

# Environmental Profile

This LCA is calculated according to: ISO 14044, ISO 14040 and EN 15804

Ecochain v4.3.1



Product: Holcim Betomat Offshore  
Unit: 1 m2  
Manufacturer: Holcim Coastal Alphen a/d Rijn

Holcim Betomat type Offshore, 1m2, hoogte mat 300mm, over de levensduur van 100 jaar. Toepassing in GWW.

LCA standard: NMD Bepalingsmethode 1.2 (2025) (obv Ecoinvent 3.6)  
Standard database: Dutch – Nationale Milieudatabase v3.8 (obv Ecoinvent 3.6)  
Externally verified: Yes  
Issue date: 07-03-2025  
End of validity: 07-03-2030  
Verifier: Tim Mol

“De methodologie en dataverzameling zoals beschreven in het onderliggende LCA rapport voldoet aan de eisen van de “Bepalingsmethode Milieuprestatie Bouwwerken” versie 1.2 van december 2024 en de onderliggende normen ISO 14040, ISO 14044 en NEN-EN 15804.”

The LCA background information and project dossier have been registered in the online Ecochain application in the account Holcim Coastal Alphen a/d Rijn (2023). (☑ = module declared, MND = module not declared).

| A1 | A2 | A3 | A4 | A5 | B1  | B2  | B3  | B4  | B5  | B6  | B7  | C1 | C2 | C3 | C4 | D |
|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|----|----|----|----|---|
| ☑  | ☑  | ☑  | ☑  | ☑  | MND | MND | MND | MND | MND | MND | MND | ☑  | ☑  | ☑  | ☑  | ☑ |

| Product stage              |              |                  |  |  | Use stage                                       |                |           |                |                  |                           |  | End-of-Life stage                               |              |                     |  |
|----------------------------|--------------|------------------|--|--|-------------------------------------------------|----------------|-----------|----------------|------------------|---------------------------|--|-------------------------------------------------|--------------|---------------------|--|
| A1 Raw material supply     | A2 Transport | A3 Manufacturing |  |  | B1 Use                                          | B2 Maintenance | B3 Repair | B4 Replacement | B5 Refurbishment | B6 Operational energy use |  | C1 De-construction demolition                   | C2 Transport | C3 Waste processing |  |
| Construction process stage |              |                  |  |  | B7 Operational water use                        |                |           |                |                  |                           |  | C4 Disposal                                     |              |                     |  |
| A4 Transport gate to site  |              |                  |  |  | A5 Assembly / Construction installation process |                |           |                |                  |                           |  | Benefits and loads beyond the system boundaries |              |                     |  |
|                            |              |                  |  |  |                                                 |                |           |                |                  |                           |  | D Reuse- Recovery- Recycling- potential         |              |                     |  |

## Environmental impacts and parameters

**MKI A1** = Environmental Costs Indicator (MKI A1) [euro]; **ADPE** = Abiotic depletion potential for non-fossil resources [kg Sb-eq]; **ADPF** = Abiotic depletion potential for fossil resources [kg Sb-eq]; **GWP** = Global warming potential [kg CO2-eq]; **ODP** = Depletion potential of the stratospheric ozone layer [kg CFC-11-eq]; **POCP** = Formation potential of tropospheric ozone photochemical oxidants [kg ethene-eq]; **AP** = Acidification potential of land and water [kg SO2-eq]; **EP** = Eutrophication potential [kg PO4 3--eq]; **HTP** = Human toxicity potential [kg 1,4-DB-eq]; **FAETP** = Freshwater aquatic ecotoxicity potential [kg 1,4-DB-eq]; **MAETP** = Marine aquatic ecotoxicity potential [kg 1,4-DB-eq]; **TETP** = Terrestrial ecotoxicity potential [kg 1,4-DB-eq]; **MKI A2 (obv EF 3.0)** = Environmental Costs Indicator (MKI A2 obv EF 3.0) [euro]; **GWP-total** = EF Climate change [kg CO2 eq]; **GWP-f** = EF Climate change - Fossil [kg CO2 eq]; **GWP-b** = EF Climate change - Biogenic [kg CO2 eq]; **GWP-luluc** = EF Climate change - Land use and LU change [kg CO2 eq]; **ODP** = EF Ozone depletion [kg CFC11 eq]; **AP** = EF Acidification [mol H+ eq]; **EP-fw** = EF Eutrophication, freshwater [kg P eq]; **EP-m** = EF Eutrophication, marine [kg N eq]; **EP-T** = EF Eutrophication, terrestrial [mol N eq]; **POCP** = EF Photochemical ozone formation [kg NMVOC eq]; **ADP-mm** = EF Resource use, minerals and metals [kg Sb eq]; **ADP-f** = EF Resource use, fossils [MJ]; **WDP** = EF Water use [m3 depriv.]; **PM** = EF Particulate matter [disease inc.]; **IR** = EF Ionising radiation [kBq U-235 eq]; **ETP-fw** = EF Ecotoxicity, freshwater [CTUe]; **HTP-c** = EF Human toxicity, cancer [CTUh]; **HTP-nc** = EF Human toxicity, non-cancer [CTUh]; **SQP** = EF Land use [Pt]; **PERE** = Use of renewable primary energy excluding renewable primary energy resources used as raw materials [MJ]; **PERM** = Use of renewable primary energy resources used as raw materials [MJ]; **PERT** = Total use of renewable primary energy resources [MJ]; **PENRE** = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials [MJ]; **PENRM** = Use of non-renewable primary energy resources used as raw materials [MJ]; **PENRT** = Total use of non-renewable primary energy resources [MJ]; **SM** = Use of secondary material [kg]; **RSF** = Use of renewable secondary fuels [MJ]; **NRSF** = Use of non-renewable secondary fuels [MJ]; **FW** = Use of net fresh water [m3]; **HWD** = Hazardous waste disposed [kg]; **NHWD** = Non-hazardous waste disposed [kg]; **RWD** = Radioactive waste disposed [kg]; **CRU** = Components for re-use [kg]; **MFR** = Materials for recycling [kg]; **MER** = Materials for energy recovery [kg]; **EET** = Exported energy thermic [MJ]; **EEE** = Exported energy electric [MJ]

## Statement of Confidentiality

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Results

| Environmental impact SBK set 1 | Unit         | A1          | A2          | A3          | A1-A3       | A4          | A5          | C1          | C2          | C3          | C4          | D            | Total       |
|--------------------------------|--------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|-------------|
| MKI A1                         | euro         | 2.081406    | 0.45971     | 0.171028    | 2.712144    | 0.644887    | 0.134149    | 0.03473     | 0.212863    | 0.21291     | 0.005419    | -0.188977    | 3.768125    |
| ADPE                           | kg Sb-eq     | 1.409181E-4 | 3.136154E-5 | 9.682924E-6 | 1.819625E-4 | 1.155383E-4 | 6.415160E-6 | 4.017527E-7 | 3.813835E-5 | 2.635391E-6 | 2.673442E-7 | -7.318089E-5 | 2.721780E-4 |
| ADPF                           | kg Sb-eq     | 1.315600E-1 | 2.378470E-2 | 1.716678E-2 | 1.725115E-1 | 5.006047E-2 | 7.572204E-3 | 1.710006E-3 | 1.652304E-2 | 5.750839E-3 | 3.803723E-4 | -1.029220E-2 | 2.442162E-1 |
| GWP                            | kg CO2-eq    | 2.373623E+1 | 3.853720E+0 | 2.030333E+0 | 2.962028E+1 | 6.724855E+0 | 1.380051E+0 | 2.592600E-1 | 2.219621E+0 | 3.164993E+0 | 5.132039E-2 | -1.505917E+0 | 4.191447E+1 |
| ODP                            | kg CFC-11-eq | 9.863186E-7 | 5.539962E-7 | 2.786659E-7 | 1.818981E-6 | 1.273986E-6 | 1.194413E-7 | 4.488825E-8 | 4.204897E-7 | 8.902610E-8 | 9.215811E-9 | -1.295953E-7 | 3.646432E-6 |
| POCP                           | kg ethene-eq | 1.239243E-2 | 2.266364E-3 | 7.974278E-4 | 1.545623E-2 | 4.202864E-3 | 7.779130E-4 | 2.639537E-4 | 1.387198E-3 | 4.627535E-4 | 3.355174E-5 | -1.082890E-3 | 2.150157E-2 |
| AP                             | kg SO2-eq    | 5.401274E-2 | 2.742694E-2 | 5.168900E-3 | 8.660858E-2 | 2.483934E-2 | 4.927577E-3 | 1.953782E-3 | 8.198826E-3 | 3.897752E-3 | 2.055049E-4 | -8.229789E-3 | 1.224016E-1 |
| EP                             | kg PO43--eq  | 6.957108E-3 | 6.136300E-3 | 9.798324E-4 | 1.407324E-2 | 4.815900E-3 | 9.527206E-4 | 4.441318E-4 | 1.589609E-3 | 9.081151E-4 | 4.487363E-5 | -1.333180E-3 | 2.149541E-2 |
| HTP                            | kg 1,4-DB-eq | 5.992431E+0 | 9.465970E-1 | 3.532991E-1 | 7.292327E+0 | 1.452751E+0 | 3.514723E-1 | 9.597366E-2 | 4.795842E-1 | 2.540160E-1 | 1.362179E-2 | -6.680132E-1 | 9.271732E+0 |
| FAETP                          | kg 1,4-DB-eq | 7.303399E-2 | 2.375216E-2 | 8.570248E-3 | 1.053564E-1 | 6.108367E-2 | 6.756206E-3 | 1.335923E-3 | 2.016276E-2 | 3.012447E-2 | 1.486789E-3 | -1.032348E-2 | 2.159827E-1 |
| MAETP                          | kg 1,4-DB-eq | 2.670807E+2 | 7.546946E+1 | 3.039469E+1 | 3.729449E+2 | 1.640133E+2 | 2.157050E+1 | 4.645284E+0 | 5.414291E+1 | 5.138984E+1 | 2.257156E+0 | -4.296221E+1 | 6.280016E+2 |
| TETP                           | kg 1,4-DB-eq | 3.042366E-2 | 4.602104E-3 | 9.545415E-3 | 4.457118E-2 | 8.164050E-3 | 1.627940E-3 | 1.579874E-4 | 2.694760E-3 | 2.389129E-3 | 3.438928E-5 | -3.463294E-3 | 5.617614E-2 |
| Environmental impact           | Unit         | A1          | A2          | A3          | A1-A3       | A4          | A5          | C1          | C2          | C3          | C4          | D            | Total       |
| MKI A2 (obv EF 3.0)            | euro         | 4.074003    | 0.739622    | 0.441488    | 5.255113    | 1.301163    | 0.119561    | 0.08721     | 0.429471    | 0.464991    | 0.011649    | -0.449169    | 7.21999     |
| GWP-total                      | kg CO2eq     | 2.426995E+1 | 3.895847E+0 | 2.071905E+0 | 3.023770E+1 | 6.787009E+0 | 7.639371E-1 | 2.620230E-1 | 2.240136E+0 | 3.176395E+0 | 5.610393E-2 | -1.546310E+0 | 4.197699E+1 |
| GWP-f                          | kg CO2eq     | 2.424628E+1 | 3.885952E+0 | 2.071155E+0 | 3.020339E+1 | 6.783153E+0 | 1.400740E+0 | 2.619584E-1 | 2.238863E+0 | 3.175035E+0 | 5.606437E-2 | -1.541104E+0 | 4.257810E+1 |
| GWP-b                          | kg CO2eq     | 1.858330E-2 | 2.728897E-3 | 5.814064E-4 | 2.189360E-2 | 2.165907E-3 | 3.345618E-4 | 4.394537E-5 | 7.149071E-4 | 1.201835E-3 | 3.097141E-5 | -3.477515E-3 | 2.290822E-2 |
| GWP-luluc                      | kg CO2eq     | 5.078593E-3 | 7.166043E-3 | 1.575814E-4 | 1.240222E-2 | 1.689918E-3 | 3.057377E-4 | 2.064595E-5 | 5.578277E-4 | 1.576568E-4 | 8.590002E-6 | -1.578800E-3 | 1.356379E-2 |
| ODP                            | kg CFC11eq   | 1.005337E-6 | 6.879232E-7 | 3.252302E-7 | 2.018491E-6 | 1.601266E-6 | 1.417785E-7 | 5.657242E-8 | 5.285111E-7 | 1.066008E-7 | 1.160388E-8 | -1.517207E-7 | 4.313103E-6 |
| AP                             | mol H+       | 8.831303E-2 | 3.829239E-2 | 6.956084E-  | 1.335615E-1 | 3.263295E-2 | 7.259285E-3 | 2.739908E-3 | 1.077132E-2 | 5.366168E-3 | 2.716781E-4 | -1.071639E-2 | 1.818864E-1 |

|                  |              |             |             |              |             |             |              |              |              |              |              |              |              |
|------------------|--------------|-------------|-------------|--------------|-------------|-------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
|                  | eq           |             |             | 3            |             |             |              |              |              |              |              |              |              |
| EP-fw            | kg P eq      | 6.767055E-4 | 4.666310E-5 | 1.049547E-5  | 7.338641E-4 | 4.684228E-5 | 2.336069E-5  | 9.536631E-7  | 1.546221E-5  | 2.532596E-5  | 3.401459E-7  | -5.427778E-5 | 7.918712E-4  |
| EP-m             | kg N eq      | 1.613717E-2 | 1.638398E-2 | 2.574681E-3  | 3.509583E-2 | 1.081489E-2 | 2.473512E-3  | 1.209549E-3  | 3.569778E-3  | 2.157600E-3  | 1.035707E-4  | -3.050919E-3 | 5.237381E-2  |
| EP-T             | mol N eq     | 1.771393E-1 | 1.803282E-1 | 2.844259E-2  | 3.859101E-1 | 1.193273E-1 | 2.712651E-2  | 1.327155E-2  | 3.938753E-2  | 2.391957E-2  | 1.027161E-3  | -3.539920E-2 | 5.745705E-1  |
| POCP             | kg NMVOC eq  | 6.291179E-2 | 4.652838E-2 | 8.171896E-3  | 1.176121E-1 | 3.623828E-2 | 7.822665E-3  | 3.649020E-3  | 1.196135E-2  | 6.453941E-3  | 3.045092E-4  | -9.815617E-3 | 1.742262E-1  |
| ADP-mm           | kg Sb eq     | 1.409102E-4 | 3.135964E-5 | 9.682875E-6  | 1.819528E-4 | 1.155379E-4 | 6.414857E-6  | 4.017495E-7  | 3.813821E-5  | 2.635364E-6  | 2.673419E-7  | -7.318072E-5 | 2.721675E-4  |
| ADP-f            | MJ           | 2.500135E+2 | 4.931737E+1 | 3.237694E+1  | 3.317078E+2 | 1.051424E+2 | 1.499912E+1  | 3.605405E+0  | 3.470338E+1  | 1.103640E+1  | 7.945371E-1  | -1.941753E+1 | 4.825715E+2  |
| WDP              | m3 depriv.   | 6.300072E+0 | 2.317347E-1 | 1.685651E-1  | 6.700371E+0 | 3.292939E-1 | -4.156898E-1 | 4.829090E-3  | 1.086898E-1  | 5.036920E-2  | 3.549245E-2  | -2.106410E+1 | -1.425075E+1 |
| PM               | disease inc. | 1.419098E-6 | 9.174281E-8 | 2.769764E-7  | 1.787817E-6 | 5.027454E-7 | 1.346562E-7  | 7.249036E-8  | 1.659439E-7  | 1.127963E-7  | 5.253801E-9  | -1.824720E-7 | 2.599231E-6  |
| IR               | kBq U-235 eq | 4.458060E-1 | 2.137841E-1 | 2.985108E-2  | 6.894412E-1 | 4.531489E-1 | 4.191791E-2  | 1.544996E-2  | 1.495658E-1  | 3.461706E-2  | 3.248446E-3  | -7.411719E-2 | 1.313272E+0  |
| ETP-fw           | CTUe         | 2.808868E+2 | 4.359430E+1 | 1.137881E+1  | 3.358599E+2 | 7.680762E+1 | 1.398571E+1  | 2.173416E+0  | 2.535220E+1  | 9.323537E+0  | 6.970410E-1  | -2.958582E+1 | 4.346136E+2  |
| HTP-c            | CTUh         | 2.279017E-8 | 1.842129E-9 | 4.100254E-10 | 2.504233E-8 | 1.967586E-9 | 8.625026E-10 | 7.595187E-11 | 6.494880E-10 | 2.918421E-10 | 1.272064E-11 | -1.096881E-9 | 2.780554E-8  |
| HTP-nc           | CTUh         | 2.872523E-7 | 3.016189E-8 | 1.115043E-8  | 3.285646E-7 | 6.535811E-8 | 1.288970E-8  | 1.865719E-9  | 2.157439E-8  | 9.164561E-9  | 4.074206E-10 | -3.091214E-8 | 4.089124E-7  |
| SQP              | Pt           | 5.124275E+1 | 3.779461E+1 | 5.078511E+0  | 9.411587E+1 | 1.212580E+2 | 4.029326E+0  | 4.601353E-1  | 4.002067E+1  | 1.874731E+0  | 1.681599E+0  | -2.364970E+1 | 2.397906E+2  |
| Resource use     | Unit         | A1          | A2          | A3           | A1-A3       | A4          | A5           | C1           | C2           | C3           | C4           | D            | Total        |
| PERE             | MJ           | 8.660214E+0 | 1.151676E+0 | 5.198328E+0  | 1.501022E+1 | 1.066864E+0 | 4.754590E-1  | 1.950157E-2  | 3.521450E-1  | 0            | 0            | -1.568339E-3 | 1.692262E+1  |
| PERM             | MJ           | 0           | 0           | 0            | 0           | 0           | 0            | 0            | 0            | 6.202353E-1  | 7.008022E-3  | -1.268976E+0 | -6.417331E-1 |
| PERT             | MJ           | 8.660214E+0 | 1.151676E+0 | 5.198328E+0  | 1.501022E+1 | 1.066864E+0 | 4.754590E-1  | 1.950157E-2  | 3.521450E-1  | 6.202353E-1  | 7.008022E-3  | -1.270545E+0 | 1.628089E+1  |
| PENRE            | MJ           | 2.668143E+2 | 5.233469E+1 | 3.556621E+1  | 3.547152E+2 | 1.116477E+2 | 1.600317E+1  | 3.828858E+0  | 3.685051E+1  | 0            | 0            | -1.242447E+0 | 5.218030E+2  |
| PENRM            | MJ           | 3.290400E-4 | 0           | 0            | 3.290400E-4 | 0           | 9.871200E-6  | 0            | 0            | 1.177282E+1  | 8.440012E-1  | -1.943871E+1 | -6.821544E+0 |
| PENRT            | MJ           | 2.668147E+2 | 5.233469E+1 | 3.556621E+1  | 3.547156E+2 | 1.116477E+2 | 1.600318E+1  | 3.828858E+0  | 3.685051E+1  | 1.177282E+1  | 8.440012E-1  | -2.068115E+1 | 5.149815E+2  |
| SM               | kg           | 5.966592E-5 | 0           | 0            | 5.966592E-5 | 0           | 1.789978E-6  | 0            | 0            | 0            | 0            | 0            | 6.145590E-5  |
| RSF              | MJ           | 0           | 0           | 0            | 0           | 0           | 0            | 0            | 0            | 0            | 0            | 0            | 0            |
| NRSF             | MJ           | 0           | 0           | 0            | 0           | 0           | 0            | 0            | 0            | 0            | 0            | 0            | 0            |
| FW               | m3           | 1.723875E-1 | 9.375289E-3 | 3.305588E-3  | 1.850684E-1 | 1.067421E-2 | -8.663977E-3 | 1.855666E-4  | 3.523264E-3  | 3.760064E-3  | 8.470561E-4  | -4.934534E-1 | -2.980588E-1 |
| Output flows and | Unit         | A1          | A2          | A3           | A1-A3       | A4          | A5           | C1           | C2           | C3           | C4           | D            | Total        |

| waste categories |    |             |             |             |             |             |             |             |             |             |             |              |             |
|------------------|----|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|-------------|
| HWD              | kg | 4.827713E-4 | 1.284624E-4 | 3.355758E-5 | 6.447913E-4 | 2.609468E-4 | 3.285596E-5 | 9.820154E-6 | 8.612858E-5 | 2.123036E-5 | 1.188546E-6 | -3.838913E-5 | 1.018573E-3 |
| NHWD             | kg | 1.467383E+0 | 2.862684E-1 | 3.315059E-1 | 2.085158E+0 | 9.227927E+0 | 3.551007E-1 | 4.268745E-3 | 3.045620E+0 | 1.530226E+0 | 5.231035E+0 | -1.988598E-1 | 2.128047E+1 |
| RWD              | kg | 5.206862E-4 | 3.196689E-4 | 4.574961E-5 | 8.861047E-4 | 7.171402E-4 | 6.145749E-5 | 2.503465E-5 | 2.366981E-4 | 4.902185E-5 | 5.180767E-6 | -8.047785E-5 | 1.900160E-3 |
| CRU              | kg | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0            | 0           |
| MFR              | kg | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0            | 0           |
| MER              | kg | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0            | 0           |
| EET              | MJ | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0            | 0           |
| EEE              | MJ | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0           | 0            | 0           |



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