

TOTEM UPDATE

Details on Sprint 8 deployed in Production

Version 3.0.0 – March 17th 2023

Subject	Documentation (EN)
Redesign of the interface	The TOTEM interface has been thoroughly redesigned. This includes the following main changes: • A new look and feel have been implemented including a new layout with clear visuals and logos. • The layout of the “Projects” and “Library” have been harmonized. A specific colour code is used to distinguish both environments (“Projects” in green, “Library” in orange). • By analogy with the EPB software, the project page is now subdivided in three parts: ○ Hierarchic tree (left side): the hierarchic tree allows to easily navigate throughout the project. ○ Central pane (centre): depending on the selection in the hierarchic tree, the central pane allows to compare variants (when a building or element category is selected) or to model a specific variant (when a building or element variant is selected). ○ Information panel (right side): the information panel includes the modelling details and/or results of the selected variant. • The structure of the hierarchic tree has been improved and is composed of three levels: ○ “Overview”: This includes all the general information related to a project. ○ “Buildings”: This level allows to model, assess, and compare the environmental impact of buildings. The buildings are ordered in categories according to their function (i.e. Residential, Office, Industrial, Retail, Educational, Healthcare and Other) ○ “Elements”: This level allows to model, assess, and compare the environmental impact of elements. The elements are ordered in main categories according to their function (i.e. Floor, Wall, Roof, Building frame, Opening, Technical Installation, External works). The element categories are in turn subdivided in subcategories according to the BB/SfB classification. As an example, the main category “Floor” is subdivided in “Floor on grade (13.)+”, “Storey floor (23.)+” and “Attic floor (23.)+”. • The modelling of a building is now subdivided in four tabs: ○ General parameters: this includes all the general parameters of the building. ○ Building composition: the building composition table allows to define the amount and type of elements included in the building. The table is structured according to the main element categories, as defined in the hierarchic tree.

	○ Energy use: this tab includes all the parameters related to the energy use calculations. ○ Results: this tab allows to visualise the building impact results. • The modelling of an element is now subdivided in three tabs: ○ General parameters: this includes all the general parameters of the element. ○ Element composition: the element composition table allows to define the components included in the element. ○ Results: this tab allows to visualise the element impact results. • The visualisations and tables in the reports have been refined to improve the analysis of the results. • The project management and collaboration functionalities have been improved. All the functionalities are grouped in the footer (left side). • The Frequently Asked Questions (FAQs) will be directly integrated in the TOTEM interface. The migration from the pdf format to the interface will be done in March 2023. To improve the search experience, a navigation tree and filter options will be implemented.
Integration of technical installations	The technical installations can now be modelled in TOTEM. This includes the following new element categories: • Water supply (53.) • Heating (56.) • Heating & Domestic hot water (56:53) • Ventilation (57.) Like in the EPB software, technical installations are modelled by defining the different components required for the production and storage, distribution, emission and control. Specific logos have been developed to indicate the main components included in each technical installation.
Energy use calculations	The energy impact of a building can now be calculated based on one of the following two approaches: • Simplified approach using the Equivalent Degree Days: the impact of heating is estimated based on the transmission and ventilation losses of the building, considering 1200 equivalent degree days. Compared to the previous TOTEM version, a limited number of parameters can be adapted by the user, including the type of ventilation system, air tightness and type of heating. The simplified approach is recommended in the sketch design stage, when EPB results are not available yet. • Approach based on EPB output: the impacts of heating, cooling, domestic hot water and auxiliaries are calculated based on output from the EPB software (entered by the user). The type of approach and related input parameters can be entered in the tab “Energy use”, available when selecting a specific building variant in the hierarchic tree.

Type of environment	For each planar element used in a building, the user can now define the type of environment. Depending on the element category, one of the following types can be chosen: • Not part of building thermal envelope • Outdoor environment • Adjacent heated space • Adjacent non-heated space • Ground • Cellar • Crawl space The type of environment has an influence on the calculated U-value and resulting transmission losses (which are used in the simplified energy use approach). As a result of this new feature, element categories “Floor above unheated space” and “Wall in contact with unheated space” were not relevant anymore and have therefore been deprecated.
Thermal bridges	The impact of thermal bridges is now included in the calculation of the transmission losses (which are used in the simplified energy use approach). The calculation is based on the method of EPB-compliant thermal bridges (method B).
Extension of building library	The building library has been extended with several representative residential buildings, including their technical systems: • 4 buildings from the SuFiQuaD research project (Allacker 2010), including a detached house, semi-detached house, terraced house and apartment. For the semi-detached house, five variants have been modelled including various construction types (solid versus timber construction), energy performances (EPB versus passive standard) and technical systems (condensing gas boiler, condensing oil boiler, heat pump, ventilation systems C and D) • 1 terraced house from the Flemish Cost Optimal study of 2013 (Veka 2013)
Building elements for renovation	The library of building elements has been extended with 22 representative elements for renovation, based on the BBSM-Feder research project. These elements are indicated with the abbreviation “Reno” in the element name.
Indication of bio-based components	Bio-based components are now indicated in the library based on a specific “green leaf” logo. A filter is also available to search specifically for bio-based or non-biobased components. Remark: A component in TOTEM is identified as bio-based if all main materials included in the component are bio-based. E.g. a sandwich panel composed of chipboard and synthetic insulation is not considered as bio-based as only the chipboard is a bio-based material.
Addition of biobased components	Additionally, the following new components with biobased content have been added to the library: • Cellulose-textile-based semi-rigid acoustic insulation board (for the following 4 applications: in floors between joists and beams, internal walls between

	timber frames, pitched roofs between rafters, and as ceiling finish between battens) (component-ID: WS1576-WS1579). • An extra application variant of the already existing cellulose-hemp-based semi-rigid acoustic insulation board was added too (i.e. as ceiling finish between battens) (WS1580). • Cork acoustic insulation sheet, glued, as internal wall finish (WS1581). • Coconut fibre/coir acoustic insulation panel, loose laid, for underlay flooring and as insulation blanket for between joists and beams in floors (WS1582-WS1583). • 3 different combinations of cork-coir acoustic insulation boards (for the following applications: to be glued on internal wall to be combined with plaster (WS1602-1604), in internal walls between timber frames (WS1594, WS1597, WS1600), to be laid upon floor as underlay (WS1595, WS1598, WS1601), and for multiple applications (WS1593, WS1596, WS1599). • 25 components with laminated veneer lumber (LVL): ○ Loadbearing LVL frame external wall, nailed or screwed, 140 mm or 220 mm thick (WS1647, WS1650, WS1669, WS1670); ○ Loadbearing LVL frame internal, nailed or screwed, 120 mm or 140 mm thick (WS1648, WS1651, WS1656, WS1657); ○ Non-loadbearing LVL frame internal wall, nailed or screwed, 100 mm thick (WS1658-WS1659); ○ LVL frame party wall, nailed or screwed, 80 mm or 120 mm thick (WS1652-WS1655); ○ LVL frame for multiple applications, nailed or screwed, 140 mm thick (WS1646, WS1649); ○ LVL flat roof or floor joists and cross beams or for multiple applications, nailed, 225 mm thick (adaptable, WS1660-WS1662); ○ LVL floor or ceiling board or for multiple applications, screwed, 33 or 63 mm thick (adaptable, WS1663-WS1668). • Cast in situ hempcrete thermal insulation for between battens (WS1671). • Hemp-lime render for three types of applications (WS1672-WS1674). • Reed mat as support structure for clay, loam or lime plaster, for four types of applications (WS1689-1692). • Miscanthus, loose thermal insulation for cavity walls (WS1693). • Flax insulation blankets, in adaptable thicknesses: ○ friction fitted for between different types of structure (WS1675-1685); ○ for cavity wall (WS1686-WS1687); ○ loose laid, for underlay flooring (WS1688). • Recycled cotton fibre insulation blankets, in adaptable thicknesses: ○ friction fitted for between different types of structures (WS1695-1705, WS1712); ○ loose laid, for underlay flooring (WS1694). • Recycled cotton fibre flakes, blown on site insulation, for between different types of structures (WS1706-1711). • Seashells, loose thermal insulation, for in crawl space (WS1713).
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Integration of EPDs	The integration of EPDs has been improved by harmonizing the way how component and material EPDs are integrated. Component and material EPDs can now both be selected via a drop-down list in the component details.
Naming of building elements	To improve the readability of the element library, the naming of the building elements has been adapted. The naming includes the following information: • Type of element (e.g. “FoG” for “Floor on Grade”) • Form of the primary part (e.g. “Cast in situ”) • Material of the primary part (e.g. “Reinforced concrete”) • Source (e.g. “LIB” when it originates from the library) • Type of work (e.g. “New” for new construction and “Reno” for renovation) • Sequential number to differentiate similar elements (e.g. 01, 02,...) As an example, “FloorOnGrade01” is renamed as “FoG_Cast in situ_Reinforced concrete_LIB_New_01”.
New components	In addition to the above-mentioned new components related to biobased materials and building services also the following components have been added based on user requests: • non-loadbearing steel frame, 125 mm (WS1637) • steel sandwich panel, 200 mm stone wool (WS1636) • cordwood wall (WS1638) • rubber floor finish, glued, 3 mm (WS1640) • wood wool cement boards, screwed, ceiling finish, 15, 25 or 35 mm (WS1643-WS1645) • double wall polycarbonate sheet, screwed, inclined roof finish, 6 mm (WS1641) • quintuple wall polycarbonate sheet screwed, inclined roof finish, 16 mm (WS1642)
Data corrections	The following data corrections have been implemented: • Missing Dutch translations have been added and some translations have been harmonised. • The amounts of plugs and screws of ETICS insulation boards have been corrected/aligned. • The amounts of screws or nails of timber frame walls have been corrected/aligned. • The amounts and types of adhesive of floor coverings have been corrected/aligned. • The demolition scenario of hempcrete blocks is harmonised with the new hempcrete component. • The reinforcement mesh in the cellular concrete components for thermal insulation as internal wall finish (WS1147-WS1155) have been taken out from the component composition. Related to this, a new internal gypsum plaster component with reinforcement mesh (WS1584) has been added. • A plaster mixing process has been added to the plaster components that were missing such a process. • The water use in the gypsum-based plasters has been harmonised.

	• Various small corrections in the composition and/or parameters of components, and/or textual corrections.
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NAME	TIMING	TOPIC
SPRINT 2	June '19	New modular backend and non-planar building elements
SPRINT 2.5	July '19	Split of E & M scores, export results to Excel and import Excel file for geometry
SPRINT 3	September '19	Life time logic, reused status, example buildings
SPRINT 3.5	October '19	Ground facilities, new materials
SPRINT 4	December '19	Ventilation losses, new materials
SPRINT 4.9	April '20	Improved compare function and excel import, new materials and elements
SPRINT 4.5	June '20	Mandatory fields registration form, corrections
SPRINT 5	October '20	Integration of EPDs, new library layout
SPRINT 5.1	December '20	EPDs, reused in/ex situ, tutorials
SPRINT 5.1	February '21	EPDs, sharing functionalities
SPRINT 6	July '21	Update of generic impact data and switch to EN 15804+A2 (both generic and EPDs)
SPRINT 7	December '21	Introduction of qualitative circularity parameters
SPRINT 7.1	March '22	EPDs, default ratios and U-value calculation of windows
SPRINT 7.2	June '22	Adaptation to the use of certain EPDs (as component and as material), data corrections
SPRINT 8	March '23	Redesign of the interface, addition technical installations and energy calculation based on EPB output, addition biobased components and leaf, addition elements for renovation, extension of the example building library

TOTEM UPDATE

Details on Sprint 2 deployed in Production

Version 1.3 – 21 June 2019

Subject	Documentation (EN)
Deploy new modular MasterExcel-Back-end 2	A new back-end & front-end were developed for the integration of new element categories: these new categories concern elements that have to be modelled with new 'Functional Units': the previous version concerned only planar elements modelled with FU "m ² ", whereas the current version also includes linear elements with FU "m" and countable elements with FU "piece".
New element categories and new predefined elements	New element categories and predefined elements were added in TOTEM: <u>Building frames:</u> - Beam: 8 new elements with FU = m - Column: 10 new elements with FU = m <u>Openings:</u> - Internal door: 3 elements with FU = piece - External door: 3 elements with FU = piece - Lintel: 10 new elements with FU = m - Door/window sill: 3 new elements with FU = m The user has to precise the element quantity taking into account the specific FU (Functional Unit). These elements are 'fixed': the user has to start from a predefined element. The only parameter that can be adapted is the status of the element ('new' or 'existing').
Adaptation in the modelling of 'windows' and 'curtain walls'	External (& internal) windows and curtain walls were 'fixed' elements in the previous version of TOTEM; with this update, these are now 'semi-fixed' elements. This implies that the user can adapt the following parameters: - Status 'new' and 'existing' for each sub-layer, - Ratio (%) for each sub-layer (sum of the ratios should be 100%).
NEW materials in TOTEM	See list below
Messages added in Front-end for the user	- Recently added materials are marked as 'NEW' in the material library (see list below). - A message was added in the material Library concerning the modeling of 'fixed' and 'semi-fixed' elements: <i>"To model project components such as Curtain Wall, Internal window, External window, Internal door, External door, Door sill / Window sill, Lintel, Beam & Column: you must start from a predefined element (see: Elements LIBRARY) "</i>. - A message was added in the material Library for the 'structural planar materials': <i>"This structural material needs to be applied as part of a multiple layer. You can add another material (e.g. air) to the multiple layer via the "+" button and adapt the ratio of each material (sum = 100%) "</i>. - In the 'element type' section this message was added: <i>"To make sure that your element type is complete, it's recommended to start from a predefined element from the Library and adapt it then to your own preferences" .</i> - Message concerning the 'fixed' curtain walls U values: <i>"The U value of this element is a fixed 'default' value (regulatory Umax); by adapting the ratios of the materials, the U value will not change"</i>
Buildings Library	Two exemplary buildings were modelled and shared with all users through the 'Building library'; it concerns 2 new construction buildings: ARIADE is an apartment building (4 apartments / 533m²) LAVA is a single-family residential building (284m²)
Adaptation in the modelling of a 'Multiple layer'	With this update, the concept of the 'multiple layer' has evolved : - A thickness can be indicated for each sub-layer - The status 'new / existing' can be adapted for each sub-layer <i>Remark: only materials that are allowed to be used in a multiple layer can be applied in a multiple layer. If the user selects a material that cannot be applied as part of a multiple layer, the material is assigned to a new layer instead of the multiple layer. To avoid inaccuracies in the calculations, it is strongly recommended to limit the number of sub-layers in a multiple layer to 2. In any case, the sum of the ratios of the materials in the sub-layers should be 100%.</i>
Improvements in the TOTEM front-end	Various improvements in the TOTEM front-end were made. The most significant ones are listed here below: - The geometry table has been adapted: all parameters related to the quantity of an element (e.g. value, unit, amount) are now grouped under the "quantity" heading. Furthermore, the environmental cost column has been moved to the end of the table (only calculated after quantity and type are provided) - The function to create a new element type has been adapted (only for planar element types): the user must first select the element category and is then redirected to the element type pop-up in which the element can be created.

	- In the element library, the hoover function (with drawing and details of the elements) is switched off and replaced by a smaller hoover screen showing the description of the element composition. Furthermore, the element visualizations of walls and windows have been rotated (all in horizontal direction).
Download report in PDF	From this version on, it is possible to download the element/building report in a pdf format and save it locally on your computer. On building level, the report creation wizard now only consists of 1 step instead of 3. The building report will only contain an impact indicator table for the building as a whole. If you want results on specific element categories, element or life cycle phases, you can extract this data in an Excel from the table 'impact per indicator'.
Corrections in elements & materials (composition, parameters, impact values)	A number of corrections to predefined elements and materials were made (non-exhaustive list below): - Thickness corrections for the following materials * 'Outer wall – load-bearing – primary part - block/bricks - insulating clay bricks (290x90x140) incl. Mortar (1cm joint)' = 0,09m instead of 0,9m * 'Floor finish, soft - carpet - tufted fitted carpet' = 0,0075m instead of 0,075m * 'Roof covering - horizontal surfaces - strips - polymer bitumen with slate flakes - fully welded' = 0,007m instead of 0,0035m * 'Pitched roof - profiles - Dutch trusses - softwood (treated; 175 mm; 400 mm c.t.c.)' = 0,175m instead of 0m. - Impact values corrections in (module A1-A3, A5 + B4.1) for the following materials: * 'Wall finish, external - board - bituminous soft wood fibre board - 18 mm' * 'Infrastructure for roof covering - sub-roof - board - bituminised wood fiber 22 mm, nailed - for ceramic & concrete tiles and natural slates' * 'Infrastructure for roof covering - sub-roof - board - bituminised wood fiber 22 mm, nailed - not for ceramic & concrete tiles and natural slates' - Element composition of 'FlatRoof30' & 'PitchedRoof44' has been adapted: * creation of a multiple layer with 'air' for the 'CLT solid wood beams (200m) incl. screws'. - Lambda Values were added for: * 'Roof covering - inclined surfaces - steel corrugated sheet (galvanised; 0.6 mm; screwed)' * 'Infrastructure for roof covering - counter battens (20 x 30 mm) softwood - for concrete roof tiles and natural roof slate s' - Composition has changed for: * 'Wall finish, external - closing sub-element - concrete facing panel 10 cm': fixations are removed, the user has to model the fixation with a specific material (see for example ExternalWall46). * 'Floor, supporting structure for finish - insulating screed with EPS grains - only upon floor slab': quantity of EPS, cement and water were corrected for the current thickness (0,05m)
Element and materials that are removed from the library	A number of elements and materials have been removed from the TOTEM library: <u>Elements:</u> - External Windows with 'Glass without Argon Uf 2,9W/m²K' - External Wall 47 'Clay facing brick 6,5, EPS board 6, precast concrete hollow wall + EPS 7, ceramic tiles' - External Wall 24 'Precast concrete sandwich panel with PUR 14, stone wool 14, steel load-bearing frame, gypsum plasterboard' <u>Materials:</u> - 'Floor finish, hard - plinth - ceramic tiles - glued - 1 cm' - 'Outer wall - load-bearing - column - steel - IPE - 140x73mm (thickness steel plate 4.7 mm)' - 'Outer wall - load-bearing - beam - steel - UPN - 300x100mm (thickness steel plate 10 mm)' - 'Flat roof cavity covering board' - 'Flat roof roof edge profile' - 'Pitched roof - infrastructure - wall plate - wood - 171x59 mm' - 'Pitched roof - infrastructure - wall plate - reinforced concrete - 140x190 mm' - 'Pitched roof - infrastructure - wall plate - stainless steel - 140x73 mm' - 'Pitched roof - hung gutter – zinc' - 'Pitched roof - roof ridge - ceramic roof tile' - 'Wall finish, external - closing sub-element - traditional plaster on brickwork - by machine" and 198 "Wall finish, external - closing sub-element - traditional plaster on insulation board - by machine' - 'Wall finish, external - closing sub-element - blocks/ bricks - clay facing brick (188x88x48) bricklaid'

Element and materials that are added to the library	A number of elements and materials have also been added to the TOTEM library (in already existing element categories): <u>Elements:</u> - Storey floor 10.1, 14.1 and 15.1 - External wall 1.1+2.1+3.1 (lower part), 1.2 (upper part), 2.2 (upper part), 3.2 (upper part), 4.1 (lower part) and 4.2 (upper part) - Non load-bearing internal wall 1.1, 2.1 and 9.1 <u>Materials:</u> see the list below.
IFC import	The IFC import module has been upgraded: currently IFC files of up to 20 MB can be imported in TOTEM. The element quantities (geometrical information) from the IFC files is imported. The quantities can (automatically) be assigned to the correct TOTEM element category.

TOTEM UPDATE

Details on Sprint 2.5 deployed in Production

Version 1.4 – 10 July 2019

Subject	Documentation (EN)
Split of the Material-related and Energy-related environmental impact, in addition to total environmental impact results	From now on, not only the total environmental cost of a building or an element is displayed, but also the Energy-related and Material-related environmental cost are displayed separately. The split of the results is shown in the geometry table, the element type table, the elements library (displayed as a table) and in the results section of a building or element. This split of the environmental cost score is included to better inform the user on the share of the energy vs. material-related impact in the total impact of an element or a building.
Import of building geometry via Excel file or CSV file	The building geometry (and in some cases also the element types) can be imported through an Excel or CSV file. This Excel or CSV file can be drafted from scratch or it can be exported from CAD software. The Excel/CSV file import is intended to allow a more flexible data input and to minimize the double input of data. The Excel or CSV file should meet certain requirements, which are described in more detail here. The Excel file can be imported via the button "Import building from an IFC, Excel or CSV file".
Export results on building level in an Excel file	From now on, the results at the building level can be exported in 1 general Excel file. This file contains the detailed impact scores per environmental impact indicator, expressed per element (category) and per life cycle phase. The Excel file can be exported via the button "Export to Excel", which was added in the results section of the building, next to the "Create report" button. The Excel export allows users to dive deeper into the results of the TOTEM tool, which are all grouped into 1 file. In all Excel exports of results and data, a general sheet was added, which contains information such as the TOTEM version that was used for the export, the disclaimers, etc.
Export of results per environmental impact indicator per life cycle stage	Via the added button "export all life cycles" in the result section with the Impact per indicator, an Excel file containing the results per impact indicator for all life cycle stages and per life cycle stage can be exported by the user. These detailed results are also included in the general Excel file that can be exported on a building level.
Create report on element level	Step 2 of the wizard to create a report on building level is left out, since it had no added value and was inactive in most cases.
Message added on significance of differences in results	The message "A difference of 20% or more between the scores of 2 projects is considered significant" is added in the comparison pop-up on building and element level. The user can take this information into account upon making a comparison between 2 (or more) buildings or elements.
A number of bug fixes	A bug which sometimes caused mistakes in the calculation of results in TOTEM is now fixed
Replacement of WS	The WS "Wall finish, external – closing sub-element – traditional plaster on insulation board – by machine" has been replaced by "Wall finish, external – closing sub-element – plaster on insulation (base plaster+reinforcement+finishing plaster; 7mm in total)
What to do when you get an "XML parse error" screen (known bug)	In case you would encounter a screen containing an "XML-parse error", the solution is to refresh the page. After this refresh, you should be able to continue working on your project. We are still looking for a solution to fix this bug in a next update.

TOTEM UPDATE

Details on Sprint 3 deployed in Production

Version 1.5 – 16 September 2019

Subject	Documentation (EN)																																																
Implementation of full lifetime logic to calculate the correct number of element/material replacements during the building lifetime	The full life cycle logic for calculating the number of replacements of elements and materials over the life of the building (= 60 years) is now implemented. Previously the element level was not taken into account, only the material level was considered in calculating the number of replacements. More information about the replacements and lifetime logic can be found in the Frequently Asked Questions (FAQ) document on the TOTEM webpage (link). More specifically it concerns FAQ 69-71. Since this update, also the lifespans of elements / materials are shown in different locations in the interface (e.g. in the element / material library and in the element type pop-up). In order to implement the element lifetime of non-loadbearing internal walls, the element category was split into 2 different categories: 1 for elements with a massive structure (lifetime ≥ 60 years) and 1 for elements with a light structure (lifetime = 30 years).																																																
Reused status	In addition to “new” and “existing” materials, "reused" materials can now also be modelled in TOTEM. For the reused materials, all impacts for transport to the construction site, construction on site and the use phase are included. Impacts from the production and end-of-life stage are not taken into account (<i>see example below</i>). This reuse status is mainly intended for materials that are reused “ex situ”, i.e. materials that come from another construction site and are reused in your project (without reconditioning of the material). In case you wish to model a material that is reused “in situ” (on your own construction site), you should model this material as “existing”. For more information, see FAQ 60-62 in the document on the TOTEM webpage (only available in NL and FR). <i>Example (Internal Wall composed of clay bricks and clay plaster in 3 different variants, from left to right: new, reused and existing materials)</i> ▲ Impact per life cycle stage <i>In this graph, the impact of the elements is given per life cycle stage. This evaluation end-of-life stage. It allows the user to address a specific life cycle stage.</i> <table><caption>Approximate data from the 'Impact per life cycle stage' chart</caption><thead><tr><th>Variant</th><th>Production</th><th>Transport to site</th><th>Construction and installation</th><th>Maintenance</th><th>Replacement</th><th>Operational energy use</th><th>Deconstruction, demolition</th><th>Transport end-of-life</th><th>Waste processing</th><th>Disposal</th><th>Total (€/FU)</th></tr></thead><tbody><tr><td>InternalWall_new bricks</td><td>2.8</td><td>0.2</td><td>0.1</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>3.1</td></tr><tr><td>InternalWall_reused bricks</td><td>0.0</td><td>0.2</td><td>0.1</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.3</td></tr><tr><td>InternalWall_existing bricks</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td></tr></tbody></table>	Variant	Production	Transport to site	Construction and installation	Maintenance	Replacement	Operational energy use	Deconstruction, demolition	Transport end-of-life	Waste processing	Disposal	Total (€/FU)	InternalWall_new bricks	2.8	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.1	InternalWall_reused bricks	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	InternalWall_existing bricks	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Variant	Production	Transport to site	Construction and installation	Maintenance	Replacement	Operational energy use	Deconstruction, demolition	Transport end-of-life	Waste processing	Disposal	Total (€/FU)																																						
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Manually select which elements are part of the building envelope	In this update, a column with checkboxes was added on the geometry screen of the TOTEM application: by default the checkbox is ticked for element categories that are typically part of the building envelope. However, it is now possible to deviate from this standard configuration. This way, the user can manually indicate for which elements the energy-related environmental impact should be calculated (and for which not). More information about this feature can be found in the FAQ document (FAQ 65).																																																
2 exemplary buildings were added	2 exemplary buildings are now available in the building library (each of them modelled in 3 languages).																																																
Small corrections in the interface	A number of typo's and visualizations have been corrected in the user-interface																																																

14 new materials were added	Massive terra cotta bricks with lime mortar joints for load-bearing party walls Massive terra cotta bricks with bastard mortar joints for load-bearing party walls Aluminium composite panel, external wall finish (in the thicknesses: 3, 4, and 6 mm) Reinforcement net for concrete floors (types P131, P189, P335, P335, P524 and P754) Concrete, cast in situ, in the unit m3, that can be combined with a reinforcement net Concrete, precast, in the unit m3, that can be combined with a reinforcement net Concrete, recycled cast in situ, in the unit m3, that can be combined with a reinforcement net
Data updates	Updated name of material regarding panel carriers by adding the details of the centre-to-centre distance of 600 mm. Updated the thickness parameters of all three paint ceiling finishes and lime paint wall finish; and the French translations of the lime finishes. Updated the thermal conductance (λ) or thermal resistance (R) values of seven floor finish materials. Updated the composition of the different cement screed by selecting the CEM II/A ecoinvent data record, except for one specific screed which uses Portland cement. Harmonised the names and density of the XPS floor insulation boards. Corrected unit of 'Floor, supporting structure for finish - screed - gypsum fibreboard (18 mm) + stone wool (10 mm)'

TOTEM UPDATE

Details on Sprint 3.5 deployed in Production

Version 1.6 – 25 October 2019

Subject	Documentation (EN)
Ground facilities added	15 predefined elements for the category 'ground facility' were added, together with approx. 30 new materials. The new elements and materials are labelled with the "new" label.
New materials and element added	32 new materials were added. Some of them are intended for renovation and reuse purposes: 3 types of rubble masonry in cement mortar with: limestone, schist, or sandstone for outer wall applications 3 types of rubble masonry in cement mortar with: limestone, schist, or sandstone for load-bearing internal wall applications 3 versions of smooth lime render/calimine - Single glazing - Window frame, steel, powder coated - Terracotta floor tiles (unglazed) in lime mortar - Terrazzo cast floor - Cement tiles (imported) in lime mortar - Cement tiles (native) in lime mortar - Natural stone tile (native) in lime mortar - Untreated hardwood joists and cross beams for storey floors - Untreated hardwood beam (structural element) - Untreated hardwood lintel (structural element) - HEM 100 untreated steel beam (structural element) - HEA 100 untreated steel lintel (structural element) 2 versions of untreated hardwood purlins 8 versions of untreated hardwood rafters - Terracotta roof tiles (unglazed) 4 new structural predefined elements are added : - WoodenBeam3 - WoodenLintel3 - SteelBeam5 - SteelLintel4 In addition, 8 new external window types with single glazing (intended for renovation projects) are added: - Frame of tropical wood (small and large) - Frame of (unvarnished) wood (small and large) - Frame of varnished wood (small and large) - Frame of steel, powder coated (small and large)
Layout changes	Several layout changes were made in the TOTEM application, some examples are listed here. In the pop-up that leads to the results, the link to access the detailed results is now replaced by a button. In the results section, the "impact per element" table is improved: the first column is widened and the hierarchy is more visible now. In addition, buttons to completely (un)fold all element categories were added. In the building library a button was added to directly add a building from the library to an open project.
Replace material in an element in 1 move	Since this update, a material within an element can be replaced by another material in 1 move, by clicking on the  nbol. This brings you to the library, where you can pick a material to replace the previous one.
	A mistake in the scores of 'Floor, supporting structure for finish - subfloor in OSB (18 mm)' was corrected Correction of the thickness of 'Pitched roof - profiles - rafters - softwood (treated; 63x75 mm - 4.243 m; 400 mm c.t.c.)' (from 72mm to 75mm)

Corrections in the material library	Correction to fix the thickness of <i>'Thermal insulation, pitched roof - blanket, between purlins - stone wool (medium hard 10cm) with extra wooden battens (38 x 100 mm, c.t.c. 1.4m) and air cavity'</i> Correction in Pitched Roof 1: the wooden rafters were modelled with a fixed centre-to-centre distance and could not be combined with another material to form a line with multiple materials; therefore the composition of PitchedRoof1 has been corrected by applying an '100% width' version of a 75 mm thick wooden rafter. Corrections to the visualisation of <i>'Thermal insulation, pitched roof - blanket, between purlins - stone wool (medium hard 10cm) with extra wooden battens (38 x 100 mm, c.t.c. 1.4m) and air cavity', 'Pitched roof - profiles - steel - purlins IPE 140 - 5 m', 'Pitched roof - profiles - steel - purlins - ZED profiles 300x3 - 5 m', 'Pitched roof - profiles - steel - purlins - ZED profiles 200x2.5 - 5 m', 'Pitched roof - profiles - purlins - softwood (treated; 75x225 mm - 5 m)' and 'Pitched roof - profiles - purlins - softwood (treated; height 225 mm; 100%)'</i> Impact of 'glazing' was added to the ceramic roof tiles that were already in the material library, in order to make a distinction with the newly added 'unglazed' ceramic roof tiles
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/!\ IMPORTANT REMARK: Due to the introduction of the "reused" status in TOTEM in the previous update (sprint 3), all materials with the status "existing" were by mistake reset to the status "new". This can have a significant impact on the scores of the elements and buildings in which the "existing" status was used. So, in case you reopen a previous project in the newest version of TOTEM, please check if the status of all layers in the elements is still correct.

TOTEM UPDATE

Details on Sprint 4 deployed in Production

Version 1.7 – 20 December 2019

Subject	Documentation (EN)
Energy impact: ventilation losses added	In addition to the transmission losses, the ventilation losses can be included in the energy-related impact at building level. Including the ventilation losses is optional: it can be switched on/off in the building creation screen. However, it is recommended to include this in the calculation, as the energy-related impacts are more in line with the calculations in the EPB/PEB software. For the calculation of the ventilation losses, the parameter “heated volume” is added in the building creation screen. When the volume is not provided by the user, a default volume will be calculated based on the gross floor area (mandatory parameter) x 3m (default ceiling height). In the formula to calculate the ventilation losses, a set of default values is used, which cannot (yet) be adapted by the user. For example, for the air tightness the default value from the EPB/PEB software is used, being $12\text{m}^3/(\text{h}.\text{m}^2)$. In some cases, this will lead to an overestimation of the impact related to the ventilation losses of the building. More information about the calculation of the ventilation losses can be found in the FAQs.
Optimisation filter function library	The filter function in the library is optimised further: When you select a new filter option from the dropdown lists, the previous filter selection is automatically replaced with the new one Filter options have been added to the ground facilities category (for the finishing layer of these elements) The filter options for glazing have been put in a more logical order (single, double, triple)
Optimisation search function library	The search function in the library is optimised further: When you enter a search term, the results will now also show approximate matches for that search term, which makes the search functionality more flexible to use
Layout changes	Several layout changes were made in the TOTEM application, some examples are listed here. In the building creation screen, the parameter “heated volume” is added, which is necessary for the calculation of the ventilation losses at building level In the pdf report, the layout has been optimised so that longer titles or elements are also displayed correctly
New materials and elements added	The following new elements were added to the library: Two glulam (= glued laminated timber) columns, based on the dimensions of existing hardwood columns (120x120mm and 200x200mm) and one extra glulam column (240x240mm) Three new glulam beams (120x120mm, 200x200mm and 240x240mm) The following new materials were added to the library: Two aluminium composite panels with a mineral filled polymer core (thickness of 3mm and 4mm)
	We revised the underlying soft- and hardwood material records and added more variations based on the possible transport and end-of-life scenarios, applications and whether the timber has been treated or not. The wood preservation treatments have also been updated. With this revision the following underlying hard- and softwood data records are available: Hardwood, (untreated) parquet Hardwood, contaminated treated wood, e.g. for outdoor use Hardwood, uncontaminated treated prefabricated structural product Hardwood, uncontaminated treated timber Hardwood, uncontaminated treated woodwork, i.e. finishing product Hardwood, untreated prefabricated structural product Hardwood, untreated timber Hardwood, untreated woodwork, i.e. finishing product Softwood, contaminated treated wood, e.g. for outdoor use Softwood, uncontaminated treated prefabricated structural product

Corrections in the material library

Softwood, uncontaminated treated timber
Softwood, uncontaminated treated woodwork, i.e. finishing product
Softwood, untreated prefabricated structural product
Softwood, untreated timber
Softwood, untreated woodwork, i.e. finishing product
The wooden beams and columns have been reviewed and corrected where needed. This resulted in the following changes:
Solid hardwood beams and columns can only be applied up to a thickness of 300 mm, in case the thickness is more than 300 mm glued laminated timber (glulam) needs to be used. Therefore, the existing two solid wood beams with dimensions of 120x360 and 200x750 mm have been changed into glulam beams.
The CLT beams with a thickness of 200 or 300 mm and an adaptable width have been changed into solid hardwood beams.
The TJI beams have been reviewed. In the names, the material composition of the TJI beams has been added, i.e. a composition of laminated veneer lumber (LVL) and oriented strand board (OSB) or solid wood and wood fibre board. In two TJI beams mistakes in the amounts of wood have been found and corrected.
In the names of certain insulation materials “for between” or “between” was used to indicate whether a structure was excluded or included. As this was not consistently applied everywhere, it has been corrected where needed.
The names of the three “Thermal insulation, wall - hard boards to plaster, without tongue and groove - polystyrene, expanded (EPS) ...” materials have been made clearer, by specifying that the material includes 10 mm of adhesive cement-based mortar. Additionally, the total thickness of the version with a 180 mm thick EPS board has been corrected to 190 mm.
Specifications whether it concerns glazed or unglazed tiles are added in the names of the ceramic and terracotta tile materials. In addition, the environmental scores of the ceramic glazed roof tile have been updated.
In the material name of the two 75x225 wooden purlins, the centre-to-centre distance of 1.06 m has been added for clarity.
In the material name “Floor, supporting structure for finish - insulating screed with EPS grains ...” the bulk density of 310-340 kg/m³ has been added for clarity.
The material names of the two parquet materials have been specified: they consist of hardwood which is surface treated with wood wax. In addition, a typo in the French translation of one of these material names has been corrected.
The lambda value of the hempcrete blocks has been changed from 0.076 to 0.074 W/mK, based on the average value of hempcrete blocs within the EPBD product database (version 23/10/2019; the lambda data of the hempcrete blocs have not changed in the version of 16/12/2019).
In the material name of the three aluminium composite panels the thickness of the core and the type of core material (i.e. LDPE – low density polyethylene) has been added for clarification. In addition, some modelling changes have been made to the manufacturing of that core.

TOTEM UPDATE

Details on Sprint 4.5 deployed in Production

Version 1.8 – 14 April 2020

Subject	Documentation (EN)
Improvements to the compare function	The compare functionality has been improved as follows: You can now select multiple buildings / elements (max. 3) to compare your building / element with in 1 time. Once the buildings / elements for comparison have been selected, you can change the order in which the results should appear by using the “up/down” arrows in the comparison pop-up An open search field is added in case you wish to search for a particular building of element to compare with In case you wish to compare with elements from the library, you are now immediately directed to the element category of your original element The comparison pop-up is closed after closing the results of the comparison
Optimisation of the Excel import function	The Excel import functionality has been optimised: If the imported element is typically part of the building envelope, the energy calculation checkbox is now checked automatically for these elements. However, you can always uncheck the box again if necessary Instead of automatically grouping all elements together with the same ElementType, TOTEM now also looks at the element name: if and the name and the type are similar, the elements are grouped (quantities are aggregated); however, if the type is the same but the name is not, the elements are not grouped. An import template is now available to facilitate the use of the Excel import function. The first sheet of the template file contains instructions on how to complete the template in the second sheet. After completing the template according to the instructions, you can import it in TOTEM via the “Import building from an IFC, Excel or CSV file” button. Download here the template
Refined contact sheet	In case you need to contact the helpdesk, a “contact sheet” is introduced. In this sheet, you should indicate the context of your questions (general, GRO project or BREEAM project). This context allows the helpdesk to estimate the urgency of your request. The same question about the context of your request has been added to the “new material request” sheet.
Updated and new FAQs	Several FAQs have been updated: FAQ 2 – 26 – 29 – 54 – 78 - 80 5 new FAQs are introduced: FAQ 19: Can I find all materials in the TOTEM library FAQ 40: What is a monetized score FAQ 53: How can I evaluate the score of my building FAQ 70: How is the evaluation method in TOTEM defined FAQ 73: What is biogenic carbon and is carbon stockage considered in TOTEM The complete updated FAQ document can be downloaded in French and in Dutch
	The following new materials and elements are added: 11 screwed on-site timber frames (based on the 11 existing timber frames that are nailed on-site) Insulating building clay bricks with a brick size of 500x138x249 mm, glued with a bed joint of 2 mm and without perpend joints Semi-rigid cellulose thermal insulation board, with an adaptable thickness, for the following 3 applications: for between wall, floor, or pitched roof structures Semi-rigid cellulose-based acoustic insulation panel with an adaptable thickness, for the following 3 applications: for between wall, floor, or pitched roof structures Thermal insulation, flat roof - board, partially glued on concrete roof floor, roof plates or bituminous roofing membrane - polyurethane (PUR; 32 kg/m³) with bituminised glass fleece and mineralised glass fleece facer, glued with hot bitumen adhesive compound, in the following four thicknesses: 110, 120, 140 and 160 mm

New materials and elements added	Thermal insulation, cavity wall - blown on-site, injected with adhesive - blown bead expanded polystyrene (EPS; 16 kg/m3) retro-fit, minimal cavity thickness 50 mm Thermal insulation, crawl space - blown on-site - blown bead expanded polystyrene (EPS; 16 kg/m3) loose, binder-free Thermal insulation, cavity wall - blown on-site - stone wool flakes (80 kg/m3) retro-fit, loose, binder-free Thermal insulation, floor - granulates - cellular glass (150 kg/m3) 2 non-load-bearing internal walls made of a metal structure in a thickness of 75 and 50 mm (a version in a thickness of 100 mm already existed) without filling. Additionally, “100%” versions of the 50, 75, and 100 mm non-load-bearing metal internal walls were added. The latter can be used in multiple layers together with any available insulation material. In the names of the materials the percentages are specified that you need to use. There are three new predefined element types added as examples (i.e. Non-load-bearingInternalWall23 to 25). Gypsum plasterboard, for internal wall finish, screwed and including joint filler in the following 3 additional thicknesses: 6, 9.5, and 15 mm OSB board with a thickness of 12 mm for 6 different applications (based on the 6 existing OSB board applications that were already available in 2 thicknesses: 18 and 22 mm) External wall - load-bearing - primary part - blocks/bricks - concrete - hollow (290x190x190) laid with cement mortar (10 mm joint) Structural element - beam - galvanised steel - IPE 400
Corrections in the element and material libraries	The U-value computation for external windows was corrected. The calculation is now in line with the first part of the equations for “glazing and window frame” of Eq. 92 and Eq. 94 in the “transmissiereferentiedocument” (annex 4 of MB 28/12/2018). The underlying modelling the CLT panel was updated. In the previous version screws were included. With this update the screws have been left out to harmonise it with other main structural materials, i.e. without fixations (in a future update fixations will be added as a separate (sub)material). The size and type of joint the glued insulating building clay brick was corrected as follows: the bed joints were reduced from 3 to 2 mm, and the perpend joints were removed. The R-value of the following materials were missing/not shown, this has been updated: Pitched roof - profiles - TJI beam (LVL+OSB; height 160 mm; 400 mm c.t.c.) Floor slab - storey floor - TJI beam (LVL+OSB; height 300 mm; 500 mm c.t.c.) The density of the EPS boards in the following applications have been updated as follows: For application in cavity walls: lowered from 25 kg/m3 to 15 kg/m3 For application on/in flat and pitched roofs: lowered from 30 kg/m3 to 25 kg/m3 Please mind that these are average densities for these types of applications and in some cases a higher density could be necessary if a higher pressure resistance is required. This remark also applies for the insulation boards that have not been updated. In the material “Roof covering - horizontal surfaces - strips - polymer bitumen with slate flakes - fully welded” the slate flakes were still missing the modelling. This has been corrected. Corrections, clarifications, and/or harmonisations implemented in several material names (in English, Dutch, and/or French). Specifically: Change in Dutch: “driedubbel” to “drievoudig” with regards to glazing Changing all PIR into PUR (see FAQ 19) Corrected the amounts for “External wall - load-bearing - primary part - blocks/bricks - sand-lime brick - hollow (300x150x150) glued” – the calculations considered the thickness (150 mm) instead of the width of the brick (148 mm) to determine the amount of bricks per m2.

Corrected the underlying material choice for “Internal wall - load-bearing - primary part - timber frame (untreated, nailed on-site; 600 mm c.t.c.) 140 mm” and “Ground facility - foundation - broken stone type I - broken concrete (m3)”. Also the underlying material choice of the metal non-load-bearing party walls and filled metal non-load-bearing internal walls was adapted, to harmonise the modelling with the new and other existing non-load-bearing walls existing of a metal structure.

TOTEM UPDATE

Details on Sprint 4.9 deployed in Production

Version 1.9 – 29 June 2020

Subject	Documentation (EN)																		
Refined contact sheet	Some additional fields are now mandatory upon registering for TOTEM: the profession field should be completed and the user is asked if he/she already has a licence for an LCA database (Ecoinvent, Gabi, others). In first instance, it is only mandatory for new users to complete these fields, but existing users will be asked to complete this info as well (will be mandatory by the end of 2020 to be able to continue using TOTEM).																		
Correction in unit of land use indicator	The units of the impact category “Land Use Transformation Biodiversity” have been corrected (shown in yellow) so they are correctly shown in the frontend and exported reports. This has no effect on the results, as the calculations are done unit-independently. <table><tr><th></th><th>Unit individual indicator</th><th>Unit monetisation factor</th></tr><tr><td>Land use: transformation, biodiversity - all</td><td>PDF*m2 yr</td><td>euro/PDF*m2 yr</td></tr><tr><td>Land use: transformation, flows biodiversity - urban</td><td>m2 yr</td><td>euro/m2 yr</td></tr><tr><td>Land use: transformation, flows biodiversity - agricultural</td><td>m2 yr</td><td>euro/m2 yr</td></tr><tr><td>Land use: transformation, flows biodiversity - forest</td><td>m2 yr</td><td>euro/m2 yr</td></tr><tr><td>Land use: transformation, flows biodiversity - tropical rainforest</td><td>m2 yr</td><td>euro/m2 yr</td></tr></table>		Unit individual indicator	Unit monetisation factor	Land use: transformation, biodiversity - all	PDF*m2 yr	euro/PDF*m2 yr	Land use: transformation, flows biodiversity - urban	m2 yr	euro/m2 yr	Land use: transformation, flows biodiversity - agricultural	m2 yr	euro/m2 yr	Land use: transformation, flows biodiversity - forest	m2 yr	euro/m2 yr	Land use: transformation, flows biodiversity - tropical rainforest	m2 yr	euro/m2 yr
	Unit individual indicator	Unit monetisation factor																	
Land use: transformation, biodiversity - all	PDF*m2 yr	euro/PDF*m2 yr																	
Land use: transformation, flows biodiversity - urban	m2 yr	euro/m2 yr																	
Land use: transformation, flows biodiversity - agricultural	m2 yr	euro/m2 yr																	
Land use: transformation, flows biodiversity - forest	m2 yr	euro/m2 yr																	
Land use: transformation, flows biodiversity - tropical rainforest	m2 yr	euro/m2 yr																	
Corrections in the element and material libraries	The thicknesses of the compressed earth blocks for the load-bearing external wall and the non-loadbearing internal wall were switched, this has been corrected. A typo was found and The element lifetime of lintels is corrected from 30 to 120 years. Some material names have been updated or made clearer: - o For treated wood, the category of wood waste the wood will belong to during its In English: “treated - uncontaminated” or “treated - contaminated”; In Dutch: “behandeld - niet-verontreinigd” or “behandeld - In French: “traité - déchets non dangereux” or “traité - déchets - o Regarding the flexible vapour-tight foil available in different types of plastic as - o The names of all air cavities or air layers have been harmonised and if applicable the minimum and maximum thickness for which the Rvalue applies is included in the name. Of the following materials, unnecessary duplicates were available in de library and have been removed in this update: - o “Roof covering - horizontal surfaces - strips - polymer bitumen - mechanically - o 150 mm version of “Thermal insulation, floor - under/upon floor slab - expanded polystyrene (EPS) board (25 kg/m3) loose laid, to be ballasted”																		

The amount of wood wax used for surface treatment in the parquet flooring (glued as well as nailed version) has been corrected for the first application as well as in the maintenance. In a big number of materials that includes a mortar (cement-based, limebased, or bastard, e.g. in the joints of masonry) the tap water input for making the mortar was missing. This has been correct.

The material category of the three flat roof sloping layers consisting of PUR or stone wool has been changed to "insulation" instead of "Continuous flooring and screed".

Parameters of all available wood fibre boards, insulating wood fibre boards, and wood wool insulation, such as the lambda value, material category, lifetime, etc., have been checked and harmonised.

The maintenance process of the material "Roof covering - inclined surfaces - tiles - terracotta or ceramic (unglazed; 246 x 195 mm) incl. tile clips" was corrected. The amounts were too high and accidently based on roof tiles applied vertically on walls as external finish.

The lambda of the 190 mm thick version of the material "Thermal insulation, floor - under/upon floor slab - extruded polystyrene (XPS, 33 kg/m3)" has been corrected, so it corresponds with the other versions.

The thermal insulation boards for floors on solid ground that can be used under or upon floor slab have been duplicated so there are separated versions for under and upon floor slabs. The predefined elements in the library have been updated accordingly. In case of elements defined by users themselves, this does not have an effect on the calculated results as the underlying modelling has not changed, only the names.

TOTEM UPDATE

Details on Sprint 5 deployed in Production

Version 2.0 – 15 October 2020

Subject	Documentation (EN)
Introduction of producer specific components (EPDs) in TOTEM	Since this update, TOTEM is linked to the B-EPD database (www.b-epd.be). This means that the TOTEM library is now extended with manufacturer specific components (Environmental Product Declarations or EPDs). These specific components can be recognized by means of the icon (globe). Specific components can be used in a similar way as the generic TOTEM components: you can use them to create elements from scratch or to replace a generic component in a predefined or previously created user element. The following EPDs are added: - Fedbeton Readymixed Concrete - SVK Fibre cement slates. Commercial names: Ardonit, Montana, Fasonit, Cromleigh, Alpina, Planalp, Alpiplan - SVK Fibre cement flat sheets, commercial names: Ornimat, Decoboard, Puro Plus. - SVK Fibre cement corrugated sheets. Commercial name: Neptunus - ECIA Loose-fill cellulose insulation (blown into attic floors) - ECIA Loose fill cellulose insulation blown into walls - ECIA Loose fill cellulose insulation for blowing into pitched roofs - ISOPROC Loose-fill cellulose insulation,blown into pitched roof,iQ3 - ISOPROC Loose-fill cellulose insulation iQ3 (for attics) - ISOPROC Loose-fill cellulose insulation blown into walls,iQ3 More information here: FAQ 22 and 42. Specific calculation rules for the EPDs are also described in FAQ 74.
New terminology (material > component)	A new terminology is introduced in TOTEM: the “material” library is now called the “component” library, since the so-called materials were in fact always processed materials, consisting of more than 1 material (e.g. bricks and mortar). The level of the processed materials is now called component in TOTEM. For each generic TOTEM component, the underlying materials included in the component (e.g. on site processes, add-on materials or treatments) are also shown in the details of the component. More information here: See FAQ 18, 19 and 20
Improvement of the library	A major change in the library layout (projects, buildings, elements and components) is made: the items in the library are no longer listed in a table, but in a list-view. All general information about the library items can be found on the left side of the screen; all details of a selected item are directly accessible on the right side of the screen. Furthermore, the search function of the library has significantly improved: the open search field is much more flexible for text searches and also numeric search values can be used. In addition, different filters can be applied to finetune the search further. In the element library, the results for each element can now be accessed directly via the element details on the right side of the screen. In the component library, the naming of the generic TOTEM components has been harmonised (aligned with the structure of the BBsfb code). Additionally, more details about the component composition (materials included in the component, such as main material or auxiliary materials for fixations, etc.) is now available in the details of each component. More information here: See FAQ 18, 19 & 20 for more information
Adaptation of the element type pop-up	The element type pop-up (screen to model / adapt an element in your project) has undergone a make-over. The components in the element are presented as a list on the left side of the screen; details of the selected component can be accessed / adapted on the right side of the screen. Another new feature is the “donut” graph on the right side of the element type pop-up to show the relative contribution of each component to the total impact of the element. More detailed results of the element can be checked via the button “detailed results”.
	From this version on, users can model window elements from scratch. This means that users can combine a frame component and a glazing component themselves.

Windows can be created by users	<u>Important remark:</u> a frame should always be combined with glazing and vice versa. The 2 components should be modelled as a composed layer. More information here : See FAQ 38 for more information.
Split of “combined” components	Previously, the component library (previously called materials library) included so-called combined components/materials consisting of 2 or more materials in a fixed composition. Some examples are a timber frame that was partly filled with insulation and a not-ventilated air layer, a board for finishing that also included paint which is painted on site, or a concrete floor slab including a pressure layer. For more transparency and flexibility in the modelling, these so-called combined components have been split into separate components and the affected predefined elements have been adjusted accordingly. Additionally, in case of a partly insulated timber wall frame, this is changed into a composed layer (see FAQ 38) consisting of fully insulated timber frame, e.g. “ExternalWall4.2 (upper part)”. In case of partly filled timber roofs or storey floors, these are left partly filled in case of acoustic reasons and multiple composed layers are included in the element composition, e.g. StoreyFloor33 or AtticFloor07. For the splitting of components such as a board and on site paint or a slab and its pressure layer, the adjustments on element level consisted of adding separate layers with the split components. The logic behind splitting up these components is that these components are separate on-site operations. The old combined components are now set to “deprecated”: this means these components remain correct in the existing element, but they should no longer be used in new element (they will no longer be updated). However, for each deprecated component one or more replacement component(s) are provided in the list in this document.
Adaptations in FAQ	Since version 2.0 contains a lot of new features and big changes, a number of FAQs have been added / adapted. The most important changes can be found in FAQ 15, 20, 22, 36, 37, 38, 39, 41, 42 and 74. (modified/added FAQs are marked in blue). Complete FAQ documents available here.
	<u>Adaptations in the material names:</u> All material names have been updated extensively so they are harmonised and in line with the structure of the BB/SfB-plus coding system (De Troyer 2008). The names are structured as follows: The first part of the name refers to the function of the material layer (in conformity with the subdivision in sub-elements defined in BB/SfB-plus), e.g. Cladding, Support structure, ... The second part of the name concerns the form of the material layer (in conformity with table 2 of the BB/SfB), e.g. Board, Frame, ... The third part of the name concerns the type of material (in conformity with table 3 of the BB/SfB) and its dimensions between brackets, e.g. Stone wool (120mm). In addition, all material layers have been given a more elaborate description in line with the structure of the BB/SfB-plus. This includes at the beginning of the material name a reference to the element function (in conformity with table 1 of the BB/SfB) and at the end some additional properties such as the type of fixation or specific application. For example: Old material name: <i>Wall finish, external - closing sub-element - board - no overlap - fibre cement - screwed</i> New material name: <i>Cladding Board Fibre cement (8 mm)</i> New material description: <i>Wall - external finish Cladding Board Fibre cement (8 mm) Screwed</i> Another example: Old material name: <i>External wall - load-bearing - primary part - building clay bricks (290x190x190) bricklaid</i> New material name: <i>Primary part Hollow bricks Fired clay (290x190x190 mm)</i> New material description: <i>External wall - load-bearing Primary part Hollow bricks Fired clay (290x190x190 mm) Laid in cement mortar</i> <u>Update of the “surface weight parameter”:</u> For all components the “surface weight parameter” has been updated. This parameter defines whether a material cannot, can, or must be applied in a composed layer (see FAQ 38).

Corrections in the component library

Materials that cannot be applied in a composed layer, thus only in not-composed layers, are for example beams, columns, and support structures for ventilated cladding.

For materials that have to be applied in a composed layer a default percentage for the surface weight is shown when the user hovers above the ratio field to adapt the ratios within a composed layer (see FAQ 38). The following default ratios have been defined:

Timber frame filled with insulation/air cavity (for walls): 20% frame – 80% insulation

Battens between insulation (for external wall finish): 7% battens – 93% insulation

Battens between insulation (for ceiling finish): 10% battens – 90% insulation

Timber joists and cross beams filled with insulation/air cavity (for floors): 22% joists and cross beams – 78% insulation

Timber substructure between insulation (for floor finish): 10% substructure – 90% insulation

Timber Dutch trusses between insulation: 11.7% trusses – 88,3% insulation

Loadbearing steel frames filled with insulation (for walls): 1.5% frame – 98.5% insulation

Non-loadbearing steel frames filled with insulation (for walls): 0.5% frame – 99.5% insulation

Steel support structures filled with insulation/air cavity (for floors): 1% frame – 99% insulation

TJI beams filled with insulation (for external walls): 4.5% TJI – 95.5% insulation

TJI beams filled with insulation (for floors and roofs): 2% TJI – 98% insulation

External window: 30% frame – 70% glazing

Corrections:

Diverse actions were undertaken to improve the data quality, such as:

Improvement of data consistencies in the modelling.

Updating/harmonizing bricks/blocks sizes in accordance with available sizes on the market.

Corrections in thickness parameters, lambdas or material ratios that occurred due to abovementioned updates.

Adding missing layers in predefined elements or missing materials in components.

The predefined pitched roof elements with Dutch Trusses were checked and harmonized, some corrections were made regarding the composed layer with the trusses and insulation or air layer. More specifically these corrections concerned PitchedRoof06, 07, 13, 35, 36, 37, 38 and 39.

The underlying generic ecoinvent life cycle inventory datasets used to model different kinds of wood fibre boards were based on a different density than the density assumed within TOTEM. In some cases the density was approximately 4 times higher than assumed in TOTEM resulting in a too high environmental impact. The concerned generic ecoinvent datasets have been adapted to support the densities assumed within TOTEM.

The material “Cladding | Board | Fibre cement (8 mm)” has been updated with regard to the weight and thickness of the fibre cement boards so it is more in line with current practices.

The component “Drainage | Loose filling | Gravel” has been remodelling into a bulk component with the unit m^3 , the default thickness of 1 m, and a density of 1600 kg/m^3 ; instead of surface component with the unit m^2 and an amount of 40 kg/m^2 . In case you have used this component in one of your buildings please correct this manually, by changing the thickness to 0,025 m in case you intended to apply this material with an amount of 40 kg/m^2 .

3 Components related to fixations for ETICS (WS182-183-184) were removed and included in the insulation components.

TOTEM UPDATE

Details on Sprint 5.1 deployed in Production

Version 2.1 – 18 December 2020

Subject	Documentation (EN)
Additional EPD's	Since the previous update (dd. 16/10/2020), TOTEM is linked to the B-EPD database (www.b-epd.be). This means that the TOTEM library is now extended with manufacturer specific components (Environmental Product Declarations or EPDs). In the current update, the following EPDs have been added: - UNILIN "UTHERM" PIR insulation board with ALUMINIUM facer - UNILIN "UTHERM" PIR insulation board with MULTILAYER facer - SAINT-GOBAIN CONSTRUCTION PRODUCTS BELGIUM ISOVER Isoconfort 35 180mm - RECTICEL PUR board for thermal insulation with ALUMINIUM FACER - RECTICEL PUR board for thermal insulation with GLASS FIBRE FACER - RECTICEL PUR board for thermal insulation with MULTILAYER FACER More information here: FAQ 22 and 42. Specific calculation rules for the EPDs are also described in FAQ 74.
Pre-defined thicknesses of EPDs	For a certain number of EPDs, it is now possible to choose the thickness via a dropdown menu. The thicknesses of these EPDs are predefined and can therefore not be customized. The most frequently used thickness on site is underlined and used as a default value (adaptable by the user once used in an element).
Improvement of the library	The component library has been further optimised: the component information is now structured into 3 different parts: 1) component info, 2) component details and 3) modelling details. Furthermore, additional information is included about the life cycle stages of the EPDs. In addition, multiple components can now be selected at once and added to an element in 1 click. In the project library, it is now easier to identify which projects are shared with other users, by means of the " " symbol. In case the project is not shared, the " " symbol is used.
New status: Reused in/ex situ	In the new version of TOTEM, the existing status of "reused" is more detailed. A distinction is made between "reused in situ" or "reused ex situ". "Reused in situ" concerns a component that is reused on the construction site (without reconditioning); "reused ex situ" concerns a component that originates from an external circuit of reclaimed materials (without reconditioning).
Calculator button added on project level	At project level, a calculator button is added, which allows you to recalculate the scores of all your buildings in the project at once.
Improvements of the element type table	In the element type table, the " " symbol is added to indicate if an element is linked to a building. In addition, the " " symbol is introduced to help you find your recently added elements in the element type table. Furthermore, you can now directly compare multiple elements in the element type table via the compare button, added on the top right of the screen.
Tutorials	From this update on, tutorials on the ambitions, methodology and use of TOTEM will be provided step-by-step. A first tutorial with a general introduction into TOTEM (short and long version) is now available in French and Dutch.
Simplification of the comparative reports	To ensure an improved readability, the comparative report of elements and buildings is now restricted to the comparative graphs. The comparative tables are still available to download in Excel format.
Export "TOTEM Building" File	It is now possible to export a project or a building in a "TOTEM Building" file. This format makes it easier to submit your project, for example, in the context of a public tender. This functionality is available via the " " icon in the top right corner of the project and building level, or via the "Export to TOTEM file" button in the detailed results section of a building (next to the "Create report" and "Export to Excel" buttons).
Adapted conditions of use of TOTEM	The conditions of use of TOTEM have been adapted, all users are asked to fill in the missing information in their user profile. A direct link to the user profile is provided in the red pop-up message on the home page.

Corrections in the component library	In the last update of mid-October 2020, the parameter “surface weight” was updated for all components, except for some of the rafters and purlins. Now these have been updated too, so the modelling is aligned for all components. A distinction is made for rafters/purlins that are intended to be applied with insulation (in a composed layer) and rafters/purlins that are surrounded by air (only allowed to be applied as a non-composed layer). The following new components have been added to the library: • Ceiling finish Cladding Board Calcium silicate - glass fibre reinforced (... mm) Screwed Fire protective • Wall - internal finish Cladding Board Calcium silicate - glass fibre reinforced (... mm) Screwed Fire protective Both components are added in the following (fixed) thicknesses: 8, 10, 12, 15, 18, 20 and 25 mm. In addition, some small textual errors were corrected.
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TOTEM UPDATE

Details on Sprint 5.2 deployed in Production

Version 2.2 – 19 February 2021

Subject	Documentation (EN)
Additional EPD's	Since October 2020, TOTEM is linked to the B-EPD database (www.b-epd.be). This means that the TOTEM library is now extended with manufacturer specific components (Environmental Product Declarations or EPDs). In the current update, the following EPDs have been added: Belgisch Luxemburgse Gips Vereniging Gypsum block, hydro (Belgian average) Belgisch Luxemburgse Gips Vereniging Gypsum block, standard, 100 mm (Belgian average) Belgisch Luxemburgse Gips Vereniging Gypsum board, fire resistant (Rf), 15 mm thickness (Belgian average) Belgisch Luxemburgse Gips Vereniging Gypsum board, standard, 12,5 mm thickness (Belgian average) Belgisch Luxemburgse Gips Vereniging Gypsum board, water resistant (WR), 12,5 mm thickness (Belgian average) REYNAERS ALUMINIUM Opening - External window* Some EPDs can only be used as a replacement of a material within a component. These EPDs are shown in grey in the component library. *This EPD is slightly adapted for module A5 to be aligned with TOTEM. More information here: FAQ 22 and 42. Specific calculation rules for the EPDs are also described in FAQ 74.
User profile information	The list of professions is extended in the user profile. For users who create a new account, these options are available upon registration; existing users can adapt their profession on a voluntary basis in "my settings" on the home-page.
Search function library	From now on, the name of the producer of an EPD can be used in the search field of the library
Lambda value logic	When replacing a component, the lambda value is automatically adjusted to the default value of the selected component.
IFC/Excel/CSV import	Some additional instructions have been formulated for modelling a building based on an IFC file in order to increase the compatibility with the TOTEM tool. These guidelines are communicated when a user wants to upload his file.
Pdf report	In the pdf report, the parameters environmental score, U-value and total thickness have been added to the information in the input section (detail per element type).
Visibility of EPDs	In the element type donut graph, [EPD] is added in the legend to make a better distinction between generic data and EPDs. Furthermore, an "I" button is added for when an EPD is used as a replacement for a material within a component. This "I" button opens the details of the EPD.
Message for sharing a project	The instructions that are sent by e-mail when a project is shared with another user were rephrased and clarified.
TOTEM contacts	In order to facilitate sharing projects and elements, users with whom a project or an element from the personal library are shared, are now automatically added to your "TOTEM contacts." These contacts can be consulted and managed in "My settings" on the home page. The email addresses in your contacts list will be automatically completed when sharing a project or an element.
Datatool	For easier data management in TOTEM, a datatool is developed. This tool is only available for TOTEM experts and allows them to download and upload new versions of the underlying TOTEM data (e.g. to make corrections, updates, ...). Further improvements and extensions of this datatool will be developed in the next sprints.
	Category correction for Recitcel and Unilin EPDs: from sandwich panel to insulation The parameter U-value has been adapted to Uf for window frames and Ug for window glazing

Corrections in the component library

The modelling of the wax surface treatment of hardwood parquet has been reviewed and updated. The material composition of wood wax that was already available in TOTEM has been updated based on more recent sources. In addition, a new variant has been added, i.e. varnished hardwood parquet. Related to this, the cleaning process of laminate flooring and of the newly added varnished hardwood parquet has been updated to weekly vacuuming and biweekly mopping with water and soap.

In line with FAQ regarding the adaptability of lambda values, the respective parameter has been checked for all components and corrected if needed. Thus:

The lambda value of thermal insulation components can be adapted by user.

The lambda value of other type of components are fixed.

The modelling of the material loam plaster has been reviewed and updated by changing the underlying data record used for the straw input.

Corrections of some textual errors/ textual clarifications added.

In the element "FloorAboveUnheatedSpace05" the mandatory pressure layer on the beam and block floor slab was missing and therefore added.

TOTEM UPDATE

Details on Sprint 6 deployed in Production

Version 2.3 – July 2021

Subject	Documentation (EN)
TOTEM newsletter subscription	In the same pop-up window, an option to register for the TOTEM newsletter is provided. Activating the checkbox will allow us to send you emails with relevant TOTEM information about updates, trainings, stakeholder meetings, ... You can also (de)activate the checkbox in your user profile.
New version EN 15804+A2	The EN15804 standard defines how Environmental Product Declarations (EPDs) should be drawn up. The standard describes how to calculate the environmental performance of construction products and provides a series of environmental indicators which should be reported for each step in the product life cycle. EN15804 has recently been revised to the EN15804 + A2 version. This switch mainly has an influence on the type and number of impact indicators that is reported in TOTEM. In the previous version 14 main indicators (and their sub-indicators) were reported; in the new version this number is reduced to 12 main indicators and their sub-indicators. For some indicators, the underlying calculation method has also changed (e.g. for human toxicity). It is important for TOTEM to keep its methodology in line with this European standard to ensure that the environmental data in the construction sector are all transparent and comparable. This update brings the TOTEM methodology in line with this revised standard. Therefore, the results for your elements, buildings and projects will look differently in the “impact per indicator” section of the tool.
PEF weighting method	In the context of the new version of the European standard, a new aggregation method to calculate the environmental score had to be chosen. The three Regions have decided to use the PEF weighting approach of the European Commission in the TOTEM tool. This means that the results are no longer expressed as an environmental cost in euro, but as an aggregated environmental impact in millipoints. This will cause changes throughout the entire TOTEM tool and the users projects. What will happen to current projects due to the switch to the new norm and PEF weighting? • Projects without calculated scores (buildings, elements) can no longer be assessed according to the old version of TOTEM. The only solution will be to update these projects to the new version. • Fully calculated projects before the update will remain available as read only.
Inclusion of biogenic CO2 flows	In line with EN 15804+A2, biogenic CO2 flows from bio-based materials are now included in TOTEM. This results in the following flows during the building life cycle:

	- Uptake of biogenic CO₂ during the production stage (module A) - Release of biogenic CO₂ during the end-of-life stage (module C) Although the contribution of the production and end-of-life stages will change, these biogenic CO₂ flows should result in a net zero carbon balance over the whole building life cycle.
LCI indicators describing resource use	The detailed results of a building or element now optionally show two LCI indicators describing resource use: 1. <u>Renewable primary energy</u> "Total use of renewable primary energy (primary energy and primary resources used as raw materials (MJ))". 2. <u>Non-renewable primary energy</u> "Total use of non-renewable primary energy (primary energy and primary resources used as raw materials (MJ))". As both indicators are part of LCI information, they are not included in the weighted environmental score (LCA-score). This information is only reported for the sake of transparency and on request of specialized TOTEM users. The indicators can optionally be displayed in the detailed results, in the impact per indicator by checking the box "Show additional indicators describing resource use".
Ecoinvent update	The database on which the generic data of the TOTEM library is based has been updated to a new version, Ecoinvent 3.6. Such updates are necessary to stay up to date and in line with the latest insights in Life Cycle Assessment. Therefore, they will occur on a regular basis in the future. This causes changes in the results of your elements, buildings and projects.
EPD in line with EN 15804+A2	The following B-EPDs (according to EN15804+A2) were added to the TOTEM library: • Dragopaint Aquagloss • Dragopaint Aquamat • Dragopaint Aquasat • Dragopaint Dragocryl mat roll sup • Dragopaint Dragocryl mat airless • Dragopaint Dragocryl mat roll • Dragopaint Dragocryl Satin airless • Dragopaint Dragocryl Satin roll • Dragopaint Dragocryl Silky airless • Dragopaint Dragocryl Velvety airless • Dragopaint Dragocryl Velvety airless sup • Dragopaint Dragocryl Velvety roll • Fedbeton Readymixed Concrete • Isola Thermogran +25 • ISOPROC Celit 3D • ISOPROC Celit 4D • Muylle Facon Ruby Monocoat (RMC) Oil Plus 2C • OEWB Glulam beam made in Belgium

	• Reynaers Aluminium MasterLine 8, thermally broken aluminium window system • Stabilame Glued Cross Laminated Timber - Glued CLT • Stabilame Nailed Cross Laminated Timber - Nailed CLT • SVK Fibre cement corrugated sheets: Neptunus • SVK Fibre cement flat sheets: Ornimat, Decoboard, Puro Plus • SVK Fibre cement slates: Ardonit, Montana, Fasonit, Cromleigh, Alpina, Planalp, Alpiplan • Unilin "UTHERM" PIR insulation board with ALUMINIUM facer • Unilin "UTHERM" PIR insulation board with MULTILAYER facer • VestaEco composites Straw Boards 280 • VestaEco composites Straw Insulation Boards 140 Previously integrated EPDs according to EN15804+A1 are no longer present in the library.
New naming structure	To improve the readability of the component library, the naming of both generic and specific components has been changed. Both types of components now follow the same naming structure including two parts. The first part of the name (in grey) refers to the application within an element. The second part of the name (in black) includes information on the form, material and dimensions of the component.
New layout in library: grouping of components	In order to improve the readability of the library, components with the same properties, but a different application or thickness, are now grouped together. The component is shown on the left-hand side of the screen with an indication of the number of variants. When clicking on this component, the left part of the screen opens an overview of the different variants, from which the user can then select and consult the chosen variant.
Find similar components	The new 'find similar component' functionality has been added to the component library. This button is located on the right side of the screen underneath the components name and suggests a number of alternative components, ordered by similarity percentage.
Composed layer with more than 2 materials	Whereas until now it was only possible to create a composed layer in an element with a maximum of two components, it is now possible to combine up to four components in one layer. TOTEM proposes various composition forms from which the user can choose (based on the principle of a structure and infill layer(s)) to which a ratio is assigned. The default ratio is communicated in a hover for each composition type.
Overrule lifetime element	If the lifetime of an element EPD is longer than the lifetime assigned to a generic element of the same category, it may be used to overrule the generic lifetime of the element. You can do this by clicking on 'Use as the lifetime of the element' in the component details next to the lifetime. The element whose lifetime you overrule may only consist of one component for this purpose.
Public sharing of an element/project	It is now possible to publish a project, building or personalised element.

	• Publishing a project is possible by clicking on ‘publish’ on the project's overview page (first level of the tree structure at the top left). This is located right next to the ‘save as’ option. • Publishing a building or an element is done in the library by clicking on the '  ' icon in the overview on the right side of the screen. By publishing a project, building or element, a public URL is generated that can easily be shared with other users. The application of this functionality is mainly foreseen in the context of public procurement.
Corrections	The following data corrections have been implemented: - The modelling and thermal parameters of components in concrete have been harmonized - The modelling and thermal parameters of gypsum products (plaster, blocks, boards) have been harmonized - The modelling of OSB boards has been harmonized - The modelling of WS 1145 (Hempcrete wall of 600x300x300mm) has been corrected - The element life time for non-loadbearing internal walls in massive structure has been harmonized with the one from non-loadbearing internal walls in light structure (30 years) - The visualisation of attic floors has been corrected related to the interior and exterior environment - The category “Ground facility” has been renamed to “Ground surface treatment” to be in line with the BB/SfB-plus classification. - Since the introduction of the adaptable thickness as a parameter, duplicated components have been deleted

TOTEM UPDATE

Details on Sprint 7 deployed in Production

Version 2.4 – December 2021

Subject	Documentation (EN)
Reversibility potential	A qualitative assessment of the reversibility potential of the connections of components (generic and specific) has been added to TOTEM. The reversibility potential provides additional insights to the user but has currently no influence on the results of the impact calculations. The assessment of the reversibility potential is integrated in the TOTEM interface on different levels: • <i>In the component library</i>, a coloured pictogram is added next to the component name. The coloured pictogram indicates the reversibility potential of the connections, ranging from red (not reversible), to green (reversible). On the right side of the screen under the collapsible section 'Connections and reversibility', the details of the reversibility assessment are shown, including the type of assembly and four additional indicators (only visible for reversible connections): 'Simplicity of disassembly', 'Speed of disassembly', 'Ease of manipulation' and 'Robustness'. For each of these indicators a specific rating is attributed, which is indicated by a bar chart. Furthermore, it is now possible to sort the component library by the type of connections and reversibility potential. • <i>In the element library</i>, the coloured reversibility pictogram is added next to the component name in the component table. Furthermore, it is possible to display the reversibility potential on the element visualisation by means of a colour code. This can be done by clicking on the checkbox, which is located next to the element visualisation. • <i>In the reports</i>, a specific section 'Connections and reversibility' is added. In this section the coloured element visualisation is shown together with the element composition tables including the coloured reversibility potential pictogram for each component. New FAQs have been added with a more detailed description of the assessment of the reversibility potential.
End of Life scenarios	In the component library, on the right side of the screen, a new collapsible section 'End of Life (cycle)' has been added. This section describes the scenarios used for the calculation of the end-of-life, which are representative for the current building practice in Belgium. In case of components based on generic data, the scenarios are defaults based on the Belgian horizontal Product Category Rules (NBN DTD B 08-001-2017). These scenarios are described in a table for each material included in the component. Per scenario the fractions of waste material allocated to landfill, incineration, reuse and/or recycling are indicated, as well as the fraction of waste material sorted directly on the building site.

	A more detailed description of the End-of-Life scenarios is available in the TOTEM publication “Environmental profile of buildings” .
Status ‘demolished’	In addition to the already existing set of statuses that can be assigned to a component (new, existing, re-used (in/ex situ)), the status ‘demolished’ has been added. This status allows to calculate the environmental impact of the demolition of existing building components in the context of a refurbishment or demolition/reconstruction scenario. In the element composition table, components with this status are indicated by a light grey background and grey italic font style. These components also get a distinctive prefix starting with the letter D. In the visualisation of the results, the impact share resulting from demolished components is indicated by hatching.
Biogenic carbon content	The biogenic carbon content of an element or building, expressed in kilogram of carbon (kg C) can now be found in the overview of the results by clicking on the checkbox 'Show additional environmental information' in the ‘Impact per indicator’ section . More information can be found in the FAQ “What is biogenic carbon and how is it taken into account in TOTEM? Is the effect of temporary carbon storage taken into account?”
Redesign of existing output tables	• The various output tables have been redesigned to improve readability: the element tables (see collapsible sections ‘Impact per element Category’ and ‘Input data’) are now structured according to the BB/SfB coding system, which includes a hierarchical subdivision of buildings in building elements. To improve readability, pictograms were also added to indicate the element categories. • The impact indicator table (see collapsible section ‘Impact per Indicator’) shows the results for the various environmental impact indicators and sub-indicators more clearly by using a pictogram and colour background for each main impact category.
Status of an element	The status of an entire element can now be modified in a single step. in the element type table (column ‘status’). All the components included in the element will then automatically be adapted to the assigned status : new, existing, reused in situ, reused ex situ or demolished.
Impact per status	In the overview of the detailed results, a section ‘impact per status’ has been added. A pie chart shows the relative impact (in %) per status (new, existing, reused in situ, reused ex situ and demolished).
Automatic description of elements	An automatic description for user-defined elements can be generated by clicking on the round arrow next to the “Description” field. The automatic description is based on the main components included in the element composition such as primary parts, insulation layers and finishes.
Addition of new components in the	When a user suggests the addition of a new component to the TOTEM library, there is now the possibility to indicate that this is done in the context of a

context of public procurements	public procurement. In addition, the region and the reference to the tender can be mentioned.
New components/elements + corrections	The following data corrections have been implemented: • The modelling of components in concrete has been harmonized. • The modelling and thermal parameters of fired clay bricks have been harmonized. • The modelling and thermal parameters of wood fibre products (boards and insulation) have been harmonized. • The modelling of gypsum boards has been adapted in terms of amount of screws and joint filler to be in line with data from manufacturers. • Harmonisation of the Ecoinvent records used for (chromium) steel screws/nails of boards. • The thermal parameters of sand-lime products have been harmonized. • Various small textual corrections/clarifications. The following new components have been added to the TOTEM library: • Building frame Beam IPE 600 profiles Galvanised steel • Building frame Beam Precast Concrete (I beam 300x700 mm) • Building frame Beam Rectangular section Reinforced concrete (150x400 mm) • Building frame Beam Rectangular section Softwood (60x180 mm) Untreated Belgian mix • Building frame Beam UPN 200 profiles Galvanised steel • Building frame Column Cast in situ - round Reinforced concrete ($\varnothing$ = 150 mm) • Building frame Column Square section Galvanised steel (80x80 mm - t = 3 mm) • Building frame Column Square section Reinforced concrete (400x400 mm) • External wall - loadbearing Primary part Hollow blocks Concrete (290x90x190 mm) Laid in cement mortar • External wall - loadbearing Primary part Sandwich panel Reinforced concrete (280 mm) - PUR (120 mm) • Floor finish Cladding Cast floor Epoxy (6 mm) • Floor finish Support structure Board Gypsum fibre (18 mm) - Stone wool (10 mm) • Internal wall - non-loadbearing Primary part Insulating bricks Fired clay (300x88x134 mm) Glued • Multiple applications Cladding Board Wood fibre (18 mm) Screwed Including joint filler • Multiple applications Primary part Hollow bricks Fired clay (288x188x138 mm) Laid in cement mortar • External wall - loadbearing Primary part Hollow bricks Fired clay (288x188x138 mm) Laid in cement mortar • Internal wall - loadbearing Primary part Hollow bricks Fired clay (288x188x138 mm) Laid in cement mortar

	• Multiple applications Primary part Solid blocks Sand-lime (897x150x643 mm) Glued • External wall - loadbearing Primary part Solid blocks Sand-lime (897x150x643 mm) Glued • Internal wall - loadbearing Primary part Solid blocks Sand-lime (897x150x643 mm) Glued • Internal wall - loadbearing Primary part Solid bricks Fired clay (2x 188x88x48 mm) Laid in bastard mortar • Internal wall - loadbearing Primary part Solid bricks Fired clay (2x 188x88x48 mm) Laid in bastard mortar • Party wall Primary part Solid bricks Fired clay (2x 188x88x48 mm) Laid in bastard mortar • Internal wall - loadbearing Primary part Solid bricks Fired clay (2x 188x88x48 mm) Laid in lime mortar • Internal wall - loadbearing Primary part Solid bricks Fired clay (2x 188x88x48 mm) Laid in lime mortar • Party wall Primary part Solid bricks Fired clay (2x 188x88x48 mm) Laid in lime mortar • Multiple applications Support structure Board OSB (12 mm) Nailed • Multiple applications Support structure Board OSB (18 mm) Nailed • Floor finish Support structure Board OSB (18 mm) Nailed • Wall - external finish Support structure Board OSB (18 mm) Nailed • Wall - internal finish Support structure Board OSB (18 mm) Nailed • Multiple applications Support structure Board OSB (22 mm) Nailed • Floor finish Support structure Board OSB (22 mm) Nailed • Wall - external finish Support structure Board OSB (22 mm) Nailed • Wall - internal finish Support structure Board OSB (22 mm) Nailed • Opening in external wall Lintel HEA 120 profiles Steel Untreated • Opening in external wall Lintel HEA 200 profiles Steel Untreated • Opening in external wall Lintel HEA 220 profiles Steel Untreated • Opening in external wall Lintel HEA 260 profiles Steel Untreated • Opening in external wall Lintel HEA 360 profiles Steel Untreated • Roof finish Thermal insulation - sloping layer Board Stone wool - glass fibre felt (40-100 mm - mean 70 mm) Loose laid To be ballasted • Wall - external finish Cladding Bricks Fired clay (210x100x50 mm) Glued • Wall - external finish Cladding Bricks Fired clay (210x100x50 mm) Laid in cement mortar • Wall - external finish Cladding Bricks Fired clay (210x100x65 mm) Glued • Wall - external finish Cladding Bricks Fired clay (210x65x50 mm) Glued • Wall - external finish Cladding Bricks Fired clay (288x90x48 mm) Glued • Wall - external finish Cladding Bricks Fired clay (288x90x48 mm) Laid in cement mortar • Wall - external finish Cladding Planks Thermally modified wood (22 mm) Nailed Untreated
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	• Wall - external finish Support structure Board Wood fibre (18 mm) Nailed • Wall - external finish Support structure Board Wood fibre (22 mm) Nailed • Wall - external finish Thermal insulation Board EPS graphite (100 mm) Glued and fixed with plugs To be plastered • Wall - external finish Thermal insulation Board EPS graphite (160 mm) Glued and fixed with plugs To be plastered • Wall - external finish Thermal insulation Board EPS graphite (40 mm) Glued and fixed with plugs To be plastered • Wall - external finish Thermal insulation Board Resol - Aluminium facer (120 mm) For cavity wall Ties and clips to be added • Wall - external finish Thermal insulation Board Resol - Aluminium facer (40 mm) For cavity wall Ties and clips to be added • Wall - external finish Thermal insulation Board Resol - Aluminium facer (80 mm) For cavity wall Ties and clips to be added • Wall - external finish Thermal insulation Board Wood fibre (120 mm) Glued and fixed with plugs To be plastered • Wall - external finish Thermal insulation Board Wood fibre (160 mm) Glued and fixed with plugs To be plastered • Wall - external finish Thermal insulation Board Wood fibre (40 mm) Glued and fixed with plugs To be plastered
New EPDs	The following B-EPDs (according to EN15804+A2) have been added to the TOTEM library: • ISOPROC iQ3: Loose-fill cellulose insulation blown into walls • ISOPROC iQ3: Loose-fill cellulose insulation for attics • ISOPROC iQ3: Loose-fill cellulose insulation, blown into pitched roofs • Recticel Powerdeck F, Powerdeck F A, Eurothane BI4, Eurothane BI4 A, Recticel Exterior. • Recticel Powerwall, Powerroof, Powerdeck, Powerline, Powerline C • Recticel IP PIR 21, Eurowall 21, Eurothane Silver, Eurothane Silver A, Eurothane Silver FR, IP PIR 22, Fitforall, Eurothane S White, Eurowall, Eurofloor, Eurofloor 300

TOTEM UPDATE

Details on Sprint 7.1 deployed in Production

Version 2.4.4 – March 7th 2022

Subject	Documentation (EN)
Added EPDs	The following B-EPDs (according to EN15804+A2) were added to the TOTEM library: • Argex AG 4/8 – 370 GEO • Argex AG 0/4 – 500 GEO • Argex AR 4/10 – 430 GEO • Argex AR 8/16 – 340 GEO • Argex AR 8/16 – 340 GEO • Eternit EQUITONE [tectiva] fibre cement sheets • Eternit EQUITONE [linea] and EQUITONE [lunara] fibre cement sheets • Eternit EQUITONE [natura – textura - materia] fibre cement sheets • Eternit EQUITONE [pictura] and EQUITONE [Natura PRO] fibre cement sheets • Eternit Cedral fibre cement sheets • FOAMGLAS T3+ • FOAMGLAS T4+ & ONE • FOAMGLAS S3 • FOAMGLAS F • FOAMGLAS W+F • ISOMO Isomo eps 60 se 15 • ISOMO Isomo eps 100 se 20 • ISOMO Isomo eps 120 se • ISOMO Isomo eps 200 se 30 • ISOMO Isomo eps 40 se 10 • ISOMO Isomo eps 150 se 25 • ISOMO Isomo eps 40 se 13 • ISOMO Isomo eps 70 se 16 • ISOMO Isomo eps 80 se • ISOMO Isomotherm eps 100 se 20 (black) • ISOMO Isomotherm eps 120 se (black) • ISOMO Isomotherm eps 80 se (black) • ISOMO Isomotherm facade sokkel (black) • ISOMO isomotherm eps 40 se 13 (black) • ISOMO isomotherm eps 50 se 14 (black) • ISOMO isomotherm eps 60 se 15 (black) • Menuiserie Riche Wood aluminium window (without glass) • Menuiserie Riche Wood window (without glass)
Corrections	The following data corrections have been implemented: • The description and modelling of glued insulation boards on roofs has been adapted and harmonized • Lambda values of nine different components

	• In the predefined element ExternalWall17 the stone wool has been replaced by glass wool as a variety. • In all predefined pitched roof elements with ceramic roof tiles, the glazed tiles have been replaced by unglazed tiles. • Diverse small textual corrections
Modelling of windows	• The calculation of the U-value of windows has been adapted to take into account the ratios of profile and glazing, as defined by the user. • In the element library, the distinction between large and small windows has been removed and replaced by a single window of 1 m² using the EPB/PEB default ratios: ○ In case of windows in which $U_{\text{glass}} \leq U_{\text{frame}}$: 70% glazing, 30% profile and 3 m glass edge; ○ In case of windows in which $U_{\text{glass}} > U_{\text{frame}}$: 80% glazing, 20% profile and 3 m glass edge. The default ratios for glazing and profile can be adapted by the user depending on his own design.

TOTEM UPDATE

Details on Sprint 7.2 deployed in Production

Version 2.4.5 – June 24th 2022

Subject	Documentation (EN)
EPDs	The following changes were done in TOTEM that are relevant for B-EPDs: • The EPDs of ISOMO, Unilin and Recticel are now available as both complete components (for the application where no fixation materials are needed) and as a material (for the application as a material, combined to generic fixation materials).
Data corrections	The following data corrections have been implemented: • Air layers are now subdivided in ventilated, moderately ventilated and not-ventilated air layers. • Harmonisation and corrections regarding the type, amount and size of fasteners of mechanically attached roof insulation boards. • Nailed or screwed OSB and wood fibre boards are harmonised regarding the amount and size of fasteners and reversibility indicators. The thickness property of these boards is now adaptable, so the user can change the thickness if necessary. • The maintenance processes of ceiling and wall plaster finishes have been harmonised. • Harmonisation and corrections regarding the composition and density of cellular glass insulation boards. • Corrections related to the modelling of (bituminous) glass fibre facers. • Correction of the end-of-life scenario of straw. • Corrections of filters and visualisation codes of a few components. • Diverse small corrections in the composition of components and elements. • Completion of a few missing French and Dutch translations. • Small textual corrections.