
Real Straw
Magic
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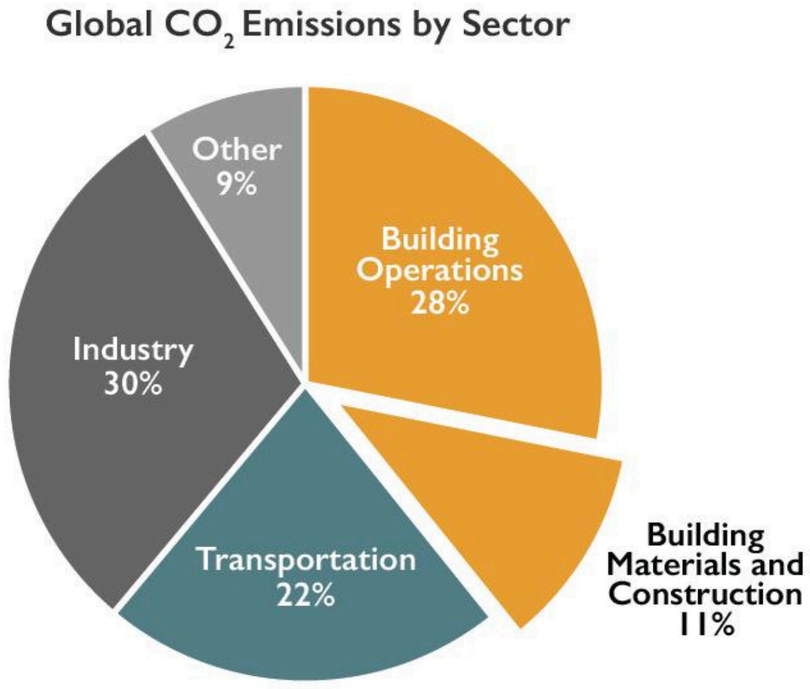
Why architecture must change

In Europe, the question is no longer only how buildings perform in use. Architects are increasingly being asked to address embodied carbon, material circularity and rapid, precise delivery.

40% of EU energy use / 36% of energy-related GHG emissions

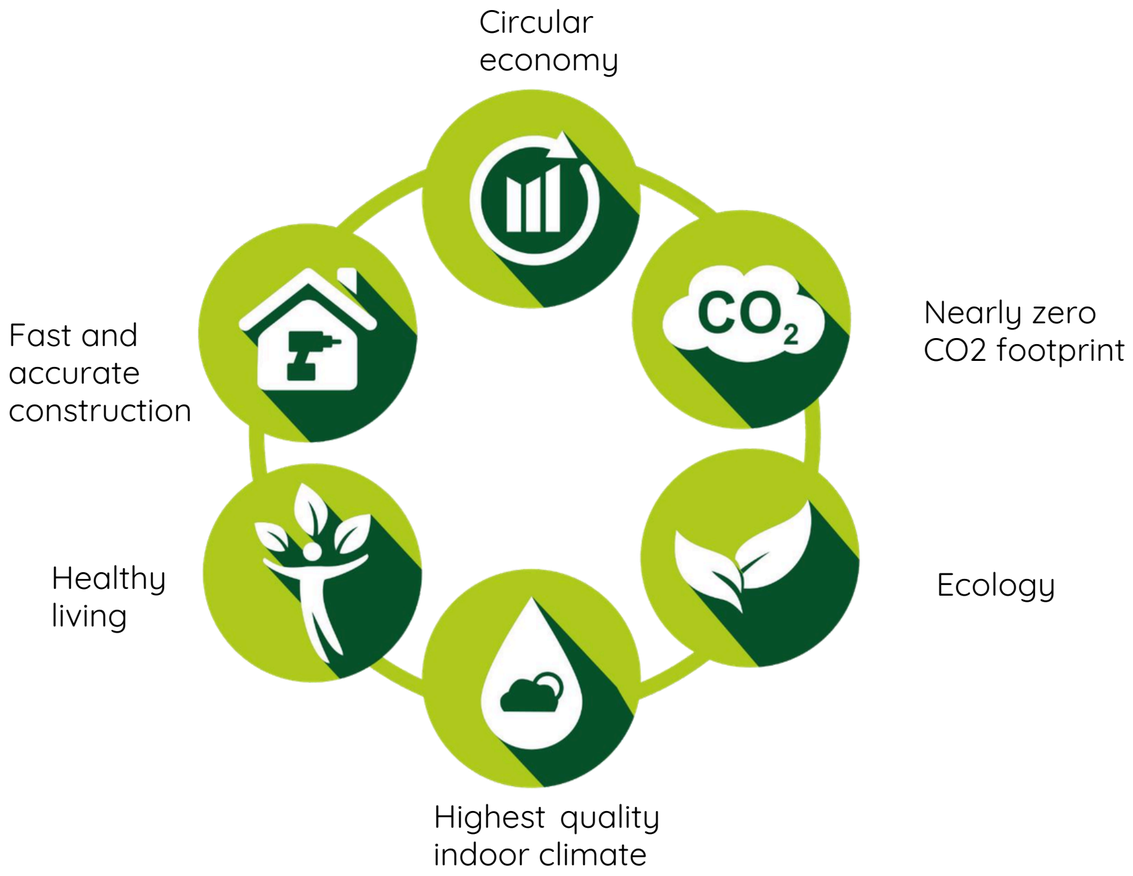
The revised Energy Performance of Buildings Directive pushes the sector toward a zero-emission building stock by 2050.
Operational and whole-life-cycle performance are becoming connected design questions.



Source: © 2018 2030, Inc. / Architecture 2030. All Rights Reserved. Data Sources: UN Environment Global Status Report 2017; EIA International Energy Outlook 2017

A new design question

Can the building envelope become bio-based, precisely manufactured and adaptable to the architectural concept — rather than becoming another limitation?



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Modular Construction



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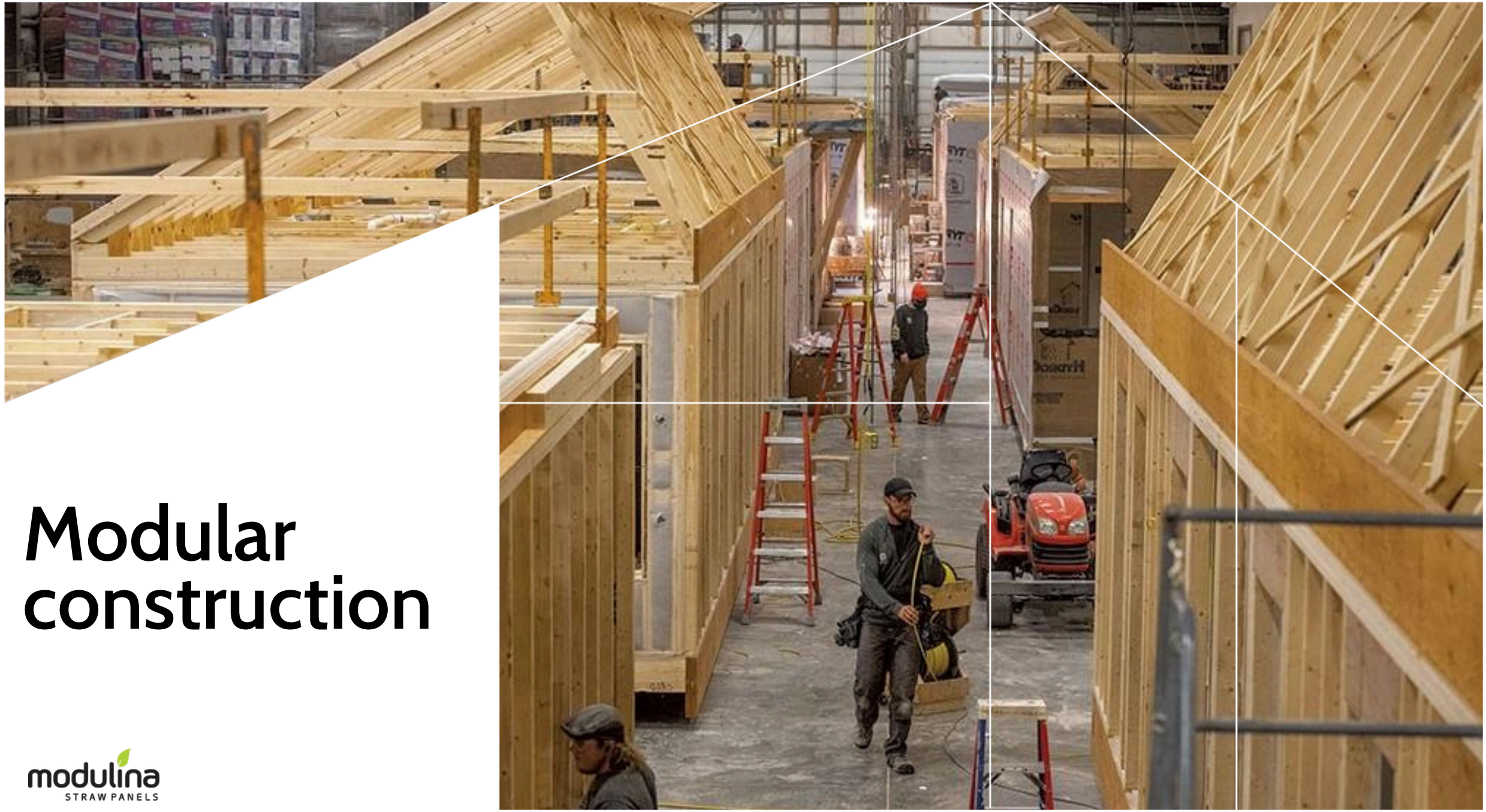

Modular construction

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Rooftop Extension



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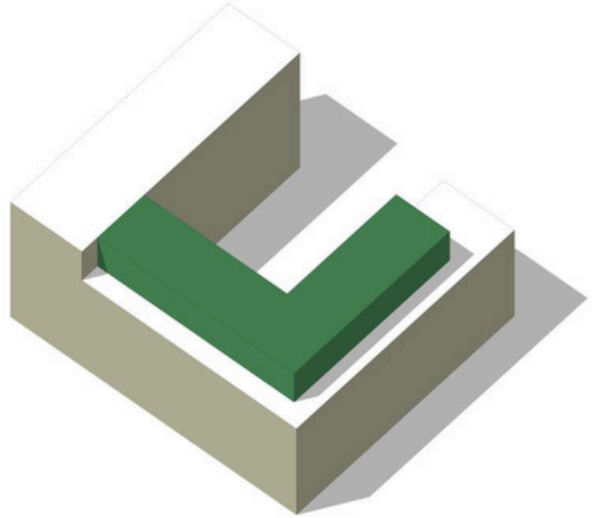
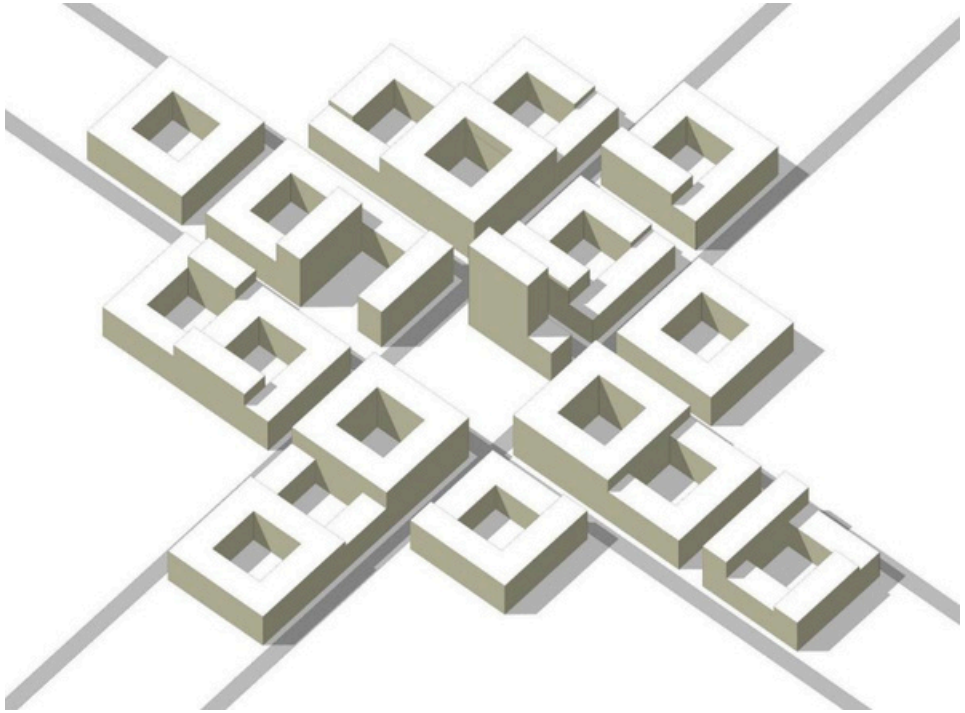
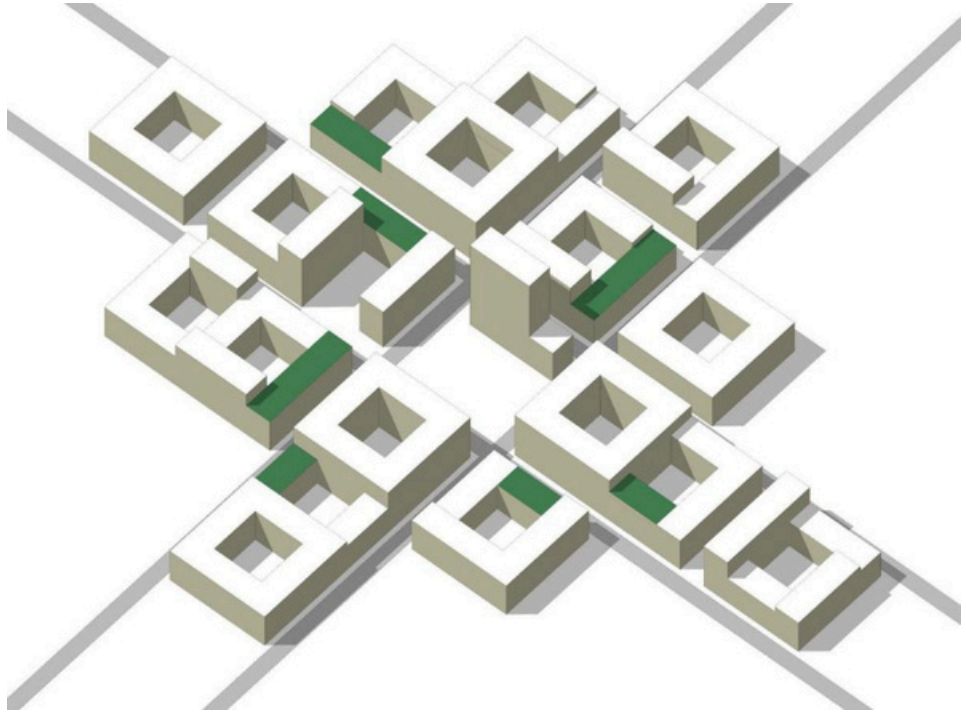


Rooftop Extension







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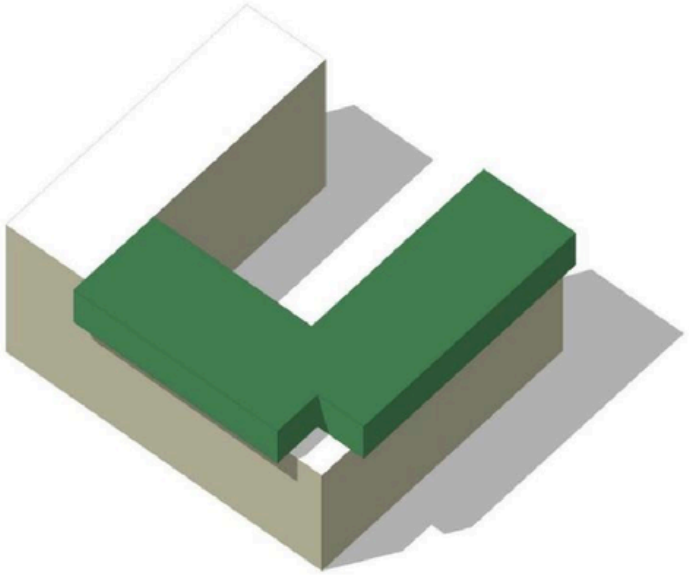
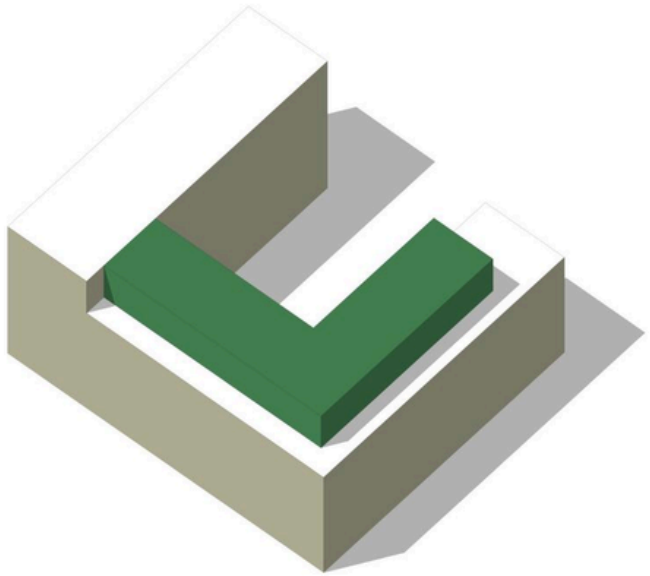
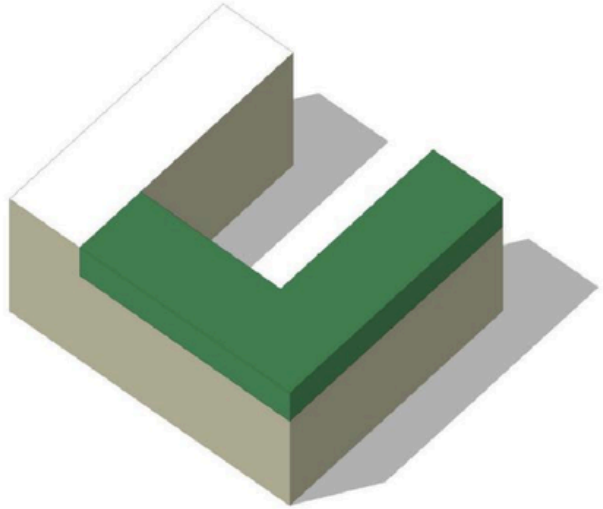
Rooftop Extension







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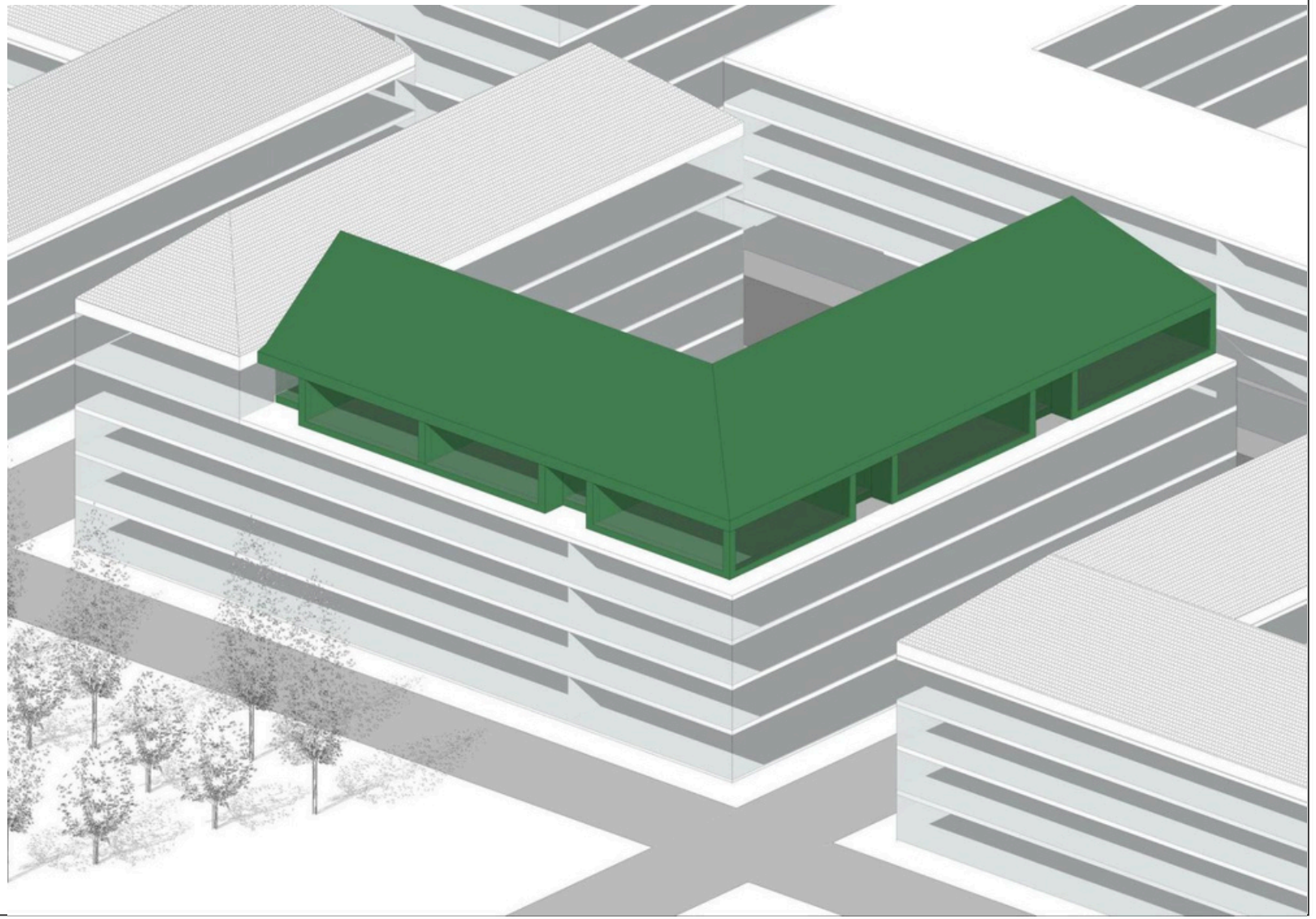
Rooftop Extensions



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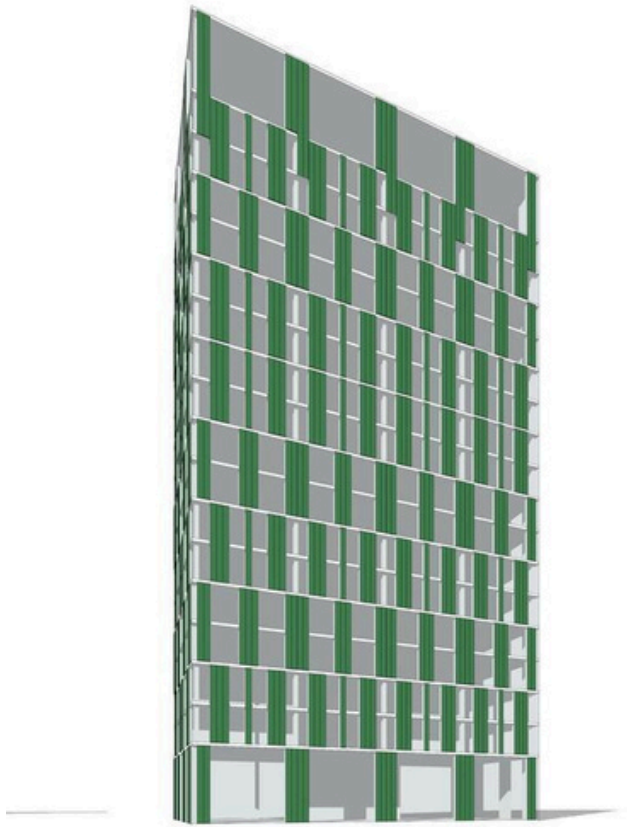
Highrise Buildings





Highrise Buildings



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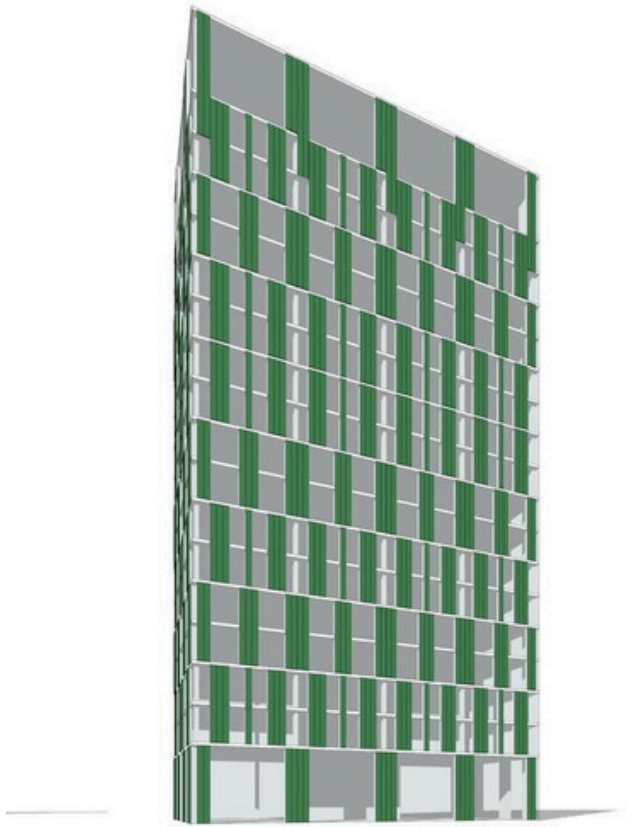

Biobased Materials



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Straw Panels



+



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Timber is the structure. Straw is the insulation.

Modulina combines an engineered timber frame with densely packed straw insulation.
The panel is prefabricated in Lithuania and configured to suit each approved project design.

Two structural roles

A / LOAD-BEARING — Timber elements inside the panel are engineered to carry specified loads.
B / INFILL ENVELOPE — The panel works as an insulated enclosure alongside an independently engineered timber, steel or concrete frame.

Wall Panel Dimensions

Width	800 – 2400 mm
Height	800 – 2900 mm
Thickness	300 – 450 mm



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External Layers of a Straw Wall

Timber frame

Compressed straw

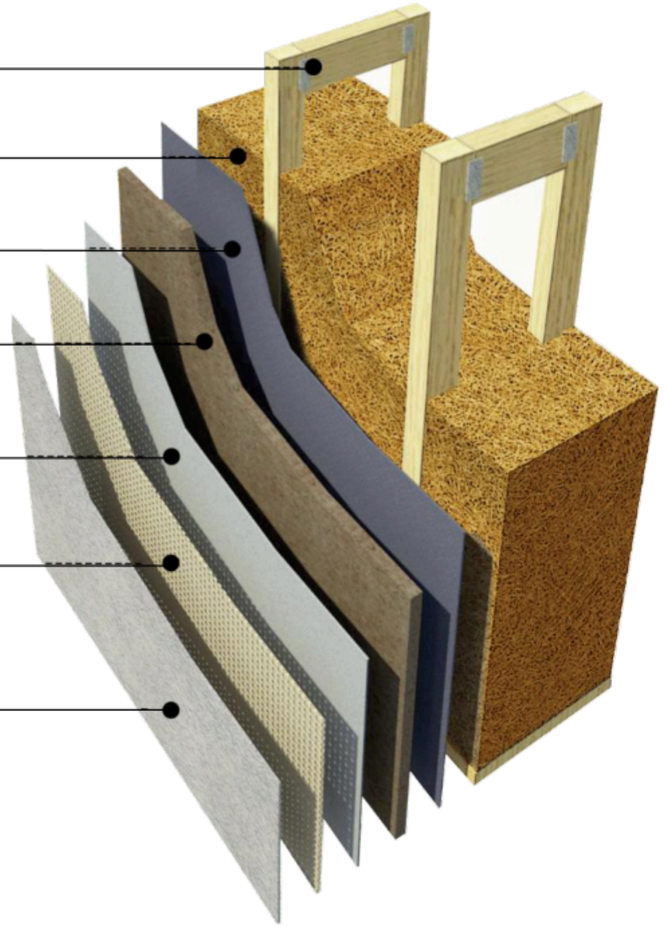
Difusion-open membrane

Water fibre board

Mineral-based plaster

Reinforcing mesh

Finish plaster



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Internal Layers of a Straw Wall

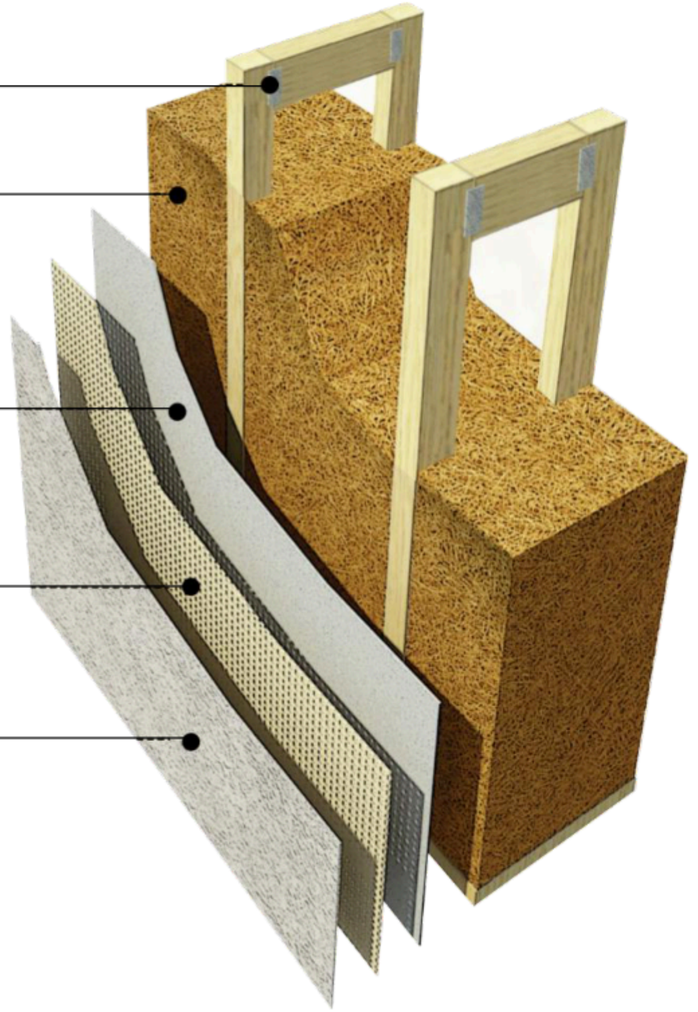
Timber frame

Compressed straw

Base clay plaster

Reinforcing mesh

White finish clay plaster



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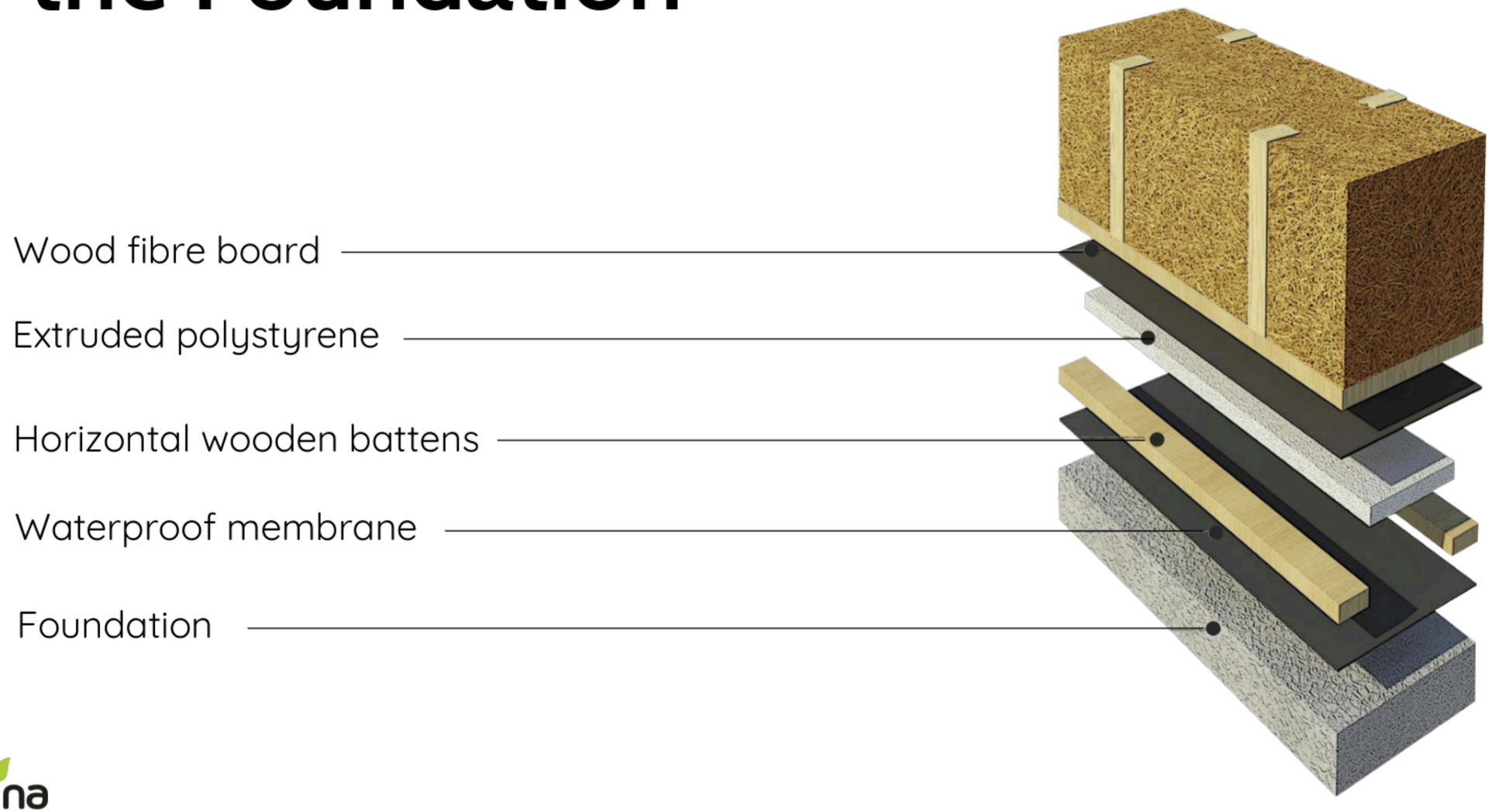
Mounting A Straw Panel to the Foundation



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Performance belongs to the whole assembly

Example declared straw conductivity: $\lambda D = 0.059$ W/(m·K).
Example wall U-value: around 0.13 W/(m²·K), depending on the exact build-up.
Acoustics, fire resistance and moisture must be assessed for the specified tested construction.



Beyond Walls

Prefabricated straw-insulated roof elements

Original construction photographs — roof-panel sequence

Roof Panel Dimensions

Width	800 – 2400 mm
Height	800 – 9000 mm
Thickness	300 – 450 mm



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Roof Layers

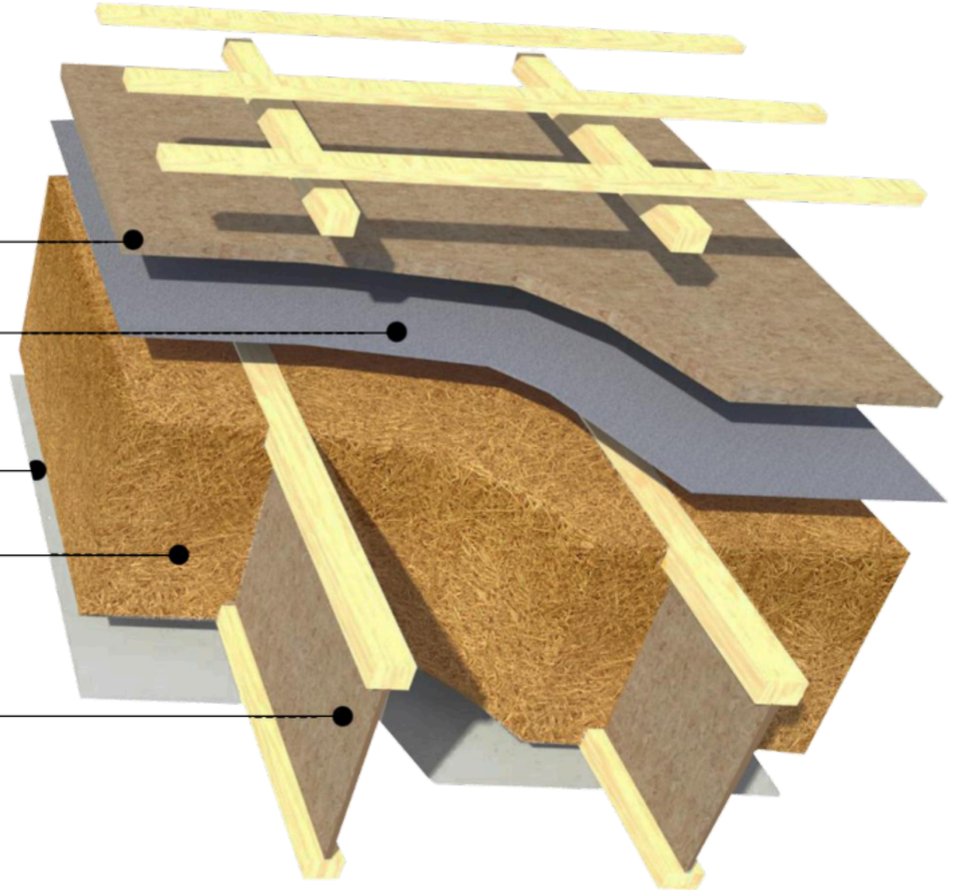
Wood fibre board

Diffusion-open membrane

Interior finish

Compressed straw

I-joist



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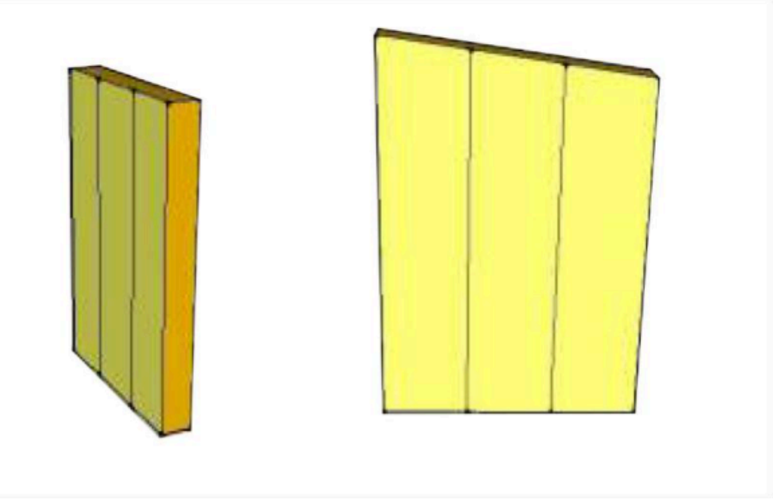
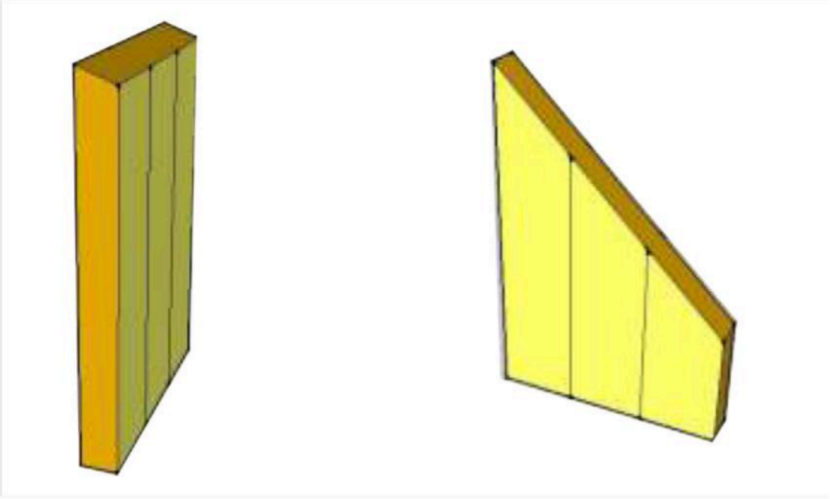
MODULINA ROOF SYSTEM

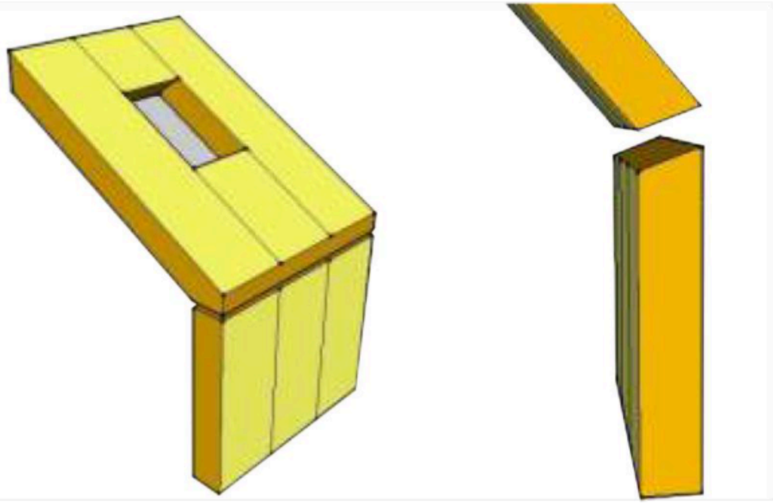
Roof panels: geometric freedom

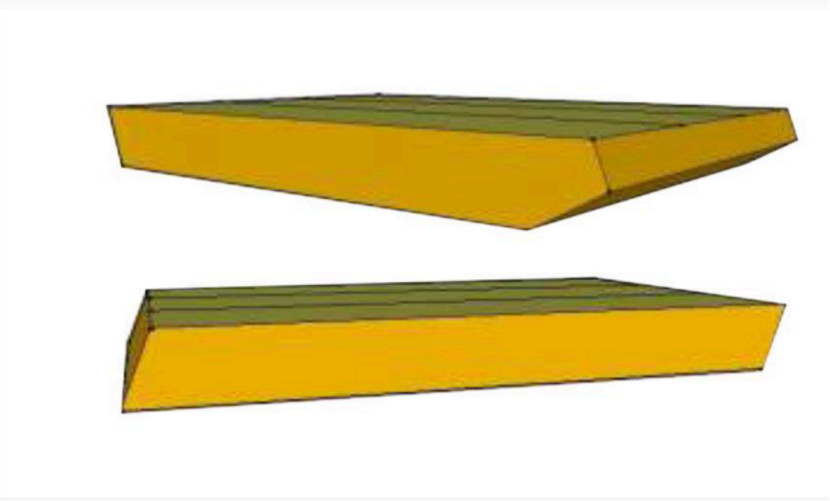
A custom gable profile within the panel system.

Geometry









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MODULINA ROOF SYSTEM

Roof panels: delivery and sequencing

Factory-made roof components staged beside the structure.



MODULINA ROOF SYSTEM

Roof: setting the pitch

Installers position the inclined roof elements.



MODULINA ROOF SYSTEM

Roof: connection at the ridge

Close coordination at the roof apex.



MODULINA ROOF SYSTEM

Roof: working with the roof geometry

Installation sequence follows the approved roof design.



MODULINA ROOF SYSTEM

Roof element junctions

The transition between roof panel, ridge and supporting member.



Design → Production → Assembly

A predictable collaboration model for architects and contractors

1. Send your project

Send architectural drawings or a 3D model (DWG / IFC), available elevations, intended wall build-ups and preliminary structural concept.
The project architect retains overall design responsibility.

2. Receive preliminary panelisation

Our technical team reviews the design, prepares indicative panel segmentation and opening layouts, estimates panel area and suggests the production scope.
This is an initial feasibility and pricing phase, not final structural design.

3. Coordinate engineering

After the cooperation agreement and initial payment, Modulina engineers coordinate with the architect and the project’s appointed structural designer. Details of load paths, connections, openings and tolerances are agreed.

4. Lock specifications and production

Approved panel schedule → final quantities and offer → production plan → quality checks → packaging → coordinated transport.

5. Assemble with the site team

Deliveries and lifting are sequenced with the contractor.
Assembly can be performed by qualified local crews supported by Modulina instructions, consultation and agreed site guidance.



Fast Assembly

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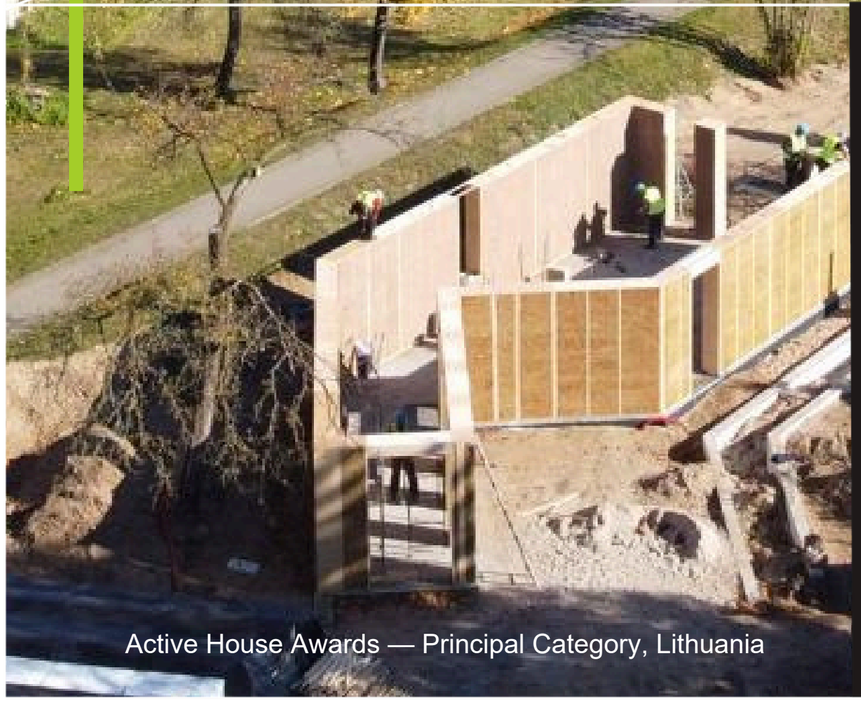


Active House Awards — Principal Category, Lithuania

01

BIRŠTONAS SINGLE FAMILY HOUSE

Global Active House Awards 2024 ·
Principal Category Winner



MODULINA / REALISED PROJECT

Birštonas — finished architecture

The award-winning A++ house after completion

Photo source: revalu.io; Active House 2024, Principal Category

The project and the design intention

A single-family house designed to complement the resort landscape while achieving high comfort and energy efficiency.
Architectural design combines modern detailing with bio-based construction materials.



CASE 01 / BIRŠTONAS

Architecture beside the river

Aerial view of the site and the surrounding landscape



CASE 01 / BIRŠTONAS

The first wall panels

Prefabricated straw panels positioned on the base level.



CASE 01 / BIRŠTONAS

Timber meets straw

Timber frame around compressed straw infill on the ground floor.



CASE 01 / BIRŠTONAS

Initial panel assembly

The first-storey envelope begins to define the plan.



CASE 01 / BIRŠTONAS

A staged site installation

Delivery, lifting equipment and the intermediate floor.



CASE 01 / BIRŠTONAS

The intermediate floor

Exposed timber joists connect the panelled enclosure.



CASE 01 / BIRŠTONAS

Design and assembly sequence

The building geometry emerges floor by floor.



CASE 01 / BIRŠTONAS

Moving to the upper level

Crane installation of second-storey wall elements.



CASE 01 / BIRŠTONAS

Setting the next panels

Upper level panels positioned beside the timber floor system.



CASE 01 / BIRŠTONAS

The second floor rises

Panels lifted into position by a truck-mounted crane.



CASE 01 / BIRŠTONAS

From plan to space

Multiple panel geometries establish the final form.



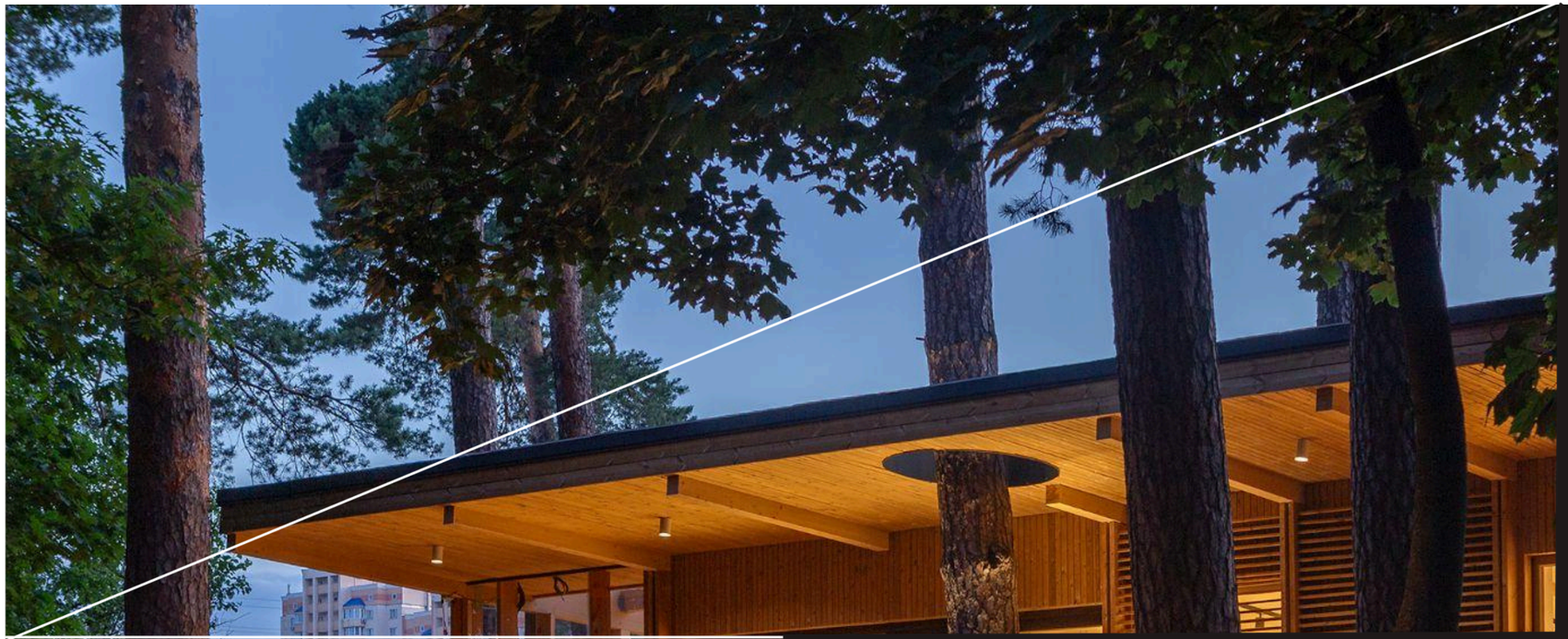
CASE 01 / BIRŠTONAS

Built in context

The progressing structure seen within the existing neighbourhood.

Built performance and recognition

A++ Lithuanian energy-performance class.
Design heating energy demand reported as 24.89 kWh/(m²·year).
Winner of Active House Awards 2024 — Principal Category.
Wall insulation: Modulina compressed-straw panels. Roof insulation: blown-in wood fibre (not Modulina straw roof panels in this project).



02

BUCHA FOREST CLASSROOM

New European Bauhaus Co-create Grant · educational and community value

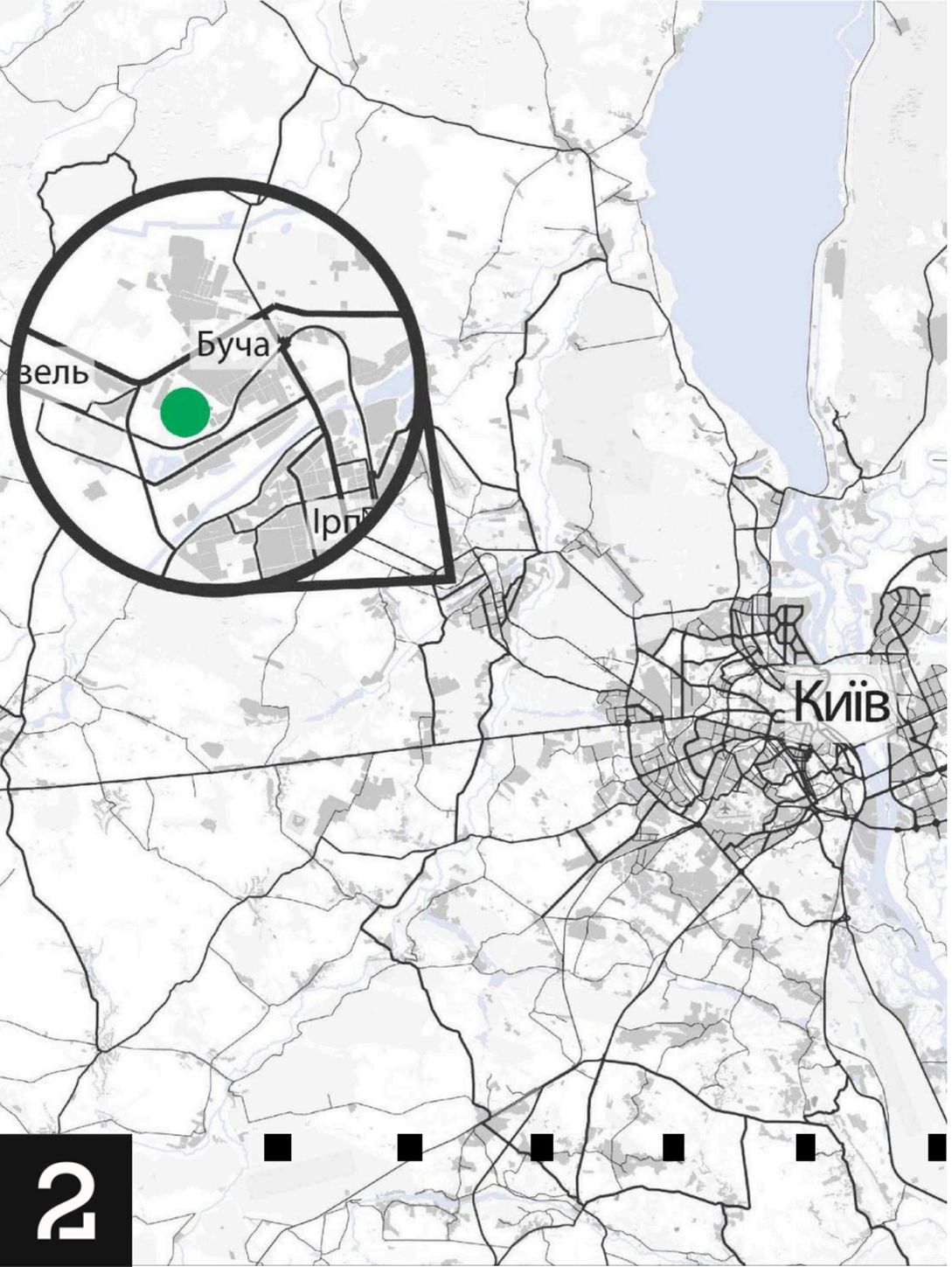
Bucha School forest

New European Bauhaus

eit Community New European Bauhaus

Funded by the European Union


PRIVATE INITIATIVE
30 LITHUANIAN PARTNERS
NEW EUROPEAN BAUHAUS SUPPORT
Bucha School forest
New European Bauhaus
eit
Community
New European Bauhaus
Funded by the European Union
VIKTORIJA KIREJEVAITE
GODA PAZUKAITE
2L ARCHITECTS
KATERYNA PYLYPCHUK
MODULINA STRAW PANELS



- Offline learning since 2020
- Emotional well-being of children during COVID and war
- 2241 IDP kids in Bucha region, and growing
- Overcrowded existing schools
- Risk of unsustainable, rushed rebuilding

SOURCE: BUCHA MAYOR OFFICE; Kiev school of Economics ESTIMATES OF DAMAGES

An educational space co-created for Bucha

The Bucha Forest Classroom brings together children, architects, community partners and bio-based construction.
Modulina supplied straw-panel walls; the larger project includes engineered timber and contributions from multiple partners.



During assessments of the possible locations for the project, an analysis of possible plots was conducted, along with a Participatory Mapping Activity for identifying the ideal location for the outdoor classroom. It was followed by a voting process for site selection. Additionally, existing functions for both formal and informal education (lifelong learning) were discussed, along with any additional functions that may be needed.

dreaming with the kids



- [x] Nature Sciences Classroom for 30 Children
- [x] Greenhouse for Environmental Education
- [x] Fully Sustainable & Autonomous
- [x] Unique Space for Mental Health & Learning
- [x] Located & Merged with Bucha Forest
- [x] Community & Children Sensory Focused



Materials and systems

- Reused windows & doors → adapted façade.
- Straw walls → breathable, low-trace.
- GL timber beams → long-lasting & reusable.
- Vinyl flooring → tile-by-tile replacement possible.
- Greenhouse with polycarbonate → long-term use, possible repurposing (lamp or fish tank!).
- Plastic/metal sheets → Rainwater collection system for planters.
- engineering systems → Off-grid solutions for energy/microclimate.





- Modular and reversible construction methods
- Minimize CO_2 footprint through design choices
- Low-tech building principles
- Bolt-based construction for easy disassembly



Private Public Partnership for sustainability:
30 partners from Lithuania and municipality in Ukraine gathered under NEB flag to make this project happen.

The project's embodied carbon is 14.6 t CO_2e, about 65% lower than a typical European dwelling of the same size — meaning we save the equivalent of ~27 t of CO_2 emissions upfront

THIS IS AROUND 110 one-way economy flights Vilnius → Venice



TOLOKA at the construction site with local kids and Lithuanian Volunteers August 2025


First lesson
February 21, 2026

BUCHA FOREST CLASSROOM



Bucha School forest

New European Bauhaus

eit Community New European Bauhaus

Funded by the European Union

BUILDING TO LEARN
LEARNING TO BUILD



03

VERKIAI

Gytis & Ramunė Gasperaičiai ·
Lithuanian architectural media recognition

Featured in LRT.lt 10 May 2025; photographer Lukas Jusas.



MODULINA / REALISED PROJECT

Verkiai — a house shaped by landscape

Charred-timber facade, large glazed openings and the natural setting

Architects Gytis & Ramunė Gasperaičiai; Photo L. Jusas / Lrytas

CASE 3 / VERKIAI

Landscape becomes geometry

The architects responded to the nearby pond: the house narrows toward one end rather than following a rigid straight axis.
Modulina timber-straw panels were manufactured to the approved architectural design.

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CASE 03 / VERKIAI

Assembly before finishing

Blue site protection and the first enclosed rooms.



CASE 03 / VERKIAI

Building physics before finishes

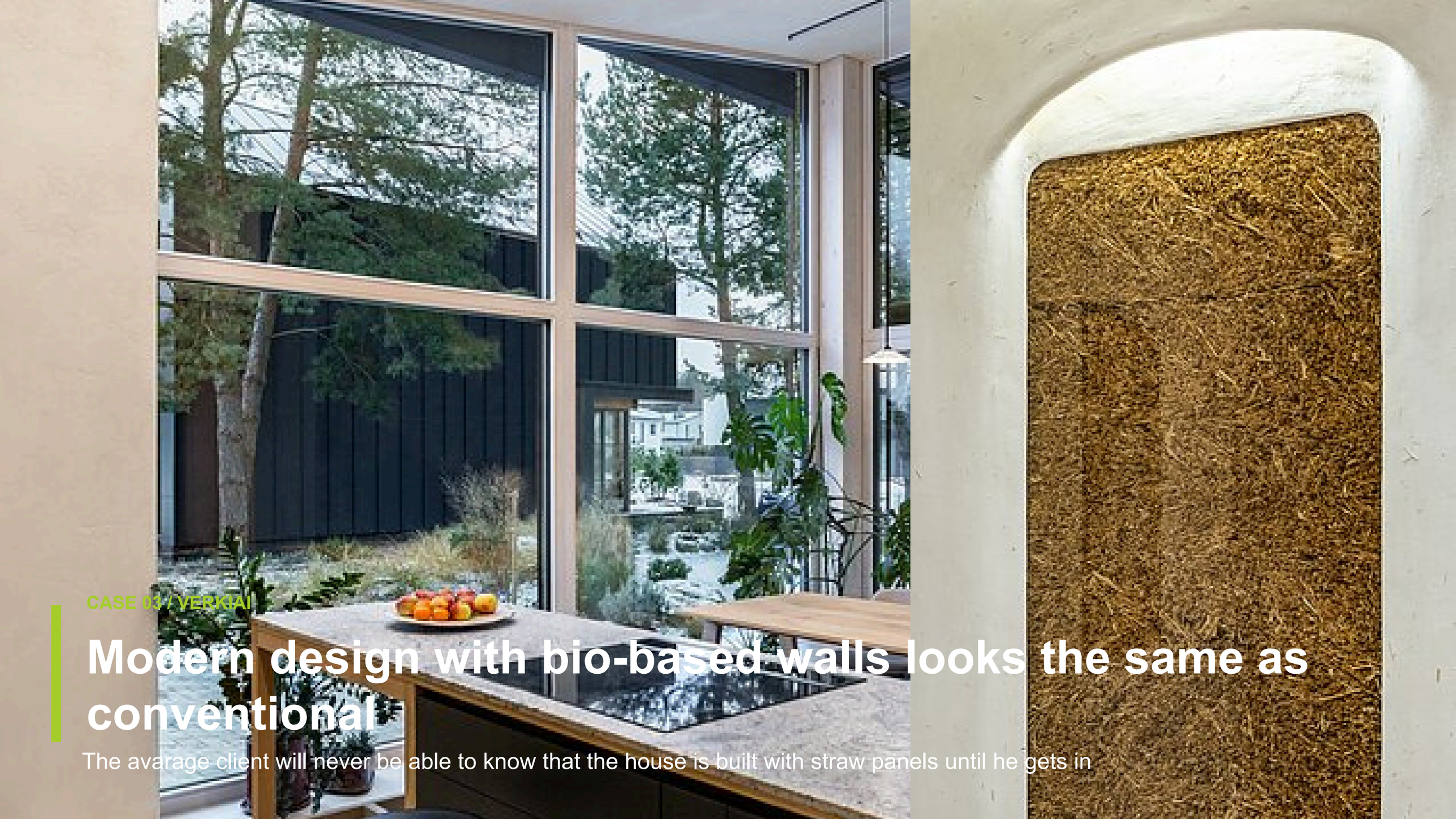
The protected building envelope before internal cladding and finishes.



CASE 03 / VERKIAI

Modern design with bio-based walls looks the same as conventional

The avarage client will never be able to know that the house is built with straw panels until he gets in



CASE 03 / VERKIAI

Modern design with bio-based walls looks the same as conventional

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04

BERLIN / MÖNCHMÜHLE

Matthias Gorenflos Architects ·
building in a protected heritage setting

From the architect interview / Modulina Blog

CASE 4 / BERLIN

Heritage does not demand imitation

The setting combines a protected historic building, remains of older structures and a new intervention.
The new building demonstrates a contemporary architectural language using timber, straw and clay.

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CASE 04 / BERLIN

A heritage site, a contemporary brief

Aerial view of the protected Mönchmühle compound and construction.



CASE 04 / BERLIN

Logistics in a constrained site

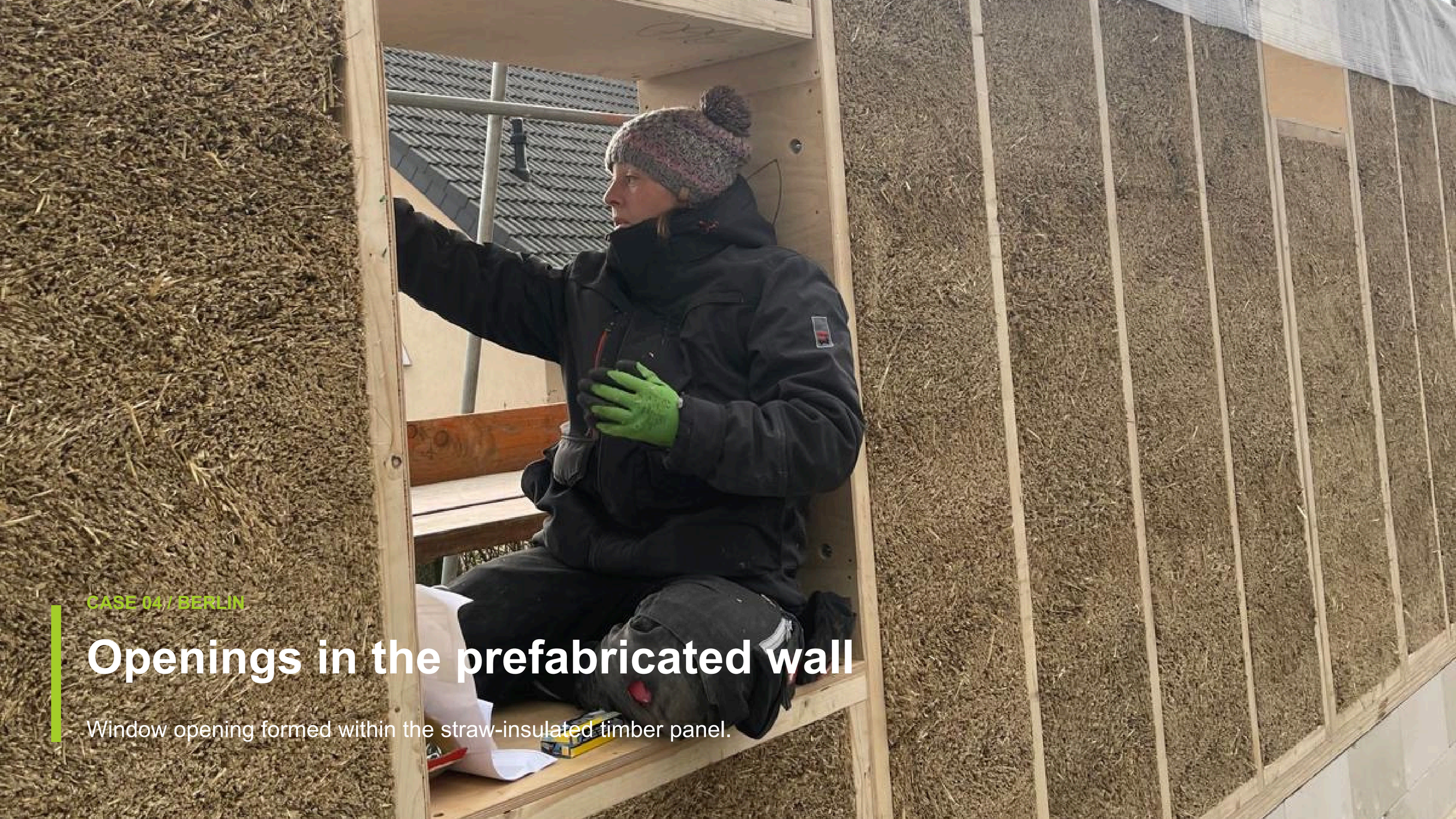
Crane access and assembly alongside neighbouring structures.



CASE 04 / BERLIN

Precision-shaped panels

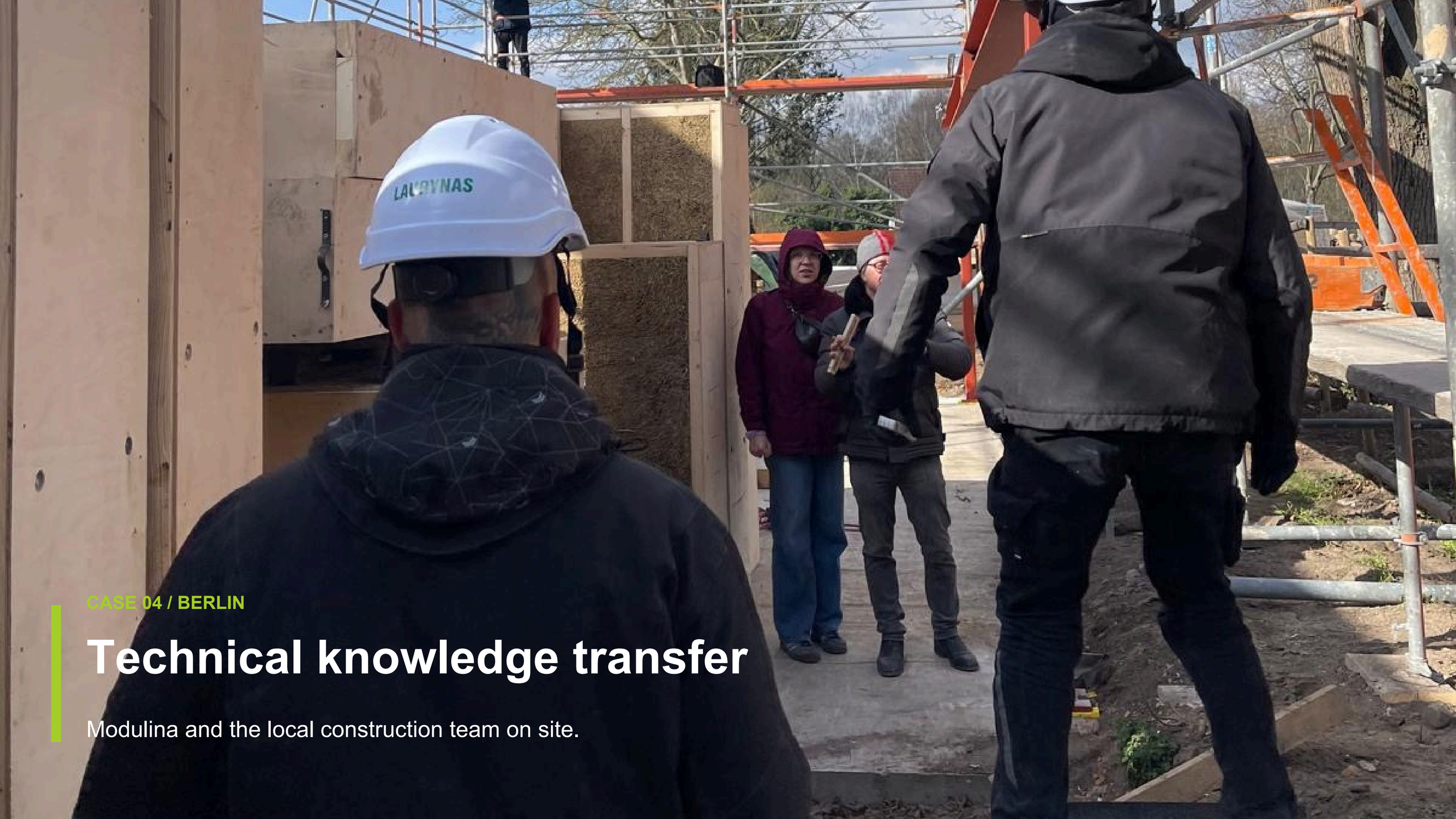
Crane lifting a custom timber-straw element.



CASE 04 / BERLIN

Openings in the prefabricated wall

Window opening formed within the straw-insulated timber panel.



CASE 04 / BERLIN

Technical knowledge transfer

Modulina and the local construction team on site.



CASE 04 / BERLIN

Interior before completion

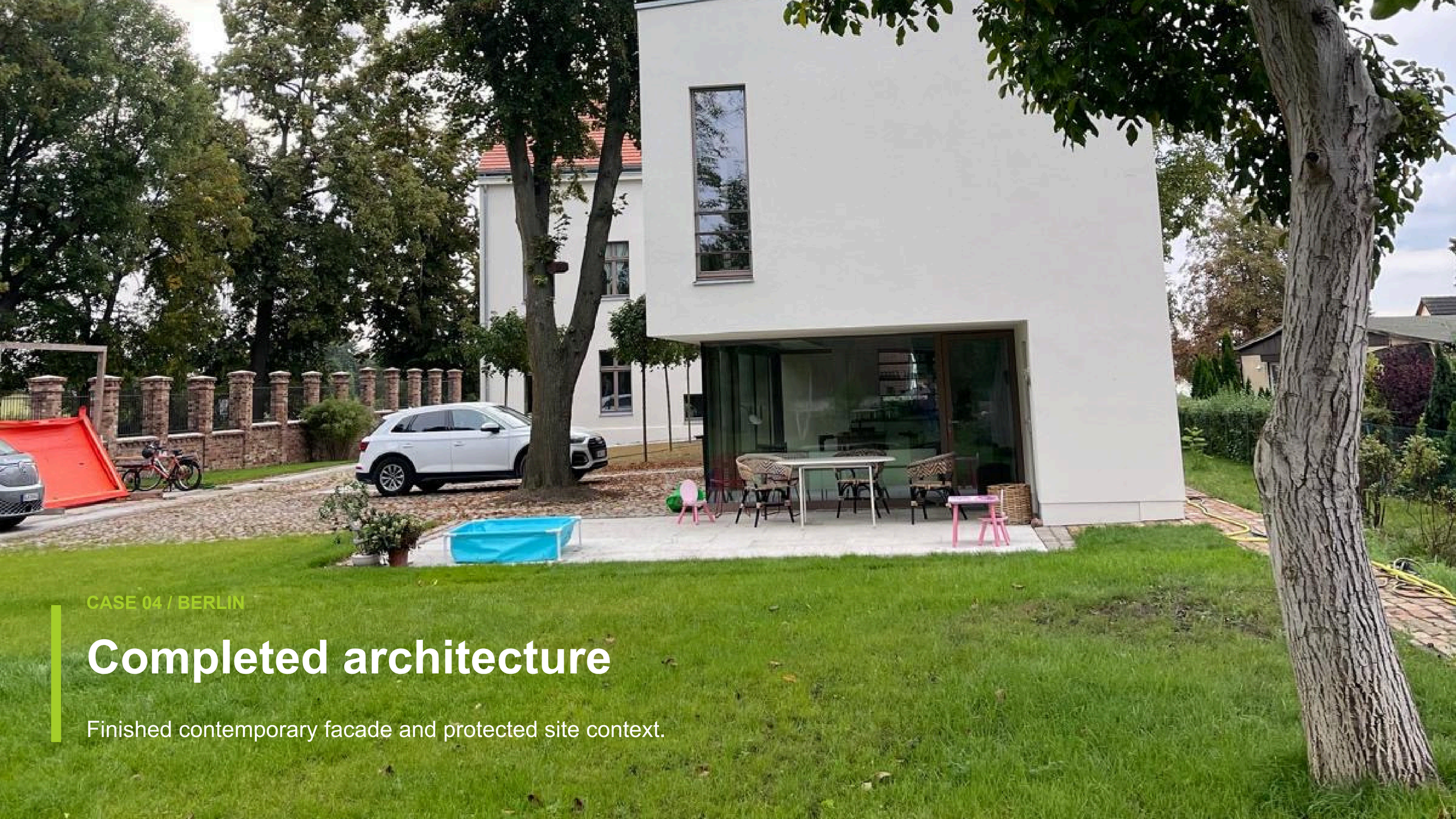
Timber floor beams and internal plaster surfaces.



CASE 04 / BERLIN

Natural finishes and detailed openings

Clay finish and carefully placed vertical windows.



CASE 04 / BERLIN

Completed architecture

Finished contemporary facade and protected site context.



CASE 04 / BERLIN

A modern silhouette

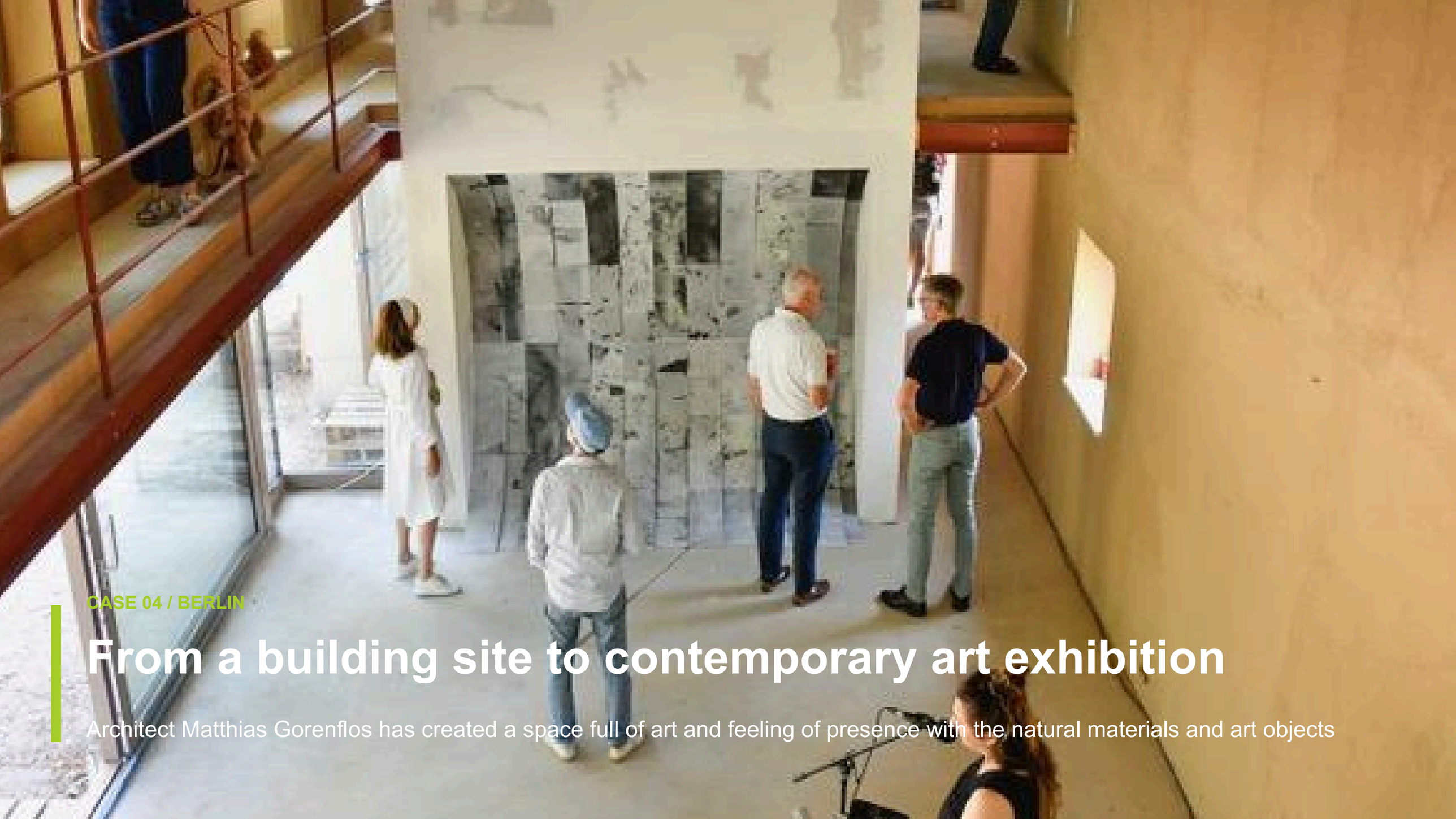
The external elevation, long openings and material restraint.



CASE 04 / BERLIN

The building after dark

Warm interior light makes the architectural rhythm visible.



CASE 04 / BERLIN

From a building site to contemporary art exhibition

Architect Matthias Gorenflos has created a space full of art and feeling of presence with the natural materials and art objects

CASE 4 / RESULT

A living architectural case study

Presented to professional audiences during the Berlin Chamber of Architects Day of Architecture 2024.
An exhibition later activated the completed building as a cultural space, illustrating how contemporary sustainable construction can participate in historic urban contexts.

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05

MELKIS SCHOOL

The Spaces of the Sun ·
EU-supported rural education development

The project and programme

Two learning spaces of about 200 m² for non-formal education, extracurricular activities and sports.
Delivered under an EU-supported rural-development measure focused on NGO social enterprise.



MODULINA / REALISED PROJECT

Melkis — a space for children

An educational project realised with straw-panel construction

Source: Modulina, The Spaces of the Sun / Melkis School



MODULINA / REALISED PROJECT

Melkis — the construction stage

Project-specific components assembled for a learning environment

Source: Modulina, The Spaces of the Sun / Melkis School



MODULINA / REALISED PROJECT

Melkis — developing new learning spaces

Project photo from the school’s Modulina case study

Source: Modulina, The Spaces of the Sun / Melkis School



MODULINA / REALISED PROJECT

Melkis — curving forms to be creative

The project provides facilities for non-formal and extracurricular education

Source: Modulina, The Spaces of the Sun / Melkis School



MODULINA / REALISED PROJECT

Melkis — the completed setting

Architectural result in the Lithuanian landscape

Source: Modulina, The Spaces of the Sun / Melkis School



MODULINA / REALISED PROJECT

Melkis — new educational infrastructure

EU rural-development investment in two children’s learning spaces

Source: Modulina, The Spaces of the Sun / Melkis School

CASE 5 / RESULT

An architectural outcome with a social purpose

The school reports dedicated spaces for non-formal education, extracurricular activities and sports — supporting healthier lifestyles and access to learning. The completed project is described by Modulina as supported through EU investments in rural areas.

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looking forward to receive your
ARCHITECTURAL PROJECT

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