

Creating Revit Models to be exported via gbXML for Energy Analysis

On building projects using a BIM, standalone energy analysis software is often used to develop and analyze energy models based on information contained in the BIM. However, there are limitations when translating the Revit design model into a Building Energy Model (BEM) using gbXML. The success of the translation depends on:

- A well-structured building model (e.g. spaces defined correctly)
- The quality of the Revit gbXML writer/exporter
- The ability of gbXML to encode the relevant information present in the model
- The energy analysis software translator/importer

Errors occur when there is a deficiency in any one of these areas. Although designers cannot control the functionality of the software products or gbXML, they can adopt certain modeling techniques that will improve the export of the Revit model to gbXML for energy analysis.

Tips for Designers

- Define Energy Settings from the Project Information dialog in Revit. Items to set include:
 - Building Type
 - Location
 - Export Category
 - Export Complexity: export at the lowest level of complexity necessary for the energy analysis, with “Simple” being the recommended level
- Spaces
 - Define all upper and lower boundaries of spaces. Verify all walls and floors are room bounding.
 - If ceilings are modeled, determine whether or not the void space between the ceiling and floor structure above needs to be included in the energy model. If so, plenum area must be included in a Revit room.
 - Set Volume Computations to “Areas and Volumes”.
 - Model multi-level spaces as separate rooms per level.
- Columns
 - Set columns in the model to “non-room bounding”. This will prevent a “room-in-a-room” situation that energy analysis software will not import correctly.
- Shading Devices
 - To enable a shading device to export from Revit it must be assigned as either a Roof Family or Mullion Family.
 - Shading devices that belong to a ‘floor’ family or in-place ‘system’ family will not translate.
 - Alternatively use the massing tool to build shading devices and apply walls/roof/floor surfaces by face.
- Walls
 - Set walls that protrude into a space, but that do not divide the space to “non-room bounding”.
 - Place walls based on their centerlines
 - For exterior walls, use walls that go from ground level to the roof as opposed to stacked walls
- Curtain walls
 - Do not embed curtain walls into other opaque wall elements; use a dedicated curtain wall family.
 - Where possible create full height curtain walls, or minimize the number of curtain wall sections.
 - Do not stack curtain walls. Create a grid and adjust panels to the correct window/wall coverage
 - For opaque sections in curtain walls use panels with a max 3% transparency.
 - For glazed doors, leave as a glazed panel.
 - For opaque doors, use a Revit door template.

- Windows
 - Use generic windows. The project-specific glazing and frame properties must be assigned in the energy analysis software.
 - Windows with overlapping frames may be clipped when exported
- Doors
 - Use generic doors. Project-specific door and frame properties must be assigned in the energy analysis software.
 - Elevator doors do not export and are not a significant contributor to building performance analysis.
 - Glass doors do not export as glass; project-specific glazed door properties must be assigned in the energy analysis software.
 - Glass doors in curtain wall systems will export as an opaque panel. The correct properties must be assigned in the energy analysis software.
- Skylights
 - Verify a Revit skylight template has been used. Project-specific glazing and frame types must be assigned in the energy analysis software.
- Modeling conditions to avoid:
 - Rooms inside of rooms
 - Room boundary lines overlapping walls and other room boundary lines. This may cause errors in the exported file.
- Use templates and the correct families for each component whenever possible. Most energy analysis software will classify elements based on UniFormat Assembly Codes and Descriptions (Walls, Floors, Ceilings, Roof) defined in Revit. Revit automatically assigns the correct UniFormat Assembly Codes and Description values at the Type level to the of Out-of-the-Box families.
- When the Revit model is thought to be ready for export, take the following steps to check for proper room creation and correct adjacencies:
 - In Visibility Graphics, turn on Rooms – In-Fill and Reference. Visually check the model (in plan view and in section view) to ensure all rooms are enclosed.
 - Create a room schedule and ensure that there are no rooms that say “Redundant Room” or “Not Enclosed”

Tasks that can be performed by either Designer or Energy Modeler

- Copy the Design Model and create a simplified Energy Model for analysis:
 - Substitute window families for curtain walls
 - Substitute simple generic families for walls
 - Delete elements not required for energy analysis, such as railings and furnishings
- Export to gbXML from Revit. Export at the lowest level of complexity necessary for the energy analysis, with “Simple” being the recommended level. Choosing “Complex w/ Mullions and Shading Surfaces” is not recommended.