

# ENVIRONMENTAL PRODUCT DECLARATION

## IN ACCORDANCE WITH EN 15804+A2 & ISO 14025 / ISO 21930

MPA Sector Level Thin Surface Course  
Mineral Products Association Ltd Asphalt



**EPD HUB, HUB-1656**

Publishing on 18.08.2024, last updated on 18.08.2024, valid until 18.08.2029.

## GENERAL INFORMATION

### MANUFACTURER

|                 |   |
|-----------------|---|
| Manufacturer    | Mineral Products Association Ltd Asphalt        |
| Address         | 297 Euston Road, London, NW13AD, United Kingdom |
| Contact details | mpaasphalt@mineralproducts.org                  |
| Website         | www.mineralproducts.org                         |

### EPD STANDARDS, SCOPE AND VERIFICATION

|                    |  |
|--------------------|--|
| Program operator   | EPD Hub, hub@epdhub.com  |
| Reference standard | EN 15804+A2:2019 and ISO 14025   |
| PCR                | EPD Hub Core PCR version 1.1, 5 Dec 2023   |
| Sector             | Construction product   |
| Category of EPD    | Third party verified EPD   |
| Scope of the EPD   | Cradle to gate with modules C1-C4, D   |
| EPD author         | Malcolm Simms  |
| EPD verification   | Independent verification of this EPD and data, according to ISO 14025:<br><input type="checkbox"/> Internal verification <input checked="" type="checkbox"/> External verification |
| EPD verifier       | Xinyuan Zhang, as an authorized verifier acting for EPD Hub Limited  |

The manufacturer has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programs may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804 and if they are not compared in a building context.

### PRODUCT

|                                   |                             |
|-----------------------------------|-----------------------------|
| Product name                      | Asphalt Thin Surface Course |
| Additional labels                 | MPA / Sector Level          |
| Product reference                 | MPA TS surf                 |
| Place of production               | United Kingdom              |
| Period for data                   | 2022                        |
| Averaging in EPD                  | Average UK production       |
| Variation in GWP-fossil for A1-A3 | + 4.9% / -22.4%             |

### ENVIRONMENTAL DATA SUMMARY

|  |                |
|--|----------------|
| Declared unit                                | 1 metric tonne |
| Declared unit mass                           | 1000 kg        |
| GWP-fossil, A1-A3 (kgCO <sub>2</sub> e)      | 73.00          |
| GWP-total, A1-A3 (kgCO <sub>2</sub> e)       | 73.02          |
| Secondary material, inputs (%)               | 0.01           |
| Secondary material, outputs (%)              | 100            |
| Total energy use, A1-A3 (kWh)                | 514            |
| Net fresh water use, A1-A3 (m <sup>3</sup> ) | 0.4            |

## PRODUCT AND MANUFACTURER

### ABOUT THE MANUFACTURER

MPA Asphalt is part of the Mineral Products Association (MPA) - the trade association for the aggregates, asphalt, cement, concrete, dimension stone, lime, mortar and industrial sand industries.

As such MPA is not a manufacturer in its own right, but represents the significant majority of asphalt manufacturers across the UK and has collected and collated data from its membership in the preparation of this Sector Level EPD.

### PRODUCT DESCRIPTION

Asphalts are described as homogenous mixtures typically of coarse and fine aggregates, filler aggregate and bituminous binder, used in the construction of a pavement e.g. roads, footways, cycleways, airfields and car parks.

Thin Surface Course Systems (TSCS) are asphalts supplied in the UK market on a proprietary basis to meet specific client requirements. Their definition does not sit within a single product standard, but their formulations are generally compatible with one of BS EN 13108, Part 1, 2 or 5.

For the purposes of this EPD an average composition for TSCS was derived as typical of products used in the UK in the surface layers (courses) of bound pavements.

Further information can be found at

<https://www.mineralproducts.org/Mineral-Products/Asphalt.aspx>.

### PRODUCT RAW MATERIAL MAIN COMPOSITION

| Raw material category                       | Amount, mass- % | Material origin                      |
|---|-----------------|--------------------------------------|
| Minerals                                    |                 |                                      |
| - coarse aggregate                          | ~66             | UK Quarries                          |
| - Fine aggregate                            | ~25             |                                      |
| - Filler aggregate                          | ~4              |                                      |
| Fossil materials - polymer modified bitumen | ~5.3            | Refined crude oil (Europe) + polymer |

### BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate

|  |     |
|--|-----|
| Biogenic carbon content in product, kg C   | -   |
| Biogenic carbon content in packaging, kg C | N/A |

### FUNCTIONAL UNIT AND SERVICE LIFE

|                        |                |
|------------------------|----------------|
| Declared unit          | 1 metric tonne |
| Mass per declared unit | 1000 kg        |

### SUBSTANCES, REACH - VERY HIGH CONCERN

The product does not contain any REACH SVHC substances in amounts greater than 0,1 % (1000 ppm).

## PRODUCT LIFE-CYCLE

### SYSTEM BOUNDARY

This EPD covers the life-cycle modules listed in the following table.

| Product stage |           |               | Assembly stage |          | Use stage |             |        |             |               |                        |                       | End of life stage |           |                  |          | Beyond the system boundaries |          |           |
|---------------|-----------|---------------|----------------|----------|-----------|-------------|--------|-------------|---------------|------------------------|-----------------------|-------------------|-----------|------------------|----------|------------------------------|----------|-----------|
| A1            | A2        | A3            | A4             | A5       | B1        | B2          | B3     | B4          | B5            | B6                     | B7                    | C1                | C2        | C3               | C4       | D                            |          |           |
| x             | x         | x             | MND            |          |           |             |        |             |               | x                      | x                     | x                 | x         | x                |          |                              |          |           |
| Raw materials | Transport | Manufacturing | Transport      | Assembly | Use       | Maintenance | Repair | Replacement | Refurbishment | Operational energy use | Operational water use | Deconstr./demol.  | Transport | Waste processing | Disposal | Reuse                        | Recovery | Recycling |

Modules not declared = MND. Modules not relevant = MNR.

### MANUFACTURING AND PACKAGING (A1-A3)

The environmental impacts considered for the product stage cover the manufacturing of raw materials used in the production as well as packaging materials and other ancillary materials. Also, fuels used by machines, and handling of waste formed in the production processes at the manufacturing facilities are included in this stage. The study also considered the material losses occurring during the manufacturing processes as well as losses during electricity transmission. Component material losses are considered negligible as they are generally recovered back to stock and re-introduced back into the production process.

The study also considered the material losses occurring during the manufacturing processes from evaporation of water - assumed to be 5% by mass of aggregate. It is appreciated that significant impacts are resultant on the LCI datapoint used for bitumen, which is understood to be under review.

Therefore, the datapoint for bitumen for this EPD has been selected from the ecoinvent v3.8 database Reference product: bitumen adhesive compound, hot. Data for transport of bitumen was derived from producer purchase records, as a mean of distances from refinery /

supply depot to production sites. In addition, a single proxy datapoint for an assumed polymer content was selected - Reference product: acrylonitrile-butadiene-styrene copolymer.

The datapoints for aggregates were selected on the basis of background research for the MPA Sustainable Development Report 2020/2021. This report provided average aggregate haulage distances, which vary significantly e.g. whether asphalt is produced at a quarry location or is imported.

An average composition for TSCS was derived as typical of products used in the UK in the surface layers (courses) of bound pavements.

Sector energy data is compiled from data representing 96% of estimated England and Wales production (71% of UK) volumes. Fuel mixes from electricity, natural gas, heavy fuel oil, diesel, kerosene, LNG, LPG and reprocessed fuel oil were considered. Combustible fuels are primarily used in the process of drying and heating aggregate, while electrical energy primarily relates to the functioning of material transfer (conveyors etc.) and mixing. Mobile plant for material transfer (loading from stockpiles etc.) primarily consume diesel.

The asphalt production process can be simplified as the controlled proportioning of the mineral components and mixing with the bitumen component. To better ensure that homogenous mixing is achieved, the minerals should be dry, and heated for compatibility with the liquid bitumen, and the majority of fuel energy consumption comes from the drying process.

Packaging materials are not considered as raw materials and products are handled and transported in bulk volumes.

### TRANSPORT AND INSTALLATION (A4-A5)

Transportation impacts occur from final products delivery to construction site (A4) cover fuel direct exhaust emissions, environmental impacts of fuel production, as well as related infrastructure emissions.

Transportation and installation impacts occurring from final product delivery to construction site (A4) and installation (A5) are not included as they are site location, scale and method specific.

### **PRODUCT USE AND MAINTENANCE (B1-B7)**

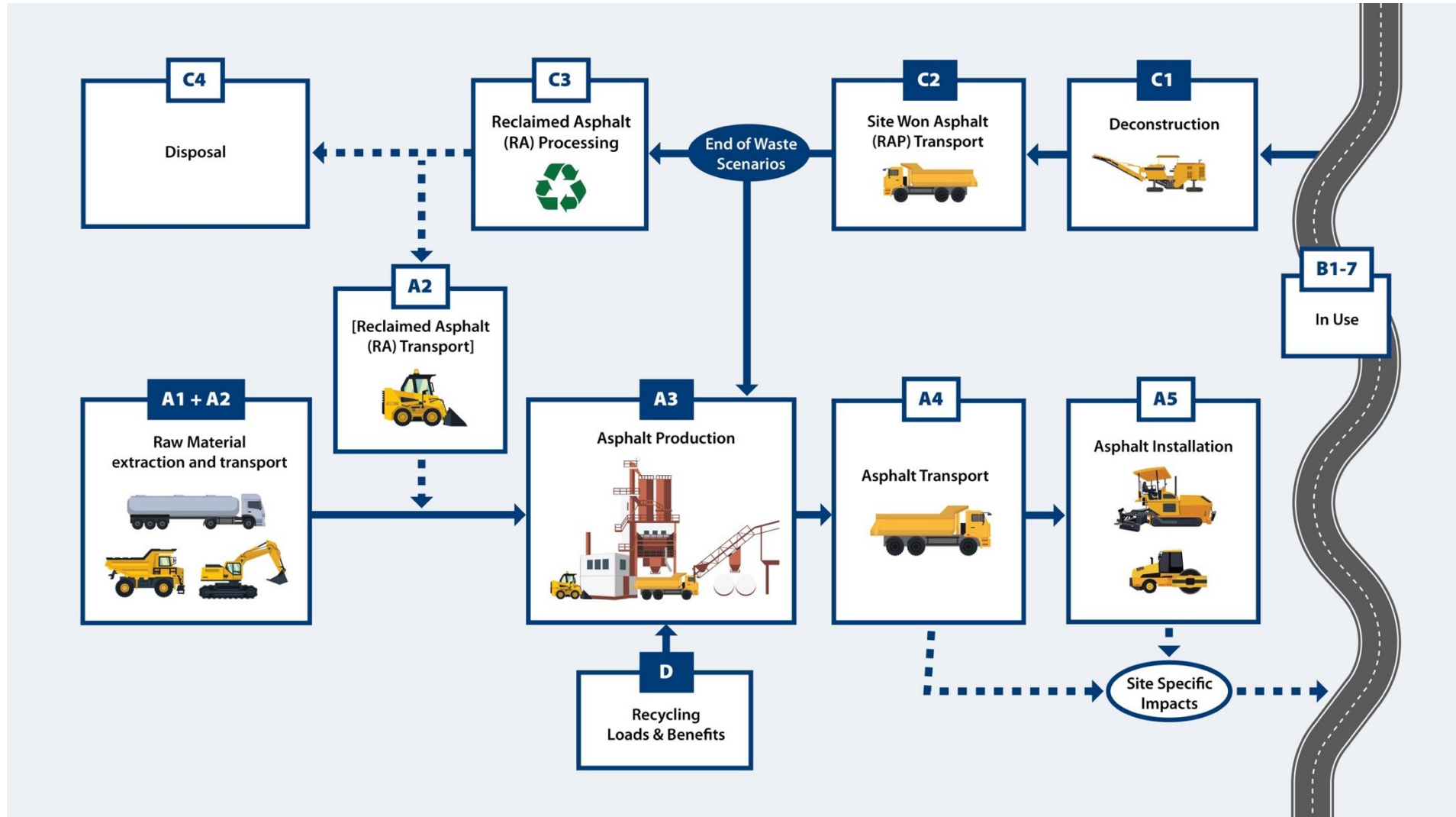
This EPD does not cover the use phase.

Air, soil, and water impacts during the use phase have not been studied.

### **PRODUCT END OF LIFE (C1-C4, D)**

The environmental impacts considered for these product stages cover the machinery used in bulk deconstruction of paved areas and the transport of material prior to processing for re-use or recycling. Their potential as inputs in future A1-A3 manufacture of similar, and/or other construction products is considered from UK Data in Asphalt In Figures (EAPA, 2021, latest update Sept '22).

# MANUFACTURING PROCESS



## LIFE-CYCLE ASSESSMENT

### PARTICIPANTS

A sample of 5 manufacturers constituting a total of 166 plants participated in the data collection. Manufacturing plants are situated in England & Wales.

The data collected from members constitutes 96% of estimated England and Wales production (71% of UK production). The EPD is considered representative for the United Kingdom. The results presented in this EPD are representative for the members participating in this study.

### ALLOCATION, ESTIMATES AND ASSUMPTIONS

All allocations are done as per the reference standards and the applied PCR. More details are provided as follows:

| Data type                         | Allocation & assumption  |
|-----------------------------------|--|
| A1-A2 Raw materials               | Sector level (mass). Mix design for asphalt was based on a representative product. Supply distances were based on MPA Sustainable Development Report 2020/21.                      |
| A3 Packaging materials            | N/A – Shipped in bulk.   |
| A3 Ancillary materials            | Sector level (mass). Upstream.   |
| A3 Manufacturing energy and waste | Sector level (mass). Energy consumption of plants was the primary focus of a member survey. A production loss of 5% was assumed for aggregates due to moisture loss in the burner. |
| C-D End of Life                   | Scenario-based: UK Data for Asphalt in Figures (EAPA, 2021, latest update Sept '22). 37% re-use. 63% recycled.   |

## AVERAGES AND VARIABILITY

|                                   |   |
|-----------------------------------|---|
| Type of average                   | Sector EPD level: multiple manufacturers. |
| Averaging method                  | Representative product                    |
| Variation in GWP-fossil for A1-A3 | + 4.9% / -22.4%                           |

This EPD contains sector level average data representative of the UK market.

### LCA SOFTWARE AND BIBLIOGRAPHY

This EPD has been created using One Click LCA EPD Generator. The LCA and EPD have been prepared according to the reference standards and ISO 14040/14044. The EPD Generator uses Ecoinvent v3.8, Plastics Europe, Federal LCA Commons and One Click LCA databases as sources of environmental data.

### CUT-OFF CRITERIA

The study included all major raw material and energy consumption. The study did not exclude any modules or processes which are stated mandatory in the reference standard and the applied PCR, nor exclude any hazardous materials or substances.

As per the PCR and EN 15804 (§6.3.6), namely the sum of the excluded material flows to the core module shall not exceed 1% of mass and energy. Hence, the following aspects were considered negligible:

- Packaging of the asphalt, as shipped in bulk.
- Machinery production

## ENVIRONMENTAL IMPACT DATA

### CORE ENVIRONMENTAL IMPACT INDICATORS - EN 15804+A2, PEF

| Impact category                     | Unit                   | A1       | A2       | A3       | A1-A3    | A4  | A5  | B1  | B2  | B3  | B4  | B5  | B6  | B7  | C1       | C2       | C3       | C4       | D         |
|-------------------------------------|------------------------|----------|----------|----------|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|----------|----------|----------|----------|-----------|
| GWP - total <sup>1)</sup>           | kg CO <sub>2</sub> e   | 4.55E+01 | 5.19E+00 | 2.23E+01 | 7.30E+01 | MND | MND | MND | MND | MND | MND | MND | MND | MND | 2.09E+00 | 4.23E+00 | 0.00E+00 | 0.00E+00 | -1.65E+01 |
| GWP - fossil                        | kg CO <sub>2</sub> e   | 4.55E+01 | 5.19E+00 | 2.23E+01 | 7.30E+01 | MND | MND | MND | MND | MND | MND | MND | MND | MND | 2.09E+00 | 4.23E+00 | 0.00E+00 | 0.00E+00 | -1.64E+01 |
| GWP - biogenic                      | kg CO <sub>2</sub> e   | 0.00E+00 | 0.00E+00 | 3.94E-03 | 3.94E-03 | MND | MND | MND | MND | MND | MND | MND | MND | MND | 0.00E+00 | 1.03E-03 | 0.00E+00 | 0.00E+00 | -2.18E-02 |
| GWP - LULUC                         | kg CO <sub>2</sub> e   | 9.41E-03 | 2.02E-03 | 4.75E-03 | 1.62E-02 | MND | MND | MND | MND | MND | MND | MND | MND | MND | 2.08E-04 | 1.56E-03 | 0.00E+00 | 0.00E+00 | -5.61E-03 |
| Ozone depletion pot.                | kg CFC-11e             | 4.00E-05 | 1.22E-06 | 3.42E-06 | 4.47E-05 | MND | MND | MND | MND | MND | MND | MND | MND | MND | 4.46E-07 | 9.74E-07 | 0.00E+00 | 0.00E+00 | -1.55E-05 |
| Acidification potential             | mol H <sup>+</sup> e   | 3.92E-01 | 1.69E-02 | 9.64E-02 | 5.05E-01 | MND | MND | MND | MND | MND | MND | MND | MND | MND | 2.17E-02 | 1.79E-02 | 0.00E+00 | 0.00E+00 | -1.55E-01 |
| EP-freshwater <sup>2)</sup>         | kg Pe                  | 4.97E-04 | 4.40E-05 | 9.77E-05 | 6.39E-04 | MND | MND | MND | MND | MND | MND | MND | MND | MND | 6.91E-06 | 3.47E-05 | 0.00E+00 | 0.00E+00 | -2.17E-04 |
| EP-marine                           | kg Ne                  | 6.44E-02 | 3.71E-03 | 3.86E-02 | 1.07E-01 | MND | MND | MND | MND | MND | MND | MND | MND | MND | 9.59E-03 | 5.33E-03 | 0.00E+00 | 0.00E+00 | -2.73E-02 |
| EP-terrestrial                      | mol Ne                 | 7.57E-01 | 4.12E-02 | 4.25E-01 | 1.22E+00 | MND | MND | MND | MND | MND | MND | MND | MND | MND | 1.05E-01 | 5.88E-02 | 0.00E+00 | 0.00E+00 | -3.23E-01 |
| POCP ("smog") <sup>3)</sup>         | kg NMVOCe              | 3.32E-01 | 1.60E-02 | 1.19E-01 | 4.67E-01 | MND | MND | MND | MND | MND | MND | MND | MND | MND | 2.89E-02 | 1.88E-02 | 0.00E+00 | 0.00E+00 | -1.34E-01 |
| ADP-minerals & metals <sup>4)</sup> | kg Sbe                 | 1.07E-04 | 1.26E-05 | 2.08E-05 | 1.40E-04 | MND | MND | MND | MND | MND | MND | MND | MND | MND | 1.06E-06 | 9.92E-06 | 0.00E+00 | 0.00E+00 | -5.88E-05 |
| ADP-fossil resources                | MJ                     | 2.69E+03 | 8.13E+01 | 3.58E+02 | 3.13E+03 | MND | MND | MND | MND | MND | MND | MND | MND | MND | 2.81E+01 | 6.36E+01 | 0.00E+00 | 0.00E+00 | -9.93E+02 |
| Water use <sup>5)</sup>             | m <sup>3</sup> e depr. | 1.59E+01 | 3.63E-01 | 9.27E-01 | 1.72E+01 | MND | MND | MND | MND | MND | MND | MND | MND | MND | 7.54E-02 | 2.84E-01 | 0.00E+00 | 0.00E+00 | -4.76E+00 |

1) GWP = Global Warming Potential; 2) EP = Eutrophication potential. Required characterisation method and data are in kg P-eq. Multiply by 3,07 to get PO<sub>4</sub>e; 3) POCP = Photochemical ozone formation; 4) ADP = Abiotic depletion potential; 5) EN 15804+A2 disclaimer for Abiotic depletion and Water use and optional indicators except Particulate matter and Ionizing radiation, human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.



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

| Impact category                  | Unit      | A1       | A2       | A3       | A1-A3    | A4  | A5  | B1  | B2  | B3  | B4  | B5  | B6  | B7  | C1       | C2       | C3       | C4       | D         |
|----------------------------------|-----------|----------|----------|----------|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|----------|----------|----------|----------|-----------|
| Particulate matter               | Incidence | 3.10E-06 | 5.90E-07 | 2.15E-06 | 5.84E-06 | MND | MND | MND | MND | MND | MND | MND | MND | MND | 5.81E-07 | 4.88E-07 | 0.00E+00 | 0.00E+00 | -1.34E-06 |
| Ionizing radiation <sup>6)</sup> | kBq U235e | 1.10E+01 | 3.89E-01 | 2.67E+00 | 1.40E+01 | MND | MND | MND | MND | MND | MND | MND | MND | MND | 1.29E-01 | 3.03E-01 | 0.00E+00 | 0.00E+00 | -4.26E+00 |
| Ecotoxicity (freshwater)         | CTUe      | 3.88E+03 | 7.23E+01 | 1.17E+02 | 4.07E+03 | MND | MND | MND | MND | MND | MND | MND | MND | MND | 1.69E+01 | 5.72E+01 | 0.00E+00 | 0.00E+00 | -1.43E+03 |
| Human toxicity, cancer           | CTUh      | 1.63E-08 | 1.77E-09 | 4.31E-09 | 2.23E-08 | MND | MND | MND | MND | MND | MND | MND | MND | MND | 6.46E-10 | 1.40E-09 | 0.00E+00 | 0.00E+00 | -7.55E-09 |
| Human tox. non-cancer            | CTUh      | 4.05E-07 | 6.96E-08 | 7.83E-08 | 5.53E-07 | MND | MND | MND | MND | MND | MND | MND | MND | MND | 1.22E-08 | 5.66E-08 | 0.00E+00 | 0.00E+00 | -1.88E-07 |
| SQP <sup>7)</sup>                | -         | 5.06E+02 | 9.35E+01 | 3.98E+01 | 6.39E+02 | MND | MND | MND | MND | MND | MND | MND | MND | MND | 3.65E+00 | 7.32E+01 | 0.00E+00 | 0.00E+00 | -2.28E+02 |

6) EN 15804+A2 disclaimer for ionizing radiation, human health. This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator; 7) SQP = Land use related impacts/soil quality.

### USE OF NATURAL RESOURCES

| Impact category                    | Unit           | A1       | A2       | A3       | A1-A3    | A4  | A5  | B1  | B2  | B3  | B4  | B5  | B6  | B7  | C1       | C2       | C3        | C4       | D         |
|------------------------------------|----------------|----------|----------|----------|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|----------|----------|-----------|----------|-----------|
| Renew. PER as energy <sup>8)</sup> | MJ             | 1.47E+01 | 9.14E-01 | 1.23E+01 | 2.79E+01 | MND | MND | MND | MND | MND | MND | MND | MND | MND | 1.60E-01 | 7.16E-01 | 0.00E+00  | 0.00E+00 | -6.50E+00 |
| Renew. PER as material             | MJ             | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | MND | MND | MND | MND | MND | MND | MND | MND | MND | 0.00E+00 | 0.00E+00 | 0.00E+00  | 0.00E+00 | 0.00E+00  |
| Total use of renew. PER            | MJ             | 1.47E+01 | 9.14E-01 | 1.23E+01 | 2.79E+01 | MND | MND | MND | MND | MND | MND | MND | MND | MND | 1.60E-01 | 7.16E-01 | 0.00E+00  | 0.00E+00 | -6.50E+00 |
| Non-re. PER as energy              | MJ             | 1.32E+03 | 8.13E+01 | 3.58E+02 | 1.76E+03 | MND | MND | MND | MND | MND | MND | MND | MND | MND | 2.81E+01 | 6.36E+01 | 0.00E+00  | 0.00E+00 | -4.93E+02 |
| Non-re. PER as material            | MJ             | 1.37E+03 | 0.00E+00 | 0.00E+00 | 1.37E+03 | MND | MND | MND | MND | MND | MND | MND | MND | MND | 0.00E+00 | 0.00E+00 | -1.37E+03 | 0.00E+00 | -4.99E+02 |
| Total use of non-re. PER           | MJ             | 2.69E+03 | 8.13E+01 | 3.58E+02 | 3.13E+03 | MND | MND | MND | MND | MND | MND | MND | MND | MND | 2.81E+01 | 6.36E+01 | -1.37E+03 | 0.00E+00 | -9.93E+02 |
| Secondary materials                | kg             | 1.28E-01 | 2.25E-02 | 5.55E-02 | 2.06E-01 | MND | MND | MND | MND | MND | MND | MND | MND | MND | 1.10E-02 | 1.77E-02 | 0.00E+00  | 0.00E+00 | -7.86E-02 |
| Renew. secondary fuels             | MJ             | 1.68E-03 | 2.27E-04 | 2.38E-04 | 2.14E-03 | MND | MND | MND | MND | MND | MND | MND | MND | MND | 3.59E-05 | 1.78E-04 | 0.00E+00  | 0.00E+00 | -7.89E-04 |
| Non-ren. secondary fuels           | MJ             | 0.00E+00 | 0.00E+00 | 6.37E+01 | 6.37E+01 | MND | MND | MND | MND | MND | MND | MND | MND | MND | 0.00E+00 | 0.00E+00 | 0.00E+00  | 0.00E+00 | 0.00E+00  |
| Use of net fresh water             | m <sup>3</sup> | 3.65E-01 | 1.05E-02 | 2.23E-02 | 3.98E-01 | MND | MND | MND | MND | MND | MND | MND | MND | MND | 1.70E-03 | 8.23E-03 | 0.00E+00  | 0.00E+00 | -9.86E-01 |

8) PER = Primary energy resources.

### END OF LIFE - WASTE

| Impact category     | Unit | A1       | A2       | A3       | A1-A3    | A4  | A5  | B1  | B2  | B3  | B4  | B5  | B6  | B7  | C1       | C2       | C3       | C4       | D         |
|---------------------|------|----------|----------|----------|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|----------|----------|----------|----------|-----------|
| Hazardous waste     | kg   | 2.09E+00 | 1.07E-01 | 3.18E-01 | 2.51E+00 | MND | MND | MND | MND | MND | MND | MND | MND | MND | 3.75E-02 | 8.43E-02 | 0.00E+00 | 0.00E+00 | -7.14E-01 |
| Non-hazardous waste | kg   | 1.24E+01 | 1.76E+00 | 3.90E+00 | 1.80E+01 | MND | MND | MND | MND | MND | MND | MND | MND | MND | 2.64E-01 | 1.38E+00 | 0.00E+00 | 0.00E+00 | -7.47E+00 |
| Radioactive waste   | kg   | 1.70E-02 | 5.47E-04 | 1.34E-03 | 1.88E-02 | MND | MND | MND | MND | MND | MND | MND | MND | MND | 1.98E-04 | 4.25E-04 | 0.00E+00 | 0.00E+00 | -6.56E-03 |

### END OF LIFE - OUTPUT FLOWS

| Impact category          | Unit | A1       | A2       | A3       | A1-A3    | A4  | A5  | B1  | B2  | B3  | B4  | B5  | B6  | B7  | C1       | C2       | C3       | C4       | D        |
|--------------------------|------|----------|----------|----------|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|----------|----------|----------|----------|----------|
| Components for re-use    | kg   | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | MND | MND | MND | MND | MND | MND | MND | MND | MND | 0.00E+00 | 0.00E+00 | 3.70E+02 | 0.00E+00 | 0.00E+00 |
| Materials for recycling  | kg   | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | MND | MND | MND | MND | MND | MND | MND | MND | MND | 0.00E+00 | 0.00E+00 | 1.26E+03 | 0.00E+00 | 0.00E+00 |
| Materials for energy rec | kg   | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | MND | MND | MND | MND | MND | MND | MND | MND | MND | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Exported energy          | MJ   | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | MND | MND | MND | MND | MND | MND | MND | MND | MND | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |

### ENVIRONMENTAL IMPACTS - EN 15804+A1, CML / ISO 21930

| Impact category      | Unit                               | A1       | A2       | A3       | A1-A3    | A4  | A5  | B1  | B2  | B3  | B4  | B5  | B6  | B7  | C1       | C2       | C3       | C4       | D         |
|----------------------|------------------------------------|----------|----------|----------|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|----------|----------|----------|----------|-----------|
| Global Warming Pot.  | kg CO <sub>2</sub> e               | 4.39E+01 | 5.14E+00 | 2.20E+01 | 7.10E+01 | MND | MND | MND | MND | MND | MND | MND | MND | MND | 2.06E+00 | 4.19E+00 | 0.00E+00 | 0.00E+00 | -1.59E+01 |
| Ozone depletion Pot. | kg CFC <sub>11</sub> e             | 3.17E-05 | 9.66E-07 | 2.86E-06 | 3.55E-05 | MND | MND | MND | MND | MND | MND | MND | MND | MND | 3.53E-07 | 7.71E-07 | 0.00E+00 | 0.00E+00 | -1.22E-05 |
| Acidification        | kg SO <sub>2</sub> e               | 3.24E-01 | 1.37E-02 | 7.04E-02 | 4.08E-01 | MND | MND | MND | MND | MND | MND | MND | MND | MND | 1.54E-02 | 1.39E-02 | 0.00E+00 | 0.00E+00 | -1.27E-01 |
| Eutrophication       | kg PO <sub>4</sub> <sup>3</sup> e  | 4.75E-02 | 3.00E-03 | 1.66E-02 | 6.70E-02 | MND | MND | MND | MND | MND | MND | MND | MND | MND | 3.58E-03 | 3.17E-03 | 0.00E+00 | 0.00E+00 | -2.06E-02 |
| POCP ("smog")        | kg C <sub>2</sub> H <sub>4</sub> e | 1.34E-02 | 6.31E-04 | 2.27E-03 | 1.63E-02 | MND | MND | MND | MND | MND | MND | MND | MND | MND | 3.38E-04 | 5.44E-04 | 0.00E+00 | 0.00E+00 | -5.44E-03 |
| ADP-elements         | kg Sbe                             | 1.03E-04 | 1.23E-05 | 2.07E-05 | 1.36E-04 | MND | MND | MND | MND | MND | MND | MND | MND | MND | 1.04E-06 | 9.61E-06 | 0.00E+00 | 0.00E+00 | -5.79E-05 |
| ADP-fossil           | MJ                                 | 2.69E+03 | 8.13E+01 | 3.58E+02 | 3.13E+03 | MND | MND | MND | MND | MND | MND | MND | MND | MND | 2.81E+01 | 6.36E+01 | 0.00E+00 | 0.00E+00 | -9.93E+02 |

## VERIFICATION STATEMENT

### VERIFICATION PROCESS FOR THIS EPD

This EPD has been verified in accordance with ISO 14025 by an independent, third-party verifier by reviewing results, documents and compliancy with reference standard, ISO 14025 and ISO 14040/14044, following the process and checklists of the program operator for:

- This Environmental Product Declaration
- The Life-Cycle Assessment used in this EPD
- The digital background data for this EPD

Why does verification transparency matter? [Read more online](#)

This EPD has been generated by One Click LCA EPD generator, which has been verified and approved by the EPD Hub.

### THIRD-PARTY VERIFICATION STATEMENT

I hereby confirm that, following detailed examination, I have not established any relevant deviations by the studied Environmental Product Declaration (EPD), its LCA and project report, in terms of the data collected and used in the LCA calculations, the way the LCA-based calculations have been carried out, the presentation of environmental data in the EPD, and other additional environmental information, as present with respect to the procedural and methodological requirements in ISO 14025:2010 and reference standard.

I confirm that the sector-level data has been examined as regards plausibility and consistency; the declaration owner is responsible for its factual integrity and legal compliance.

I confirm that I have sufficient knowledge and experience of construction products, this specific product category, the construction industry, relevant standards, and the geographical area of the EPD to carry out this verification.

I confirm my independence in my role as verifier; I have not been involved in the execution of the LCA or in the development of the declaration and have no conflicts of interest regarding this verification.

Xinyuan Zhang, as an authorized verifier acting for EPD Hub Limited  
18.08.2024

