

**Declaration Owner**

**Moland**
Strandvejen 16, 7800 Skive, Denmark,
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**Product**
Moland/Pro 55 Design

(UNSPSC Class Code 30161700/CSI Code 09 65 00)

**Functional Unit**
The functional unit is one square meter of flooring over a 75-year period

**EPD Number and Period of Validity**
SCS-EPD-10352
EPD Valid April 7, 2025, through April 6, 2030

**Product Category Rule**
PCR Guidance for Building-Related Products and Services Part A: Life Cycle Assessment Calculation Rules and Report Requirements. UL 10010, UL v.4.0, March 2022.
PCR Guidance for Building-Related Products and Services Part B: Flooring EPD Requirements, v.2.0, validity extended to July 1, 2025.

**Program Operator**
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|---|---|
| Declaration Owner: | Moland |
| Address: | Strandvejen 16, 7800 Skive, Denmark |
| Declaration Number: | SCS-EPD-10352 |
| Declaration Validity Period: | April 7, 2025 through April 6, 2030 |
| Program Operator: | SCS Global Services |
| Declaration URL Link: | https://www.scsglobalservices.com/certified-green-products-guide |
| LCA Practitioner: | Gerard Mansell, Ph.D., SCS Global Services |
| LCA Software and LCI database: | OpenLCA v2.1 software and the Ecoinvent v3.10 database |
| Product RSL: | 20 years |
| Markets of Applicability: | Europe |
| EPD Type: | Product-Specific |
| EPD Scope: | Cradle-to-Grave |
| LCIA Method and Version: | EN 15804+A2/AC 2021 (EF3.1) |
| Independent critical review of the LCA and data, according to ISO 14044 and ISO 14071 | ☐ internal ☒ external |
| LCA Reviewer: | Lindita Bushi, Ph.D., Athena Sustainable Materials Institute |
| Part A Product Category Rule: | PCR Guidance for Building-Related Products and Services Part A: Life Cycle Assessment Calculation Rules and Report Requirements. UL 10010, UL v.4.0, March 2022. |
| Part A PCR Review conducted by: | Lindita Bushi, PhD (Chair); Hugues Imbeault-Tétreault, ing., M.Sc.A.; Jack Geibig |
| Part B Product Category Rule: | PCR Guidance for Building-Related Products and Services Part B: Flooring EPD Requirements, v.2.0, validity extended to July 1, 2025. |
| Part B PCR Review conducted by: | Jack Geibig (chair), Ecoform; Thomas Gloria, Industrial Ecology Consultants; Thaddeus Owen |
| Independent verification of the declaration and data, according to ISO 14025 and the PCR | ☐ internal ☒ external |
| EPD Verifier: | Lindita Bushi, Ph.D., Athena Sustainable Materials Institute |
| Declaration Contents: |  |

***Disclaimers:*** *This EPD conforms to ISO 14025, 14040, 14044 and 21930.*

***Scope of Results Reported:*** *The PCR requirements limit the scope of the LCA metrics such that the results exclude environmental and social performance benchmarks and thresholds, and exclude impacts from the depletion of natural resources, land use ecological impacts, ocean impacts related to greenhouse gas emissions, risks from hazardous wastes and impacts linked to hazardous chemical emissions.*

***Accuracy of Results:*** *Due to PCR constraints, this EPD provides estimations of potential impacts that are inherently limited in terms of accuracy.*

***Comparability:*** *The PCR this EPD was based on was not written to support comparative assertions. EPDs based on different PCRs, or different calculation models, may not be comparable. When attempting to compare EPDs or life cycle impacts of products from different companies, the user should be aware of the uncertainty in the final results, due to and not limited to, the practitioner's assumptions, the source of the data used in the study, and the specifics of the product modeled.*

*In accordance with ISO 21930:2017, EPDs are comparable only if they comply with the core PCR, use the same sub-category PCR where applicable, include all relevant information modules and are based on equivalent scenarios with respect to the context of construction works.*

*The owner of the declaration shall be liable for the underlying information and evidence; SCS shall not be liable with respect to manufacturer information, life cycle assessment data, and evidence supplied or made available to SCS.*

# 1. Moland

If you choose Moland, you are making it easy for yourself. Easy, because all our products are of the highest quality and live up to our demanding clients' expectations. Easy, because you are sure to have your products ready for shipment the day after. And easy, because you have our whole team of advisors with you if you have any questions about dimensioning, installation and choice of materials.

We are working on making it even easier for you to recognize all our Moland products. We have attached the Moland name to the different companies in our family, to make the affiliation more recognizable. This makes it easy for you to spot our quality seal, no matter if it is wooden flooring, facades, fences, cladding for terraces or plaster that you are looking for. You just need to look for the Moland name.

# 2. Product

### 2.1 PRODUCT DESCRIPTION

Introducing Moland/Pro 55 Design, a beautiful aesthetic rigid click 0.55 flooring, made of the best technology.

### 2.2 PRODUCT FLOW DIAGRAM

A flow diagram illustrating the production processes and life cycle phases included in the scope of the EPD is provided below.


### 2.3 APPLICATION

The Moland/Pro 55 Design products provide the primary function of flooring for various residential and commercial interior applications including retail, healthcare, education, and hospitality.

### 2.4 DECLARATION OF METHODOLOGICAL FRAMEWORK

The scope of the EPD is cradle-to-grave, including raw material extraction and processing, transportation, product manufacture, product delivery, installation and use, and product disposal. The assessment is conducted following an attributional LCA approach. Cut-off and allocation procedures are described below and conform to the PCR and ISO standards.

The life cycle phases included in the product system boundary are shown below.

**Table 1.** *Life cycle phases included in the product system boundary.*

| Product | | | Construction Process | | Use | | | | | | | End-of-life | | | | Benefits and loads beyond the system boundary |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A1 | A2 | A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
| Raw material extraction and processing | Transport to manufacturing facilities | Manufacturing | Transport | Construction - installation | Use | Maintenance | Repair | Replacement | Refurbishment | Operational energy use | Operational water use | Deconstruction demolition | Transport | Waste processing | Disposal | Reuse, recovery and/or recycling potential |
| X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | MND |

*X = included | MND = Module Not Declared*

### 2.5 TECHNICAL DATA

Technical specifications for the Moland/Pro 55 Design flooring products are summarized in Table 2

**Table 2.** *Product specifications for the flooring products.*

| Characteristic | | | Description | | | |
|---|---|---|---|---|---|---|
| Sustainable certifications | | | ISO 9001; ISO 14001 | | | |
| VOC emissions test method | | | EN 16516 | | | |
| **Characteristic** | | | **Average Value** | **Unit** | **Min Value** | **Max Value** |
| Product thickness | | | 5.20 (0.205) | mm (in) | 5.10 (0.201) | 5.30 (0.209) |
| Wear layer thickness (where applicable) | | | 0.55 (0.022) | mm (in) | 0.55 (0.022) | 0.60 (0.024) |
| Product weight | | | 8,400 (27.53) | g/m$^2$ (oz/ft$^2$) | 7,980 (26.15) | 8,820 (28.90) |
| Product Form | Planks | Width | 220 (8.66) | mm (in) | 219.9 (8.66) | 220.1 (8.67) |
| | | Length | 1,510 (59.45) | mm (in) | 1,509.5 (59.43) | 1,510.5 (59.47) |

### 2.6 MARKET PLACEMENT/APPLICATION RULES

Technical specifications of the Moland/Pro 55 Design flooring products are summarized above. Detailed product performance results can be found on the manufacturer's website www.moland.dk.

### 2.7 PROPERTIES OF DECLARED PRODUCT AS DELIVERED

The Moland/Pro 55 Design flooring products are delivered for installation in the form of tiles of the dimensions specified in table 2 above.

### 2.8 MATERIAL COMPOSITION

The Moland/Pro 55 Design flooring is made primarily from polyvinyl chloride (PVC), calcium carbonate (mineral reinforcement), stabilizers and certain other substances. The rigid click flooring is structured with a top board and an attached foam underlayment. The board consists of a vinyl wear layer with the protective surface coating, a printed decorative film, a vinyl backing layer, and a solid polymer composite core extruded in a one-step process.

**Table 3.** *Material content for the flooring products in kg per square meter and percent of total mass.*

| Material | Value | |
|---|---|---|
| | kg/m² | percent |
| Polymer Binder | 2.50 | 29% |
| Filler | 5.46 | 64% |
| Stabilizer | 0.156 | 1.8% |
| Other Plastics | $9.54x10^{-2}$ | 1.1% |
| Pigment | $7.34x10^{-3}$ | 0.086% |
| Others | 0.291 | 3.4% |
| **Total Product** | **8.51** | **100%** |

No substances required to be reported as hazardous are associated with the production of the product.

### 2.9 MANUFACTURING

The products are manufactured at production facilities in China. The manufacturer provided primary data for its annual production, resource use, electricity consumption, and waste generation at the facilities. Electricity consumption is modeled using Ecoinvent datasets for the regional electricity grid resource mix. No green power sources or $CO_2$ certificates are included in the present study.

The production of rigid click flooring involves the following general manufacturing processes:

- The properly mixed raw materials are calendared into the wear layer.
- The wear layer, the printed decorative film, and other properly mixed raw materials are extruded into the top board, which is then UV-coated, annealed, and cut into individual tiles or planks.
- These tiles or planks are profiled per the locking mechanism, attached with the foam underlayment, and then appropriately packed in the packaging boxes.
- Quality checks are made at each step of the production process.

### 2.10 PACKAGING

The products are packaged for shipment using corrugated board, plastic wrap and wooden pallets.

**Table 4.** *Material content for the flooring product packaging in kg per square meter of flooring.*

| Material | Value | |
|---|---|---|
| | kg/m² | percent |
| Corrugate/Paper | 0.258 | 47% |
| Plastic | $7.93x10^{-3}$ | 1.5% |
| Wood | 0.280 | 51% |
| **Total Packaging** | **0.546** | **100%** |

### 2.11 PRODUCT INSTALLATION

Installation of this product primarily involves hand tools for measuring and cutting floor materials. Approximately 4.5% of the total material is assumed to be trimmed and discarded as waste. While some of this waste could be recycled, this scrap is modeled as being disposed of in a landfill. No adhesive is required for product installation. Impacts from the production, transport and disposal of waste material associated with installation are included in this phase, in addition to the impacts associated with packaging disposal are included with the installation phase as per PCR requirements.

### 2.12 USE CONDITIONS

No special conditions of use are noted.

### 2.13 REFERENCE SERVICE LIFE

The Reference Service Life (RSL) of the flooring products varies based on the manufacturer's warranted lifetime.

### 2.14 RE-USE PHASE

The flooring products are not reused at end-of-life.

### 2.15 DISPOSAL

At end-of-life, the products may be disposed of in a landfill or via incineration. Although in some instances vinyl flooring can be recycled into other products, the practice is not typical, nor widely available as a disposal route for the products in the consumer markets considered. It is assumed that no components of the product are recycled at end-of-life.

### 2.16 FURTHER INFORMATION

Further information on the Moland/Pro 55 Design products can be found on the manufacturer's website www.moland.dk.

## 3. LCA: Calculation Rules

### 3.1 FUNCTIONAL UNIT

The functional unit used in the study is defined as 1 $m^2$ of floor covering installed for use over a 75-year period. The corresponding reference flow for each product system is presented in Table 6. For the present assessment, a reference service lifetime (RSL) corresponding to the manufacturer's warranted lifetime is assumed. The total number of required product lifecycles during the 75-year period over which the product system is modeled is also summarized for the products in Table 5.

**Table 5.** *Reference flow and RSL for the flooring products.*

| Product Line | Reference flow (kg/$m^2$) | Reference Service Life – RSL (years) | Total # of Products Modeled |
|---|---|---|---|
| Moland/Pro 55 Design | 8.51 | 20 | 3.80 |

### 3.2 SYSTEM BOUNDARY

The scope of the EPD is cradle-to-grave, including raw material extraction and processing, transportation, product manufacturing, product delivery, installation and use, and product disposal. The life cycle phases included in the EPD scope are described in Table 6 and illustrated in Figure 1.

**Table 6.** *The modules and unit processes included in the scope for the flooring product system.*

| Module | Module description from the PCR | Unit Processes Included in Scope |
|---|---|---|
| A1 | Extraction and processing of raw materials; any reuse of products or materials from previous product systems; processing of secondary materials; generation of electricity from primary energy resources; energy, or other, recovery processes from secondary fuels | Extraction and processing of raw materials for the product components. |
| A2 | Transport (to the manufacturer) | Transport of component materials to the manufacturing facilities |
| A3 | Manufacturing, including ancillary material production | Manufacturing of flooring products and packaging (including upstream unit processes) |
| A4 | Transport (to the building site) | Transport of product (including packaging) to the building site |
| A5 | Construction-installation process | Impacts from product installation. Impacts from the production, transport and disposal of waste material associated with installation are included in this phase in addition to impacts from packaging disposal |
| B1 | Product use | Use of the product in a commercial building setting. There are no associated emissions or impacts from the use of the product |
| B2 | Product maintenance | Maintenance of products over the product RSL, including periodic cleaning. |
| B3 | Product repair | The product is not expected to require repair over its lifetime |
| B4 | Product replacement | The materials and energy required for replacement of the product over the 75-year ESL of the assessment are included in this phase |
| B5 | Product refurbishment | The product is not expected to require refurbishment over its lifetime |
| B6 | Operational energy use by technical building systems | There is no operational energy use associated with the use of the product |
| B7 | Operational water uses by technical building systems | There is no operational water use associated with the use of the product |
| C1 | Deconstruction, demolition | Demolition of the product is accomplished using hand tools with no associated emissions and negligible impacts |
| C2 | Transport (to waste processing) | Transport of the product to waste treatment at end-of-life |
| C3 | Waste processing for reuse, recovery and/or recycling | The products are disposed of by landfilling which require no waste processing |
| C4 | Disposal | Disposal of the product |
| D | Reuse-recovery-recycling potential | Module Not Declared |

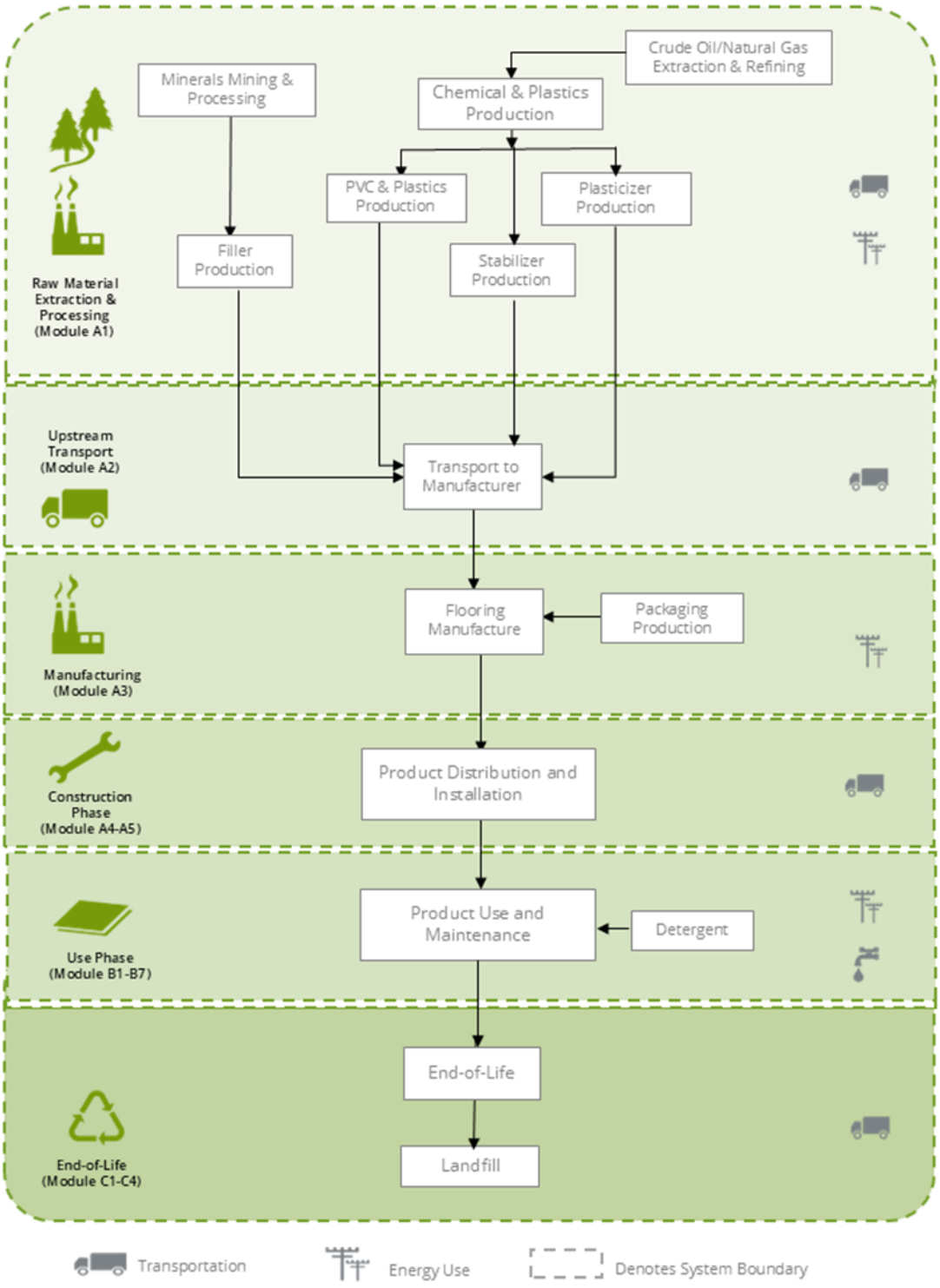


**Figure 1.** *Flow diagram for the life cycle of the flooring products.*

### 3.3 PRODUCT SPECIFIC CALCULATION FOR USE PHASE

The recommended cleaning regime is highly dependent on the use of the premises where the floor covering is installed. In high traffic areas more frequent cleaning will be needed compared to areas where there is low traffic. For the purposes of this EPD, average maintenance (moderate traffic levels) is presented based on typical installations.

### 3.4 UNITS

All data and results are presented using SI units.

### 3.5 ESTIMATES AND ASSUMPTIONS

- Electricity use at the manufacturing facility was allocated to a product based on the product area as a fraction of the total production.
- The manufacturing facility under review is located in China. Ecoinvent inventory datasets for the appropriate regional energy grids were used to model resource use and emissions from electricity use at the manufacturing facilities.
- Inventory data for some material components were unavailable and modeled using proxy datasets from the Ecoinvent LCI databases.
- The Reference Service Life (RSL) of the products was modeled based on information provided by the manufacturers assuming their products are installed and maintained as recommended and used for the specific application noted.
- Downstream transport was modeled based on information provided by the manufacturers representing transport for product distribution to North America.
- The maintenance phase of the product life cycle was modeled based on information provided by the manufacturers including recommended installation and cleaning methods, as well as cleaning frequency.
- For the product end-of-life, disposal of product and product packaging is modeled based on the PCR guidance regarding recycling rates of products and packaging materials.
- For final disposal of the packaging material and flooring products at end-of-life, all materials are assumed to be transported 161 km by diesel truck to either a landfill or material reclamation facility (for recycling). Datasets representing disposal in a landfill and waste incineration are from Ecoinvent.

The PCR requires the results for several inventory flows related to construction products to be reported including energy and resource use and waste and outflows. These are aggregated inventory flows, and do not characterize any potential impact; results should be interpreted taking into account this limitation.

### 3.6 CUT-OFF RULES

According to the PCR, processes contributing greater than 1% of the total environmental impact indicator for each impact are included in the inventory. No data gaps were allowed which were expected to significantly affect the outcome of the indicator results. No known flows are deliberately excluded from this EPD.

### 3.7 DATA SOURCES

Primary data were provided for the manufacturing facilities and select suppliers. The sources of secondary LCI data are the Ecoinvent database.

**Table 7.** *Data sources for the flooring products.*

| Component | Dataset | Data Source | Publication Date |
|---|---|---|---|
| **PRODUCT** | | | |
| **Polymer Binder** | | | |
| Polyvinyl Chloride | polyvinylchloride production, bulk polymerisation \| polyvinylchloride, bulk polymerised \| Cutoff, S/RoW;<br>extrusion, co-extrusion of plastic sheets \| extrusion, co-extrusion \| Cutoff, S/RoW;<br>extrusion, plastic film \| extrusion, plastic film \| Cutoff, S/RoW | EI v3.10 | 2023 |
| **Filler** | | | |
| Calcium Carbonate | limestone production, crushed, washed \| limestone, crushed, washed \| Cutoff, S/RoW | EI v3.10 | 2023 |
| **Stabilizer** | | | |
| Stabilizer | market for chemical, organic \| chemical, organic \| Cutoff, S/GLO | EI v3.10 | 2023 |
| | market for chemicals, inorganic \| chemical, inorganic \| Cutoff, S/GLO | EI v3.10 | 2023 |
| | solvent production, organic \| solvent, organic \| Cutoff, S/GLO | EI v3.10 | 2023 |
| | limestone production, crushed, washed \| limestone, crushed, washed \| Cutoff, S/RoW | EI v3.10 | 2023 |
| | market for zinc oxide \| zinc oxide \| Cutoff, S/GLO | EI v3.10 | 2023 |
| **Pigments** | | | |
| Carbon Black | market for carbon black \| carbon black \| Cutoff, S/GLO | EI v3.10 | 2023 |
| **Others** | | | |
| Additives | chemical production, organic \| chemical, organic \| Cutoff, S/GLO; chemical production, inorganic \| chemical, inorganic \| Cutoff, S/GLO | EI v3.10 | 2023 |
| Adhesive | polyurethane adhesive production \| polyurethane adhesive \| Cutoff, S/GLO | EI v3.10 | 2023 |
| Coating | market for chemical, organic \| chemical, organic \| Cutoff, S/GLO | EI v3.10 | 2023 |
| **PACKAGING** | | | |
| Cardboard/Paper | corrugated board box production \| corrugated board box \| Cutoff, S/RoW;<br>containerboard production, linerboard, testliner \| containerboard, linerboard \| Cutoff, S/RoW | EI v3.10 | 2023 |
| Wrapping film | packaging film production, low density polyethylene \| packaging film, low density polyethylene \| Cutoff, S/RoW | EI v3.10 | 2023 |
| Wood | EUR-flat pallet production \| EUR-flat pallet \| Cutoff, S/RoW | EI v3.10 | 2023 |
| **TRANSPORT** | | | |
| Road transport | market for transport, freight, lorry 16-32 metric ton, EURO4 \| transport, freight, lorry 16-32 metric ton, EURO4 \| Cutoff, S/RoW;<br>transport, freight, lorry 16-32 metric ton, EURO4 \| transport, freight, lorry 16-32 metric ton, EURO4 \| Cutoff, U/RER | EI v3.10 | 2023 |
| Ship transport | transport, freight, sea, container ship \| transport, freight, sea, container ship \| Cutoff, S/GLO | EI v3.10 | 2023 |
| **MAINTENANCE** | | | |
| Neutral cleaner | ethoxylated alcohol (AE7) production, petrochemical \| ethoxylated alcohol (AE7) \| Cutoff, U /RER;<br>fatty acid production, from palm oil \| fatty acid \| Cutoff, U/RER;<br>tap water production, conventional treatment \| tap water \| Cutoff, U/Europe without Switzerland | EI v3.10 | 2023 |
| Electricity | market group for electricity, low voltage \| electricity, low voltage \| Cutoff, U/RER | EI v3.10 | 2023 |
| Water | tap water production, conventional treatment \| tap water \| Cutoff, U/Europe without Switzerland | EI v3.10 | 2023 |
| **WASTE DISPOSAL** | | | |
| Landfill | treatment of municipal solid waste, sanitary landfill \| municipal solid waste \| Cutoff, S/RoW;<br>treatment of waste plastic, mixture, sanitary landfill \| waste plastic, mixture \| Cutoff, U/CH<br>treatment of waste polyvinylchloride, sanitary landfill \| waste polyvinylchloride \| Cutoff, U/CH<br>treatment of waste paperboard, sanitary landfill \| waste paperboard \| Cutoff, U/CH<br>treatment of waste wood, untreated, sanitary landfill \| waste wood, untreated \| Cutoff, U/CH<br>treatment of waste polyvinylchloride, sanitary landfill \| waste polyvinylchloride \| Cutoff, S/RoW | EI v3.10 | 2023 |

| Component | Dataset | Data Source | Publication Date |
|---|---|---|---|
| Incineration | treatment of waste plastic, mixture, municipal incineration \| waste plastic, mixture \| Cutoff, S/RoW<br>treatment of waste paperboard, municipal incineration \| waste paperboard \| Cutoff, S/RoW<br>treatment of waste polyvinylchloride, municipal incineration \| waste polyvinylchloride \| Cutoff, S/RoW<br>treatment of waste wood, untreated, municipal incineration \| waste wood, untreated \| Cutoff, S/RoW | EI v3.10 | 2023 |
| **RESOURCES** | | | |
| Grid electricity - China | market group for electricity, medium voltage \| electricity, medium voltage \| Cutoff, S/CN | EI v3.10 | 2023 |
| Water | tap water production, conventional treatment \| tap water \| Cutoff, S/RoW | EI v3.10 | 2023 |

### 3.8 DATA QUALITY

The data quality assessment addressed the following parameters: time-related coverage, geographical coverage, technological coverage, precision, completeness, representativeness, consistency, reproducibility, sources of data, and uncertainty.

**Table 8.** *Data quality assessment for the flooring product system.*

| Data Quality Parameter | Data Quality Discussion |
|---|---|
| **Time-Related Coverage:** Age of data and the minimum length of time over which data is collected | The most recent available data are used, based on other considerations such as data quality and similarity to the actual operations. Typically, these data are less than 5 years old. All of the data used represented an average of at least one year's worth of data collection, and up to three years in some cases. Manufacturer-supplied data (primary data) are based on annualized production for 2023. |
| **Geographical Coverage:** Geographical area from which data for unit processes is collected to satisfy the goal of the study | The data used in the analysis provide the best possible representation available with current data. Electricity use for product manufacture is modeled using representative data for regional power mixes from the Ecoinvent LCI database. Surrogate data used in the assessment are representative of global or North American operations. Data representative of global operations are considered sufficiently similar to actual processes. Data representing product disposal are based on regional statistics. |
| **Technology Coverage:** Specific technology or technology mix | For the most part, data are representative of the actual technologies used for processing, transportation, and manufacturing operations. Representative datasets, specific to the type of material, are used to represent the actual processes, as appropriate. |
| **Precision:** Measure of the variability of the data values for each data expressed | Precision of results are not quantified due to a lack of data. Data collected for operations were typically averaged for one or more years and over multiple operations, which is expected to reduce the variability of results. |
| **Completeness:** Percentage of flow that is measured or estimated | The LCA model included all known mass and energy flows for production of the flooring products. In some instances, surrogate data used to represent upstream and downstream operations may be missing some data which is propagated in the model. No known processes or activities contributing to more than 1% of the total environmental impact for each indicator are excluded. |
| **Representativeness:** Qualitative assessment of the degree to which the data set reflects the true population of interest | Data used in the assessment represent typical or average processes as currently reported from multiple data sources and are therefore generally representative of the range of actual processes and technologies for production of these materials. Considerable deviation may exist among actual processes on a site-specific basis; however, such a determination would require detailed data collection throughout the supply chain back to resource extraction. |
| **Consistency:** Qualitative assessment of whether the study methodology is applied uniformly to the various components of the analysis | The consistency of the assessment is considered to be high. Data sources of similar quality and age are used; with a bias towards Ecoinvent v3.10 data where available. Different portions of the product life cycle are equally considered. |
| **Reproducibility:** Qualitative assessment of the extent to which information about | Based on the description of data and assumptions used, this assessment would be reproducible by other practitioners. All assumptions, models, and data sources are documented. |

| Data Quality Parameter | Data Quality Discussion |
|---|---|
| the methodology and data values would allow an independent practitioner to reproduce the results reported in the study | |
| **Sources of the Data:** Description of all primary and secondary data sources | Data representing energy use at manufacturing facilities represent an annual average and are considered of high quality due to the length of time over which these data are collected, as compared to a snapshot that may not accurately reflect fluctuations in production. For secondary LCI data, Ecoinvent v3.10 LCI data are used. |
| **Uncertainty of the Information:** Uncertainty related to data, models, and assumptions | Uncertainty related to materials in the products and packaging is low. Actual supplier data for all upstream operations were not available and the study relied upon the use of existing representative datasets. These datasets contained relatively recent data (<10 years) but lacked geographical representativeness. Uncertainty related to the impact assessment methods used in the study are high. The impact assessment method required by the PCR includes impact potentials, which lack characterization of providing and receiving environments or tipping points. |

### 3.9 PERIOD UNDER REVIEW

The period of review calendar year 2023.

### 3.10 ALLOCATION

Resource use at the manufacturing facilities (e.g., water and energy) was allocated to the products based on the product area as a fraction of the total facility production volume (i.e., area-based allocation). Area-based allocation was deemed most appropriate for the flooring products as total facility production was available as total square meters of product. Electricity use at the manufacturing facilities was modeled using ecoinvent inventory datasets for the country-specific electrical grid.

The product systems include the use of recycled materials. Using the recycled content allocation approach, system inputs with recycled content do not receive any burden from the previous life cycle other than reprocessing of the waste material. At end-of-life, materials which are recycled leave the system boundaries with no additional burden.

Per ISO 21930, 2.8.4.1.2, useable output flows such as scrap are not considered co-products but are considered waste, and no allocation to secondary material, secondary fuels, or recovered energy is applied.

Impacts from transportation, including product distribution to point of sale, were attributed to the products based on the mass of material and distance transported.

### 3.11 COMPARABILITY

The PCR this EPD was based on was not written to support comparative assertions. EPDs based on different PCRs, or different calculation models, may not be comparable. When attempting to compare EPDs or life cycle impacts of products from different companies, the user should be aware of the uncertainty in the final results, due to and not limited to, the practitioner's assumptions, the source of the data used in the study, and the specifics of the products modeled.

# 4. LCA: Scenarios and Additional Technical Information

***Delivery and Installation stage (A4 - A5)***

Distribution of the flooring products to the point of installation is included in the assessment based on information provided by the manufacturer. Transportation parameters for modeling transport to consumer markets are summarized in Table 9.

**Table 9.** *Product distribution parameters by transport mode and consumer market.*

| Parameter | Unit | Value | |
|---|---|---|---|
| **Ground transport** | | | |
| Fuel type | - | Diesel | |
| Liters of fuel | L/100km | 18.7 | |
| Vehicle type | - | Diesel truck | |
| Capacity utilization | % | 76 | |
| **Ocean transport** | | | |
| Fuel type | - | Fuel oil | |
| Liters of fuel | L/tkm | 2.23 | |
| Vehicle type | - | Ocean freighter | |
| Capacity utilization | % | 70 | |
| **Product Name** | **Gross mass transported (kg)** | **Transport Distance (km)** | |
| | | **Road** | **Ship** |
| Moland/Pro 55 Design | 9.05 | 768 | 18,207 |

Installation and maintenance of the products are based on typical application and intended use. Approximately 4.5% of the product mass is assumed lost as waste during product installation which is disposed of via landfilling. Impacts from the production, transport and disposal of waste material associated with installation are included in this phase. The VOC emissions associated with the installation, use and maintenance of the products are negligible.

The impacts associated with packaging disposal are included with the installation phase as per PCR requirements. The recycling rates used for the product packaging are based on the PCR guidance for disposal practices in the US. The relevant disposal statistics used for the packaging are summarized in Table 10. For material not recycled, 80% are assumed landfilled and 20% incinerated. Modeling parameters for product installation are summarized in Table 11.

**Table 10**. *Recycling rates for packaging materials at end-of-life.*

| Material | Recycling rate (%) |
|---|---|
| ***Recycling Rates*** | |
| Plastics | 41% |
| Paper & Pulp | 82.3% |
| Wood | 31.1% |
| ***Disposal of Non-recyclables*** | |
| Landfill | 80% |
| Incineration | 20% |

The impacts associated with packaging disposal are included with the installation phase as per PCR requirements.

**Table 11.** *Installation parameters for the flooring products, per 1 $m^2$.*

| Parameter | | Value |
|---|---|---|
| Ancillary materials (kg) | | 0.00 |
| Net freshwater consumption ($m^3$) | | 0.00 |
| Electricity consumption (kWh) | | 0.00 |
| Product loss per functional unit (kg) | | 0.383 |
| Waste materials generated by product installation (kg) | | 0.928 |
| Output materials resulting from on-site waste processing (kg) | | 0.00 |
| Mass of packaging waste (kg) | Plastic | $7.93x10^{-3}$ |
| | Corrugate | 0.258 |
| | Wood | 0.280 |
| Biogenic carbon contained in packaging (kg $CO_2$) | | 0.986 |
| Direct emissions (kg) | | 0.00 |

***Use stage (B1)***

No impacts are associated with the use of the products over the Reference Service Lifetime.

***Maintenance stage (B2)***

According to the manufacturer, typical maintenance involves regular sweeping and damp mopping, as well as periodic machine cleaning of the flooring. The present assessment is based on a recommended weekly cleaning schedule including sweeping and mopping with a neutral cleaner and monthly machine cleaning.

**Table 12.** *Maintenance parameters for the flooring products, per 1 $m^2$.*

| Parameter | Unit | Value |
|---|---|---|
| Maintenance process | - | Damp mopping |
| Maintenance cycle | Cycles / RSL | 1,040 |
| Maintenance cycle | Cycles / ESL | 3,900 |
| Net freshwater consumption | $m^3/m^2/yr$ | 0.0058 |
| Cleaning agent | $kg/m^2/yr$ | 0.0119 |
| | | |
| Maintenance process | - | Machine cleaning |
| Maintenance cycle | Cycles / RSL | 240 |
| Maintenance cycle | Cycles / ESL | 900 |
| Electricity | $kWh/m^2/yr$ | 0.022 |
| Further assumptions | - | Moderate traffic |

***Repair/Refurbishment stage (B3; B5)***

Product repair and refurbishment are not relevant during the lifetime of the products.

***Replacement stage (B4)***

The materials and energy required for replacement of the product over the 75-year estimated service lifetime of the assessment are included in this stage. Impacts associated with the production, transport, waste processing, and disposal of all materials required for the replacement of the product over the 75-year assessment period are included. Modeling parameters for the product replacement stage are summarized in Table 13.

**Table 13.** *Product replacement parameters for the flooring products, per 1 $m^2$.*

| Product | Unit | Value |
|---|---|---|
| Reference service life | Years | 20 |
| Replacement cycle | - | 2.8 |
| Energy input | kWh | - |
| Freshwater consumption | $m^3$ | - |
| Ancillary materials | kg | Negligible |
| Replacement parts | kg | 25.35 |

***Building operation stage (B6 – B7)***

There is no operational energy or water use associated with the use of the products.

***Disposal stage (C1 - C4)***

The disposal stage includes removal of the products (C1); transport of the flooring products to waste treatment facilities (C2); waste processing (C3); and associated emissions as the product degrades in a landfill or is burned in an incinerator (C4). For the flooring products, no emissions are generated during demolition (C1) while no waste processing (C3) is required for incineration or landfill disposal.

Transportation of waste materials at end-of-life (*C2*) assumes a 161 km (~100 mile) average distance to disposal, consistent with the PCR. No recycling of the product materials is assumed at end-of-life. The relevant disposal parameters used for the product system are summarized in Table 14.

**Table 14.** *End-of-life disposal scenario parameters for the flooring products.*

| Parameter | | Value |
|---|---|---|
| Scenario assumptions | | Landfill |
| Collection process | Collected separately | 0 |
| | Collected with mixed waste | 8.51 |
| Recovery | | |
| Disposal | Recycling | 0 |
| | Landfill | 8.51 |
| | Incineration | 0 |
| Removals of biogenic carbon | | 0 |

# 5. LCA: Results

Results of the Life Cycle Assessment are presented below. It is noted that LCA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks. All LCA results are stated to three significant figures in agreement with the PCR for flooring products and therefore the sum of the total values may not exactly equal 100%.

The following environmental impact category indicators are reported using characterization factors based on EN15804+A2/AC 2021 (EF3.1).

| Impact Category | Unit |
|---|---|
| Global Warming Potential **(GWP)** | kg $CO_2$ eq |
| Depletion potential of the stratospheric ozone layer **(ODP)** | kg CFC 11 eq |
| Acidification potential, Accumulated Exceedance **(AP)** | mol H+ eq |
| Eutrophication potential, fraction of nutrients reaching freshwater end compartment **(EP)** | kg P eq |
| Formation potential of tropospheric ozone **(POCP)** | kg NMVOC eq |
| Abiotic depletion for fossil resources potential (ADP-fossil) | MJ |

These impact categories are globally deemed mature enough to be included in Type III environmental declarations. Other categories are being developed and defined and LCA should continue making advances in their development. However, the EPD users shall not use additional measures for comparative purposes.

The following inventory parameters, specified by the PCR, are also reported.

| Resources | Unit | Waste and Outflows | Unit |
|---|---|---|---|
| **$RPR_E$:** Renewable primary resources used as energy carrier (fuel) | MJ, LHV | **HWD:** Hazardous waste disposed | kg |
| **$RPR_M$:** Renewable primary resources with energy content used as material | MJ, LHV | **NHWD:** Non-hazardous waste disposed | kg |
| **$NRPR_E$:** Non-renewable primary resources used as an energy carrier (fuel) | MJ, LHV | **HLRW:** High-level radioactive waste, conditioned, to final repository | kg |
| **$NRPR_M$:** Non-renewable primary resources with energy content used as material | MJ, LHV | **ILLRW:** Intermediate- and low-level radioactive waste, conditioned, to final repository | kg |
| **SM:** Secondary materials | kg | **CRU:** Components for re-use | kg |
| **RSF:** Renewable secondary fuels | MJ, LHV | **MR:** Materials for recycling | kg |
| **NRSF:** Non-renewable secondary fuels | MJ, LHV | **MER:** Materials for energy recovery | kg |
| **RE:** Recovered energy | MJ, LHV | **EE:** Recovered energy exported from the product system | MJ, LHV |
| **FW:** Use of net freshwater resources | $m^3$ | - | - |

Modules B1, B3, B5, B6 and B7 are not associated with any impact and are therefore declared as zero. In addition, no emissions are generated during demolition (C1) while no waste processing (C3) is required for landfill disposal. Additionally, as the flooring products do not typically contain significant amounts of bio-based materials, biogenic carbon emissions and removals are not declared. Module D is not declared. In the interest of space and table readability, these modules are not included in the results presented below.

**Table 15.** *Life Cycle Impact Assessment results for the flooring products over a 75-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.* ***(Moland/Pro 55 Design)***

| Impact Category | A1 | A2 | A3 | A4 | A5 | B2 | B4 | C2 | C4 |
|---|---|---|---|---|---|---|---|---|---|
| **EN 15804** | | | | | | | | | |
| GWP (kg $CO_2$ eq) | 10.4 | 0.944 | 4.74 | 3.15 | 1.57 | 2.68 | 78.9 | 1.96 | 5.39 |
| | 9.5% | 0.86% | 4.3% | 2.9% | 1.4% | 2.4% | 72% | 1.8% | 4.9% |
| AP (mol H+ eq) | $4.19x10^{-2}$ | $3.85x10^{-3}$ | $2.43x10^{-2}$ | $5.63x10^{-2}$ | $6.46x10^{-3}$ | $1.01x10^{-2}$ | 0.403 | $1.01x10^{-2}$ | $1.19x10^{-3}$ |
| | 7.5% | 0.69% | 4.4% | 10% | 1.2% | 1.8% | 72% | 1.8% | 0.21% |
| EP (kg P eq) | $2.81x10^{-3}$ | $7.24x10^{-5}$ | $9.98x10^{-4}$ | $1.45x10^{-4}$ | $2.14x10^{-4}$ | $7.85x10^{-4}$ | $1.32x10^{-2}$ | $3.58x10^{-5}$ | $4.51x10^{-4}$ |
| | 15% | 0.39% | 5.3% | 0.77% | 1.1% | 4.2% | 71% | 0.19% | 2.4% |
| POCP (kg NMVOC eq) | $4.22x10^{-2}$ | $5.33x10^{-3}$ | $1.56x10^{-2}$ | $4.63x10^{-2}$ | $6.38x10^{-3}$ | $1.50x10^{-2}$ | 0.384 | $1.91x10^{-2}$ | $2.32x10^{-3}$ |
| | 7.9% | 0.99% | 2.9% | 8.6% | 1.2% | 2.8% | 72% | 3.6% | 0.43% |
| ODP (kg CFC-11 eq) | $3.72x10^{-6}$ | $1.37x10^{-8}$ | $1.61x10^{-8}$ | $5.16x10^{-8}$ | $1.73x10^{-7}$ | $8.01x10^{-8}$ | $1.12x10^{-5}$ | $2.94x10^{-8}$ | $2.89x10^{-9}$ |
| | 24% | 0.09% | 0.1% | 0.34% | 1.1% | 0.52% | 73% | 0.19% | 0.019% |
| ADPF (MJ eq) | 190 | 12.8 | 42.4 | 39.3 | 14.6 | 59.5 | 912 | 24.5 | 2.41 |
| | 15% | 0.98% | 3.3% | 3% | 1.1% | 4.6% | 70% | 1.9% | 0.19% |

The embodied carbon of the products is equivalent to the GWP summed across phases A1 through A3.

**Table 16.** *Resource use and waste flows for the flooring products over a 75-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.* ***(Moland/Pro 55 Design)***

| Para-meter | A1 | A2 | A3 | A4 | A5 | B2 | B4 | C2 | C4 |
|---|---|---|---|---|---|---|---|---|---|
| **Resources** | | | | | | | | | |
| RPRE (MJ) | 8.26 | 0.171 | 17.2 | 0.478 | 0.752 | 3.87 | 48.6 | 0.107 | $7.55x10^{-2}$ |
| | 10% | 0.21% | 22% | 0.6% | 0.95% | 4.9% | 61% | 0.13% | 0.095% |
| RPRM (MJ) | 0.00 | 0.00 | 0.00 | 0.00 | 0.437 | 0.00 | 28.4 | 0.00 | 0.00 |
| | 0% | 0% | 0% | 0% | 1.5% | 0% | 98% | 0% | 0% |
| NRPRE (MJ) | 148 | 12.9 | 46.0 | 39.8 | 15.2 | 66.3 | 810 | 24.6 | 2.50 |
| | 13% | 1.1% | 3.9% | 3.4% | 1.3% | 5.7% | 69% | 2.1% | 0.21% |
| NRPRM (MJ) | 51.1 | 0.00 | 0.00 | 0.00 | $1.32x10^{-2}$ | 0.00 | 144 | 0.00 | 0.00 |
| | 26% | 0% | 0% | 0% | 0.0068% | 0% | 74% | 0% | 0% |
| SM (kg) | 0.910 | 0.00 | 0.00 | 0.00 | $4.09x10^{-2}$ | 0.00 | 2.66 | 0.00 | 0.00 |
| | 25% | 0% | 0% | 0% | 1.1% | 0% | 74% | 0% | 0% |
| RSF/NRSF (MJ) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| RE (MJ) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| FW (m3) | 0.771 | $1.04x10^{-2}$ | 0.240 | $2.42x10^{-2}$ | $4.80x10^{-2}$ | 0.709 | 3.10 | $9.21x10^{-3}$ | $4.01x10^{-3}$ |
| | 16% | 0.21% | 4.9% | 0.49% | 0.98% | 14% | 63% | 0.19% | 0.082% |
| **Wastes** | | | | | | | | | |
| HWD (kg) | $3.58x10^{-3}$ | $8.99x10^{-5}$ | $6.10x10^{-5}$ | $2.36x10^{-4}$ | $1.91x10^{-4}$ | $9.76x10^{-4}$ | $1.22x10^{-2}$ | $1.73x10^{-4}$ | $1.61x10^{-5}$ |
| | 20% | 0.51% | 0.35% | 1.3% | 1.1% | 5.6% | 70% | 0.99% | 0.092% |
| NHWD (kg) | 0.830 | 0.613 | 0.978 | 0.929 | 0.678 | 0.144 | 35.5 | 0.117 | 8.53 |
| | 1.7% | 1.3% | 2% | 1.9% | 1.4% | 0.3% | 73% | 0.24% | 18% |
| HLRW (kg) | $4.01x10^{-5}$ | $7.78x10^{-7}$ | $1.25x10^{-5}$ | $2.18x10^{-6}$ | $2.56x10^{-6}$ | $2.26x10^{-5}$ | $1.65x10^{-4}$ | $5.57x10^{-7}$ | $3.75x10^{-7}$ |
| | 16% | 0.32% | 5.1% | 0.88% | 1% | 9.2% | 67% | 0.23% | 0.15% |
| ILLRW (kg) | $1.06x10^{-4}$ | $1.83x10^{-6}$ | $3.60x10^{-5}$ | $6.19x10^{-6}$ | $6.89x10^{-6}$ | $7.62x10^{-5}$ | $4.45x10^{-4}$ | $1.31x10^{-6}$ | $9.84x10^{-7}$ |
| | 16% | 0.27% | 5.3% | 0.91% | 1% | 11% | 65% | 0.19% | 0.14% |
| CRU (kg) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| MR (kg) | 0.00 | 0.00 | 0.00 | 0.00 | 0.316 | 0.00 | 0.885 | 0.00 | 0.00 |
| | 0% | 0% | 0% | 0% | 26% | 0% | 74% | 0% | 0% |
| MER (kg) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| EE (MJ) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

# 7. Additional Environmental Information

The Moland/Pro 55 Design flooring products are certified to various environmental standards, as summarized below.

ISO 9001 establishes the criteria for a quality management system. The standard is based on several quality management principles, including a strong customer focus, the motivation and implication of top management, the process approach, and continual improvement. For more information, visit: https://www.iso.org/iso-9001-quality-management.html

ISO 14001 establishes the criteria for an environmental management system. Designed for any type of organization, regardless of its activity or sector, it can provide assurance to company management and employees as well as external stakeholders that environmental impact is being measured and improved. For more information, visit: https://www.iso.org/iso-14001-environmental-management.html

# 8. References


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