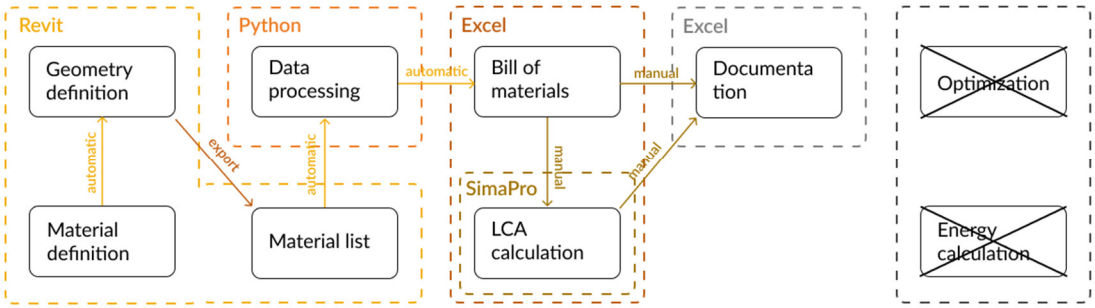
Workflow Description AT

The Austrian Workflow is so far completely manual, which offers detailed insight into the generated Bill of Quantities and will therefore act as a reference workflow in this study.

The list of materials, sorted by building family and type, is exported directly from the Revit model and is further processed with a python script to fit into the workflow template provided. As the BIM-model did not have information on the exchange rates for different building parts, those were added manually according to DIN 276. The excel sheet is then used to summarise the amounts per material/transportation distances per vehicle type for the supported modules.

The workflow allows the calculation of the emissions of the production and construction phase, the use phase except for B5 and the End-of-Life.

The full Life Cycle Inventory is then entered into SimaPro using the respective processes. The results can easily be exported to excel and further analysed with various tools.

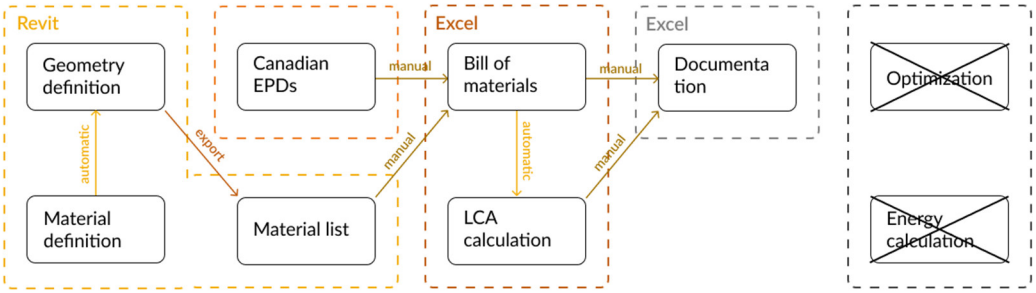


Workflow Description CA

The Canadian workflow is based on generic Canadian EPDs.

The list of materials was exported from the Revit model and then sorted in an excel sheet to analyse the materials used among different building elements. The materials were then quantified per building element and matched with the corresponding material EPD. This allowed the quantification of the environmental impacts per building element for the modules A1-A3 as the workflow only supports the calculation of the impacts of the production phase. For the calculation of these modules, no data had to be added.

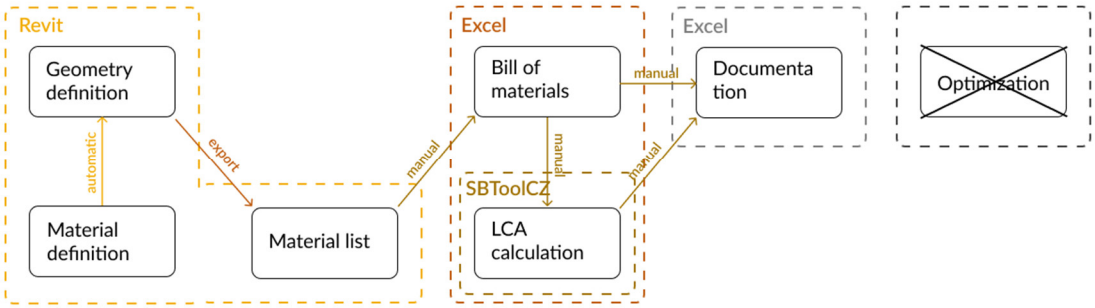
The Canadian experts suggested adding more information to high impact materials like concrete to achieve a more accurate result.



Workflow Description CZ

The model was edited prior to exporting the material list by grouping according to the SBToolCZ methodology by adding extra information to each element. Any element or material property was not edited. The workflow also supports the use of non-proprietary files or open standards, which means, it is open-BIM ready.
The Czech experts did not use the provided information on composite materials to calculate the mass per material. The generated Bill of Quantities cannot be viewed in detail.

To calculate the environmental impacts the workflow uses the SBToolCZ combined with National LCA Methodology.
The workflow supports the calculation of impacts from the production phase, the replacement in the use phase and the operational energy use.

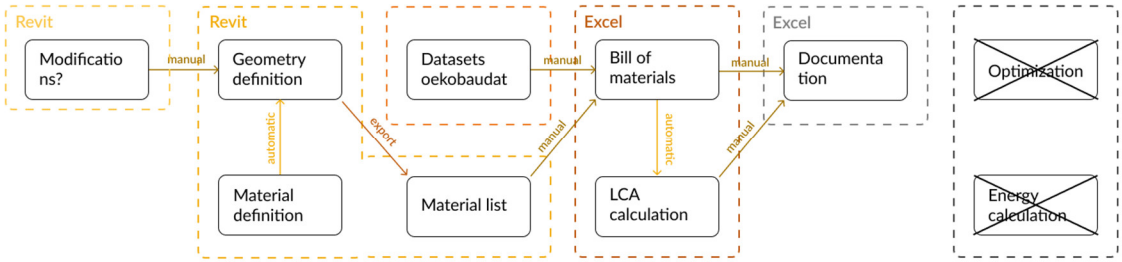


Workflow Description DE

The German experts modified the model before exporting the list of materials to excel. They had to edit the material names, group or modify the information stored in the model and more. The workflow also supports the use of IFC.

First, the experts mapped the Austrian Building element classification according to ÖNORM B1801-1 to the coding of German DIN 276 classification. Then they matched the building elements from the model to the aforementioned categories and to the categories according to the Standard ASTM E1557-97 Classification Of Building Elements and omitted the building elements that did not fit these categories in their opinion. The remaining building elements were then split in their respective materials which resulted in a total Bill of Quantities. The materials were assigned a dataset from

oekobaudat to calculate the environmental impacts.



Workflow Description ES

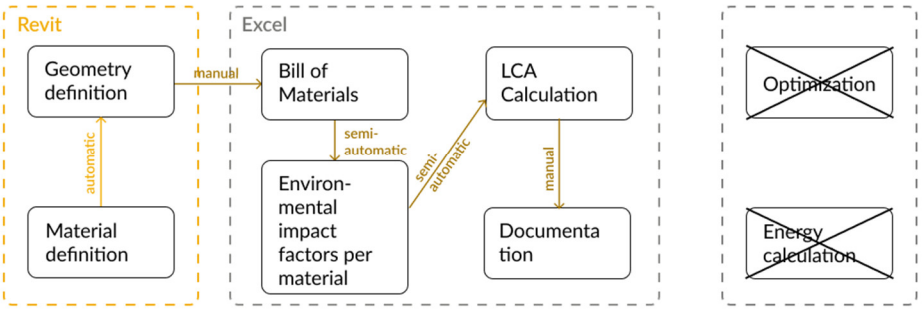
The workflow adds the environmental impact factors per material or average of the combination of materials directly to the model using the Revit Dynamo plug-in. Adding additional information, such as a non 0 value for the thickness of the membrane layers materials, was done via Dynamo script too.

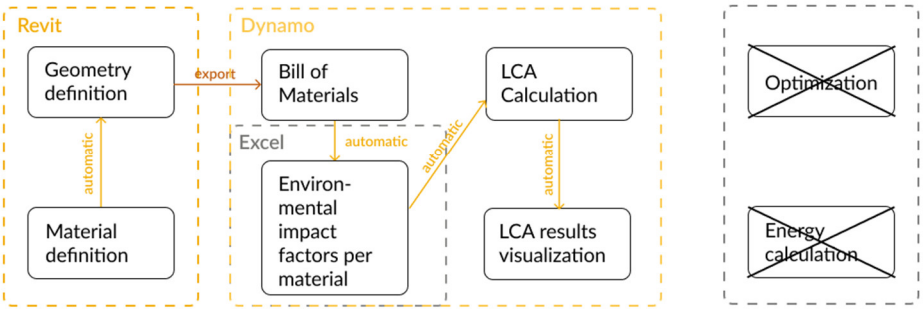
It is open-BIM ready as it supports the use of IFC.

Although the workflow could operate fully automatic within Revit, the Spanish experts had to restructure the data in the provided BIM model to fit with their Dynamo script and again to fill the documentation template.

The approach was based on extracting the volume values for the building elements, creating the new parameters for the environmental impacts to be included in the building elements, and then assigning to the created parameters the data about the environmental impacts. Finally, the calculation of the impact is concluded by multiplying the volumes with the environmental impacts factor, and the visualisation of the results is concluded by the generation of an emerging window showing a chart with the results.

The experts suggest adding a reference that can retrace which building element the material is part of, its function, and its main material or product. This would simplify organising the inventory and could prevent errors in the quantity take-off.



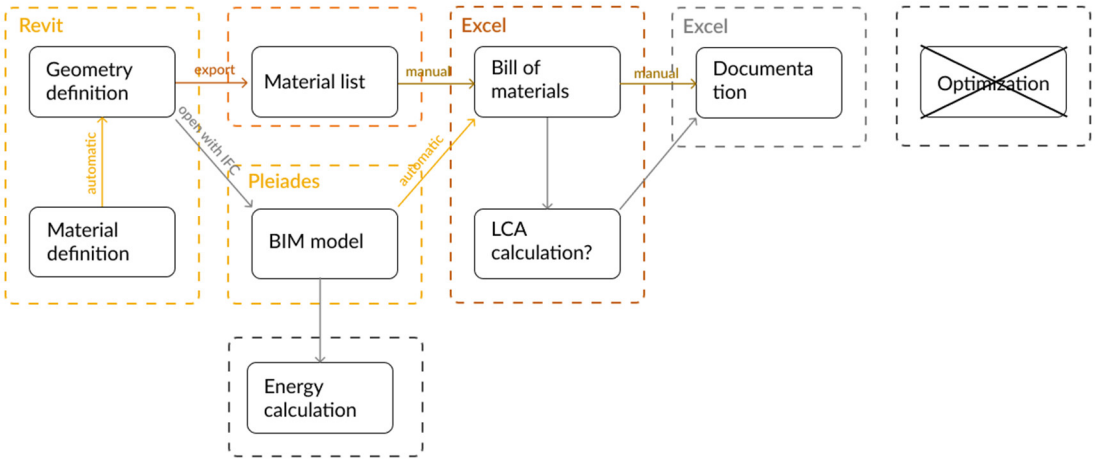


Workflow Description FR

The workflow is based on IFC already which proves that the workflow is open-BIM ready.

As the workflow integrates energy modelling in the use phase, it requires joined wall layers. Additionally joined layers decrease the risk of geometry interpretation errors when using IFC. The wall layers were merged using an automatic tool, considering a 0.3 m tolerance. This may lead to some errors in material quantification. The French experts had to add a non 0 value for the thickness of the membrane layers materials too.

The workflow allows a detailed insight into the Bill of Quantities which is created by the Pleiades plug-in in Revit. In general, the plug-in used by the French experts did not fit with the way the information was stored in the BIM model (e.g. use of curtain walls, material densities stored in customised parameters instead of being placed in thermal properties of materials) and led to the experts having to manually add data.



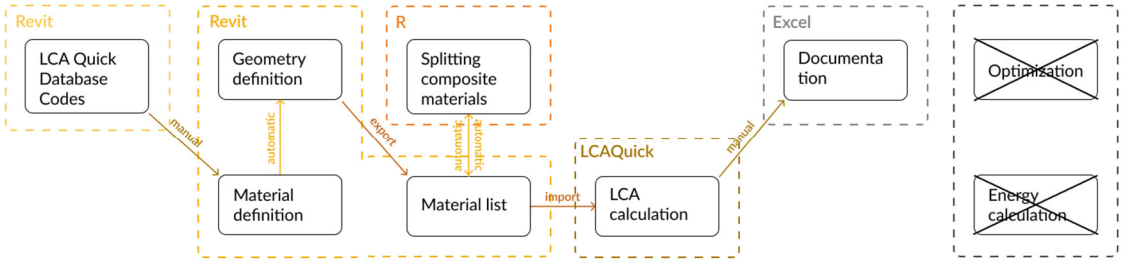
Workflow Description NZ

The workflow is not open-BIM ready and there are no plans to enable it in the future.

The workflow requires codes linking the materials to the LCAQuick database. These codes were added within the model as material parameters manually. The Bill of Quantities was then exported from Revit and imported in LCAQuick. To deal with composite materials, an additional step had to be

implemented using R. Having composite materials that represent multiple materials required assigning multiple parameters and then separating them again. The New Zealand experts noted that the information about the percentages of materials in the composites made the process easier.

The workflow allows the calculations of the environmental impacts in the production and construction phase, the embodied emissions in the use phase, the end-of-life and the recycling potential.



Workflow Description SI

The data was exported as a full material list including density, volume, mass, area and material description, which was then imported into Excel and summed up via Pivot tables.
Based on these tables the respective datasets in GaBi were assigned to the materials so an LCA model could be generated. The detailed information about the composite materials helped generate a more accurate submodel in Gabi.

The workflow already supports the use of IFC files.

The Slovenian experts would appreciate additional information about the materials and their uses in different building elements in case the extracting and LCA modelling are not performed by the same person.

