are indicative of local material performance at the time of publishing and are subject to change based on material availability and seasonal factors.

| Product Identification | EPD Registration Number | Compressive strength [MPa] | A1-A3 GWP-tot ¹ [kg CO ₂ eq./m ³] | Application |
|--|-------------------------|----------------------------|---|---------------------|
| Post-tensioned 40 MPa (22 MPa @ 4 days) | EPD-IES-0018996:001 | 40 | 349 | Post-Tensioned Slab |
| Post-tensioned 40 MPa (25 MPa @ 4 days) | EPD-IES-0018997:001 | 40 | 349 | Post-Tensioned Slab |
| Post-tensioned 40 MPa (22 MPa @ 3 days) | EPD-IES-0018998:001 | 40 | 349 | Post-Tensioned Slab |
| Post-tensioned 40 MPa (25 MPa @ 3 days) | EPD-IES-0018999:001 | 40 | 349 | Post-Tensioned Slab |
| ShotCrete 32 MPa | EPD-IES-0019023:001 | 32 | 303 | Shotcrete |
| ShotCrete 40 MPa | EPD-IES-0019024:001 | 40 | 351 | Shotcrete |
| Stabilised Sands 12:1 (Volume) | EPD-IES-0019025:001 | No guaranteed strength | 119 | Stabilised Sands |
| Stabilised Sands 6% | EPD-IES-0019026:001 | No guaranteed strength | 82 | Stabilised Sands |
| Stabilised Sands 10% | EPD-IES-0019027:001 | No guaranteed strength | 89 | Stabilised Sands |
| TMR MRTS70 No Fines Concrete | EPD-IES-0019028:001 | No guaranteed strength | 213 | TMR No-Fines |
| TMR MRTS70 Cast-in-place piles - 32 MPa (Exp B1) | EPD-IES-0019015:001 | 32 | 279 | TMR Piling |
| TMR MRTS70 Piling TMR MRTS70 Cast-in-place piles - 40 MPa (Exp B2) | EPD-IES-0019018:001 | 40 | 320 | TMR Piling |
| TMR MRTS70 Cast-in-place piles - 50 MPa (Exp B2) | EPD-IES-0019020:001 | 50 | 386 | TMR Piling |
| TMR MRTS70 Cast-in-place piles - 55 MPa (Exp B2) | EPD-IES-0019022:001 | 55 | 427 | TMR Piling |
| TMR MRTS70 Shotcrete - 32 MPa (Exp B1) | EPD-IES-0019013:001 | 32 | 309 | TMR Shotcrete |
| TMR MRTS70 Shotcrete - 40 MPa (Exp B2) | EPD-IES-0019016:001 | 40 | 341 | TMR Shotcrete |
| TMR MRTS70 - 32 MPa (Exp B1) | EPD-IES-0019014:001 | 32 | 285 | TMR Structural |
| TMR MRTS70 - 40 MPa (Exp B2) | EPD-IES-0019017:001 | 40 | 334 | TMR Structural |
| TMR MRTS70 - 50 MPa (Exp B2) | EPD-IES-0019019:001 | 50 | 406 | TMR Structural |
| TMR MRTS70 - 55 MPa (Exp B2) | EPD-IES-0019021:001 | 55 | 449 | TMR Structural |

¹ More detailed information is provided in the mix-specific tables and assumptions covered in Life Cycles & Processes section.



Content Declaration

| Bill of Materials | Low Level (%) | High Level (%) |
|--------------------------------------|---------------|----------------|
| Cement | 3 | 19 |
| Supplementary Cementitious Materials | 0 | 8 |
| Aggregates | 64 | 100 |
| Water | 4 | 11 |
| Admixtures | >0 | <1 |
| Reinforcements | 0 | 0 |

The materials (by mass%) contained in Country Region - North Queensland mixes are summarized in the table above.

Hazard information related to concrete placement

GHS classifications

- Skin Corrosion Category 1
- Serious Eye Damage Category 1
- Skin Sensitisation Category 1
- Specific Target Organ Toxicity (Repeated Exposure) Category 2

Hazard Statement(s)

- H302 – Harmful if swallowed
- P280 – Wear protective gloves/clothing/eye protection.
- H314 – Causes severe skin burns and eye damage
- H317 – May cause an allergic skin reaction
- H318 – Causes serious eye damage
- H373 – May cause damage to lungs by inhalation (dust from dried product)

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Co-Products, Recycled Materials & Allocations

Co-products would be allocated via economic allocations and then normalized based on BOM. The following materials are the product of waste streams of other industrial processes:

Fly ash

- Fly ash is a co-product of coal-fired power stations. To duly allocate the environmental impacts, 0% economic allocation has been applied.

Ground Granulated Blast Furnace Slag (GGBFS)

- Blast furnace slag is a co-product of steel production that is dried and ground for use in concrete production. To duly allocate the environmental impacts, 1.27% economic allocation has been applied. All impacts associated with drying and grinding are assigned to the material.

Silica fume

- Silica fume is a co-product of silicon production. To duly allocate the environmental impacts, 10.67% economic allocation has been applied.

Recycled concrete aggregate

- A component of the boarder category of construction and demolition waste, environmental impacts are allocated on the basis of reprocessing the material following delivery to the recycling facility.

Manufactured Sand

- A co-product of processing coarse aggregate. This manufactured sand is a direct replacement for natural sand and prevents the need to extract natural resources. In terms of emission factors, we treat manufactured sand as having the same environmental burden as aggregate.

Packaging

- This concrete is not produced with any packaging, instead delivered directly to site immediately following production.

In Accordance with Environdec c-PCR-003 Concrete, concrete elements (EN 16757), ISO 14025 and EN15804:A2



LCA Information

Declared Unit is 1m³ of Concrete

- The process is used to produce an accurate estimation at all stages of the product life cycle from cradle to grave. Estimation at each stage is based on actual data which is a combination of both current and prior year average consumption per declared unit.

Life Cycle Assessment Tool

- For the purposes of creating this Environmental Product Declaration (EPD), the Global Cement & Concrete Association (GCCA) concrete EPD tool v5.2 (short: GCCA tool) has been employed.

We have two streams of how we frame our EPDs:

- Regional product-specific- The class of product modelled is used for a particular geographical region using averaged data across operations.
- Project-specific stream – Models the manufacture of specific products required for a particular project being delivered from specific plant(s) using weighted average data where relevant and possible. Reports created after the completion of a project offer the highest accuracy, including all mix variations for each delivery.

The main data categories include:

- The average bill of materials (BOM) for the concrete mix selected in the range of concrete plants specified including their average raw material travel distance, or the calculated BOM based on actual delivered materials incl. travel distances (average or specific) for the producing plants.
- The average fuel, water and energy consumption per declared unit between those plants;
- Plant production waste based on a nationally calculated figure;
- Recarbonation of concrete is determined through pre-defined values within GCCA tool for the type of construction project (-2.25kg CO₂ eq./ m³ at Stage B, -2.49 kg CO₂ eq./ m³ at Stage C3, and -5.20kg CO₂ eq./ m³ at Stage C4), where known; and,
- End of life recycling is based upon industry data.

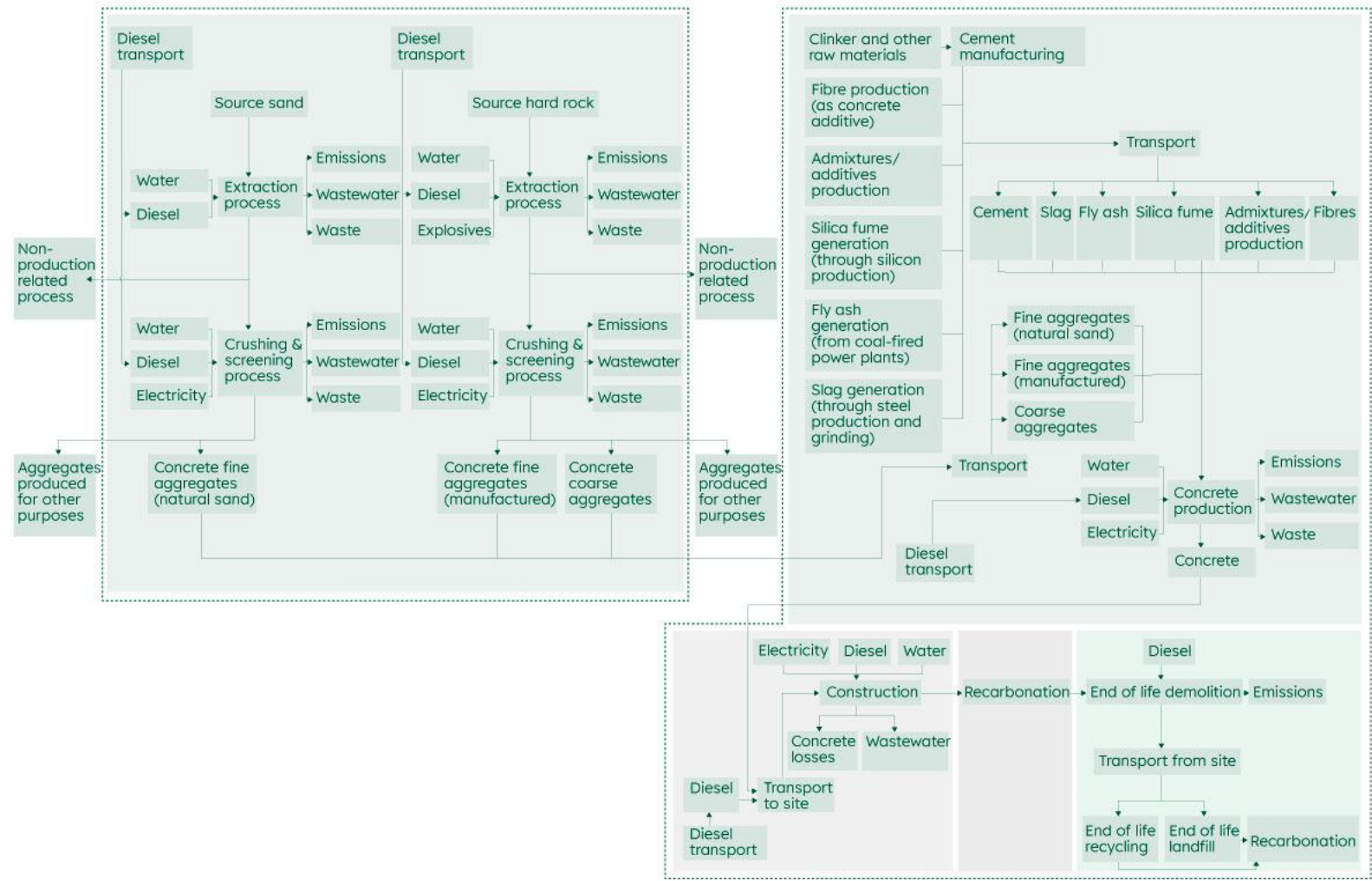
- This EPD Process is certified using GCCA international modelling of energy use and environmental impact to obtain a suitable estimation for products manufactured.
- Pre-defined cement and clinker data provided by the GCCA tool are used only where no better (supplier/source specific) information is available.

Assumptions & Limitations

- This is a regional product-specific EPD.
- All modelling assumptions adopted from the GCCA Tool. Any missing values are documented in this section.
- The geographical scope involves QUEENSLAND - NORTH QUEENSLAND.
- Raw material (inbound) transport distances is the previous year's travel distance average weighted according to deliveries across operations.
- A4 Transport to the building site. For regional product-specific EPDs travel for diesel truck from concrete production site to customer site was set to 20 km default. Longer or shorter travel distances will have minor effects on the overall CO₂ values. Concrete plants in the study include: Cairns, Innisfail, Port Douglas, Tully, Townsville, and Woree, Truck type of >32 tonne was assumed to be fully utilized travelling to construction site with empty returns.
- Travel distance for fuel from depots to operations was set to 1080 km.
- Concrete mixes are assumed to use an equal amount of site fuel and energy and responsible for an equal amount of waste flows.
- Production is assumed to be equal across all plants included in the study for the calculation of the bill of materials.
- Water usage in operations is averaged over the entire state.
- Grid purchased electricity mixes are based on the specific state's energy mix from Australian Energy Statistics. For this project, energy mix was sourced from coal and peat (80%), gas (20%), solar (0%), wind (0%), hydro (0%), and biomass (0%). The electricity emission (GWP-GHG) is 1.02652 kg CO₂e/kWh.
- Travel for materials sources internationally included from shipping origin.
- Reference Service Life (RSL) is set to 50 years as per default. It's based on the lowest exposure class A1 & A2 (AS 3600:2018 "Concrete Structures") in relatively benign environments.



LCA Information



- The lifecycle model and system boundary is the same for both Regional Product-specific and Project-specific concrete EPDs, as detailed in the graphic.
- All stages of the lifecycle, from quarry to recycling are covered by the EPD.

Cut-off rules

We follow the cut-off rules as outlined in the PCR 2019:14 – Construction Products – Version 2.0.1, section 4.4. The cut-off threshold for the LCA study was flows contributing less than 1% for any individual input included in the LCA. No flows were deliberately excluded due to this threshold, however particularly minor impacts (e. g. packaging of chemical admixtures) were not considered. Cut off will occur only when data, or reliable estimates, are not practical to source. The contribution of capital goods (production equipment and infrastructure) and personnel are non-attributable and excluded for the system boundary.

Please note: The GCCA Tool datasets include infrastructure/capital equipment. This means some infrastructure and capital equipment is not entirely excluded from the system boundary.

Infrastructure relating to A2: Transport – Trucks, Trains and Boats are included in consideration. Direct (foreground) infrastructure is excluded, as it is commonly accepted to contribute negligibly to the environmental footprint of clinker, cement, aggregates, concrete and precast. The (background) infrastructure is however included by default in the ecoinvent database used in the model.



LCA Information

| | Product Stage | | | Construction Stage | | Use Stage | | | | | | | End of Life Stage | | | | Benefits & loads for the next product system |
|-----------------------|---------------------|-----------|---------------|--------------------|-----------------------------------|-----------|-----------------------------|------------------------|-----------------------------|-------------------------------|------------------------|-----------------------|------------------------------|-----------|------------------|----------------|--|
| | Raw Material Supply | Transport | Manufacturing | Transport | Construction/installation process | Use | Maintenance incl. transport | Repair incl. transport | Replacement incl. transport | Refurbishment incl. transport | Operational Energy Use | Operational Water Use | De-construction & demolition | Transport | Re-use recycling | Final Disposal | |
| Module | A1 | A2 | A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
| Modules declared | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Geography | GLO | GLO | AU | AU | AU | AU | AU | AU | AU | AU | AU | AU | AU | AU | AU | AU | AU |
| Share of primary data | 30% | | | | | | | | | | | | | | | | |
| Variation products | <10% | | | | | | | | | | | | | | | | |
| Variation sites | <10% | | | | | | | | | | | | | | | | |

- All stages of the product lifecycle have been considered for this EPD – cradle to grave. By its nature, there are some stages of the lifecycle that are not applicable to the concrete product.
- The scenario applied for the use stage assumes that under normal use, no maintenance repair or replacement of the product during its service life is required. As a result, the values are displayed as zero.
- Those stages that, due to practicality, cannot be assessed accurately draw on default values of the underlying GCCA tool.
- For Project-specific EPDs, allocation is determined by the supplying plants with estimates as to the likely volume to be delivered from each. Where existing and sufficient data exists, historical data will be used to make this determination.



Disclaimers

Limitations & Non-conformities

Materials incorporated to the product and packaging materials available in the tool are pre-defined. For a given material, for instance, the share of primary versus secondary cannot be specified. Any give material is either 'primary' or 'secondary, product' or 'secondary, co-product' or 'secondary, waste'. The indicator 'Use of secondary materials' is computed as 'secondary materials, product' + 'secondary, co-product' + 'secondary, waste'. 'Secondary materials, waste' coming into the system are considered as a waste stream and are accepted as such. Therefore, no impact from the former life is considered. 'Secondary materials, product' and 'secondary materials, co-products' however inherit the impact of pre-processing (processing from 'end-of-waste' state to 'fit-for-use' state), consistently with the requirements of EN15804.

The PCR requires that the biogenic carbon content of the product and packaging should be reported in an EPD. It is mandatory when the biogenic carbon content exceeds 5% wt. (product or packaging). The latter is calculated and reported in the tool based on the default biogenic carbon content of input materials and is taken into account in the calculation of the GWP-bio indicator as per the requirements of the PCR. It is the responsibility of the EPD owner to report the biogenic content of the product and packaging in the EPD.

The removals and emissions associated with biogenic carbon content of the product and packaging are calculated based on the material input as per the inventory and are taken into consideration in the calculation of the GWP-bio indicator, as per the PCR. It is considered that all the material input eventually ends up in the product (resp. the packaging) with zero losses. The uptake of CO₂ in A1-A3 (e.g. bio-based insulation materials in precast elements or bio-based packaging materials) and reemission in A5 (packaging end-of-life) or C3-C4 (product end-of-life).

The following hypotheses apply to waste streams at the end-of-life: 1) The only materials sent to recycling are the concrete itself and the reinforcement steel when applicable. Other materials (e.g. insulation, void formers) are considered to be landfilled. We assume the recycled materials are actually recycled and accounted for as recycled material. 2) The only credit in module D therefore applies to the recycling of concrete at the end of life and the recycling of reinforcing steel at the end of life. This methodological choice is consistent with the reality of the cement and concrete industry.

No allocation is applied in the GCCA tool. For instance, no allocation of impacts will be applied to excess electricity or excess heat which may result from the production of concrete or precast. Such situations are considered to be marginal and negligible when they take place.

Mandatory Disclaimer:

The results of the impact categories abiotic depletion of minerals and metals, land use, human toxicity (cancer), human toxicity, non-cancer and ecotoxicity (freshwater) may be highly uncertain in LCAs that include capital goods/infrastructure in generic datasets, in case infrastructure/capital goods contribute greatly to the total results. This is because the LCI data of infrastructure/capital goods used to quantify these indicators in currently available generic datasets sometimes lack temporal, technological and geographical representativeness. Caution should be exercised when using the results of these indicators for decision-making purposes.

Infrastructure relating to A2: Transport – Trucks, Trains and Boats are included in consideration. Direct (foreground) infrastructure is excluded, as it is commonly accepted to contribute negligibly to the environmental footprint of clinker, cement, aggregates, concrete and precast. The (background) infrastructure is however included by default in the ecoinvent database used in the model.



Data Quality Assessment

| Process | Source type | Source | Reference year | Data Category | Share of primary data, of GWP-GHG results for A1-A3 (%) |
|--|--------------------------|---|----------------|--------------------|---|
| Manufacturing of Concrete | Collected Data | EPD Owner | 2024 | Primary | 0.1% |
| Generation of electricity used in manufacturing of product | Database | Govt table, Table O from DCCEEW (2024 data) | 2024 | Primary | 1.1 % |
| Transport of raw materials to concrete plant | Collected Data, Database | EPD Owner | 2024 | Primary, Secondary | 18.2 % |
| Production of cement | EPD | Supplier EPD ¹ - Cement Australia Gladstone | 2023 | Primary | 59.1 % |
| Production of GGBFS | Database | Quantis + GCCA Database | 1999 - 2018 | Secondary | 0.0 % |
| Production of Fly Ash | Database | Quantis + GCCA Database | 1980 - 2018 | Secondary | 0.0 % |
| Production of Silica Fume | Database | Quantis + GCCA Database | 2008 - 2018 | Secondary | 0.0 % |
| Production of coarse aggregates and natural sand | Database | Ecoinvent v3.10 | 1997 - 2023 | Secondary | 4.3 % |
| Admixtures | Database | Ecoinvent v3.10 + EFCA | 2011 - 2023 | Secondary | 0.0 % |
| Other processes | Database | Ecoinvent v3.10 + Quantis | 2023 | Secondary | 0.0 % |
| Total share of primary data², of GWP-GHG results for A1-A3 | | | | | 30% |

¹ The reported share of primary data is associated with uncertainty, as an EPD [or: several EPDs] used as data source lack information on the share of primary data.

² 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.



Product Data Sources

| LCA Stage | Process / Item | Source type | Source | Data Quality | | |
|-----------------------|--|---------------------------|--|--------------|-----------|-----------|
| | | | | Geographical | Technical | Time |
| Product Description | Product description and density | Collected data | EPD Owner: ERP report Bill of Materials and material specific data | Very good | Very good | Very good |
| A1-3 Materials | Cement production | EPD | Supplier: Cement Australia Gladstone | Very good | Very good | Good |
| A1-3 Materials | Other Concrete Raw Materials | Collected data & Database | <p>EPD Owner: ERP report BOM and Mix design compilation used in conjunction with material template</p> <p>Note. Upstream process for raw materials utilise data from ecoinvent 3.10. Specific cement EPD data by the cement manufacturer was used if available. Published cement EPDs were used to create concrete EPDs.</p> <p>In the rare case that specific cement data was not possible, region-specific default cement and clinker values (default values from ecoinvent v3.10) would have been used. This would be reflected in "Specific data."</p> | Very good | Good | Very good |
| A1-3 Materials | Inbound travel (raw materials) | Database | <p>EPD Owner: ERP report 2. Inbound Travel drawing from actual deliveries from sources to operations.</p> <p>Where delivery data not available, travel calculated based on Google Maps.</p> <p>Train travel (only for operations around Melbourne) calculated by actual Google Maps distance.</p> <p>Fuel type and consumption for Truck for Quarry operations and transport to concrete plant + distance in km.</p> | Very good | Good | Very good |
| A1-3 Materials | Allocation Factor (for secondary co products): | Database | <p>Slag: economic allocation as calculated by AusLCI. All impacts associated with drying and grinding are assigned to the material.</p> <p>Fly Ash & Silica fume: Due to the lack of reliable data for the Australian market, we use the guidance from EPD Australasia for economic allocation, where fly ash = 0%, and Silica fume = 10.7%</p> | Very good | Good | Very good |
| A1-3 Manufacturing | Fuel Consumption | Collected data | <p>EPD Owner: ERP Report 3. Concrete Energy Use, drawing on actual invoiced usage.</p> <p>AEMO: Grid composition data is sourced from the Australian Energy Market Operator (AEMO) for all States. We use a conservative modelling approach and minus renewables from the grid composition.</p> <p>Renewable Energy Contracts (w. Guarantee of Origin): Some plants have contracts with suppliers for renewable energy. In this instance, we use these numbers + the remaining grid composition numbers for the relevant state.</p> | Very good | Very good | Very good |
| A1-3 Manufacturing | Plant Energy & Electricity Energy Sources | Collected data & Database | EPD Owner: ERP Report 3. Concrete Energy Use, drawing on actual invoiced usage. | Very good | Very good | Very good |
| A1-3 Waste Management | Waste and wastewater | Collected data | Wastewater volume set to 9L per 1 m ³ | Very good | Good | Very good |



Product Data Sources

| LCA Stage | Item | Source | Timing | Data Quality | | |
|--|-----------------------|---|---|--------------|-----------|-----------|
| | | | | Geographical | Technical | Time |
| A4-5 Construction | Outbound Travel | <p>For Regional Product-specific EPDs: ERP report 5. Outbound travel drawing from actual deliveries from operations to customer sites. Where data not available, travel calculated based on Google Maps.</p> <p>For project-specific EPDs: The project-specific travel distances from the main plant to the construction site was applied.</p> <p>For both scenarios, diesel truck is used to transport deliveries to customer site/s. A5 uses default GCCA Tool settings for: 2.8 kWh electricity, 1.7 L diesel in building machine, 669 kg water, and 0.7 m³ wastewater. Note that internal concrete losses are at ~1% (based on internal reports)</p> | <p>Regional Product-specific EPD: Full prior year data, average per delivery.</p> <p>Project-specific EPD: Actual travel distances between plant and construction site.</p> | Very good | Good | Very good |
| B. Use | Recarbonation | <p>Default GCCA Tool settings: The modelling for recarbonation during the life cycle of the concrete products follows the guidance provided in norm EN 16757 – Annex BB – CO2 uptake by carbonation – Guidance on calculation, and in the British application of the norm, BRE EN 15804 – Annex C.</p> <p>The GCCA Tool default settings align with the defaults set out in the PCR (v2.0.1).</p> | NA | Good | Good | Very good |
| C. End of Life Demolition | Demolition | <p>Default GCCA Tool settings: 2.674 L diesel in building machine, 0.0365 mg PM2.5, 0.184 mg PM10, 0.139 mg PM>10. PM refers to particulate matter.</p> | NA | Good | Good | Very good |
| C. End of Life Transport | Transport | <p>Default GCCA Tool settings: For recycling, the tool assumes 50km default distance by truck, via Quantis estimate. If waste is going to landfill, the tool assumes a distance of 15km by truck, as per the ecoinvent v2.2, inert material landfill.</p> <p>The GCCA Tool default settings align with the defaults set out in the PCR (v2.0.1).</p> | NA | Good | Good | Very good |
| C. End of Life Waste Processing | Recycling Rate at EOL | <p>Masonry materials recycling rate obtained from annual National Waste Report published (e. g. for National Waste Report 2022, page 41, figure 29). Referenced recycling rate is used in industry as closest to concrete-specific value.</p> <p>National Waste Reports</p> | Prior year National Waste Report if available. If not, then latest available | Good | Good | Very good |
| C. End of Life Disposal | Disposal Rate at EOL | <p>Disposal rate inverse of masonry materials recycling rate obtained from annual National Waste Report published</p> <p>National Waste Reports</p> | Prior year National Waste Report if available. If not, then latest available | Good | Good | Very good |
| D Benefits and Loads | | <p>Default GCCA Tool settings: The impacts beyond the system boundaries are calculated, for each flow of recycled material, as the difference between the impacts of recycling 1 kg of material and the impacts of 1 kg of the primary materials avoided, multiplied by the mass flow sent to recycling minus its initial recycled material content.</p> <p>The GCCA Tool default settings align with the defaults set out in the PCR (v2.0.1).</p> | NA | NA | NA | NA |
| General | General | <p>Ecoinvent database used by the GCCA tool</p> <p>Note: This covers environmental information for all raw materials and energy sources. Cement, where data is available, employs specific raw material and energy data for the product manufacture and for each component draws on Eco Invent Data.</p> | NA | Very good | Good | Very good |



LCA Indicators

Comment

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. Since Module C is included in the EPD, the use of Module A1-A3 results without considering the results of Module C is discouraged.

EF3.1 based EN15804+A2 impact assessment methodology has been used for all indicators.

The removals and emissions associated with biogenic carbon content of i) the product and ii) the packaging are not significant or even not relevant in the sector. The only limitation is the uptake of CO₂ in A1-A3 (e.g. biobased insulation materials in precast elements or biobased packaging materials) and reemission in A5 (packaging end-of-life) or C3-C4 (product end-of-life). This does not affect the GWP-tot indicator.

The indicator RWD (Radioactive Waste Disposed) is calculated over the whole supply chain of the product using the background database Ecoinvent 3.10 with EN15804 add-on.

Core Environmental Impact Indicators

GWP-tot (Global Warming Potential total) • **GWP-fos** (Global Warming Potential fossil fuels) • **GWP-bio** (Global Warming Potential biogenic) • **GWP-luc** (Global Warming Potential land use and land use change) • **ODP** (Depletion potential of the stratospheric ozone layer) • **AP** (Acidification potential, Accumulated Exceedance) • **EP-fw** (Eutrophication potential, freshwater) • **EP-mar** (Eutrophication potential, fraction of nutrients reaching marine end compartment) • **EP-ter** (Eutrophication potential, Accumulated Exceedance) • **POCP** (Formation potential of tropospheric ozone) • **ADPE**¹ (Abiotic depletion potential for non- fossil resources) • **ADPF**¹ (Abiotic depletion for fossil resources potential) • **WDP**¹ (Water (user) deprivation potential, deprivation-weighted water consumption)

¹ The 'Water deprivation potential' (WDP) indicator is characterised according to global characterization factors and not local ones. The results of this environmental impact indicator shall be used with care as the uncertainties of the results are high and as there is limited experience with the indicator.



LCA Indicators

| | |
|--|---|
| <p>Additional Environmental Impact Indicators</p> | <p>GWP-GHG (Global Warming Potential, GHG) • PM (Potential incidence of disease due to PM emissions) • IRP² (Potential Human exposure efficiency relative to U235) • ETP¹ (Potential Comparative Toxic Unit for ecosystems) • HTPC¹ (Potential Comparative Toxic Unit for humans - cancer) • HTPNC¹ (Potential Comparative Toxic Unit for humans - non-cancer) • SQP¹ (Potential soil quality index)</p> |
| <p>Parameters Describing Resource Use</p> | <p>PERE (Use of renewable primary energy excluding renewable primary energy resources used as raw materials) • PERM (Use of renewable primary energy resources used as raw materials) • PERT (Total use of renewable primary energy resources) • PENRE (Use of non renewable primary energy excluding non-renewable primary energy resources used as raw materials) • PENRM (Use of non-renewable primary energy resources used as raw materials) • PENRT (Total use of non-renewable primary energy resources) • SM (Use of secondary materials) • RSF (Use of renewable secondary fuels) • NRSF (Use of non-renewable secondary fuels) • NFW (Net use of fresh water)</p> |
| <p>Waste Categories³</p> | <p>HWD (Hazardous waste disposed) • NHWD (Non-hazardous waste disposed) • RWD (Radioactive waste disposed)</p> |
| <p>Output Flows</p> | <p>CRU (Components for re-use) • MFR (Materials for recycling) • MER (Materials for energy recovery) • EE (Exported energy)</p> |
| <p>Extra Indicators</p> | <p>CC¹ (Emissions from calcination and removals from carbonation) • CWRS (Emissions from combustion of waste from renewable sources used in production processes) • CWNRS (Emissions from combustion of waste from non-renewable sources used in production processes) • GWP-prod (Removals and emissions associated with biogenic carbon content of the bio-based product) • GWP-pack (Removals and emissions associated with biogenic carbon content of the bio-based packaging)</p> |

¹ The results of this environmental impact indicator shall be used with care as the uncertainties of the results are high and as there is limited experience with the indicator.

² 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.

³ The 'Non-hazardous waste disposed' (NHWD) and 'Hazardous waste disposed' (HWD) indicators in the tool relate only to the foreground of the clinker, cement and concrete, where cement inherits the impacts from clinker and concrete inherits the impacts from cement.



Environmental Performance

EPD Registration Number

EPD-IES-0019015:001

Core environmental impact indicators

| | | A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---------|-----------------------------------|----------|----------|----------|-----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|-----------|
| GWP-tot | kg CO ₂ eq. | 2.79E+02 | 5.00E+00 | 1.23E+01 | -2.25E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 8.68E+00 | 3.66E+01 | 1.09E+01 | -4.95E+00 | -1.37E+01 |
| GWP-fos | kg CO ₂ eq. | 2.79E+02 | 5.00E+00 | 1.23E+01 | -2.25E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 8.68E+00 | 3.66E+01 | 1.09E+01 | -4.95E+00 | -1.37E+01 |
| GWP-bio | kg CO ₂ eq. | 1.38E-01 | 2.05E-04 | 1.12E-02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 9.49E-04 | 8.16E-04 | 1.93E-02 | 2.77E-05 | -3.41E-02 |
| GWP-luc | kg CO ₂ eq. | 3.95E-02 | 2.03E-03 | 2.85E-03 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 7.54E-04 | 1.45E-02 | 8.00E-03 | 2.20E-05 | -1.08E-02 |
| ODP | kg CFC 11 eq. | 2.75E-06 | 7.80E-08 | 2.28E-07 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.33E-07 | 5.11E-07 | 1.26E-07 | 3.88E-09 | -1.12E-07 |
| AP | mol H+ eq. | 1.05E+00 | 2.08E-02 | 9.14E-02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 7.83E-02 | 1.22E-01 | 8.23E-02 | 2.29E-03 | -8.65E-02 |
| EP-fw | kg P eq. | 3.90E-02 | 1.28E-04 | 8.40E-04 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 8.27E-05 | 9.37E-04 | 7.87E-04 | 0.00E+00 | -1.24E-03 |
| EP-mar | kg N eq. | 1.21E-01 | 7.59E-03 | 3.11E-02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 3.63E-02 | 3.96E-02 | 2.56E-02 | 1.06E-03 | -2.05E-02 |
| EP-ter | mol N eq. | 2.81E+00 | 8.27E-02 | 3.48E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 3.98E-01 | 4.30E-01 | 2.62E-01 | 1.16E-02 | -2.60E-01 |
| POCP | kg NMVOC eq. | 8.04E-01 | 3.03E-02 | 1.04E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.19E-01 | 1.70E-01 | 7.71E-02 | 3.47E-03 | -7.04E-02 |
| ADPE | kg Sb eq. | 2.75E-04 | 1.41E-05 | 2.15E-05 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 3.19E-06 | 1.20E-04 | 5.45E-05 | 9.31E-08 | -7.26E-05 |
| ADPF | MJ, net calorific value | 1.92E+03 | 7.30E+01 | 1.40E+02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.14E+02 | 5.14E+02 | 1.64E+02 | 3.32E+00 | -1.64E+02 |
| WDP | m ³ world eq. deprived | 2.92E+01 | 3.51E-01 | 1.01E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 2.78E-01 | 2.31E+00 | 1.74E+00 | 8.13E-03 | -2.76E+01 |

Parameters describing resource use

| | | A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|-------|-------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|
| PERE | MJ, net calorific value | 6.19E+01 | 9.60E-01 | 5.75E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 6.97E-01 | 6.74E+00 | 1.63E+01 | 2.04E-02 | -1.36E+01 |
| PERM | MJ, net calorific value | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| PERT | MJ, net calorific value | 6.19E+01 | 9.60E-01 | 5.75E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 6.97E-01 | 6.74E+00 | 1.63E+01 | 2.04E-02 | -1.36E+01 |
| PENRE | MJ, net calorific value | 1.92E+03 | 7.30E+01 | 1.40E+02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.14E+02 | 5.14E+02 | 1.64E+02 | 3.32E+00 | -1.64E+02 |
| PENRM | MJ, net calorific value | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| PENRT | MJ, net calorific value | 1.92E+03 | 7.30E+01 | 1.40E+02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.14E+02 | 5.14E+02 | 1.64E+02 | 3.32E+00 | -1.64E+02 |
| SM | kg | 1.19E+02 | 0.00E+00 | 1.19E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| RSF | MJ, net calorific value | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| NRSF | MJ, net calorific value | 8.49E+01 | 0.00E+00 | 8.49E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| NFW | m ³ | 1.79E+00 | 1.08E-02 | 3.21E-02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 7.38E-03 | 6.64E-02 | 4.73E-02 | 2.16E-04 | -6.51E-01 |



Environmental Performance

EPD Registration Number

EPD-IES-0019015:001

Additional environmental impact indicators

| | | A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---------|------------------------|----------|----------|----------|-----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|-----------|
| GWP-GHG | kg CO ₂ eq. | 2.79E+02 | 5.00E+00 | 1.23E+01 | -2.25E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 8.68E+00 | 3.66E+01 | 1.09E+01 | -4.95E+00 | -1.37E+01 |
| PM | Disease incidence | 1.18E-05 | 5.12E-07 | 1.78E-06 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 2.23E-06 | 2.90E-06 | 1.23E-06 | 6.51E-08 | -1.40E-06 |
| IRP | kBq U235 eq. | 7.21E+02 | 6.45E-02 | 7.40E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 5.09E-02 | 4.22E-01 | 7.48E-01 | 1.49E-03 | -1.18E+00 |
| ETP | CTUe | 2.87E+02 | 1.76E+01 | 1.69E+02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.61E+01 | 1.37E+02 | 3.78E+01 | 4.71E-01 | -8.78E+01 |
| HTPC | CTUh | 7.63E-07 | 2.50E-08 | 4.83E-08 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 3.39E-08 | 1.90E-07 | 3.03E-08 | 9.92E-10 | -1.62E-07 |
| HTPNC | CTUh | 1.14E-05 | 4.83E-08 | 1.73E-07 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.55E-08 | 3.29E-07 | 1.08E-07 | 4.52E-10 | -1.11E-07 |
| SQP | dimensionless | 1.90E+03 | 7.35E+01 | 4.16E+01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 7.98E+00 | 3.06E+02 | 4.75E+01 | 2.33E-01 | -1.75E+02 |

Other environmental information describing waste categories

| | | A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | 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 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| NHWD | kg | 1.83E-01 | 0.00E+00 | 4.40E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 4.40E+02 | 0.00E+00 |
| RWD | kg | 4.06E-04 | 1.58E-05 | 4.91E-05 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.25E-05 | 1.03E-04 | 1.83E-04 | 3.65E-07 | -2.87E-04 |

Environmental information describing output flows

| | | A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | 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 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| MFR | kg | 0.00E+00 | 0.00E+00 | 1.90E+01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.90E+03 | 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 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| EE | kg | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |

Extra indicators

| | | A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|----------|------------------------|----------|----------|----------|-----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|-----------|----------|
| CC | kg CO ₂ eq. | 1.14E+02 | 0.00E+00 | 1.04E+00 | -2.25E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | -2.49E+00 | -5.20E+00 | 0.00E+00 |
| CWRS | kg CO ₂ eq. | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| CWNRS | kg CO ₂ eq. | 6.80E+00 | 0.00E+00 | 6.80E-02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| GWP-prod | kg CO ₂ | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| GWP-pack | kg CO ₂ | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |



Environmental Performance

The EPD values here are representative of 100% landfill scenario.

Core environmental impact indicators

| | | C1 | C2 | C3 | C4 | D |
|---------|-----------------------------------|----------|----------|----------|----------|----------|
| GWP-tot | kg CO ₂ eq. | 8.68E+00 | 3.66E+01 | 7.57E+00 | 1.35E+00 | 0.00E+00 |
| GWP-fos | kg CO ₂ eq. | 8.68E+00 | 3.66E+01 | 7.55E+00 | 1.35E+00 | 0.00E+00 |
| GWP-bio | kg CO ₂ eq. | 9.49E-04 | 8.16E-04 | 1.24E-02 | 1.48E-04 | 0.00E+00 |
| GWP-luc | kg CO ₂ eq. | 7.54E-04 | 1.45E-02 | 8.60E-04 | 1.17E-04 | 0.00E+00 |
| ODP | kg CFC 11 eq. | 1.33E-07 | 5.11E-07 | 8.19E-08 | 2.07E-08 | 0.00E+00 |
| AP | mol H+ eq. | 7.83E-02 | 1.22E-01 | 5.02E-02 | 1.22E-02 | 0.00E+00 |
| EP-fw | kg P eq. | 8.27E-05 | 9.37E-04 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| EP-mar | kg N eq. | 3.63E-02 | 3.96E-02 | 1.82E-02 | 5.65E-03 | 0.00E+00 |
| EP-ter | mol N eq. | 3.98E-01 | 4.30E-01 | 1.85E-01 | 6.19E-02 | 0.00E+00 |
| POCP | kg NMVOC eq. | 1.19E-01 | 1.70E-01 | 5.40E-02 | 1.85E-02 | 0.00E+00 |
| ADPE | kg Sb eq. | 3.19E-06 | 1.20E-04 | 2.40E-05 | 4.95E-07 | 0.00E+00 |
| ADPF | MJ, net calorific value | 1.14E+02 | 5.14E+02 | 8.89E+01 | 1.77E+01 | 0.00E+00 |
| WDP | m ³ world eq. deprived | 2.78E-01 | 2.31E+00 | 5.40E-01 | 4.33E-02 | 0.00E+00 |

Parameters describing resource use

| | | C1 | C2 | C3 | C4 | D |
|-------|-------------------------|----------|----------|----------|----------|----------|
| PERE | MJ, net calorific value | 6.97E-01 | 6.74E+00 | 6.73E+00 | 1.08E-01 | 0.00E+00 |
| PERM | MJ, net calorific value | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| PERT | MJ, net calorific value | 6.97E-01 | 6.74E+00 | 6.73E+00 | 1.08E-01 | 0.00E+00 |
| PENRE | MJ, net calorific value | 1.14E+02 | 5.14E+02 | 8.89E+01 | 1.77E+01 | 0.00E+00 |
| PENRM | MJ, net calorific value | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| PENRT | MJ, net calorific value | 1.14E+02 | 5.14E+02 | 8.89E+01 | 1.77E+01 | 0.00E+00 |
| SM | kg | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| RSF | MJ, net calorific value | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| NRSF | MJ, net calorific value | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| NFW | m ³ | 7.38E-03 | 6.64E-02 | 1.32E-02 | 1.15E-03 | 0.00E+00 |

Additional environmental impact indicators

| | | C1 | C2 | C3 | C4 | D |
|---------|------------------------|----------|----------|----------|----------|----------|
| GWP-GHG | kg CO ₂ eq. | 8.68E+00 | 3.66E+01 | 7.57E+00 | 1.35E+00 | 0.00E+00 |
| PM | Disease incidence | 2.23E-06 | 2.90E-06 | 8.61E-07 | 3.46E-07 | 0.00E+00 |
| IRP | kBq U235 eq. | 5.09E-02 | 4.22E-01 | 3.18E-02 | 7.91E-03 | 0.00E+00 |
| ETP | CTUe | 1.61E+01 | 1.37E+02 | 1.92E+01 | 2.50E+00 | 0.00E+00 |
| HTPC | CTUh | 3.39E-08 | 1.90E-07 | 1.59E-08 | 5.28E-09 | 0.00E+00 |
| HTPNC | CTUh | 1.55E-08 | 3.29E-07 | 5.58E-08 | 2.41E-09 | 0.00E+00 |
| SQP | dimensionless | 7.98E+00 | 3.06E+02 | 6.61E+00 | 1.24E+00 | 0.00E+00 |

Other environmental information describing waste categories

| | | C1 | C2 | C3 | C4 | D |
|------|----|----------|----------|----------|----------|----------|
| HWD | kg | 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 | 2.34E+03 | 0.00E+00 |
| RWD | kg | 1.25E-05 | 1.03E-04 | 7.61E-06 | 1.94E-06 | 0.00E+00 |

Environmental information describing output flows

| | | C1 | C2 | C3 | C4 | D |
|-----|----|----------|----------|----------|----------|----------|
| CRU | kg | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| MFR | kg | 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 |
| EE | kg | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |

Extra indicators

| | | C1 | C2 | C3 | C4 | D |
|----------|------------------------|----------|----------|----------|----------|----------|
| CC | kg CO ₂ eq. | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| CWRS | kg CO ₂ eq. | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| CWNRS | kg CO ₂ eq. | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| GWP-prod | kg CO ₂ | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| GWP-pack | kg CO ₂ | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |



Environmental Performance

The EPD values here are representative of 100% recycling scenario.

Core environmental impact indicators

| | | C1 | C2 | C3 | C4 | D |
|---------|-----------------------------------|----------|----------|----------|----------|-----------|
| GWP-tot | kg CO ₂ eq. | 8.68E+00 | 3.66E+01 | 1.47E+01 | 0.00E+00 | -1.69E+01 |
| GWP-fos | kg CO ₂ eq. | 8.68E+00 | 3.66E+01 | 1.47E+01 | 0.00E+00 | -1.69E+01 |
| GWP-bio | kg CO ₂ eq. | 9.49E-04 | 8.16E-04 | 2.09E-02 | 0.00E+00 | -4.20E-02 |
| GWP-luc | kg CO ₂ eq. | 7.54E-04 | 1.45E-02 | 9.65E-03 | 0.00E+00 | -1.33E-02 |
| ODP | kg CFC 11 eq. | 1.33E-07 | 5.11E-07 | 1.37E-07 | 0.00E+00 | -1.37E-07 |
| AP | mol H+ eq. | 7.83E-02 | 1.22E-01 | 8.97E-02 | 0.00E+00 | -1.07E-01 |
| EP-fw | kg P eq. | 8.27E-05 | 9.37E-04 | 9.70E-04 | 0.00E+00 | -1.52E-03 |
| EP-mar | kg N eq. | 3.63E-02 | 3.96E-02 | 2.73E-02 | 0.00E+00 | -2.53E-02 |
| EP-ter | mol N eq. | 3.98E-01 | 4.30E-01 | 2.80E-01 | 0.00E+00 | -3.20E-01 |
| POCP | kg NMVOC eq. | 1.19E-01 | 1.70E-01 | 8.24E-02 | 0.00E+00 | -8.67E-02 |
| ADPE | kg Sb eq. | 3.19E-06 | 1.20E-04 | 6.16E-05 | 0.00E+00 | -8.95E-05 |
| ADPF | MJ, net calorific value | 1.14E+02 | 5.14E+02 | 1.81E+02 | 0.00E+00 | -2.02E+02 |
| WDP | m ³ world eq. deprived | 2.78E-01 | 2.31E+00 | 2.01E+00 | 0.00E+00 | -3.39E+01 |

Parameters describing resource use

| | | C1 | C2 | C3 | C4 | D |
|-------|-------------------------|----------|----------|----------|----------|-----------|
| PERE | MJ, net calorific value | 6.97E-01 | 6.74E+00 | 1.85E+01 | 0.00E+00 | -1.68E+01 |
| PERM | MJ, net calorific value | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| PERT | MJ, net calorific value | 6.97E-01 | 6.74E+00 | 1.85E+01 | 0.00E+00 | -1.68E+01 |
| PENRE | MJ, net calorific value | 1.14E+02 | 5.14E+02 | 1.81E+02 | 0.00E+00 | -2.02E+02 |
| PENRM | MJ, net calorific value | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| PENRT | MJ, net calorific value | 1.14E+02 | 5.14E+02 | 1.81E+02 | 0.00E+00 | -2.02E+02 |
| SM | kg | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| RSF | MJ, net calorific value | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| NRSF | MJ, net calorific value | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| NFW | m ³ | 7.38E-03 | 6.64E-02 | 5.52E-02 | 0.00E+00 | -8.01E-01 |

Additional environmental impact indicators

| | | C1 | C2 | C3 | C4 | D |
|---------|------------------------|----------|----------|----------|----------|-----------|
| GWP-GHG | kg CO ₂ eq. | 8.68E+00 | 3.66E+01 | 1.47E+01 | 0.00E+00 | -1.69E+01 |
| PM | Disease incidence | 2.23E-06 | 2.90E-06 | 1.32E-06 | 0.00E+00 | -1.73E-06 |
| IRP | kBq U235 eq. | 5.09E-02 | 4.22E-01 | 9.13E-01 | 0.00E+00 | -1.46E+00 |
| ETP | CTUe | 1.61E+01 | 1.37E+02 | 4.20E+01 | 0.00E+00 | -1.08E+02 |
| HTPC | CTUh | 3.39E-08 | 1.90E-07 | 3.36E-08 | 0.00E+00 | -1.99E-07 |
| HTPNC | CTUh | 1.55E-08 | 3.29E-07 | 1.20E-07 | 0.00E+00 | -1.37E-07 |
| SQP | dimensionless | 7.98E+00 | 3.06E+02 | 5.70E+01 | 0.00E+00 | -2.15E+02 |

Other environmental information describing waste categories

| | | C1 | C2 | C3 | C4 | D |
|------|----|----------|----------|----------|----------|-----------|
| HWD | kg | 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 |
| RWD | kg | 1.25E-05 | 1.03E-04 | 2.23E-04 | 0.00E+00 | -3.54E-04 |

Environmental information describing output flows

| | | C1 | C2 | C3 | C4 | D |
|-----|----|----------|----------|----------|----------|----------|
| CRU | kg | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| MFR | kg | 0.00E+00 | 0.00E+00 | 2.34E+03 | 0.00E+00 | 0.00E+00 |
| MER | kg | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| EE | kg | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |

Extra indicators

| | | C1 | C2 | C3 | C4 | D |
|------------|------------------------|----------|----------|----------|----------|----------|
| CC | kg CO ₂ eq. | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| CWRS | kg CO ₂ eq. | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| CWNRS | kg CO ₂ eq. | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| GWP-p-prod | kg CO ₂ | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| GWP-p-pack | kg CO ₂ | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |



Abbreviations & Version History

Abbreviations

| | |
|-----------|---|
| ANZIC | Australian and New Zealand Standard Industrial Classification |
| BOM | Bill of Materials |
| CEN | European Committee for Standardization |
| CPC | Central Product Classification |
| EN | European Norm (Standard) |
| EPD | Environmental Product Declaration |
| GCCA | Global Cement and Concrete Association |
| GGBFS | ground granulated blast furnace slag |
| GPI | General Programme Instructions |
| ISO | International Organization for Standardization |
| LCA | Life Cycle Assessment |
| ND | Not Declared |
| PCR/c-PCR | Product Category Rules / complimentary Product Category Rules |
| UN | United Nations |

Version History

| Version | Notes |
|-----------------------|--------------------|
| v.1 2026-02-16 | 1st version |

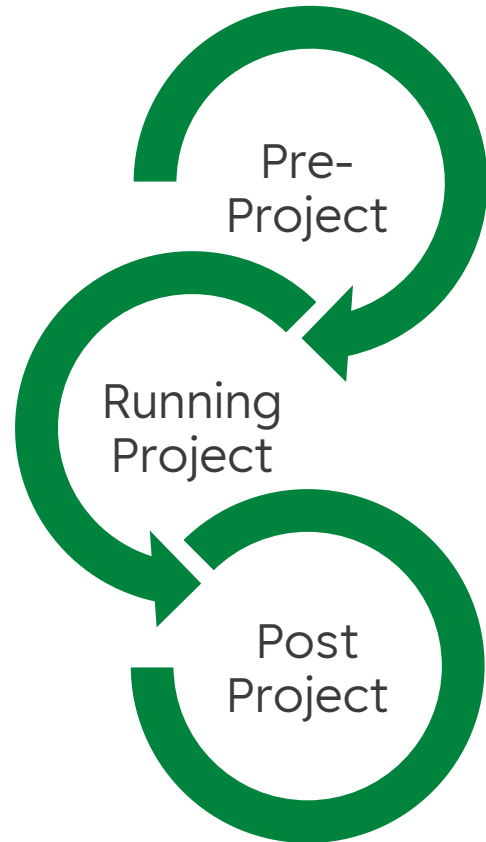


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CO₂ Service Offer



CO₂ is set to become a crucial budgeting currency in the construction sector. As such, it must be managed accordingly. Most provided embodied carbon emission data out there is based on estimates and typically handed over to the customer before a project starts.

At Heidelberg Materials Australia, we believe there's a better way to communicate carbon values, which also eliminates the current gap of carbon monitoring options during the construction phase in the market:

- 1) Pre-project:** Predicting - We can provide you indicative CO₂ values for your specific project with our 3rd party verified CO₂ calculator (targeted & fast & reliable).
- 2) Running project:** Monitoring - You get regular updates of your deliveries and how you track towards your carbon targets (no more surprises).
- 3) Post-project:** Verification - You'll receive a final report and a project-specific EPD based on actual deliveries (highest accuracy).

