

trä!

A MAGAZINE ON INSPIRING ARCHITECTURE
FROM SWEDISH WOOD • ISSUE 2 • 2023

DESIGN THAT PUSHES
THE BOUNDARIES
**STATEMENT OFFICE
BLOCKS IN THE CITY**
CHAPELS FOR A MODERN
CONGREGATION

TRÄ MEETS
Karin Fällman Lillqvist

KNOWLEDGE
Continuous cover
or clearcutting

SHINGLES FROM OFFCUTS

Flooring gives façade a unique look



VI ODLAR HUS. VI ODLAR FÖRÄNDRING.



För att förverkliga framtidens hållbara samhälle behöver många starka krafter samarbeta för att skapa förändring. Vi på Holmen vill bidra till en positiv samhällsutveckling genom att låta ännu fler upptäcka och ta tillvara möjligheterna med trä. Det kan handla om allt ifrån privatpersoners egna byggprojekt, till stora kontorshus, bostadsområden och offentliga byggnader.

Vi har byggt upp en komplett, cirkulär kedja, där nyckelorden är hållbarhet och energieffektivitet. Det gäller såväl när vi vårdar, brukar och skördar skogen, som i förädlingen på våra sågverk. I koncernen ingår dessutom Martinsons, som med nytänkande byggsystem gör att vi erbjuder en helhet som framtids-säkrar levnadsmiljöerna för framtida generationer. Hela vägen från planta till färdiga byggnader. Vi odlar hus, helt enkelt. Och vi odlar förändring.

MAGASIN X är med sina sju våningar och en BTA på 16 600 m² Sveriges största kontorshus i trä – mitt i centrala Uppsala. Byggnaden i sig har ett tydligt hållbarhetstänk där Martinsons trästomme haft en betydande del för att minska klimatavtrycket och bidra till en behaglig inomhusmiljö.

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trä!

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Two new office blocks being built in the centres of Örebro and London challenge accepted building methods. Kvarteret Korsningen also involved a whole different process, with the architects given an even deeper role as the recipients of the land allocation.

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Swedish Wood disseminates knowledge about wood, wood products and wood in construction, contributing towards a sustainable society and a thriving sawmill industry. We achieve this by inspiring, educating and driving technical advances.

Swedish Wood represents the Swedish sawmill industry and is part of the Swedish Forest Industries Federation. Swedish Wood represents the Swedish glulam, CLT and packaging industries, and collaborates closely with Swedish builders' merchants and wholesalers of wood products.

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www.woodarchitecture.se

Anders Bøbert

Anna Ryberg Ågren Director, Swedish Wood

Building a sustainable and inclusive future

STOCKHOLM, SWEDEN In recent months, the Swedish Forest Industries Federation, of which Swedish Wood is part, has been discussing with our member companies what more we can do to help solve the challenges facing society. This work, dubbed the Future Journey, revolves around formulating promises for the future in the areas where we clearly bring benefits for society. The climate transition is one such area, as well as boosting biodiversity and ensuring that all of Sweden has the conditions to develop. These promises will then guide our work over the coming years.

One thing has become very clear in all this: our member companies have an incredibly strong desire to contribute even more than they already do to the green transition. Making this journey together is therefore going to be incredibly stimulating!

In April, the industry got together at the Framtidsmötet conference, at which I was pleased to lead a debate on how the Swedish wood industry can help with the reconstruction of Ukraine. Earlier this year, EU President Ursula von der Leyen said that it was our moral duty to rebuild Ukraine, and that we should do so »in the spirit of the New European Bauhaus«. The New European Bauhaus is an initiative focused on building a sustainable and inclusive future that is beautiful to the eye, the mind and the soul.

Building with wood gets right to the heart of this and Sweden has a lot to contribute in terms of knowledge in the field of wood construction. Because although Ukraine is a relatively large producer of wood products, the country has no tradition of building in wood. I hope I will be able to return to this topic in future issues.

Earlier this spring, Södra opened its new CLT factory in Värö, with the capacity to supply framing material for more than 4,000 homes each year. I believe in a bright future for wood construction, despite inflation and interest rate rises that have hit construction hard. We simply can't afford to go any other way! We are running out of time to limit the impacts of climate change and reverse the trend – the climate crisis will not wait. The fastest way to reduce the climate footprint of construction is to choose wood as a material, not least because of its many benefits. In addition to the low climate footprint of wood product manufacturing, built-in wood products also remain a carbon sink throughout the life of the building. This is a feature we need to make better use of to limit carbon emissions!

Anna Ryberg Ågren
Anna Ryberg Ågren

Editorial



Mikael Olsson

Behind the dark façade lies a bright interior, a single room but with distinct functions and openable gables.

One room, many functions

OBJECT A House
ARCHITECT Studio Náv
STRUCTURAL ENGINEER Peter Kristensson

MÖJA, SWEDEN On an island in the Stockholm archipelago sits a small, discreet holiday home. The sturdy façade is painted with dark distemper to blend in with the landscape, and inside is a light interior with birch plywood walls and ceilings, Douglas fir floors and pine window frames, all treated with hardwax oil to provide a hardwearing finish.

The site-built glulam frame determined the dimensions and elements of the single space in the house, but the kitchen, bedroom and living

room areas are clearly zoned. While the solid west façade gives the home a sense of privacy, the other sides are made up of generous windows, with both gables fully openable for additional light and airflow.

Running along the three open sides is a curtain that can be pulled to keep the home more private at certain times. The exterior also features a removable screen that can be used to make the house less visible from the water. «
w| studio-nav.com

Discreet infill in Paris

PARIS, FRANCE A large residential area in Paris, built in the 1980s, has recently gained six additional apartments, including

OBJECT Apartments
ARCHITECT Mobile architecture office
STRUCTURAL ENGINEER Ginko ingénierie

two maisonnettes. This timber infill project is tucked into a corner between the existing buildings, taking its design cues from the adjacent postmodern architecture. The street façade is clad in a white, ribbed metal shell, combined with wooden window frames and glass balustrades. To the rear, the façade is finished in larch.

Using CLT for the façade, partition walls and floors allowed for a great deal of prefabrication, and the five floors were assembled in just ten days – a distinct advantage in such an urban setting. Parts of the structure have been left exposed in the interior. The ground floor houses an airy retail space, and the apartments are accessed via a passageway with stairs. The roof collects rainwater that is reused both for watering plants and for the building's sanitation system. «

w| moaarch.com



Cyrille Lallemand

The newly built corner in one of Paris' residential neighbourhoods is made of wood and reflects the existing architectural style.



Julien Kertraon

The simple new structure in local timber sits comfortably among Corsica's older stone houses.

Unique process in Corsica uses local wood for low emissions

CORSICA, FRANCE Standing among Corsica's traditional stone houses is a wooden block of three local authority apartments for rent to people on a low income as part of a social project. The clean and simple wooden structure in Corsican black pine (*Pinus nigra laricio*) connects the apartments to the surrounding stone buildings, with the open architecture creating a panoramic view of the mountains on the horizon.

OBJEKT Apartments
ARCHITECT ORMA architettura
STRUCTURAL ENGINEER Teckicea

This is Corsica's first official low-carbon building, but sourcing the wood has required some extra planning. The island has plenty of trees and there was a clear desire to use local timber for its quality and to reduce emissions. But Corsica has no facilities for drying timber, which usually needs to be shipped to the French mainland or Italy.

A very precise construction method was therefore developed to use local timber with a slightly higher moisture content, thus avoiding additional transportation. «
w| orma-architettura.com

SiOO:X – inte bara silvergrått!

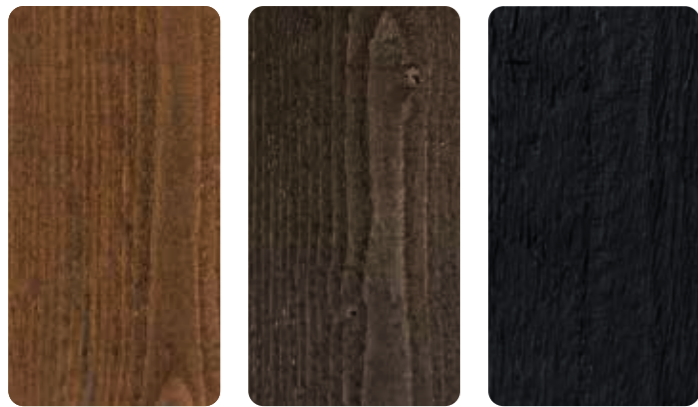


Brandklass D på termofura och granpanel.



www.sioox.se

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23. Almond Brown. 27. Walnut Brown. 07. Black Stone.

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Sioo Wood Protection blev först känt för den så uppskattade silvergrå träytan. Till SiOO:X-sortimentet kom sedan sex sobra, grå nyanser från vitgrått till svartgrått. I år utökas paletten för panel med ytterligare tre nyanser!

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Tromsø's largest piece of art is created from vertical plywood sheets milled into soft and comfortable seating.

Spectator seating as art

ARCHITECT/ARTIST Hans-Petter Bjørnådal
MASTER CARPENTER Ben Adams
STRUCTURAL ENGINEER Rambøll

TROMSØ, NORWAY A work of art you can sit on? That's right. Grønnåsen School in Tromsø has a new sculptural seating and activity area, intended to be used both by the school's students and as a meeting place for local residents in the evenings and at weekends. At 30 metres, it is the largest art work in the municipality's collection.

The seating is created from vertically arranged plywood sheets, with the seat side shaped into a gentle wave. It was first worked out parametrically using digital tools and then each vertical panel was CNC-milled to create the curved

shape. The sculpture is a reflection of nature, offering both intimate and open spaces.

The main part of the installation faces the school's basketball court and serves as an open stand, while the curved part of the other side forms a more secluded area with several niches

Located on a slope, the seating is designed to accommodate an existing tree on the site, and is said to have space for up to 70 people at once. «

w| barkitekt.no

Outdoor spaces allow for sheltered play in bad weather

SAINT-OUEN-DU-TILLEUL, FRANCE Children should be offered not only good learning opportunities, but also space for play and relaxation in a healthy environment. This is the idea behind the new preschool in Normandy, where seven volumes with gable roofs have been arrayed along the edge of the playground, providing space for both teaching and play.

Each structure is made of wood, and the walls are largely

clad in spruce. However, the most striking feature is reserved for the foyer outside the main entrance – a sophisticated grid of glulam trusses. Its polycarbonate windows admit light that creates a greenhouse feel, not to mention a pleasant indoor climate all year round. In winter, they help heat the whole building, and in summer they protect the interior from overly strong sunlight.

The doors to the playground can be fully opened, bringing children even closer to nature and providing natural ventilation during the summer. «

OBJECT Preschool
ARCHITECT Acau architectes
STRUCTURAL ENGINEER Alpha Bet

w| acau-architectes.fr



The preschool's transitional spaces form a natural link between inside and out.

ANVÄND FÄRRE SKRUVAR FÖR BÄTTRE RESULTAT

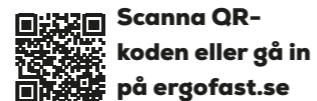


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Strict lines emerge from steep slope

VORARLBERG, AUSTRIA In the midst of the rocky landscape in western Austria, a modern wooden house stands out below

OBJECT House Ebnit

ARCHITECT Innauer-Matt architekten

STRUCTURAL ENGINEER

ZT E Leitner & Schröcken Z

the mountain, with nature as its closest neighbour. Sitting on a steep slope, the house has a basement floor and three additional levels. Apart

from the concrete foundations, the whole building is wood. The façade is clad with slender wooden battens that give the building a light but cosy shell. In addition to the visual impact, they also cover some of the windows to filter light. Small round openings have been made just below the ridge of the pitched roof as a decorative detail that adds softness to the strict lines.

The large windows provide views of the stunning landscape and, together with the balconies on each floor, help to blur the line between inside and outside.

The interior also offers a good dose of exposed wood, complemented by a feature wall of subdued, dark green tiles in the living room that breaks up the warm wooden surfaces. «

w|innauer-matt.com



Sheltered by the mountains, the holiday home occupies a very private space. The thin wood cladding on the façade envelops the building and filters the light.



Four cabins floating above the fjord

FORSAND, NORWAY Four neat two-storey cabins stand on a cliff edge overlooking Lysefjord. To minimise their footprint on the ground, they rest on concrete pillars, giving the illusion of floating above the clear blue fjord. After a day of hiking along the water's edge, tourists can relax in a cosy cabin where interior details are sparse so as not to interfere with the experience or the panoramic view. The concrete floor downstairs breaks up the exposed wood

and provides a tactile ruggedness. The oak wood used in the interior has been treated differently in each cabin, so that visitors can enjoy a new and different experience if they return another time.

The cabins are built from untreated western red cedar, which will blend into the rocky landscape as it greys. The trees that had to be cut down during construction were reused in other parts of the project, and the granite excavated from the ground was used to make the concrete for the building. «

OBJECT Starlodges
ARCHITECT Snøhetta

w|snohetta.com

Four cabins seemingly floating on the cliff above Lysefjord are carefully positioned to keep their footprint as modest as possible.

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The design of the cycle bridge makes it easy for animals to pass underneath while offering cyclists great views.

Sensitive landscape explored by bridge

LIMBURG, BELGIUM The Belgian province of Limburg's nature reserve boasts vast pine forests, flower-strewn heathland and hills with views stretching for miles. The 12,000 hectare site spans several municipalities and visitors are encouraged to cycle through the park. The four-kilometre cycle path includes a 300-metre-long bridge that helps to elevate the experience while also preserving the sensitive landscape around it.

High walls of vertical battens screen the two ends of the bridge – a feature that seeks to enclose the cyclist and create anticipation for the views further ahead. The structure consists of two vertical timber trusses on concrete foundations, employing small spans and prefabricated elements. The deck is also made of concrete to ensure as comfortable a bike ride as possible. The pine walls reference the trees once planted here in abundance to provide firewood for the local coal mines. «

OBJECT Wooden bridge
ARCHITECT Maat Ontwerpers
STRUCTURAL ENGINEER
Witteveen+Bos

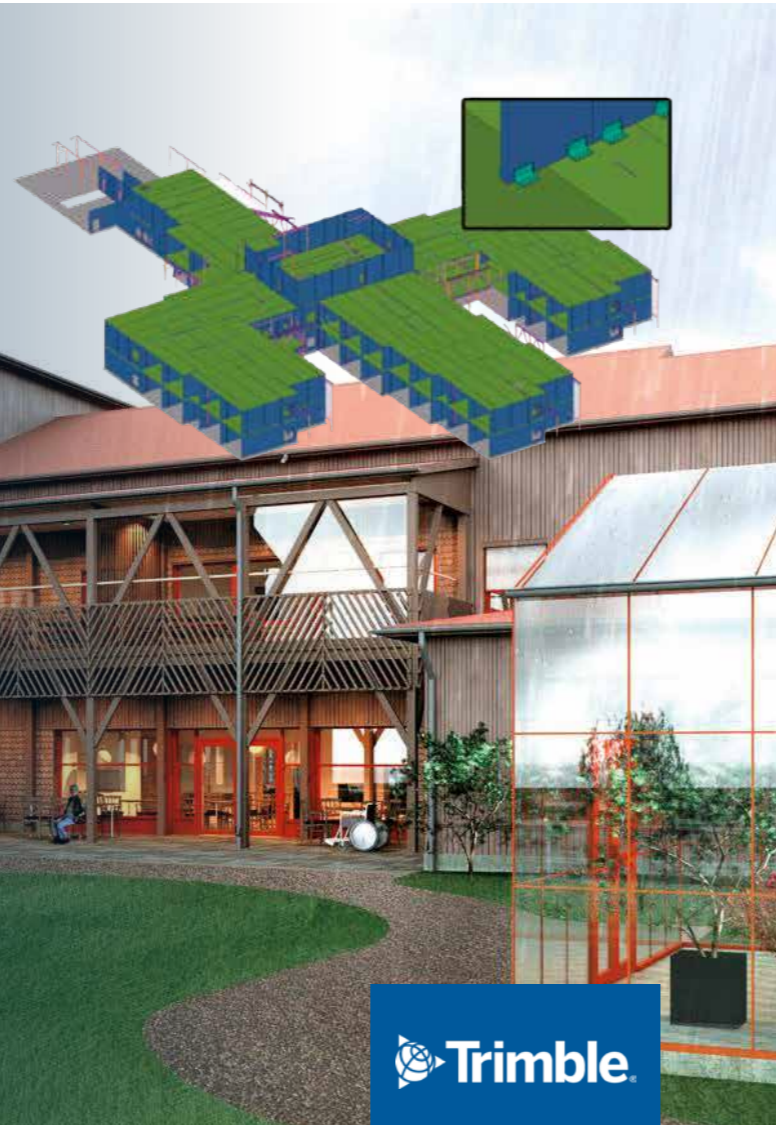
www.maatontwerpers.be

Tekla 2023

Fortfarande annorlunda, alltid bättre

Tekla Structures öppenhet och anpassningsbarhet gör konstruktionsarbetet enkelt oavsett materialval.

Structor Dalarna fick uppdraget att konstruera ett äldreboende med stomme i KL-trä. Att skapa egna komponenter i Tekla Structures, anpassade för just en trästomme, blev en effektiv lösning i projektet. Läs mer här: tek.la/nyheter



Trimble

Cubes shape open and closed spaces

BAVARIA, TYSKLAND A seemingly simple geometric form underpins the Bavarian villa, located on a plateau overlooking the nearby lake. The ground floor comprises the social spaces, based around the shape of a cube and partially open-plan. The private rooms on the upper floor share the cuboid influence and have been partially modified to fit the site: each room is a different height – forming a stepped exterior silhouette – and has a monopitch roof sloping towards the ground at the rear.

The spatial zoning along the façade creates a rhythm of open and closed sections, with wooden slats and generous sliding windows alternately completing the cubes.



The whole house is created from a series of cubes. The more open areas on the ground floor create space and light.

OBJECT Cube house
ARCHITECT Appels architekten
STRUCTURAL ENGINEER
Merz Kley partner.

The dark façade allows the house to become part of the natural landscape, and inside,

the wooden structure has been painted white, punctuated by wooden stairs, doors and wardrobes. The grey floor and stone worktop match the boulders featured outside the window. «
www.appels-arch.ch

Tinna Harling, architect SAR/MSA, Chair of Egnahemsfabriken.

Only together can we build a sustainable future

TJÖRN, SWEDEN How can we work together to create homes in sustainable and reused materials, for people without big budgets?

After 12 years as a planning architect in Tjörn, spending a lot of my time talking to people of all ages, I became frustrated by how difficult it was to get the housing that citizens were asking for, i.e. sustainable and attractive housing that even young and old people can afford. Instead, large houses and seafront apartments are being planned and built for wealthy buyers.



Together with a few local activists, I therefore set up Egnahemsfabriken in Tjörn in 2017, both to establish a forum for people who are interested in finding new ways to build homes, and to showcase practical examples of how to build sustainable homes even for those without deep pockets. We run Egnahemsfabriken jointly with a dedicated team of architects, carpenters, researchers and volunteers, shifting housing from an individual problem to a common concern. Our activities are also part of a Swedish movement supporting community-led and social housing.

At Egnahemsfabriken, our main emphasis is on the socially focused construction of small residential buildings. Construction with a social focus is defined by broad participation and involvement. We mainly build on a small scale, with volunteers, professional architects and carpenters supporting the self-builders. The small scale makes it easy to work with recycled materials, and wood is often the easiest and most sustainable material for self-building. We realised early on that we needed to collaborate with local authorities to secure land and some kind of context for the people building houses with us. Since 2021, we have therefore been running the 'Self-build homes for all' research project with partners such as Orust Municipality, which has given a newly formed self-build cooperative a land allocation of 20 plots with space for shared functions, such as a community centre and allotments. There is great interest in joining the project as a resident, and the group that will perform the building work features a range of ages, but especially young people.

To enable similar initiatives to build small-scale housing with sustainable materials for low-income citizens, cooperation is needed between municipalities and groups of people who want to build in a different way from the conventional approach. It is also important that these groups are supported by professional project managers, architects and carpenters. Perhaps the economic slowdown we are now facing will increase official interest in cooperating with organisations working on various forms of community-led and social building.

This is a chronicle. Positions in the text are the writer's own.

BRIGHT CAVE FOR CLIMBING AND SOCIAL ACTIVITIES

PHOTOGRAPHER

Eirik Evjen

OBJECT

Climbing centre

ARCHITECT

Snøhetta

STRUCTURAL

ENGINEER (WOOD)

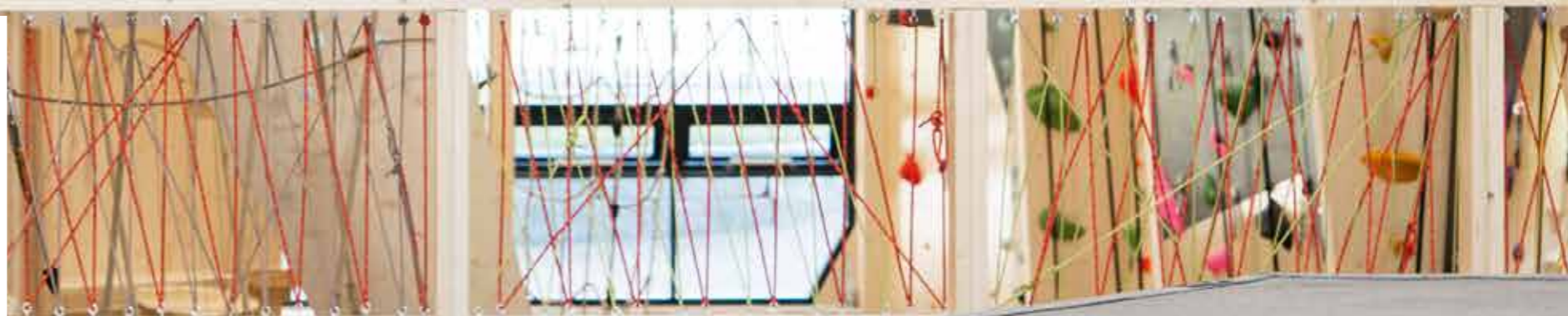
Degree of Freedom

SKIEN, NORWAY Climbing is an increasingly popular sport, both on outdoor rockfaces and indoor climbing walls. In the Norwegian town of Skien, a new climbing centre measuring 1,500 square metres has been erected around a framework of CLT supports like giant roof trusses. The architects believe that wood is the natural material to use for sports facilities, due to its breathability and the pleasant indoor climate that it creates. They were also able to prefabricate much of the building, and the lightweight timber does not require deep foundations like many other materials.

The climbing centre is inspired by the shape of a cave, where the roof and the timber supports merge into a single entity. It is unusual for a climbing gym to have much glazing, but here the window – the mouth of the cave – occupies a large section of one end. The flow of natural light is intended to increase the sense of airiness and make the climbers feel closer to nature. «

- The lightweight material has great advantages when building in an urban environment and has been used here as an example of how to develop small urban plots within existing developments.
- The highest climbing wall ascends 15 metres, and there are also facilities for bouldering – climbing at a lower height without a safety harness.

w|snohetta.com





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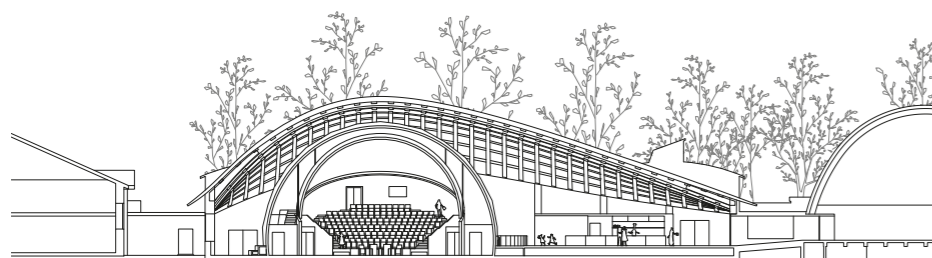
THAT TWIST,

TURN & STRETCH

Spectacular in so many ways, Wisdome Stockholm is being built in the courtyard of Tekniska Museet – Sweden’s National Museum of Science and Technology – away from public view. But it will soon be time for the big reveal, turning the spotlight on a project whose free form dome has challenged everyone involved. »

TEXT Katarina Brandt PHOTO Anna Gerden

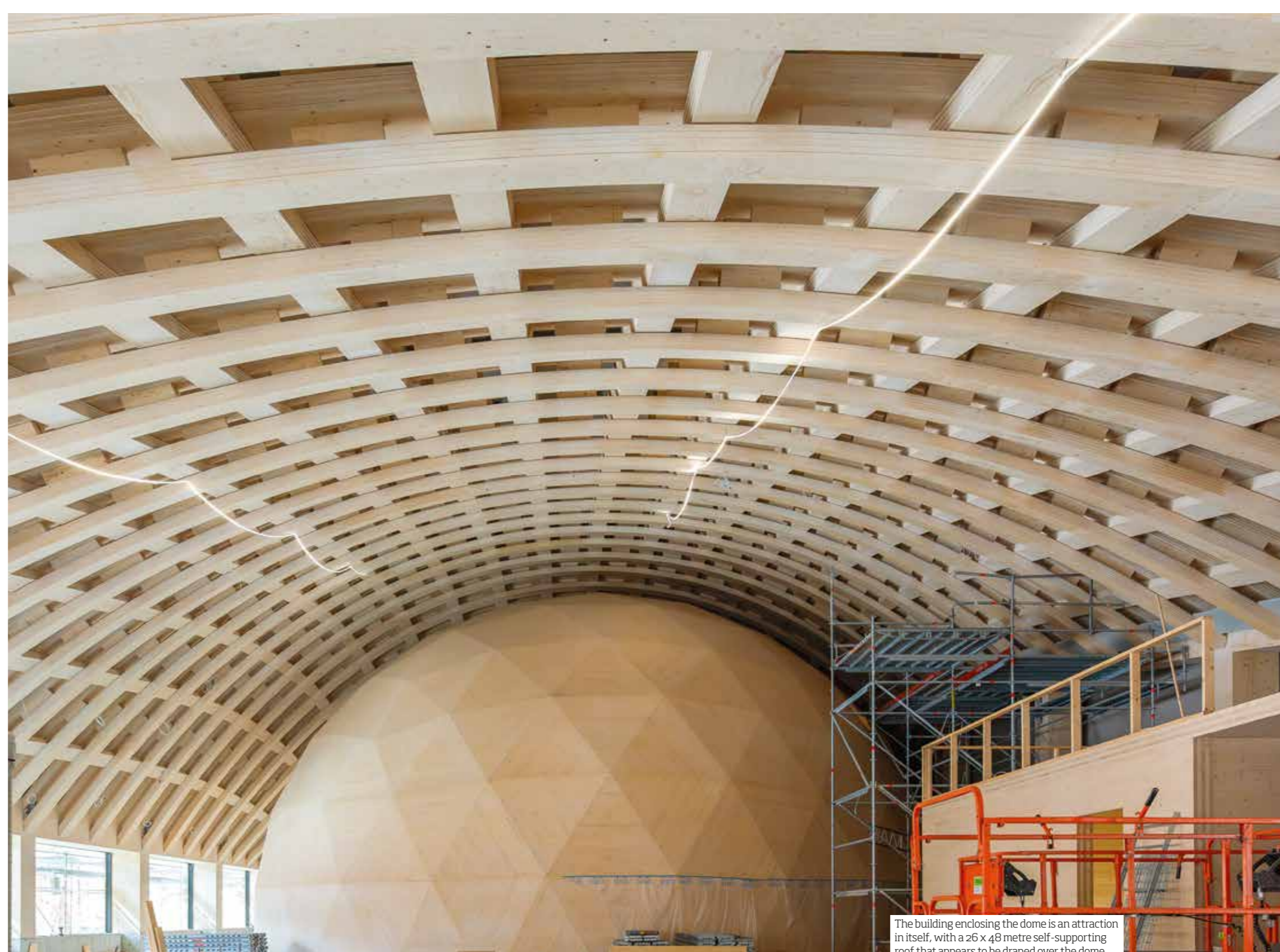
Tekniska Museet's new experience arena, an innovation in its own right, is opening soon.



Cross-section



Assembly.



The building enclosing the dome is an attraction in itself, with a 26 x 48 metre self-supporting roof that appears to be draped over the dome.

Wisdome Stockholm is Tekniska Museet's largest investment since 1936, when it moved from the Royal Swedish Academy of Engineering Sciences' attic on Grev Turegatan to its current premises in Norra Djurgården. The new experience arena for visualisation is part of a major national project based on world-leading visualisation research at Linköping University and Visualisation Centre C in Norrköping. One of its main features is a spherical dome where laser projectors will create a 360° experience in 3D. At the start of the Wisdome Stockholm project, three architectural offices, Elding Oscarson and White from Sweden plus Denmark's Dorte Mandrup, were invited to submit parallel designs. The brief required the use of an existing planning permit, and for the buildings' frames to be made in engineered wood from the project's main partner Stora Enso,

employing their framing system in laminated veneer lumber (LVL) and cross-laminated timber (CLT). The eventual winner was Elding Oscarson's design, which pushed the boundaries of both the material and the site.

»We could have just gone straight up and down with the framing system, but we were looking for a challenge and wanted to demonstrate the true capabilities of the material. The aim was for this to be an exploratory project that stretches the limits of what is possible with wood and the products we had at our disposal,« says Johan Oscarson, one half of Elding Oscarson.

The dome itself is like a pearl enveloped in a huge, arched roof whose organic shape is reminiscent of half a mussel shell. The size and shape of the roof attracts attention and arouses curiosity about what is actually hidden underneath.

»There's a spatial and site-specific story behind the form, which is about how we interact with the culturally valuable buildings of Djurgården. Both the Maritime Museum's dome and Tekniska Museet's transverse machine hall have vaulted forms that are echoed in Wisdome Stockholm, creating a kind of unity,« continues Johan.

THE DOME CONSISTS of 277 unique triangles made of CLT from Stora Enso's Grums factory and assembled into a self-supporting spherical structure. It is just over 12 metres tall and has a diameter of a little over 21 metres. Although the spherical dome is the core of Wisdome Stockholm, the architects wanted the surrounding building to be an attraction in itself.

»We feel the technology for delivering experiences might look different in the future, so it was important to us that the

external structure should be self-supporting and provide a fantastic space with many uses,« says Jonas Elding.

Since the surrounding facilities such as a café and exhibition hall only require a single-storey volume, the most obvious solution would have been to make the dome rise up through a lower ceiling. In order to exploit its uniqueness and at the same time chisel out a strong internal space, as well as an interesting external form, Elding Oscarson chose instead to make the spherical dome a freestanding indoor feature.

»This has allowed us to keep the façade low towards the courtyard, while the dome will now be the main attraction inside. It has its specified dimensions, and we had to keep to the overall height limits in the detailed development plan, which means there are only a few metres between the top of the dome and the lower edge of the roof,« says Jonas Elding. »



Section, model.



Roof with props removed.



The triangles have been assembled into a self-supporting dome whose shape is inspired by other museum buildings in Djurgården.

Architect **Johan Oscarson**

»THE AIM WAS FOR THIS PROJECT TO STRETCH THE LIMITS OF WHAT IS POSSIBLE WITH WOOD.«

»ELDING OSCARSON WORKED closely on this project with structural engineer Florian Kosche of Norwegian construction company DIFK, and together they came up with the design concept of an undulating roof constructed from a lattice of LVL beams, known as a gridshell. The asymmetrically free form roof has a span of 26 x 48 metres, with no internal supports.

»It has been a very open process where we exchanged ideas, designs and engineering proposals throughout the concept phase. Florian Kosche is not just a very knowledgeable structural engineer. We also see him as a creative, and without his support we would never have dared to embark on this,« says Jonas Elding.

The inspiration for the design concept draws on several international projects, including the Multihalle in Mannheim,

Germany, which was built as a temporary structure in the 1970s but still stands on the same site to this day. The hall shows how, with good design, even thin materials can support large loads and it is one of the earliest structures to predict what can be created using today's digital parametric design tools.

In Florian Kosche's view, too many contractors still lack an engineer's understanding of wood and what you can actually do with it, and as far as he is concerned, the biggest challenge in working on Wisdome Stockholm has been finding someone who wanted to take on the project.

»Our proposal was based on LVL surface units for highly efficient use of all the materials. But no contractor in either Sweden or the rest of Scandinavia was willing to get involved. In the end, we had to turn to Blumer Lehmann in Switzerland,

which has experience with similar structures. But even for them, Wisdome Stockholm was a new challenge that required different techniques and methods.«

WORKING WITH HERMANN Blumer at Création Holz, the structural engineers at sJB Kempter Fitze and the IT specialists at Design-to-Production, the project team further developed the original proposal. The final roof structure now comprises 2,500 individual LVL beams, joined by 3,600 dowels in three different designs, also made of LVL, all of which was produced at Stora Enso's sawmill in Varkaus, south-eastern Finland.

After further machining in the Blumer Lehmann factory, the components were delivered to the construction site where they were bent and adjusted with precision accuracy.

The tolerance is as low as 0,5 millimetres on each side across the width and even lower longitudinally, at zero. The roof structure rests on 600 x 600–800 millimetre LVL posts with concealed steel tie rods and a concrete foundation. The LVL posts were themselves an innovation project and are now a product in Stora Enso's portfolio.

One of the challenges that comes with the extensive use of wood is how to deal with wind and other weather factors during the build. For the construction of Wisdome Stockholm, the decision was therefore taken to use a full temporary shelter with a built-in overhead crane. It is designed to cover the entire construction site and withstand the same conditions as a permanent building.

»As well as protecting the timber during construction, the shelter has had a positive effect on the working environment.«



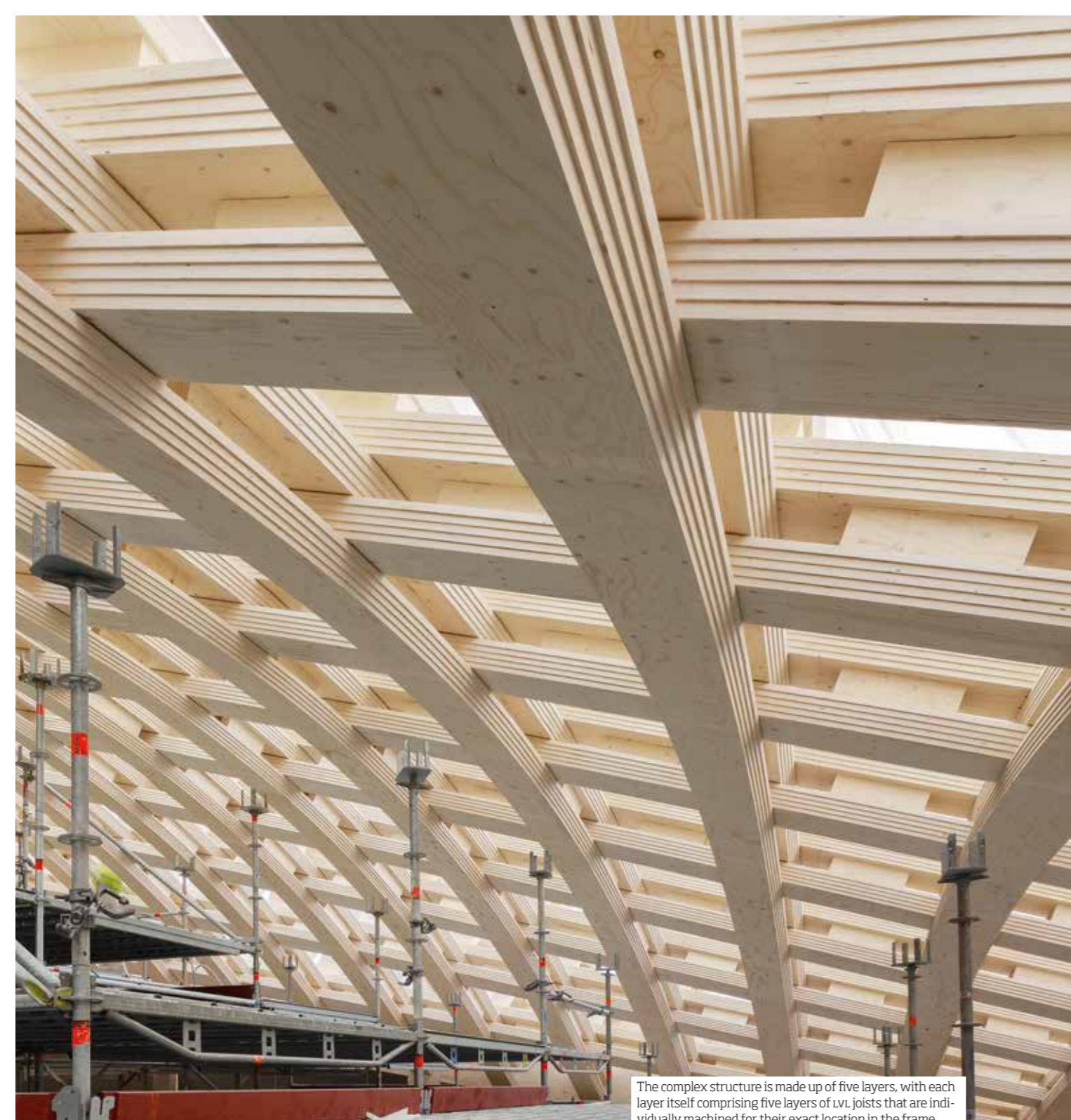
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The complex structure is made up of five layers, with each layer itself comprising five layers of LVL joists that are individually machined for their exact location in the frame.

It has also made deliveries and the assembly itself easier, as the trucks have been able to drive all the way into the tent to unload the material, which is lifted into place using the crane,« explains Johan Oscarson

JESSIKA SZYBER, BUSINESS Development Manager at Stora Enso, hopes that Wisdome Stockholm will serve as a source of new knowledge about wood construction. She praises the courage of the client and the commitment of the project team, which has enabled the material to be used in a cost-effective and industrially efficient way.

»Wisdome Stockholm is an innovative development project that showcases the success of digital craftsmanship. Together, we've managed to push the boundaries of what can be built in wood.«

Wisdome Stockholm STOCKHOLM, SWEDEN

ARCHITECT Elding Oscarson
CLIENT Tekniska Museet, Stockholm
DESIGN CONCEPT AND CHIEF STRUCTURAL ENGINEER Florian Kosche, DFK
STRUCTURAL ENGINEERS TIMBER FRAME Herman Blumer Création Holz,
SJB Kempter Fitze and Design-to-Production
CONTRACTOR TIMBER FRAME Blumer Lehmann
MATERIAL SUPPLIER Stora Enso
PROJECT COST SEK 220 million
AREA 1,325 sqm
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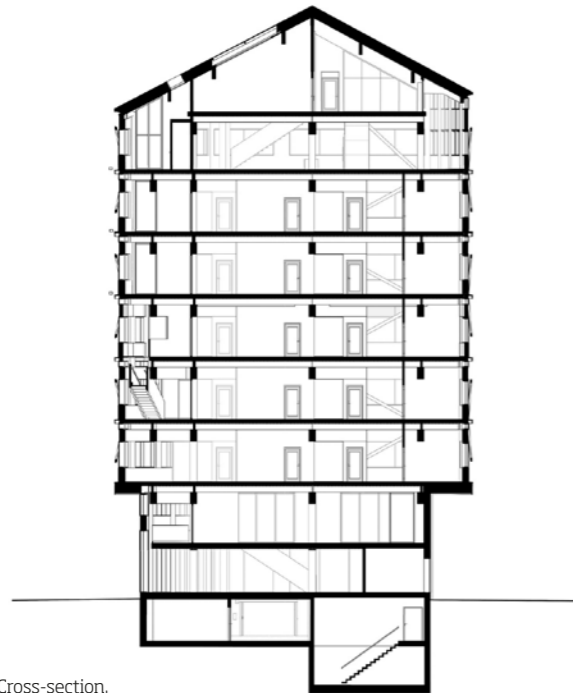
The office buildings in Örebro and London have a lot in common, including a low carbon footprint and a central location.



Innovative office buildings in two countries

In Örebro and London, two new office blocks are challenging the traditional approach to building. Both are made of wood, with the exposed structure as a key element of their design. »

TEXT Sara Bergqvist PHOTO Anders Robert (Kv. Korsningen), Jake Curtis & Ed Reeve (B&W)



Cross-section.

The Kvarteret Korsningen office building in Örebro and the Black & White Building in London are each unique in their own way: Black & White because it is the tallest wooden office building in London, and Kvarteret Korsningen because of the special development process that the municipality has called »giving the architect the power«. Although the two buildings are located in different countries, they have a lot in common. Both have timber frames and façades, and the exposed structures are an important aspect of the design. The high sustainability profile, low carbon footprint and central location are other commonalities.

Stepping out of Örebro Central Station, the warm wooden façade of Kvarteret Korsningen across the road quickly catches the eye, a calm oasis in a sea of busy roads and concrete buildings. A few years ago, the plot of land owned by the municipality consisted of a gravel car park with recycling bins.

»When we decided to develop this central, prominent site, we wanted a building of sound architectural quality, preferably a landmark that embraced innovation,« says Peder Hallkvist, City Architect in Örebro.

TO ACHIEVE THIS, the municipality decided to take a bold approach and reverse the process by giving the land allocation to architects rather than a developer. The project attracted considerable attention in the industry, and eventually 13 architectural firms expressed an interest in participating. The municipality interviewed all of them to find out how they would approach the project, and Utopia was finally chosen. After an initial phase of workshops between the municipality and the architectural firm, Utopia came up with a proposal

for a seven-storey office building where almost everything was made of wood – including the elevator shaft, stairs, interior surfaces and façade. Only the foundations were concrete.

»We knew from the beginning that we wanted to build in wood and see how far we could push it. We also felt that most new offices all look the same, with minimalist white surfaces and suspended ceilings, and little of the charm and identity that can be found in older offices. Having been handed the chance to decide so much for ourselves, we wanted to highlight the wooden structure and make it a central part of the building's personality,« says Mattias Litström, creative director and lead architect at Utopia.

The design of the block began on the inside, starting with the exposed timber structure, based on a system of primary and secondary beams.

»We had an inspirational image of an old warehouse in New York with big wooden beams on the ceiling and exposed piping that was very rough and ready. Somewhere out of that



The plot is small and irregular, but a six-sided building with different lengths of sides has made maximum use of the space.

came the idea of working with the wood as a raw surface and honestly portraying how the whole system is supported. It also prompted the early decision to completely avoid suspended ceilings and make the ceiling part of the architecture instead,« says Mattias Litström.

The next step was to take a closer look at the shape, which led the staircase to be moved out towards the façade.

»The idea was to turn the concepts on their head and make it so that people would rather take the stairs than the elevator. Now you get great views of the city in several different directions as you move up and down through the building,« says Mattias Litström.

EXTERNALLY, THE BUILDING has been designed around the highly irregular plot and limited space of 1,200 square metres, with sides of different lengths to make the best possible use of the site.

»But at the rear, which backs onto a school, we took a

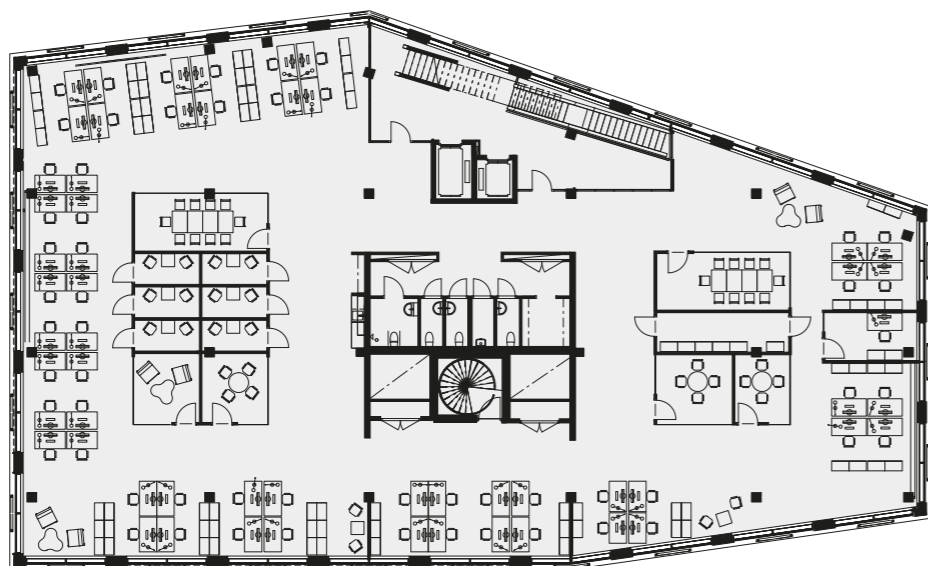
Creative director **Mattias Litström**

»WE WANTED TO HIGHLIGHT THE WOODEN STRUCTURE AND MAKE IT A CENTRAL PART OF THE BUILDING'S PERSONALITY.«

slightly different approach. If we had built all the way out, the passage between the buildings would have felt very narrow. So instead, we've cantilevered the building higher up, giving us much more space than the plot would suggest,« says Mattias Litström.

The limited space and difficult location with busy roads on two sides of the building presented an additional challenge during the construction process.

»The conditions of the site meant that it was important to get the building up quickly. And thanks to a high degree of «



Plan Kvarteret Korsningen.

» prefabrication, things went relatively smoothly. We bought the frame as a turnkey contract from Martinsons, who were able to get it in place quickly using their own team of installers. The façade contractor was Metus, and they did an amazing job. In addition to getting the façade done quickly, they were extremely careful to get every single detail correct, right down to the choice of screw heads in the façade,« says Jonas Hällgren, quality control engineer at Utopia.

But let us take a step back. The upended process at the start of the project meant that it was up to Utopia to find the right developer for the project, rather than the other way around, and they chose the real estate company and office developer Castellum.

»We thought they had a vision that fit in well with what we wanted to achieve. They also wanted to raise the bar further on the environmental side by certifying the building to the Nollco₂ standard, which excited us,« says Mattias Litström.

Nollco₂ certification requires net zero carbon emissions during the lifetime of the building, including materials, manufacturing and transportation during the construction

Kvarteret Korsningen

ÖREBRO, SWEDEN

ARCHITECT Utopia

CLIENT Örebro Municipality

DEVELOPER Castellum

MAIN CONTRACTOR Tyréns

TIMBER CONTRACTOR Martinsons

CERTIFICATION Nollco₂, Miljöbyggnad Gold

SURFACE AREA (LOA) 6.900 sqm

w| utopia.se

process, the building's energy use once it is completed, and end-of-life dismantling.

For the architects, the main challenge posed by the certification was to find a good solution for the windows.

»The more windows you have, the more difficult it is to meet the carbon requirements. However, we didn't want a façade with just a few small holes in it. I think we found a good balance in the end. We've added mirrored reflectors to the façade that deceive the eye, making the windows look much larger than they actually are,« adds Mattias.

Another measure that helps make the building climate-neutral is the solar panels on the roof, which actually generate some surplus energy over the course of a year. But the most important factor is the choice of materials.

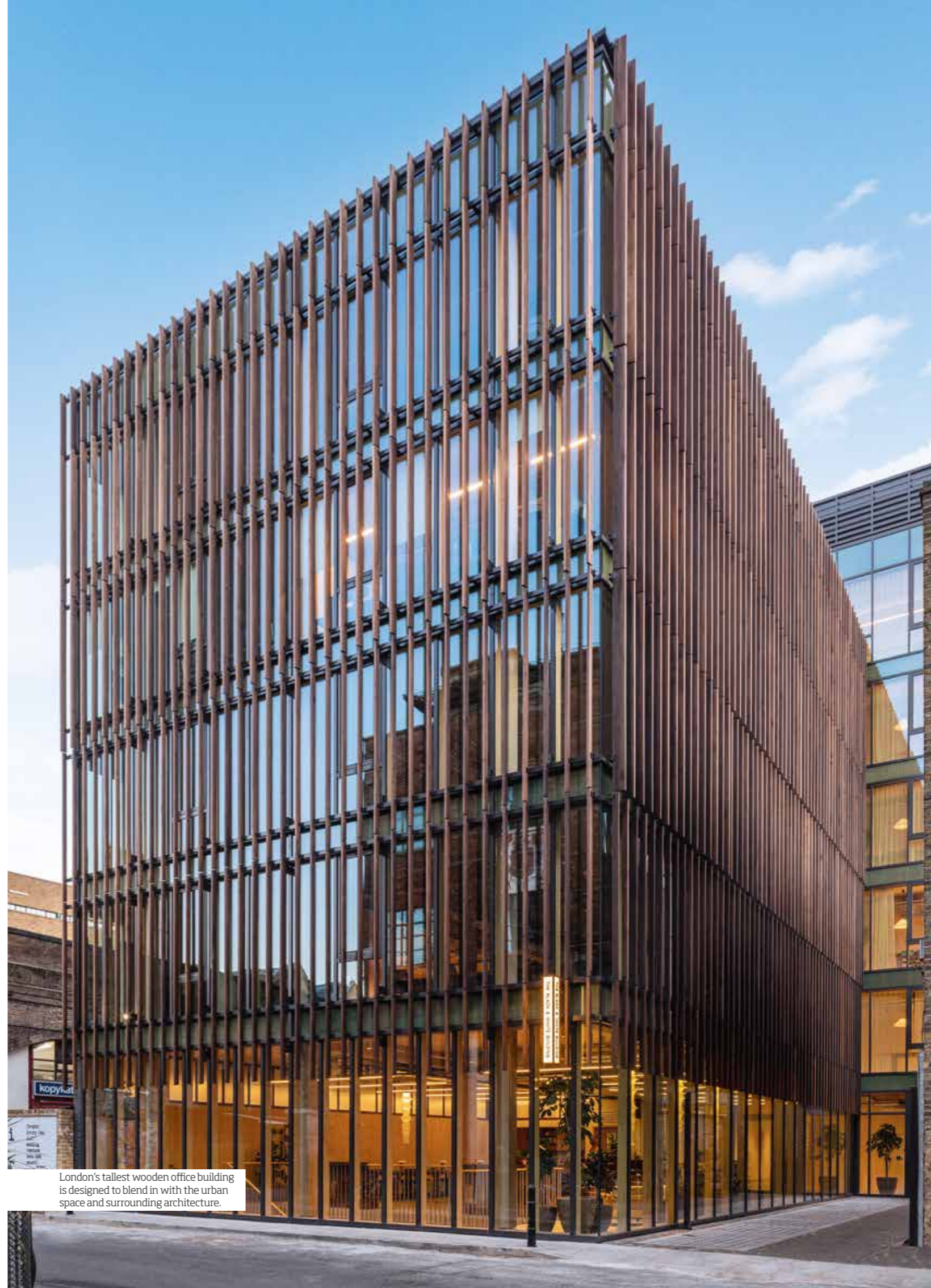
»Choosing wood as the framing material has allowed us to significantly reduce the carbon footprint compared with using concrete,« says Jonas Hällgren.

THE STRUCTURE CONSISTS of a glulam post-and-beam system made of spruce. It was chosen quite early in the process and decided in consultation with the wood supplier Martinsons.

»We had extensive discussions about how to build the floor structure. The design we chose relies heavily on verticality, with the system comprising both primary and secondary beams. All the wooden load-bearing walls also required quite heavy metal fixings, which we wanted to keep hidden. So we added 13-millimetre-thick wall panels of CLT, making it wood on wood,« states Jonas. »



The building comes to life in the evening when the interior becomes visible behind the large sections of glazing.



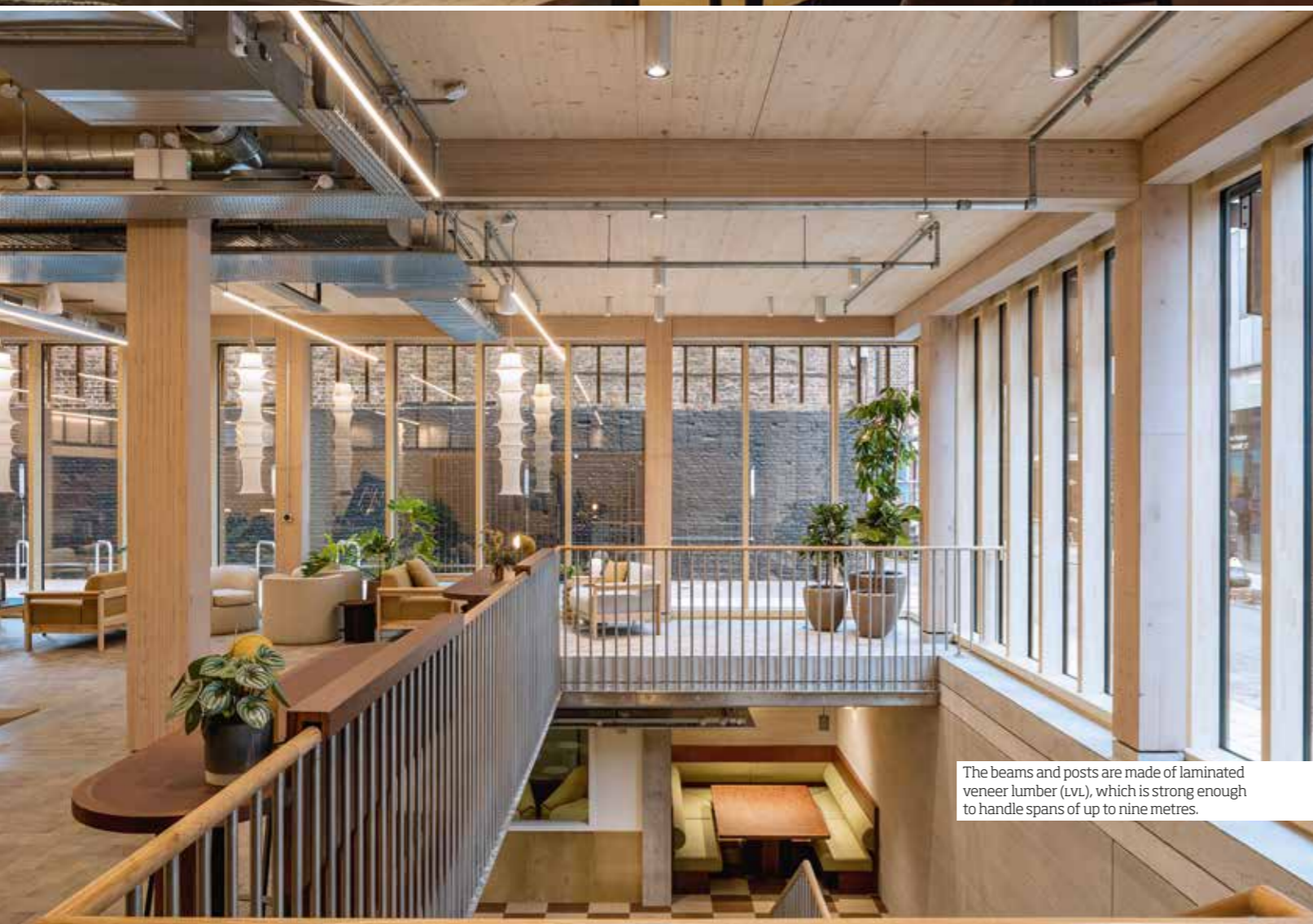
London's tallest wooden office building is designed to blend in with the urban space and surrounding architecture.



The wooden feel is palpable with all the exposed clt. Most of the furniture is made of wood and sourced from local suppliers.



The wooden beams from the previous building have been used for the sculptures in the reception area.



The beams and posts are made of laminated veneer lumber (LVL), which is strong enough to handle spans of up to nine metres.

» Because the whole interior is exposed wood, the entire building is covered by a sprinkler system. Good acoustics were achieved with an impact sound absorbing floor covering, coupled with sound absorbing panels in the ceiling.

On the ground floor, the building has been designed as a mezzanine level with large glazed windows and a six-metre ceiling height, which helps to create an airy feeling. The same mezzanine feature is then repeated on the top floor, which has its own terrace. A delightful detail and key part of the exterior design is the wooden diagonals that run across the entire façade, forming a repeating diamond pattern. The timber elements of the façade use furfurylated wood, which also appears under the cantilevers that rest on top of the mezzanine level.

One important consideration for Castellum was flexibility and the ability to move, remove or add walls as the activities in the building change.

»We needed to build in a way that meant you could have everything from a whole floor of cellular offices to completely open floor plans or a combination of both. The challenge was how to achieve this in a system without a suspended ceiling. But in fact, it's almost easier and creates greater freedom because all the utilities are visible and accessible in a whole different way,« comments Mattias Litström.

No tenants had yet been found when the construction work began, but as the building progressed, a single tenant was secured for the entire building – the police. And so the building has become Örebro's newest police station, complementing the previous station nearby as Sweden's first climate-neutral police station, and probably the country's only timber one.

»We're very pleased with the result. Both with the architectural design itself and with the debate the building has generated about how to build in new and innovative ways,« says Peder Hallkvist.

Architect **Andrew Waugh**

»EVERY TIME I WORK WITH WOOD, I DISCOVER MORE AND MORE BENEFITS.«

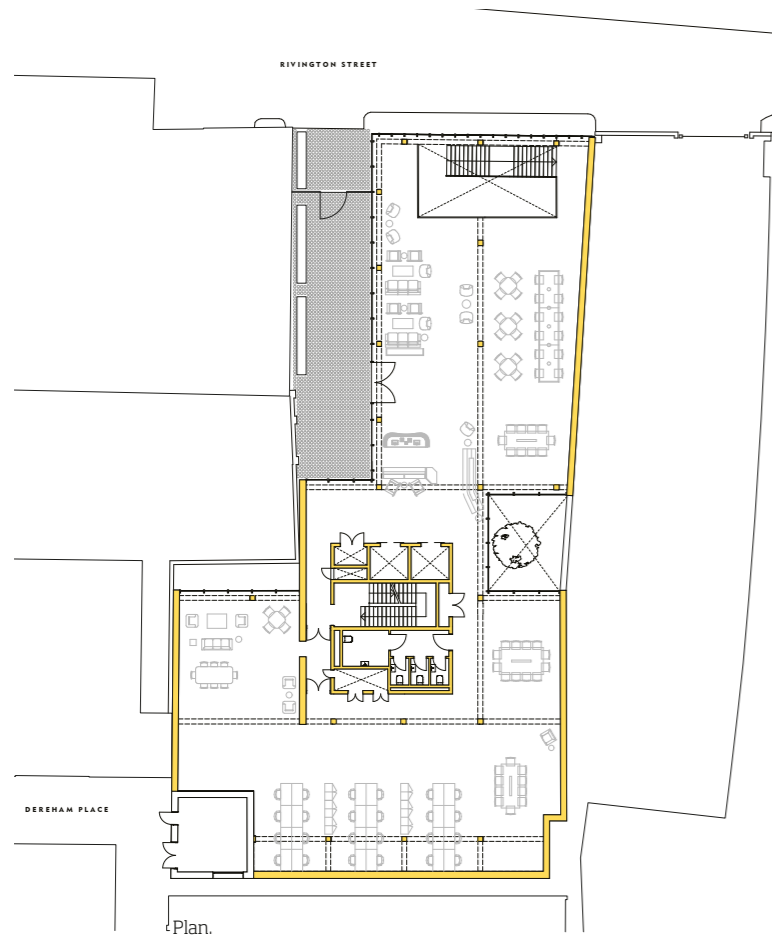
OVER 1,100 KM away, in the middle of London and less than a mile from St Paul's Cathedral, stands the 17.8-metre Black & White Building – London's tallest wooden office block, rising up seven floors. In terms of construction and sustainability, this is a building that really stands out. But in the urban space itself, not so much.

»The context of a building is important to us. We want to create buildings that feel like part of the city and its modern architecture, not individual pop stars trying to outdo what's around them,« says Andrew Waugh, a founding partner and lead architect for the project at Waugh Thistleton.

The London-based architectural practice has long held wood in high regard, resulting in a wide range of timber buildings.

»This interest started with a fascination for prefabrication when we realised its benefits in terms of speed, precision, quality, reduced waste, better working environment, dismantling and a significantly smaller carbon footprint. Every time I work with wood, I discover more and more benefits. But knowledge is vital. Building with wood doesn't mean simply switching out another material – it requires a completely different approach,« explains Andrew.

A few years ago he met Charlie Green, co-founder of office developer The Office Group (TOG), during a panel debate on »



Wood meets wood in the interiors and exteriors.

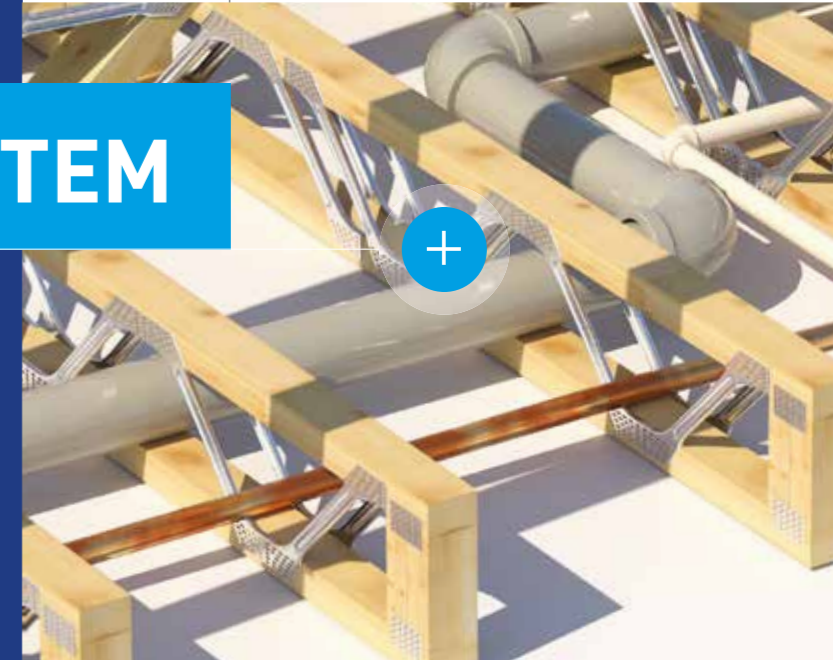
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» sustainability and was impressed by their success in transforming a large number of office buildings that others would probably have given up on and demolished.

»I told him that their way of working is the most sustainable of all, but I asked him to contact me if they ever wanted to build something new,« Andrew recalls.

And one day the phone rang. TOG had come across a property in central London where the foundations were too poor to build on.

»Our shared vision was to create a sustainable, all-wood building that would blend into its historic surroundings, in line with principles that are good for the planet and nature. A prefabricated building that could be dismantled at the end of its life and with an indoor environment that creates a sense of calm, well-being and conviviality,« says Andrew Waugh.

As with Kvarteret Korsningen, the structure employs a post-and-beam system, supplemented by CLT panels in the walls. But instead of glulam, beech laminated veneer lumber (LVL) has been used for the beams and columns.

»There are several advantages to using LVL. First of all, it's extremely strong – 2.9 times stronger than concrete – which allowed us to handle the long spans of up to nine metres. It also ensures highly efficient use of the material, and not just because the dimensions can be reduced. If you just make planks from a tree, you can use about 55–60% of the wood. With LVL it's 90–95%,« says Andrew Waugh.

Assembling the prefabricated building took just 14 weeks above ground, a much quieter process with 37% less embodied carbon than if the structure had been built in concrete, according to TOG. A total of 1,774 trees were used to make the frame – 227 beech trees and 1,547 spruce and pine trees – while the façade features thermally modified tulipwood.

»It's basically the same method used by the Vikings, but improved and modernised. Tulipwood itself is also a stable and reliable material that we haven't tried before. Where the

Black & White LONDON, UK

ARCHITECT Waugh Thistleton
CLIENT The Office Group (TOG)
STRUCTURAL ENGINEER Eckersley O'Callaghan
SURFACE AREA (LOA) 4,480 sqm
www.waughthistleton.com

sun shines on the façade, it will turn a silvery grey, and where it doesn't, it will become more like dark chocolate,« says Andrew Waugh.

The name of the building – Black & White – has nothing to do with the exterior, but comes from the original building, which was painted black and white on the inside.

»Plus 'being 'black and white' in English means sticking to the facts, being honest,« says Andrew.

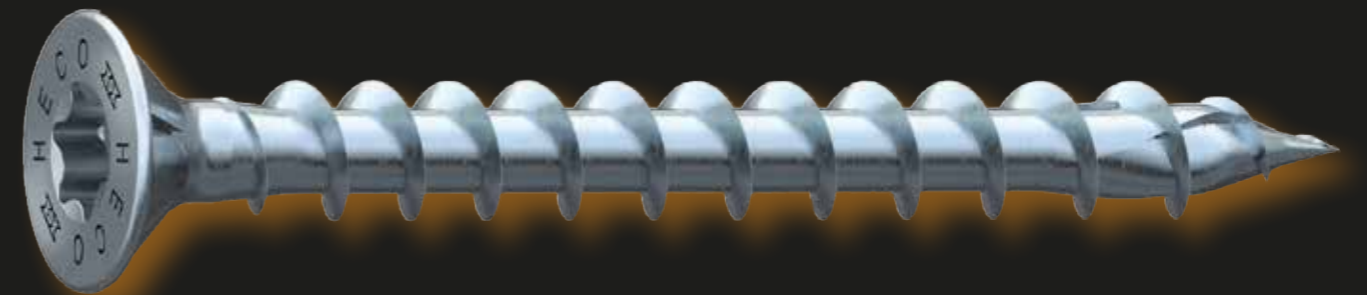
Some of the wooden beams from the previous building have been used for the sculptures that adorn the shared lobby on the ground floor. Most of the furniture is also made of wood, with around 80% coming from local suppliers.

LIKE WITH KVARTERET KORSNINGEN, the roof has been fitted with 80 solar panels, which supply the building with some of its energy. For the rest, only renewable energy is purchased.

»One of the great things about the whole process is that we've been able to use natural materials in a very sophisticated way, which is such a significant factor in creating a good environment for the people in the building. Climate change may be the biggest driver, but we should also see it as a transformation that can help create a brighter future in many other ways,« concludes Andrew Waugh. ☺

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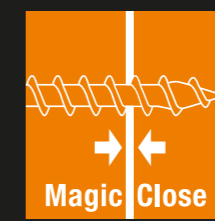


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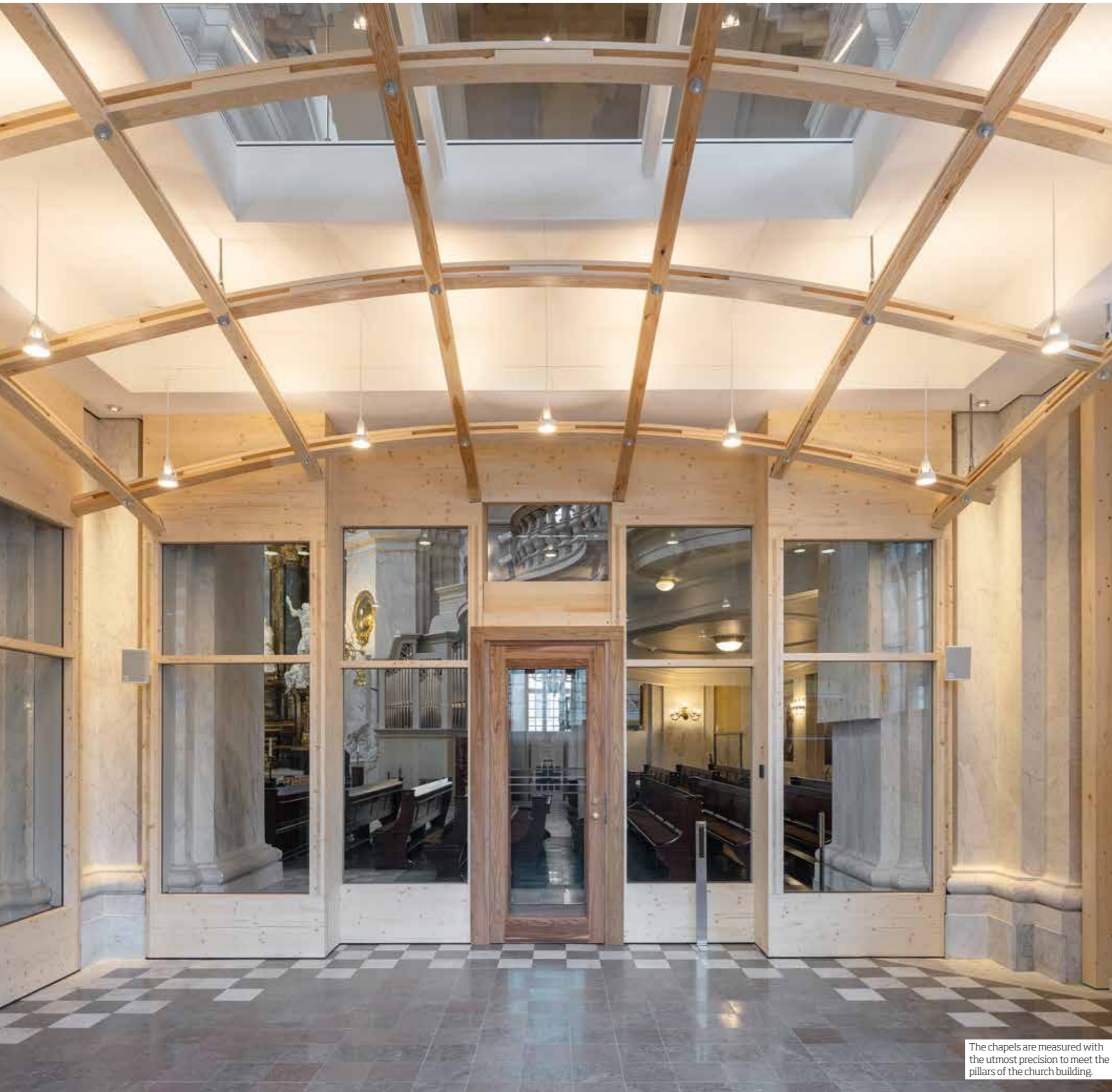
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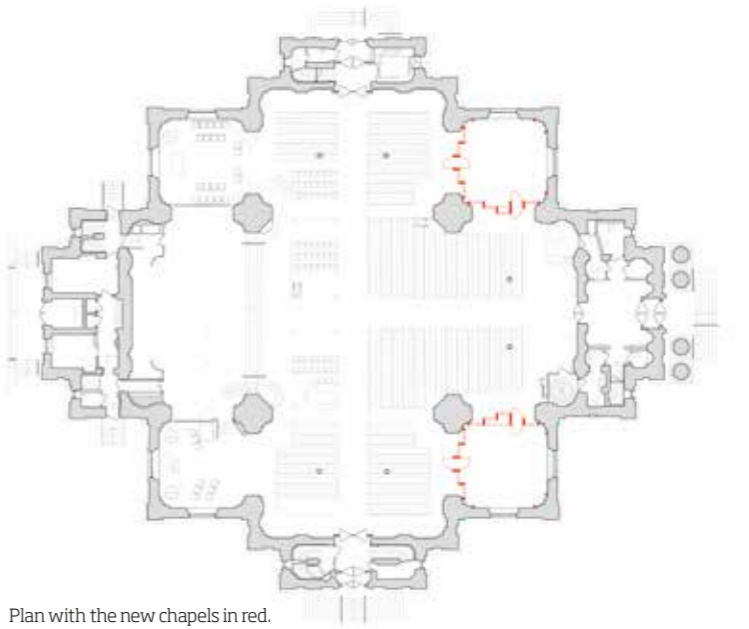


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The chapels are measured with the utmost precision to meet the pillars of the church building.



Plan with the new chapels in red.

THE CHURCH HAS ADAPTED THE SPACE, BY INSERTING TWO NEW CHAPELS, AS THE WAY PEOPLE INTERACT CHANGES

TEXT Malin Zimm PHOTO Peder Lindbom

The newly planted beech trees around Gustaf Vasa Church reach toward the spring sun. When the old elms that flanked the church, forming a striking backdrop to Odenplan, suffered Dutch elm disease and had to be cut down, it coincided with the planning of much-needed 'rooms within a room' inside the church. The Easter weekend saw the inauguration of two new chapels built inside the church, with their arched CLT structure creating a bridge between contemporary building techniques and the neo-baroque style of the church.

GUSTAF VASA CHURCH was completed in 1906, designed by Agi Lindegren as a neo-baroque cruciform church with a 60-metre-high dome. The church nave is one of the largest in Stockholm, seating over a thousand people, with pews in three of the four transepts. The church is one of the few spaces in the urban environment that is not

governed by commercial concerns and fulfils an important function as a meeting place both for festivals and in everyday life. One of its most vital functions is to facilitate interactions between people inside the church, and it is only natural that the historical setting will face changing spatial demands. In this symmetrical and open church space, the need arose to carve out two spaces so that activities of a more social nature could take place at the same time as services and masses. AIX Arkitekter have been working on Gustaf Vasa Church for some time, most recently with the extensive renovation completed in 2017. Mona Lantzourakis, architect at AIX, explains the new needs:

»To allow people to stay and drink coffee and socialise after a service, a soundproof room within a room is needed so that other church activities can continue in the main space. The children's area previously occupied a corner of the main hall, and the sound »

Arkitekt **Mona Lantzouraki**

» **THE ROOM IS CAREFULLY PROPORTIONED SO AS NOT TO INTERRUPT SIGHTLINES, LIGHT DISTRIBUTION AND THE PERCEPTION OF HEIGHT AND LINES IN THE CHURCH SPACE.**«

» conditions were not always compatible with an ongoing service.«

Petrus Tahan, project manager at Kyrkans Fastighetssamverkan Stockholm, says that the parish wanted to maintain the contact between the church and these activities. After sketching out many designs, the architect and the client hit on a common consensus that the new chapels should have a vaulted ceiling and that a gridshell was the best way to support the roof structure and create vaulted rooms.

TAKING INTO ACCOUNT Mona Lantzourakis' existing experience with the church, the choice of building in CLT and the County Administrative Board's strict rules for the

listed building, all the conditions were in place to complete the project with minimal impact on the existing space. With utmost precision and visual sensitivity, two enclosed chapels were tucked into the two vaulted corners of the square floorplan along the entrance façade. The structure is made entirely of wood, with a CLT frame and other types of wood chosen for specific functions and structural roles. The only fixing to the existing church building is a single anchor in the floor; otherwise the chapels are independent of the church structure and can in principle be removed without a trace.

The contact between the new chapels and the church outside is maintained through glazed walls and skylights. The gridshell is a

striking internal feature that supports the vaulted ceiling, with a distance of about five metres from the floor to the highest point. Lights are suspended from the CLT ceiling panels, carefully arranged to harmonize with the curvature of the interacting shell structure. The skylight admits both daylight from the tall church windows and light from the corner vault's chandelier. Mona Lantzourakis describes how the rooms have been designed to be discreet yet distinctive.

»Externally, the roof tapers upwards, and the entire volume of the room is carefully proportioned so as not to interrupt sightlines, light distribution and the perception of height and lines in the church space as a whole. The façade follows the geometry of the corner columns in the church, with folds that extend the entrance outwards.«

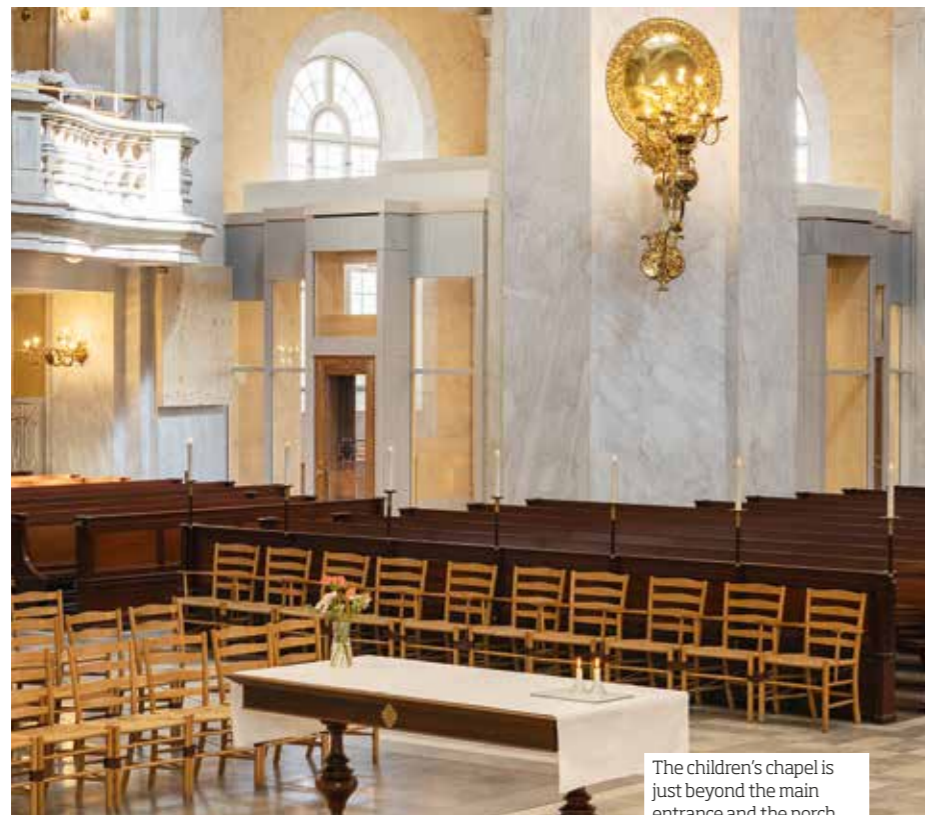
IT WAS IMPORTANT that the new chapels did not intrude visually or acoustically on the main part of the church, says Mona Lantzourakis.

»The church organ is purpose-built for this space, and a great deal of effort went into the frame of the new rooms and ensuring quiet door operation, so these additions would not interfere with or alter the sound of the organ. A stud wall structure would have absorbed the organ music, while the chosen engineered wood frame keeps the sound profile intact in the church.«

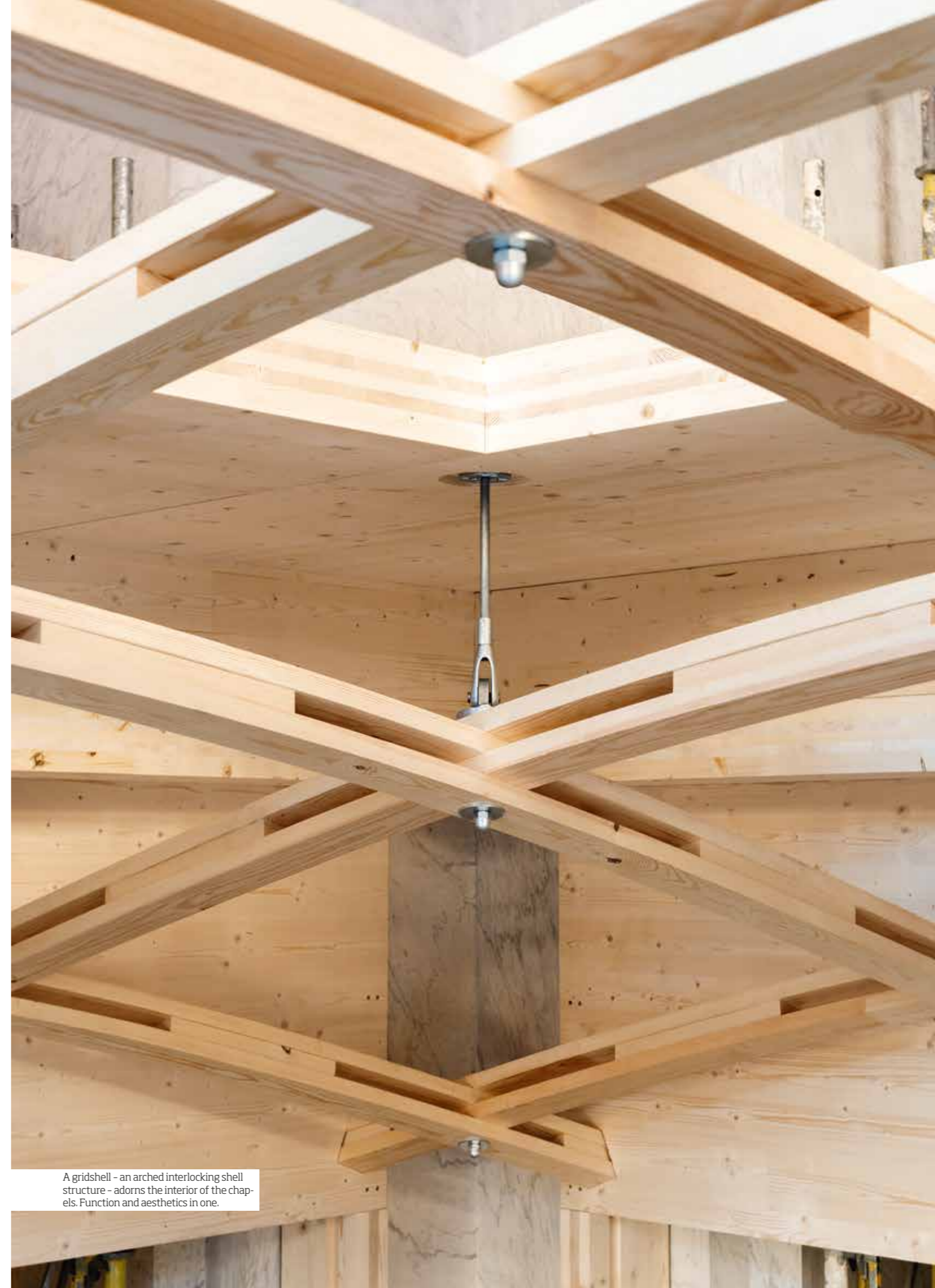
To keep the church open during the construction period, the frame was prefabricated. Erik Bergman Lenne at Setra, which supplied the CLT frame, confirms that collaboration with structural engineers and project managers is the way forward for Swedish CLT construction.

»We always want to show what a great raw material we have, but on this project we also had to show what we can do in such a special case, how we bring knowledge and skills to a complex project and how we can pass on knowledge about the possibilities of wood.«

The entire project has been governed by how much load can be placed on the floor of



The children's chapel is just beyond the main entrance and the porch.



A gridshell - an arched interlocking shell structure - adorns the interior of the chapels. Function and aesthetics in one.

» the church. The load limit per square metre is 250 kilogrammes, which requires not only a lightweight structure, but also a well thought-out construction process that keeps both material movements and construction aids within the load requirements during assembly. The breaking down of the constituent parts was governed by the access through the church door.

MATTIAS BRÄNNSTRÖM at Dala Massivträ has been across the design and planning, assembly and delivery of all the parts. He stresses that a lot remains to be done after delivery of the components from the factory.

»You have to remember that what we deliver from a CLT factory is a frame, not a 'finished piece of furniture'. It's important to communicate to the client that what gets delivered is comparable to a prefabricated concrete element, a fairly rough thing that needs to be adjusted and completed on site.«

The assembly was made possible by prefabricating the gridshell from a 3D model by Dalabygg, after which the elements were dismantled and transported to the site from the Dalahus factory in Linghed for final assembly.

»It would not have been possible to adapt this on site. The high level of precision and the well-coordinated construction process set this project apart. Kyrkans Fastighetssamverkan ensured that all the players were on the pitch and ready to pass to each other. It turned out to be a really good line-up,« says Mattias.

AIX and Lantzourakis' experience in traditional wood construction is evident in the design, with each placement and treatment of different woods contributing to the whole. Spruce has been used in the walls, sill plate, top plate and roof elements, while the gridshell dome is made of pine.

And what happened to the elms from the church grounds? After winter felling and spring machining, they were reused, largely in their old location. Henrik Holmberg from Snickargården Storfors was present at the



The glass in the walls and doors is non-reflective, low-iron and provides a pleasing light. The plinth is made from the church's elms.

felling to ensure that there were sufficient lengths to work with after sawing. In the end, there was enough timber for the doors, frames, lining and three-layer glued panels for the outer surfaces of the chapels.

THE USE OF a CLT frame for the chapels in Gustaf Vasa Church is an excellent example of wood construction at its best, says Mattias Brännström.

»Wood in general and CLT in particular is excellent when it comes to making additions to existing buildings. Getting strong building materials through ordinary window and door openings, meeting load requirements and even being able to keep working alongside ongoing activities – this can only be achieved with wooden structures.«

This project combines a minor scale with major complexity, bringing together

Two chapels in Gustaf Vasa Church STOCKHOLM, SWEDEN

ARCHITECT Mona Lantzourakis and Maki Yoshida at AIX Arkitekter
CLIENT Kyrkans Fastighetssamverkan Stockholm, Developer Gustaf Vasa Church
STRUCTURAL ENGINEERS Dala Massivträ with JR Dala Bygg and Limträteknik
COST SEK 13.3 million
AREA Approx. 49 sqm per chapel
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Innovative reuse is paired with a natural colour palette

When it came to refurbishing the offices of the Swedish Society for Nature Conservation, sustainability and reuse were the watchwords. Natural materials have been given a leading role, including a wooden staircase that contributes to good acoustics.

TEXT Marit Engstedt PHOTO Emil Fagander

When the Swedish Society for Nature Conservation (SSNC) needed to refit its headquarters, it was keen to make it as sustainable as possible. The project recycled 100% of the furniture and fittings, 85% of the lighting and much of the building materials. The process has also recycled internal installations, including the ducts from the ventilation system and cable ladders. Construction panels such as plywood and plasterboard have been carefully dismantled and reused.

HELENA FREDRIKSSON, PROJECT MANAGER at the Swedish Society for Nature Conservation, meets us in the calm lobby. It is an appealing environment with a colour scheme in various shades of green and natural tones, made even more inviting by means of textiles, carpet and upholstered furniture, combined with clean wooden surfaces. The lobby is slightly lower than the other rooms, and pendant lighting casts a pleasant, subdued light.

Sheer curtains and glazing conceal a room

1. The green is a recurring feature that here contrasts with a naturalistic pink wall and beige felt-covered sound absorbers.
2. In the South Hall, with its generous ceiling height, a staircase leads up to the mezzanine floor. The chairs, like many other pieces of furniture, were donated.
3. The more secluded parts of the space are enclosed by glass and green painted surfaces.

with a ceiling height of 5–6 metres and tall windows along the entire outer wall.

»We call it the South Hall. It's an old industrial building that used to house a brewery, and the large copper kettles were kept in here. Our premises extend across two buildings, as you can see from the outside. These tall windows give way to slightly lower ones further into the building,« explains Helena.

The old industrial metal windows, rising up 4–5 metres, are painted in verdigris green, and the same tone is picked up on a large ventilation pipe that runs straight through the room at ceiling height. The strong industrial vibe provides a pleasing contrast to the room's otherwise warm décor.

The floor is laid with ash parquet, which is both FSC and PEFC certified. Around the tables sit wooden chairs with webbing seats.

»Härlanda Church in Gothenburg had these chairs stored in a bell tower for ages. They were happy to donate them to the SSNC. They're John Kandell chairs from 1958. We've

tightened up the webbing and freshened them up,« Helena continues.

IN THE CENTRE of the long, double-height space, there was already a two-level section. Kaminsky Arkitektur, which helped the SSNC to realise its renovation project, has streamlined the functions and placed the conference and meeting rooms, the kitchen and the dining room in this central section. Desks and workstations have been placed along the outer façades, on both sides of a mezzanine, giving direct access to natural light.

The more enclosed rooms in the centre all have light coming in through glazed green-painted wooden sections with sheer curtains in natural tones. From the South Hall, a grand staircase leads up to the mezzanine level. The side pieces are made of FSC-certified CLT, while the treads and risers use the same ash parquet as the floor and have been treated with hardwax oil. There is a similar staircase on the other side of the »



» mezzanine, facing the north façade, but this is painted green to mask a slightly over-prominent ventilation pipe.

»When we realised that we needed to replace the old stairs, we chose a solid wood staircase, partly because it provides a good working environment and nice acoustics, and partly because it reflects our position as a nature and environmental organisation. For us, natural materials are key. We like to choose wood and cork, and minimise the use of plastic, steel and plaster,« says Helena Fredriksson.

ARCHITECT JOAKIM KAMINSKY ponders whether the stairs could have been made from recycled material instead of new timber:

»It's difficult to get the right dimensions and quantities of, let's say, CLT because it's a relatively new material. There isn't much being recycled. You might consider using glulam beams, but they've often been exposed to the elements,« he says.

»In the new library at the far end of the room, we've built bookshelves from new birch plywood, which is also not recycled, although it does at least make use of waste wood. We could maybe have sourced recycled plywood from other office interiors.«

The walls of some of the meeting rooms adjacent to the library are also clad in

plywood, and both the bookshelves and the wall cladding are fitted so that they can easily be taken down. Helena Fredriksson points out that this is in line with their circular thinking.

Inside the library, the space and light of the South Hall has been transferred to the part of the room with lower ceiling height and windows. This was previously a mass of walls and glazed sections in high-gloss white, in a dated 1990s style.

»We had to give all this a bit of extra thought. The most sustainable approach is not to demolish and discard, so we dismantled and repainted the glazed sections in a matte green. We added more glass panels, which are now visible around the office, taking what was originally the most awful thing and turning it into a key element of the interior design,« says Joakim Kaminsky.

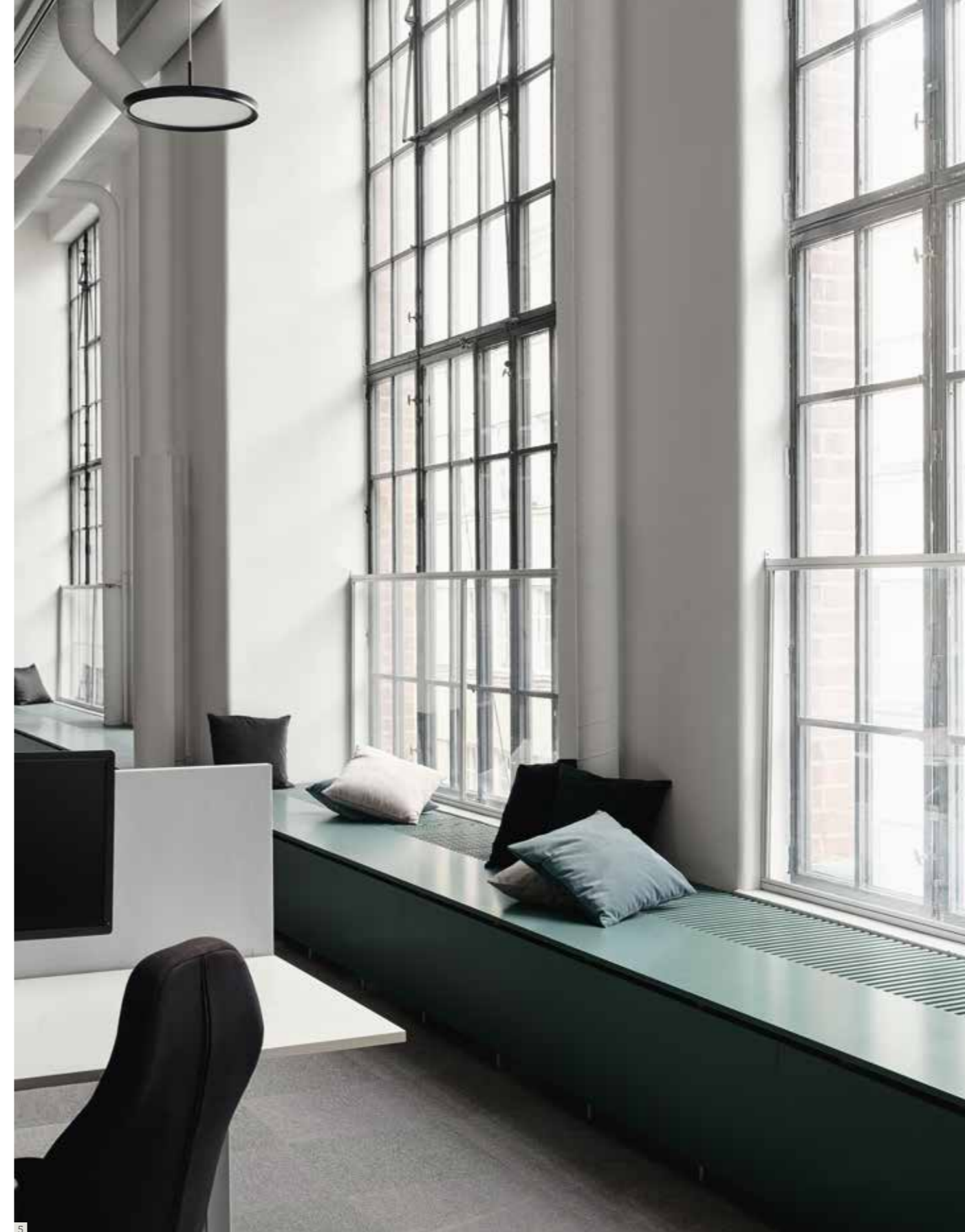
THE FLOORS in this part of the building are carpeted and the desks have sound-absorbing felt screens.

Where the South Hall encourages informal meetings, chats and conversations, the desks and carpeted floor indicate that this is a quiet place, a work zone.

The carpets are made of yarn from recycled ocean plastic, but do not contain PVC or other environmental toxins, as verified by the SSNC's own environmental toxins expert.»

4. The work area's carpet is made of yarn from recycled plastic taken from the ocean.

5. Workstations are positioned along the windows to take advantage of the natural light.



Five steps for working with material reuse

Kaminsky Arkitektur is participating in a research project with cc Build and ivl, among others, that has developed a 10-step process for working with material reuse. Here are some of the key steps.

- 1. Involvement.** Formulate a common vision for the project between all the parties involved: clients, consultants and contractors. It is vital to get everyone on board.
- 2. Conduct a rough inventory and check the premises.** What can be kept? What condition are the suspended ceilings and doors in? Identify different product categories that you think could be used.

3. Plan the design. Use the product categories as a basis. Make a rough sketch of what can be placed where.

4. Detailed inventory. Thoroughly go through a category, e.g. doors. Photograph, assess and label all the doors. What should be kept and what can be sold? Make sure you store them carefully.

5. Implementation phase. Suddenly a lot is happening and many decisions have to be made. It is important to be on site, monitoring and getting involved. Many solutions require logistics, warehousing, supply chains, reconditioning and coordination.

ccbuild.se/kunskapsbank/guider



» The Swedish Society for Nature Conservation was a client with a very clear vision. They had experts in energy, environmental toxins, textiles and so on, who were part of the project's reference group, and as process manager Helena was involved in all the decisions,« says Joakim Kaminsky.

He points out that you have to take into account the limitations and constraints of reuse and sustainability. It takes longer to source materials and furnishings, for example.

»We save the time we spend by reducing the cost of the furniture. The loose furnishings may cost SEK 1,000 per square metre on a reuse project, while in other projects they might cost as much as SEK 4,000. You have to be able to explain this to the customer.«

Joakim Kaminsky also says that reuse requires new business models for contractors and that this must be respected by both the contractor and the client.

»On regular projects, contractors often get quite a large part of their profit through mark-ups on materials, but this is not possible on reuse projects. You have to respect the fact that they will make their profit on more hours instead.«

Kaminsky Arkitektur is part of a network of other contractors and practices interested in recycling, and the commitment of the

Process manager **Helena Fredriksson**

» **WE LIKE TO CHOOSE WOOD AND CORK, AND MINIMISE THE USE OF PLASTIC, STEEL AND PLASTER.**«

consultants and suppliers involved made them solution-oriented detectives, finding waste or recycled materials on other projects that they could use here. It was also an advantage that the SSNC was involved in the project, as some furniture and fixtures were donated or discounted because they were going to a good cause.

JOAKIM KAMINSKY AND Helena Fredriksson agree that collaboration was the most important success factor for this reuse project. Kaminsky Arkitektur managed the project and was the spider at the centre of the web, coordinating all the contacts, while the contractors entered into partnering agreements, which made them equally committed to the project.

»Collaborative turnkey contracts and being an open book are key to making a reuse project work. You work together. We also had our environmental policy as a foundation, underpinning all our choices,« concludes Helena Fredriksson. ☺

6. Sustainability has been an important part of the project. All the furniture and fittings are made from recycled materials.

7. The interior features natural materials such as wood and textiles.

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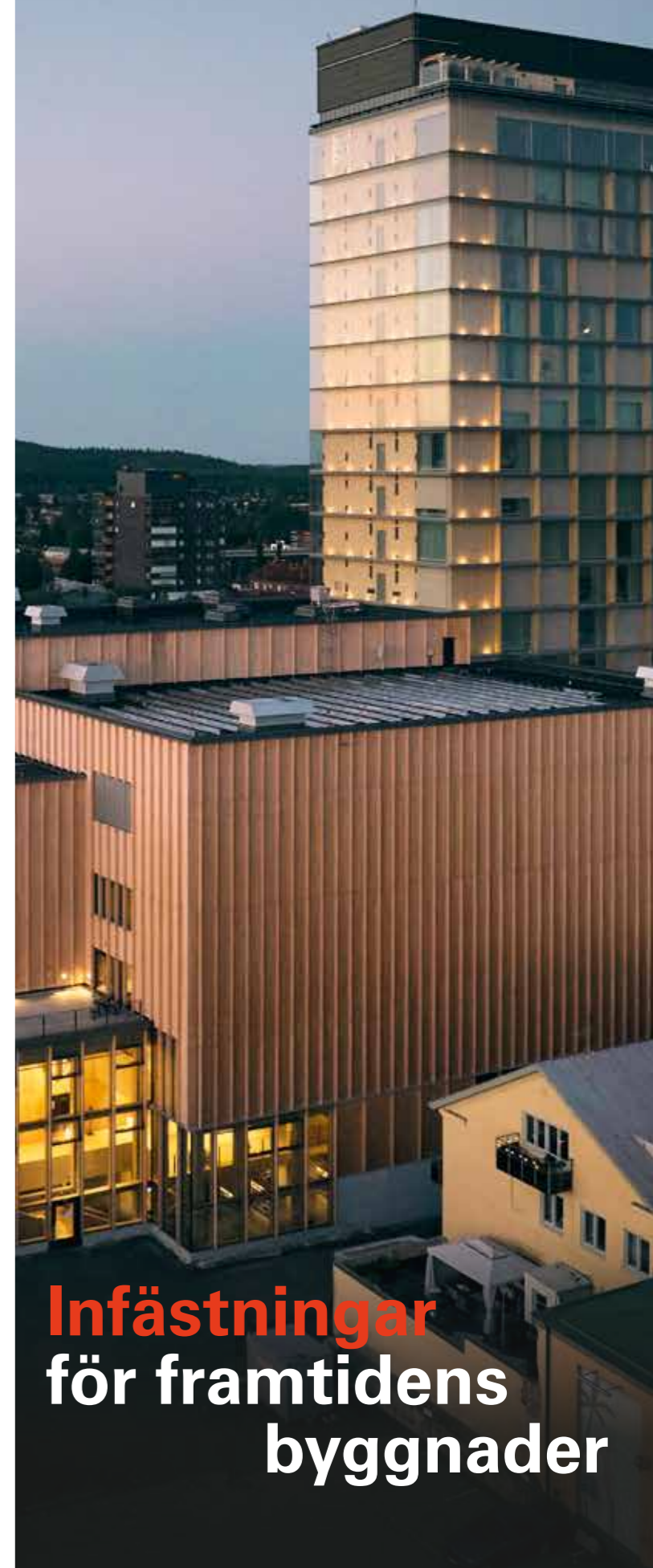
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Modern heritage management is about as old as the Nationalmuseum in Stockholm, which was completed in 1866. The first principles of restoration theory were formulated in the second half of the 19th century, provoking heated debate. The Nationalmuseum's major refit included the use of modern CLT boards to preserve the original appearance.

TEXT Stina Hagelqvist PHOTO Sweco

THE QUESTION OF how the cathedrals and the Vasa castles, especially Gripsholm Castle, should be managed for the future was first raised back in the 1890s. Should the building be restored to its ideal state or should its historical narrative be respected? The 20th century restoration debate oscillated between these different poles, posing further questions: Should the renovations be hidden or made visible? Should new or old techniques be used and should so-called modern or traditional materials be used?

Each restoration of our listed buildings has been preceded by detailed discussions about objectives, necessary considerations and the possibilities available, while precision and professionalism have defined the implementation – be it humble log cabins or proud stone buildings, such as cathedrals, castles or, for that matter, the Nationalmuseum, which became a listed national monument in 1935. The restoration of national monuments thus requires not only the largest budget, but also interest in the latest ideas and technical solutions.

THIS MAKES THE Nationalmuseum a chronicle of the restoration ideologies from different eras, having been rebuilt and repainted internally several times since its construction, and each change was modern at the time. In today's Nationalmuseum, the windows boarded over in the 1910s have now been uncovered, and the 1960s additions – an auditorium, storage room and exhibition room that effectively obscured the façades of the southern courtyard – have been removed.

The lighter grey colour palette of modernism has been replaced by more vibrant colours, based on architect Friedrich August Stüler's colour scheme from the 1860s and unearthed during the latest restoration. The museum now showcases a whole range of renovation methods, from antiquarian conservation and almost archaeologically exposed surfaces to reconstructions and new additions using old techniques combined with some new technologies. There is no



A major challenge during the restoration of the Nationalmuseum was the load-bearing floor, with the designers only having 60 millimetres to play with.

universal solution, and today each restoration project is recognised as unique, with specific challenges that require specific solutions.

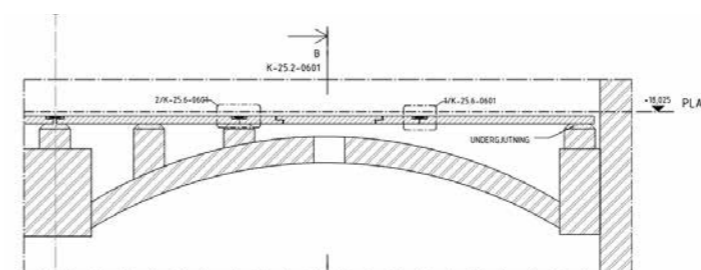
In addition to the modern requirements for accessibility, climate and safety, there are inherent limitations in terms of strength, load-bearing capacity, geometries and dimensions. In the case of the Nationalmuseum, the challenges were even greater because of the stringent requirements for climate control and ventilation in the exhibition halls on the one hand, and the preservation of the structure and existing floor levels on the

other. The designers at Sweco had only 60 millimetres at their disposal when they came to fit a new load-bearing subfloor between the existing brick vaults below and the top layer of flooring.

FEW MATERIALS OTHER than the chosen CLT panels could have satisfied both the design requirements and the small dimensions allowed by the building. The boards replaced the previous wooden planks and were laid like a puzzle on the short brick columns that transfer the loads from the floor to the vault,



The exhibition hall on the floor below with its domed vaults on which the new subfloor rests.



CLT floor with and without brick pillar supports above the dome vault.

with thin joints between the panels creating the effect of a homogeneous load-bearing sheet in each room. The CLT elements effectively distribute the quite unusual loads of an art museum like the Nationalmuseum, with its heavy sculptures and paintings that have to be transported to and from the exhibition halls, while at the same time allowing the legally protected vault structure to be preserved in its entirety.

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Wood – a fossil-free, renewable material that traps carbon dioxide – has a vital role to play in the green transition. But what is the situation with the forest? In a series of articles, Trä addresses the question of why Swedish forestry is the way it is, and what opportunities and challenges are on the horizon.

Where knowledge and forests grow

There are different ways of managing forests. Clearcutting, with its characteristic open areas, is the most common – but there are also other methods, known collectively as continuous cover forestry (ccf). What is best for growth, climate and biodiversity?

TEXT Göran Crafoord

CLEARCUTTING HAS LONG been the dominant method of Swedish forestry. It is an efficient method based on a cyclical process from planting to felling. Almost all trees in a given area are felled at the same time and new ones are planted. Recently, however, there has been increasing interest in what is usually referred to as continuous cover forestry methods.

Professor Tomas Lundmark, who works in the Department of Forest Ecology and Management at the Swedish University of Agricultural Sciences (SLU), has followed forestry research since the 1980s.

»The choice of method depends on what you want to achieve. When it comes to timber production, clearcutting is more efficient than CCF methods, yielding an average of 15–20% more raw material per hectare. In addition, harvesting costs are about 20% lower than, for example, selective cutting, because clearcutting takes place at one time and in one place, meaning less transport over shorter distances.«

THE COMMON PRINCIPLE of the different continuous cover methods is that the land is always covered with trees. In other words, harvesting does not create large treeless areas in the way that clearcutting does. The CCF methods have been in use for a long time, not least as a complement to clearcutting. But which method is best – and from what perspective? This question is being studied on several fronts.

In 2021, SLU launched a series of experiments in collaboration with certain forestry companies, including Södra – an association of 50,000 private forest owners – to compare different forest management systems. To date, there have not been many scientific studies of this kind in southern Sweden.

»We want to provide sound advice to our members, based on science and proven experience. We're now investigating and comparing clearcutting, group selection cutting and



Tomas Lundmark.



Magnus Petersson.

shelterwood cutting. We are both collecting experiences from forest owners and testing the methods ourselves in an experimental area consisting of spruce, pine and deciduous forest stratified by height, diameter and age. A fourth area, left untouched, is also included. In 2023, we'll be training our forestry advisors in CCF methods so that they can always carry out their work in a professional manner, whatever method the forest owner chooses,« says Magnus Petersson, head of Södra's forestry department.

Are CCF methods better for biodiversity than clearcutting?

»We'll see what SLU's research results say. If only the large trees are removed and most of the forest is left in place, shady conditions will remain even after felling, which favours animals and plants that thrive in moist and dark conditions. If, on the other hand, we create large open areas by clearcutting and leave very few trees behind, the species that thrive on light and warmth do better. So the more different methods we use, the greater the biodiversity, but we don't yet know what proportion is ideal,« says Magnus Petersson.

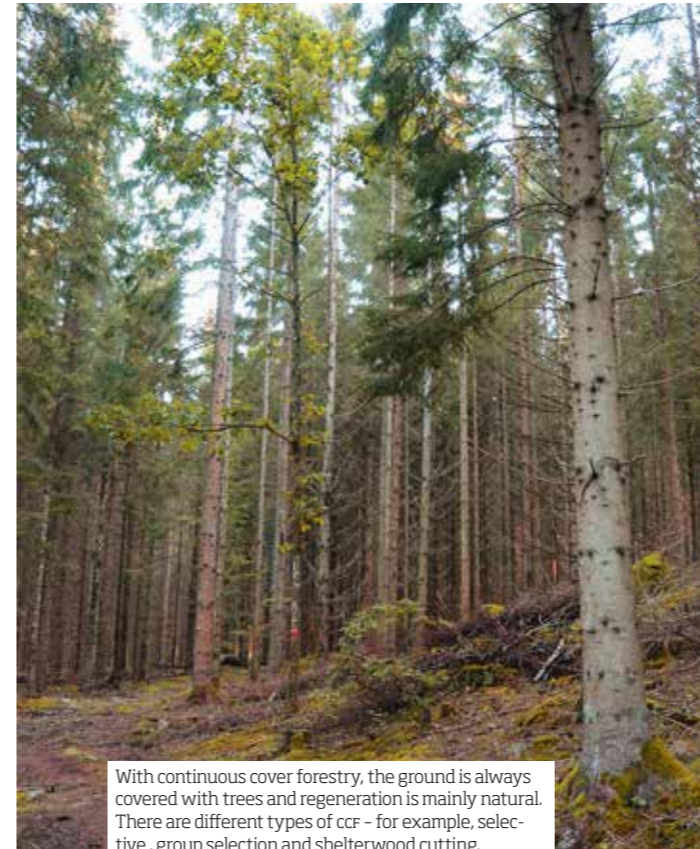
Which method is best from a climate perspective?

»The faster the forest grows, the more carbon is sequestered in the wood. The system that absorbs the most carbon over time therefore provides the greatest climate benefit.«

LARS ERIK LEVIN has long personal experience of clearcutting methods. He has managed his family farm for more than 40 years and continues to practise continuous cover forestry in some areas, just as his father did. Lars Erik applies clearcutting practices on around 70% of the forest, while the rest is subject to selective cutting.

»Both methods are needed, but they have different strengths. I try to think about what's best for both nature and my wallet. Clearcutting involves a lot of thinning and the trees grow faster. From a production perspective, this is good because the volume of wood per hectare increases within a given time-frame. And the more wood we can produce, the more carbon dioxide we can store away.«

A selectively cut forest comprises a mixture of trees of all sizes, from small one-year-old seedlings to large mature trees. In the darker forest, the trees grow slowly, which means better quality timber. But converting to 100% CCF is not an option.



With continuous cover forestry, the ground is always covered with trees and regeneration is mainly natural. There are different types of CCF – for example, selective, group selection and shelterwood cutting.



With clearcutting, the trees are about the same age and new seedlings are planted after harvesting. Clumps of retention trees, high stumps, dead wood and protective buffer zones are left to promote biodiversity.



Lars Erik Levin has managed his forest using CCF methods on parts of his property for over 40 years.

»With such a slow growth rate, it takes a long time to convert forest from clearcutting to selective cutting. If I decided to switch entirely to continuous cover, I'd have to start from scratch, and I'd need up to century,« says Lars Erik Levin.

IT TAKES 50–100 years to convert a forest from clearcutting to CCF. Professor Tomas Lundmark points out that such a conversion would have a major impact on the Swedish economy.

»During the conversion period, there would be a significant loss of growth and harvesting would be volatile. In the long term, growth would be lower and timber volumes would be drastically reduced.«

From a climate perspective, a transition would boost the carbon sink effect in the short term, as harvesting is reduced. However, a reduced supply of forest products would risk increasing the use of fossil materials such as oil and cement.

»So overall, the climate benefit is less,« says Tomas Lundmark.

Would biodiversity benefit from such a transition?

»In the short term, a rapid transition to CCF is likely to have little effect, as it takes time for biotopes to adapt. Over the long term, changing the forest management system may result in some species benefiting more than today, while others that are dependent on open spaces and fires, for example, would instead be disadvantaged. Many studies show that clearcutting with increased nature conservation work has had positive effects on biodiversity,« says Tomas Lundmark, who continues:

»Since no single forest management system can benefit all species at the same time, using a variety of forest management practices would seem to be a better strategy. This could, for example, be based on clearcutting, but where the aim is to benefit species that

Forest – a carbon sink

In a growing forest, trees and ground vegetation absorb more carbon dioxide than they emit and than is released when litter (such as needles, plant material and dead branches lying on the ground) decomposes.

When trees are harvested and sawn into planks and boards, the wood continues to store carbon. From a climate point of view, wood is therefore a good material for building houses or making furniture.

However, the felled trees stop absorbing carbon dioxide from the forest, while ground vegetation and litter continue to release carbon dioxide. But as soon as new trees start to re-establish themselves, carbon dioxide storage picks up again.

require continuity or where there are social reasons to avoid clearcutting, it could be supplemented by CCF methods.«

Trä meets! Karin Fällman Lillqvist (page 50–51) »

»FORESTS ARE KEY TO CREATING A MORE SUSTAINABLE WORLD«

Biodiversity, economic interests and social values are all important. But how do you know that the forest is being managed in a way that balances the different aspects of sustainability? Trä meets Karin Fällman Lillqvist, certified forester and sustainability manager at Skogssällskapet.

TEXT Göran Crafoord PHOTO Eric Cronberg

What is Skogssällskapet?

It's a foundation established by a few private individuals in 1912. The forests of western Sweden were considered to be in poor condition due to over-harvesting. The initial focus was on reforesting heathland so that there would be enough forest for the future. Growth has been good since then, and in 1962 the society's new statute required the foundation to promote both good forest management and nature conservation.

What do you do?

We help forest owners to establish stable revenue and value over time. We also have our own forest. As a foundation, we have no shareholders. If there's a surplus, the profit, usually around SEK 15–20 million per year, is distributed to various forest research projects. This is always applied research, as the results must be translatable into real benefits for day-to-day forestry work.

How did you come to work in forestry?

I grew up in Västerbotten so the forest has always been close to my heart. As a child, my dream was to work as a miner, police officer or geneticist. But I ended up becoming a forester, a choice I've never regretted.

How does the Forestry Act work?

The original Forestry Act of 1903 was intended to provide timber for the expanding industries. The law therefore stipulated that after final felling, there was a duty to establish new forests. This duty of regeneration still applies, which is why the Swedish forest has grown both taller and denser since the turn of the last century. 1993 saw the introduction of a new Forestry Act which gives equal weight to both production and environmental objectives.

Swedish forestry has come in for some criticism. Is this justified?

Modern forestry is sometimes criticised for 'sterile' forests. But it's important to bear in mind that forests grow slowly and that what we see today is the result of a different way of looking at forests which, in line with the laws of the time, put production first. Things are different today. We leave stumps, dead wood, twigs, buffer zones and other things to protect biodiversity. We'll only see the results of today's rules and initiatives 30–40 years from now.

Why certify forests?

The Forestry Act is not very specific, so representatives from the environmental movement, trade unions, reindeer owners, forestry companies and other stakeholders have agreed on how to balance social, economic and environmental interests. The result is two types of certification, FSC and PEFC. Certifications help customers make sustainable choices. Labelling products with PEFC or FSC enables companies and end

consumers to choose purchases that push the entire forestry industry in the right direction, towards responsible and more sustainable forestry.

What is the process of certifying an operation?

The certification confirms, for example, that biodiversity is taken into account, that the size of the clearcutting is limited, that those who work in the forest are treated properly, that 5% of the forest land is set aside as areas where no felling may take place and that 5% of the forest is managed with alternative goals, for example using continuous cover methods. Once you've gone through the checklist and signed it, you're certified. Every year, independent auditing firms carry out checks to ensure that all procedures are in place and that the forest is managed as promised. Anyone who falls short in an area can take corrective action.

Has the debate on forests changed?

A lot has happened in the past 20 years. There's more division and more polarisation. Forests are the solution to so much, so the debate is relevant. Biodiversity is under threat globally. But at the same time, we need to move away from oil and concrete. Trees are the best carbon capture resource in the world, so the question is: do we use them in products and as building materials or do we leave the forest alone?

What is your thinking right now?

A balance needs to be struck between the three aspects of sustainability: social, ecological and economic. Money is not the most important thing to many landowners. The creation of wetlands and rich recreational areas also adds considerable value. As a forest owner, you have to think about what the ultimate goal is. In principle, you always earn less with CCF methods, which is why we need better models and data to support decisions on how much to set aside if you want to balance out a clearcutting approach. The forest shouldn't be reduced to a binary 'either/or' choice, because that won't get us anywhere. It's about making the forest work for both sides.

What challenges lie ahead for the Swedish forest?

As more people realise that forests are an important part of the solution to creating a more sustainable world, interest in forestry issues is growing. Of course it's great that so many people care about the forest and what we do there, but it also means there'll be some friction between different interests. If the forest is to work for everyone and everything, we need more knowledge about how to balance these interests.

What drives you?

The feeling that I can influence and bring about change. Society's perception of the forest is changing. Forests are becoming more and more important, and I want to be part of this process. ©

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The shingles on the façade and roof are leftovers from a flooring factory that have been given a new lease of life.

Thoughtful geometry as flooring is turned into shingles

The oak shingles that run in neat rows around the house in Saltviga, Norway, don't just help it blend in beautifully with the landscape. They are also a great example of how wood offcuts and leftovers can be given a starring role elsewhere, combined with thoughtful details.

TEXT Johanna Lundeberg PHOTO Johan Dehlin

IT WOULD PERHAPS seem logical to take down the gnarled pines that have long grown on the rocky hillside in Saltviga, Norway, to maximise the view of the Skagerrak strait. But instead, the owners of the simple cabin that stood on the site at the time chose to let the pines frame the view by bonsai clipping

them: keeping the tops and the lower branches, but cutting everything away just at window height. When the decision was made to replace the old house with a new one, there was no doubt that the pine trees would stay, and the band of glazing had to be adapted to the way the trees were pruned.

»It's like a natural window through the forest, where the house is not only adapted to the terrain but also to the opening between the trees,« says architect Erik Kolman Janouch of the Kolman Boye architectural practice.

The already greying oak shingle cladding on the façade and roof may play its part in making the house sit comfortably in its surroundings, and be a key component of this project, but the choice of shingles is something of a happy accident. »Initially, the brief was only that the house should have a «



Architect **Erik Kolman Janouch**

»OUR IDEA WAS THAT NOTHING FROM THE TREE WOULD GO TO WASTE.«

»wooden façade, planks maybe,« says Erik Kolman Janouch. Then one day, when visiting the Danish flooring manufacturer Dinesen for a completely different project, all the pieces literally fell into place.

»As we were walking around their huge factory, it suddenly struck us that we could take all the leftover pieces they didn't want and use them for a whole house.«

HANS PETER DINESEN, the fifth-generation co-owner of the flooring factory, says they were very excited by the prospect of their offcuts playing a key role in the architecture of a new house.

»We and the architects share the view that even the smallest piece of wood can have great value if treated with care and respect. And the result is simply amazing. The façade has some historical references while creating a new tradition and new ways of working with wood in architecture,« he says.

The factory had hundreds of pallets of oak

and Douglas fir offcuts – pieces of all sizes in different widths and thicknesses. What didn't exist was a standard template or system. So the architects spent several weeks sorting and classifying the different pieces and using them to build small 1:1 scale models. From there, the carpenters were able to cut them and pre-drill screw holes. Everything was governed by the availability of material in similar lengths.

»The longest pieces were 80 centimetres, and those are hardly shingles, they're more like small planks. However, such large offcuts from prime quality floorboards are unusual and there were only a few of those pieces available. We therefore chose to place these at the top by the ridge, where it's narrower, so that each band would have a specific length that could run around the entire house,« explains Erik Kolman Janouch.

A total of 12,000 pieces were fitted using 20,000 screws. Erik concedes that it was time-consuming, but the result is undeniably

1. The kitchen has an open-plan layout, with grey worktops accentuating the wood of the kitchen fittings.
2. The three volumes are built on five different levels to avoid impacting on the rocky outcrops of the steeply sloping site.
3. The light interior is clad in Douglas fir – more remnants from the flooring supplier.
4. Plan.

beautiful and the work skilfully done. Roof shingles are nothing new, but they are usually split along the tree's natural way of separating, with the grain.

The difference here is that because the material was pre-sawn, the fibres had been cut instead. This causes the wood to absorb more water than normal shingles, so it has been treated with a tar paint known as Roslagen mahogany as a precaution.

»The durability of oak is well proven, but this is a marine environment with lots of salt in the air, lots of moisture and a rainy climate. The important thing is that the oak has been allowed to dry out and that it's positioned so that it doesn't collect moisture and rot,« explains Erik Kolman Janouch.

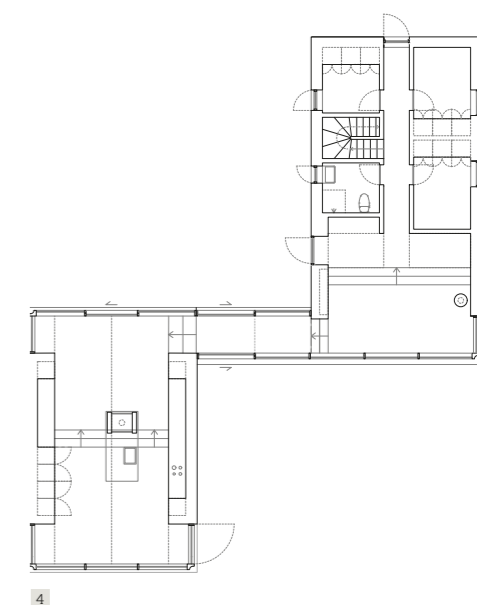
The interior is also clad with larger offcuts from the same supplier, this time Douglas fir that has been mounted flush. The walls and ceiling have been finished with a lime-like paint, moderating the yellowy red of the wood, and the grey floor screed forms a

neutral base that subtly breaks up the wood. Another detail is that all the window frames are made of two types of wood – Douglas fir on the inside and oak on the outside – which meet at the glass, allowing them to harmonise with the respective walls inside and out.

THE GLULAM FRAME is reinforced with steel because the large open space needed some extra rigidity. The building stands on steel piles drilled into the rock, reducing the use of concrete. To minimise the impact on the site, the three volumes of the building stand on five different levels.

»We always try to adapt our buildings to the natural features of the site, such as rocks and boulders, and this plot slopes quite steeply down to the sea, so it made sense to build on several different levels that follow the terrain,« says Erik.

The base of the house moves up and down slightly between the different volumes – each of which has a different function in the »





» house – but the upper line of the windows never changes. Some of the doors and windows are two metres high, while others rise to three metres, so in what may seem like minor chaos, the shingles unify and hold everything together.

The location at the top of the cliff is quite exposed and windswept, so a terrace has been created at the rear of the house, backing onto the trees and the hillside in a position that enjoys the evening sun. Sliding glass doors run along both exterior walls of the living room from the floor to the eaves, giving sightlines from the terrace right through the room and out over the sea. The sliding doors can be pulled back to allow greater airflow from the sea on warm days, both into the house and through to the terrace.

Reuse and new applications have become an important focus for both architects and material suppliers. Dinesen, for example, manufactures three-layer laminate flooring using offcuts from its other flooring

production. These are finger-jointed and glued into beams, after which they are sliced and used as the layers for the new product.

»We have a rich tradition of using wood for much more than just flooring. The fact that we buy whole logs forces us to find uses for the part of the wood that doesn't get turned into flooring. We do this through collaborations with artists, architects and designers,« says Hans Peter Dinesen.

ERIK KOLMAN JANOUCH also enjoys the possibilities of reusing materials that would otherwise end up as firewood.

»It's great to be able to reuse material in this way, but for us it was mainly about our love of wood as a fantastic material, and the incredible beauty of the façade. So it wasn't an intentional carbon-cutting exercise where we've calculated the precise emissions. Our idea was just to use the material, so that nothing from the tree would go to waste,« he concludes.®

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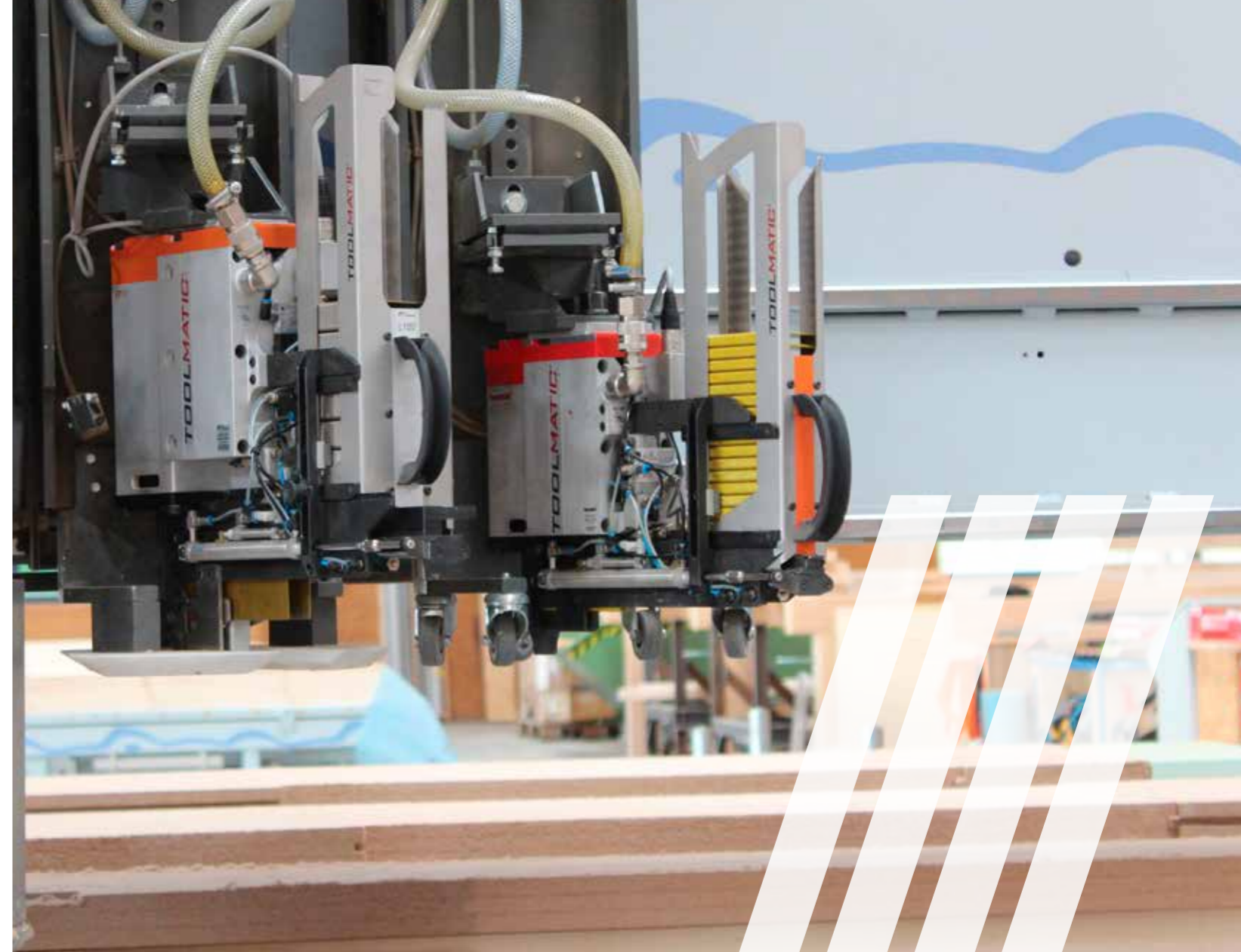
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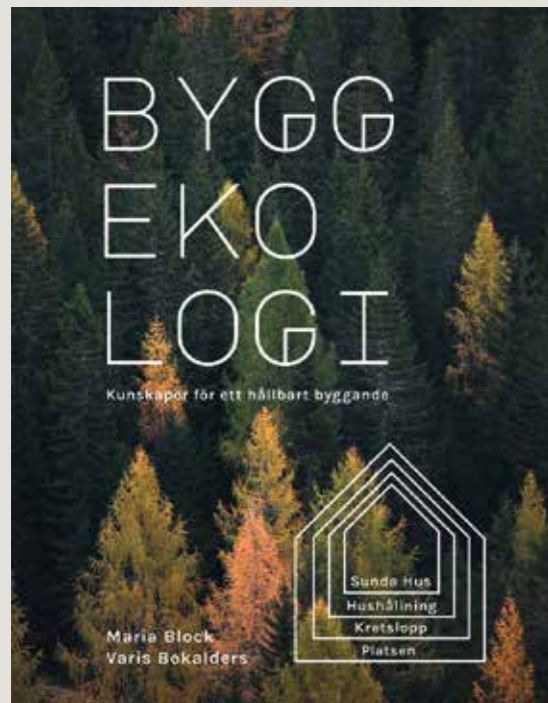
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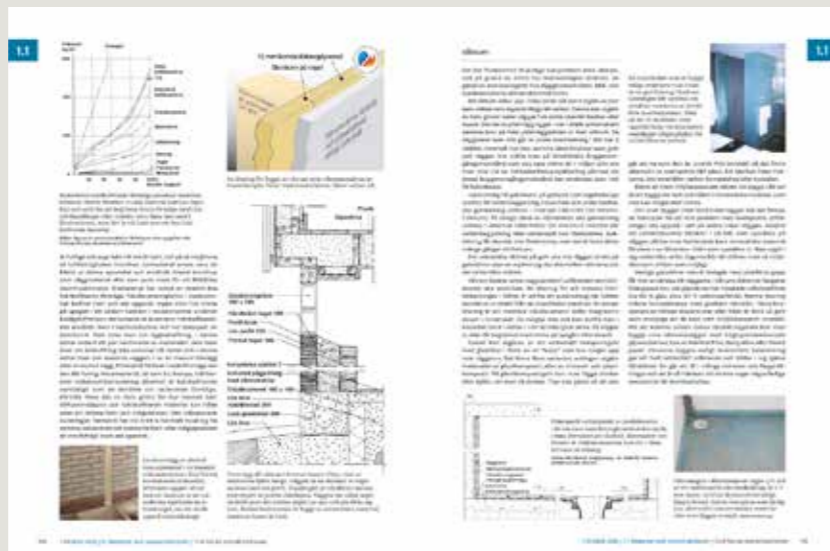


Byggekologi – kunskaper för ett hållbart byggande

Maria Block & Varis Bokalders
Svensk Byggtjänst (Swe)
978-91-7917-150-6

Byggekologi – kunskaper för ett hållbart byggande (Building Ecology – Knowledge for Sustainable Construction) is an important book, written in Swedish. It goes beyond the building and discusses the impact of materials on our houses, primarily from an architect's perspective. Maria Block and Varis Bokalders propose not only energy-efficient and environmentally friendly technologies, but solutions that are also circular in order to create a sustainable society. This fourth edition of the book has been expanded and updated.

The key to reducing a building's impact is to choose materials from an environmental and health perspective, to conserve resources, to make use of closed-loop systems and to adapt to the nature and climate of the site. Materials should be reusable, upcyclable or, as a last resort, recyclable.



In a clear structure, they cover not only why but how we should build healthier buildings. The authors are experts in their field and the different topics are covered both theoretically and with real-world examples and solutions to show how we can reduce the impact of a building. In most cases, several different solutions are offered that can be applied according to the

prevailing conditions. The book has an extensive index and a large, well-organised bibliography for those who want to dig even deeper.

Byggekologi is a book that should be on the desk of anyone involved in building projects – whether they involve reuse, renovation, extension or new construction.

[w| bit.ly/byggekologi4](http://w|bit.ly/byggekologi4)

UIA 2023

Taking the theme of *Sustainable futures – leave no one behind*, this year's World Congress of Architects will focus on how everyone involved in the building process can work together to achieve the 17 UN Sustainable Development Goals. The congress will focus on six themes, including *Climate adaptation* and *Rethinking resources*.
[w| uia2023cph.org](http://w|uia2023cph.org)



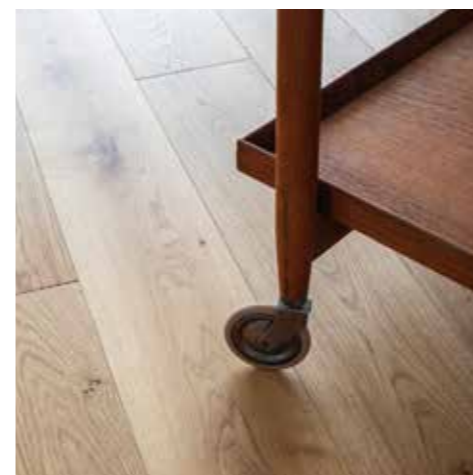
IFLA 2023

This year's IFLA conference, the largest annual meeting of landscape architects and urban planners is being held simultaneously on two different continents, with shared streaming content. The theme is *Emergent Interaction – daring solutions are needed to tackle the future*.
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12 September 2023 | Trä! issue 3

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