One Click LCA Integration
for **Autodesk Revit**
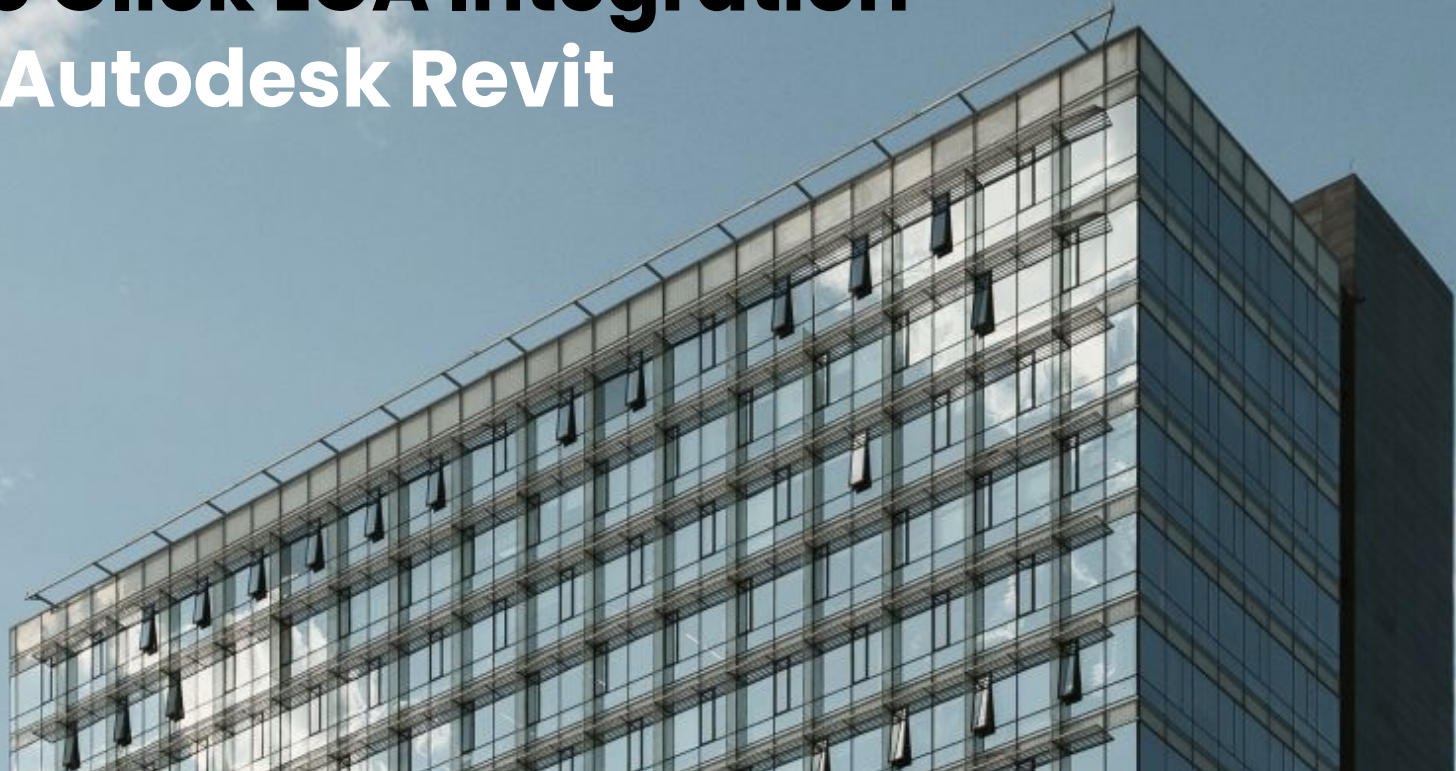
Table of contents

Any terms and definitions that are esoteric to the field of LCA and the construction industry are explained here, as well as terms and definitions that are relevant to the One Click LCA software or Revit.

EPD
EPD stands for Environmental Product Declaration. It is a document that provides transparent information on a product's environmental performance, based on a life-cycle assessment. It helps make informed decisions about the environmental impact of products.

LCA
LCA or life-cycle assessment is a scientific method to assess the environmental impact of a product throughout its entire life-cycle, from production to disposal, and helps identify and quantify potential environmental impacts.

Private data
Refers to materials and material constructions that have been created by a user within their One Click LCA company account.

Generic data
Refers to materials and resources similar to EPDs however often based on average emissions of the product type, they are useful in the earlier stages of a project when the specific product to be used is not known, or the chosen product does not have an EPD.

Manufacturer data
Is data relevant to specific manufacturers and their specific products in the form of an EPD. This data is very accurate and therefore give you highly accurate results.

Plant specific data
Refers to EPDs that represent products form a very specific manufacturing plant.

Constructions
Refers to material data in the One Click LCA software that are material build-ups representing entire building elements like an external wall from the inner leaf to the outer one.

Datapoint
Refers to any EPD or generic material included in the One Click LCA database.

LOD
Refers to the Level of Detail of the Revit model.

Revit Category
Revit categories are used to classify the Revit elements as explained in this article by Autodesk.

Revit family
A Revit family describes a type of Revit elements with common characteristics. More information about Revit families can be found in this article.

Revit family type
A Revit family type describes an element subtype. It shares the same common characteristics with all other types in the same family but is differentiated via some parameters. For example, a Revit family can be created for rectangular concrete columns and several family types for different dimensions of the same rectangular column.

Chapter 1
Introduction

1.1. About this report

This report provides guidance on how to utilize the integration of One Click LCA with the Revit plugin. It covers the installation process for different integration options, provides descriptions of all input fields in the 'LCA in Autodesk Revit' window, explains considerations that should be taken when modelling various building elements for analysis, outlines how to optimize building performance using the Revit plugin, and recommends the most suitable integration method to use.

This report aims to assist One Click LCA users in understanding the practical benefits of integrating LCA and BIM, providing guidance on how to achieve this integration, establish internal workflows, and use the information as a reference book. It includes documentation on each of the plugin's settings and data inputs.

Throughout the guide, the Revit plugin features are stated according to varying license levels (business or expert).

This is a comprehensive guide that is regularly updated to cover the latest features of the One Click LCA plugin for Revit and to address any new frequently asked questions from plugin users. The most recent version of this guide was compiled for the One Click LCA plugin for Revit version v4.0.6.

1.2. What is BIM?

Building Information Modeling (BIM) is a digital representation of a facility's physical and functional characteristics. It is a process for creating and managing building data during its lifecycle, from design and construction to operation and maintenance.

In BIM, a building is represented as a 3D model that contains information about all the physical and functional characteristics of the building. This information is stored in a digital database, which can be accessed and shared by all project team members, including architects, engineers, contractors, and facility managers.

One of the main advantages of BIM is that it allows for better collaboration and information exchange among project team members. It also allows for better visualization of the building, which can help identify potential problems and conflicts before they occur.

In addition, BIM can help with life-cycle assessments, cost estimation, scheduling, and facility management.

Many software programs, such as AutoCAD, Revit, and ArchiCAD, are available for creating BIM models. This guide is about the integration with Autodesk Revit.

1.3. Why integrate LCA with BIM?

Life-cycle assessment (LCA) is a method for evaluating the environmental impacts of a product or system over its entire life-cycle, from raw material extraction to disposal. In the construction industry, the assessed product is a building or infrastructure. By integrating LCA with BIM, it is possible to use BIM models to conduct more accurate and comprehensive LCAs of buildings faster.

BIM models contain a wealth of information about the materials, components, and systems that make up a building. This information can be used to assess the environmental impacts of those materials and systems more accurately.

Another benefit is that BIM models can be used to simulate different design scenarios and compare the environmental impacts of those scenarios. This can help designers and decision-makers choose the most sustainable design options

Integrating LCA with BIM can also help to improve communication and collaboration among project team members, as it allows everyone to work from a single, comprehensive source of information. This can reduce errors and rework and help ensure the final design is as environmentally friendly as possible.

1.4. About Autodesk Revit

Autodesk Revit is a BIM software widely used in architecture, engineering, and construction (AEC). It allows users to create, visualize, and analyze building designs and generate construction documents.

Revit supports a wide range of design and documentation tasks, including architectural design, MEP engineering (mechanical,

electrical, and plumbing), and structural engineering. It has a range of tools and features that support these tasks, including 3D modeling, drawing generation, scheduling, and data management.

One of the key features of Revit is its ability to support collaborative workflows. Multiple users can work on the same model simultaneously, and Revit includes tools for tracking and resolving conflicts between different user changes. This can help to improve communication and collaboration among project team members.

Revit is regarded as the industry standard for BIM software and widely used in the AEC sector in many countries.

1.5. One Click LCA integration in Revit

Integrating One Click LCA and Revit enables users to extract relevant data from their models, such as material names, categories/classes, geometric data, and units.

This is highly effective at speeding up the process of inputting data into the 'building material' data query of the main One Click LCA software, allowing the user to work directly from Revit to perform complete LCA studies on the building materials of their designs.

Furthermore, the plugin allows the user to perform quick analyses to determine the best material choices (i.e., the most sustainable) while designing their models in Revit. This is valuable in that there doesn't have to be a long, disruptive process in gaining insights into the embodied carbon/ environmental sustainability of the material choices, nor does there have to be any change in the Revit modeling as the plugin works over the top of the Revit modeling, not changing any of the geometry but rather assessing any changes of the geometry.

Chapter 2
Installation

The plugin installs seamlessly without options. Download the Revit plugin directly from the Autodesk App Store, as shown in the figure below:

1

2

3

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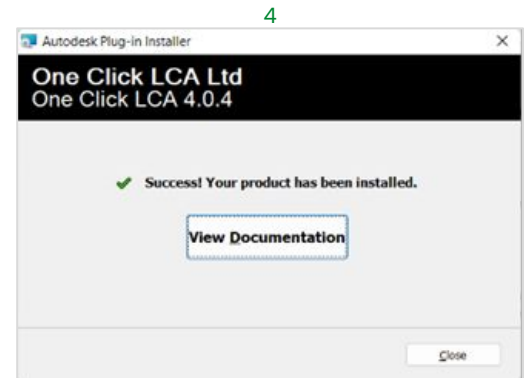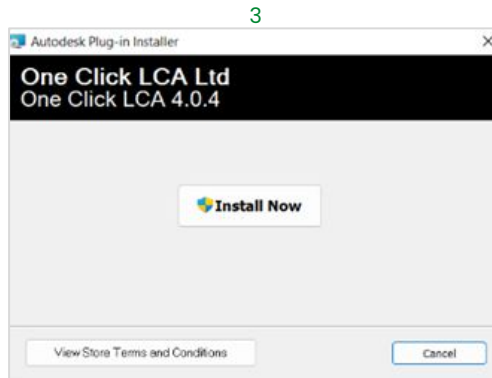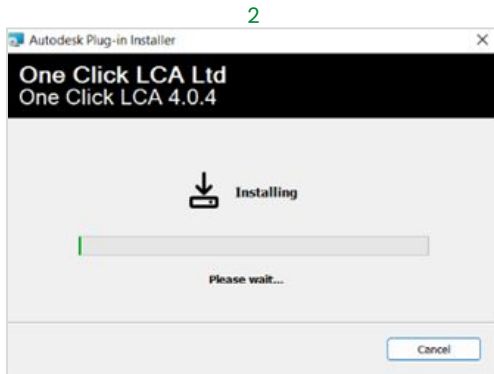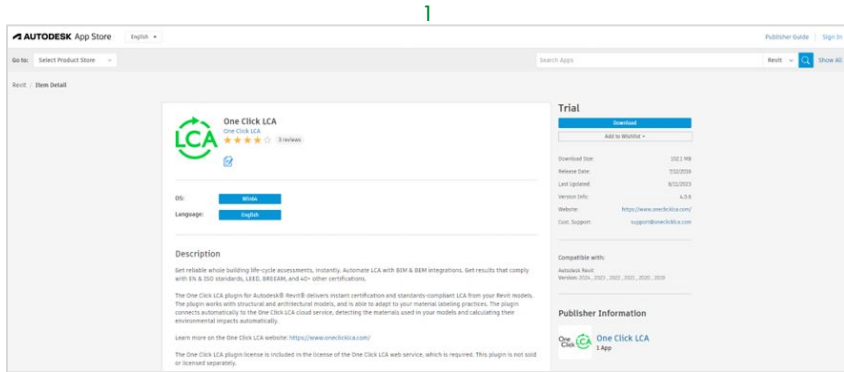
Chapter 3
Integration options

3.1. Overview

There are three available options for integrating LCA into Revit. These are:

- LCA in Cloud
- LCA in Revit
- Revit to Excel

To access any of the three available integration options, the One Click LCA plugin for Revit must be installed and initiated from Revit. To start working with the plugin, follow the two steps below.

Step 1: Open the One Click LCA plugin from your Revit model

To use the One Click LCA plugin, open the Revit model to be assessed and then go to the One Click LCA ribbon.

Step 2: Select "LCA in Autodesk Revit" or "LCA in Cloud".

"LCA in Autodesk Revit": This option allows you to edit the plugin settings, tailor the system boundary of your assessment, and undertake the assessment within the Revit environment.

"LCA in Cloud": This option exports quantities directly with default settings and opens your web browser so you can choose the project and design you wish to import them for.

Figure 1: One Click LCA plugin ribbon and available options

3.2. LCA in Cloud

The LCA in Cloud option sends the material information directly to One Click LCA. Clicking on the "LCA in Cloud" button at the One Click LCA ribbon, the plugin will collect the material information of all the elements in the Revit model. By default, it will export the material quantities instead of the family type ones; however, if the relevant setting is changed in the "LCA in Revit" option, this is also applied to the "LCA in Cloud" one. This is the simplest and fastest way to export the material information from Revit to One Click LCA. However, as BIM models are not only modeled to enable LCA calculations, they contain elements that fall outside the LCA scope. These elements/materials can be removed from the Revit model before exporting the material information to One Click LCA or removed from One Click LCA once imported. Alternatively, the physical scope of the assessment can be defined in the LCA in Revit option.
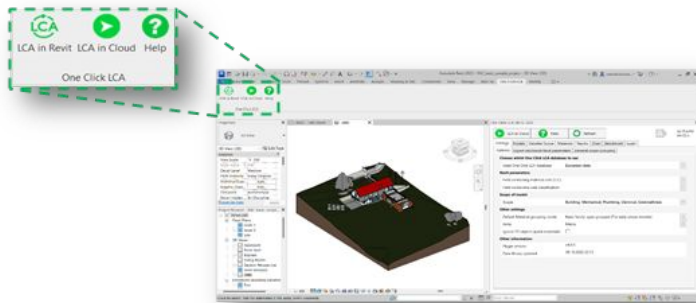
3.3. LCA in Revit

The "LCA in Revit" option allows the user to undertake the assessment within the Revit environment and adjust the assessment's physical scope, i.e., the Revit elements that shall be included in the LCA. Chapter 4 of this guidance provides a detailed overview of the LCA in Revit option. The steps that are typically followed in the LCA in the Revit option are shown in Figure 2.

```
Open the One Click LCA plugin for Revit
                    │
Review the settings tab (Define the database, default
quantity types and any additional parameters)
                    │
Define the assessment system boundary based on
phases, worksets, design options, visible elements or
selected elements.
                    │
Finetune the system boundary based on Revit categories,
families and family types.
                    │

LCA in Cloud  ◄──── Cloud ──(Continue in Revit or Cloud)── Revit ──►  Map Revit materials with EPDs and
                                                                        or generic materials
     │                                                                          │
Send Revit information                                                  Get instant results in Revit
to One Click LCA                                                                │
     │                                                                  Get results in Revit
Map Revit materials and family types with EPDs                                  │
and generic materials                                                  Optimize your design with One Click LCA
     │                                          Send your assessment to the Cloud │
     │                                                                  LCA in Cloud
     └──────────────►  Save your assessment in One Click LCA. Check  ◄───┘
                       detailed results and optimize further.
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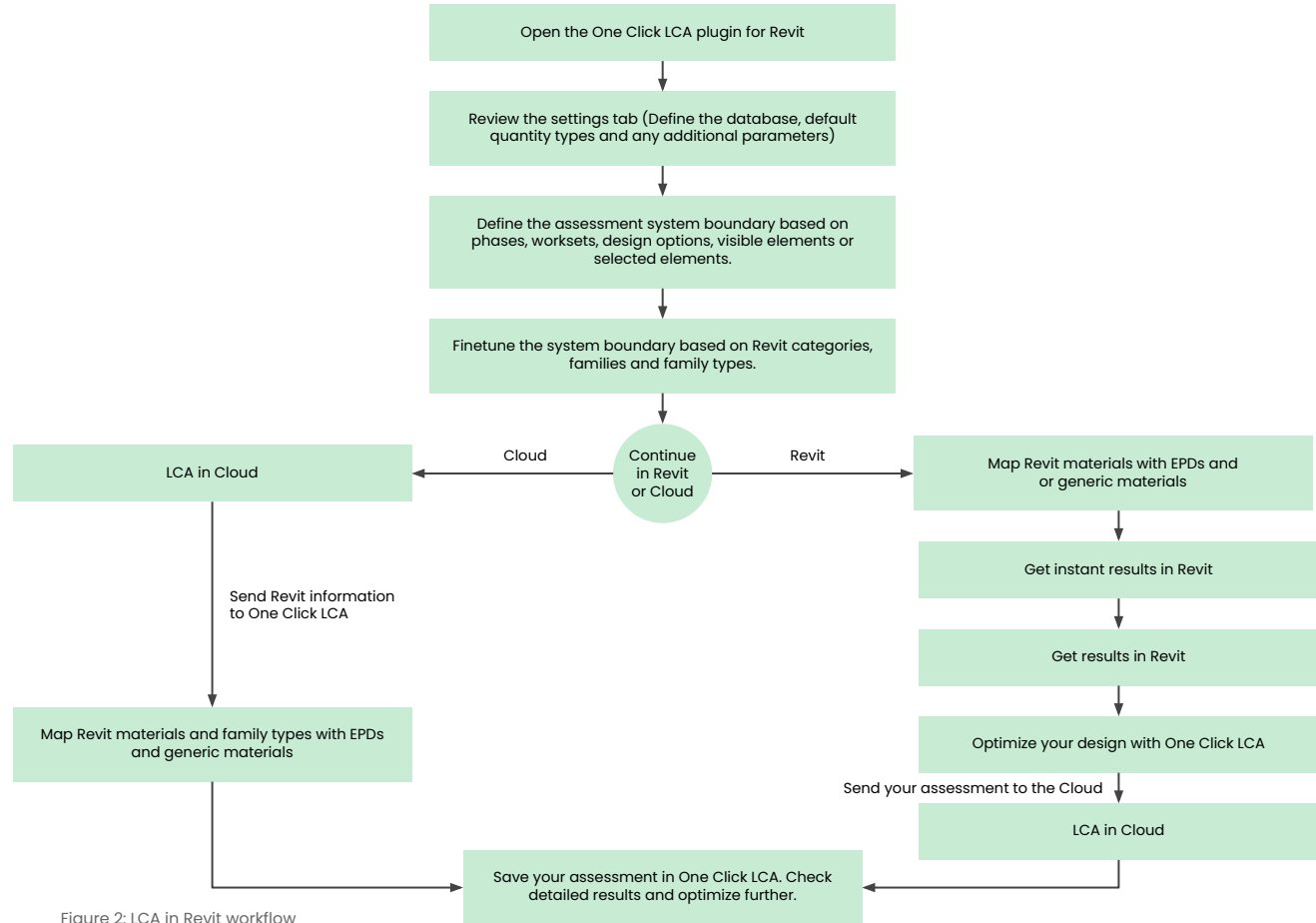
Figure 2: LCA in Revit workflow

Once the Revit model is open, the first step is to define the basic settings. The most important question is whether the default quantities taken from the Revit model should be material or family-type quantities. This can be adjusted later for entire categories or family types if needed. In the initial setup, the user may also define the unit system of preference and the database to be used in the assessment if this is to be undertaken within Revit. One Click LCA integrates virtually all available EPDs and embodied carbon databases. As some LCA methodologies require the use of certain databases or EPD types, this can be achieved by specifying the database to be used. For example, assessments undertaken in the USA or Canada should be undertaken with TRACI EPDs. For the rest of the world, most EPDs will be made available with CML characterization.

The next step is to define the scope of the assessment in the "Models" and "Detailed" scope tabs of the plugin. This can be done in various ways, as explained in Paragraph 4.

When the scope of the assessment is defined, the user may continue with the calculations in the plugin or export the material information to the Cloud. When continuing to the Cloud, the material quantities are mapped, and the results are presented in the Cloud version of One Click LCA. When continuing in Revit, the material quantities are mapped in the plugin interface, and the results are presented inside the plugin and can also be visualized in the 3d view of the Revit model. The user may, in parallel, send the assessment in the Cloud at any point to generate and review additional graphs and charts to support hotspot analysis.

The process always ends with sending the assessment to the Cloud. This is where it can be revisited and modified at any time. When changes have been made in the Revit model, the assessment can be done again in Revit and sent later to the Cloud either as an additional design iteration or to replace a previous assessment.
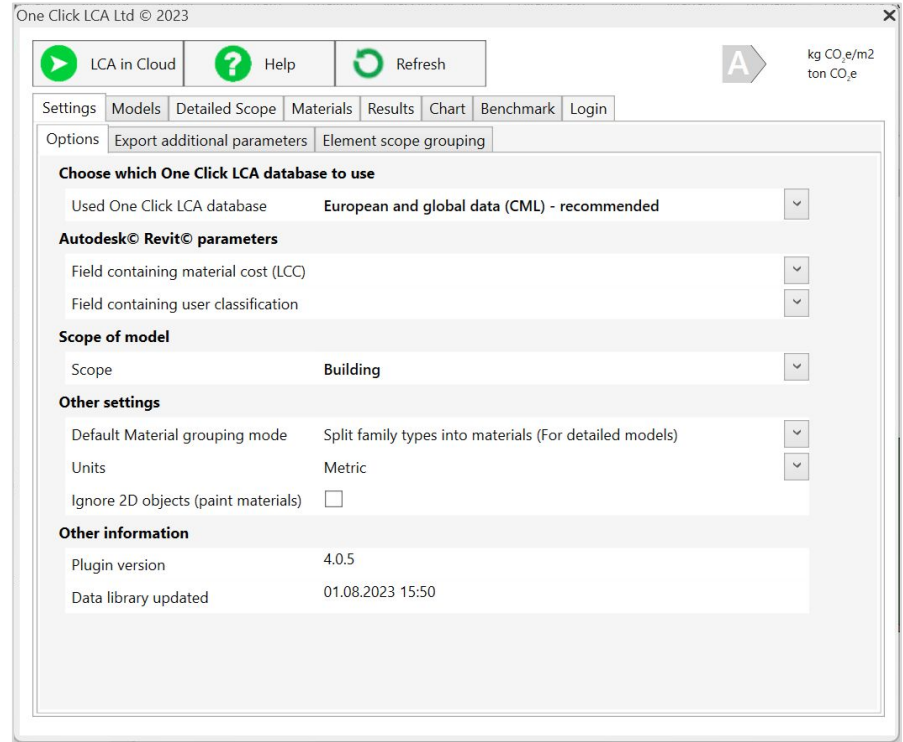
Figure 3: Settings Tab

3.4. Revit to Excel

In this option, the material information is exported from Revit to Microsoft Excel to be processed before being imported to One Click LCA. The export to Excel functionality is available once the data has been sent to the Cloud by clicking the "Download Excel" button at the "settings" step of the import process.

Figure 4: Download Excel functionality

The data sent to the Cloud may include all material information if sent directly from the One Click LCA ribbon, or they will be limited to the assessment's scope as defined in the LCA in the Revit option.

The data exported in Excel can be reviewed and adjusted before being imported using the Excel import feature in One Click LCA. This workflow is recommended for assessors using externally sourced Revit models for the material take-off who want to ensure the quality of the dataset they use in their assessments. Typical actions taken during this step include the following:

A. Review and cross-check unclear Revit materials and/or family types, along with other design documents like detailed drawings, specifications, etc.

B. Remove materials that fall outside the assessment's scope, especially when this has not been defined with the LCA in the Revit option.

C. Rename Revit materials using a standard naming convention to maximize automated recognition and mapping with EPDs.

D. Add materials and elements that were not modeled in Revit.

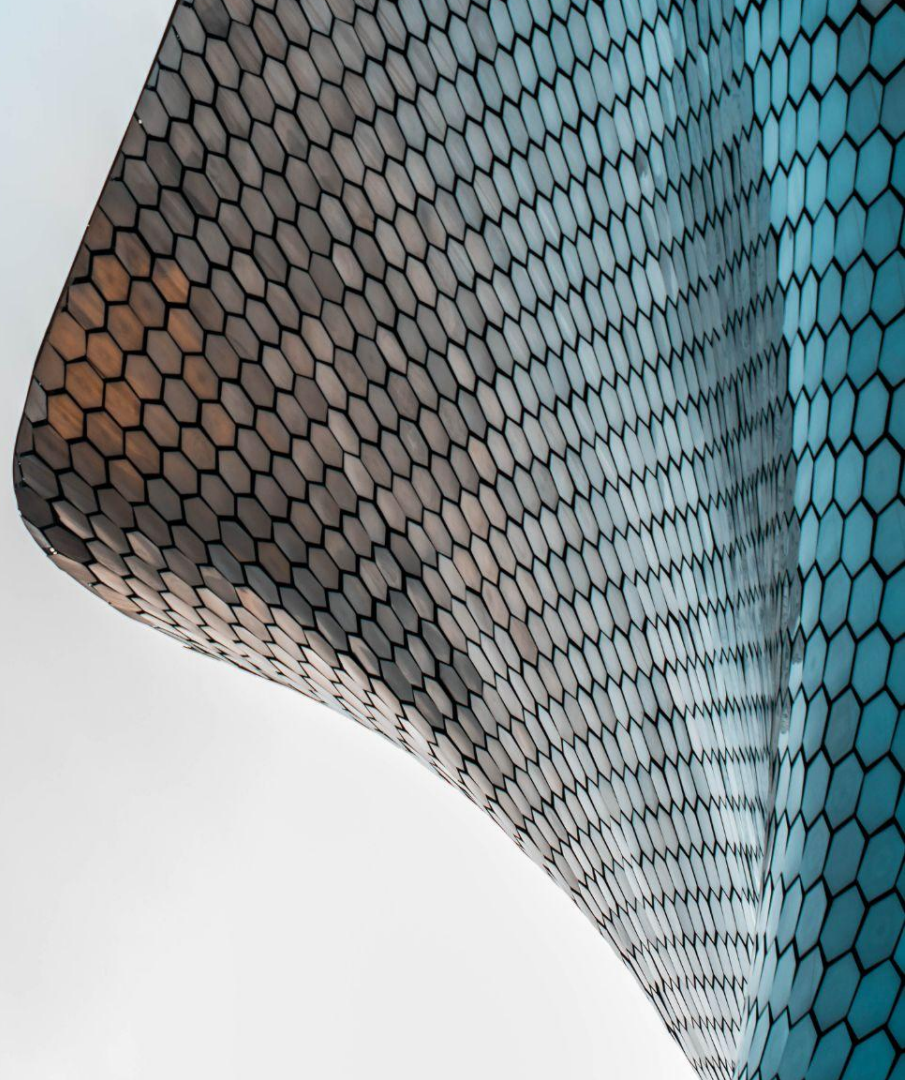The data are exported in a standardized structure in Excel that is recognized by One Click LCA when imported back.

Figure 5: Revit material information exported in Excel

Detailed guidance on importing material information from Excel to One Click LCA can be found here.

Chapter 4
LCA in Revit –
A detailed review

4.1. Overview

The three buttons across the top are LCA in Cloud, Help, and Refresh. What each of them do is as follows.

"LCA in Cloud" will initiate the import process of the relevant information from the Revit model into One Click LCA. The information exported will be based on the settings defined by the user or as per the default settings if these are not defined before the export.

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LCA in Cloud   Refresh   Save   Help

kg CO₂e/m2
ton CO₂e

File | Settings | Models | Detailed Scope | Materials | Results | Chart | Benchmark | Login

Setting & mappings management

This step is optional.
Plugin settings and mappings can be saved locally and reused in future sessions.
Mappings that are saved in the plugin, are not synced with the cloud's automated mapping generation mechanism.
Reset option restores plugin settings to the defaults ones and removes all mappings at once.

Save
Save as
Load   Loaded file: C:\Program Files\Autodesk\Revit 2023\Samples\RAC_basic_sample_project.oneclicklca
Reset

"**Help**" leads to the support page explaining the Revit integration on the Customer Help Centre that you can access at this link: https://oneclicklca.zendesk.com/hc/en-us/articles/360015009600-Autodesk-Revit-Integration

"**Save**" saves the plugin settings and material mappings locally for future use in the same Revit model.

"**Refresh**" checks for model/material updates and refreshes results.

4.2. Primary Tabs

The primary tabs in the 'LCA in Autodesk Revit' window are the different parts of the plugin that allows the user to adjust the data retrieved from Revit, undertake the assessment and check the results.

"File" allows saving or loading all plugin settings from a previous assessment.

The "**Settings**" tab contains general settings like the types of data to be retrieved from Revit and databases to be used in the assessment.

In the "**Models**" tab, the basic rules for scope definition are applied.

"Detailed Scope" is where the scope of the assessment is defined in more detail, e.g., categories, families, and types included.

Materials are where the Revit materials falling in the assessment scope are mapped with EPDs and generic material datapoints.

"Login" needs to be done at the start to get the results in the plugin and update the database. Having an account is what you need to have before this. If you are new to One Click LCA, an account can be created by following this link.

In the "**Benchmark**" tab, the building is compared with the One Click LCA benchmark based on the country, building type, and gross floor area of the building.

The "**Chart**" tab contains a bar chart that presents the results for the Embodied Carbon in Tons (CO2e) for the most impactful materials used in the project.

The **"results"** tab is of a similar layout to the materials tab and reports the values of the environmental impact of the materials.

4.3. Settings

4.3.1. Settings > Options

At the Options tab the user can select the database to be used in the LCA, define the parameters that contain classification and cost data, define the assessment scope at a high level, select the unit system and define the default type of data taken form Revit (materials or family types).

For projects in North America, choose "Traci". For anywhere else choose "CML". For regulation compliant LCAs choose the respective database where necessary.

The **"Scope"** allows the selection of which aspects of the building should be included in the assessment. Choose from 'Building,' 'Mechanical,' 'Plumbing,' 'Electrical', and 'External Areas.'

"Default Material grouping mode" is where the user can define the default type of data taken from the Revit model. This can be either material or family type quantities if the material information is inadequate. This option can be overwritten at the "Detailed scope" per Revit category and family type basis.

"Units" can be either Metric or Imperial.

In the "**Field containing material cost (LCC)"**, the user can define which of the additionally exported type or material parameters contains cost information that can be used in a Life Cycle Cost Assessment. This setting is optional and is empty by default.

In the "**Field containing user classification",** the user can define which of the additionally exported type parameters contains classification information that can be used in the LCA. This setting is optional and is empty by default.

"Ignore 2D objects (paint materials)". Check this to ignore any 2D materials like paint materials and membranes.

Data library updated states the date and time that the library of the One Click LCA database was last updated.

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LCA in Cloud | Refresh | Save | Help

kg CO₂e/m2
ton CO₂e

File | Settings | Models | Detailed Scope | Materials | Results | Chart | Benchmark | Login

Options | Export additional parameters | Element scope grouping

Database settings

Used One Click LCA database — European and global data (CML) - recommended

Prioritized language for LCA data — English

Autodesk® Revit® parameters

Field containing material cost (LCC)

Field containing user classification

Scope of model

Scope — Building

Other settings

Default Material grouping mode — Split family types into materials (For detailed models)

Units — Metric

Ignore 2D objects (paint materials) — ☑

Other information

Plugin version — 4.0.6

Data library updated — 19.09.2023 12:17

4.3.2. Settings > Export additional Revit parameters

"Export additional Revit parameters" is where the user can select additional type or material parameters to be exported. Parameters that include LCC or Classification data must be checked here prior to selecting them in the setting tab. This is an optional step and may be skipped if no additional parameters need to be exported.

This is the list of the available family type parameters that can be exported to One Click LCA.

This is the list with the material parameters that can be exported in addition to the name and quantity of the material.

This is the list with the material parameters that can be exported in addition to the name and quantity of the material.

4.3.3. Settings > Element Scope Grouping

The element scope grouping tab lists all the categories detected in the Revit model and allows the user to define the scope category under which they fall. This will dictate whether elements of a certain category will be included in the assessment based on the scope definition in the settings tab. This is an optional step, as all Revit categories are assigned a scope category by default.

The One Click LCA Revit plugin automatically detects the Categories that are being used within the Revit model and lists them here. Each category can be assigned to Building, Mechanical, Plumbing, Electrical or External Areas.
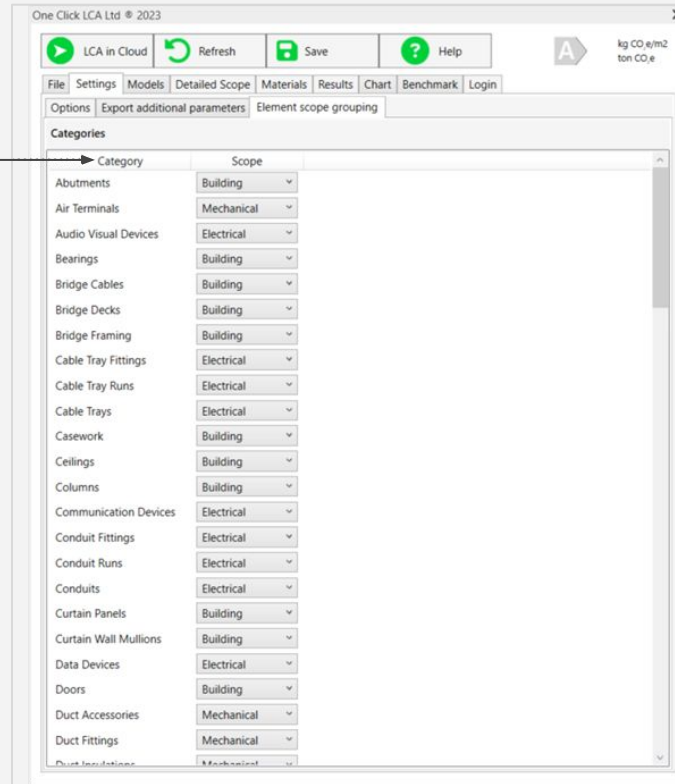
4.4. Models

The **"Models"** tab is the first step in defining the assessment scope. At this step the user selects how the elements that material information is required for will be selected. There are three options available, the active view where all elements that are visible in the active Revit view will be included in the assessment, the selected elements where only elements selected in the Revit model will be included and the detailed configuration where elements will be included based on the workset they belong, the phase and design option.

"Active View" will only get materials from the elements visible in the active view in Revit. Elements that are out of the assessment scope can be temporarily or permanently hidden in the view. A view template may also be prepared for LCA and saved in the organization's Revit template to simplify the scope definition. Note that this option only gets elements of the main model. Linked models will be ignored and must be assessed separately or imported in One Click LCA.

"**Detailed Configuration**" allows the user to define the phases, options worksets, and linked models from which materials will be taken from. This is the default selection when opening the plugin.
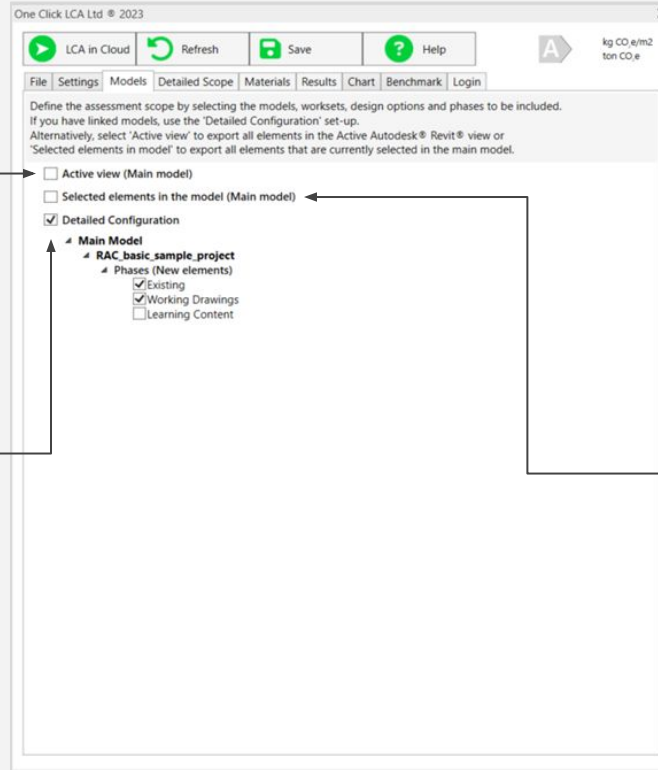
With **"Selected elements in the model"** the user can select all elements within the assessment scope. Only materials from these elements will be taken for the Revit model. The user can save the selection as a selection set in Revit for future reuse. This option only works for the main model. Linked models will be ignored and must be assessed separately or imported in One Click LCA.

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| LCA in Cloud | Refresh | Save | Help |

kg CO₂e/m2
ton CO₂e

File | Settings | Models | Detailed Scope | Materials | Results | Chart | Benchmark | Login

Define the assessment scope by selecting the models, worksets, design options and phases to be included.
If you have linked models, use the 'Detailed Configuration' set-up.
Alternatively, select 'Active view' to export all elements in the Active Autodesk® Revit® view or 'Selected elements in model' to export all elements that are currently selected in the main model.

☐ Active view (Main model)

☐ Selected elements in the model (Main model)

☑ Detailed Configuration

  ▲ **Main Model**
    ▲ **RAC_basic_sample_project**
      ▲ Phases (New elements)
        ☑ Existing
        ☑ Working Drawings
        ☐ Learning Content

4.5. Detailed Scope

In the '**Detailed Scope**' tab, further adjustments can be made for entire Revit categories, families and family types. The user can define whether these will be included in the assessment or not, whether they will be split into materials or not and what will be the default unit for each of them.

This is a list that contains the main model that is being assessed and the linked models to it. By selecting each model in the list, the user can adjust the settings for the available Revit categories and families in that model.

This is a list of all categories that exist in the selected model. The user can split all elements of a category into materials or vice versa, include or exclude them from the assessment, and change the default quantity unit.

In these checkboxes, the user defines whether the respective Revit category will be included in the assessment or not.

In these checkboxes, the user defines whether the elements in the respective Revit category will be split into materials or family type quantities will be reported instead.

In these drop-down lists, the user can define the default quantity unit used for the materials extracted from elements in the respective category. The unit can be changed individually for each material reported later in the "Materials" tab.

This search box allows the user to filter family types based on their name.

This search box allows the user to filter family types based on their name.

4.6. Materials

The **materials** tab is where the materials within the Revit model can be reviewed and mapped with EPDs and generic materials. This Paragraph has been split into sub-paragraphs covering the '**Top Tabs**', the '**Filter & Search**', and the '**Project Materials**' sections in order to explain every aspect of the interface clearly and in detail.

4.6.1 Materials > Top Tabs

"List" converts the "Project materials" table at the bottom of the window to display the Revit materials as a single list.

"Refresh Materials" refreshes the materials list. Any new materials will be added. Any existing materials will have their quantities adjusted.

"Clear Filter" removes the settings applied in the filter section below.

"Group" converts the "Project materials" table at the bottom of the window to show the materials grouped by Revit category.

"Isolate in 3D" isolates all elements in the current Revit view from which the selected material is coming.

"Find element from 3D" isolates in the plugin, all materials associated with the selected Revit model elements.

"Show data" card displays the details of the selected environmental profile (login required).

4.6.2. Materials > Filter & Search

In the 'Filter & Search' section the use searches for EPDs and other generic materials and maps them with the selected Revit material(s).

The OCL material database search choices can be refined by adjusting the **"filter"** criteria.

The **"Search"** function allows for refining the search of material options by typing material names, manufacturer names, EPD numbers, etc.

The **"Search"** window displays the materials from the One Click LCA database. This list can be refined by applying filters or typing in relevant keywords in the search bar.

"Category" describes the Revit category of the elements from which this material comes.

"Type" selects between Private, Generic, Manufacturer, and Plant data. You can find the descriptions of these on the page of Terms & Definitions.

"Update LCA database" updates the One Click LCA database (login required).

The **"unit"** filters the search results to only the ones that can accept the specified unit e.g. m3, ft3, etc.

"Assembly" filters the search results to only the constructions/assemblies.

"Country" filters the search results to only those from the specified country.

4.6.3. Materials > Project Materials

The interface displays project materials that are detected from the Revit model and maps the materials from the OCL database to these detected Revit materials. The materials are presented in a table format, along with other parameters that are read from the Revit model. These parameters include Category, Family, Type, Material, whether it is a construction, One Click LCA Mapping, Unit, Multiplier, Quantity, Thickness, Volume, Area, Length, Pieces, and more.

"Unit" is the unit used in the impact calculation for this material. The user can choose from a list of available units depending on the Revit Category.

"Multiplier" allows for adjusting the material quantity from the Revit model. The multiplier must be lower than 1 for hollow elements modeled as solid.

"Quantity" is the quantity type (between volume, area, length, and pieces) used in the impact calculation for this material.

"One Click LCA Mapping" is the datapoint from the One Click LCA database mapped with the Revit material.

This column displays if the datapoint mapped with this material is a generic material.

"Quantity" data that has been extracted from the Revit geometry comes in the form of **Thickness(T), Volume(V), Area(A), Length(L), and the number of Pieces (Pcs)**.

This column displays if this row represents a family type instead of a material, i.e., family type is kept grouped.

If there are any **"warnings"** associated with the data point used, they will be displayed here.

"Category" refers to the Revit Category of the element from which this material is taken.

The material cost will be displayed in this column if it is included as a material parameter in the settings tab.

"Family" is the name of the family from which the material is taken in Revit.

"Type" is the name of the family type from which the material is taken in Revit.

"Structural Material" states whether the material has been defined as structural in the Edit Type > Structure > Edit > Layers section of the Revit parameters.

"Material" is the name of the material that was taken from Revit.

The **"User Classification"** will include values from the type or material parameter previously specified in the settings tab as containing the classification codes.

4.7. Results

The results tab follows a similar structure as the materials tab. The results are presented in rows by material in tonnes of CO2e and as a percentage share of the overall impacts.

4.7.1. Results > Top Buttons

"Refresh Results" updates the results following any changes in the materials tab.

"Intensity Quintile" will divide the kg CO2e/m3 results into quintiles (20% bands) and then display them as Low, Medium, Average, High, and Very high to give a quick overview of the material's impact intensity.

"Absolute Quintile" will take the results of the % of the total of tons CO2e, divide them into quintiles (20% bands), and then display them as Low, Medium, Average, High, and Very high to give a quick overview of the impact of the material.

4.7.2. Results > Table

The table section of the results tab lists the Revit materials as gotten from the Materials tab together with the mapped datapoints and the resulting impacts.

Impact Quintile take the results of the % of total of the tons CO2e and divide them into quintiles (20% bands) and then display them as; Low, Medium, Average, High, very high to give a quick overview of the materials impact.

The **"Mapped"** column includes the datapoint from the One Click LCA database mapped with this material.

"Warning" will show any potential warnings related to the mapped datapoint.

"Tons CO2e" shows the tons of embodied carbon caused by the material represented in each row.

"Intensity Quintile" will divide the kg CO2e/m3 results into quintiles (20% bands) and then display them as Low, Medium, Average, High, and Very high to give a quick overview of the material's impact intensity.

"% of total" is the % share of this material to the overall impacts of the building.

"Kg CO2e/m3" is the carbon intensity of the mapped material.

4.8. Chart

The chart tab contains a graph that displays the tons of CO2e of the most impactful materials.

The "**Y-axis**" displays the tons of embodied carbon (CO2e).
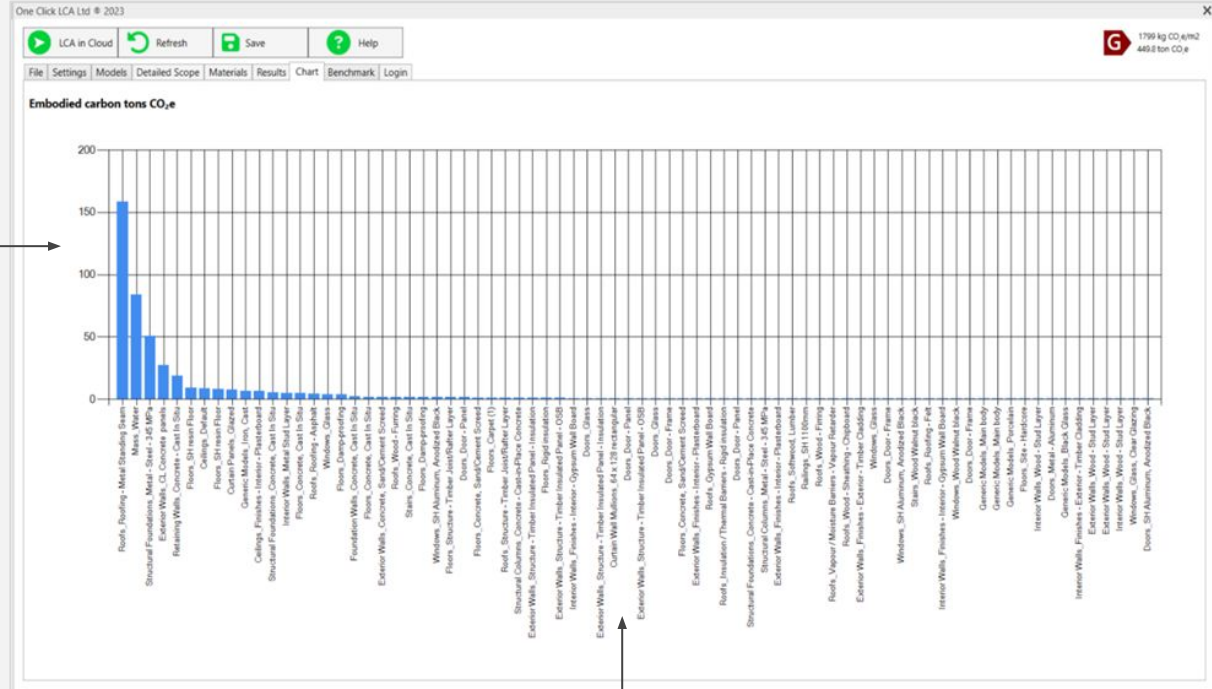
The "**X-axis**" displays the material name and orders the materials from the most impactful to the least.

4.9. Benchmark

The benchmark allows the user to benchmark the results against the One Click LCA 'Carbon Heroes Benchmark' feature. More information about Carbon Heroes can be found in this link.

By selecting the right **"Country,"** the results are benchmarked against the embodied carbon of buildings in that country.

The **"Building Type"** selects which building you want to compare against — i.e., office, apartment, one-dwelling building, etc.

"Gross Area (sqm)" is required to normalize the embodied carbo by m2 or ft2 so they can be compared with the carbon heroes benchmark.

"Embodied Carbon Benchmark" specifies which benchmark you wish to compare against.

The **"Benchmark Value"** is the score from A to G for the project's kg CO2e/m2 to the respective benchmarking criteria. More information about this can be found in this link.

One Click LCA Ltd ® 2023

| LCA in Cloud | Refresh | Save | Help | 1799 kg CO₂e/m2 449.8 ton CO₂e |

File | Settings | Models | Detailed Scope | Materials | Results | Chart | Benchmark | Login

Define benchmark parameters

Country	Finland
Building Type	Apartment buildings
Gross Area (sqm)	250.00	Set
Embodied Carbon Benchmark	CH Q1 2020 Finland

Embodied carbon benchmark

Cradle to grave (A1-A4, B4-B5, C1-C4)	kg CO₂e/m²
(180-259) A	
(259-337) B	303
(337-416) C	
(416-494) D	
(494-573) E	
(573-651) F	
(651-730) G	

Chapter 5
Modeling guide and considerations
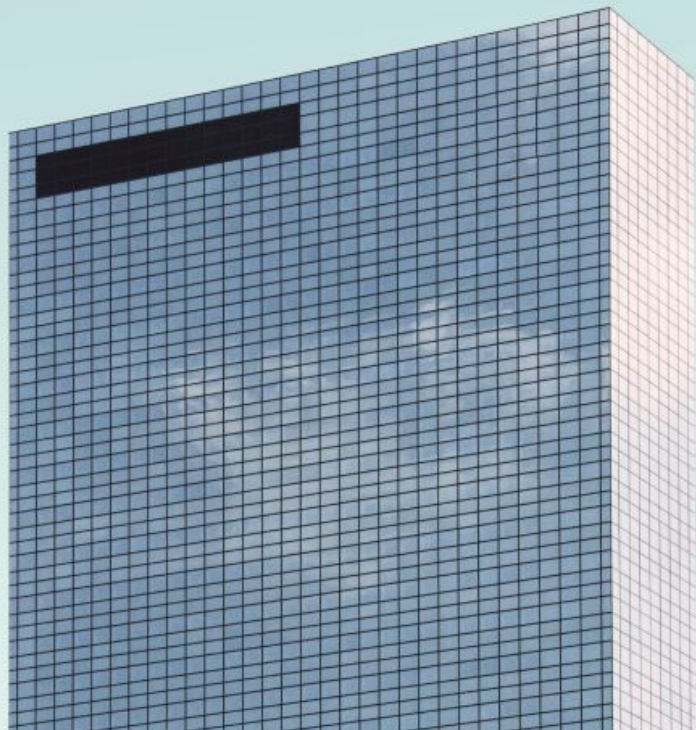
The One Click LCA plugin for Revit has been developed to work with multiple development levels, modeling approaches, and techniques. There are no best practice modeling techniques that fit all One Click LCA and Revit users; however, in this paragraph, some common challenges will be discussed when it comes to getting the correct type of data from Revit and how the Revit model could be built to facilitate the undertaking of Life Cycle Assessments after that with One Click LCA.

5.1. Material modeling in Revit

The One Click LCA plugin for Revit gets all material information directly from the Revit model based on the modeled geometries and the materials assigned to these geometries. In simple terms, if a material is not assigned to an object, the One Click LCA plugin will only consider the quantity of the object itself instead. Note: It is important to ensure that the materials are assigned to the various geometries that comprise the family and not just to a material parameter of the family. Figure 6 shows a pile family that is assigned a concrete material. However, the material will not be recognized if the actual geometry has not been assigned to this material as well. This is done at a family level and typically when the family is created. If this is not the case, the family must be edited and saved back to the Revit model. Figure 7 shows where the material must be assigned in the same example pile family. It can either be done at the material parameter of the selected geometry [1], or it can associated with the relevant family parameter shown in Figure 6[2].
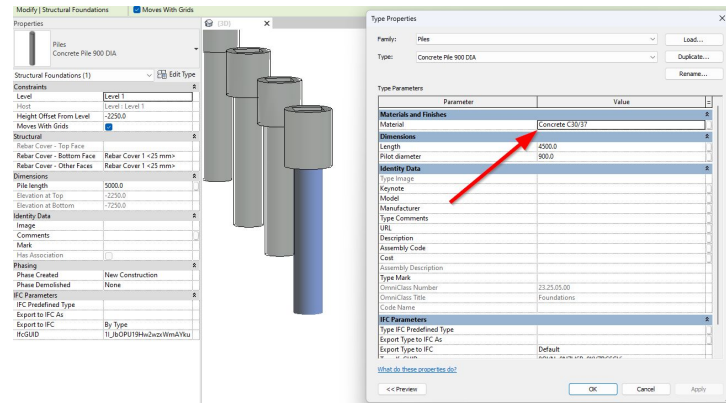
Figure 6: Pile family with concrete assigned in the family material parameter
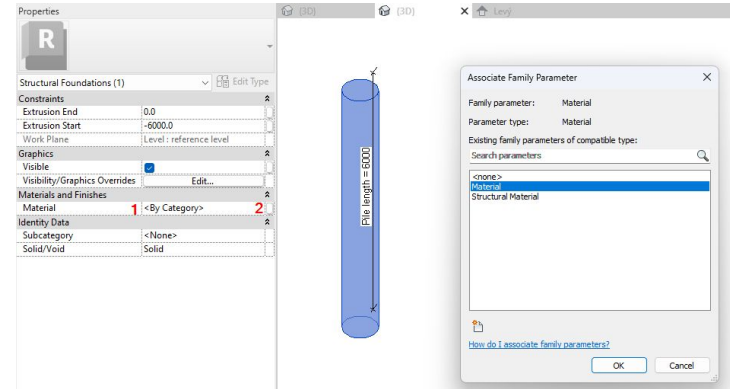
Figure 7: Material parameter of extrusion geometry of a pile family

For more information on applying materials to Revit families, refer to this article in Autodesk Help Centre.

5.2. Level of detail related recommendations

The first thing to consider when planning to use a Revit model for LCA is the level of detail of the material information stored in the Revit model. If materials have not been modeled properly, then the best possible data that can be used is family-type data. When material information is adequate, then material information must be used in the LCA. A more comprehensive description of the different Levels of Development and how to use BIM models in each case can be found in this article.

Depending on the level of development of the Revit model, the user will need to decide on the type of information to be used for the LCA. This will be done on the settings tab, as shown in Paragraph 6.3.1.

As shown in Figure 8, splitting family types into materials should be chosen in the settings tab for models where most elements have adequate material information.

Figure 8: Example of a wall structure with adequate material information

Figure 9: Example of a wall structure with inadequate material information. Family type information is more suitable in this case.

Figure 10: Typical hollow core slabs

For models where most elements do not have adequate information, as shown in Figure 9, keeping family types grouped should be selected in the settings tab.

It is important to note that the grouping mode selection in the settings tab is not binding, as the user can further define it by Revit category, family, or family type in the "detailed scope" tab. Different elements can come with different LOD in a Work in Progress model, allowing the user to use the best available data for each family type.

This flexibility in choosing the data type by category, family, and family type is beneficial for the following cases where elements will typically not be modeled accurately, even at more detailed design stages.

Some elements typically not modeled accurately enough to use their material quantities are listed below, with recommendations on how to include them in an LCA.

5.2.1. Hollow core slabs
Hollow core slabs are typically modelled as solid slabs in a Revit model. This results in the concrete quantity taken off Revit being overestimated.

Recommendations

A.   Use a generic datapoint for hollow core slabs. These generic One Click LCA datapoints represent typical slabs of this type and take into account the hollow core and the reinforcement. The volume to be used should be the element volume, which coincides with the concrete volume from Revit when the slab is modeled as a solid element.
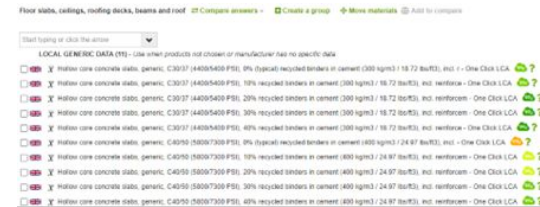
B.   Use a private construction. In this option, the user may use a private construction that they have created before or specifically for this particular case and map it with the area of the concrete material or the slab type.

More information about private constructions can be found in this article.

The information required to create a private construction for a hollow core slab is the reinforcement rate in kg per m2 of the slab, the concrete element volume ratio(m3 per m2 of the slab), and the quantity of any tendons used if the hollow core planks are prestressed.

C.   Adjust the concrete quantity. In this option, the user may adjust the volume of concrete taken off the Revit model. This may be done while still in the Revit plugin, as shown in Paragraph 6.6.3, or in Excel when data are downloaded in Excel for review and adjustment, as described in Paragraph 3.4.

5.2.2. Composite metal decks
A composite metal deck is a floor slab composed of a galvanized steel sheet and concrete. The steel sheet acts as a permanent formwork and the bottom side reinforcement of the slab.

Figure 11: Composite metal deck detail

Composite metal decks in Revit are modelled by using a concrete layer and a structural deck profile with zero thickness at the bottom. This will trim the concrete slab at the bottom in accordance with the applied profile and will show the slab's geometry accurately in sections created in Revit. The material quantities, however, are not adjusted accordingly as the steel sheet only has a visual effect in the Revit model. This means that a 1 m2 , 150mm thick composite metal deck modelled in Revit will give 0.15 m3 of concrete volume and no steel for the steel sheet.

Recommendations
A.   Use a private construction. Similarly, the user may create private constructions for different steel sheet types and slab thicknesses with hollow core slabs. You can find additional guidance on how to build private in this article.

The materials to be added in such a private construction include the concrete mix, the steel sheet, and the conventional reinforcement added to the top side of the deck. The steel sheet's product sheet is the best place to start for such a construction. If the manufacturer has created an EPD that covers that steel sheet, then that EPD may be used. Otherwise, the product sheet will provide the mass of the sheet per area unit of the deck. The product sheet will also typically provide the volume of concrete per area unit of the deck for various thicknesses. Finally, an assumption must be made for the top reinforcement mesh if a typical one is not mentioned in the product sheet.

B.   Adjust the material quantities. In this option, the concrete quantity taken from Revit must be adjusted. The LCA expert must calculate the adjustment factor based on the steel sheet's product sheet and the concrete volume per area unit mentioned in it. The steel sheet and reinforcement must be modeled separately.

5.2.3. WIndows
Material quantities of windows modeled in Revit will typically not be accurate enough to use in an LCA. A window element will consist of a minimum of two materials: the material of the frame, e.g., aluminium, PVC, or timber, and the glass of the window panes. As shown in Figure 12, the window frame is modeled as a solid element, while the two or three glass panes are modeled as a single glass panel with a thickness equal to the sum of the panes and spacers' thickness. For example, a 4/20/4 double-glazed window will be modeled as 28mm thick glass, highly overestimating the glass quantity taken from Revit.

Figure 12: 3D section of a window showing the frame and glazed panel being modelled as solid elements.

Recommendations

A.   Use window datapoints. In this option, the quanti
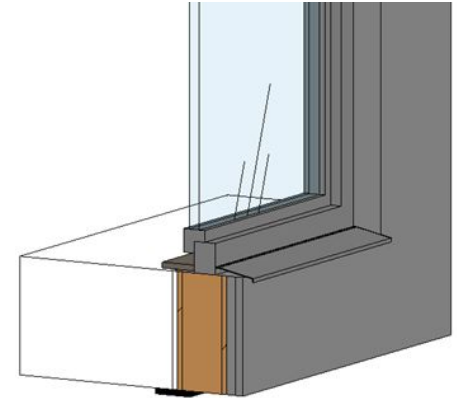used in the LCA is the window area instead of the
frame and glass quantity. The window area will
then be mapped with a datapoint representing
the entire window. Such datapoints can be EPDs
from manufacturers, generic datapoints, or even
private constructions created by the user.

The area of the window can be extracted in two
ways. The first is to keep all the family types unde
the Windows category grouped. This way, the us
will get the overall area of windows by family typ
The second way is, if the user has already split th
family types into materials, to ignore the materic
that represents the frame and only consider the
glass area. The glass area taken from Revit will be
slightly smaller than the window area.

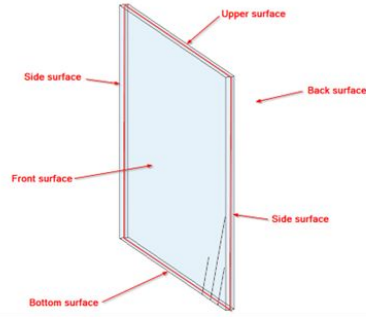Figure 13: Window glass panel geometry
in Revit

B.   Adjust material quantities. In this case the user selects to split the family types into materials.
Glass may be either mapped with a glass pane datapoint by using the glass area based or
with a generic glass material based on the volume which must be adjusted so it only
represents the volume of the glass panes only. The frame quantities must be adjusted as
well if the frame is made of PVC or Aluminium to allow for the hollow core of these elements.
The best way to calculate the adjustment factor to be applied is to quickly measure the area
of the frame material and the overall frame in a detailed section of the frame if this exists.
If this does not exist or for time efficiency this may be calculated for any PVC or Aluminium
frame that can be considered typical.

*Important note: The area of materials taken from window and door family types is halved
before being reported in the One Click LCA plugin. This is because the area extracted from
Revit represents the entire solid's surface area, not the projected area. As the only useful area
in the case of windows, glass panes, and door panels is the projected area, the area gotten
from Revit is divided by two to approximate the projected area. The value calculated is not
accurate but very close to the actual area since the area of the upper, lower, and side
surfaces is negligible compared to the front and back surface areas, as visualized in Figure 13.*

5.2.4. Doors

Similar to windows, doors will not be modeled accurately in Revit in most cases. The door frames will be
modeled as solid elements, even hollow ones. The same applies to the door panels. In many cases, door
panels may consist of more than one material, for example, steel sheets and insulation for industrial
doors. As doors often will not contain this information, it is better to use the door area instead and map it
with a data point representing an entire door. Many door EPDs and generic datapoints in the One Click
LCA database represent different types of doors with different frames and materials in the door panel. If
no suitable data point can be found for a door type, then creating a private construction may be the
best option.

*Note: When undertaking a building LCA, it is important to consider the impact of various elements on the
overall results. This helps the LCA practitioner assess the value added to the exercise by dedicating time
to model certain elements more accurately. Doors, especially in new construction, will typically
contribute a very small part, which means that trying to model them accurately, if not modeled as such
already in Revit, will not add any value to the LCA exercise.*

5.2.5. Curtain Wall mullions

Curtain Walls in Revit are "parent" objects for hosting objects like curtain wall panels, curtain wall
mullions, windows, doors, and regular walls. Curtain wall mullions similar to window frames are typically
modeled with simplified solid geometries, as shown in Figure 14. This means that the volume of the
curtain wall mullion material obtained from the Revit model will not be accurate unless the mullion is
solid.

Recommendations

A.   Use the length of mullions and map them
with suitable datapoints. Such datapoints
can be either EPDs and generic materials
for curtain wall mullions that accept "m"
or "ft" as units or private constructions
created by the user that represent the
exact geometry of the mullion. Private
constructions may be more suitable when
mullions are modelled with more
complicated geometries.

B.   Adjust the volume by applying a multiplier
in the Revit plugin or later in the Cloud
version of the tool. The multiplier may be
defined based on detailed sections of the
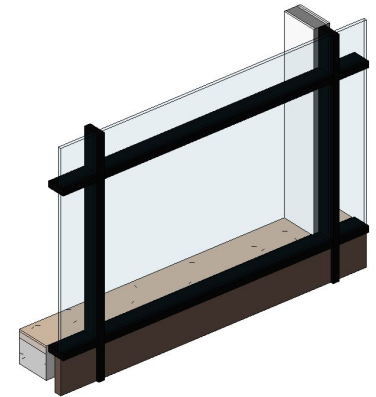mullion if available.

Figure 14: Curtain wall mullions modelled
with solid geometries

5.3. Classification considerations

The One Click LCA plugin for Revit automatically translates the various elements' Revit category into the One Click LCA Class. Once the materials are imported or saved in the One Click LCA cloud version, these classes are also translated into the local classification system if used in the selected LCA tool in One Click LCA. The classification of materials allows for the breakdown of results by classification code, which local standards, certification schemes, or policies may require.

For example, some LCA methodologies might only require the overall impacts of the building while others, like the BREEAM UK Mat 01, require reporting at a more detailed classification level, e.g., distinguishing walls into internal and external ones and above or below ground.

For cases where the results must be reported at a detailed level, the modeling in Revit may be adjusted to facilitate the material take-off. Examples of modeling considerations related to classification are listed below.

A. Definition of internal and external walls. The function of the wall family types can be defined in Revit by the "function" family parameter shown in Figure 15. This parameter is being read by the Once Click LCA plugin, and based on its value, it will classify the wall materials as external or internal walls.

B. Internal and external curtain wall panels and mullions. Similar to the wall families, the curtain wall panel and mullion types used in internal and external curtain walls must be different if the results must be reported separately for internal and external walls. This applies even when the function is defined in the curtain wall type itself because the materials are taken from the panels, mullions, and other objects hosted in the curtain wall.

C. Internal and external wall windows and doors. Similar to walls and curtain wall mullions and panels, window and door families must be different when used internally or externally if the results are to be reported separately.

D. Roof, upper floor, ground floor, and foundation slabs. When impacts from slabs at different levels are to be reported separately, these objects must be modeled using separate family types as well. For best practice, use foundation slabs for the lowest floor slab, floor slabs for the upper floors, and roof family types for the roofs. Suppose floor families are preferred for all levels. Different family types will allow the LCA assessor to distinguish which material quantities are from the lowest floor, upper floors, and roofs.

E. Ground beams and structural beams. When ground beams are modeled in Revit, these must be modeled as structural foundations, not structural framing. This is for these elements to be correctly classified later as foundation and their impacts to count in the foundation impacts instead of the structural frame ones.
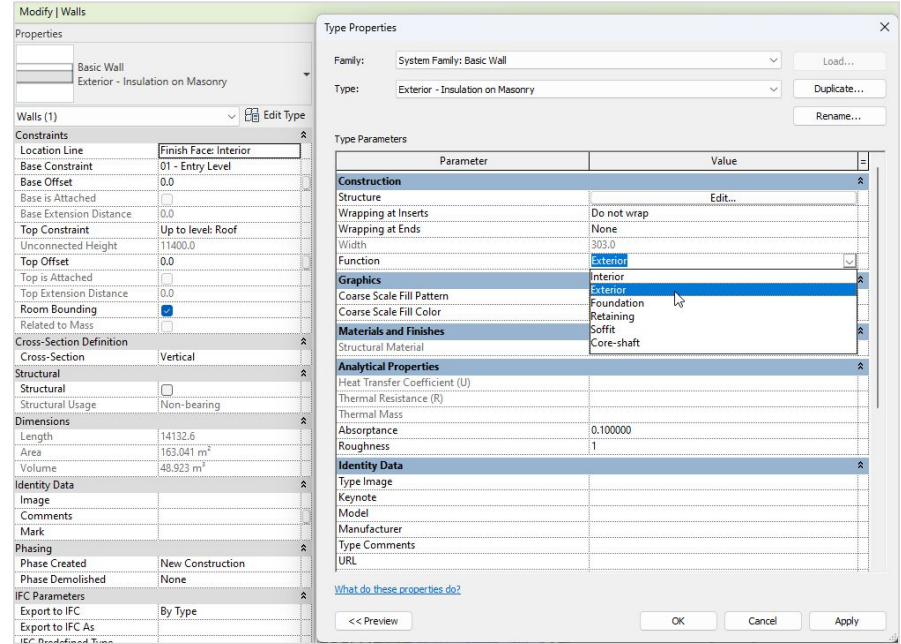
Figure 15: Function parameter of wall family types

When a classification system is applied within the Revit model, this information can be taken directly by the family type parameter in which the information is being stored. The modeling guidance given above may still be relevant, but in this case, only for resulting in a tidier LCA model rather than for the results breakdown, as this will happen based on the actual classification taken from the Revit model. To extract the classification from a family type parameter, you must ensure that this parameter is selected in the "Export additional parameters" tab of the plugin and specified as the parameter containing the classification in the settings tab, as shown in Figure 16.
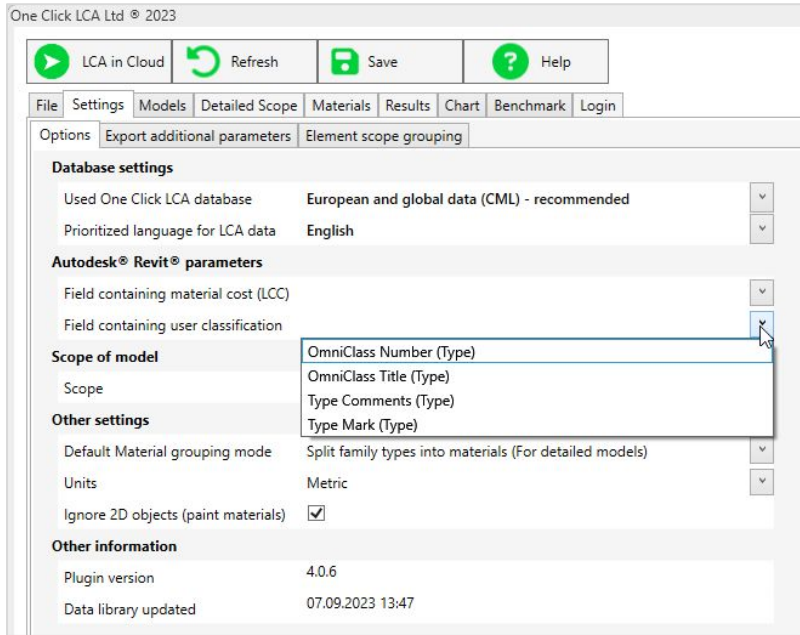
Figure 16: Selection of classification parameter in the settings tab

5.4. System boundary related considerations

When using a BIM model for a Life Cycle Assessment (LCA), it's important to check:

A. If materials and elements are not modeled in the BIM model but should be included in the LCA.

B. If there are materials modeled in the BIM model that are not in the LCA scope and how these will be excluded from the assessment.

C. If material build-ups in the BIM model is accurate enough or whether the assessment should be based on element quantities instead of materials.

D. If there are any duplicate materials or elements either in the same BIM model or in multiple models that are to be used in the LCA.

5.4.1. Missing Materials

Various materials may be missing from a Revit model because they are either too detailed for the current design stage or are easier to draw in 2D drawings. Such materials can be reinforcements, wall and floor finishes, railings, wall studs, and steel framing for façade systems and ceilings.

The assessor must become aware of any such materials and ensure they are included in the LCA separately. In most cases, when the designer undertakes the assessment, such elements should be known and taken care of. When a different LCA consultant undertakes the assessment, a quick review must be undertaken before the material takeoff to identify any missing materials.

5.4.2. Materials that are out of scope

A Revit model typically contains elements and materials irrelevant to a Building LCA. Before the assessment in Revit, such elements must be identified and excluded from the assessment scope. This is done either by hiding out-of-scope materials and choosing the "Active view" option in the "models" tab, as shown in Figure 17, or by filtering them out based on their workset, phase, and design option in the "Detailed Configuration" option of the "Models" tab.
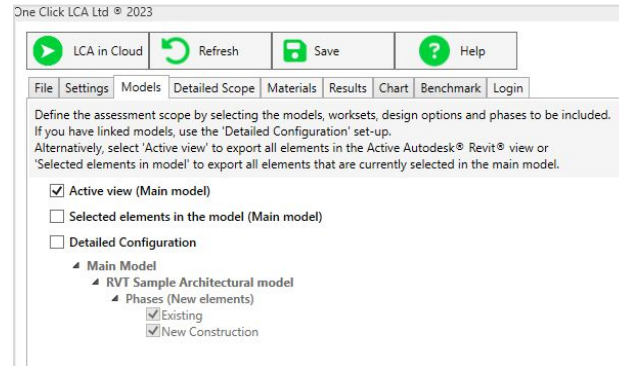
Figure 17: Active view option in "Models tab"

Further filtering of out-of-scope materials can be done in the "Detailed scope" tab based on the elements' Revit category, family, and family type, as shown in Figure 18.
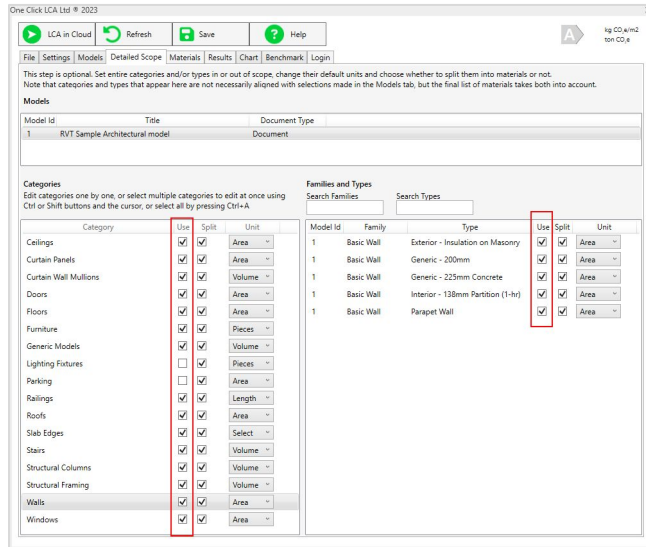
Figure 18: Filtering out of scope elements based on the Revit category, family and family type

5.4.3. Accuracy of material information within the BIM elements

Elements modeled in Revit may not be modeled in an adequate level of detail for a detailed LCA, especially at early design stages. Examples include walls and floors with no materials assigned, material layers with the wrong thickness, e.g., too thick metal sheets, and layers completely missing, e.g., metal studs, insulation membranes, etc. A review must be made before the assessment to assess the level of detail of the Revit model and decide on the default type of material information to be taken from the Revit model, as shown in Figure 19. Later, this setting can also be changed for entire Revit Categories, Families, and Family types at the "Detailed scope" tab.

A quick assessment can be easily made by spot-checking some wall and floor family types, the layers they consist of, and the feasibility of these layers' thickness.
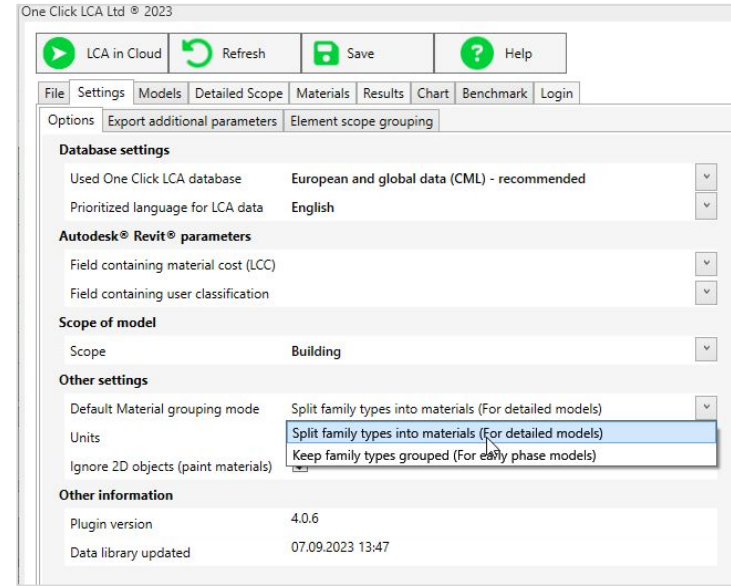
Figure 19: Default material grouping mode

When family types are not split into materials, they must be mapped with a datapoint representing the entire assembly using the publicly available One Click LCA constructions or previously made private constructions. More information about constructions can be found here.

5.4.4 Duplicates

Many elements may sometimes be duplicated either accidentally or because they are modeled in parallel in more than one Revit model by different design team members. For example, an architect may model the structural columns in the architectural model in parallel with the structural engineer in the structural model.

To quickly check for duplicates, the assessor can apply a section box in the 3D view and adjust its size at various times to reach elements in different building parts. By selecting various elements, it is possible to identify if there are any duplicate elements in the same position. As shown in Figure 20, duplicated elements are not highlighted in the same way as regular elements.

The assessor may also check the architectural model to see if the structural slabs and columns are modeled. If this is the case and the structural model already contains the same elements, they can be filtered out by hiding them and choosing "active view" in the model's tab or in the "detailed scope" based on their category.

5.5. Objects imported from other modelling tools

Complicated geometries in a Revit model may sometimes be imported from other modeling tools either directly in the Revit model or within a custom family created in Revit. Such elements that were not created natively in Revit will typically not contain the material information required for an LCA. A material take off must be done manually for such elements and added separately in the assessment.

Figure 20: Duplicated floor element is not highlighted when selected

Chapter 6
Performance optimization with Revit and One Click LCA

An LCA can be performed at any design stage. However, the embodied carbon reduction potential becomes lower as the design progresses, as visualized in Figure 21.

Figure 21: Decarbonization potential reduces as design progresses

BIM tools used at various design stages can automate the material takeoff process and provide instant LCA results. Autodesk Revit can be used from the early concept design stage up to the construction stage, and dif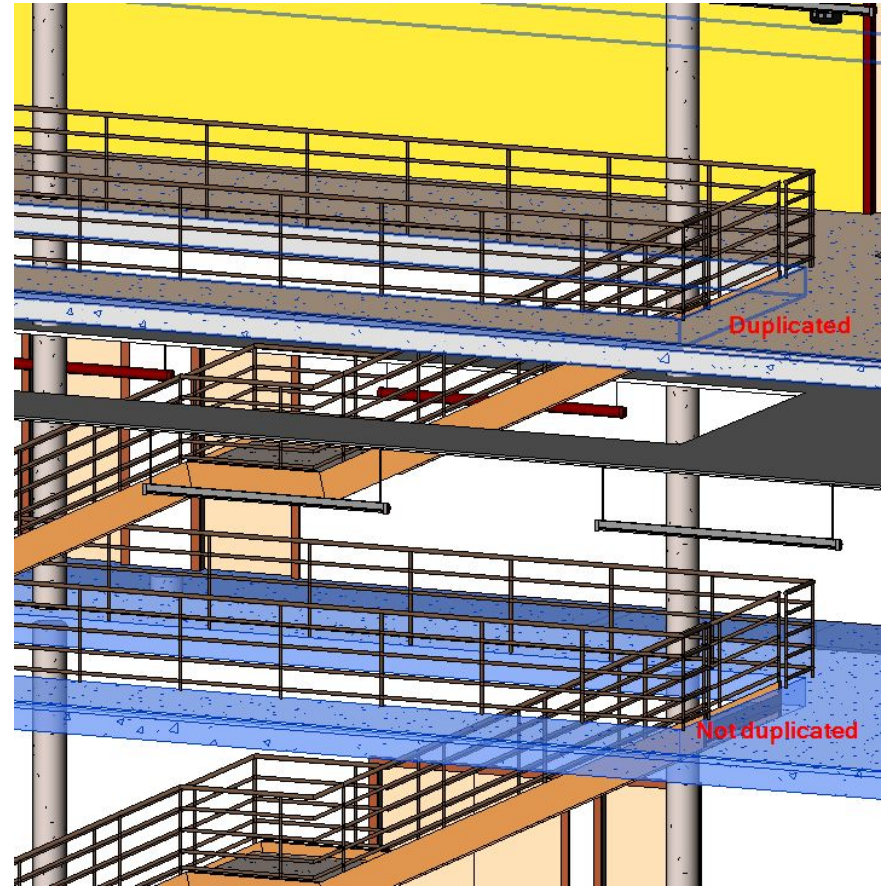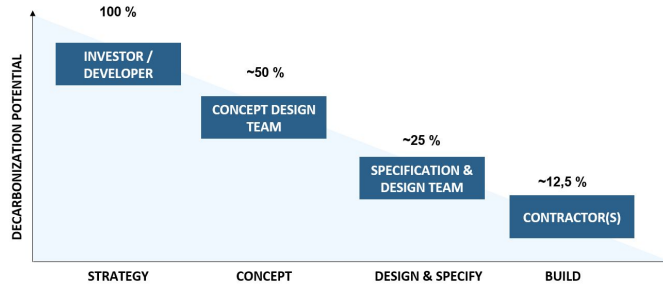ferent levels of detail are used in the model. As such, it can also be used as the main data source for the Building LCA during these design stages. The type of data acquired will depend on the design stage and level of detail, as mentioned in Paragraph 7.2.
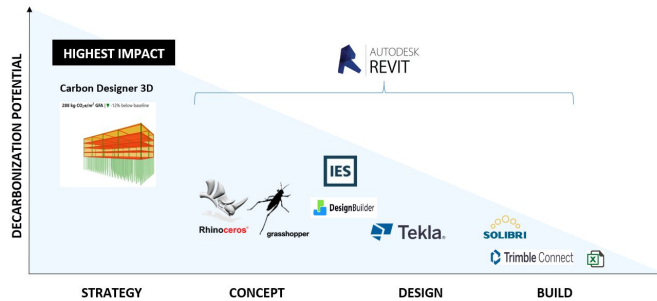
Figure 22: BIM tools used at different design stages

6.1. Early-stage assessments with Revit

At early design stages, the Revit model will typically be less accurate regarding material build-ups. Elements like walls and floors may only be modeled to represent the geometry of the building initially, and hence, no proper material may have been assigned. Even once the form of the building has been concluded, elements like walls and floors may only be defined at an element level, i.e., designers define the type of the wall or floor but not the exact build-up, which will happen later..

At such early stages, the assessor or BIM modeler may use the elemental quantities and map them with One Click LCA constructions, while making several assumptions on the type of elements. This allows the design team, mainly the architects, to optimize the geometry of the building in terms of embodied carbon at the earliest stages.

6.2. Hotspot analysis

Regardless of the design stage in which the LCA was conducted, LCA results should be analyzed to identify the most contributing materials and elements and consequently embodied carbon reduction strategies. Using the One Click LCA plugin for Revit, the assessor can visualize the results directly in the Revit 3D view, as shown in Figure 23.
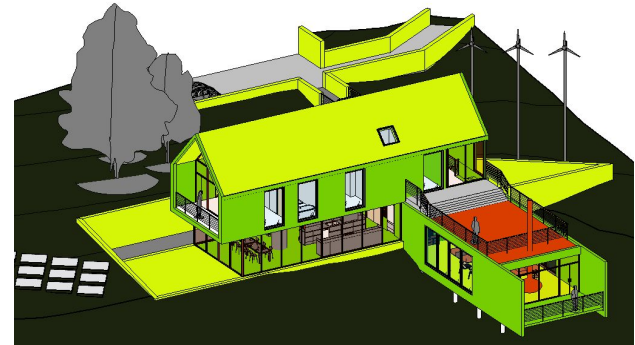
Figure 23: Impacts visualization in Revit

In addition the assessor can use the various graphs generated on the cloud once the assessment has been uploaded. The assessor can continue working and getting updated results in Revit and at the same time update the results in the cloud and benefit from the numerous detailed graphs and charts that are available there. Some of the available charts are shown in Figure 24, Figure 25, Figure 26 and Figure 27.

Figure 24: Pie charts with impacts per module, element category and material type
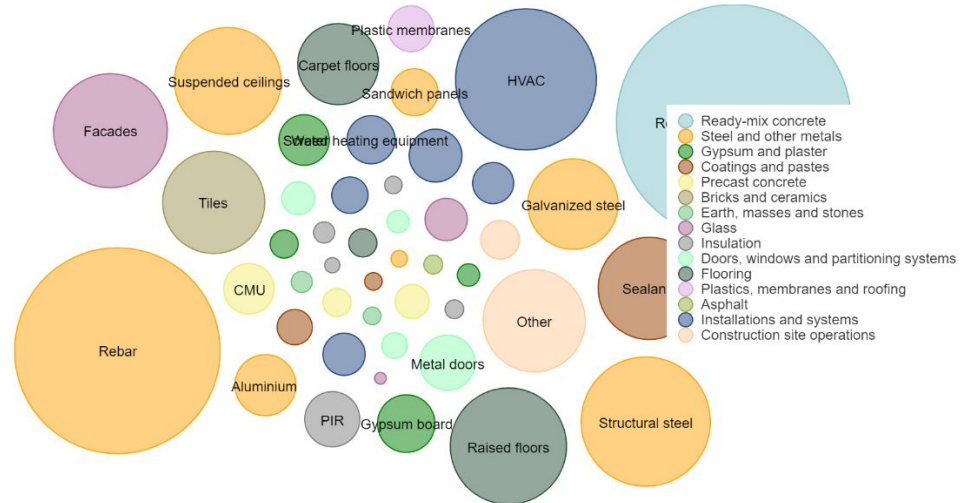
Figure 25: Bubble chart that visualizes the impact contribution of materials
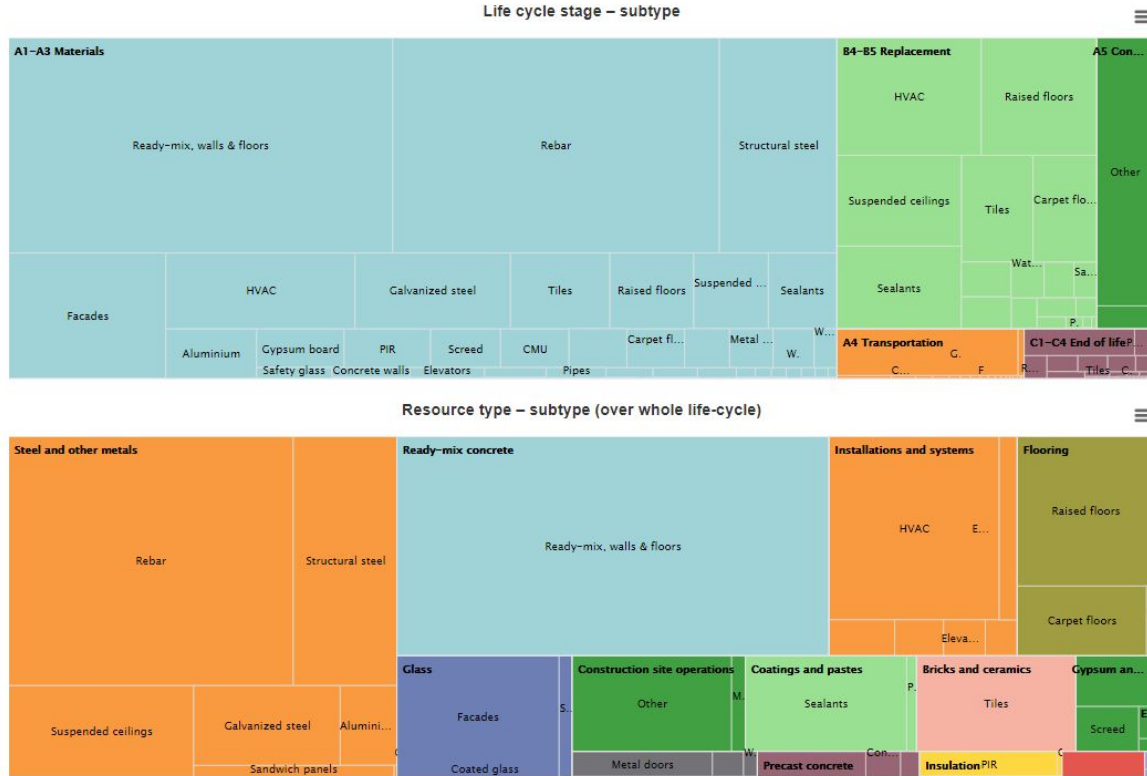
Figure 26: Treemap chart showing impacts per module and material type
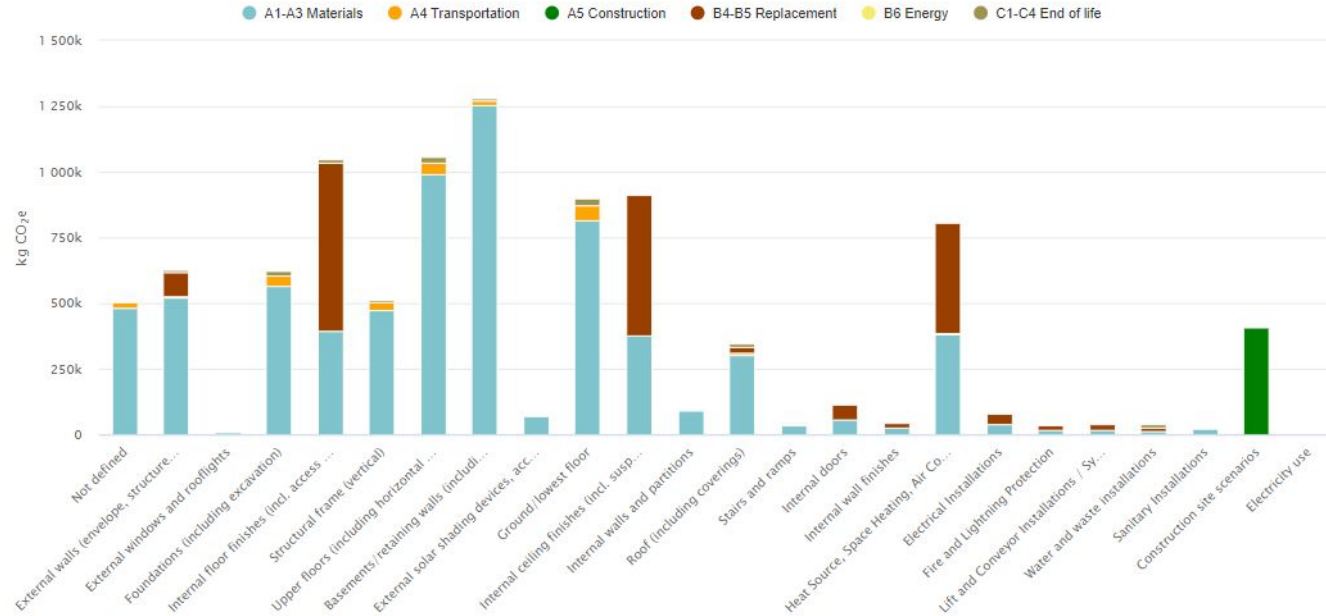
Figure 27: Bar chart showing impacts element category

Once the most contributing elements and materials have been identified, the assessor must take action to reduce the environmental impacts. When finding lower-carbon products, the assessor can use green material benchmarking or advanced comparison features.

With the green material benchmarking feature, the assessor can use any selected material and get a list of lower embodied carbon alternative products available in their country, nearby countries, or across the world, as shown in Figure 28 and Figure 29.

Figure 28: Material benchmarking feature
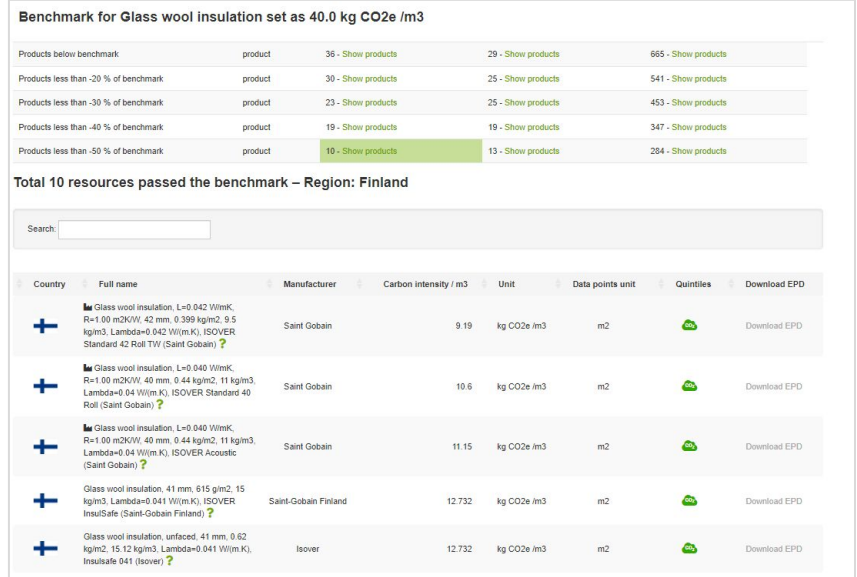
Figure 29: List of products with at least 50% lower embodied carbon

With the comparison feature, the assessor can select all the products being considered for specification and automatically produce a graph where products are compared on an embodied carbon basis, as shown in Figure 30.

Figure 30: Advanced comparison feature

6.3. Performance monitoring

Architects and engineers who assess their own Revit models can monitor the embodied carbon of their designs throughout the design process. Although a standalone assessment might require a considerable time investment, this is not the case when the assessment is repeated periodically using One Click LCA and its integration for Revit. This is because all the EPDs and generic materials assigned to the Revit materials and family types will be remembered, and hence, any future iteration will only require a few minutes to undertake.
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In this case, assessors can undertake a first assessment at an early stage when their Revit model is set up to an adequate level, e.g., the form of the entire building is defined, and then keep making iterations when design changes and material changes occur. The results can be generated automatically by going to the Results page and clicking "Update results." All Revit materials that were mapped previously will be automatically mapped again before the results are calculated. Any Revit materials added to the Revit model after the last iteration will be mapped if they have been mapped previously in a different assessment by the assessor or any other One Click LCA user. If the new Revit materials have never been mapped in the past, they will remain unmapped, and the assessor will need to map them manually before the results are updated again.

Embodied carbon monitoring with One Click LCA can be set up at an organizational level by importing all Revit materials in a design at One Click LCA and mapping them with the preferred EPDs or generic materials. This can be done either by using a sample Revit model that contains all materials and/or all family types of the organization's Revit template or by importing these materials and family type names via Excel using the One Click LCA Excel template.

Chapter 7
LCA in Cloud or Revit?

The One Click LCA plugin for Revit allows the user to conduct an LCA directly within the Revit environment or simply export the material information and undertake the assessment in the cloud version of One Click LCA. Choosing the option to proceed with depends on the following factors:

1. Confidence in the data exported from the Revit model
2. Expected level of automated mapping of materials
3. Personal preference

Data confidence

When the assessor is not familiar with the Revit model and is not confident with how any data gaps (missing elements or materials) can be addressed, it is advisable to proceed with "LCA in Cloud" (either directly or once the scope has been set up." This will allow us to either import the materials without being mapped or to download them in an Excel sheet for further review and analysis, as described in Paragraph 3.4. This will provide the assessor the necessary time to review other design documentation, recognize the exported materials, and build-up any exported elements.

Automated mappings

When Revit materials are mapped with EPDs and other generic material datapoints, it is easier to undertake the LCA directly in Revit and get instant results as part of your embodied carbon monitoring process, as described in Paragraph 8.3. This will typically be the case for assessors who have previously used Revit models from the same organization to undertake LCAs, for example, Architects or Structural engineers who assess their own Revit models or LCA consultants who regularly assess Revit models from the same organization.

Suppose it is the first time that a particular organization provides a Revit model. In that case, the assessor may proceed with "LCA in Cloud" or "LCA in Revit" based on their preference, as described in the following paragraph.

Personal preference

In both the "LCA in Revit" and "LCA in Cloud" options, the plugin reads the material quantities from elements that fall within the assessment scope, which must then be mapped with EPDs and generic material datapoints to calculate the results. The process of defining the scope of the assessment is the same and is done at the "Models" and "Detailed Scope" of the "LCA in Revit" option unless the assessor selects to export all material quantities directly by clicking "LCA in Cloud" in the One Click LCA ribbon without first setting the scope in the "LCA in Revit" option.

Following the material take-off, the main difference is in the user interface when mapping the Revit materials with EPDs and generic material datapoints and when reviewing the results. Consultants who regularly work on the cloud version of One Click LCA may prefer to map the materials and review the results in the cloud. In contrast, professionals more familiar with the Revit user interface might choose to complete the assessment in Revit.

The "LCA in Revit" option allows the visualization of the results directly in a 3D view in Revit. At the same time, with the "LCA in Cloud," the assessor has access to more graphs to enable a hotspot analysis. It is noted, however, that when "LCA in Revit" is selected, the assessor can still get access to the results in the Cloud by importing the LCA undertaken in Revit to the Cloud, as mentioned in Paragraph 8.2.

Chapter 8
Frequently asked questions

1. How should I assess windows and doors?

Windows and doors are best assessed by keeping their family types grouped. This means you will get the overall projected window/door area instead of quantities of individual materials, e.g., glass, aluminum, PVC, etc. The window/door area must then be mapped with an EPD or generic data point that represents an entire window/door, including the panel and frame. This is a better option because the frames in windows and doors are often modeled as solid elements ignoring the hollow part of the profile is made of aluminium or PVC, and also because the glazing is typically modeled as a single, considerably thicker glass pane instead of two or three thinner ones for double and triple glazed windows respectively. More information on this topic can be found in Paragraphs 7.2.3 and 7.2.4.

2. How should I assess hollow core slabs?

Hollow core slabs are best included in an LCA by using their area instead of the individual material quantities. This area must then be mapped with an assembly, EPD, or generic data point that represents the entire profile of this slab, including the concrete, the hollow cores, and the reinforcement. More information on this topic can be found in Paragraph 7.2.1.

3. How should I assess composite metal decks?

Composite metal decks are best included in an LCA by using their area instead of the individual material quantities. This area must then be mapped with an assembly, EPD, or generic data point that represents the entire profile of this slab, including the concrete, the steel deck, and the additional reinforcement. More information on this topic can be found in Paragraph 7.2.2.

4. How should I assess curtain walls?

Curtain walls are typically best included by using the area of the curtain wall panels and the length of the curtain wall mullions. In both cases, it might be best to map these two quantities with custom assemblies that accurately represent the panels and mullions. This is because, in many cases, curtain wall panels are modeled at a lower level of detail in Revit models, while curtain wall mullions might be modeled as solid elements, ignoring the hollow core of their profile, and might also include materials and elements that form part of the panel in reality. More information on this topic can be found in Paragraph 7.2.5.

5. How should I use my Revit model for LCA if it is not detailed enough?

The level of detail of your Revit model should not prevent you from using it for LCA. Revit models with a lower level of detail can still be used by extracting the family type quantities instead of material quantities. These quantities can then be mapped with One Click LCA assemblies, e.g., the area of the external wall from Revit can be mapped with an external brick slip wall assembly in One Click LCA. This way, although it is probably too early in the design process to know the exact materials and thickness of these materials, we can still take them into account by using an average/typical buildup of that wall type. More information can be found in Paragraph 7.2.

6. How can I set up my LCA scope?

The scope of your LCA regarding the materials and elements that should be included in the assessment can be defined with the following three steps.

A. Define the scope at the settings tab by selecting any of the "Building," "Mechanical," "Electrical," "Plumbing," and "External Areas." This way, the plugin will exclude or include materials and elements from entire Revit categories based on whether they are classified as Building, Mechanical, Electrical, or External Areas categories. The user can also change default classifications.

B. Models tab: At this point, the user can refine the scope by selecting whether materials and elements should be included based on the linked model they are included in, the workset, the phase, the design option, whether they are selected in the Revit model or not and whether they are visible in the active Revit view.

C. Detailed Scope tab: At this point, the user can refine the scope further by selecting Revit categories, families, and family types that currently fall within the scope based on the previous settings but should be excluded.

More information on this topic can be found in Paragraphs 6.3, 6.4, and 6.5.

7. Are materials from parts considered by the One Click LCA plugin?

Yes, materials from parts are extracted in the same way as if the family type was not split into parts. However, any part removals and other geometrical changes in parts will not be considered as these only happen visually in Revit, and hence, the reported material quantities remain the same.

8. Are materials from groups considered by the One Click LCA plugin?

Yes, materials from grouped elements are reported similarly to any other element, i.e., segregated by family type.

9. Are materials from nested families considered by the One Click LCA plugin?

Yes, the material quantities from nested families are reported under the name of the nested family, not the parent family. For example, if a pile family is nested in a pile cap family, the concrete quantity of the piles will be reported under the pile family type's name, while the concrete of the pile cap will be reported under the pile cap family type's name.

10. How should I model Curtain Walls in Revit to get their materials quantities for LCA?

To get the best results regarding material takeoff, curtain wall modeling must align as much as possible with the Revit definitions of curtain wall panels and mullions. In practice, this means that curtain wall panel types are better to include actual curtain wall panels only. If a Revit curtain wall panel is modeled in a way that it includes other elements as well, like mullions, shading devices, windows, doors, etc, then the only quantity type for each reported material that can be used is volume, which in some cases might not be the best option. If curtain wall panels only include curtain wall panel types, and if other elements are modeled using the 14 appropriate Revit categories, then the material quantity types extracted can differ depending on the element and better facilitate mapping with EPDs and other datapoints.

11. Why can I not split a family type into materials?

This can be because this family type has not been assigned any material, and there is also no default material assigned for this category in the "Object styles" in the "Manage" tab in Revit.

12. How can I use a specific material database only for compliance with regulations?

To ensure you only use material datapoints from a specific compliance database such as the Swedish Boverket database, the Finnish co2data database, or BRE's IMPACT database, you will need to choose the database from the settings tab in the One Click LCA plugin for Revit.

13. My mappings from the One Click LCA plugin for Revit are lost when I send them to One Click LCA. Why?

This can happen if the datapoints mapped to the Revit materials do not meet the requirements set by the LCA methodology that the selected tool in the One Click LCA cloud application complies with. For example, a mapping with a CML-characterized EPD will be lost if the assessment is sent to a project that only uses the "LEED for North America" tool because that tool can only accept Traci-characterized EPDs.

14. How can I add materials that are not modeled in my Revit model?

Currently, materials that are not modeled in the Revit model can be added either in the online version of the tool once the data is sent there to be stored or in the Excel file if the user chooses to follow the process described in Paragraph 3.4.

15. Why does the plugin not extract materials from linked models?

This can happen if the "Active view" option is selected in the "Models" tab. Materials from linked models can only be extracted with the "Detailed Configuration" option.

16. Why does the plugin not isolate a material I select in the Materials or Results tab?

This can happen if the material belongs to a linked model instead of the active Revit model and is limited by the lack of such native functionality in Revit.

17. Why does the plugin not extract the area of some window and door types when these are not split into materials?

To enable the window and door area calculation, Revit relies on the dimensions of the door/window opening (width and height). Although these parameters are integral to the calculation, they are typically not directly visible to users. They are built-in parameters within Revit's API, which are then mapped to visible parameters accessible to users in the window/door family. If the window/door type parameters are not linked with the right API parameters for width and height, the window/door area might not be accurate or calculated. If the area of a window/door type is not calculated properly, please make sure that the width and height parameters are type parameters instead of instance parameters. If the issue persists, rebuilding the window/door type using the latest Revit family templates for windows and doors is advised.

18. Why can I not split a family type into materials if I have selected the "Detailed configuration" option but can do so with the "Active view" option at the "models" tab?

This can happen sometimes, especially with curtain wall panels, if some panels of the same panel type lose their material information. This can happen for various reasons, one of which could be that two curtain wall gridlines are placed so close to each other that the panel's geometry in between is not recognized. If the "active view" is selected, these problematic elements are not visible and hence ignored by the plugin. In the case of the "Detailed configuration," they are recognized, but with no material information, and hence, the plugin will only allow the type quantities to be extracted.

19. Nothing happens when I click at the "LCA in Autodesk Revit" button in the One Click LCA ribbon. Why?

The plugin may be attached to the main window of Revit. Locate it, click on it and drag it to detach it from Revit.
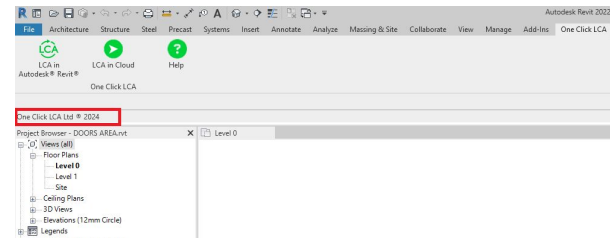
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