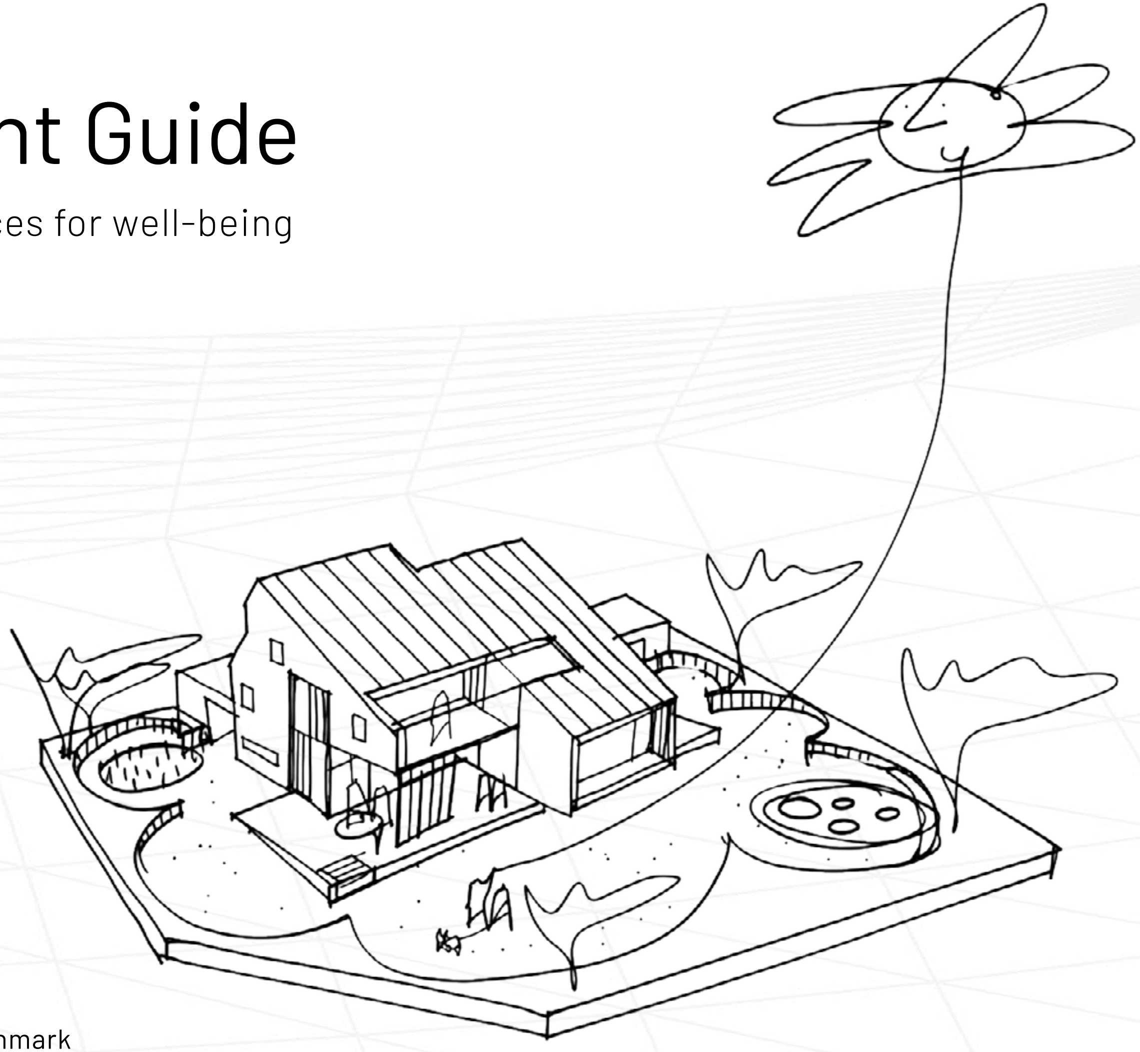
Project Development Guide

Best practice for using BIM to design spaces for well-being



Developed in collaboration with GRAPHISOFT Center Danmark

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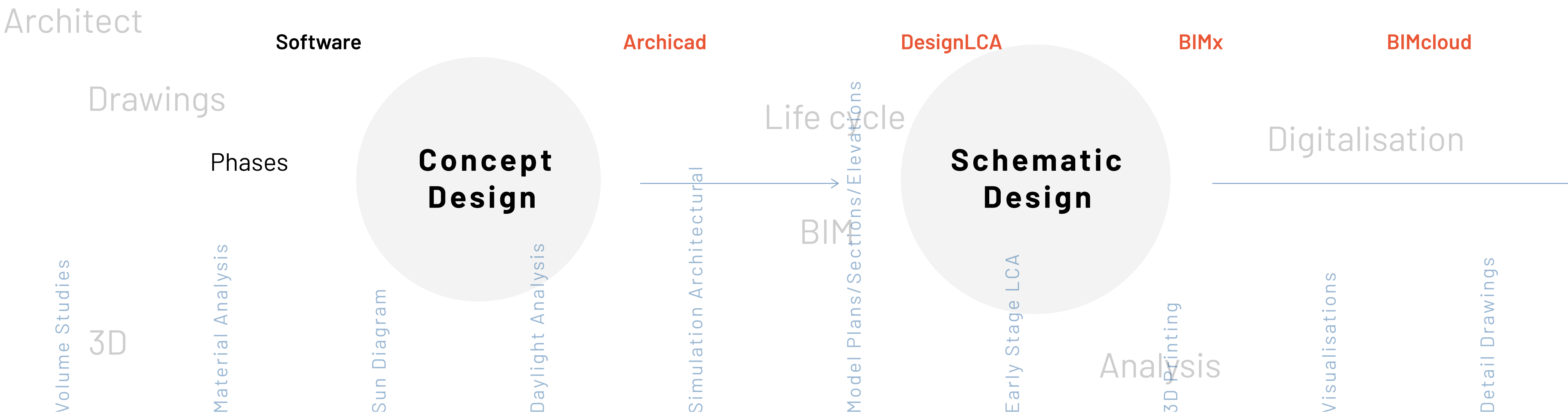


WHAT IS BIM

Building Information Modelling (BIM) is the process of creating, managing, and storing information related to a building project. Through data, physical elements and environments are digitally recreated, and in a well-managed BIM project, the model contains all the information needed to realize the project.

Traditionally, BIM has been associated primarily with large-scale projects, such as hospitals or major office buildings. However, BIM is equally relevant for smaller projects, where it can improve coordination, efficiency, and overall project quality.

BIM is relevant for all project scales
BIM does not have to be overly technical, data-heavy, or time-consuming. With some experience using a BIM software platform, it becomes an intuitive and powerful tool that supports design development from early stages through to as-built documentation, as well as coordination and communication.

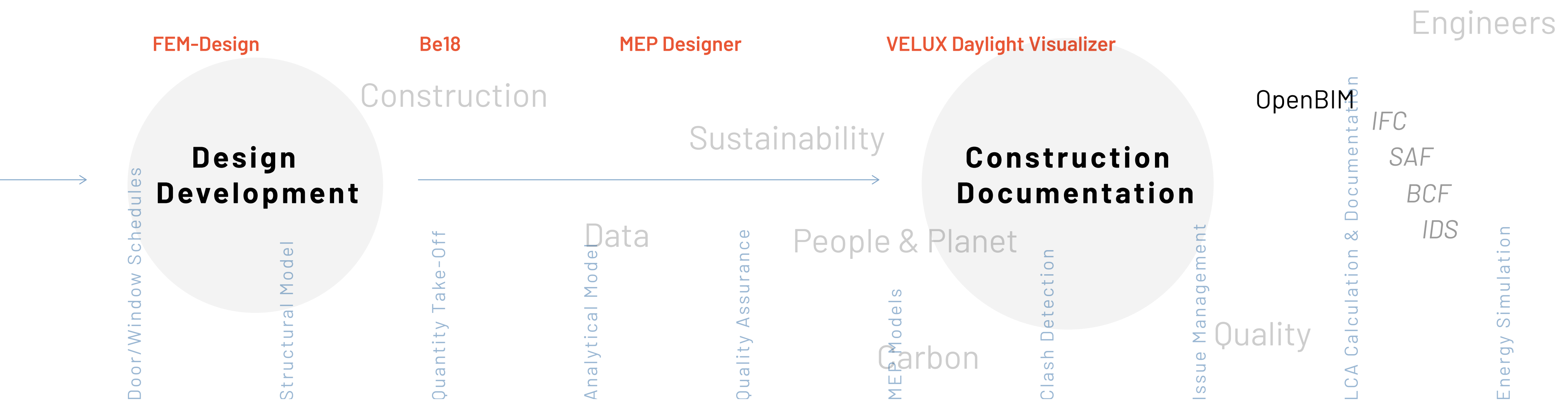
BIM is a workflow
BIM can be utilized from the very early stages of a building project and already serves as a valuable tool at this point. In the early design phases, BIM can be used for sketching and exploring different design options - not only to visualize aesthetics, but also to evaluate performance and identify missing aspects of a design. This helps guide the project toward a solution that not only meets aesthetic goals but also fulfills building performance requirements.

As the project progresses into later design stages, BIM software can be used to develop detailed construction documentation, support coordination, and prepare for execution. Ultimately, BIM aims to minimize costly errors, improve building quality, and ensure a more efficient construction process.

BIM is relevant for projects of all sizes - from single-family houses, such as the VELUX Home for Life used as a reference in this project, to large and complex developments. In this project, Archicad is used as the primary BIM authoring tool to support the entire process from early design to documentation.

OpenBIM enables different software platforms to work together through open file formats such as IFC, SAF, BCF and IDS. These formats allow building and structural data to be exchanged reliably between disciplines.

By using an OpenBIM approach, teams are not tied to a single software platform, making it easier to collaborate across disciplines and maintain flexible, efficient workflows throughout the project.



Software used

Archicad
- BIM Authoring Software

MEP Designer
- for modelling technical systems

Rhino & Grasshopper
- for environmental simulation

DesignLCA
- for Life Cycle Assessment

BIMx
- for model visualisation and communication

BIMcloud
- for collaboration and team workflows

FEM-Design
- for structural analysis and design

IDA ICE
- for energy assessment

Be18
- for energy assessment

Daylight Visualizer
- for analysing indoor daylight

OUR PROJECT

To further the use of BIM, VELUX and GRAPHISOFT Center Danmark have initiated the VELUX Project Development Guide project showcasing how BIM can support informed decision-making throughout a building project. Our ambition is to provide architects and design professionals with a hands-on, practical guide by sharing a complete project development BIM workflow based on a real building project, "Home for Life".

Home for Life
Home for Life is a building located in Lystrup, near Aarhus, Denmark, developed by VELUX Group and VELFAC in collaboration with AART architects and Esbensen Consulting Engineers in 2009.

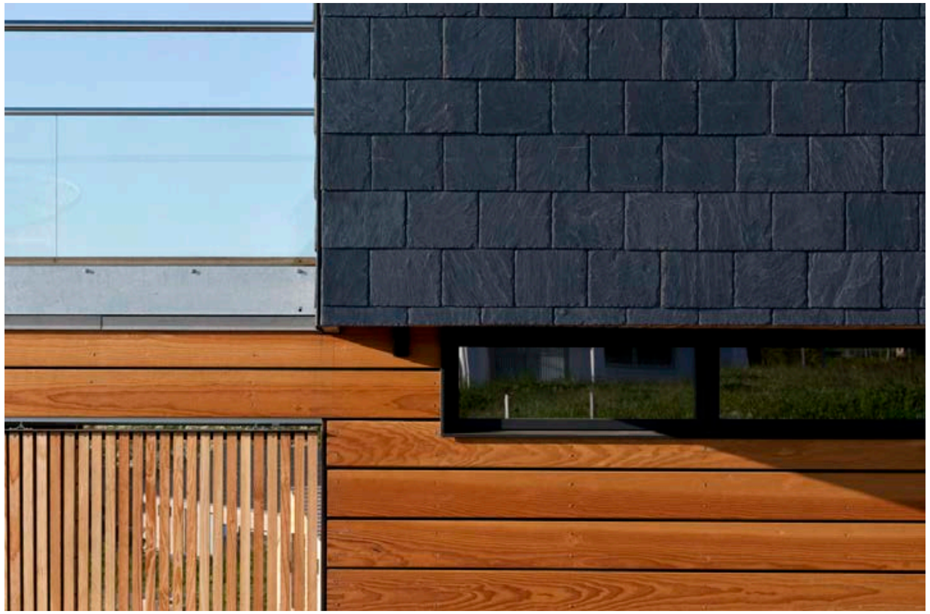
The building is a one-family house that is the result of an interdisciplinary design process that integrates energy performance, indoor comfort, and architectural quality into a unified design solution. The aim is to create a healthy, comfortable, and sustainable living environment where these aspects complement one another rather than compete. The project closely aligns with VELUX's People & Planet approach, which promotes solutions that support both occupant well-being and environmental responsibility.

Home for Life was a frontrunner in sustainable residential design for its time. Its performance was enabled by extensive simulations and informed decision-making, integrating energy use, daylight, and indoor climate from the early design stages.

Why use Home for Life as a reference?
Home for Life represents a strong example of holistic design, where key parameters such as daylight, volume, orientation, and energy performance were analysed from the earliest design stages.

This approach demonstrates the strength of BIM as a method that supports integrated and data-driven design, enabling informed decision-making throughout the entire process – from concept development to as-built documentation.

For this reason, the project is highly relevant as a reference for developing a BIM-based workflow. In addition, we have had access to drawings and reports related to the original project from 2009, which made it possible to reconstruct and analyse the building within a BIM environment.



For VELUX, this project also provided an opportunity to investigate how BIM can support decisions related to daylight, natural ventilation, indoor climate and sustainable design.

However, using this project for inspiration also means that our final building deviates from the original design in certain aspects. We have allowed ourselves the flexibility to select more sustainable materials, particularly because the identification of materials in the original house is primarily based on a material list, drawings, and building photographs.

Identifying materials

As part of this project, one of our key tasks was to identify the materials used in the building's construction. This step is crucial, as it has a significant impact on both the LCA and energy calculations.

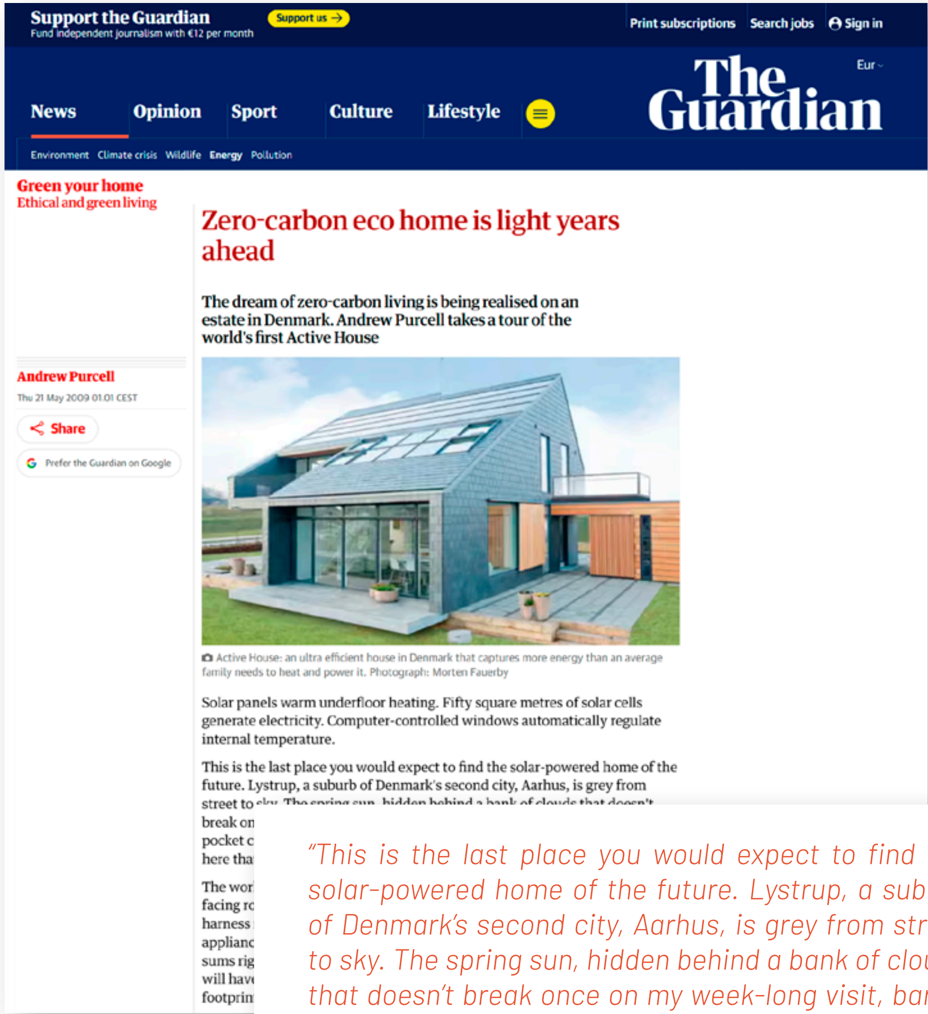
Using a combination of a materials list, building photographs, and the drawings from the Home for Life project, we identified the materials used for the various building components. The drawings specified the thickness of each layer, while a report confirmed that the house is primarily a timber structure.

Combining this information with practical judgment and energy calculations, we estimated the exact materials for each layer - ensuring they aligned with the energy performance calculated for the house in 2009.

To comply with the current Danish Building Regulations (BR18), the material selection in the VELUX Project Development Guide was revised to reduce the building's climate impact and improve its LCA performance.

Site plan

Source: The Guardian, Andrew Purcell (2009)



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Zero-carbon eco home is light years ahead

The dream of zero-carbon living is being realised on an estate in Denmark. Andrew Purcell takes a tour of the world's first Active House

Andrew Purcell
Thu 21 May 2009 01.01 CEST
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Active House: an ultra efficient house in Denmark that captures more energy than an average family needs to heat and power it. Photograph: Morten Fauerby

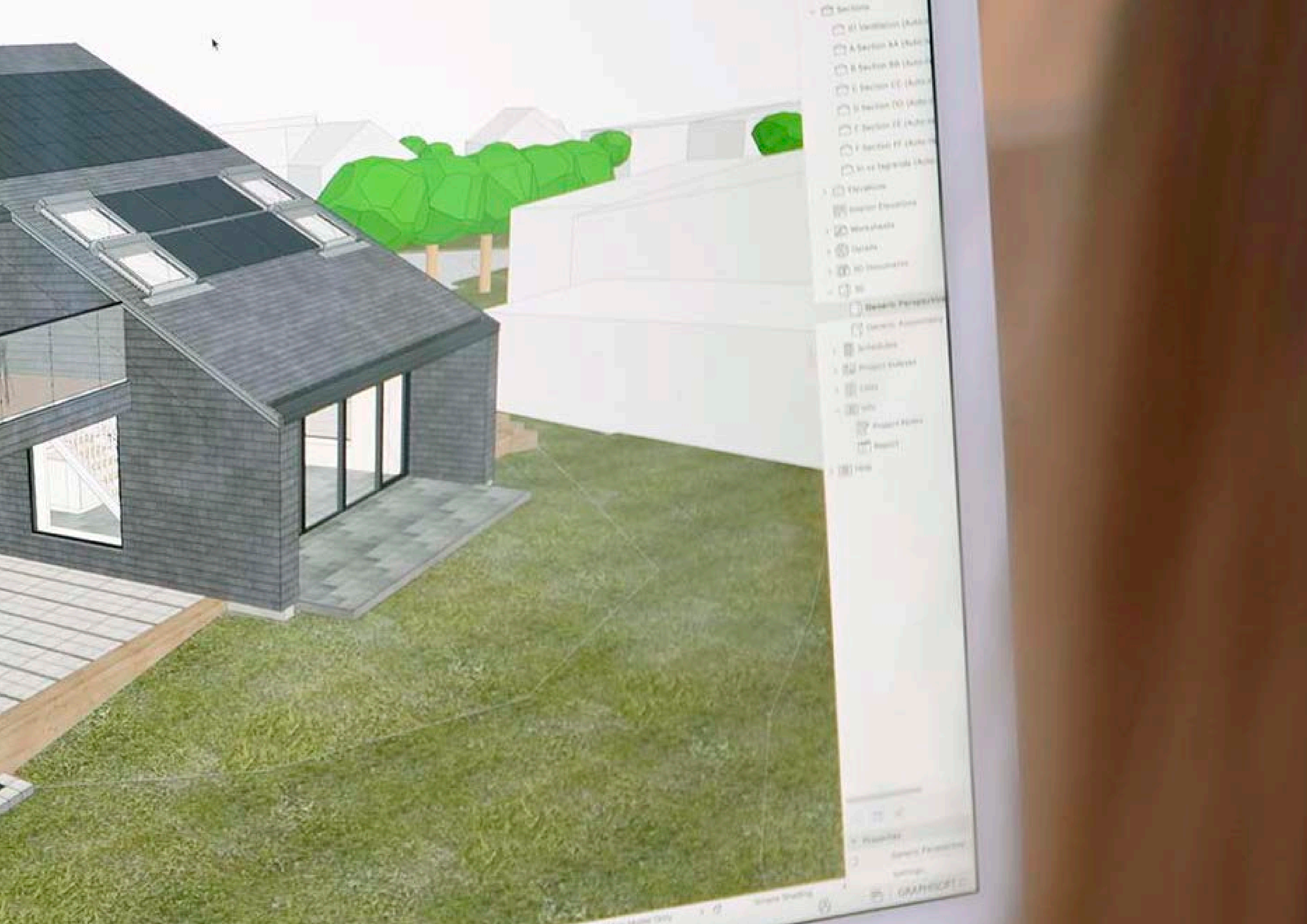
Solar panels warm underfloor heating. Fifty square metres of solar cells generate electricity. Computer-controlled windows automatically regulate internal temperature.

This is the last place you would expect to find the solar-powered home of the future. Lystrup, a suburb of Denmark's second city, Aarhus, is grey from street to sky. The spring sun, hidden behind a bank of clouds that doesn't break on

"This is the last place you would expect to find the solar-powered home of the future. Lystrup, a suburb of Denmark's second city, Aarhus, is grey from street to sky. The spring sun, hidden behind a bank of clouds that doesn't break once on my week-long visit, barely seems strong enough to run a pocket calculator, let alone meet the energy needs of a family of four. But it is here that a dream of zero-carbon living is being realized."

Clipping of the article written by The Guardian


Design
Viewpoint
Document



PROJECT WORKFLOW

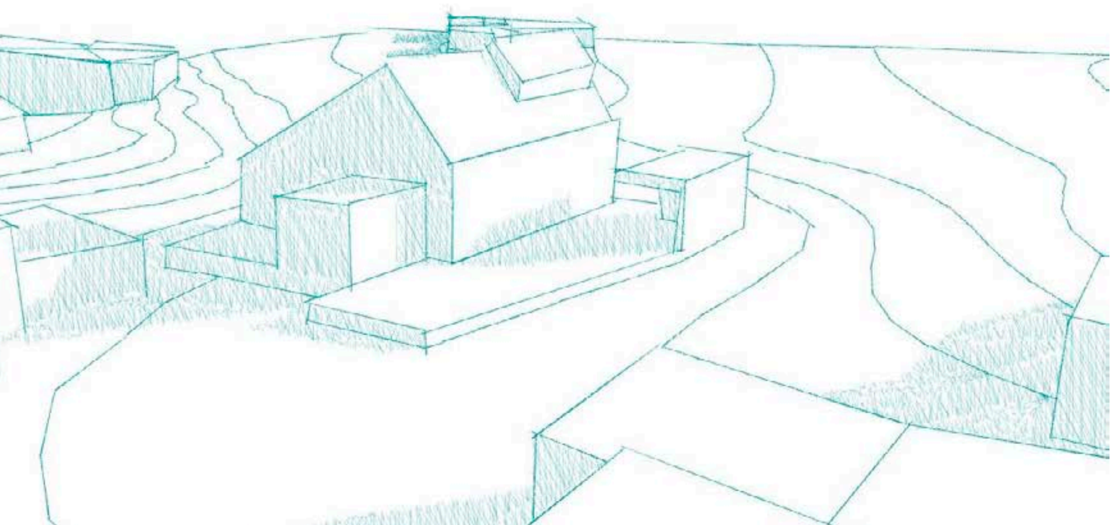
A well-structured project workflow is essential for achieving a successful building design. Knowing when to introduce specific analyses, tools, and decisions is crucial, as early design choices have a significant impact on the building's overall performance, environmental impact, and quality. While the project workflow may vary depending on the specific project, the following section outlines the approach applied in this case.

Early Design Decisions

Decisions made in the early design phase have the greatest influence on the final building. At this stage, the design is still flexible, making it possible to influence key parameters with relatively low effort compared to later phases. Therefore, it is essential to integrate analyses such as LCA, indoor climate, and daylight performance from the very beginning of the design process.

By incorporating these considerations early, designers can:

- Optimise building orientation, geometry and window placement in relation to solar conditions
- Enhance daylight availability and visual comfort
- Improve indoor environmental quality
- Reduce the building's environmental impact through informed material choices and energy-optimised design
- Support informed decision-making by balancing multiple performance goals through a holistic design approach



Examples of Early-Stage documentation

Sun path diagram:

- A sun path diagram is used to analyse how the building's orientation and surrounding context influence solar exposure throughout the day and across seasons. It helps to understand how the building both casts shadows and is affected by shading from its surroundings, and supports informed decisions regarding building layout and optimal window placement.

Sketch visualisation:

- Sketch visualisations are used to quickly communicate and explore design ideas during the early design phase. By using simple 3D geometry and visual styles such as a white model or sketch effect, the focus can remain on the building's form, proportions, and relationship to its surroundings rather than detailed materials and construction.

Material diagram:

- Material studies help evaluate how material choices affect the building's CO_2 footprint. While low-carbon materials are desirable, other factors such as durability and performance must also be considered, supporting a balanced material selection from the early design stage.

Building geometry:

- Building geometry influences natural ventilation, daylight penetration, and solar exposure. By shaping the building's form and volume, it is possible to improve indoor comfort and optimise energy performance from the early design stage.

Early-stage LCA:

- An early-stage LCA is used to evaluate how different design and material choices influence the building's overall CO_2 impact. By comparing material options, building components and operational energy at an early stage, it is possible to identify lower-carbon solutions before the design is fixed.

Early-stage daylight simulation:

- Early-stage daylight simulations are used to evaluate how the building's geometry, orientation, and window placement influence daylight availability and visual comfort. By analysing daylight before the design is fixed, potential challenges can be identified and adjustments can be made to the building volume, openings, and layout.

When to do what?

Concept Design:

- Layer Structure
- Volume Study
- Microclimate evaluation
- Sun Analysis
- Material Path Diagram
- 3D Print
- BIMx
- Layout & Publishing Sets

Schematic Design:

- Site Plan
- Floor Plans, Sections and Elevations
- 3D Section
- Furniture Plan
- BIM Objects
- Rendering/Visualisation
- Daylight Analysis

Design Development:

- Foundation Plan + Structural Plan
- Structural Model
- Details
- Quantity Take-Off

Construction Documentation:

- Structural simulation
- MEP Modelling
- Collision Control and Issue Management
- Data Exchange

People & Planet:

- LCA
- VELUX Daylight Visualizer
- Holistic Approach

Coordinate System Alignment

A Survey Point is used to connect the BIM model to real-world coordinates while allowing the project to be modelled close to the local project origin. This approach combines the stability and performance of a local coordinate system with the accuracy required for coordination with surveyors, engineers, and external consultants.

In this project, the surveyor's DWG drawing was first attached as an Xref on a Worksheet using its original coordinates. The Archicad Project Origin was then marked, making it easier to reference and snap to later in the workflow. Using the Worksheet as a Trace Reference, the building model was positioned relative to the local project base point, while the Survey Point was enabled and moved to match the coordinates provided by the surveyor. You can enable the Survey Point under the "Options" menu, "Project Preferences" and choose "Survey Point".

By separating the local modelling origin from the real-world coordinates, the project can be developed efficiently without the performance issues that can occur when modelling far from the project origin. At the same time, the Survey Point stores the correct geographic position of the building, including north orientation, easting, northing, and elevation.

Once configured, the Survey Point provides flexibility when exchanging information with other disciplines. Both DWG and IFC files can be imported and exported either relative to the local project origin or the Survey Point, depending on the requirements of the recipient. This ensures consistent positioning of models and drawings across different software platforms and supports a reliable OpenBIM workflow.

For the Home for Life project, the Survey Point establishes a clear connection between the BIM model and the site data, ensuring accurate coordination throughout the design and documentation process.

Pro tip! Establish the coordinate strategy as early as possible. Defining the Project Origin, local base point, and Survey Point at the beginning of the project makes model exchange and interdisciplinary coordination significantly easier later in the workflow.

Teamwork

Modern BIM projects are rarely developed by a single designer. Architects, engineers, BIM managers, and other specialists often need to work on the same project simultaneously. Archicad Teamwork supports this by allowing multiple users to work in one shared BIM project while controlling who can edit specific parts of the model.

Teamwork is based on a reservation system. Users work in the same shared project and reserve the elements or project data they need to modify, such as walls, slabs, objects, layouts, or views. Other users can continue working on the parts available to them. This helps prevent users from overwriting each other's work and provides a clear overview of who is working on which elements.

In this project, Teamwork was used to allow multiple contributors to work on different parts of the Home for Life BIM model at the same time. This was especially useful because the project included architectural modelling, structural design, MEP modelling, documentation, and analysis. By working in one shared model, changes could be incorporated into the overall project without creating multiple independent versions.

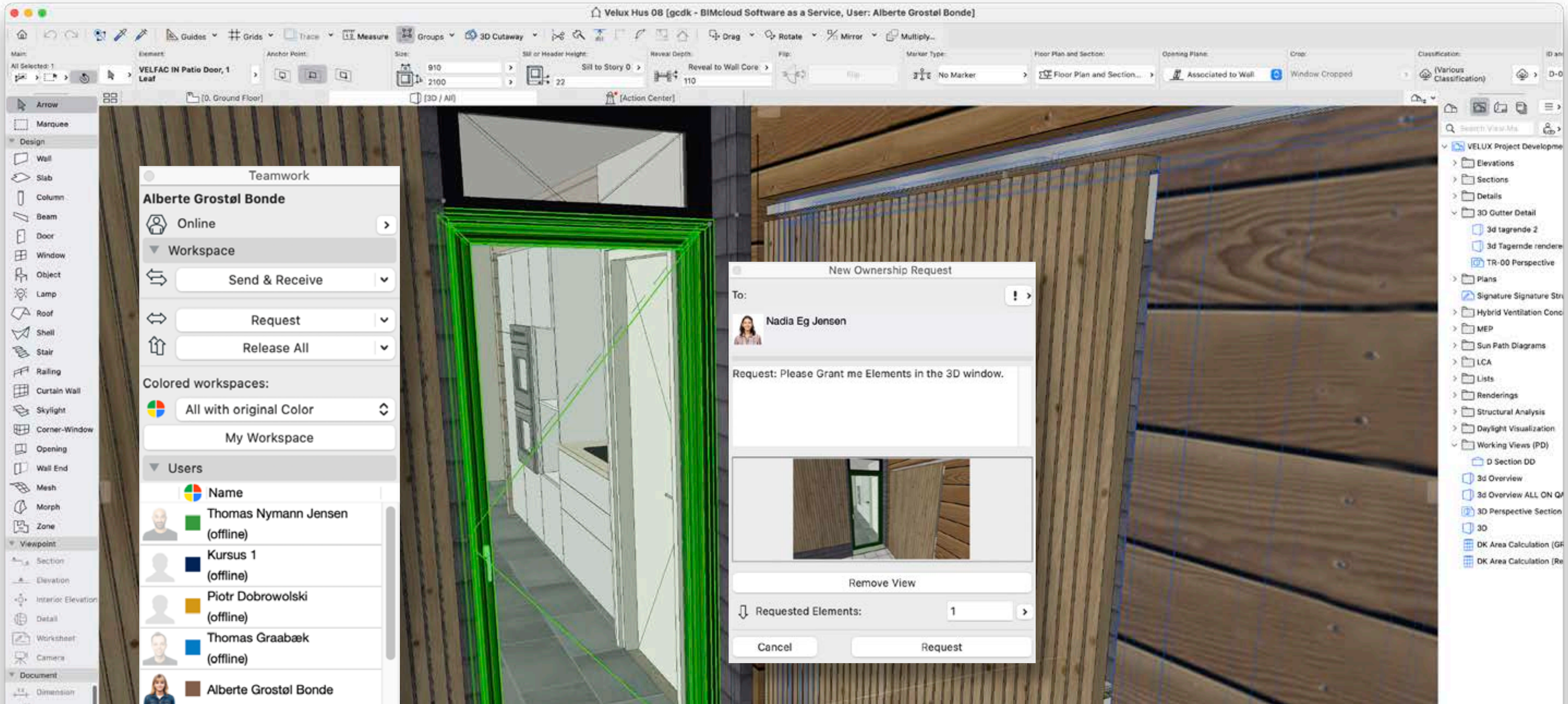
An important part of the workflow is Send & Receive. Sending uploads a user's changes to the shared project, while receiving downloads updates from other team members. Regular use ensures that everyone works with current project information and reduces the risk of outdated data.

Users can also request access to elements reserved by others. However, reservations should generally be limited to the elements needed for the current task so that the model remains accessible to the whole team. Therefore release elements when your task is complete.

Teamwork also supports project administration through user roles and permissions, allowing administrators to control access and responsibilities. Overall, Teamwork provides a structured way to manage collaboration, model access, and project updates within one shared BIM environment.

Pro tip! For efficient workflow you can attach the Teamwork Palette to your workspace. That way you will have easy access to Teamwork features, such as "Send & Receive" or "Request".

Teamwork, reserve and request elements



BIMcloud

BIMcloud is GRAPHISOFT's platform for hosting, managing, and sharing BIM projects. It provides a central environment where project information can be stored and accessed by the project team, and forms the technical foundation for Archicad Teamwork projects.

In this project, BIMcloud was used to host the shared Home for Life project and provide a central location for the project team to access the latest model. This helped establish a common project environment where the BIM model could be developed and managed throughout the project.

One of the main advantages of BIMcloud is that it supports collaboration between project participants regardless of their physical location. Team members and external consultants can access the project remotely, making it possible to work together even when the project team is distributed across different offices or locations.

BIMcloud also provides tools for project administration. Administrators can manage users, user roles, permissions, and access to individual projects. This makes it possible to control who can access project information and who is responsible for managing the shared environment.

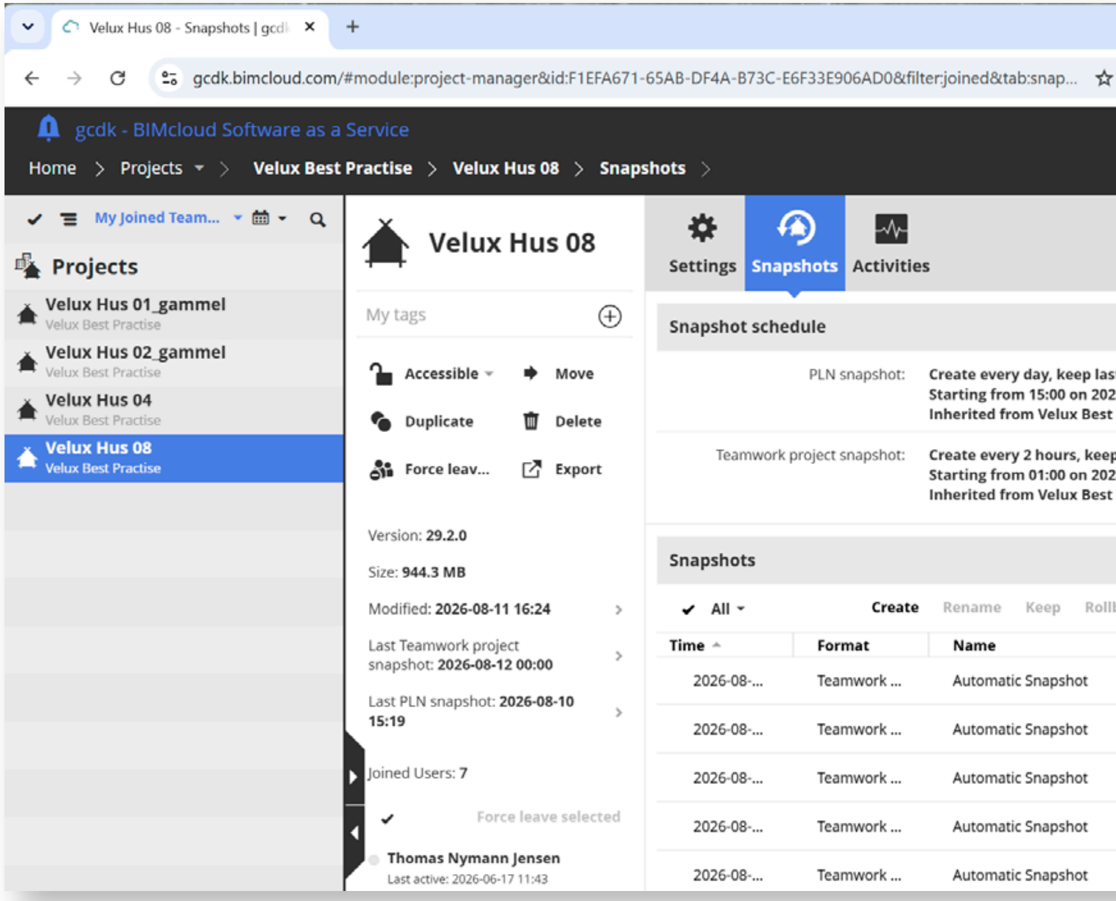
The BIMcloud server also includes several layers of backup systems, ensuring that you can always recreate a crashed project file or roll back time to undo changes made earlier or by other team members.

In addition to hosting Archicad Teamwork projects, BIMcloud can be used to organize other project information. Files such as IFC models, SAF files, BCF issues, drawings, and other coordination documents can be stored and shared through the platform. This makes BIMcloud particularly useful in an OpenBIM workflow, where information is exchanged between different disciplines and software platforms, as well as users switching beween Mac and Windows. BIMcloud is also a great solution to users without access to local office servers.

BIMcloud also provides a degree of flexibility when working with project information. Team members can access the information they need without having to maintain their own independent collection of project files. This helps create a more controlled information structure and reduces the risk of outdated or duplicated files being used during the project.

For the Home for Life project, BIMcloud therefore functions as the central infrastructure for project collaboration and information management. While Teamwork defines how users work within the Archicad model, BIMcloud provides the environment in which the shared project and related information are managed.

Pro tip! Treat BIMcloud as part of the project's information structure rather than simply as a place to store the Archicad model. Establish a clear folder structure and naming convention for models, IFC, SAF, BCF, drawings, and other project files from the beginning of working on the project.



BIMcloud manager

CONCEPT DESIGN

Layer Structure

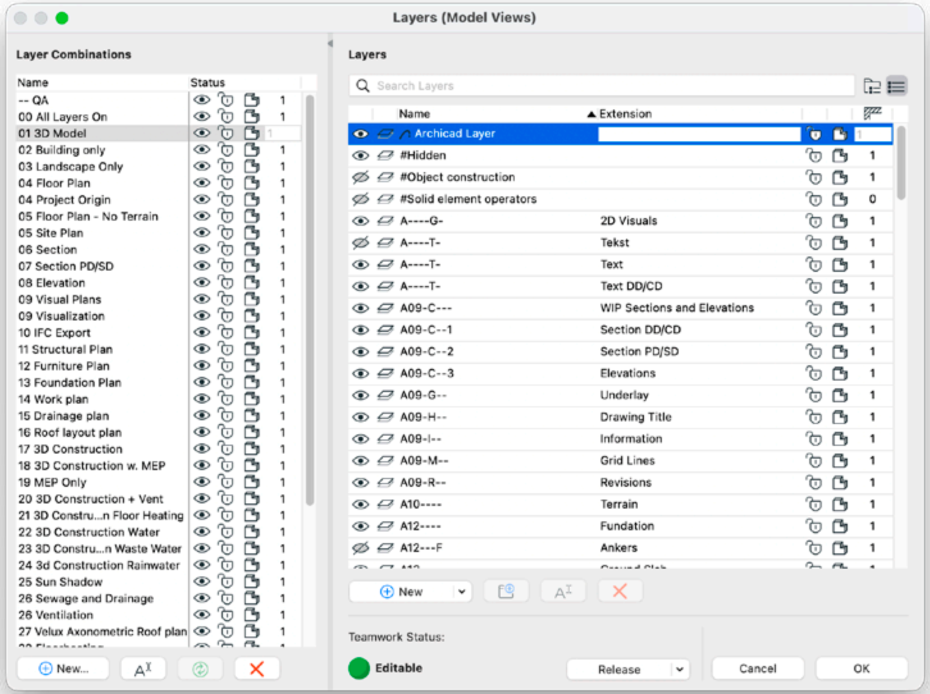
A well-defined layer structure is essential for ensuring clarity and consistency within a BIM project. Layers should be created in a way that is logical and understandable for all project participants, and ideally follow standardized classification systems or local standards to support coordination across disciplines.

A clear naming convention is crucial, as it allows team members to quickly identify and manage elements within the model. Consistent classification also improves collaboration, reduces the risk of errors, and ensures that the model can be shared and understood across different BIM platforms. This is particularly important when exchanging models using formats such as IFC.

Using this structured layer system, it is possible to create layer combinations, which allow specific elements—such as objects, text, or 2D annotations—to be shown or hidden depending on the purpose of each view. This is particularly important for effectively communicating the project at different stages.

In this project, both concept and schematic design as well as detailed and construction design are developed within a single BIM model. As a result, layers have been organized to correspond to different design phases, meaning that certain layers are only activated in specific stages of the workflow.

Different approaches to layer structuring exist, and preferences may vary between projects. Therefore, it is important to establish a clear and agreed-upon layer strategy, especially when multiple designers are working within the same model.



Layer settings

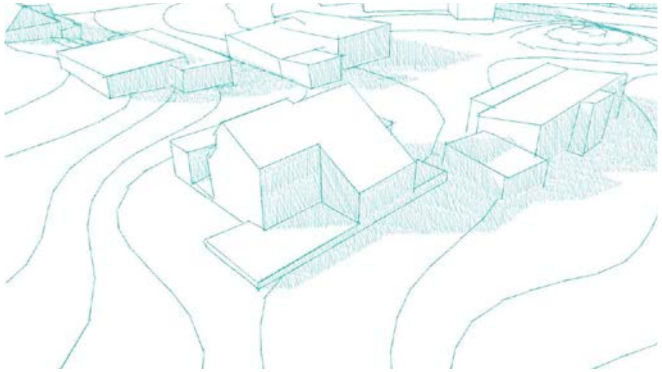
Pro tip! When using Solid Element Operations in Archicad, it's helpful to dedicate specific layers to operation targets (the elements being cut) and operators (the elements performing the cut). This prevents unwanted geometry from being affected, simplifies troubleshooting, and maintains clean, manageable model geometry. In this project, we use #layers specifically for Solid Element Operation layers to keep all cuts organized and easily manageable.

Volume Study
A volume study is an essential part of the early design phase, where the overall form, scale, and proportions of a building are explored. The focus at this stage is not on detailed construction, but on understanding how the building's massing relates to its surroundings, orientation, and spatial qualities.

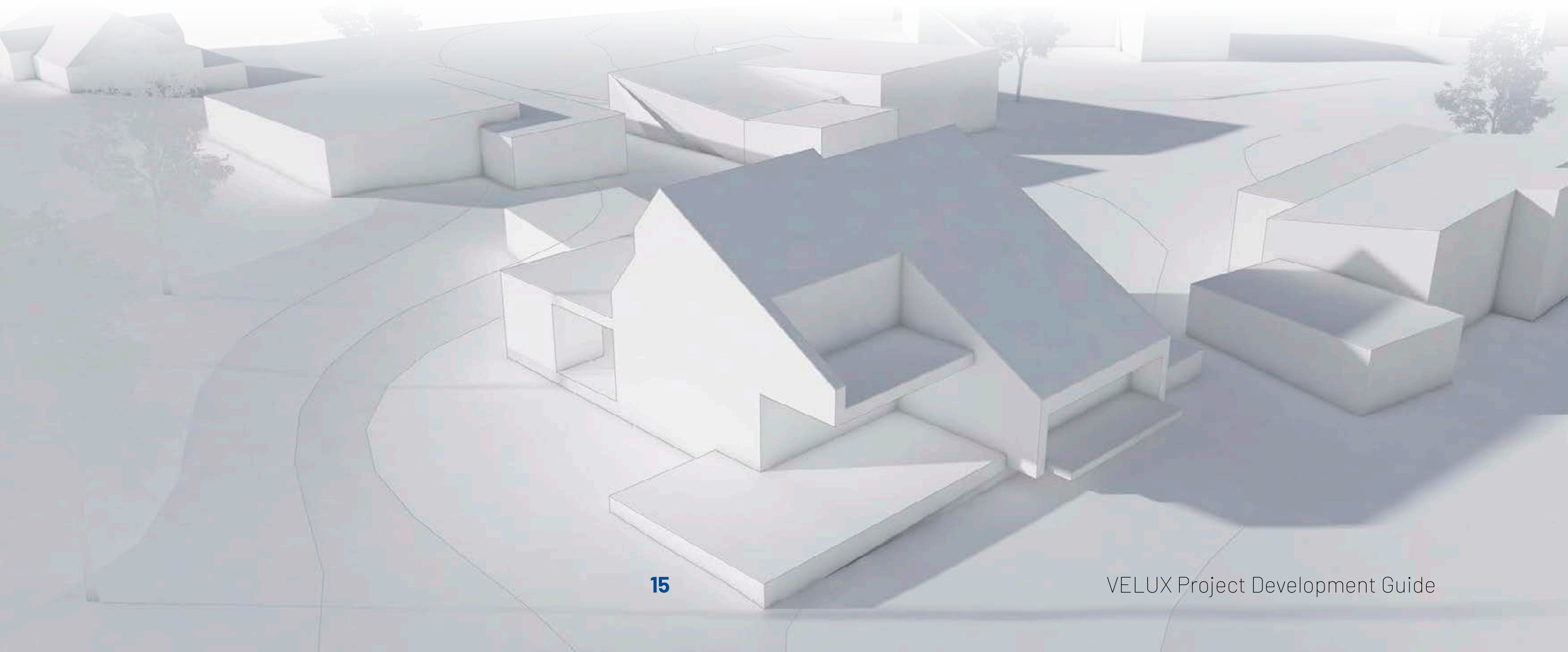
In Archicad, volume studies are typically created using simple geometry, such as basic walls, slabs, and roofs, or massing elements using the Morph tool. This allows for quick iteration and comparison of different design options. Working in 3D makes it easier to evaluate how the building interacts with the site, including views, daylight access, and shadow impact.

Volume studies also support decision-making regarding building orientation, window placement, and overall geometry, which significantly influence energy performance and indoor comfort. They can be combined with shadow and sun analyses to better understand solar exposure throughout the year.

Pro tip! Different visual styles can be applied to communicate the volume study. A quick render can be created as a white model, giving a clean, plaster-like appearance that emphasizes form and geometry.



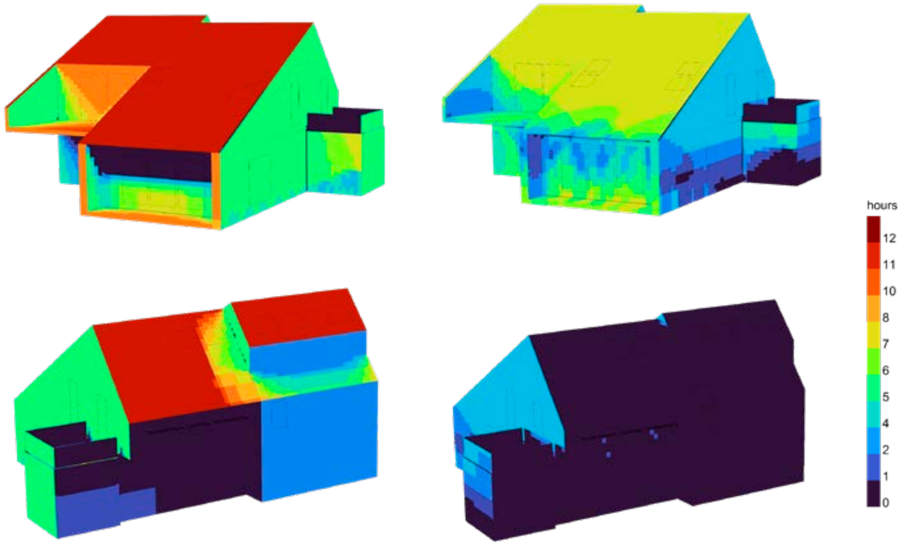
This can be done through "Creative Imaging" under the "Document" menu by selecting "PhotoRendering Settings". Using Cineware by Maxon, the White Model Effect can be enabled, or alternatively, the render style can be set to "Sketch" for a hand-drawn look.



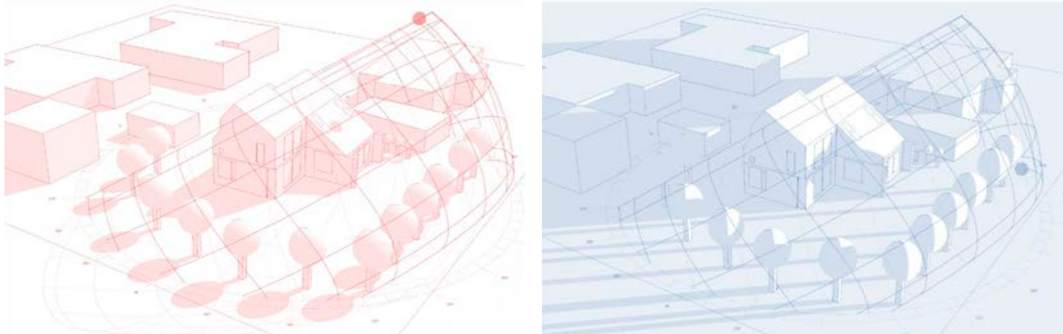
Microclimate

Analysing microclimate is an important part of the early design process, as local environmental conditions have a significant influence on building performance, occupant comfort, and the quality of outdoor spaces. While regional climate data provides a general understanding of weather patterns, microclimate studies focus on the specific conditions of the site, including solar exposure, temperature, wind, and the influence of surrounding buildings and landscape features.

In this project, a series of climate analyses were carried out to better understand how the site performs throughout the year and how it may be affected by future climate conditions. The studies included assessments of solar exposure, shading, surface radiation, temperature distribution, and wind patterns. Together, these analyses provided a comprehensive understanding of the environmental conditions affecting the building and its surroundings.



Summer solstice, June 21st *Winter solstice, December 21st*

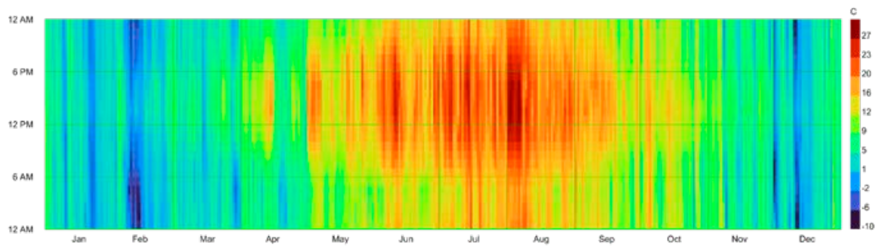


Sun path diagram shows how shadows change between summer and winter

The results were visualized with the Ladybug tools in Rhino and Grasshopper through a range of diagrams and heat maps, including studies of current and future annual weather conditions, solar radiation, sunlight exposure, shadow patterns, and seasonal wind behaviour. These visualisations helped identify opportunities and challenges related to daylight, passive solar gains, overheating risk, natural ventilation, and outdoor comfort.

By integrating microclimate analysis into the design workflow, it becomes possible to make informed decisions regarding building orientation, geometry, glazing, shading strategies, and landscape design before major design decisions are fixed. This supports a more resilient and performance-driven design process while improving both occupant comfort and environmental performance.

For a project such as Home for Life, where daylight, indoor climate, and energy performance are key design parameters, microclimate analysis provides valuable insight into how the building interacts with its environment. The analyses support a holistic design approach where decisions are based not only on aesthetics, but also on measurable environmental performance.



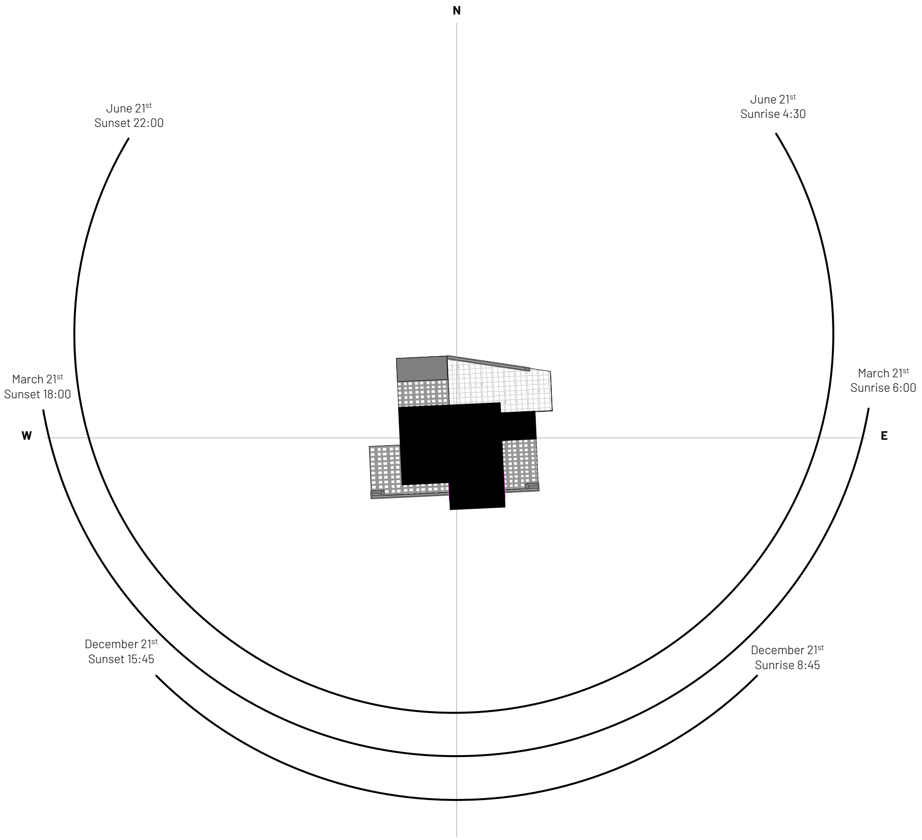
Annual heatmap with current weather data. Temperature shown for hours of the day and days of the year.

Shadow and Sun Analysis

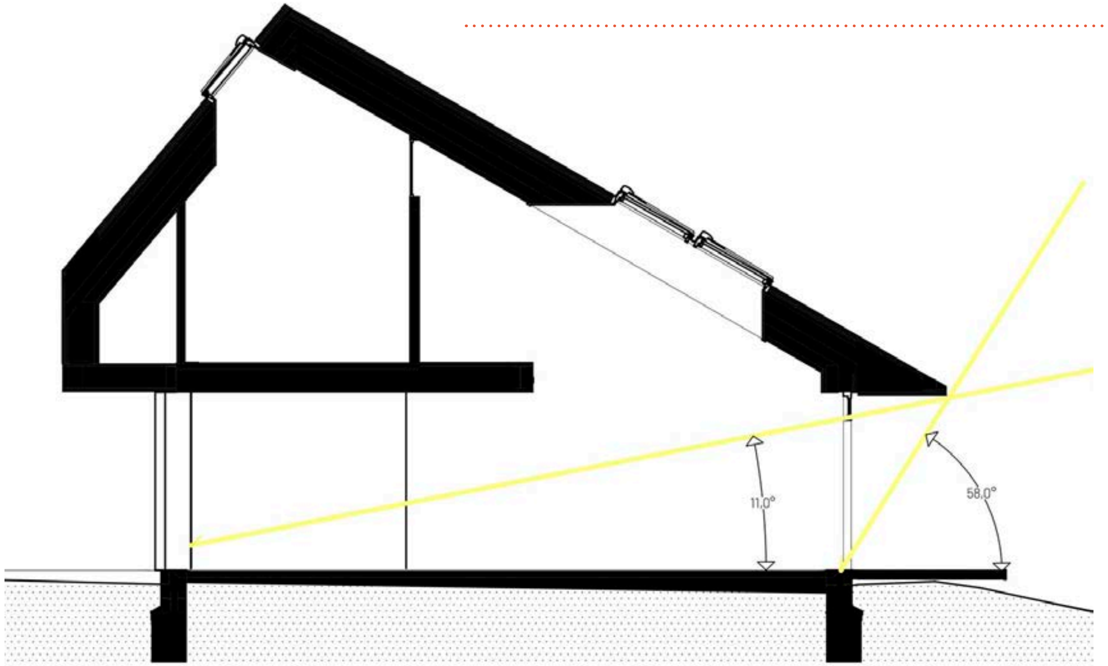
A shadow diagram study can be quickly performed once a basic building volume and its surrounding context have been modelled. It illustrates how solar exposure and shading vary throughout the day and across seasons, based on the building's geographic location. Particular attention is given to the summer and winter solstices, as they represent the extreme conditions of solar angles.

In addition to shadow studies, a sun path diagram can also be created. This is constructed manually based on open-source solar data, where the sun's path is drawn using the "Arc/Circle Tool" in a plan view of the building. Similarly, a conceptual section can be developed to illustrate solar gain, by modelling the sun's angle and the depth of sunlight penetration into the building.

Together, these methods provide a clear representation of solar movement and support further analysis of building orientation and solar exposure.



Sun path diagram

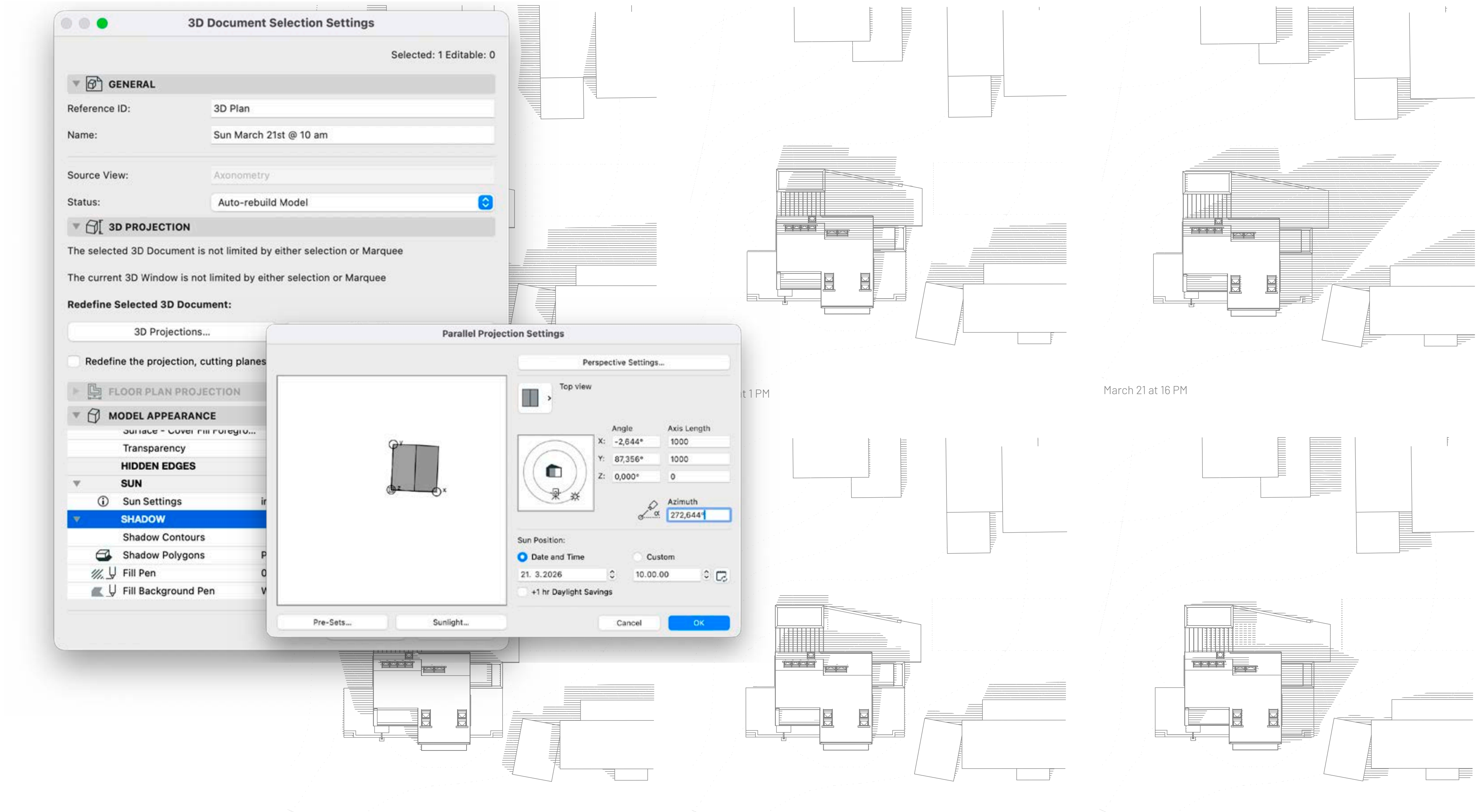


Solar gain diagram shows how far sunlight penetrates the building for summer and winter solstices

In Archicad, the study is created from the 3D model by generating a "3D Document from 3D...". After naming the document, the view can be adjusted in "3D Document Selection Settings", where the projection is typically set to a top view and the sun position is defined according to the relevant date and time.

By enabling "Sun Shadows", the model will display how shadows are cast by the building and its surroundings. See how this was done in our project on the next page.

The visual output can be further refined using graphic overrides, allowing adjustments to colours, fills, and overall appearance to clearly communicate the results.



t 1 PM

March 21 at 16 PM

June 21 at 10 AM

June 21 at 1 PM

June 21 at 16 PM

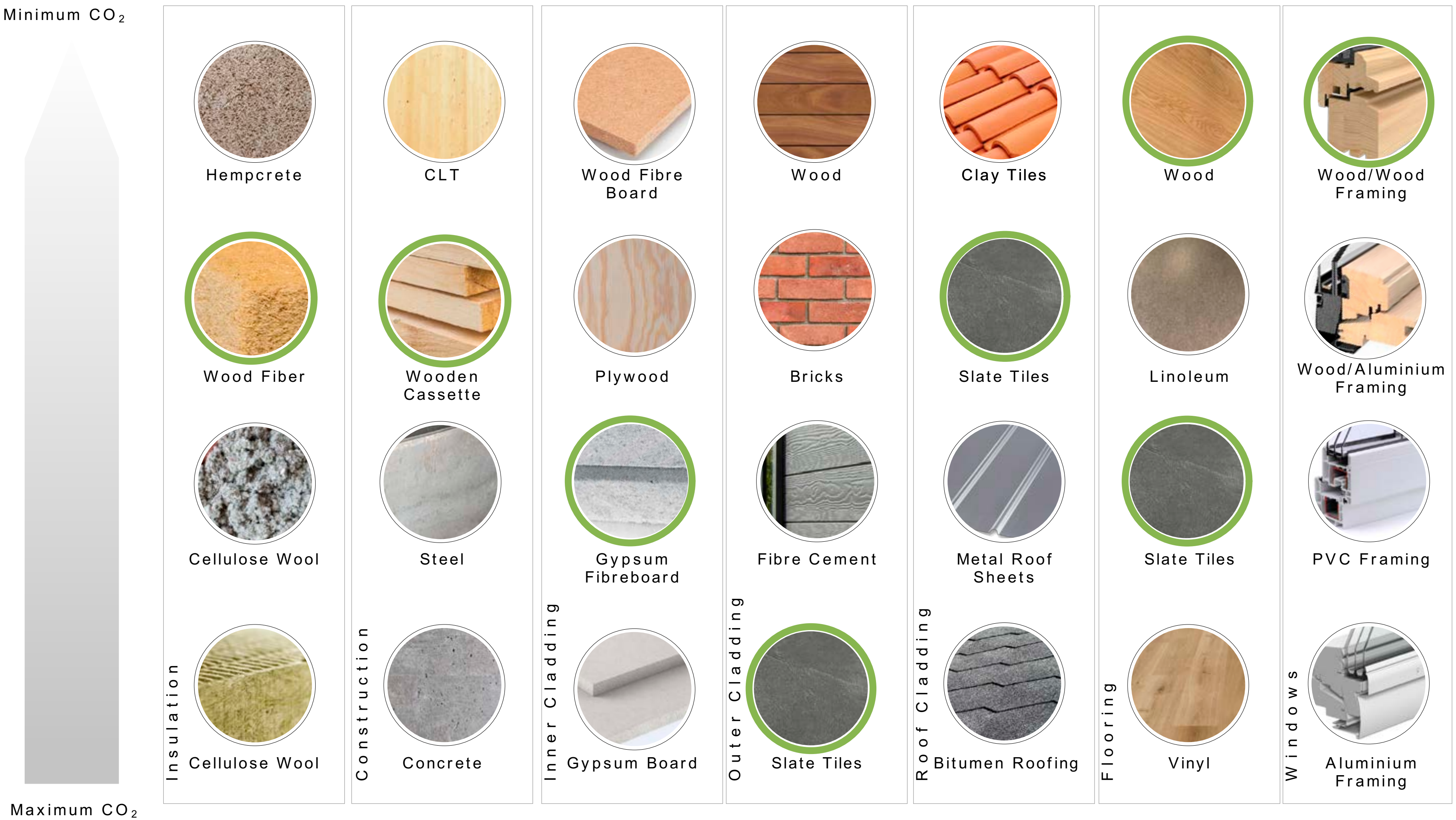
Sun study diagram

Material path diagram

The Material Path Diagram shows how different material choices affect the building's CO_2 impact across key building elements such as structure, insulation, cladding, roofing, flooring, and windows. Each category presents alternative material options ranging from low-carbon solutions like timber and bio-based materials to higher-impact materials such as concrete, steel, and certain cladding systems.

The highlighted selections (green) represent the chosen material strategy for the project. These are based not only on CO_2 performance but also on aesthetics, durability, and technical requirements, reflecting the necessary balance in real design decisions.

The diagram is used as an early design tool to compare material pathways and understand the environmental consequences of different choices. In this way, it works as a sketch LCA, supporting informed decisions before the design is fixed.

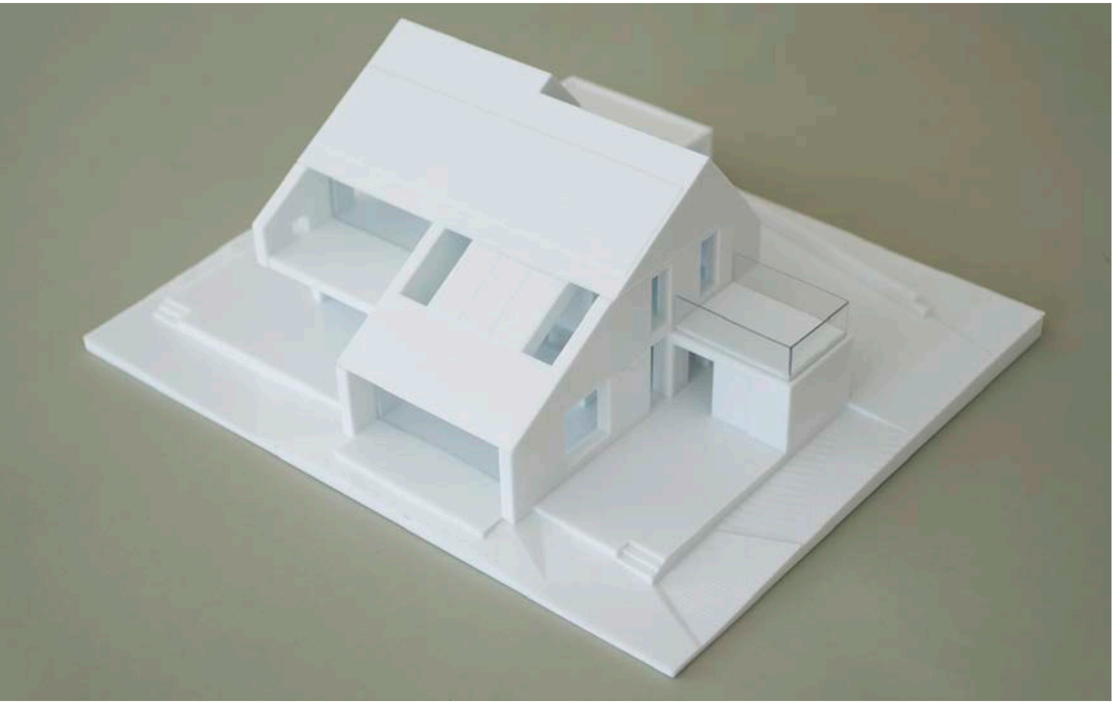


3D print

One of the advantages of BIM is that the same project data can be used in many different ways, thereby creating added value for the project. A good example of this is the use of the BIM project's 3D geometry, which is otherwise used to generate drawings and visualisations, as well as forming the basis for tasks such as quantity take-offs and clash detection. The 3D geometry can also be used for 3D printing.

There are many different types of 3D printers. One of the most common and accessible types is Fused Deposition Modelling (FDM), which typically uses PLA filament. Already during the sketch phase, we produced a massing model at a scale of 1:200, and later a more detailed model during the development of the main project at a scale of 1:100.

Using the Morph tool, we created a low-detail massing model including parts of the terrain and neighbouring house. To prepare it for printing, we activated the relevant layers, turned off windows and doors using Model View Options, and used 3D Cutaway to crop the terrain to a printable size.



section model 1:100

The model was exported as an STL file using the "Save as ..." command and opened in the 3D printer's software, where the only thing left to do was click "Print." The model took 27 hours to print. Fortunately, the printer operates on its own, so it can easily run overnight or throughout the weekend.

When we printed the model in 1:100, the windows and doors were shown only as wall openings, while the kitchen and staircase were replaced with more solid 3D objects with less detailing.

In addition, we wanted to be able to look inside each floor of the model, which required "sectioning" the 3D model — in our example into three parts — which were then printed one by one. Some extra geometry was also added beneath the floor slabs to secure the three parts when assembling the model, much like the studs on a LEGO brick.

One of the three parts was the top of the roof, which would have caused printing challenges because most of the shape lacked support. Therefore, after exporting from Archicad and importing into the 3D printer software, the roof sections were laid flat on the roof surface so the printer could print one roof plane as the "base" and the other roof plane upright from the first. This resulted in a more accurate and cleaner print.

For both 3D prints, we received assistance from TMP Arkitektur. Thomas Meld-gaard Pedersen, the owner of the company, uses 3D printing for almost all of their projects to help communicate the design to clients. It is a very effective way of utilizing the data and work that has already been invested in the BIM model.

BIMx

Communicating the architectural vision is crucial for both the architect and the project. BIMx is a model viewing and communication tool developed by GRAPHISOFT, used to present and share BIM projects outside the authoring software environment. In this project, BIMx has been used as a key tool for coordination, communication, and design presentation.

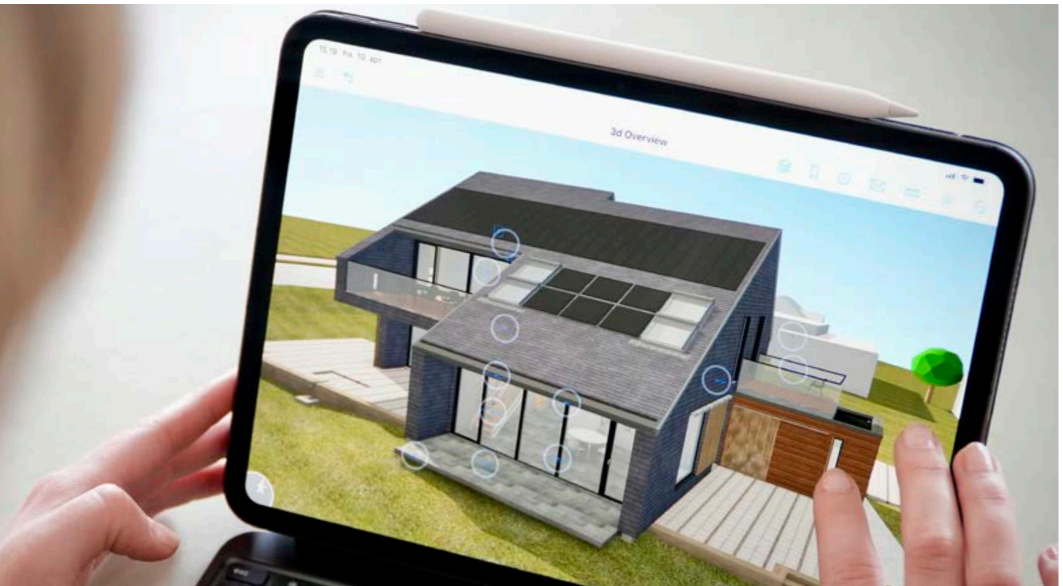
One of the main strengths of BIMx is seamless navigation between 2D drawings and the full 3D model, allowing users to move intuitively between plans, sections, and spatial views. This helps improve understanding of the design by linking technical documentation directly to the spatial experience.

BIMx is also platform-independent, meaning it can be accessed on mobile devices, web browsers, and Windows/Mac computers. This makes it highly flexible for project communication, as all stakeholders can view the model without requiring specialist software.

Another important feature is its collaboration through Issues, where users can place comments or mark up specific elements directly in the model. This supports clear communication during design and construction phases, especially on-site.

In addition, BIMx offers free access without requiring a license or login, making it easy to share with clients, consultants, and end users.

In this project, BIMx has been used as a communication layer on top of the Archicad model, helping present the design of the Home for Life in an accessible and interactive way.



Layouts & Publishing Sets

Archicad includes a structured system for producing and managing project documentation through Layouts and Publishing Sets, which in this project are used as the framework for organizing and exporting BIM-based deliverables.

Even though the project is currently in the concept design phase, it is beneficial to set up the layout structure and publishing workflow early. At this stage, it is not about producing final drawings, but about establishing a clear system for how information will later be collected, structured, and exported. This early setup helps ensure consistency and reduces the need for reorganising documentation later in the process.

Layouts act as the final sheets where views from the BIM model are placed, including plans, sections, diagrams, and visualisations. Since these views are live-linked to the model, any design changes are automatically reflected in the layouts, supporting an iterative workflow even in early design stages.

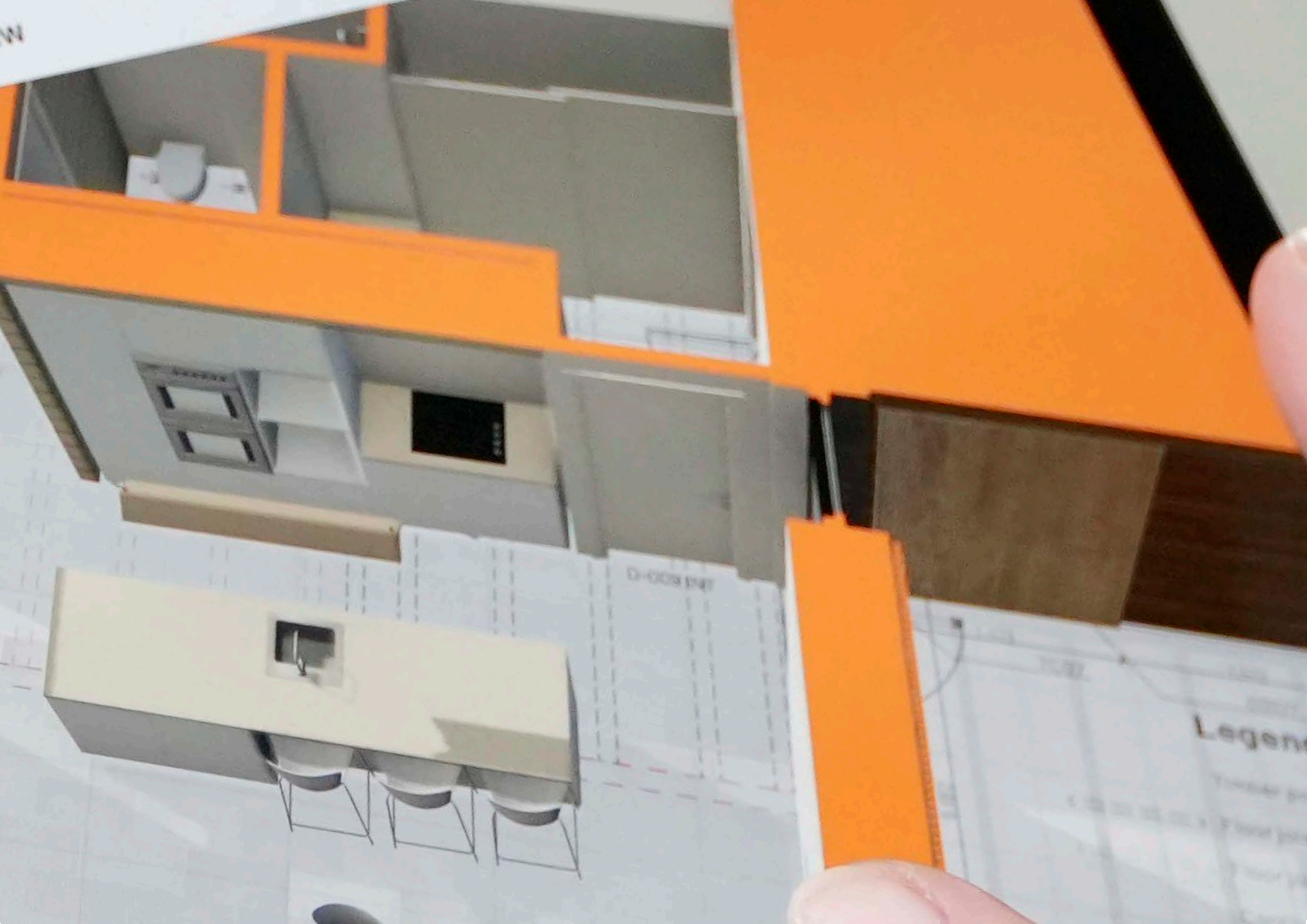
Publishing Sets define how these layouts are exported and grouped into deliverables, such as PDF sets or IFC packages. In this project, publishing sets are already being used to begin collecting the first structured outputs from concept design, gradually building up the foundation for future submission packages.

Setting up this system early, makes it possible to continuously publish as you design, where iterations of the concept can be exported and reviewed without rebuilding documentation from scratch. It also supports a more controlled workflow, where different outputs (e.g. diagrams, concept drawings, and analysis layouts) can be organised from the beginning instead of being assembled at the end of the process.

Overall, "Layouts" and "Publishing Sets" act as a preparation for the later stages of the project, ensuring that documentation is not only a final step, but an integrated part of the BIM workflow from the earliest design decisions.

BIMx model shown on an iPad


15.16 fre. 10. apr.
3d Overvi
Covered outdoor space
SB02



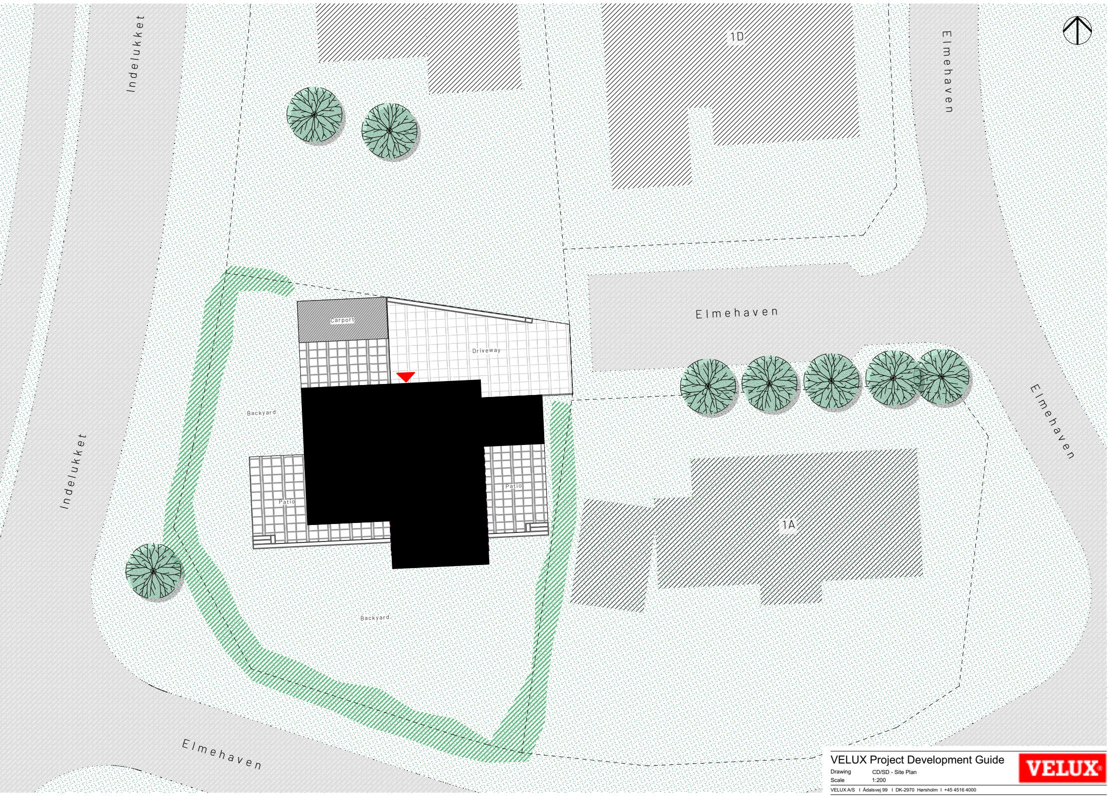
SCHEMATIC DESIGN

Site Plan

In Archicad, a site plan is created by modelling the terrain based on reference data, typically imported from a DWG file provided by a surveyor, as well as by referencing a satellite image. The project is then positioned correctly within a coordinate system, after which the terrain can be modelled using the Mesh tool, where elevations are defined using "Mesh Point Height."

Next, property boundaries, roads, and existing conditions are drawn to accurately represent the site. To ensure clarity, a dedicated view is created using layer combinations, where only relevant elements such as the building, terrain, access roads, and vegetation are visible. Graphic overrides can be applied to highlight specific elements, such as different types of paving or planting.

A north arrow is added in the plan view, and scale is set to 1:200.



Floor Plans, Elevations and Sections

In Archicad, plans, sections, and elevations are generated directly from the 3D model. As long as the relevant layers are activated, all modelled elements will be visible in the corresponding drawings.

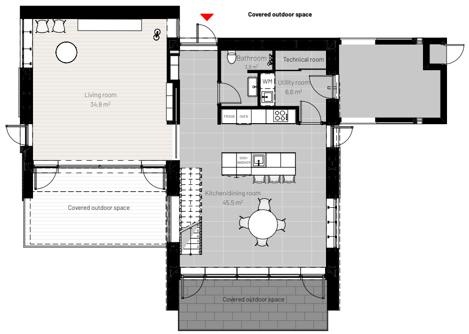
This means that modelling in Archicad usually takes place simultaneously in both a 3D and 2D environment, where any changes made in one view are automatically reflected in the other. This means that from the early stages of the project, designers typically work across both 3D models and 2D representations, such as plans, sections, and elevations.

As a result, during the schematic design phase, much of the work related to 2D drawings involves placing views on layouts, as well as managing and organizing the views, rather than redrawing geometry. This includes controlling which layers are active, applying graphic overrides, setting the scale, and adding staffage to clearly communicate the design.

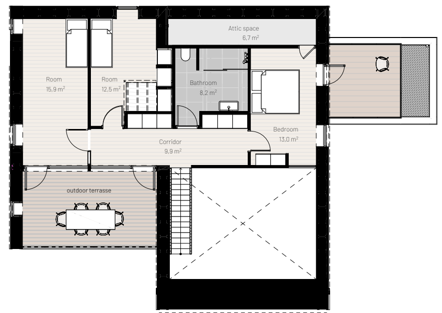
All of these decisions depend on what aspects of the project you aim to communicate.

Different drawing scales are used to support communication. Scales such as 1:200 provide an overall, diagrammatic overview of the project, while 1:100 clarifies spatial organization and function, often through furnished plans. More detailed drawings at 1:50 show elements such as façades and materials.

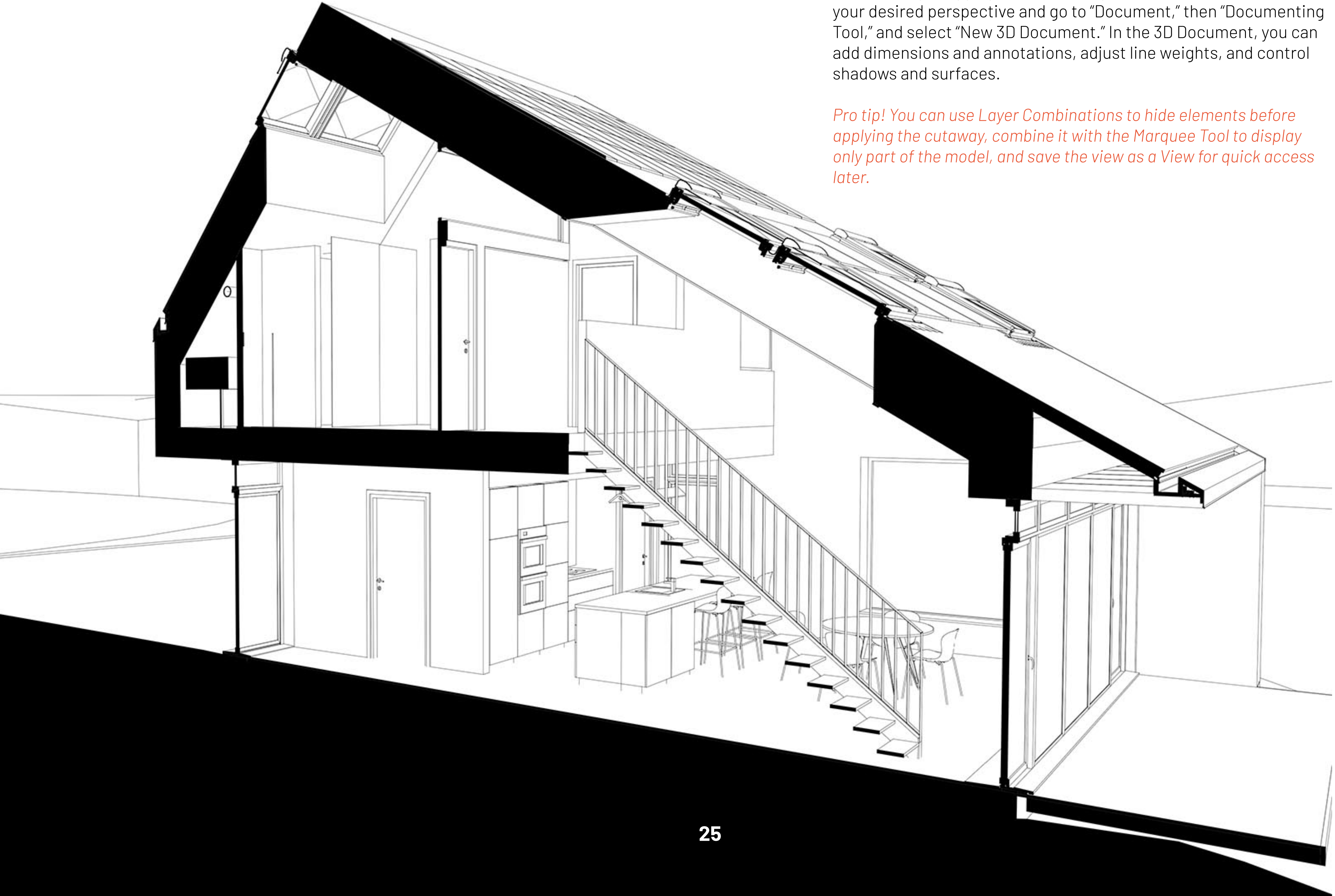
Pro tip! During modelling, you often work across multiple sections and plans. Temporary 2D annotations can be placed on a "Working" layer, while final annotations are kept on a separate layer. This makes it easier to control visibility and ensure clean final drawings.



Ground floor



First floor



3D section

To create a 3D section, open your project in "Generic Perspective," then click the 3D Cutaway icon (Ctrl+Y) in the toolbar and cut into the model by dragging the scissors by the window frame. Choose your desired perspective and go to "Document," then "Documenting Tool," and select "New 3D Document." In the 3D Document, you can add dimensions and annotations, adjust line weights, and control shadows and surfaces.

Pro tip! You can use Layer Combinations to hide elements before applying the cutaway, combine it with the Marquee Tool to display only part of the model, and save the view as a View for quick access later.

Visualisations

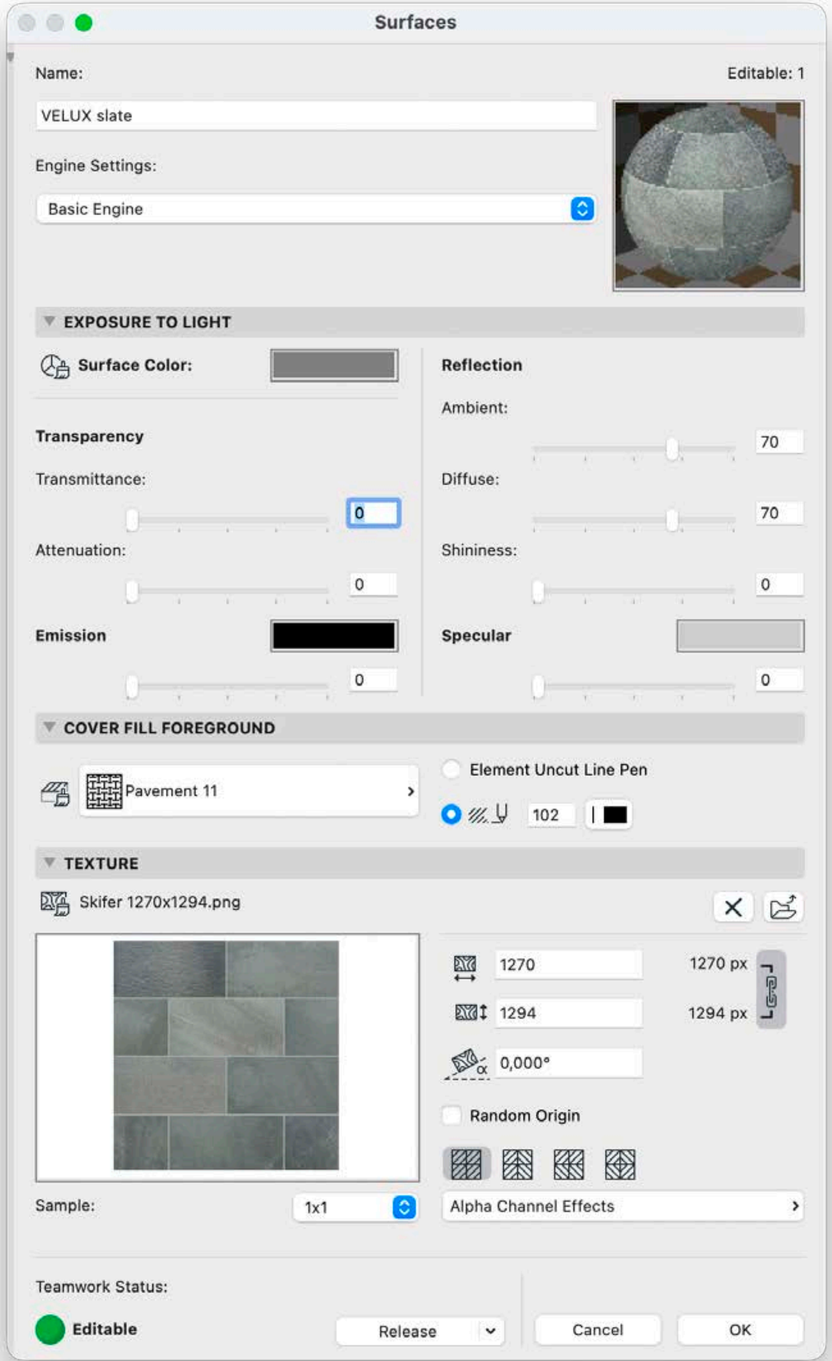
When working with visualisations in Archicad, materials and surfaces have a major impact on the final result. They define colours, textures, and reflections and can be adjusted to create realistic or stylised visualisations. To create a custom surface, go to "Element Attributes" under "Options" and select "Surfaces". Duplicate an existing surface, give it a new name, and insert your own material image. The image should be seamless so it can be repeated across the surface for a consistent appearance.

It is also beneficial to work with BIM objects, as they often include predefined materials and details that improve visual quality while saving time. In this project, the visualisations were set up using Cineware in Archicad with no editing, which provides a fast and efficient way to produce renderings without time consuming customisation.

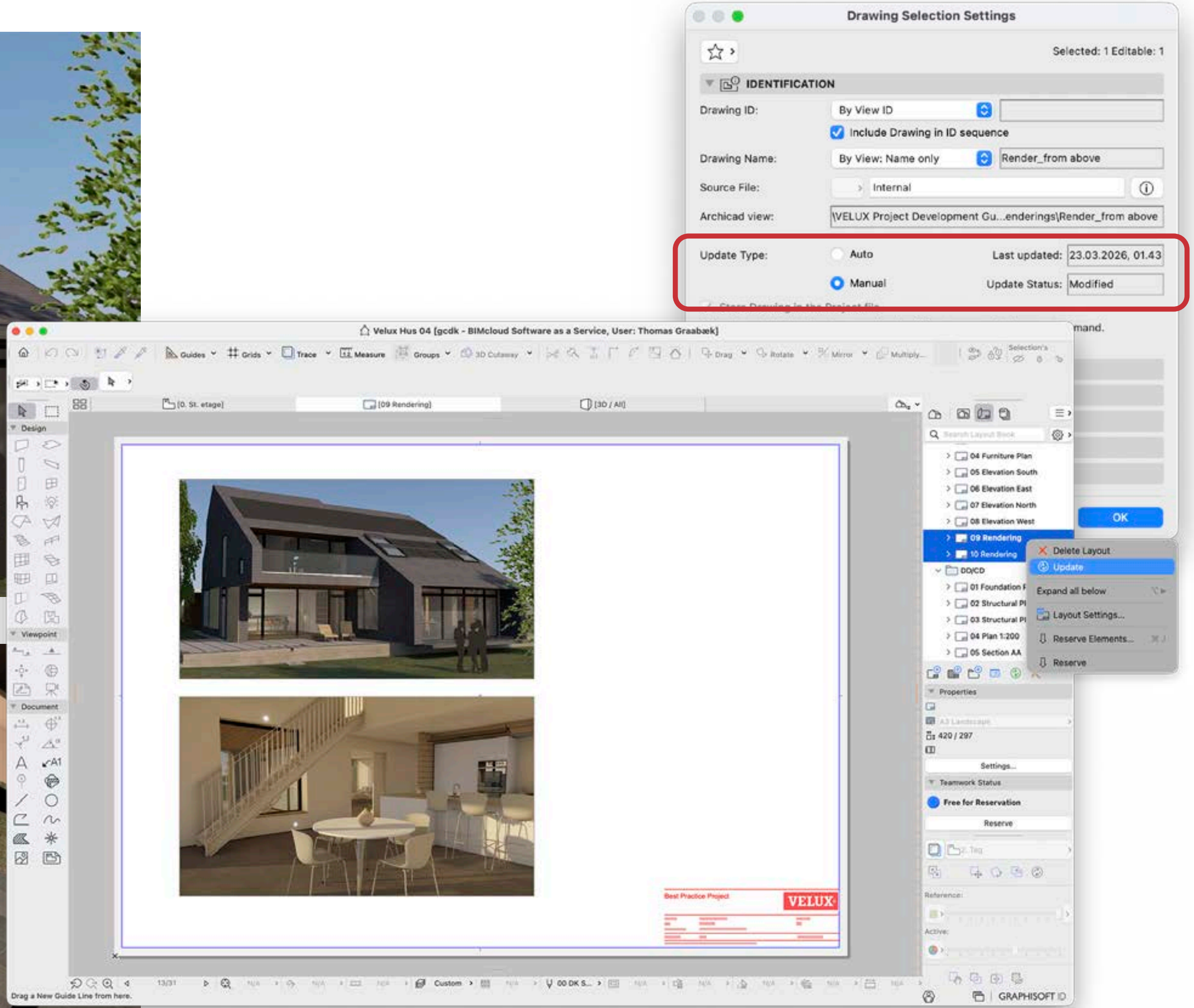
To prepare a view for rendering, you typically start by setting up your 3D view and then saving it as a 3D Document. This document acts as a controlled view where you can adjust composition and details. From there, the 3D Document can be used as the basis for a PhotoRendering window, where the visualisation is generated.

To adjust the visualisation, open “Photo Render Settings” under “Creative Imaging” in the Document menu. Here you can control lighting, shadows, materials, and render quality. There are also several preset render settings available, making it easy to quickly create a rendering without manually configuring every parameter. These presets are especially useful in the early stages, where fast visualisations are needed for review or presentation.

Bespoke material maps



Surfaces Settings



Exterior and interior visualisations, Cineware in Archicad

Pro tip! You can set up your renderings in a layout, so they automatically update whenever changes are made to the model. This ensures that your presentation material is always up to date without needing to re-render manually. If you do not want a new image to be generated automatically, you can simply switch the setting to manual updating.

BIM objects
In a BIM project, BIM objects serve both as visual elements and as data-rich components. Visually, they help designers understand how spaces function in real life – for example, by placing furniture to explore layout and usability.

At the same time, product-specific BIM objects – such as a manufacturer's window or door - add an important layer of accuracy. They include precise dimensions, material properties, and performance data, ensuring that the design reflects what can actually be built.

In this way, the same element evolves from a conceptual design tool into a precise, buildable solution, supporting both creative exploration and technical accuracy.

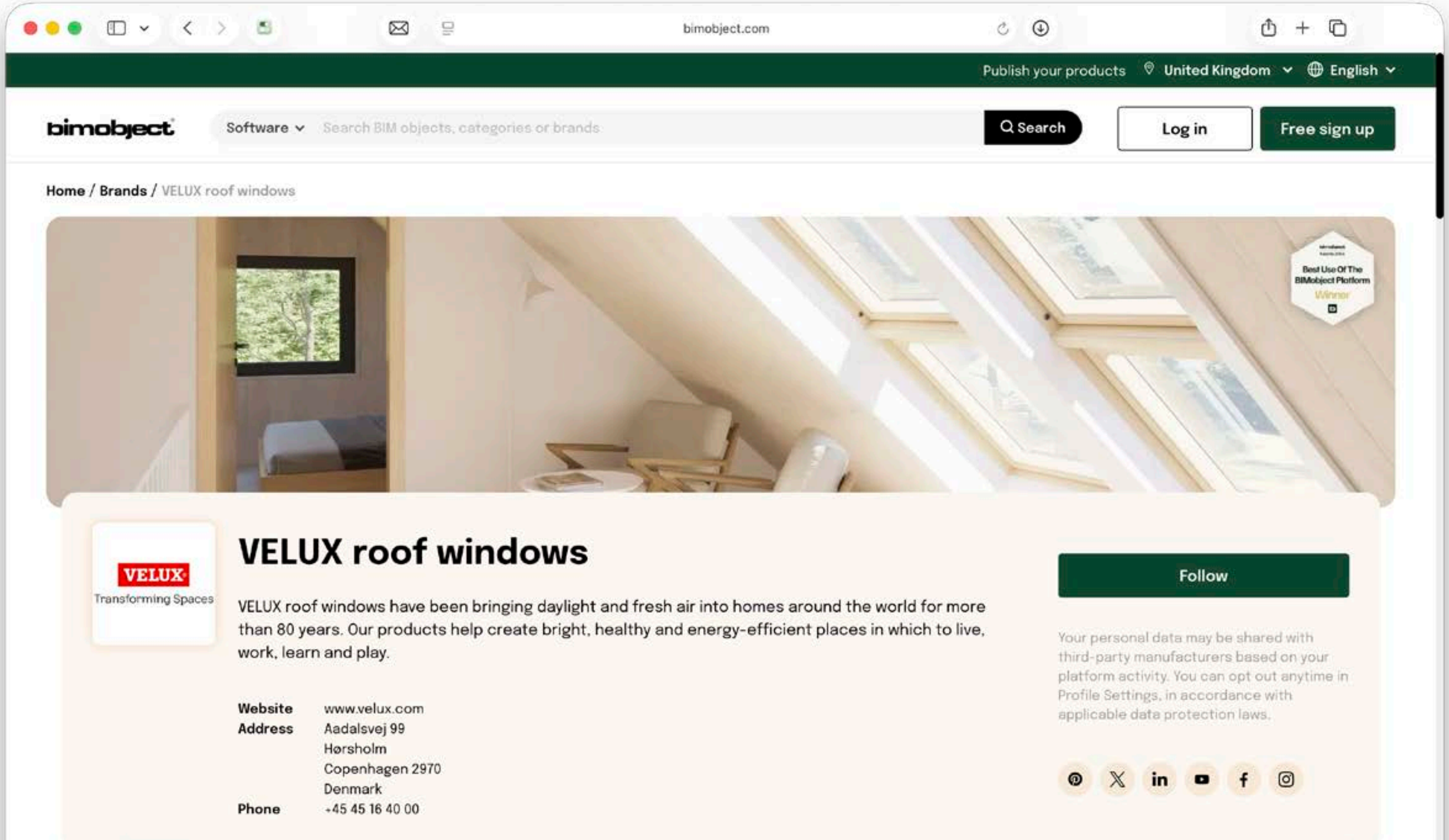
BIM objects can be used in Archicad if the file format is GSM, and as a extensive library of objects, if the file format is LCF. You add the objects to Archicad by adding them to the Library Manager or by dragging and dropping the objects right into your project.

VELUX provides a dedicated BIM library that can be downloaded free of charge from the VELUX BIM portal containing roof windows, sun tunnels, accessories, and related products developed specifically for BIM workflows. The objects can be downloaded from the VELUX BIM portal at www.velux.com.

After downloading the library, it can be loaded into the project through Library Manager. Once loaded, the VELUX objects become available through the Archicad Object Tool, Window Tool or Skylight Tool depending on the product.

Unlike generic window objects, VELUX BIM objects contain extensive embedded product information, including dimensions, opening types, glazing specifications, thermal performance, daylight-related properties, and installation requirements. This allows the same object to support both design development and project documentation throughout the BIM process.

Download VELUX BIM objects >>



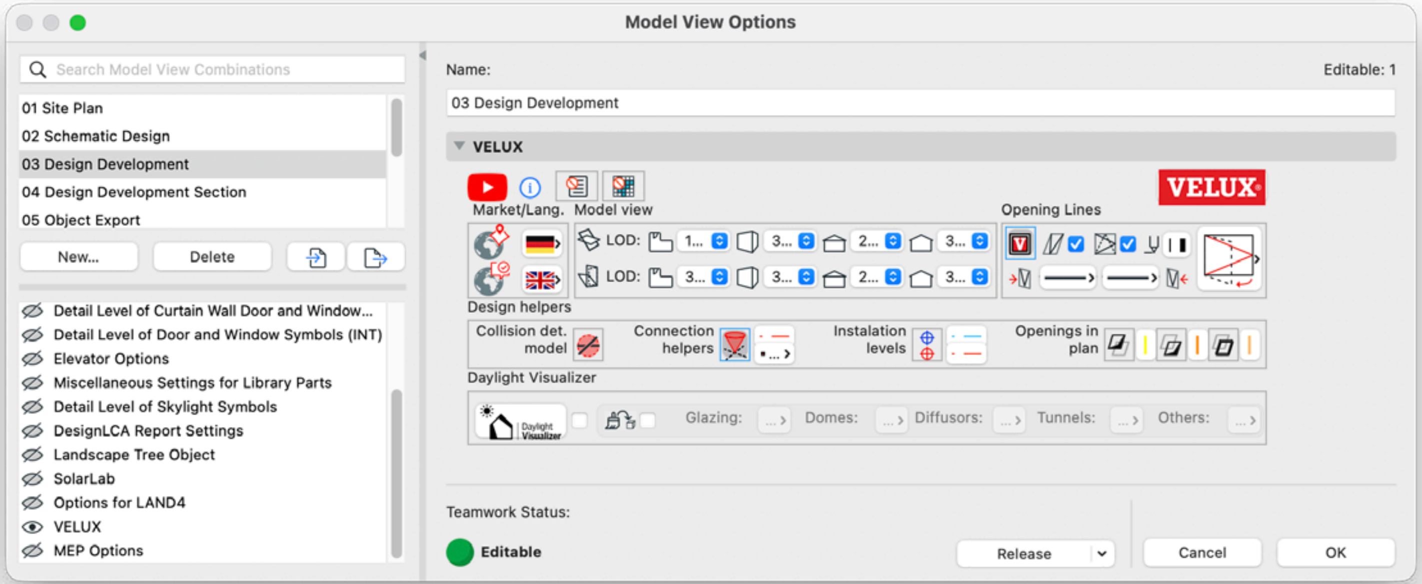
Model View Options

A key feature of the VELUX Archicad library is its integration with Model View Options (MVO), that allow the graphical representation and level of detail of BIM objects to be controlled across the entire project.

During concept design, roof windows can be displayed as simplified openings with minimal graphical information. This keeps drawings clear and improves model performance while still supporting daylight studies, placement evaluations, and spatial design development.

As the project progresses into design development and construction documentation, the same objects can display additional information such as frame profiles, opening mechanisms, installation details, and product-specific geometry. This allows the model to gradually increase in detail without replacing the objects.

Pro tip! Create Model View Combinations for each project stage or specific views. This allows the same BIM model to support concept design, planning approval, detailed design, and construction documentation while showing the appropriate level of information for each stage.



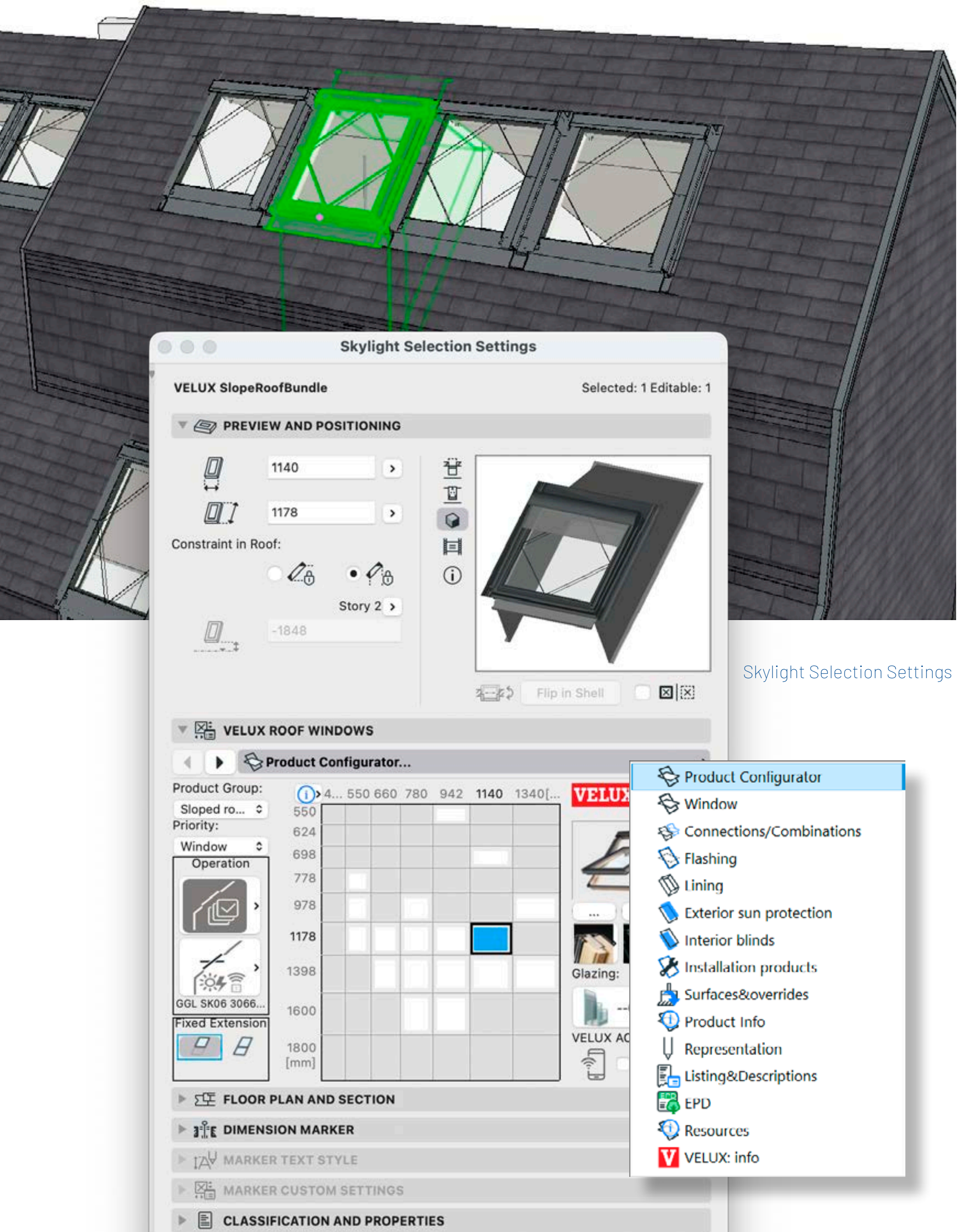
Model View Options settings

VELUX Window Settings

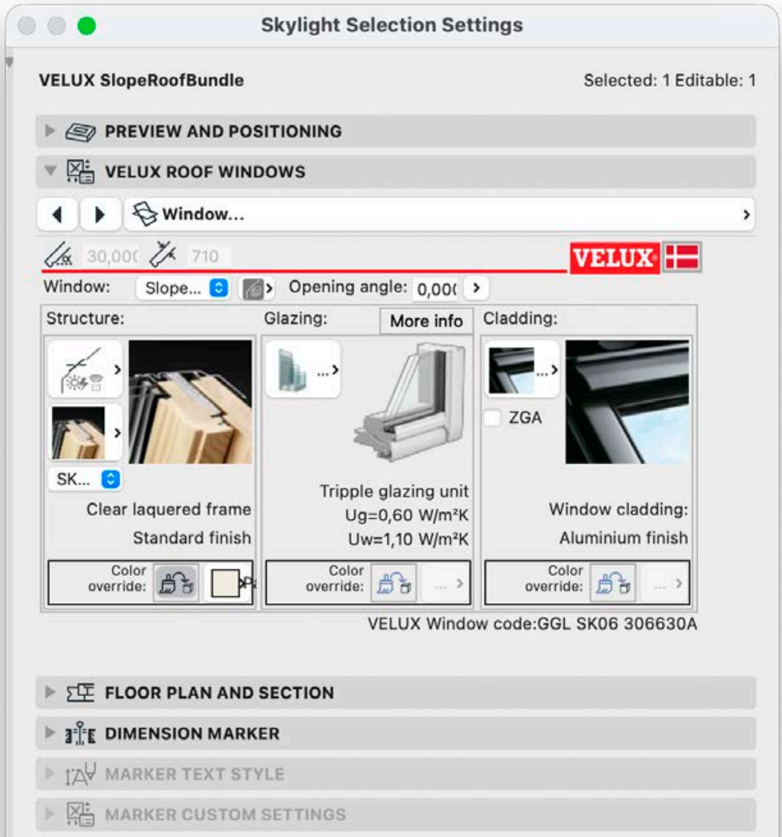
VELUX windows allow you to select and adjust product size, product line, features, and accessories, offering design flexibility.

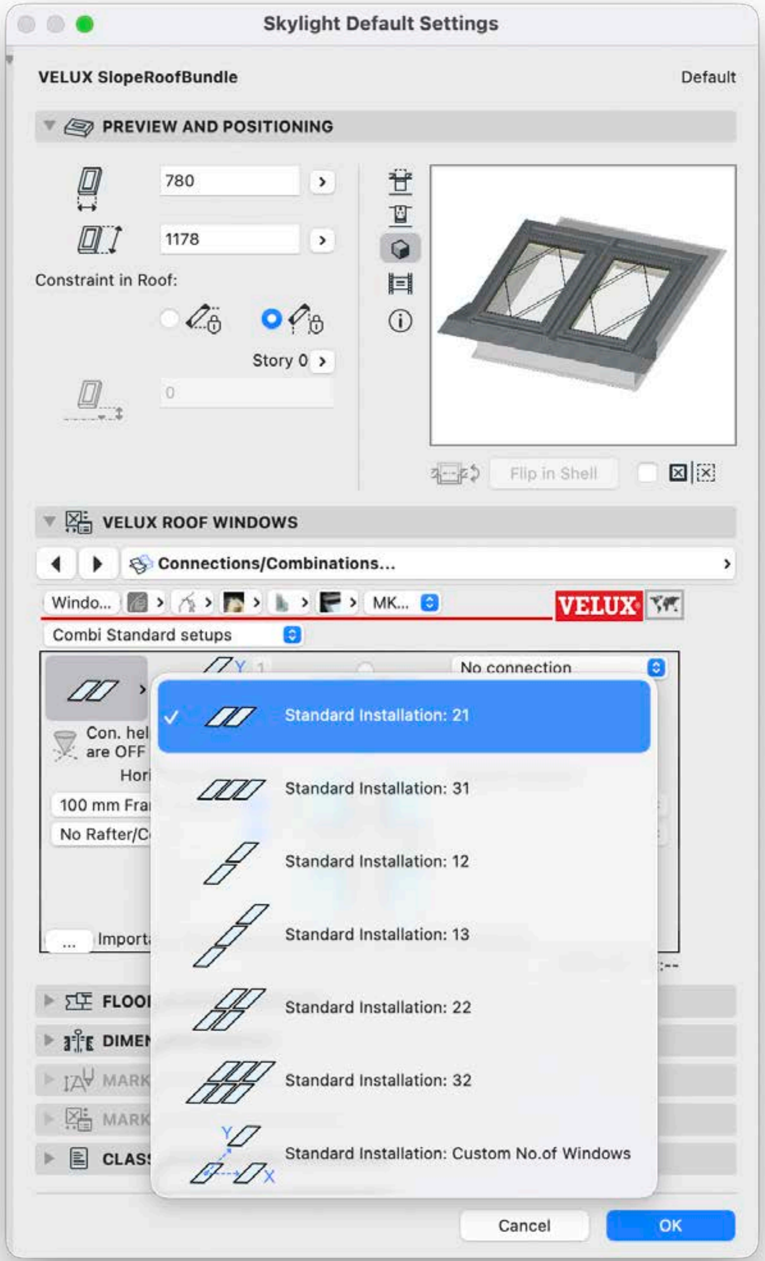
As with many other objects, windows exist in relation to their surroundings, and VELUX window settings take this into account. Rather than treating each window as an isolated object, VELUX window settings allow you to define how windows behave as part of a system. With “Connections / Combinations,” you can ensure consistent spacing, alignment, and detailing, depending on whether the windows are placed in series or across different building planes.

When VELUX roof windows are placed in a row, for example as a sequence of four windows, they will be treated as a single modular system. In this setup, the spacing between windows is no longer just a fixed geometric distance, but becomes a controlled installation zone. This allows the windows to automatically align to a shared grid, where frames, flashings, and in-between details are coordinated as one continuous solution.



Skylight Selection Settings

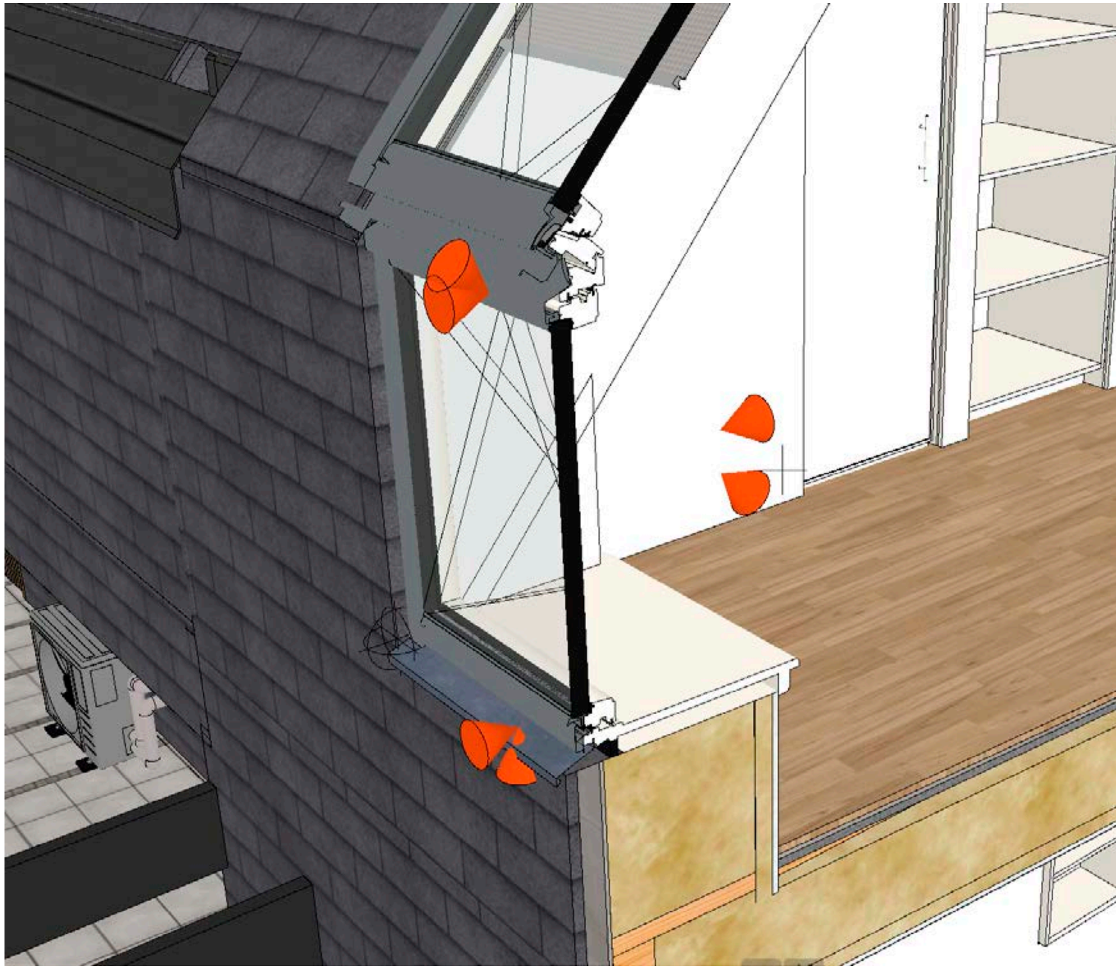




Connections/Combinations Settings

When a vertical connection occurs between a facade window and a roof window, you can enable the "Connection Helpers" feature, which helps align the windows using red cones.

The 'Connection helper' acts as a transformation zone, adjusting the relationship-between the vertical facade element and the inclined roof window. This ensures that the transition between wall and roof is resolved without clashes, and that in-between flashing, frame geometry, and construction logic are generated in a way that reflects realistic building assembly.



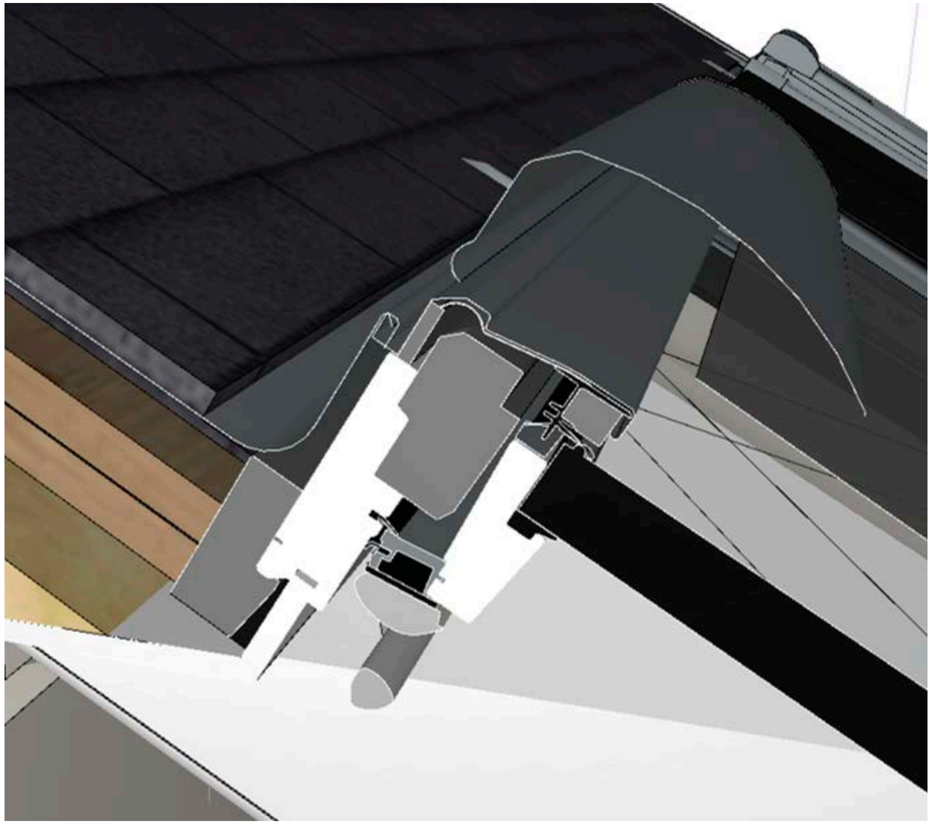
Windows with connection helpers on

Installation Principles Through BIM Objects

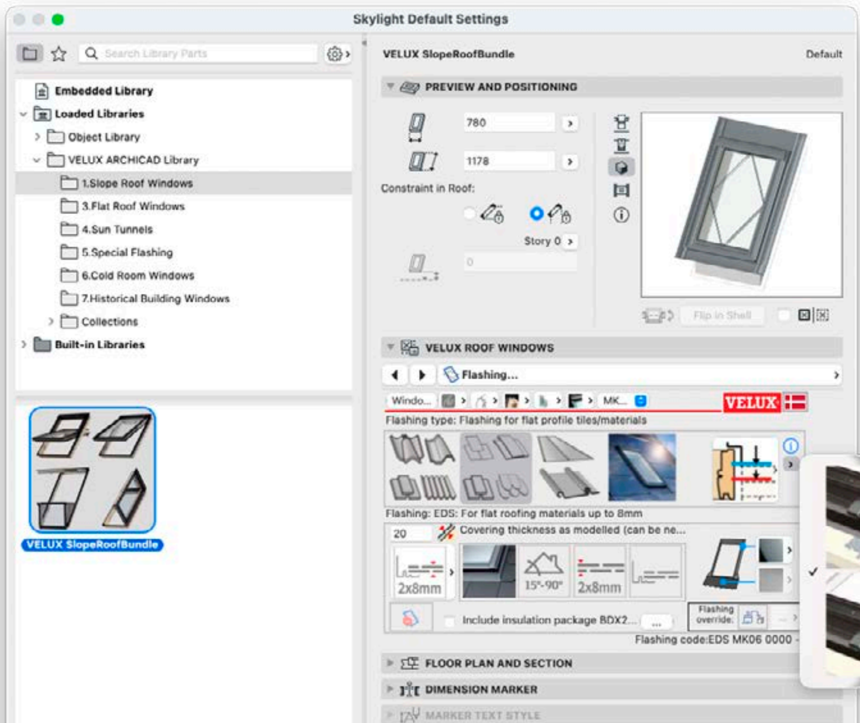
BIM objects not only define geometry and data, but also act as a direct link between the digital model and the physical product. In the case of VELUX roof windows, the detailed 3D BIM objects are designed to closely match the real-world products, ensuring that what is modelled can also be built without interpretation gaps. This includes exact dimensions, frame build-ups, installation zones, and product-specific constraints that reflect the actual installation process on site.

A key aspect of this level of detailing is ensuring sufficient space for performance-critical components, such as a 30 mm insulation collar around the window frame. This detail is essential for achieving improved thermal performance, as it reduces thermal bridging and contributes to a lower overall U-value for the construction. By embedding this requirement directly into the BIM object, the design automatically accounts for the necessary installation space, reducing the risk of conflicts during later design and construction phases. Windows, curtains and shutters can be opened and rolled up/down for design evaluation and visualization purposes.

In this way, BIM objects move beyond representation and become active design tools that ensure both geometric accuracy and building performance. They support a workflow where technical detailing, energy performance, and constructability are integrated from the earliest stages of design development.



VELUX window profile



Skylight settings, flashing

VELUX 2D detail drawing workflow
3D objects can automatically generate much of the information needed for detail drawings. However, the level of detail in 3D objects is often a bit rough to keep the object lightweight and avoid slowing down the model. For detailed drawings of objects, it can therefore be useful to work with dedicated 2D CAD details for refinement.

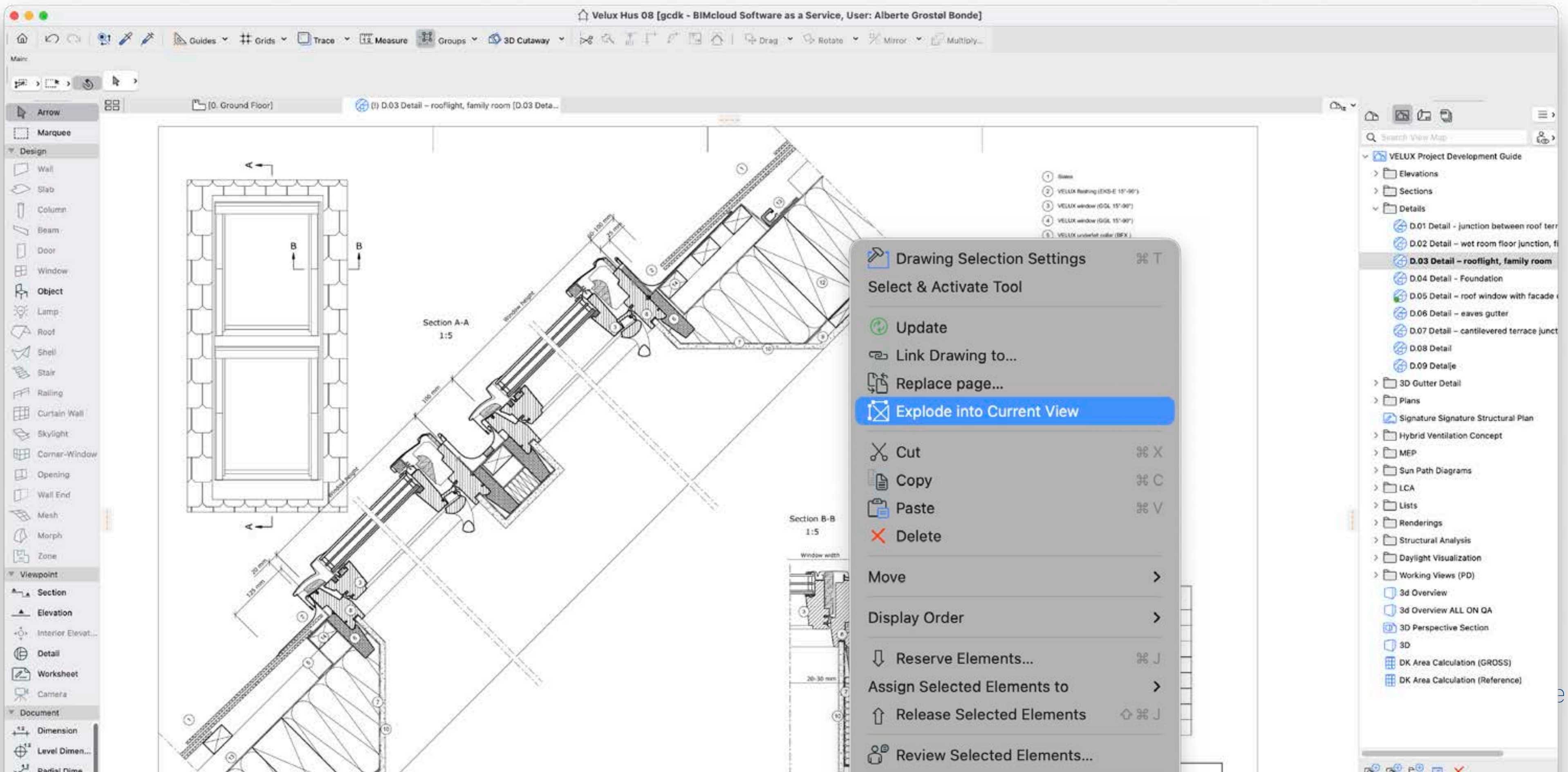
For VELUX windows specifically, there are many different configurations, products and installation options to choose from. Obtaining the details for your specific VELUX window is made into a straightforward process. From the "Skylight Selection Settings" in Archicad, go to "VELUX ROOF WINDOWS" then "Resources..." and choose "2D Detail Configurations". This opens the VELUX detail configurator in your web browser, where you can select the configuration that corresponds to the window in your project. Here, you can specify parameters such as roof material, window group, flashing, roof construction, and other relevant conditions.

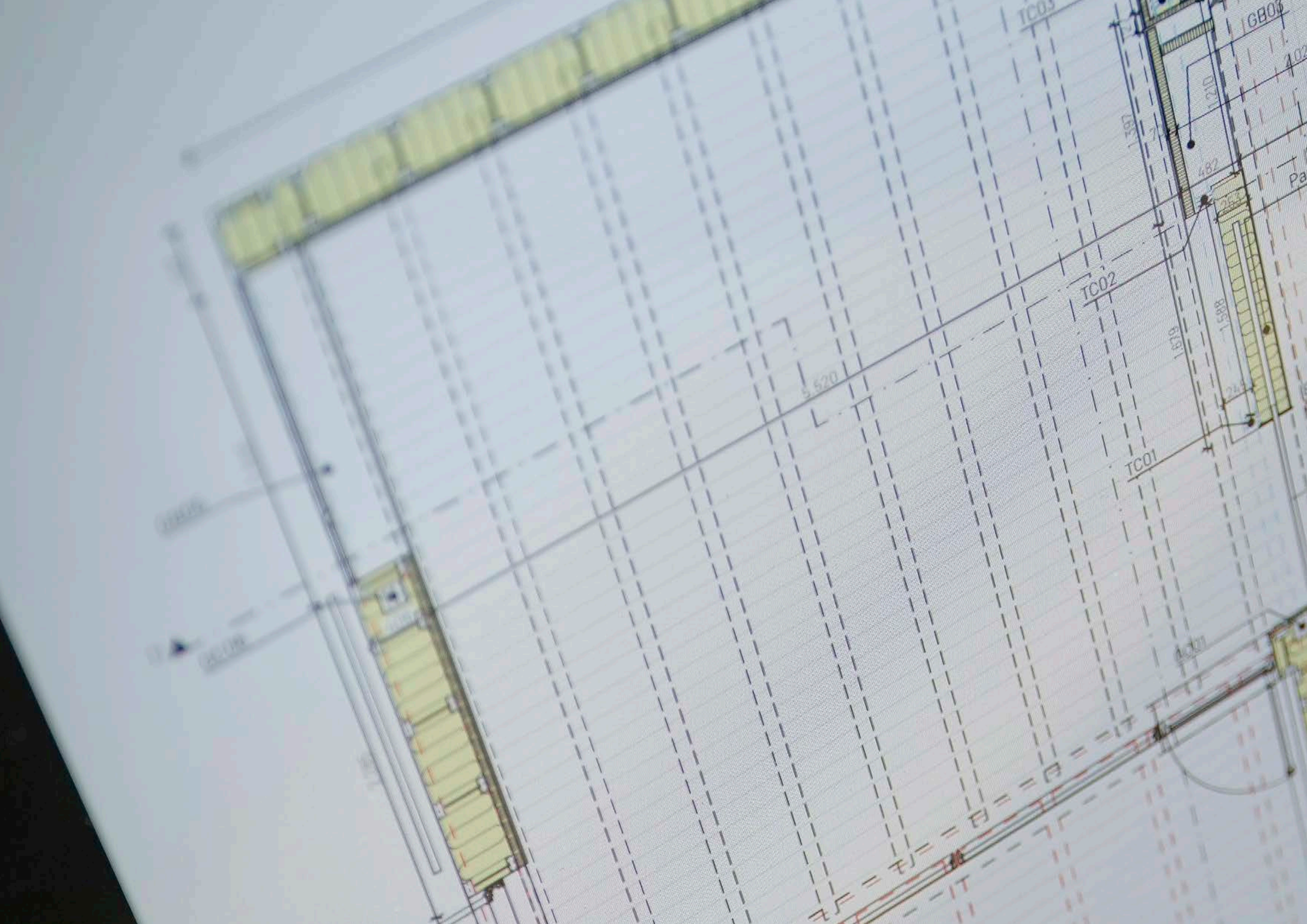
Once the configuration is complete, VELUX generates a PDF containing detail drawings specific to the selected window and construction. Download the PDF and return to Archicad. The PDF can then simply be dragged and dropped directly into the Archicad detail view. It is important that the scale of the detail view corresponds to the scale on the 2D detail drawing PDF.

To turn the imported PDF into editable 2D elements, right-click it and select "Explode into Current View". The individual lines, fills, and other drawing elements can now be edited directly in Archicad. Delete any parts of the original drawing that are not needed and adjust the remaining elements to suit the project.

This gives you a detailed, editable 2D CAD drawing based on the specific VELUX window configuration, rather than relying solely on the simplified detail generated from the 3D object.

VELUX 2D drawing exploded into layout




TC03
GB03
1.210
1.397
482
TC02
1.588
1.679
5.520
TC01


sliding door

DESIGN DEVELOPMENT

Detailed Modelling
As we move into the detailed design phase, the expectations for the level of detail increase. It therefore becomes essential that the model is developed with sufficient accuracy and detail to support the next stages of the project.

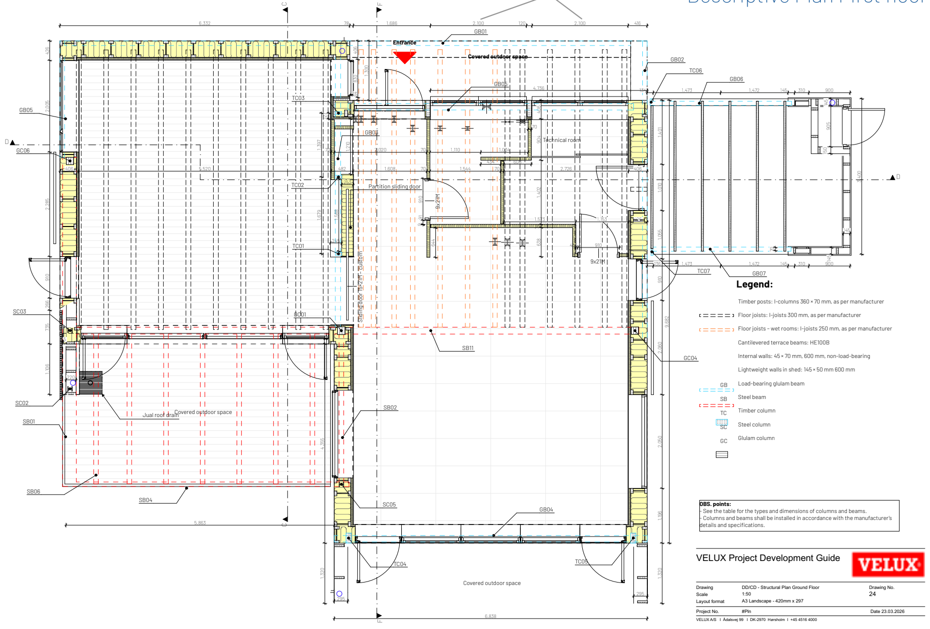
If the project is not modelled in enough detail, it can lead to coordination issues, misunderstandings, and errors during documentation and construction. A well-developed model, on the other hand, ensures that all elements are clearly defined, coordinated across disciplines, and ready for execution.

It's crucial to the design workflow, that details are not added too early in the process, in order to keep flexibility for applying design changes to the project as late as possible.

This applies not only to geometry, but also to the level of information embedded in the model, supporting accurate drawings, quantity take-offs, and analysis.
In our project, we have modelled the construction in detail, primarily consisting of a timber frame structure with additional steel framing in specific areas. This represents a high Level of Development, and whether this level is necessary depends on the intended use of the model.

Pro tip! A higher level of detail can be beneficial for tasks such as clash detection, coordination between disciplines, and LCA calculations, where accurate material definitions and quantities are essential.

Descriptive Plan First floor



Architectural structural model prior to analytical simplification

Detail Drawings and 3D Details

In the detailed design phase, detail drawings are developed by extracting and refining specific parts of the model to clearly communicate how building elements are constructed. In Archicad, this process typically begins by identifying an area in a plan, section, or 3D view that requires further clarification, such as a junction between building components.

To create a detailed drawing, a new detail view is generated from the selected area of the model. This is done using the Detail Tool, where a region is defined – by drawing a polygon around the area of interest. This creates a separate detail window, where the scale can be increased (for example, from 1:100 to 1:10 or 1:5). The extracted view contains the relevant model elements, which serve as a precise base for further development. The detail can then be accessed and opened through the Navigator under "Details."

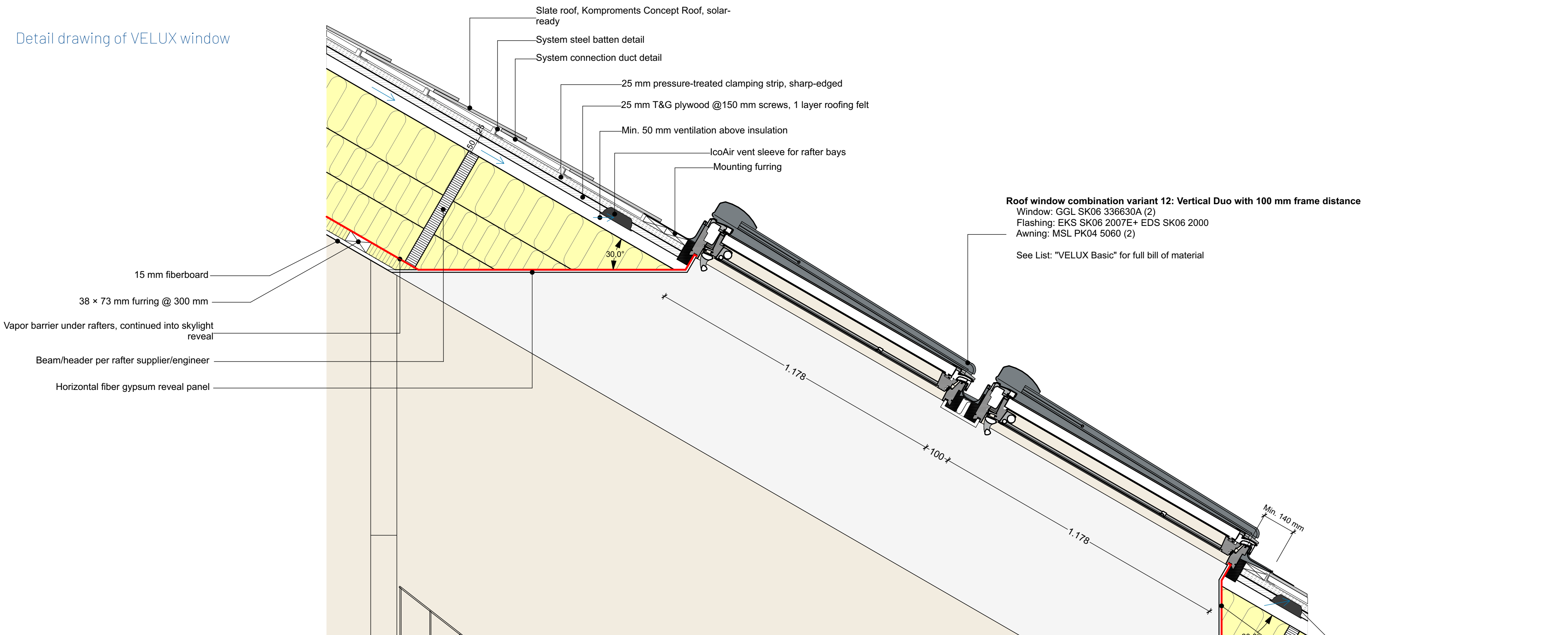
Once the detail view is created, it can be refined in 2D by adding linework and hatches on top of the extracted model geometry.

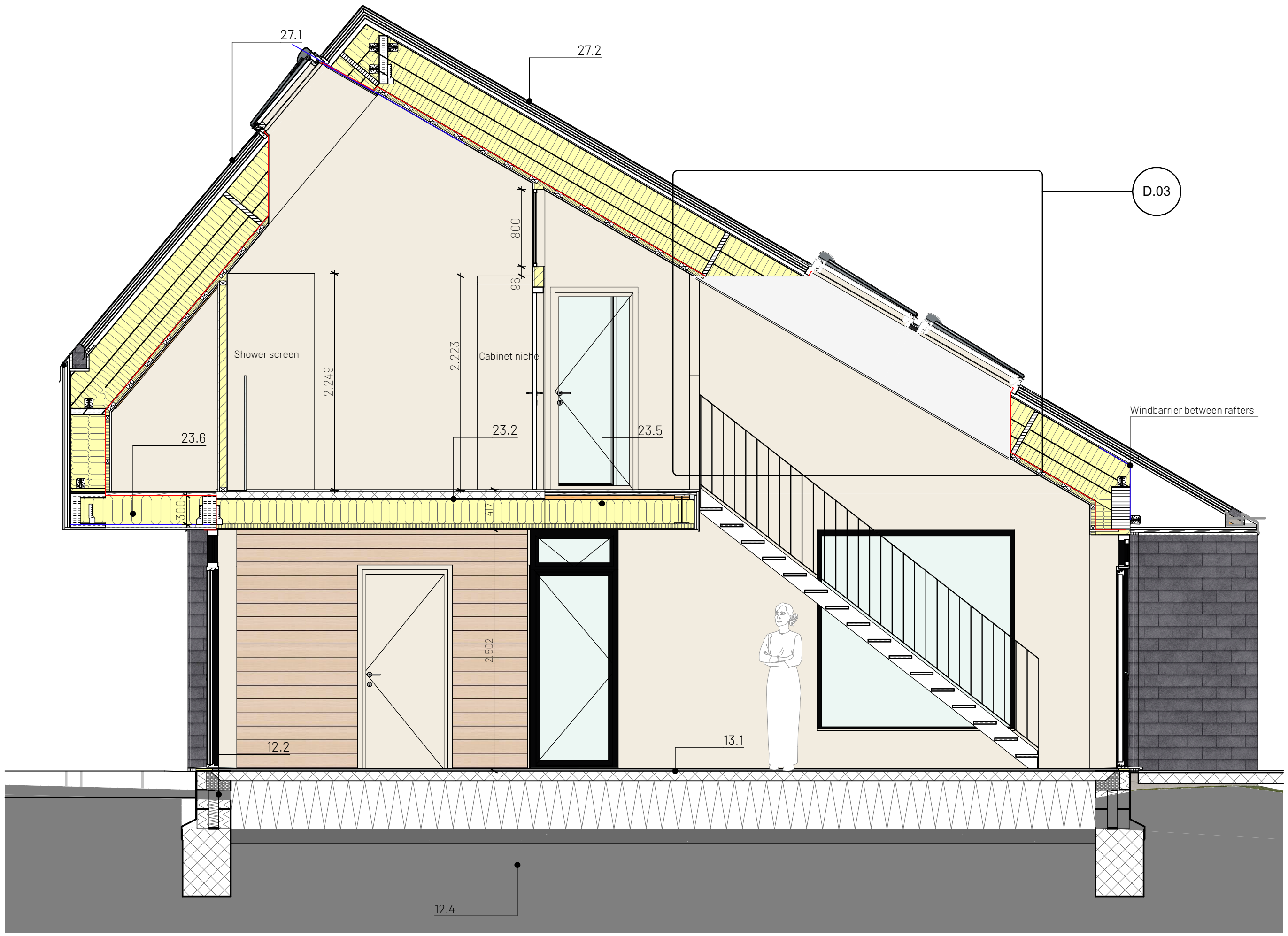
Pro tip! It is important to note that detail drawings are not always dynamically linked to the model. This means that if the model changes, the detail may need to be manually updated. As a result, the workflow can be more drawing-based depending on the project setup.

Pro tip! 3D details can also be developed by creating focused 3D documents or cutaways of specific building parts. These help illustrate complex assemblies and spatial relationships that may be difficult to fully understand in 2D.

By working in this way, detail drawings remain closely linked to the BIM model while allowing the level of information and clarity required for construction. This ensures that the project is accurately communicated and ready for execution.

Detail drawing of VELUX window





Section with Keynotes

12 Foundations

12.2 Door foundation	100 mm Leca block 40 mm beveled edge insulation 2 × Lecaterm blocks 350 × 190 × 490 mm Concrete foundation 500 × 600 mm – reinforced with 3 Y12 top and bottom
12.4 Isolated footing P01	Isolated footing 600 × 600 × 600 mm, reinforced with 4 Y12 bars top and bottom

13 Ground slab

13.1 Ground slab U-value: 0.07 W/m^{2}K	100 mm reinforced concrete slab, C25, reinforcement Y6 @ 150 mm 500 mm polystyrene insulation, C80, class 31 Minimum 150 mm capillary-breaking layer of crushed stone, also functioning as a radon suction layer

23 Floor slab

23.2 Floor slab wet room	20 mm tile system including adhesive and waterproofing 70 mm cast C20 concrete 16 mm dovetail panels (e.g., LEWIS) with underfloor heating pipes Sylomer strips between floor joists and dovetail panels 250 mm timber I-joists at 400 mm c/c according to manufacturer 245 mm wood fiber insulation 45 × 95 mm battens at 300 mm c/c 45 mm insulation 1 layer of 15 mm gypsum fibreboard
23.5 Raised floor slab	20 mm timber flooring 12.5 mm floor gypsum board 22 mm chipboard with grooves for underfloor heating 50 mm packing to achieve same floor height 250 mm timber I-joists at 400 mm c/c according to manufacturer 245 mm Steico Flex wood fiber insulation 45 × 95 mm battens at 300 mm c/c 45 mm wood fiber insulation 2 layers of 13 mm gypsum board
23.6 Cantilevered floor at attic space	20 mm timber flooring 12.5 mm floor gypsum board 22 mm chipboard with grooves for underfloor heating Vapor barrier 300 mm timber I-joists at 600 mm c/c according to manufacturer 295 mm Steico Flex wood fiber insulation 45 × 95 mm battens at 300 mm c/c Wind barrier / windproofing 25 mm battens / counter-battens Underside cladding

27 Roofs

27.1 Roof 50°, U: 0,07	Slate roofing Suitable steel battens and connection channels according to manufacturer 25 × 50 mm pressure-treated counter battens Roofing felt underlay 25 mm tongue-and-groove roof plywood Minimum 50 mm ventilated cavity between roof panels and insulation 500 mm wood fiber insulation, class 36 Rafters according to rafter manufacturer 45 × 95 mm strapping at 300 mm c/c 45 mm wood fiber insulation, class 36 15 mm gypsum fibreboard
27.2 Roof 30°, U: 0,07	Slate roofing Appropriate steel battens and connection channels according to manufacturer 25 × 50 mm pressure-treated counter battens Roofing felt underlay 25 mm tongue-and-groove roof plywood Minimum 50 mm ventilated cavity between roof panels and insulation 500 mm wood fiber insulation, class 36 Rafters according to rafter manufacturer 45 × 95 mm strapping at 300 mm c/c 45 mm wood fiber insulation, class 36 15 mm gypsum fibreboard

Keynotes & Specifications

In this project, a Keynote and specification system is used, which makes it possible to structure and communicate information about building elements in a consistent and efficient way within Archicad. A "Key" is linked to a database, where specific information about materials or building components is attached. This information can easily be displayed in the project by inserting it as Auto-text in Labels, if it needs to appear directly on a Viewpoint. In this way, a clear connection between the drawing and the description is ensured.

As part of the Keynote system, there is also a Legend object, which can be placed on one or more layouts. This object updates automatically and only shows the Keynotes that are relevant for the given layout, depending on which views or drawings are placed. The Legend object thus functions as a dynamic overview of the Keynotes used and their associated information, such as building component descriptions.

Keynotes are created via the "Keynote Palette" under the "Document" menu, where they can be organized into folders by building element, for example, "12 – Foundations" and "23 – Floor slab." Within these folders, individual Keynotes are created with a Key (number), a title, and a description containing the relevant specifications. For example, an exterior wall can be assigned a Key with a corresponding description of its composition, while an interior wall receives a different Key with its specific layers and materials.

Once Keynotes are created, they can be applied in plans, sections, and elevations using the "Label Tool", where building elements are 'tagged' with the relevant Keys. In the label itself, it is possible to define which information from the Keynote system should be displayed – ranging from just the Key number to a full description. Often, only the Key is displayed on the drawing to maintain clarity, while the full information is automatically collected in a Keynote Legend on the layout. This creates a clean and professional presentation, where drawings and descriptions are closely linked but remain easy to read.

Quantity Take-Off

With a highly detailed BIM project, Quantity take-off enables more accurate, efficient, and dynamic quantity information.

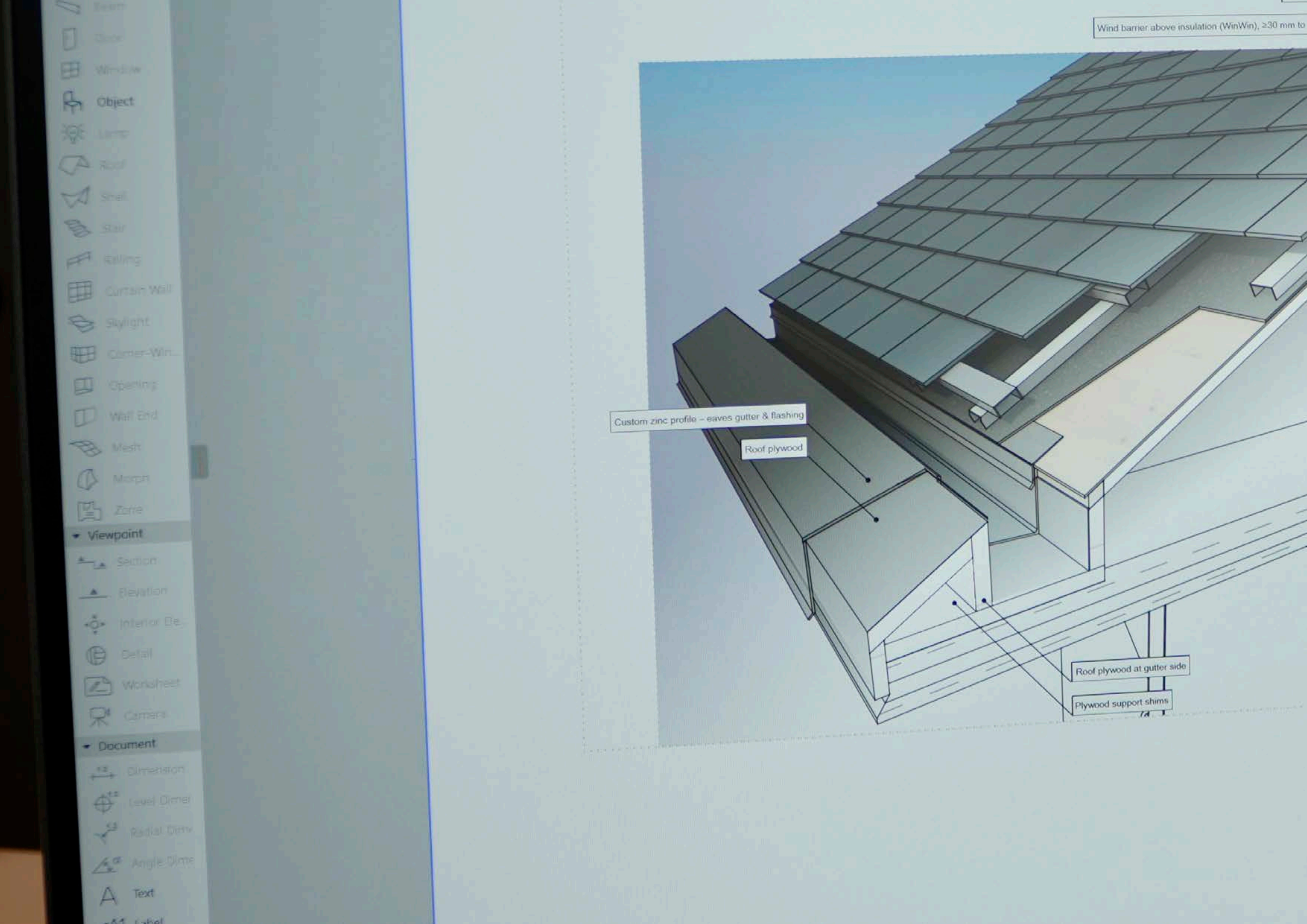
Because BIM contain both geometry and data, quantity take-off becomes more accurate and efficient compared to traditional manual methods. Any changes made in the model are automatically reflected in the quantities, ensuring that calculations remain up to date throughout the project.

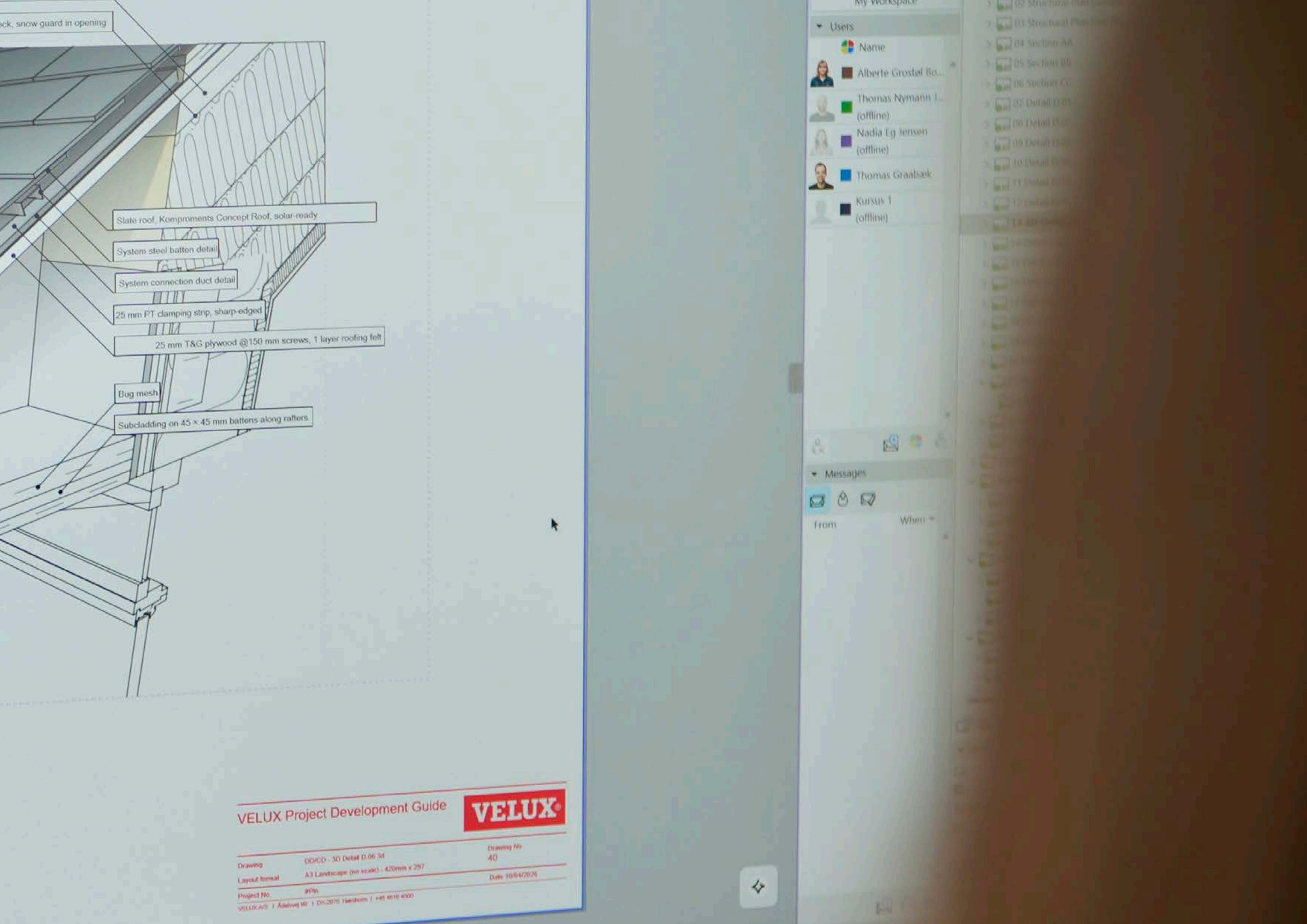
In Archicad, quantity take-off is typically performed using schedules. Elements are organized and filtered based on their properties, allowing you to extract specific information such as quantities, sizes, materials, and other relevant data into a schedule.

Pro tip! Carefully setting up your schedule filters can make quantity take-offs more robust. By filtering elements based on project data such as classifications, properties, or building materials rather than solely on element type, you can ensure that schedules capture the intended elements and provide accurate quantities, regardless of how individual elements were modeled.

VELUX Roof Window Schedule

Exterior Elevation					
Plan & Section					
Height (mm)	954	978	978	978	978
Width (mm)	942	942	942	942	1.340
Quantity	1	1	1	2	1
Description	Vertical window element VFB is side-hung, tilt and turn window. It is hinged on the right-hand side seen from the inside and installed vertically directly below a VELUX roof window. It is operated with a handle on the left side sash. Frame and sash made o	Electric roof window GGL is mains-powered and centre-pivoted. It is an all-in-one window equipped with a rain sensor and is based on the design of manual roof window GGL. In the VELUX code system, electric roof windows are identified by the number '21' at	Electric roof window GGL is mains-powered and centre-pivoted. It is an all-in-one window equipped with a rain sensor and is based on the design of manual roof window GGL. In the VELUX code system, electric roof windows are identified by the number '21' at	Electric roof window GGL is mains-powered and centre-pivoted. It is an all-in-one window equipped with a rain sensor and is based on the design of manual roof window GGL. In the VELUX code system, electric roof windows are identified by the number '21' at	Electric roof window GGL is mains-powered and centre-pivoted. It is ar all-in-one window equipped with a rain sensor and is based on the design of manual roof window GGL. In the VELUX code system, electric roof windows are identified by the number '21' at
External Material	VFB PK35 2066	GGL PK04 306921A	GGL PK04 306921A	GGL PK04 306921A	GGL UK04 306921A
Operation	Manual	ELECTRIC WITH IO CONTROL	ELECTRIC WITH IO CONTROL	ELECTRIC WITH IO CONTROL	ELECTRIC WITH IO CONTROL
Article Number	VFB PK35 2066	GGL PK04 306921A/EKS PK04 2001M/EKY W35 2000	GGL PK04 306921A/EKS PK04 2003C/EKY W35 2000	GGL PK04 306921A/EKS PK04 2002M	GGL UK04 306921A/EKS UK04 4003C
Roof Window Type	VFB PK35 2066	GGL PK04 306921A	GGL PK04 306921A	GGL PK04 306921A	GGL UK04 306921A
Vapour Barrier Collar	BBX PK35 0000	BBX PK04 0000	BBX PK04 0000	BBX PK04 0000	BBX UK04 0000
Awning	–	–	–	–	–
Blind	–	–	–	–	–
VELUX ACTIVE	☐	☐	☐	☐	☐
Acoustic Rating (Rw)	37(-2;-4)	35(-1;-3)	35(-1;-3)	35(-1;-3)	35(-1;-3)
Fire Classification	E	C-s1,d2	C-s1,d2	C-s1,d2	C-s1,d2
Security Class	P2A	P2A	P2A	P2A	P2A
Solar Heat Gain Coefficient	0.440	0.270	0.270	0.270	0.270
Window U-value (Uw)	1.000	1.100	1.100	1.100	1.100
Frame U-value (Uf)	1.700	1.800	1.800	1.800	1.800
Glazing U-value (Ug)	1.700	0.600	0.600	0.600	0.600
Glazing Edge Psi-value (Ψg)	0.049	0.052	0.052	0.052	0.052
Installation Psi-value (Ψi)	0.049	0.090	0.090	0.090	0.090
Window Area (m2)	0.900	0.921	0.921	0.921	1.311
Frame Area (m2)	0.340	0.321	0.321	0.321	0.401
Glazing Perimeter (m)	3.0	3.1	3.1	6.2	3.9
Window Perimeter (m)	3.8	3.8	3.8	7.6	4.6
Solar Reflectance	0.310	0.400	0.400	0.400	0.400
Solar Heat Transmittance	0.330	0.240	0.240	0.240	0.240
Ultraviolet Transmittance	0.050	0.050	0.050	0.050	0.050
Visible Light Reflectance	0.200	0.150	0.150	0.150	0.150
Visible Light Transmittance	0.680	0.620	0.620	0.620	0.620
Water Tightness Class	npd	E900	E900	E900	E900
Actuator Type		MOTORDRIVE	MOTORDRIVE	MOTORDRIVE	MOTORDRIVE
Glass Layers	3	3	3	3	3
Insulating Gass Fill	VFB PK35 2066	GGL PK04 306921A	GGL PK04 306921A	GGL PK04 306921A	GGL UK04 306921A
Infiltration	3.000	4.000	4.000	4.000	4.000
Shading Coefficient	0.530	0.633	0.633	0.633	0.633
Coated Glass	☒	☒	☒	☒	☒
Laminated Glass	☒	☒	☒	☒	☒
Tempered Glass	☒	☒	☒	☒	☒
Solar Powered	☐	☐	☐	☐	☐
Fire Exit	☐	☐	☐	☐	☐
Net Weight (kg)	36.149	42.503	42.503	42.503	57.129


Object
Viewpoint
Document
Text
Wind barrier above insulation (WinWin), ≥30 mm to
Custom zinc profile – eaves gutter & flashing
Roof plywood
Roof plywood at gutter side
Plywood support shims



ck, snow guard in opening
Slate roof, Komproments Concept Roof, solar-ready
System steel batten detail
System connection duct detail
25 mm PT clamping strip, sharp-edged
25 mm T&G plywood @150 mm screws, 1 layer roofing felt
Bug mesh
Subcladding on 45 × 45 mm battens along rafters
VELUX Project Development Guide
VELUX
Drawing
Layout format
Project No
40
Users
Name
Alberte Grostøl Bo...
Thomas Nymann J...
(offline)
Nadia Eg Jensen
(offline)
Thomas Graabæk
Kursus 1
(offline)
Messages
From
When

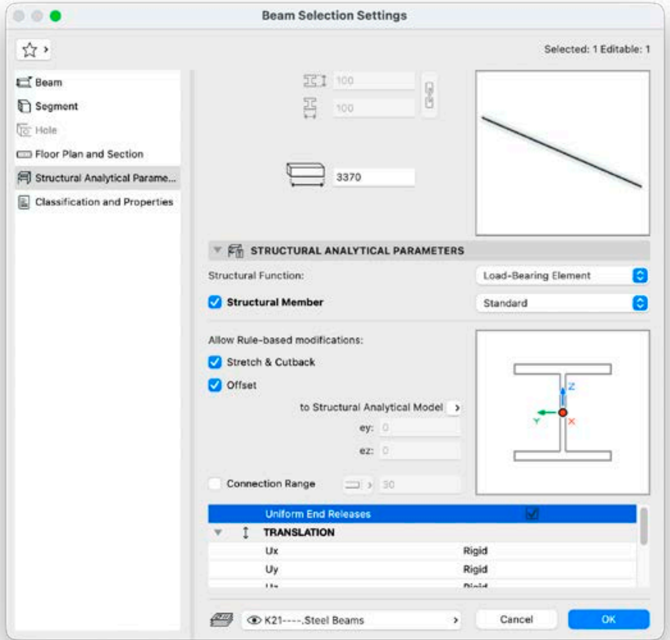
CONSTRUCTION DOCUMENTATION

Structural Modelling & Simulation
During the detailed design phase, structural analysis plays a key role in ensuring that the building is both structurally sound and materially efficient. Rather than only verifying that the structure can withstand applied loads, the process also supports optimisation by refining structural elements, reducing material use, and improving overall performance.

In this project, the structural model developed in Archicad was used as the basis for analysis in FEM-Design. To prepare the model for analysis, structural elements such as beams, columns, slabs, and load-bearing walls were assigned the structural function "Load-Bearing Element". The analytical model was then reviewed in Analytical Model mode, where it appears as a simplified system of lines and nodes, allowing the structural system to be checked for connectivity and consistency.

To focus on the structural system, "Partial Structure Display" can be set to "Core of Load-Bearing Elements Only". Elements that transfer loads without acting as structural members can remain load-bearing while having their analytical model participation disabled, allowing them to define load positions without creating analytical elements.

Beam assigned as load-bearing



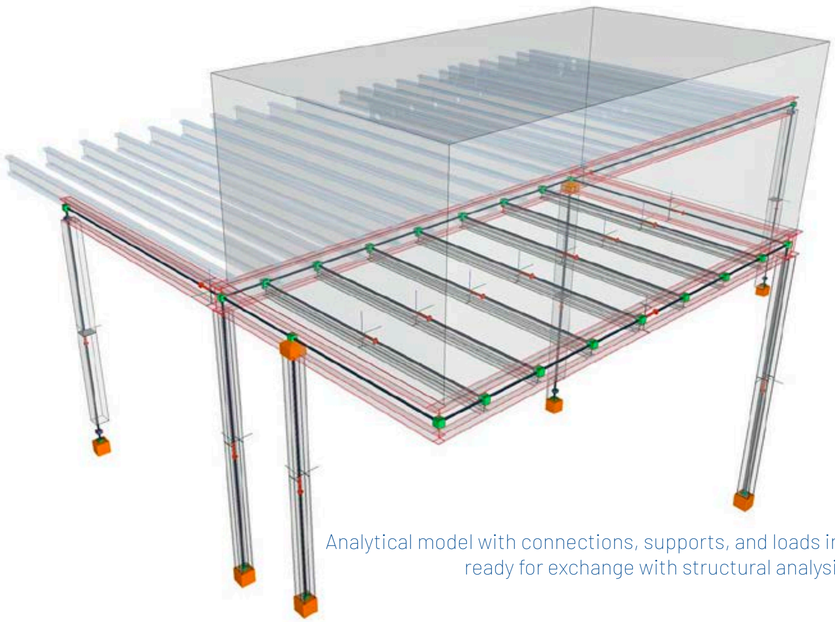
Pro tip! Some elements may transfer loads without acting as structural members. These should remain load-bearing but have their analytical model participation disabled, so they define load positions without creating analytical elements.

Once the analytical model has been prepared, it is exported as a SAF file to FEM-Design for structural analysis, where loads, supports, material properties, and structural connections are evaluated.

Once analysed in FEM-Design, the results were used to evaluate the performance of the structure. Elements that were underutilized could be reduced, while overstressed areas could be strengthened or redesigned. The resulting design changes were then implemented back into the Archicad model, creating an iterative workflow between modelling and structural analysis.

This continuous exchange between design and analysis supports more informed decision-making and helps achieve a structure that is both safe and resource-efficient, and thereby supporting informed structural optimisation decisions that may contribute to reduced material consumption.

Pro tip! Use Zones to generate live loads automatically. Enable "Generate Live Loads" in the "Zone Settings", assign a load category, and ensure a slab is included as a load-bearing analytical element.

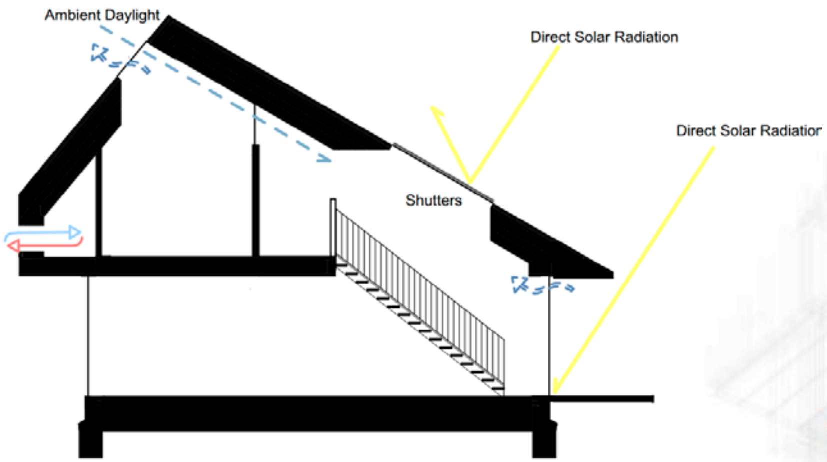


Analytical model with connections, supports, and loads in Archicad, ready for exchange with structural analysis software

MEP Modelling

Mechanical, electrical, and plumbing (MEP) systems are an important part of a coordinated BIM project, particularly as the interaction between building services and architectural elements becomes more complex. This is especially relevant for this project, which includes a range of systems such as natural and mechanical ventilation, a heat pump, solar thermal systems, and solar panels.

The range of systems reflects an integrated design approach focused on achieving low energy consumption through the combination of passive design strategies and efficient building systems. Natural ventilation was supported by the building geometry, while beneficial solar gains were utilised when appropriate and external shading was used to reduce the risk of overheating during summer. These passive and active strategies were analysed and optimised using building performance simulation tools such as IDA ICE.

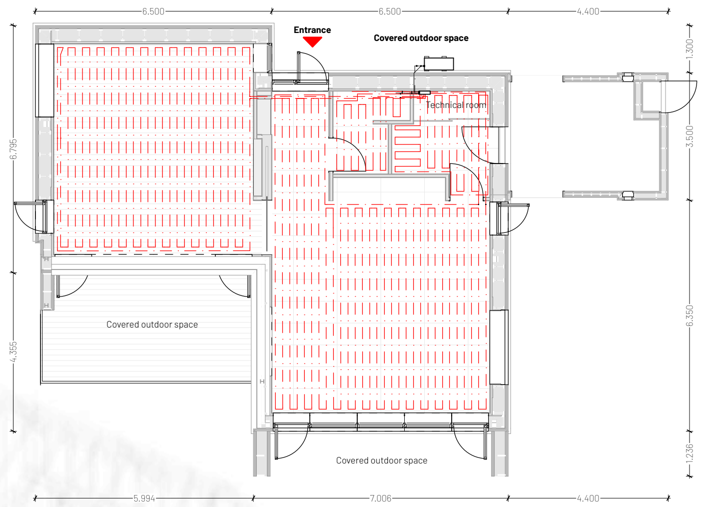


Hybrid ventilation and passive design strategies under summer conditions.

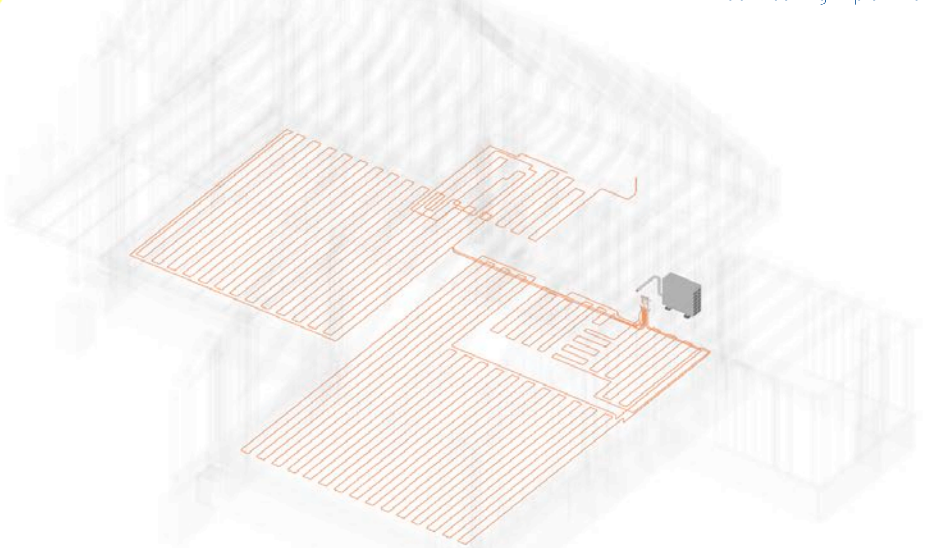
For modelling MEP systems in Archicad, the MEP Designer tool is used. MEP Designer supports water supply, heating, sanitation, ventilation, and electrical systems. It also enables the import of IFC-based systems and supports the modelling and coordination of ductwork, piping, and required openings in building elements.

To optimise the workspace and improve the efficiency of MEP modelling and routing, select the "MEP Engineering Profile" under "Work Environment" in the "Options" menu. This configures the Archicad workspace with the tools and settings needed for efficient MEP modelling.

MEP systems can be managed under "Element Attributes" in the "Options" menu, where system types, attributes, and standards can be defined. Routing dimensions and default parameters can be adjusted under "Project Preferences" and then "Route Specifications"



Floor heating in plan view



Floor heating in axometric view

The systems are drawn using segments and nodes. The "Info Palette" allows continuous adjustment of system size, type, and placement. Nodes and segments can be added along the routing line, and connections to existing systems automatically create junctions and tees.

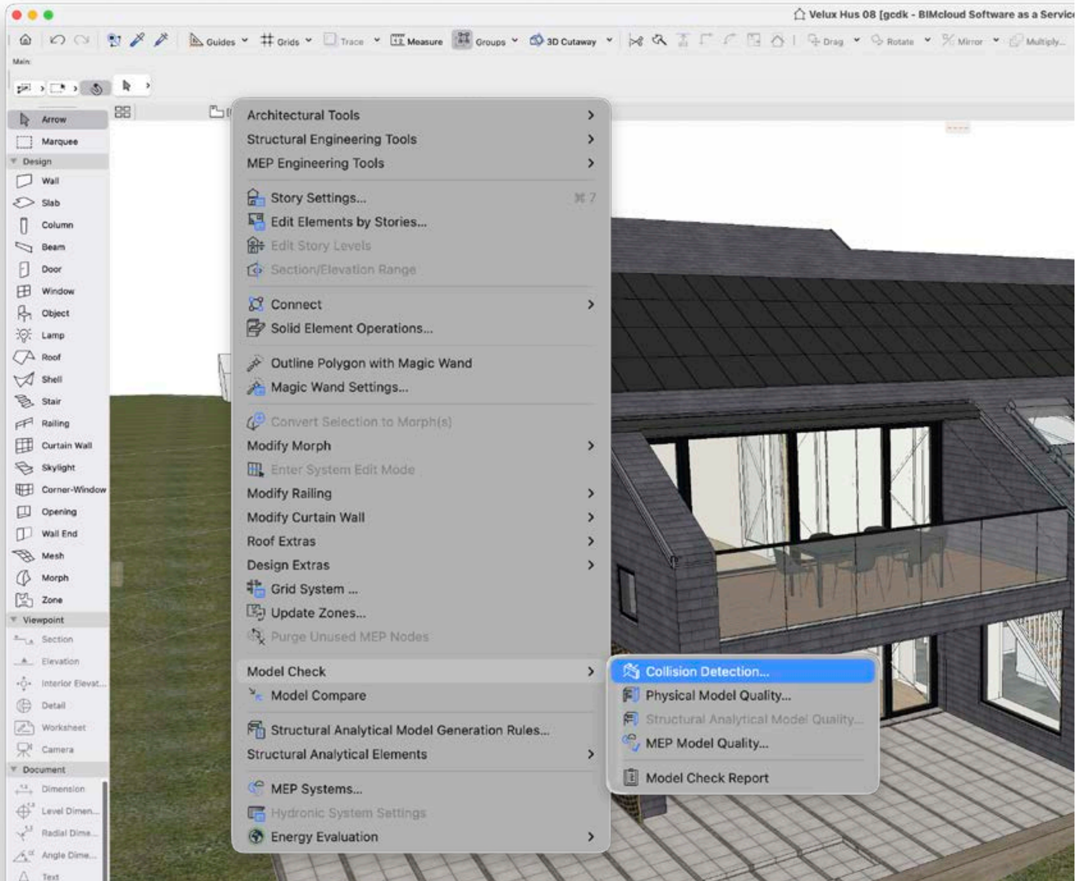
MEP systems are modelled in both 2D and 3D views, ensuring coordination with the overall building model and supporting accurate construction documentation.

Collision Control and Issue Management

Collision control is an important part of BIM-based coordination, helping identify conflicts between building systems and disciplines before construction begins. By reviewing the model digitally, clashes between disciplines such as structure, architecture, and MEP can be detected and resolved early, reducing the risk of costly changes on site.

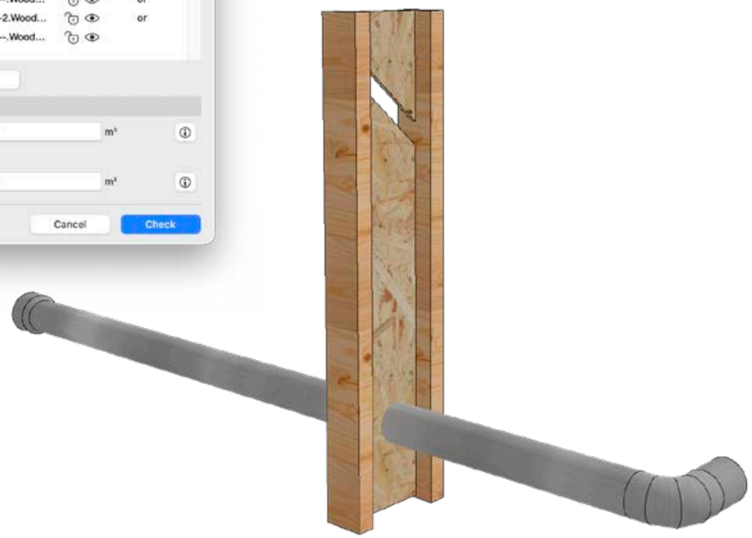
In this project, collision control was primarily carried out between the structural elements and the MEP systems. Particular attention was given to areas where ducts, pipes, and cable routes passed through structural elements such as beams, walls, and slabs. Identifying these conflicts early made it possible to adjust the structural design, reroute MEP systems, or introduce the necessary openings before construction documentation was finalized.

Collision control in Archicad was performed using the built-in "Collision Detection" tool. The tool allows users to define which elements should be checked against each other using criteria such as element type, layer, classification, or element ID. The process generates a "Model Check Report", from which colliding elements can be quickly located, highlighted, and isolated directly in the model.



Issue management supports this process by documenting identified clashes and assigning actions to the relevant discipline. Issues can either be resolved directly by the user or assigned to other project participants working on the shared BIMcloud project or via BCF files, ensuring that coordination tasks are tracked and resolved systematically.

Collision detected between wood construction and MEP element



Pro tip! Run collision checks regularly throughout the project instead of waiting until the model is complete. Resolving small coordination issues early is significantly easier than addressing large numbers of clashes at the end of the design process.

Collaboration
BIM-based collaboration makes it possible for different disciplines and software platforms to work together while maintaining a consistent flow of project information.

In a multidisciplinary project, collaboration is not limited to working simultaneously in the same model. It also involves exchanging models and data between different software platforms, coordinating design changes, and ensuring that information can be transferred without unnecessary loss or duplication.
In this project, collaboration was supported through a combination of Archicad Teamwork and BIMcloud for working within the shared BIM environment, and OpenBIM formats for exchanging information with external analysis and coordination software.

This made it possible to maintain a central architectural and building model while allowing structural and technical disciplines to work with the information in software suited to their specific tasks.

IFC
Industry Foundation Classes (IFC) is an open format for exchanging BIM information between different software platforms. Unlike a native Archicad file, IFC allows building elements and their information to be transferred between BIM applications such as Revit, Vectorworks, Scia, Tekla and MagiCAD.

In this project, IFC was used to exchange information between Archicad and other disciplines or software platforms. The Archicad model could be exported with relevant building elements, geometry, classifications, properties, and relationships, which could then be used for coordination, modelling, or analysis.

A successful IFC exchange depends on correct model preparation and export settings. IFC Translators control which elements and properties are exported and how they are mapped to IFC entities. Different setups can therefore be created depending on the purpose, such as coordination or delivery to external consultants.

SAF
Structural Analysis Format (SAF) was used to exchange structural information between Archicad and FEM-Design. Unlike IFC, SAF is specifically designed for structural analytical models.

In this workflow, the structural model was prepared in Archicad and exported to FEM-Design for analysis and optimisation. Changes could then be transferred back to Archicad and incorporated into the BIM model.

Before exporting, structural elements, materials, cross-sections, and analytical connections must be correctly defined. The SAF Translator controls how these elements are mapped between the two software platforms.

SAF supports an iterative workflow between architectural modelling and structural analysis, allowing information from the BIM model to be reused instead of creating a separate structural model from scratch.

BCF
BIM Collaboration Format (BCF) was used as a lightweight format for communicating issues between BIM applications. Instead of exchanging the entire model, BCF allows users to share specific issues, including their location, viewpoint, description, and status.

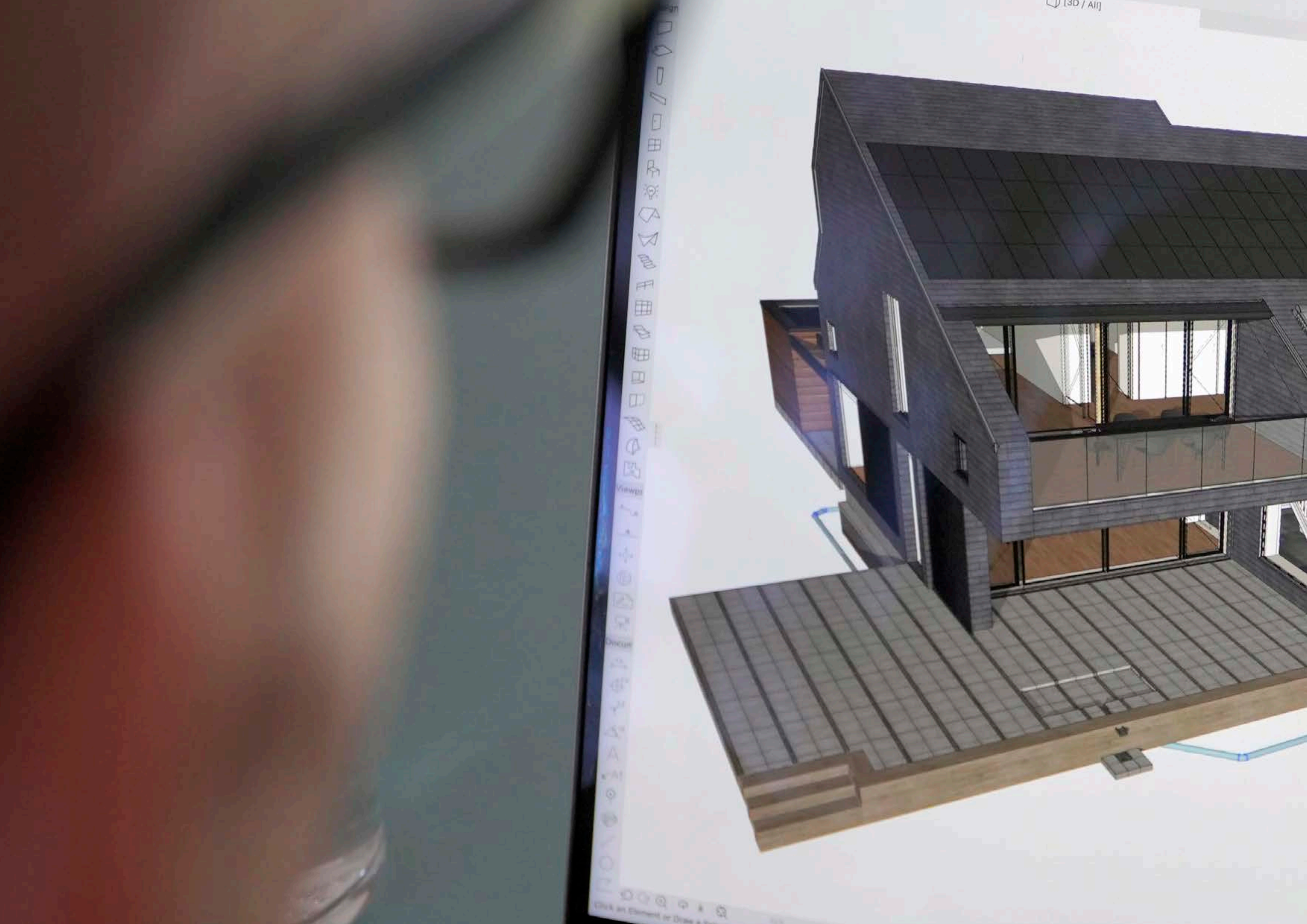
This makes it possible to identify a problem in one software platform and communicate it to another discipline without sending a new version of the entire BIM model. The receiving user can open the issue, navigate to the relevant location, and make the necessary changes.

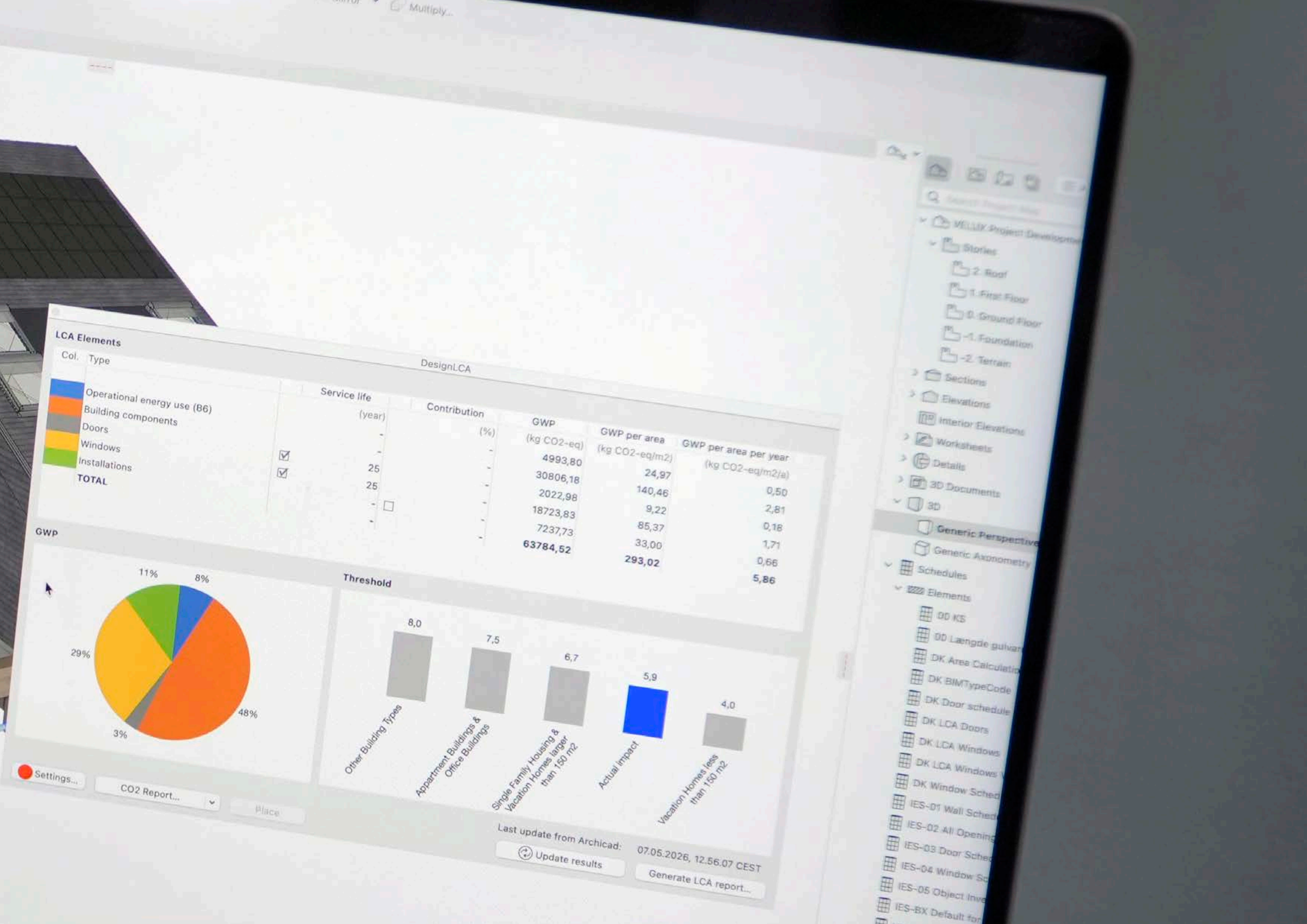
In this project, BCF supported issue management by connecting coordination problems with the people responsible for resolving them. This is particularly useful when working across different disciplines and software platforms.

Together, IFC, SAF, and BCF support an OpenBIM workflow by enabling the exchange of models, structural analysis data, and coordination issues between different software environments. This reduces dependence on a single platform and makes BIM information more flexible throughout the project.

Pro tip! Before exchanging information, agree on what the receiving discipline actually needs. Exporting the entire model is not always the best solution. A well-defined IFC, SAF, or BCF exchange containing only the relevant information makes coordination easier and reduces the risk of unnecessary or incorrect data being transferred.

openBIM®


[3D / All]



LCA Elements
DesignLCA
Col.
Type
Operational energy use (B6)
Building components
Doors
Windows
Installations
TOTAL
Service life
(year)
Contribution
(%)
GWP
(kg CO2-eq)
4993,80
30806,18
2022,98
18723,83
7237,73
63784,52
GWP per area
(kg CO2-eq/m2)
24,97
140,46
9,22
85,37
33,00
293,02
GWP per area per year
(kg CO2-eq/m2/a)
0,50
2,81
0,18
1,71
0,66
5,86
GWP
11%
8%
29%
48%
3%
Threshold
8,0
7,5
6,7
5,9
4,0
Other Building Types
Appartment Buildings &
Office Buildings
Single Family Housing &
Vacation Homes larger
than 150 m2
Actual impact
Vacation Homes less
than 150 m2
Settings...
CO2 Report...
Place
Last update from Archicad:
07.05.2026, 12.56.07 CEST
Update results
Generate LCA report...
Stories
2. Roof
1. First Floor
0. Ground Floor
-1. Foundation
-2. Terrain
Sections
Elevations
Interior Elevations
Worksheets
Details
3D Documents
3D
Generic Perspective
Generic Axonometry
Schedules
Elements

LCA

Iterative LCA Calculations & DesignLCA

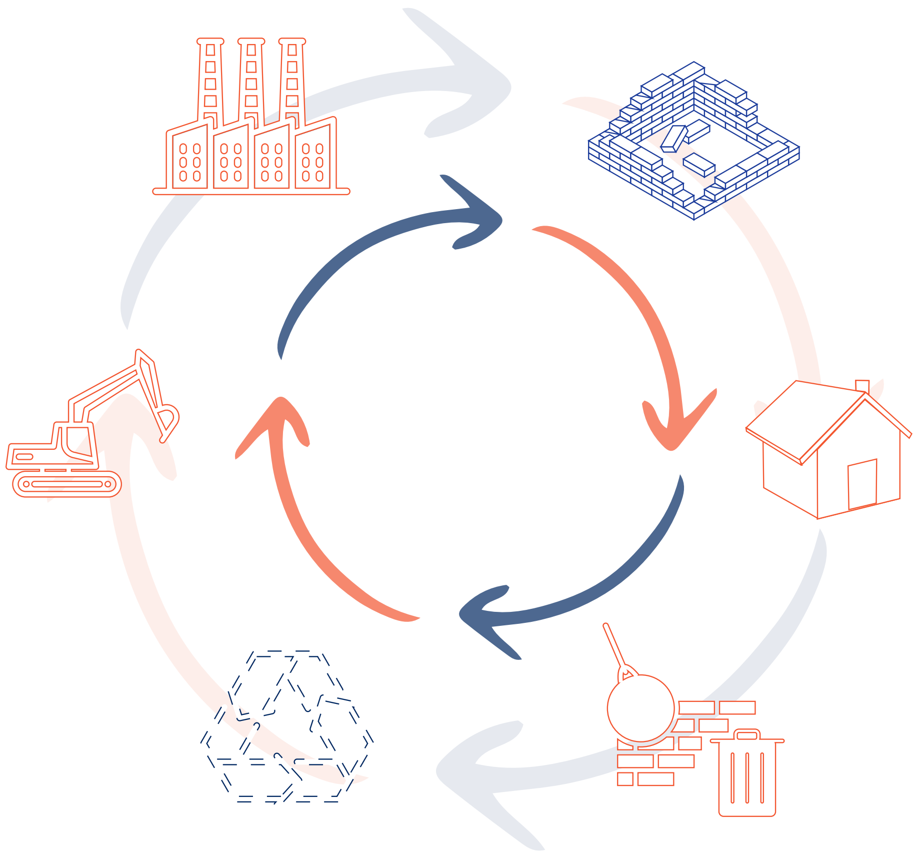
Life Cycle Assessment (LCA) is an essential tool for understanding and reducing the environmental impact of a building throughout its life cycle. Rather than being a one-time calculation, LCA is most effective when used as an iterative design tool that supports decision-making from early concept stages through to detailed design.

LCA should be introduced as early as possible in the design process. In the initial concept phase, even simplified assessments can provide a general understanding of how different material strategies influence the building's climate impact. At this stage, the goal is not precision, but direction – this is where the material path diagram introduced earlier can support decision-making.

As the project develops, LCA becomes increasingly detailed and accurate. However, design flexibility decreases over time, making early insights especially valuable. By continuously updating the LCA throughout the project, it becomes possible to evaluate design changes and compare alternatives.

In principle, LCA is a relatively straightforward calculation based on adding, subtracting, and comparing material impacts. However, it requires reliable data on material quantities, which change continuously during the design phase. This makes manual workflows, such as spreadsheets, time-consuming and difficult to maintain.

In Archicad, this process can be streamlined using the DesignLCA add-on. DesignLCA enables automated LCA directly from the building model, including all modeled elements, provided that materials are assigned with valid environmental data such as EPDs. This allows for rapid feedback, making it possible to test design variations and material substitutions efficiently as the project evolves. This approach was applied throughout the project, enabling iterative assessment of design decisions and material substitutions during the design process.



The life cycle of a building, from material production and construction to use, end-of-life, and potential reuse.

Operational Energy Calculation
In addition to the embodied carbon associated with building materials, LCA also includes the environmental impact of operational energy use, such as heating, cooling, and ventilation. Both operational and embodied impacts can represent a substantial share of a building's total life cycle impact, making it important to consider them together throughout the design process.

Material selection, layer thicknesses, and overall building geometry all influence the building's energy demand, including its potential for passive heating, cooling, and ventilation. This means that decisions made to reduce material use can affect the building's energy performance, and vice versa. Therefore, it is important to consider both embodied and operational impacts together throughout the design process.

In DesignLCA, operational energy can be included in two ways. The most integrated approach is to use Archicad's Energy Evaluation tool.

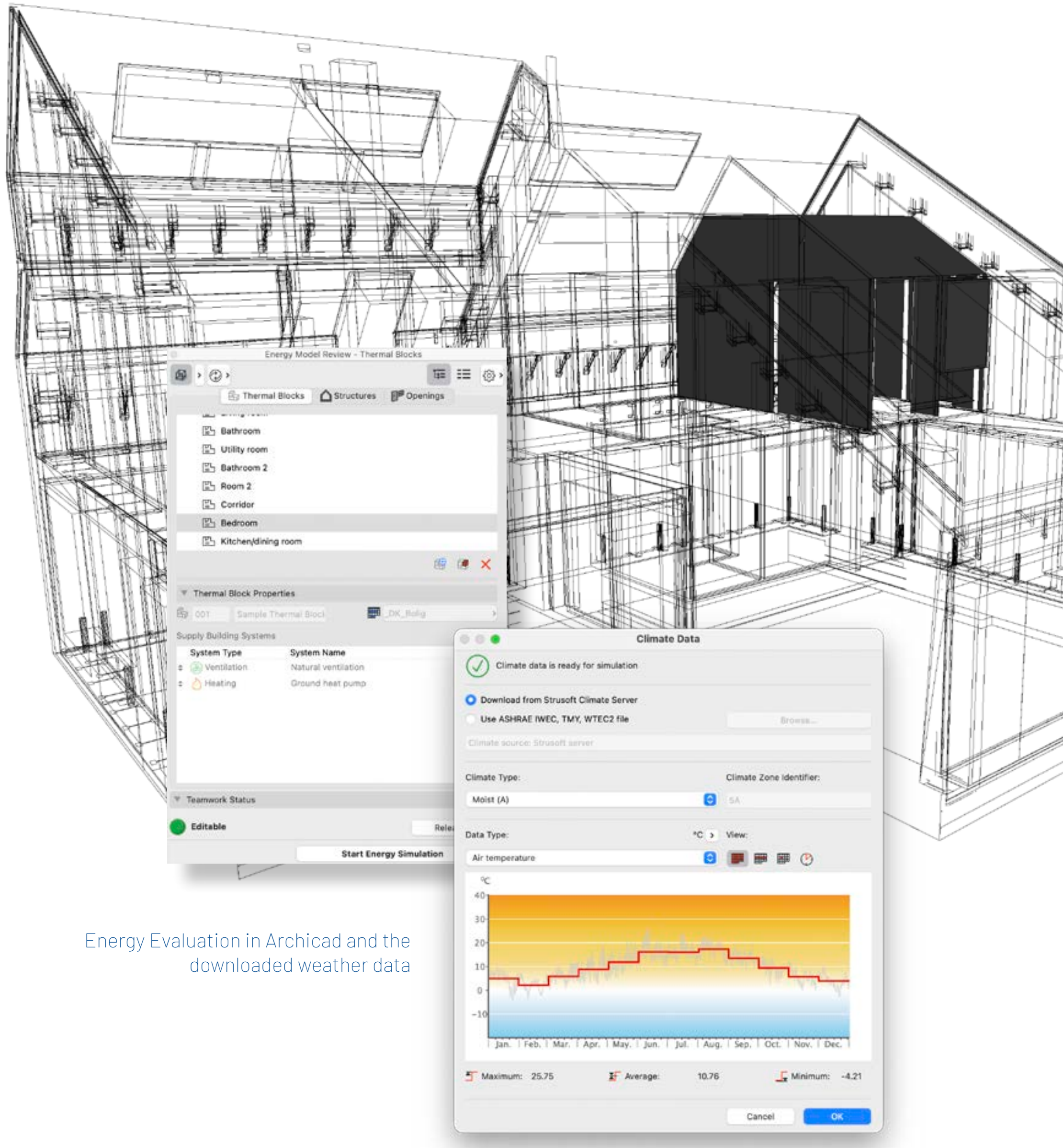
Here, the building is divided into thermal blocks based on function (e.g., residential, office, or school), each containing the relevant zones. For each block, systems such as heating, ventilation, and cooling are defined, along with location and climate data.

Based on the thermal properties of materials and constructions, Archicad calculates key values such as U-values and estimates the building's energy demand. The results can then be transferred directly to DesignLCA via "Export to DesignLCA", including operational energy and building area for use in the LCA.

Alternatively, operational energy can be calculated using external tools. In this case, the calculated energy demand must be translated into environmental impacts using appropriate emission factors and then entered manually into DesignLCA. This approach may be useful when more detailed or standardized energy simulations are required.

Pro tip! Ensure that the thermal properties of your materials are realistic and correctly defined, as they directly influence the energy calculation. When creating new materials, it is recommended to copy an existing similar material from the Archicad template, as these are typically set up with reliable thermal properties. You can then adjust the values if more accurate data is available.

In our project, it was important to perform an energy calculation that accurately reflected the building's hybrid energy system. Therefore, the energy simulation was carried out in IDA ICE rather than within Archicad. The resulting annual energy demand (kWh) was subsequently converted into kg CO_2e/m^2 and imported into DesignLCA for inclusion in the life cycle assessment.



Energy Evaluation in Archicad and the downloaded weather data

LCA Documentation

Documenting LCA is not only for reporting results but also for understanding and guiding the design process. It helps identify key impact drivers and supports informed decision-making throughout the project.

In DesignLCA, results are shown in a dynamic palette that updates with each calculation. The overview breaks down impacts into categories such as operational energy, building components, openings, installations, and construction processes. Results are presented as total emissions, emissions per m^2, and emissions per m^2 per year.

Visual diagrams, such as distribution charts and comparisons with reference values, provide a quick overview of where the main impacts occur and how the project performs relative to benchmarks.

More detailed insights are available through material and element CO_2 reports, which break down impacts by building parts and layers. This makes it easier to identify high-impact elements and target them for optimisation.

The results can be placed directly on drawings, worksheets, or layouts, integrating LCA into the project documentation rather than treating it as a separate report.

Pro tip! Place and lock LCA results for different design options. This allows you to preserve earlier calculations and compare results over time, making it easier to track progress and evaluate design decisions throughout the project.

EPDs & Product-specific Materials

Environmental Product Declarations (EPDs) improve the accuracy and reliability of LCA. While generic data is sufficient in early design stages, more detailed and product-specific data becomes important as the project develops.

In Archicad, both generic and product-specific materials can be included in LCA by creating or editing building materials and assigning environmental data to them. This is a manual setup, but once completed, the materials can be used directly in the model and included in the LCA.

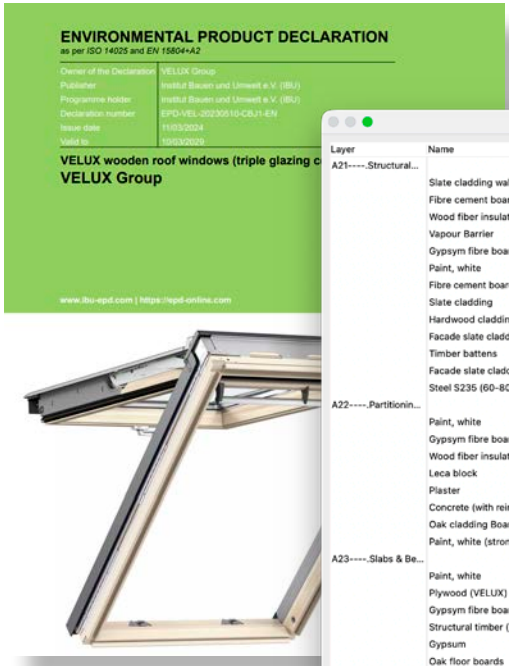
To create a product-specific material, it is recommended to copy an existing generic material that closely matches the intended product and then adjust its properties based on EPD data, including CO_2 values, units, and service life.

Product-specific data can also be assigned directly to individual elements through "Classification and Properties" in the element settings. In this case, the relevant CO_2e values from the EPD are entered for the applicable life cycle modules. This approach was used for the VELUX windows and shutters, allowing their product-specific environmental data to be included directly in the LCA.

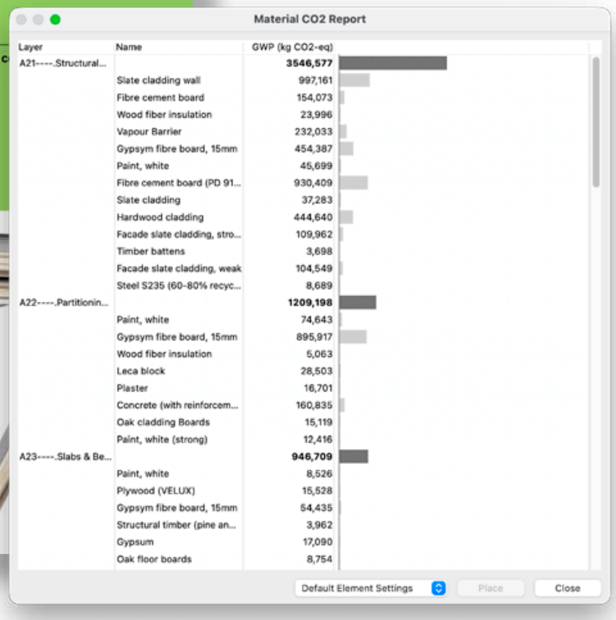
Using product-specific data is particularly relevant in later design phases, when products and suppliers are more clearly defined. It improves the accuracy of the LCA and makes it possible to compare alternatives within the same product category, supporting more informed material and product choices.

Danish Building Regulations

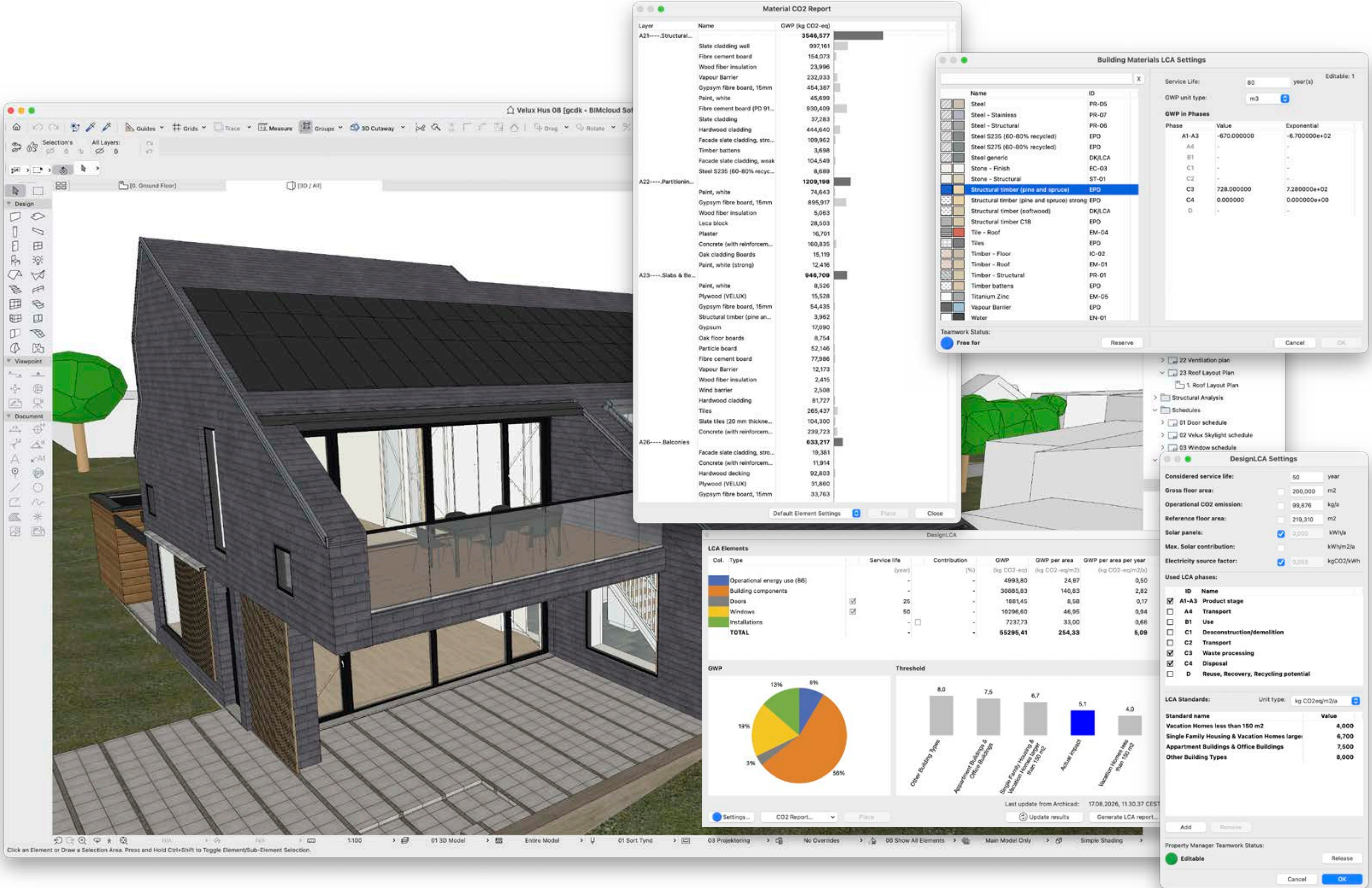
In Denmark, LCA is required for most new buildings under the Danish Building Regulations (BR18). Projects must document their climate impact over a 50-year period and comply with building typology-specific CO_2e limits, expressed as kg CO_2e/m^2/year. Our project's LCA follows the BR18 framework and supports the documentation required for both building permit applications and final approval.



EPD of VELUX roof window



Material CO_2 Reports in DesignLCA



DesignLCA combines Building Material LCA Settings with the result of the LCA

VELUX DAYLIGHT VISUALIZER

Daylight plays a significant role in the comfort, atmosphere, and overall performance of a building. Daylight simulation makes it possible to evaluate both the quantity and distribution of natural light, helping to identify potential issues while the design can still be refined. By integrating daylight analysis early in the design process, factors such as window placement, roof windows, room geometry, and orientation can be tested and optimised, rather than being assessed only after key design decisions have been made.

VELUX Daylight Visualizer is a free daylight simulation tool for evaluating and visualizing daylight conditions in buildings. It can calculate daylight performance based on building geometry, openings, orientation, surface properties, location, and surrounding context.

For BIM-based projects, the building geometry can be transferred directly from the design model rather than recreated for daylight analysis. This makes it possible to use the Archicad model as the basis for simulations throughout the design process.

VELUX Daylight Visualizer Workflow
The workflow allows the BIM model and daylight analysis to develop alongside one another and can be divided into five main steps: Prepare in Archicad → Export→ Set up in Daylight Visualizer → Simulate and Evaluate → Document and Communicate. After evaluation, the design can be refined based on the daylight results and taken through the workflow again until the desired daylight conditions are achieved.

Prepare in Archicad
Before exporting, the Archicad model should be simplified and structured so that the relevant geometry and surfaces can be easily identified in Daylight Visualizer.

Map the surfaces:
- Create dedicated surfaces for the main building elements that need individual reflectance properties in the simulation, for example walls, floors, ceilings, glazing, and window frames.

- Graphic Overrides provide a simple way of temporarily mapping these surfaces without changing the underlying model. Rules can, for example, override walls, columns, and beams with a dedicated surface.

Photorealistic image generated in Daylight Visualizer

- Windows may require their individual surfaces to be assigned through the Window Settings, while VELUX roof windows can be mapped through Model View Options, where separate surfaces can be assigned to the glazing and remaining window components.

Pro tip! Using clearly named and visually distinct surfaces makes it easy to check the model before export and identify the corresponding materials later in Daylight Visualizer.

Define the calculation areas:
- The areas to be evaluated can be prepared directly in Archicad using simple Morph planes.

- Create a plane within each relevant room and offset it 500 mm from the surrounding walls. Elevate the plane 850 mm above the finished floor level and assign each plane a dedicated surface that makes the individual calculation areas easy to recognize after importing the model into VELUX Daylight Visualizer.

Simplify the context:
- 3D Cutaway can be used to limit large or complex terrain and remove unnecessary geometry while retaining nearby buildings relevant to the daylight conditions of the building.

- Where appropriate, simplified geometry can also represent more distant surroundings that may block daylight at low solar angles.

Pro tip! Keep the daylight setup as a dedicated saved view, allowing the setup to be reused whenever an updated model needs to be exported.

Export
Once the model has been prepared, save the daylight setup as a dedicated Archicad view and export the geometry, e.g. as a SketchUp (.skp) file. The exported model can then be imported directly into VELUX Daylight Visualizer.

Setting up in VELUX Daylight Visualizer
After importing the model, first verify a known dimension to confirm that the model scale is correct.

Under “Surfaces”, the materials prepared in Archicad can be identified and assigned the appropriate material properties and reflectance values. These should follow the recommendations from standards and national regulations, or known project specifications.

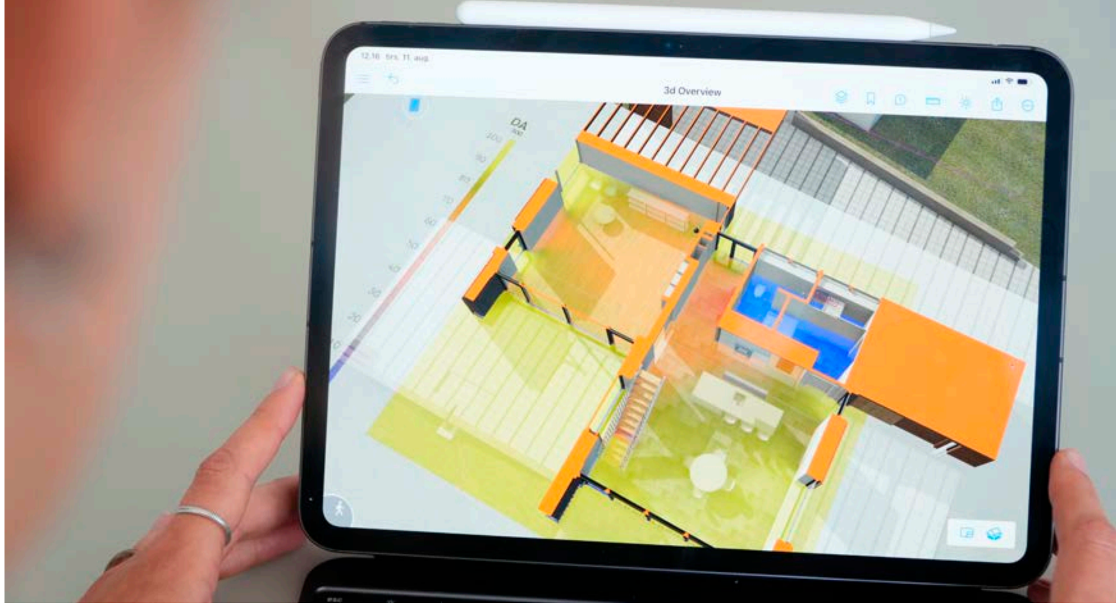
For the surfaces representing calculation areas, activate “Zone”. This identifies them as measurement areas rather than physical surfaces that obstruct incoming daylight.

Under "Location/Weather", define the project location. This information is required for climate-based daylight simulations, which use annual weather data to evaluate daylight conditions throughout the year. Camera views and calculation extents can then be configured to focus the analysis on the relevant areas of the building.

Simulate & Evaluate
VELUX Daylight Visualizer supports several types of analysis, including:
- Point-in-time daylight simulations
- Daylight Factor calculations
- Annual climate-based daylight simulations
- EN 17037 daylight assessments and reporting

The quality of the simulations are specified and then you click “Render”. Simulation results and visualisations can be exported as images and reports as PDF for comparison and project documentation.

Pro tip! During iterative design, lower render settings can be used to quickly compare alternatives without spending unnecessary calculation time. Higher-quality settings can then be introduced as the project develops and more detailed results are required.

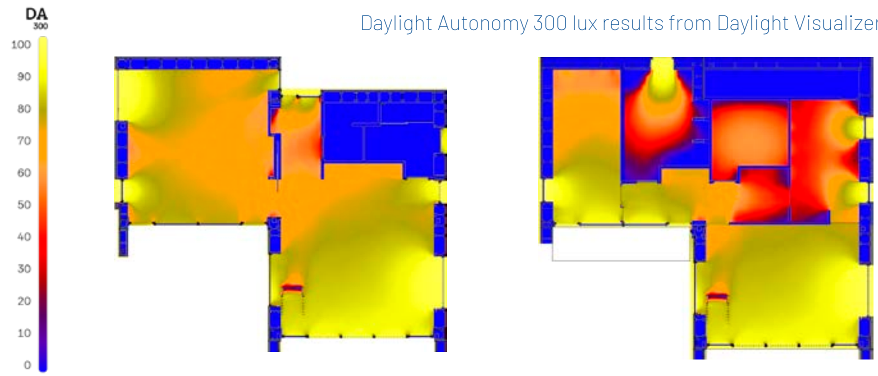


Daylight analysis, aligned with the building model and explored in BIMx

Document and Communicate
Simulation results become most useful when they are connected back to the building model and project documentation.

Simulation results from VELUX Daylight Visualizer can be incorporated directly into the Archicad documentation. For Home for Life, the daylight autonomy results for each floor were placed on layouts and aligned with matching plan views from the Archicad model. When published to BIMx, this allows the daylight distribution to be viewed alongside the 3D model, making it easier to understand how daylight autonomy varies across the building and relate the simulation results directly to the spaces being experienced.

Daylight Autonomy 300 lux results from Daylight Visualizer



Ground floor

First floor

HOLISTIC APPROACH

A holistic approach to building design means seeing the building as one interconnected system. Architecture, daylight, indoor climate, energy, materials, and environmental impact are closely linked, where changes in one area can create both opportunities and trade-offs.

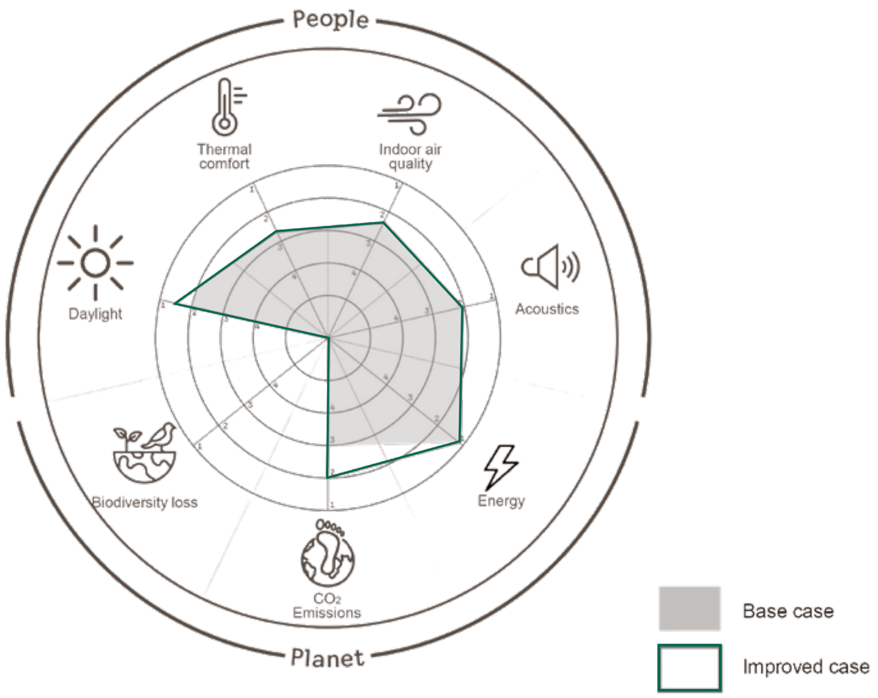
Rather than optimising individual parameters in isolation, a holistic approach focuses on understanding these relationships and finding a balance between them. The question is therefore not simply whether a design performs well in one category, but how different design decisions work together and what their combined consequences are for both people and the planet.

The People & Planet approach provides a framework for holistic building design. By bringing together key aspects of building performance related to people, such as daylight, thermal comfort, indoor environmental quality, acoustics, and energy performance, with planet-related indicators such as CO_2 emissions and biodiversity impact, it becomes possible to assess buildings from a broader perspective.

This is particularly important in the early design stages, when decisions have the greatest influence on the building's overall performance. For example, increasing window size can enhance daylight, views, and occupant well-being, but it may also increase solar gains and the risk of overheating. By considering these interactions early, designers can combine larger glazed areas with passive solutions such as solar shading, natural ventilation, and appropriate orientation to maximize benefits while mitigating potential drawbacks. Similarly, material choices influence not only embodied carbon, but also durability, resource consumption, indoor environmental quality, and the building's future adaptability. A holistic assessment helps identify solutions that improve both people- and planet-related outcomes without creating unintended trade-offs.

A holistic approach therefore does not necessarily mean finding one perfect solution. Instead, it means understanding the consequences of different design choices and making informed decisions based on several performance criteria at the same time.

Planetary boundaries
The concept of planetary boundaries adds another dimension to this holistic approach by placing buildings within the broader environmental systems on which society depends.



People & Planet model by VELUX

Planetary boundaries describe limits for critical Earth-system processes and define a scientifically based safe operating space for humanity.
The framework includes areas such as climate change, biosphere integrity, freshwater change, land-system change, biogeochemical flows, and other global environmental pressures.

In the context of building design, the concept helps shift the focus from relative performance to absolute environmental impact. Instead of asking only whether one design has a lower impact than another, the question becomes whether a building's impacts remain within the environmental limits that can be sustainably supported.

This creates an important connection between LCA and holistic design. LCA provide a reference for assessing whether those impacts are compatible with a fair share of the Earth's environmental capacity. Together, they support design decisions that aim not only to reduce impacts but also to operate within ecological limits.

At building level, however, global planetary boundaries cannot simply be applied directly. The available environmental capacity needs to be translated into a meaningful target for the individual project. This requires an allocation of the global environmental budget and careful consideration of which indicators and methods are used. Planetary boundaries should therefore be viewed as a framework for guiding environmental target setting and decision-making, rather than as a simple universal scoring system.

In this guide, a planetary-boundary perspective is used to support the holistic evaluation of the building. Of the planetary-boundary categories, climate change has been included in the assessment through the evaluation of CO_2 emissions. The score provides a simple way of communicating how closely a design performs relative to its defined environmental target. A score of 1 represents the best performance, while a score of 4 represents the lowest. Biodiversity impacts were not assessed and are therefore not included in the evaluation.

The purpose of the score is not to reduce the complexity of sustainability to a single number. On the contrary, it is intended to make the relationships between different environmental criteria easier to see and discuss. A design may perform very well in one area while creating challenges in another. The value of the assessment lies in making these relationships visible.

The aim is not simply to achieve the highest possible score in every individual category. It is to understand where improvements are meaningful, where trade-offs occur, and how design strategies can contribute to several objectives at the same time.

From data to design decisions

This is where the holistic approach becomes particularly powerful. When performance data is connected to the digital building model, information can become an active part of the design process rather than something added afterwards.

For GRAPHISOFT Center Danmark, this represents a natural extension of the BIM methodology. The model should not only describe what has been designed; it should help us understand the consequences of our design decisions.

By combining BIM, analysis, and visualisation, architects can test alternatives and see how changes affect different aspects of performance. This makes it possible to explore questions such as: What happens if the window area is increased? How does a change in orientation affect daylight and overheating? Can external shading reduce cooling demand without compromising daylight? How does a different material strategy affect the building's environmental impact?

The answers to these questions are rarely found by looking at one parameter alone. They emerge from understanding the building as a connected system.

The holistic approach therefore provides a bridge between people, planet, and performance. People represents the quality, health, and comfort of the built environment, while planet represents the environmental systems and resources affected by the building. Performance provides the measurable indicators needed to understand and balance the relationship between the two.

Ultimately, holistic design is about using information to make better decisions. By bringing different types of performance data together early in the design process, architects can move beyond documenting what has been designed and begin to actively shape how the building performs – for people, for the planet, and throughout its life cycle.

LESSONS LEARNED

Perhaps the most important lesson is the importance of dialogue and accessibility. To make BIM solutions useful in practice, it is important to understand how architects actually work and what information they need at different stages of the design process. This means not only communicating the possibilities of BIM but creating an ongoing dialogue with users and making the right BIM objects and information easily accessible when they need them.

Accessible and well-structured BIM objects are an important part of this. If relevant product information can be found and used directly within the architect's existing workflow, it becomes easier to integrate VELUX solutions into the design process and make informed decisions about daylight, natural ventilation and indoor climate.

A key lesson was therefore the importance of testing solutions in real project environments and validating assumptions through actual user workflows. The project demonstrated that even well-thought-out solutions can reveal opportunities for improvement when used in practice. One example was the workflow around documenting VELUX solutions in detailed drawings, where it was not as straightforward as anticipated to identify and communicate all components required for a given solution.

More importantly, involving real users early in the process allows us to develop solutions based on actual needs and practical use cases. This helps ensure that digital solutions create value rather than unintentionally adding complexity.

BIM creates value when data can travel with the project
A key learning is the value of maintaining continuity in the model throughout the design and documentation process. When information is structured well from the beginning, the same model and data can be reused across different stages and purposes, reducing the need for remodelling.

The investment in a well-structured model pays back
Building a robust model requires an investment at the beginning of the process. However, this investment pays off when the model can be reused across different areas and purposes. The lesson is therefore not simply to model more, but to model with purpose.

From separate data to shared knowledge
BIM offers an opportunity to bring knowledge together. Instead of information being distributed across different disciplines and data silos, a shared model can provide a common framework for understanding the building and become a shared professional knowledge base.

Technical competence unlocks automation
The project demonstrated that the full potential of BIM and automation requires a high level of technical understanding. The value of automated processes depends on how well the underlying model, data and relationships are structured.

Design is an iterative process
The project reinforced that building design is not a linear process. Requirements related to energy, daylight, indoor climate, LCA and other performance criteria increasingly need to be considered alongside architectural and technical decisions. The design methodology must therefore remain open to iteration as new information and requirements emerge.

A good building is more than a beautiful building
A successful building is not defined only by its form or visual expression, but also by how well it performs for the people who use it. Daylight, ventilation, energy performance and indoor climate are fundamental parts of the experience of a building, and digital tools can help make these qualities visible earlier in the design process.

Experience the project yourself
Watch the webinars and download the project material for BIMx, Archicad or as PDF, DWG and IFC files:
www.velux.com/project-development-guide

Thanks to

Nanna Lyngø Kikkenborg, LK Konstruktion

Ákos Rechtorisz, StruSoft

Thomas Meldgaard Pedersen, TMP Arkitektur

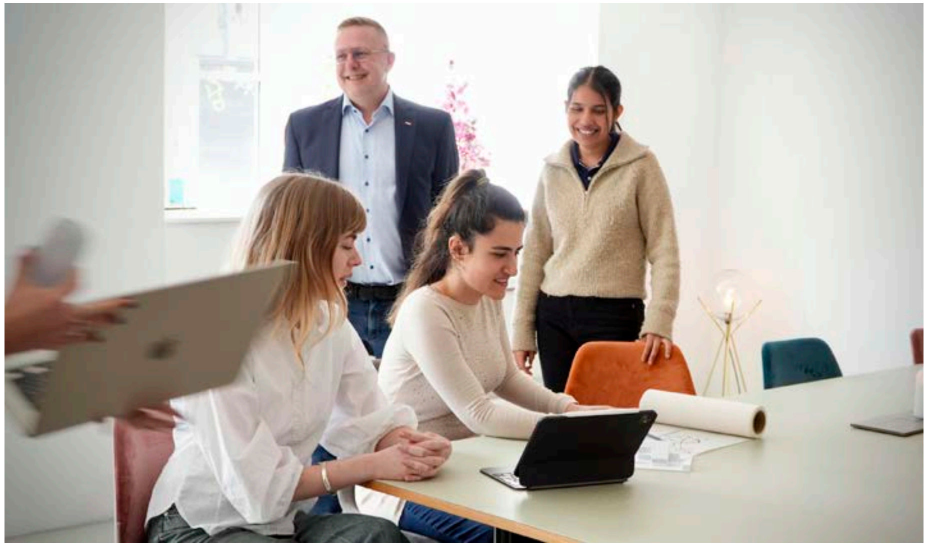
Jonas Kastrup, Jokani Engineering

Jamie Menuier, LE34

This guide is published by Formfaktor ApS.

Printed on RecyStar® Nature 100% uncoated recycled paper.

www.blauer-engel.de/uz14



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Sun Analysis
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3D Print
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Schematic Design:
Site Plan
Floor Plans, Sections & Elevations
Furniture Plan
Rendering/Visualisation

Design Development:
Foundation Plan & Structural Plan
Structural Model
Details
Quantity Take-Off

Construction Documentation:
Structural Optimisation
MEP Modelling
Collision Control and Issue Management
Data Exchange

People and planet:
LCA
VELUX Daylight Visualizer
Holistic Approach

Software:
Archicad 29
for BIM authoring tool

MEP Designer
for modelling technical systems

DesignLCA 6.0
for Life Cycle Assessment

Rhino & Grasshopper
for evironmental simulation

BIMx
for model visualization and communication

BIMcloud
for collaboration and team workflows

FEM-Design
for structural analysis and design

Be18
for energy assessment

IDA ICE
for energy assessment

VELUX Daylight Visualizer
for analysing indoor daylight