

trä!

A MAGAZINE ON INSPIRING ARCHITECTURE
FROM SWEDISH WOOD » ISSUE 1 » 2022

FIRST WITH ZERO WASTE

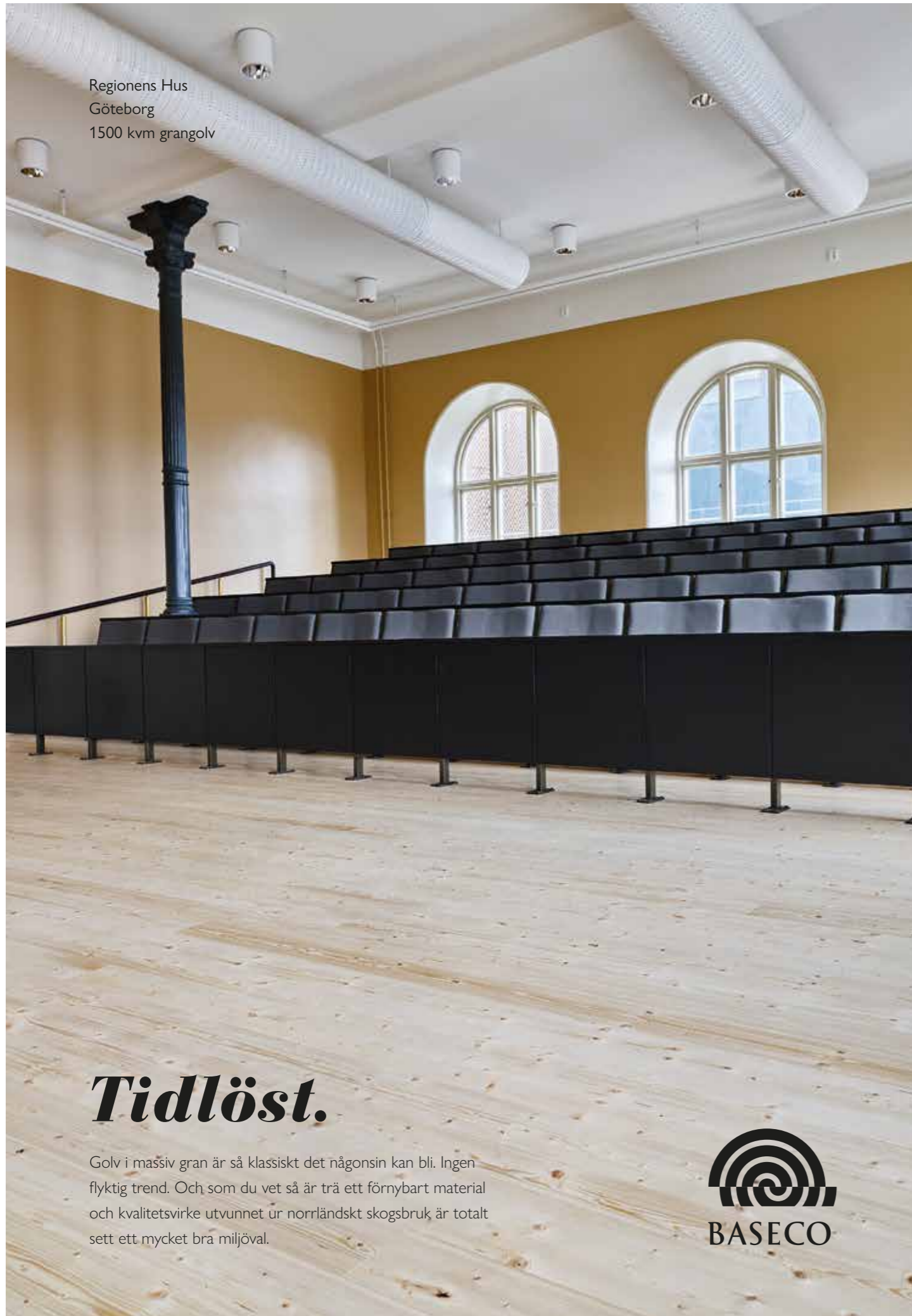
Reuse and local materials

VERTICAL LINES
IN NEW OFFICE BLOCK
APARTMENTS WITH
CLIMATE FOCUS
ALIEN FORM
IN FOREST GLADE

TRÄ MEETS
Simon Anund

KNOWLEDGE
Avoid damp issues
through collaboration

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Tidlöst.

Golv i massiv gran är så klassiskt det någonsin kan bli. Ingen flyktig trend. Och som du vet så är trä ett förnybart material och kvalitetsvirke utvunnet ur norrländskt skogsbruk är totalt sett ett mycket bra miljöval.



trä!

ISSUE 1 » 2022
VOL. 35 » CONTENTS

15 » Emotional response to an office

A new office block becomes a welcoming landmark in Hovås' new mixed district. Behind the inversely stepped façade, the glulam structure creates flexible spaces with generous ceiling heights.

30 » Village cares about recycling

Kamikatsu is a Japanese community that embraces waste. The recycling centre is made up of local wood and recycled materials from local residents. The site also has a hotel and a reuse & recycling store.

47 » Hidden spaces and geometry

Behind the dark, egg-shaped façade lies a light and dynamic home with vertical flows. Concealed between the inner and outer shell are small, private niches.

- 4 **In brief** » Multifunctional meeting place » Sustainable for food » City extension » Curvy offices » Inspired by barn » Sheltered open space » New form of thatched roof » Natural form for women » Sinuous co-working
- 11 **Chronicles** » Anders Tväråna
- 12 **The photo** » Rings for nature
- 36 **Interior** » Beauty and mystery
- 40 **Trä meets** » Simon Anund
- 42 **History** » Post-and-plank in new guise
- 44 **Knowledge** » Build without damp issues
- 50 **Good read** » Reusing building materials



22 » Focus on the climate and new solutions

Two new buildings in Västerås will be the model for climate-positive, crowdfunded apartment blocks in several other locations across Sweden. Wood takes the lead role, but other materials used in the project also have improved climate credentials.



Publisher Arbio AB
Responsible publisher Mathias Fridholm
Project manager Alexander Nyberg
Editorial team Björn Nordin & Alexander Nyberg (Swedish Wood), David Valldeby (Utopi)
Editorial board Mikael Andersson (Wingårdhs), Jessica Becker (Trästad), Eric Borgström & Björn Johanson (Bjerking), Carmen Izquierdo (Esencial), Lars Ringbom (MSB), Sara Szyber (HDK Steneby)
Editor & art director David Valldeby, Utopi
Text editing Johanna Lundeborg, Ordaglad
Cover Zero waste center by Hiroshi Nakamura & NAP in Kamikatsu, Japan. Photo Koji Fujii.

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Jan Tore **Mathias Fridholm** Director, Swedish Wood

Information on wood via digitalisation

STOCKHOLM, SWEDEN Digitalisation is a word that can mean many things. In my line of work perhaps the best definition would be »standardised properties and traceability through digital information sharing«. The need for accessible information about the products you manufacture is ever increasing.

It is no longer enough to excel at delivering high-quality products at a competitive price. An attractive supplier must also be able to meet customer demand by making relevant information about its products available as efficiently as possible. Providing information on the properties and origin of the product is becoming an increasingly important competitive advantage – and one that is likely to be an absolute requirement in the future. Public authorities, various stakeholders in the value chain and not least end consumers want to know, for example, where the product comes from and the climate footprint of its production. This development may be unavoidable, but it also has its complexities. For instance, the demand for transparency might collide with a company's need not to share commercially sensitive information.

The benefits of efficient, digital and systematised information-sharing on a construction project are enormous. In addition, increased productivity and quality assurance are two guaranteed consequences (to which I will return in a later editorial). Being able to digitally document the component parts of a building is also a crucial foundation for making reuse and circular business models possible on a greater scale.

Looking at the whole chain of a construction project, it is clear that many of the subprocesses, for example the processes within a company, are well optimised. However, when information has to be passed on to other actors, there is no standardised way of doing so. Bearing in mind the large number of stakeholders involved in a construction project, this is not only inefficient, but creates a major risk of information being lost, misunderstood or changed as it moves along the value chain.

In the wood industry, we are taking the digital challenge seriously, not least with the recent launch of the product database *traprodukter.se*. This will be the hub for disseminating information on wood and wood products, including dimensions, grades, strength, climate data and much more besides. All of this can be shared, in a quality-assured way, with other databases that need this information via APIs (Application Program Interfaces).

Mathias Fridholm



Dimitar Gamizov

Generous ceiling height and carefully selected materials blur the boundary between inside and out. Small open squares in the interior invite social interaction.

Encounters across many rooms

OBJECT Community centre
ARCHITECT Smartvoll architects
STRUCTURAL ENGINEER
 TK11 Gebäudetechnik

GROSSWEIKERSDORF, AUSTRIA Many Austrian communities have been hit by what is sometimes called the doughnut effect, whereby residents increasingly settle on the outer edges of the town, putting the town centre at risk of dying out. To tackle this problem and bring the dormant town centre back to life, Großweikersdorf, 40 km north-west of Vienna, has developed a new meeting place. The community centre has been squeezed in alongside an existing row of houses off the town square, with its main entrance facing the square to draw visitors into the building. The

interlinked blocks house three separate functions: town hall, health centre and activity centre. By also visually splitting up the building into multiple small-scale volumes, the development becomes a natural part of the other surrounding architecture. Internally, the visual division is made clear by the varying slope of the roof. The light, knotty wood of the walls is exposed right up to the ridge of the pitched roof, and a similar approach is adopted for parts of the façade, although much of it is clad in shingles. « **wj** smartvoll.com

Supermarket sets the tone in new district

SJÖBO, SWEDEN Supermarkets are increasingly being built in wood, as a way to inspire customers and also to help raise the issue of sustainability.

OBJECT Supermarket
ARCHITECT Semrén & Månsson
STRUCTURAL ENGINEER
 Fristad bygg

November saw ICA open a new supermarket in Sjöbo. The store is a modern interpretation of a market hall and is part of the new Westport district, which has an explicit sustainability strategy.

The frame, walls and roof of the 2,000 sqm building are made of CLT. The façade is clad with cedar shingles that will silver over time, and solar panels have been fitted on the sedum roof. The roof extends out to provide protection from the weather, and is supported on glulam posts placed in a repeating V-shaped pattern, framing the store's entrance and inviting social interaction.

Inside, the visual tone is set by exposed glulam posts that have been screwed and glued to achieve larger dimensions and greater load-bearing capacity. The wood has been treated with a white-pigmented fire retardant paint to stop the exposed surfaces yellowing. Windows placed high up allow in a certain amount of natural light. «

wj semren-mansson.se



Diagonal glulam posts frame the new supermarket, an important visual landmark in Sjöbo's new district.

Fredric Schebler



The former office block now also provides housing, with a façade of cedar shingles, and a glulam upward extension.

Ira Andreoli

Wood on top lifts building

STOCKHOLM, SWEDEN Over many years, the area around Sergels Torg has been redeveloped to make Stockholm's city centre more alive. A mix of offices, housing, restaurants and retail is intended to inject life into the area by day and night. Dark, narrow spaces have been removed, so the areas can be connected with more pedestrian-friendly routes.

The site's former banking complex has now been converted primarily into offices,

although the newly emerging block also adds new housing to the cityscape. The façade is clad in cedar shingles, with the angled and straight shapes forming a pattern. Since the area will still have road traffic, the apartment balconies have been glazed in.

At the very top of the property, an upward extension in glulam houses a rooftop bar. The wooden structure is exposed both internally and externally, with a frame that visually holds the building together while at the same time providing views of the city. There is even a small park on the roof. «

OBJECT Sergelhuset
ARCHITECT Equator
STRUCTURAL ENGINEER
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The seamless transition between wall and ceiling was created by the client to highlight the possibilities of wood.

Peter Bennetts

Curvy lines for open meetings

OBJECT Showroom
ARCHITECT Woods Bagot
CARPENTER Sculptform

MELBOURNE, AUSTRALIA By combining its offices with a showroom and store, cladding supplier Sculptform sought to demonstrate what can be created in wood and how its products can be used. And so they turned to Woods Bagot, which created an environment for both securing new contacts and displaying the possibilities of their own design and craftsmanship. The eye-shaped showroom guides visitors through the manufacturing process and materials.

The walls and ceilings are clad in a shell of thin, repetitively placed battens. The sweeping curves that mark the

transition between wall and ceiling were developed by the client over the course of the project, and are now also part of their product range.

The battens are made of American oak, a hard wood that is ideal for this type of processing. They are steamed and then carefully bent into the required shape before finally being treated with a clear varnish. The design incorporates many of the company's various products, making them easy to present to clients. «

[w| woodsbagot.com](http://w|woodsbagot.com)

Open volumes that can be reused

DRAGØR, DENMARK Dragør, just south of Kastrup Airport, is home to an industrial area where several converted hangars now serve as offices or workshops. With their simple lines and open spaces, the offices that were recently built on site could be said to still resemble a hangar, but the architects were instead inspired by the traditional Danish wooden barn with its exposed structural frame. The result was a 1810 sqm two-storey building

OBJECT Framehouse
ARCHITECT Schmidt Hammer Lassen architects
STRUCTURAL ENGINEER Arne Elkjær

with a sedum roof. The building is divided into three parallel volumes. The middle volume houses shared functions such as the entrance, meeting rooms and dining room, while the two outer volumes have offices and meeting rooms of various sizes.

Although the idea is that the building will stand for a long time, an important aspect of the design was that the materials could be reused. The glulam structure has been left widely exposed, complemented with Douglas fir and oak in the interior fittings. Large expanses of glass and a central atrium with a glass roof bring natural light into the premises. «

w|shl.dk



The three volumes are open spaces in which the tactile properties of the wood promote staff well-being.

Adam Merck



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The derelict building next to Larrabetzu Town Hall has now become a modern new interpretation framed in glulam.

Ny offentlig plats med gammal form och volym

LARRABETZU, SPAIN A plan to renovate the Town Hall in Larrabetzu, in the Basque region, prompted the realisation that the city centre lacked public spaces with a protective roof. Right next-door stood a derelict building, and the idea was to re-place it with a space where residents could meet, no matter how stormy or hot the weather got.

OBJECT Last Chance for a Slow Dance
ARCHITECT Behark
STRUCTURAL ENGINEER Madergia SL

The two-storey high structure was based on the shape and volume of the old building, and used wood and stone to slot seamlessly into the cityscape. Glulam posts create a welcoming feel inside and out, while the airy design also provides natural light and ventilation. The posts support the sloping roof, with its load-bearing glulam beams left exposed.

On the lower level there is a small bar and a social area, linked to the activities that will take place here. Once the renovation of the Town Hall is complete, it will be accessible from the mezzanine floor upstairs, which will also be used as a speaker's gallery and as a stage.

«

www.behark.com

Research centre with a reinterpretation of the thatched roof

HAINAN, CHINA Growing demand for rural and nature-based experiences among Chinese tourists, combined with concerns about climate change, have resulted in a new research centre in Sanya, on the southern tip of the tropical island Hainan. The 4,000 sqm building also houses offices and public exhibition spaces.

Glazed sections in the façade and interior create a light and inviting feel, while the spiral staircase that connects the four

floors allows visitors and researchers to meet and exchange a few words as they move around the building.

The whole building is encased in a lattice of wood that blurs the boundary between outside and in. The design is a modern take on the protruding thatched roofs that cover traditional buildings locally, and with a depth of almost a metre, the lattice provides both shade and weather protection, while at the same time helping with the building's indoor climate. Integrated gutters collect rain that can be used to water the surrounding green spaces.

OBJECT Sanya Farm Lab
ARCHITECT Clou architects
STRUCTURAL ENGINEER Urban architecture design

« www.clouarchitects.com



The research centre's shell, inspired by the traditional roofs of the local area, provides shade for the offices.

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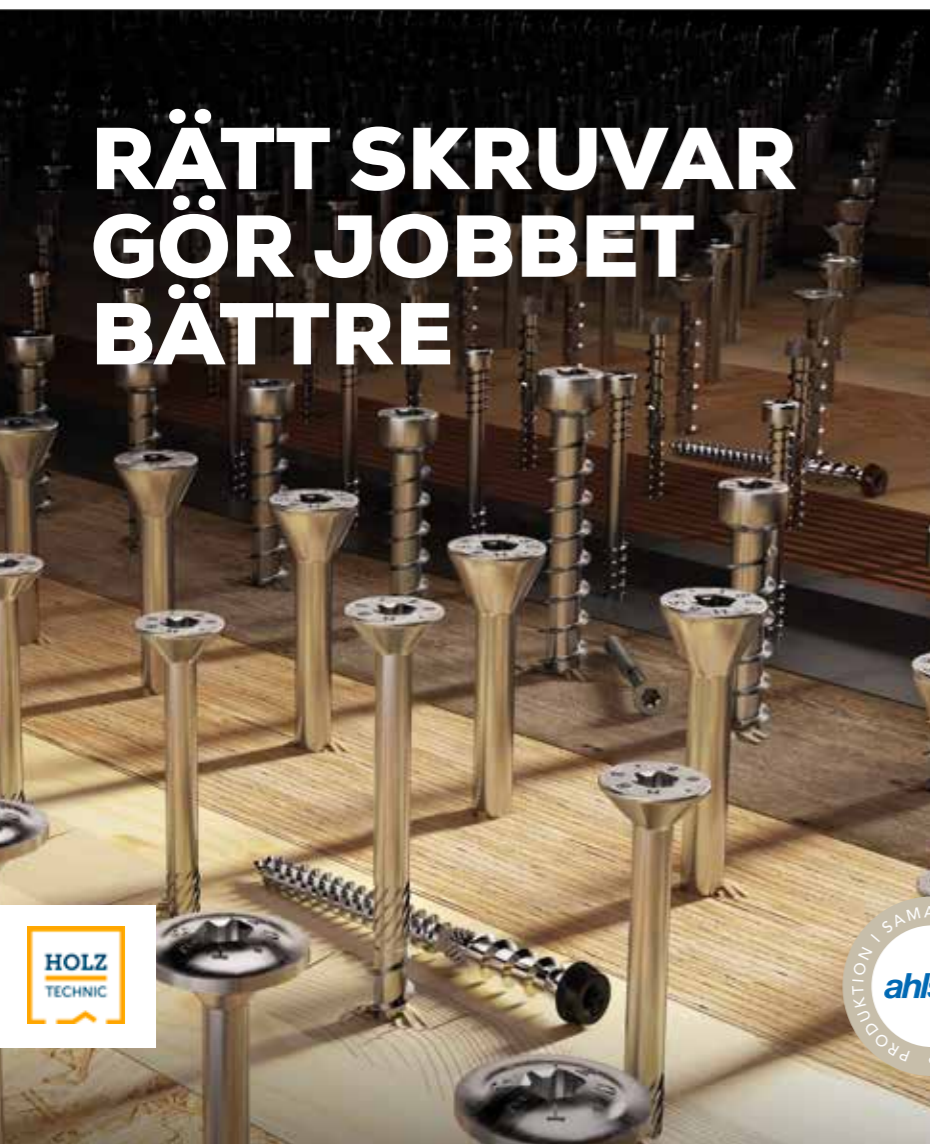


Sara Kulturhus, Skellefteå
Foto: Martinssons

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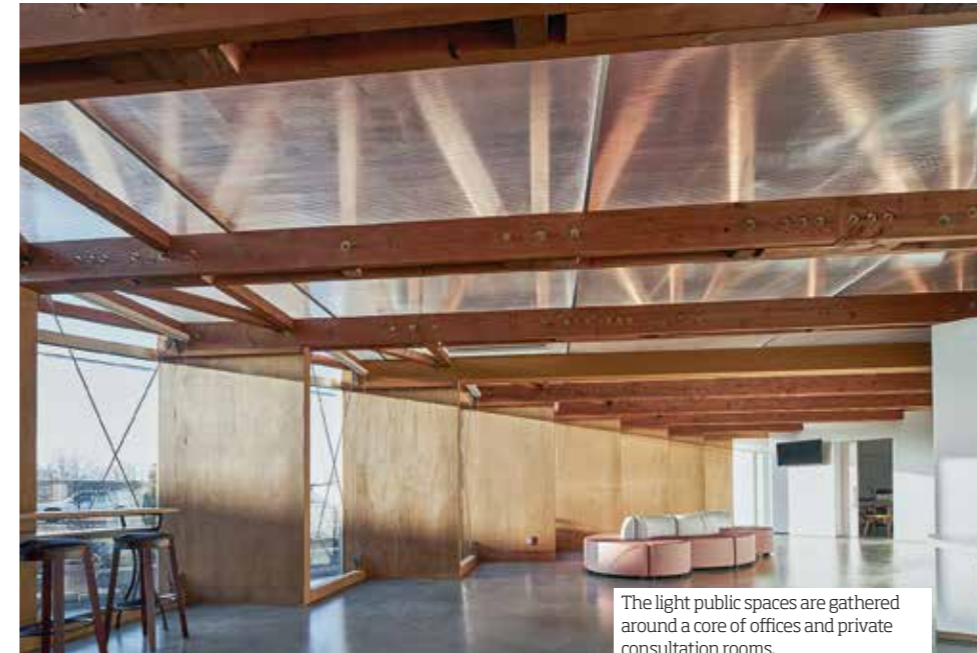
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The light public spaces are gathered around a core of offices and private consultation rooms.

Locally produced for local craftspeople

KONOHANA, JAPAN The brief for the new reproductive medical centre was for a bright, hopeful and natural building. The light-coloured interior fittings, combined with a transparent roof that changes appearance depending on the sunlight, are supplemented with warm details in wood, such as posts and trusses. The trusses span the whole building and are supported on posts lining the walls and windows.

The area around Konohana, in the Nagano prefecture, is 80 percent forest. For the project, this meant that they could not only use locally produced timber, but they could also create jobs for local craftspeople. The building design was therefore intentionally made simple enough to use standard timber available on the local market. For example, the roof trusses were constructed by splitting 90 millimetre wide planks in half and then placing them on either side of 90 millimetre wide blocks before finally fixing them in place with bolts and drift pins. «

W | [instagram.com/ota.archistudio](https://www.instagram.com/ota.archistudio)

OBJECT Medical center
ARCHITECT OTA archistudio
STRUCTURAL ENGINEER
Megumi Tamura
structural factory

Long furniture for inspiration

TOKYO, JAPAN When a new co-working office opened in Tokyo, it was with the knowledge that users were often digital nomads who could work anywhere. It was therefore important to combine the digital facilities that are available almost everywhere with a tactile experience that exists only in the workspaces that the company offers in various countries. Taking inspiration from the simple stroke of a paintbrush, the architects created a multi-functional piece of furniture that stretches all the way across the room. The material is Japanese cedar (cryptomeria), and the knots and grain have been left exposed as part of the design. The item provides cut-out seating and desks, inviting



The curved furniture creates a fixed point for digital nomads in all the co-working company's offices.

OBJECT Pangea co-working
ARCHITECT Snøhetta

both individual work and creative meetings with other people.

For the sake of the acoustics, the walls are clad in a wool

fabric, arranged as a pixelated image of Mount Fuji. On a clear day, the snowy peak can be spotted on the horizon by anyone gazing out of the window on the 10th floor. «
W | [snohetta.com](https://www.snohetta.com)

Anders Tväråna, architect SAR/MSA, White

I'm living my dream of building in wood

UPPSALA, SWEDEN Ever since building dens as a child, I have loved assembling things. After various construction/carpentry jobs, beginning a certified forester course, and two years of adventure where I spent more nights in a tent than under a roof, I enrolled at the School of Architecture at ΚΤΗ Royal Institute of Technology. Here I continued with the theme of assembly. Many of the school projects had a focus on the clarity of constructional principles. In my time as an architect, I have moved via restoration projects and small wooden buildings at national park entrances to large-scale office blocks. I have always tried to work with simple materials, clear structures and a drive to promote sustainable building.

I often talk about honesty in construction. I believe that humans as seekers of meaning find it easier to create contexts and feel secure in an environment that is easy to understand. To achieve this, I always choose the solution that saves most material or is most economically rational. There is a difference between being simple and looking simple.

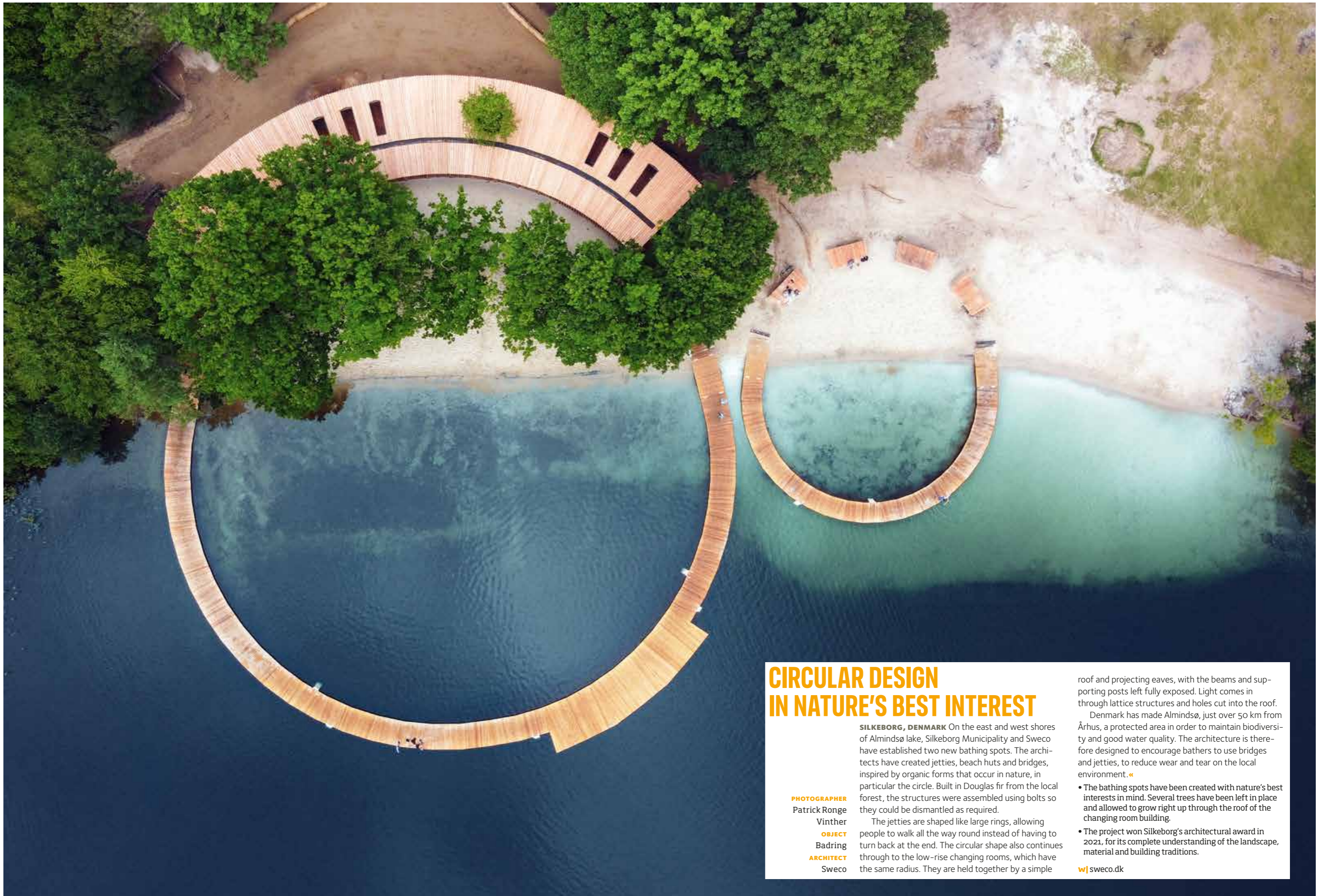
As an architect, I also feel a major responsibility for the unmeasurable values that are the key to whether or not a building is sustainable. A building that is clear and honest in its construction is liked and gets to stand for longer without being redeveloped. This is sustainability at a level beyond certification systems and costings.

As chief architect for the Magasin X office block in Uppsala, I have now been involved in, and even moved into, my first large wooden building. Dreams can come true! The project combines the den builder's joy, the carpenter and forester's wood expertise, the outdoor person's appreciation for simplicity and the restoration architect's feel for materials into one legible, attractive package.

As a construction material, wood is perfectly suited to this structural honesty. Posts and beams are obvious, and the large crosses in the façade clearly show how the frame is braced. We have constantly sought to use wood in a way that increases people's understanding of how the building is structured, and gratifyingly this has already been confirmed by several of the building's visitors. We are particularly pleased that we have managed to replace 4.5 km of aluminium profiles in the façade with glulam arches and a simple add-on system that holds glass and solar panels.

I am living my dream and hope to design many more wooden buildings, but right now I'm busy with something else – developing and building onto a concrete carcass from the 1970s that would otherwise have been demolished. This is taking sustainability even further. And naturally the new floors will mainly be made from wood.

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



CIRCULAR DESIGN IN NATURE'S BEST INTEREST

PHOTOGRAPHER

Patrick Ronge
Vinther

OBJECT

Badring

ARCHITECT

Sweco

SILKEBORG, DENMARK On the east and west shores of Almindsø lake, Silkeborg Municipality and Sweco have established two new bathing spots. The architects have created jetties, beach huts and bridges, inspired by organic forms that occur in nature, in particular the circle. Built in Douglas fir from the local forest, the structures were assembled using bolts so they could be dismantled as required.

The jetties are shaped like large rings, allowing people to walk all the way round instead of having to turn back at the end. The circular shape also continues through to the low-rise changing rooms, which have the same radius. They are held together by a simple

roof and projecting eaves, with the beams and supporting posts left fully exposed. Light comes in through lattice structures and holes cut into the roof.

Denmark has made Almindsø, just over 50 km from Århus, a protected area in order to maintain biodiversity and good water quality. The architecture is therefore designed to encourage bathers to use bridges and jetties, to reduce wear and tear on the local environment. «

- The bathing spots have been created with nature's best interests in mind. Several trees have been left in place and allowed to grow right up through the roof of the changing room building.
- The project won Silkeborg's architectural award in 2021, for its complete understanding of the landscape, material and building traditions.

w| sweco.dk



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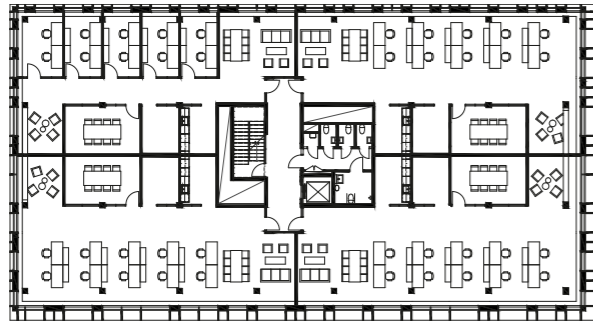


**UNLIMITED HEIGHT
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The Nodi office block in the carefully planned new district of Gothenburg, Nya Hovås, defines the character of the whole area. With its eye-catching architecture and thoughtful design, using wood for both the carcass and the façade, the building is a proud feature of the cityscape. »

TEXT Sara Bergqvist PHOTO Åke E:son Lindman

The façade is made of pine treated with brown-pigmented linseed oil, while the exterior surfaces of the spruce glulam have been treated with silicon.



Standard plan.

Nodi means hub – the perfect name for an office block that serves as a hub for the area it stands in, while at same time being designed so that the activities within the building revolve around their own hub, the central stairwell. With its warm brown wooden façade and floors that extend out and get bigger as you move higher up, this is a building that attracts the attention not only of visitors, but also passers-by on Route 158. Nodi was named business building of the year in the 2021 Dezeen Awards.

»When we started the build, we didn't have a single tenant, but by the time it was completed we had leased every part of the building, despite being in the middle of the pandemic. I would say that's because of the outstanding architecture and the sustainability profile associated with our choice of building in wood. When we presented the sketches and people began to see the spectacular wooden frame rising up like a glulam puzzle, we soon realised how amazing it was going to be and how popular it would be to rent,« explains Oskar Lindström, property developer Next Step Group's project manager for the construction of Nodi.

The planning and development of Nya Hovås as a mixed district of shops, housing and offices began in 2010, under the leadership of the Next Step Group. Four years later, the first buildings began to take shape. The site where Nodi now stands has the very best location and was reserved for something extra special as a flagship and a welcoming entrance to the area. The decision to build the carcass and the frame entirely in wood was made at an early stage. The commission to design the new building to a high architectural standard went to White, which at the time was involved in another large wood construction project in partnership with the Next Step Group. In Nya Hovås, the detailed development plan imposes restrictions on the number of storeys rather than maximum height.

»Our starting point was to build as rational a building as possible based on the planning permission and the detailed development plan. The result was this shape, with a small footprint on the ground, airy spaces around it and particularly generous room heights, since there was no limit to the height, only to the number of floors,« states Joakim Hansson, chief architect at White.

Another requirement was that the premises should be flexible and easy to adapt to the needs of the tenants. To avoid having installations in several parts of the building that were difficult to move, White therefore designed a single utilities section in the middle of the building, with a stairwell and toilets that are shared by all the tenants on that floor. It was also one of the reasons for choosing an open

post-and-beam system in glulam, which allows great flexibility for the floorplan. The design was also then tweaked in a unique way that allows scope for further flexibility, makes the most of the site's features and has also been extremely cost-effective, despite the high quality.

»What we did was to create our very own kind of floor system, based on a post-and-beam system with primary and secondary beams, and then we simply lifted in what is practically an ordinary domestic floor,« says Oskar Lindström.

Having a structure with primary beams running north to south, and secondary beams stacked on top of these running east to west, has facilitated several smart solutions. To start with, it has made the rising expansion possible, with the floorspace increasing by around 50 sqm for each level. This

expansion on the south and west faces has also been used to create effective suncreening with the help of wooden fins suspended from the protruding beams.

»Internally, it means we have generous spaces between the secondary beams, which has allowed us to run all the installations here, without any need to cut out holes,« says Filip Stefansson, lead project manager for the building contractor BRA Bygg, which also worked with BRA Teknik and Moelven on the structural engineering.

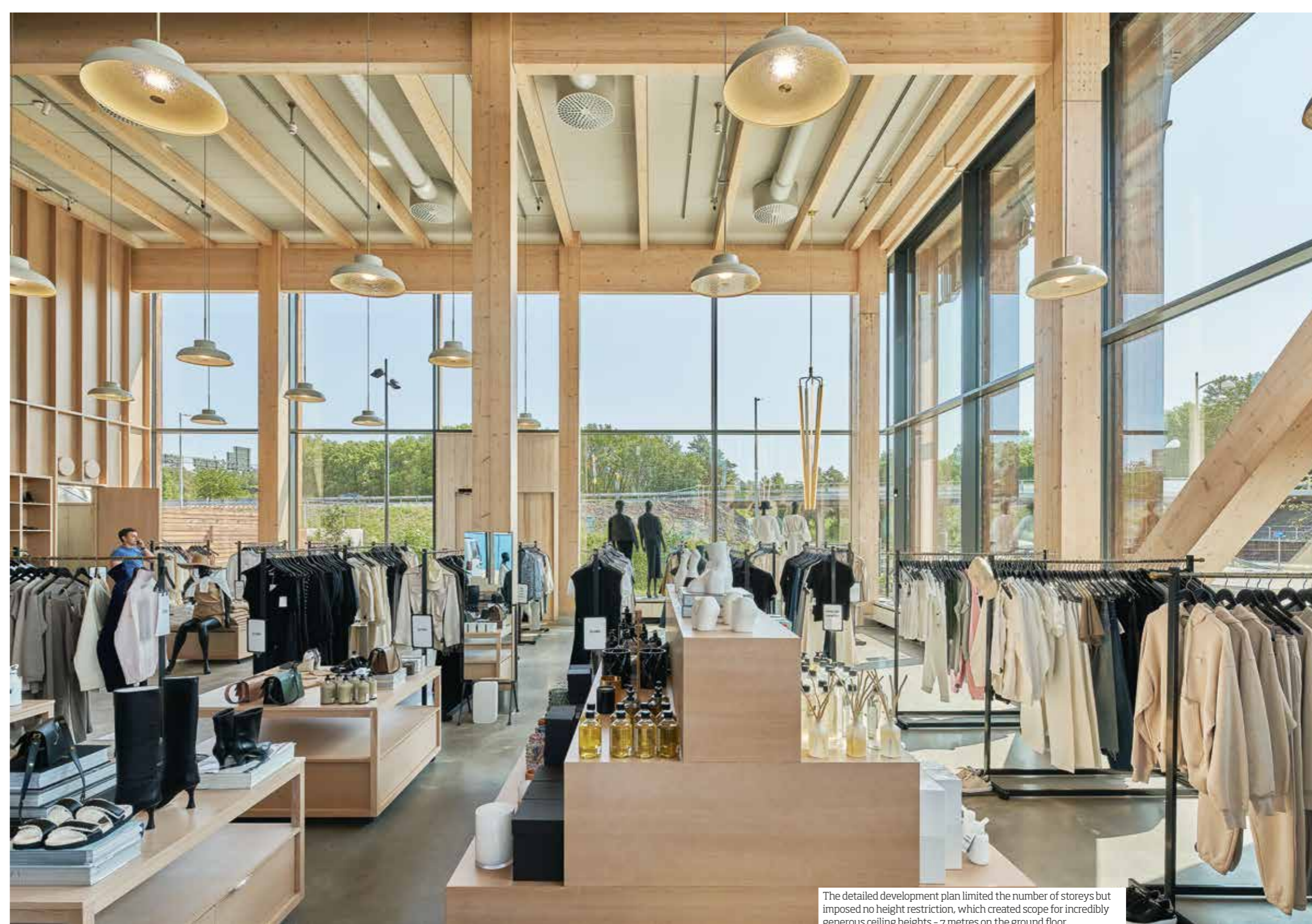
He points up to the ceiling, where the installations are almost hidden between the crossbeams. This office has been leased out, although it is not yet occupied, and despite the busy main road nearby, it is completely quiet. The walls are clad with spruce CLT panels and the floor is a soft, sound-damping carpet. The large, exposed glulam posts,

The detailed development plan limited the number of storeys but imposed no height restriction, which created scope for incredibly generous ceiling heights – 7 metres on the ground floor.

measuring 360 x 355–445 millimetres and the glulam beam system in the ceiling lend a strong character to the space. Securing the beams on top of the posts are concealed inset fixings, which are covered with wooden wedges, except in the south corner. Here, the posts have instead been mortised so the 765 x 280 millimetre thick primary beams rest directly on top of them, serving as the load-bearing structure for the overhang as well as an interior feature.

»Because of the shape at this point, we don't have posts running in a line all the way up. But in the rest of the building, the posts are as long as the overall height of 25 metres, which is another interesting structural detail,« comments Filip Stefansson.

The posts with inset fixings were delivered as prefabricated elements, requiring extreme levels of precision. »





Architect **Joakim Hansson**

»THE TERRACE HAS AN AIRY FRAME THAT EXTENDS OUT.«



The building uses a glulam post-and-beam system, with primary and secondary beams stacked on top of each other.

»We had a tolerance of no more than 1 millimetre, but it all worked really well. Having this level of precision throughout the process brings all sorts of extra benefits, such as not needing to use a spirit level or cut anything to make it fit,« adds Filip.

The initial idea was for the entire building to have a wooden structural frame, including the stairwell, where the plan was to use CLT panels.

»But after much deliberation, we chose a concrete carcass for the stairwell. Since we only have one stairwell, we weren't allowed to have exposed wood there. We would have had to clad the walls with plasterboard, despite the building having a sprinkler system. And because the building is so light, we would have needed to anchor it in the bedrock if we had used wood. The final consideration was that the stairwell

would be built early on, leaving it exposed to the weather, and that worked better with concrete,« he concludes.

A key element of the building's design is the tall ground floor with its large expanses of glazing. The front section houses a clothing and home furnishings store that was previously based elsewhere in the area. The new store was designed by interior architect Lisa Robertz. The ceiling height is striking, and the contrast between the polished concrete floor and the exposed glulam structure is dramatic.

»We love this space with its airiness, light and lovely wooden details. We also love that it's so modern and contemporary, and could just as well be in Berlin or New York. Many people see the building from the street or come here out of curiosity, which means that we get even more trade,« says store manager Camilla Odén.

Nodi

NYA HOVÅS, GÖTHENBERG

ARCHITECTS White (Joakim Hansson and Maria Flårbäck).

CLIENT Next Step group.

CONTRACTOR BRA Bygg/BRA Teknik.

WOOD STRUCTURAL ENGINEERS Moelven and Derome.

AREA 4,200 sqm above ground.

w| whitearkitekter.com

At the very top of the building there is another interesting detail – the shared roof terrace, occupying half of the upper level and fitted with a glulam pergola. Up here, the exterior spruce glulam surfaces are silicon-treated and have already begun to silver, while the rest of the façade comprises pine treated with brown-pigmented linseed oil.

»Design-wise, we felt it was important to create the sense that there was a complete upper floor, which is why the terrace has an airy frame that extends out in the same way as the other floors. We had a few discussions on this, and afterwards the contractors said they were glad we had stuck with the idea,« says Joakim Hansson.

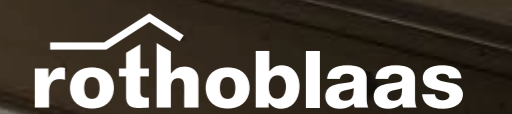
One factor highlighted by everyone involved as crucial to the success of the end result was the close dialogue and collaboration.

»We feel it's vital to get everyone on board right from the start, by which I mean the whole chain of clients, consultants, contractors and suppliers. That is what enabled us to achieve this level of quality and come in both on schedule and on budget,« states Oskar Lindström.

A large industrial warehouse with a wooden structure and automated distribution equipment. The ceiling and walls are made of light-colored wood. In the foreground, there is a long, dark, automated conveyor system. In the background, there are tall wooden racks filled with boxes. The lighting is warm and focused on the equipment.

**VI KUNDE HA
BYGGT VÅRT NYA
AUTOMATISKA
DISTRIBUTIONSCENTER
I STÅL. MEN VARFÖR?**

**VI VALDE TRÄ FÖR
ATT VI ÄLSKAR TRÄ.
VI LEVER SOM VI LÄR.**

The logo for rothoblaas, featuring a stylized house icon above the company name.

Solutions for Building Technology

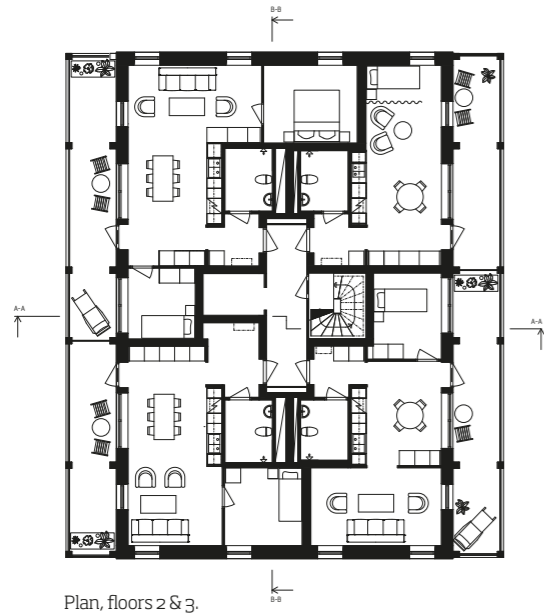


The two new climate-positive apartment blocks in Västerås are the first of many set to be built the same way in other parts of Sweden, with a cr structural frame.

Unique solutions in climate-positive buildings

The idea behind the two new climate-positive apartment blocks in Västerås is to inspire the industry and demonstrate that it is possible to design green, climate-smart buildings, without rents spiralling. But also to give the tenants a chance to live their best lives. »

TEXT Katarina Brandt PHOTO Jan Tove



Plan, floors 2 & 3.

Located in Västerås' new lakeside district of Öster Mälarsstrand, the two buildings are an initiative by entrepreneur Johan Ehrenberg, founder and owner of ETC Bygg. This is a non-profit construction company that forms part of a small group focusing on media, energy and construction. The company is now erecting apartment blocks entirely in wood, using modern techniques that make them climate positive, which means that the buildings produce more energy than they consume.

The unique features of the project include the way the team has left no stone unturned in driving the climate impact in the right direction. They are also generous about sharing drawings, experiences and insights – all to pave the way for more companies to do the same thing.

Even the financing has been arranged in quite an unconventional way, through what is known as crowdfunding. Since 2017, private individuals have been able to buy B-shares in ETC Bygg with a guaranteed return of around 2 percent. This money funded the buildings in Västerås, which have now been mortgaged to fund the three apartment blocks being erected in Växjö.

»We're aware that many people want to save outside the anonymity of the banking system, where you have no idea what the money is being used for. Over a thousand people have put their savings into the first buildings, and of those only three now live in them. Those who funded the buildings have not had any priority access, they have simply believed in the project and chosen to support it. The actual apartments were thus never the main focus of their investment,« says Johan Ehrenberg, CEO and owner of ETC Bygg.

The project began with Johan Ehrenberg sketching out the climate requirements. He then brought in architect Hans Eek, who conducted an analysis of what the buildings might look like with a focus on energy solutions. Hans Eek in turn contacted Kaminsky Arkitektur, the practice that created the designs for the building permit application. Building contractor Fredrik Fagerberg was then added to the team, along with Strombro Building Workshop, which was responsible for the project's structural solutions, among other things.

»Our mission was to create crowdfunded and sustainable wooden buildings. It was an incredibly broad and fantastical-inspiring job, particularly as we were brought on board so

early on. We hit the ground running, and began designing without actually having a plot to build on. The proposal was submitted to various land allocation competitions, three of which we won, in Västerås, Växjö and Malmö,« relates Joakim Kaminsky.

The work has resulted in a standardised building made of CLT and built to a Passive House standard, with extremely low energy losses. Completed in summer 2021, the two blocks in Västerås offer a total of 30 rental units of various sizes, from studios to three-bedroom apartments, ranged over five floors. The block can easily be adapted to conditions on the site. The number of floors is flexible, and can be varied from five to nine. The apartments can also be changed by simply adjusting their size to meet local needs.

»We realised that we needed to take an approach that was tasteful and attractive, but also low-key and functional. We therefore went for an efficient layout that made smart use of the floorspace, with large balconies that we placed on the



Wood gives a warm and natural feel and ages attractively over time. The large balconies become an extension of the room.

Architect **Joakim Kaminsky**

»OUR MISSION WAS TO CREATE CROWDFUNDED AND SUSTAINABLE WOODEN BUILDINGS«

long side of the building,« says Joakim Kaminsky.

The blocks stand on a piled slab foundation made of concrete with an improved climate profile that generates around 45 percent lower greenhouse gas emissions compared with traditional concrete. The lower climate impact is achieved by replacing some of the cement with slag.

»We had to knock on quite a few doors to find someone who could mix concrete in a new and more carbon-saving way. It's not just a case of lifting the phone and ordering

green concrete. You have to discuss every choice and find the best compromise,« says Fredrik Fagerberg.

For the three blocks that ETC Bygg is currently building in Växjö, the climate initiatives have been pushed even further. Here two of the foundation slabs use climate-improved concrete, just like in Västerås. The idea is that the third foundation will use Småland granite as a way of completely avoiding concrete.

The outer and inner walls, floor system, stairwell and lift shaft are made from CLT manufactured by the Austrian firm Binderholz. The elements are transported by train from the factory in Austria to the construction site in Västerås.

»We've been keenly focused on putting wood at the centre of everything. As a surface layer, wood gives a warm and natural feel, coupled with the ability to age attractively over time. The large, light balconies function as an extension of the indoor environment, adding value as extra living and growing space,« Joakim Kaminsky. »

» **Strombro Building Workshop** is a firm of architects and structural engineers guided by Daniel Fagerberg's extensive experience of wood construction. They were responsible for project planning, design, statics and landscaping in the building of the apartment blocks in Västerås, where one of the challenges related to walls with flammable insulation and façades. The wood-based solution required specific detailing of the air gap structure, as well as exhaustive fire safety testing.

»We used the project as a testbed to see whether we could move forward with a façade design that is 100 percent wood. In practical terms, this involved building three full-scale façades at RISE Research Institutes of Sweden in Borås that we then set fire to, which cost time, effort and money,« comments Daniel Fagerberg.

There are three variations of the outer wall structure. The first is used in the middle of the block's long side, the other at the gable ends, and the third along the edges of the long side. The walls are insulated with 60 millimetre fibreboard plus 170–265 millimetres of loose wood fibre insulation. The outer wall structure is lined with a further 40 millimetres of fibreboard. Externally, the walls are finished with a façade of heat-treated pine that has been fireproofed with a natural, biodegradable product.

CLT has been used where structurally necessary, specifically in the stairwell, party walls and the gable ends of the block. The long side applies a glulam post-and-beam structure, which is a more resource-efficient use of wood.

Load-bearing outer walls are made of 120 or 140 millimetre CLT and load-bearing inner walls 160 millimetre CLT. Non-load-bearing internal walls are 80 millimetre CLT and the floor system is 220 millimetre CLT.

The intermediate CLT floors are topped with an eco-friendly and recyclable 40 millimetre wood wool board. Then

Wood construction expert **Daniel Fagerberg**

» WE BUILT THREE FULL-SCALE FAÇADES, WHICH WE THEN SET FIRE TO. «

comes a 90 millimetre layer of insulating aggregate. On top of the aggregate is another layer of 40 mm wood wool board, and the final flourish is the oiled, three-stave oak flooring. The solution proved to be smart in many ways, not least for enabling cables, pipes and other installations to be run through the aggregate layer. The bathroom floors have the same structure as the other floors, but with a layer of timber studs to regulate the incline down to the floor drain. On top of the studs sit sheets of chipboard and finally a vinyl flooring made from recycled plastic and bio-oils, which give it a smaller climate footprint than ceramic tiles.

»In summary, we have solved the acoustic challenge by combining light and soft layers with heavy and hard ones. The idea is not new – in fact it's how people used to build. Before concrete became a cheap option, building waste such as aggregate, bricks, wood shavings and mortar was dropped into the floor for acoustic insulation,« says Fredrik Fagerberg.

The entrances, corridors and the floor in front of the apartments' kitchen worktops feature a strip of new, smart and durable material – still a wooden floor, but finished with a layer of ceramic wood composite. This finish makes the floor even more hardwearing and impact resistant than stone, tile and laminate floors.

The apartments' kitchen cabinets come from Finnish manufacturer Puustelli's ecological Miinus concept. Calculations of the kitchen cabinets' carbon footprint include both materials and production processes, as well as transport emissions. Instead of solid panels, the cabinet doors use a cellular construction that makes them lightweight, saving on fuel during distribution.

One of the blocks has a bike room with charging points for electric bikes. Outside, there are bike stands and charging points for both bikes and cars. Residents initially have free access to two electric cars in order to assess the need for a carpool.

With his long experience, architect Hans is quite the expert on sustainable architecture. He was involved in developing the Passive House technologies of the 1990s and since 1974 he has worked with energy-efficient buildings, as well as developing and researching energy-efficient homes. The blocks in Västerås are designed to meet the criteria of the Passive House standard in line with certification system FEBY12.

»This is the most interesting project I've been involved with. The Passive House principle of low heat losses has been used in Sweden since the 18th century. What is new in Västerås is that the comfortable indoor climate is created »



The stairwell and communal spaces use as much exposed CLT as the functional requirements permit.



The façade is clad in heat-treated pine and the roof is lined with solar panels that work with storage batteries to provide the homes with electricity.

» with the least possible amount of energy, as solar panels on the roof, on the balconies and in the garden generate more energy over the year than the buildings consume,« says Hans Eek.

Thanks to the solar panels and storage batteries, the buildings are easily able to produce all the energy they need, for both heating and electricity, which means there was no need to connect them to the city's district heating network. The solar panels are part of ETC Elproduktion's national solar farm, and are leased out to the tenants, who pay rent based on their consumption. Any electricity not used is split between their other customers.

»The operating costs are low thanks to heat pumps, storage batteries and an impressive number of solar panels. What's more, the ventilation system recovers around 90 per cent of the heat. This means the buildings are largely warmed up by the residents themselves,« explains Hans Eek.

Researchers at Mälardalen University are currently conducting a technical and social assessment of the buildings.



The kitchen has been chosen for its eco-friendly credentials, including a low climate footprint and easy disassembly for reuse.

ETC standard house design

VÄSTERÅS, SWEDEN

ARCHITECTS Joakim Kaminsky at Kaminsky arkitektur, Hans Eek.

CLIENT ETC Bygg.

STRUCTURAL ENGINEER Strombro building workshop.

COST SEK 75 million.

AREA 2,900 sqm.

www.etcbygg.se, kaminsky.se, strombro.se

The technical study includes a building simulation to calculate the property's energy use and the supply from the solar panels, simulation of solar storage in batteries and measurements of airtightness and U-values. The social study touches on collaboration between the residents and what it is like to live in a low-energy building.

Ann Löfqvist lives in a second-floor apartment with two bedrooms in one of the blocks. She likes ETC's ideas about challenging the construction industry and demonstrating that it is perfectly possible to build climate-smart and good-value rental apartments.

»Last winter I was walking along the waterfront here in Västerås and I saw the buildings beginning to take shape. I was completely captivated, and thought this is where I want to live. When I actually moved in, it was like my vision had become a reality.«

Having fully settled into her apartment, Ann loves the pure wood walls, which create a warm and cosy atmosphere. Her fear that she would hear every sound from her neighbours quickly proved unfounded. Instead, it is surprisingly quiet, with almost silent ventilation, so the only noise is a low hum from the fridge. She points out some of the apartment's wonderfully thoughtful details, like the window openings being quite deep, which helps to make the windows look larger and the rooms lighter.

For Erica Söderberg, who lives above Ann, it took some time to get used to the apartment's bare wooden walls. Initially, she thought about painting them with a pigmented clay paint, but when she moved in, she realised that the untreated walls created a sense of calm and were restful to look at.

»We live in a luxury treehouse, as I tell my son, who is also very proud to be living here. When we have guests, he's keen to give them a tour of the apartment. Moving here has really given us both an injection of energy.«

The climate-positive apartment blocks in Västerås are one of the projects competing for the title Building of the Year 2022. This is the community development sector's most prestigious prize, awarded each year by the construction industry magazine Byggindustrin.

»I'm extremely pleased that our buildings are among the competition entries. It means that there is an interest in what we've managed to achieve and that some people actually want to take the discussion to a higher level,« concludes Johan Ehrenberg. ☺



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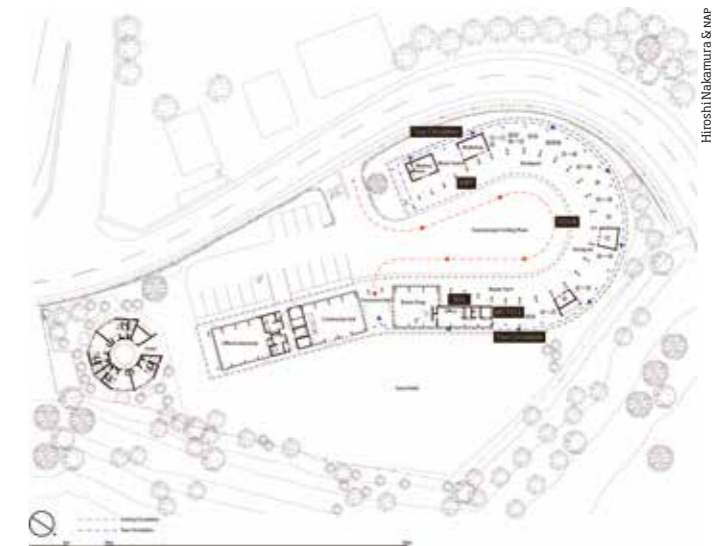
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Next to the recycling centre stands a hotel with features made from recycled material.



Hiroshi Nakamura & NAP

RECYCLING CENTRE IN LOCAL TIMBER STUDDED WITH 700 REUSED BUILDING PARTS TO SAVE NATURE AND THE ENVIRONMENT

TEXT Marit Engstedt PHOTO Koji Fujii/Toreal

Nestled among the lush green hills, along a winding road, sits the village of Kamikatsu, on the southern Japanese island of Shikoku. Its ageing population of 1,500 people is divided among 800 households at various altitudes between 100 and 800 metres. 88 percent of the local area is forest, and 80 percent of that is managed forest primarily growing cedar trees. The forestry industry has, however, shrunk due to cut-price imports of foreign timber into Japan.

In its place, the villagers have found another income source. The leafy hills are home to exquisite herbs and flowers that are hand-picked for delivery to the big city restaurants as a garnish, and everyone is keen to protect and preserve this greenery.

In 2003, Kamikatsu became the first municipality in Japan to issue a zero waste declaration. The aim was to be a community that creates zero waste, in order to protect its culture and nature. In the 1990s, the small village had had major issues with its waste management. The locals simply dumped their rubbish outside their homes or burned

it, causing considerable environmental damage. In addition, the municipality needed to decommission a small incineration plant due to emission problems, but did not have the financial resources to buy a new one. Discussions resulted in a decision to make each household compost its kitchen waste and sort the rest at the local recycling station. The initial number of sorting categories was nine, but when this was expanded the time had come to build a new sorting station. By March 2020, Kamikatsu Zero Waste Centre was ready to accept 45 categories of sorted waste.

The task of designing the new waste facility went to Hiroshi Nakamura & NAP. Embracing the principle of zero waste, the architectural practice set itself a rule of using local resources, making efficient use of materials and planning the construction so that it would generate minimal waste. They therefore chose not to use materials from outside the area, in order to reduce packaging materials, transport and fuel.

»We decided to use 70 to 80-year-old cedar »

» trees with a diameter of at least 250 millimetres for the building's carcass. This is the most common dimension of the wood in the local forests. We planned for a maximum length of 8 metres, because then the timber could be dried with the help of equipment that was available locally,« explains Hiroshi Nakamura.

However, they realised they would not be able to keep to the construction schedule if they only began felling and drying timber once the contractor had been chosen. The architects therefore negotiated with Kami-katsu Municipality and ordered timber from a total of 350 cedar logs a whole year before construction was due to start.

»By getting local suppliers to handle the harvesting in the hills and the timber production, drying and machining, we contributed to the local economy and reinvigorated its forestry operations.«

They chose to leave the logs in their natural form, rather than sawing them into boards, as this would create too much waste.

Architect **Hiroshi Nakamura**

» **WE FOUND MATERIALS THAT WE CONSIDERED A RESOURCE, RATHER THAN WASTE.** «

»Also, the logs can be used in an almost unprocessed form, which makes it easier to obtain the necessary lengths, as well as allowing us to benefit from the wood's maximum performance. The diameters and shapes do vary, and some parts are crooked, which requires sophisticated carpentry skills during production and assembly,« says Hiroshi Nakamura.

The facility promotes itself around the question »why?«. Why did I buy this and why am I throwing it away? Why do we produce this and why do we sell it? These questions are intended to raise awareness among

consumers and manufacturers, thus helping to reduce the amount of waste and rubbish.

That final question mark also formed the basis for the centre's design – quite literally. The top curve houses the sorting stations, arranged in a semicircle for easy navigation. The straight lower section has a reuse & recycling store, a community hall for the locals and a training room for people coming to learn more about the facility. A round hotel building sits detached below, as the point beneath the question mark.

»To begin with, it meant more work for me – sorting your rubbish is quite a time-consuming task. But then I started taking more care. Now when I buy stock, I make sure I get it in cardboard boxes. We can then reuse the clean boxes to pack up other products,« explains grocery store owner Takuya Takeichi in a YouTube video.

The architects also wanted the structure to be flexible and sustainable, so it could continue to be used, even if the purpose of the site were to change in the future or renovations were needed. The municipality also required the building to have an open structure, so air and light could pass through freely and stop smells accumulating.

The chosen structure comprises load-bearing posts made of split logs with their natural form intact. Between the halved logs sits a diagonal, roughly sawn brace that goes up to the ridge of the roof. The brace passes through the roof's lower tie beams, which are also split timber. All the pieces are joined together with bolts.

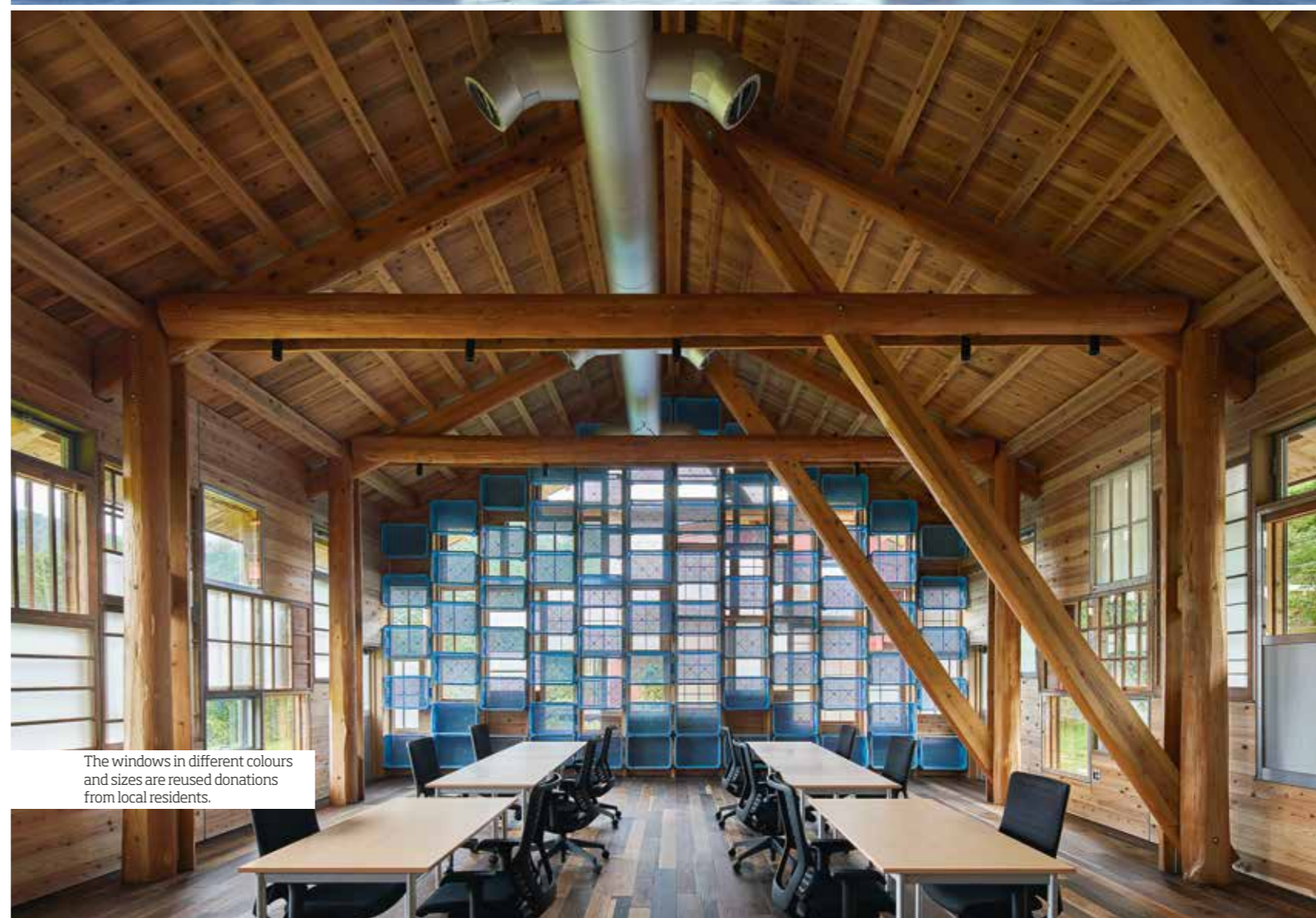
»Using an open structure makes maintenance tasks such as replacing rotten or corroded materials easier, not to mention the reuse of materials if dismantled. It also »



The recycling station is arranged in a semicircle for ease of navigation. There are 45 different categories of recycling, plus storage and a reuse & recycling store.



Between each pair of load-bearing posts sits a roughly sawn brace, secured in the roof ridge.



The windows in different colours and sizes are reused donations from local residents.



Here, nothing goes to waste. Materials from the local area were reused in the hotel, and there is also a store giving items a new lease of life.



Årgångsvirke från norrländska skogar

Norrlands karga klimat gör att skogen växer långsamt här. Det gör träden senvuxna, finkvistiga och med täta årsringar. Här har generationer av skogsägare vårdat skogen i nästan hundra år innan den förädlas och blir till ett av världens mest ansedda virke.

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norra timber

» minimises the amount of composite materials, which are difficult to separate for material recovery.«

When the sides of the braces were roughly sawn, the outer parts were reused on the exterior façade and as a finishing material. The choice was made to allow boards of different widths in order to minimise the amount of waste.

The intention to only use locally grown cedar in the construction, and to reuse local materials, prompted searches in unusual places.

»We repeatedly visited the previous recycling station and abandoned local structures, like the formal municipal building before it was demolished and a school that had been closed down. We thought carefully about how, through our design choices, we could add value to something that was no longer

Shop owner **Takuya Takeichi**

»IT MAY INVOLVE MORE WORK, BUT I BELIEVE IT HAS ENRICHED OUR SOULS.«

used. We found materials that we considered a resource, rather than waste,« states Hiroshi Nakamura.

It was also important for residents to feel proud about the municipal initiative and to appreciate the building. The architects therefore put out a call to the locals to bring in certain types of material. This resulted in a collection of around 700 objects, from a community of just 1,500 people. Donated windows have been used to create a patchwork effect on the façade, and at night the patchwork is illuminated as a signature feature of the building. Ceramic fragments have also been used for the floor and cupboards are piled up on the wall, while old agricultural crates form bookshelves in the community hall.

»This shows how, with creativity and a

conscious focus on reuse, we've been able to combine different materials. By collecting waste material in an organised way with the help of the municipality, we were also given certain latitude concerning the performance and quality levels generally required for public buildings. This architecture would not have been possible without collaboration between local residents and the local authority,« says Hiroshi Nakamura.

The residents also have a key role to play in maintaining the zero waste target. For Takuya Takeichi, it is not just about how he runs his grocery store, but also about a lifestyle:

»I now always stop and think, before I throw anything away. This whole agenda has nurtured a sense of caring for things. It may involve more work, but I believe it has enriched our souls,« he says. ☺

Why? - Zero waste center

KAMIKATSU, JAPAN
ARCHITECT Hiroshi Nakamura & NAP.
CLIENT Kamikatsu Municipality.
STRUCTURAL ENGINEER Yamada Noriaki.
AREA UNDER ROOF 1,176 sqm.
www.nakam.info, why-kamikatsu.jp

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Box for theatrical ideas

A box built inside a historical barn. That is one way to describe Västana Teater's new Loftet space. The modern venue envelops the audience, but also has clear ties to the older parts of the building.

TEXT Johanna Lundeberg PHOTO David Valldeby

A good theatre performance develops bit by bit, revealing things to the audience a little at a time. And ideally, the drama will stay with people afterwards. So says Ola Hellekant Nilsson, architect at Lugnet Arkitektur, who explains that he and his colleagues employed the same philosophy when adding a new stage to Berättarladan, a theatre venue in Sunne, Värmland.

»Through the architecture, you should be able to feel the sense of mystery before the performance, experience the building and at the same time get a sense of the place and the surrounding landscape. The cultural heritage here relates to the land, the farming community and their Swedish roots. We wanted to retain that, while at the same time giving Västana Teater's style a modern twist. The design of the architecture is an interpretation of their aesthetic and their conceptualisation of folk culture,« he says.

In the 1930s, Berättarladan was one of

1. The older barn's walls can be glimpsed through the foyer's glazed frame. The old and the new are interwoven to create a total experience for the theatre audience.
2. The stage is shaped like a circus ring, tailored to the folk culture of Västana Teater's performances, with singing, music and dance, all in constant motion.

the largest agricultural buildings in Sweden. Now it has been transformed into a venue where, since 1999, Västana Teater has presented dramatisations of Selma Lagerlöf's novels, for example. However, the performances in the barn have been limited to the summer months, and for the rest of the time the theatre company has toured with its performances, which can be expensive, as well as taxing on the performers. Instead, the theatre wanted to add a winterproof stage at the empty end of the barn, as explained by Hallström Stinnerbom, costume designer for Västana Teater and the client for the project.

»We wanted it to be done in wood to fit in with the barn. It's an old building with an amazing structure, so it would have made no sense to use any other material,« she asserts.

The solution was to create a new theatre space, shaped like a box inside the barn. Loftet, as the new addition is called, is a separate, free-standing volume with a glulam frame clad in CLT. However, glass has also been used in the

peripheral spaces to create contact between new and old.

»The first time I visited the huge loft in this part of the Berättarladan building, I was completely captivated by the simple boarded structure of the outer walls. It reminded me of a birdcage, with a grille that you can see through. And so we put glass in the foyer's walls and roof, so you can see the older parts of the structure and appreciate the magical transparency of the boarded wall. Where the glass meets the theatre's new, solid walls, it's easy to understand that the actual theatre box is a modern addition inside the wonderful old barn,« says Ola Hellekant Nilsson.

All the new elements are well hidden as you approach the building. The only things that give away the change are the new entrance steps and a lift, plus the window that has been cut out of the façade in the foyer.

»Going to the theatre should be exciting and it should envelop you, so the only thing that exists in that moment is the acting, dancing and music. That's why the theatre

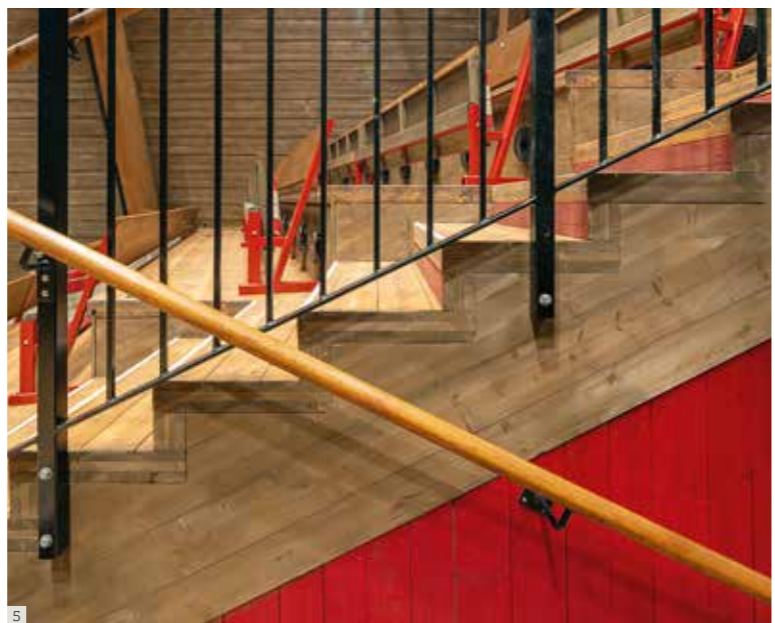
Architect **Ola Hellekant Nilsson**

»Going to the theatre should be exciting and it should envelop you.«

space has no windows, but for a brief time in the foyer you can look out on the amazing landscape. There is a great contrast between the wide open landscape outside and the enclosed atmosphere that you encounter as you take your seat in the theatre,« adds Ola.

The colour palette in the foyer comprises rich shades of red, blue and olive green, combined with details on door frames and mouldings carved by Jörgge »Surole« Sundqvist.

»It's supposed to echo the old, folk-art style, and we wanted the colour scheme to be warm and welcoming,« says Inger Hallström Stinnerbom, who right from the start had a clear



» image of what colours and shades reflect the way the theatre operates and presents itself.

Västanå Teater's performances are based on folk culture, which makes music and dance an important part of the staging. It creates a circular movement on stage, and this is what the circus ring-like design of the stage is based on. The initial idea was for a round stage surrounded by tiered seating, but Ola Hellekant Nilsson and his colleagues felt that this design was not quite suitable for the CLR elements that they were going to use. So instead, they went for a stage and seating in crystalline form. The auditorium has 235 seats, which are reached through an entrance placed halfway up the bank of seating.

»It's a more enjoyable experience if the audience get their first view of the stage from above, even if they're sitting right down at the front. It makes the entrance a drama in itself, without revealing everything in the room straight away,« says Ola.

The acoustics were created with the help of experts, and all the steps to the seats have

little round holes that are part of the theatre's ventilation system.

»Sorting out the ventilation was a major challenge, but I think the pattern made by all the air vents is quite decorative, part of the overall architectural appeal,« he adds.

Loftet has made a huge difference to Västanå Teater and what they are able to do. They can now bring everything together, including stages, offices, studios and rehearsal rooms, inside the barn. They can welcome school parties to watch theatre in its proper environment, and for the ensemble, winter opening means they can devote more time to both rehearsals and family life, instead of being on the road.

»But above all, our year-round operation has shown that the theatre means much more to the community than we had previously thought. In the summer, we have many more tourists from far afield, but the audiences are increasingly being made up of local people,« says Inger Hallström Stinnerbom.®

3. The rich colour scheme reflects the theatre's scenography. The carved details are by Jögge »Surolle« Sundqvist.

4. Berättarladan was once one of Sweden's largest agricultural buildings. When Loftet was built, the exterior gained new entrance steps, a lift and a new window, but was otherwise left undisturbed.

5. CLR steps and stringers in a sophisticated blend of form and function.

Loftet
ROTTNEROS, SWEDEN
ARCHITECTS Ola Hellekant Nilsson, Petter Kärnekull and David Lookofsky at Lugnet Arkitektur.
CLIENT Västanå teater.
STRUCTURAL ENGINEER Integra.
AREA 1,400 sqm.
COST SEK 19.5 million.
wlugnark.se

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Simon Anund, perhaps best known as a concrete artist, wanted to take the phrase »Made in Sweden« a step further. With his company Verk, he is doing everything he can to ensure that not only is every part of furniture assembled in Sweden, but all the raw materials are Swedish.

TEXT David Valldeby PHOTO Jann Lipka

What is your background?

I'm more or less self-taught. After upper secondary school I did a two-year foundation course at art school. I moved from Linköping to Stockholm and began working in furniture design in 1999. I'm also an artist, and for the past 11 years I've taught furniture design at Konstfack (University College of Arts Crafts and Design).

Much of your art is in concrete, and now you're making sustainable furniture in wood. How does that work?

I was employed as an assistant to an artist who had been commissioned to improve the look of Stadshagen metro station, and we were at it for two and a half years, by which time I knew a lot about concrete. I received an increasing number of requests from artists to help them with their sculptures and became associated with concrete. Almost 10 years ago, I turned the tables and began making my own art.

Concrete is a cheap, amorphous material that allows you to try things out without racking up huge costs. I've now claimed my niche, as not many people sculpt using concrete. I haven't had time to do much recently, although I'm currently working with Robert Mood and Isak Nordell from the Svart collective on a sculpture for Jockum Nordström that will stand in Stockholm Royal Seaport.

What made you decide to work only with Swedish raw materials?

I met (co-founder) Jacop Merlini at a dinner, and then we collaborated on some exhibitions with Konstfack and the furniture design school Malmstens. Following countless trips and discussions, and all sorts of different ideas, we decided that we wanted to fill the niche of only working with Swedish materials. This is something that needs to be focused on and talked about.

What were the greatest challenges you faced?

We realised very early on that there are only three kinds of wood that we can work with industrially – oak, birch and pine – but oak of good enough quality proved difficult to source at the moisture content for furniture. Sometimes it was hard to get hold of any oak at all, particularly in larger dimensions.

What makes wood furniture-grade?

We've tried several hardwood sawmills that have experience of vacuum drying, but in Sweden we don't seem to follow any standard procedures. The wood is dried either for too short a time or at too high a temperature, putting it under stress so it's unsuitable for furniture. We believe you should allow occasional bits of pith and knots, to reduce the amount of waste. It's time to change our view of what constitutes an exclusive product. We're facing a generational shift, with a younger generation that sees quality in a different way. If you buy five chairs and they all have a different character, I think nowadays that's seen as a plus compared with all the mechanically veneered products.

How do you go about developing a new item of furniture?

We wanted to launch Verk with a whole collection of furniture. The question was whether we could do this in just one year. That's a short development time. I set very clear parameters and briefs for our freelance designers. We needed to do that in order to predict what the production and costs would look like, but also to achieve a cohesive aesthetic style. The materials were limited to pine, birch, oak, stone, leather and wool. We also wanted the furniture to use glued butt joints if possible, to avoid the need for screws.

Why did you want to avoid screws?

Unfortunately, there are no Swedish screws on the market. We therefore try to avoid screws entirely, but it's not viable to ship the dining table assembled, so we needed screws for that. We could have cold-formed our own screws for a large production run, but now we've got a precision mechanical workshop to turn them from Swedish stainless steel.

How does the furniture production work?

We outsource the work to multiple workshops, and they need to be able to do several of the items in the range. We want more people to follow in our footsteps with local production. We prefer to keep things simple so that anyone can make the furniture. That's one of the reasons we can compete on price.

What do you do about traceability?

We don't use any labels, but we work with small, local sawmills that source their logs from nearby forest. Basically, we know exactly which forest owners we're buying from.

What material challenges do you see for the future?

A lot of my time is taken up with finding suppliers and manufacturers of Swedish raw materials and products. I've spent half a year trying to sort out a nail. There are six companies involved in producing a leather-wrapped upholstery nail. We mine a lot of iron ore in Sweden, but it's only really refined into stainless steel and specialist steel within the country's borders. Skyllbergs Bruk has now made stainless steel nails for us, using wire from Fagersta Stainless. Then there are two parts made using sheet metal from SSAB that is stamped in Ätvidaberg. The leather comes from Tärnköping, and then all the parts travel to Kallfeldts Läder to be pressed together.

We're involved in a project with Region Västra Götaland and the Swedish Industrial Design Foundation (SVID) to hopefully re-establish a carded yarn spinning mill. The textile element is one of the most difficult to sort out. I can't find any completely Swedish fabrics. Our sofa cushions don't contain any plastic or rubber. Instead, they are stuffed with wool from Texel sheep, which is kept in place by needle felt made from 100% Swedish sheep's wool. We hope to soon have large-scale industrial production of Swedish wool yarn, so Sweden doesn't have to import it from the other side of the planet. Zips and sewing thread are the only things we haven't been able to resolve. ☺

Post-and-plank – old technique for sustainable building



Created using the post-and-plank technique, the House of Nature can easily be dismantled and moved. An important sustainability feature.



Since the UN set out the 2030 Agenda and its global goals for the climate, interest in sustainable development has grown. The term »sustainable« has also become ever broader and is now used in many different contexts. The House of Nature at Silkeborg Folk High School is the embodiment of smart building, with an eye on both the past and the future.

TEXT Stina Hagelqvist PHOTO Anders Rajendiram

The more technical meaning of sustainability is about service life and durability, with synonyms including stability, resilience and toughness used to describe the attributes of physical structures and materials. Many wooden structures could be said to exemplify the concept in several of its senses.

Some might even be considered to expand the definition. Danish architectural practice ReVærk is a master of sustainable construction, and the House of Nature at Silkeborg Folk High School from 2021 is one of its boundary-pushing sustainable buildings.

It embodies sustainability's connection with the 2030 Agenda, in that the building meets several global, national and local environmental targets regarding choice of material. Wood is used throughout – externally, internally and as a carcass and insulation material – in order to minimise the climate footprint. The building is also an extension of the activity conducted here – education in nature and outdoor pursuits – through its location on the edge of the forest, with building volumes almost wedged between the trees and large window openings offering close contact with the forest.

What is more, the design uses a post-and-board system – an ancient technique in Sweden, Denmark and many other countries that is mainly found in regions where straight pine logs are in short supply and they have to use oak and other hardwoods instead. In fact, the Vikings made use of post-and-board, and in Denmark the method of dropping horizontal planks in between grooved vertical posts dominated construction before the advent of industrialisation

– in stark contrast to Sweden with its plentiful supply of pine. In its purest form, the post-and-board technique is an entirely wood-based system, without any nails, bolts or fixings, where only mortises, tenons and dowels are used to make the structure rigid, and the whole thing can easily be dismantled and moved.

So when ReVærk uses this historical and material-specific building technique, the concept of sustainability takes on an added dimension. The fact that the construction system still endures to this day is proof of resilience in a sense that is far from technical. The post-and-board method can be used in new contexts and adapted to modern technical requirements, allowing it to be used to create an architectural identity and a modern look – as clearly shown in the House of Nature's slightly conical volumes of different sizes, the play between the posts and wall plates, and the walls clad with acacia shingles. Not to mention how the posts literally raise the building so that it floats above the ground,

like a hyper-modernist box by Mies van der Rohe or Philip Johnson. The screw pile foundation also lifts the building out of any structural dependence on concrete. The structure of the House of Nature is both rooted in the traditional vernacular of Denmark and a reference to modernism's love of the play between horizontals and verticals.

Like its historical predecessors, the House of Nature can also be dismantled, making it a manifestation of circularity and sustainability through its ability to be moved and reused or, with certain modifications, reworked for a whole different function. The use of short logs and shorter lengths of posts and boards means that the material can be employed in new buildings, once the first one has come to the end of its useful life.

The House of Nature shows how simple, traditional building techniques can be updated to meet modern demands, while traditional construction shows how sustainability in all its senses was an integral aspect of all building once upon a time. Something to learn from. ☺



Projekt: 02 Orminge – Nybackakvarteren, Nacka Material: Brandskyddad och infärgad ThermoWood enligt SP Fire 105 Arkitekt: DinellJohansson

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Moisture-proofed construction requires planning and communication

Moisture-related damage can be very costly during the construction and operation of buildings. It can also lead to long legal wrangling, as there is no official metric for the assessment of the damage itself or the assessment of measures taken to rectify the damp problem. It is therefore vital to avoid damp issues during construction and when the building is in use.

TEXT Björn Källander

Builders currently employ both a full temporary shelter and targeted measures during the construction process. The choice of whether to work with or without a full temporary shelter must be decided on a case-to-case basis. Factors that need to be taken into account include the complexity of the building, geographical location, season and cost. The cost of a full temporary shelter and the benefits of a more efficient construction process with less risk of weather disruptions has to be weighed up against the cost of the measures required without such a shelter. The choice of weather protection affects both the design of the building and planning of its construction, which means that the decision should be taken early on in the planning process. A more detailed discussion of the topic can be found in Swedish Wood's recently published guide to building in mass timber without a full temporary shelter, *Fuktsäkert KL-träbyggande utan heltäckande väderskydd*.

Damp-proof construction is largely about planning and communication. From the earliest stages of the project, consideration must be given to the risk of moisture ingress at the interfaces between structural elements and connections exposed to the weather, and ways to channel away any precipitation.

Assembly of the building should be planned to minimise the time that the structure is unprotected. Preparations should be made to ensure that sufficient manpower and materials are available if it rains, to both protect the material from getting wet and quickly rectify any water effects. The building should never be left unprotected during

prolonged breaks in the work, such as weekends and holidays.

Everyone on the site needs to understand the importance of moisture protection and have basic knowledge about wood and moisture. Clear delineation of responsibilities for the various actors on site reduces the risk of moisture-related damage. In Sweden, support is provided by the industry standard Bygga F, which sets out a system for the planning, control and reporting of moisture-proofing work.

The time factor is important for protection against moisture-related damage. It takes time to make wood damp and it takes time for biological damage to develop. If snow and water are quickly removed, timber can be protected against damaging levels of moisture. It is also important to protect the structure against pooling of water, for example rainwater collecting in a corner of the building or running down through openings into underlying floors.

At the same time, it is useful to know that wood takes up moisture and dries out in different ways. Wood sucks up water through capillary action, particularly if the end-grain wood is in contact with water. However, drying occurs through the diffusion of moisture out to the surface, where it then evaporates into the air – a significantly slower process. It is particularly important to stop water from collecting in holes or cracks that can serve as water reservoirs and cause serious local moisture uptake, as well as creating a damp microclimate that both slows the drying process and promotes mould growth.

Mould grows on the surface of the material and relies on high humidity for its development. A mould attack occurs when the air nearest the material surface is kept damp, which can happen in joints and holes for example, under non-breathable plastic or during periods of high natural air humidity.

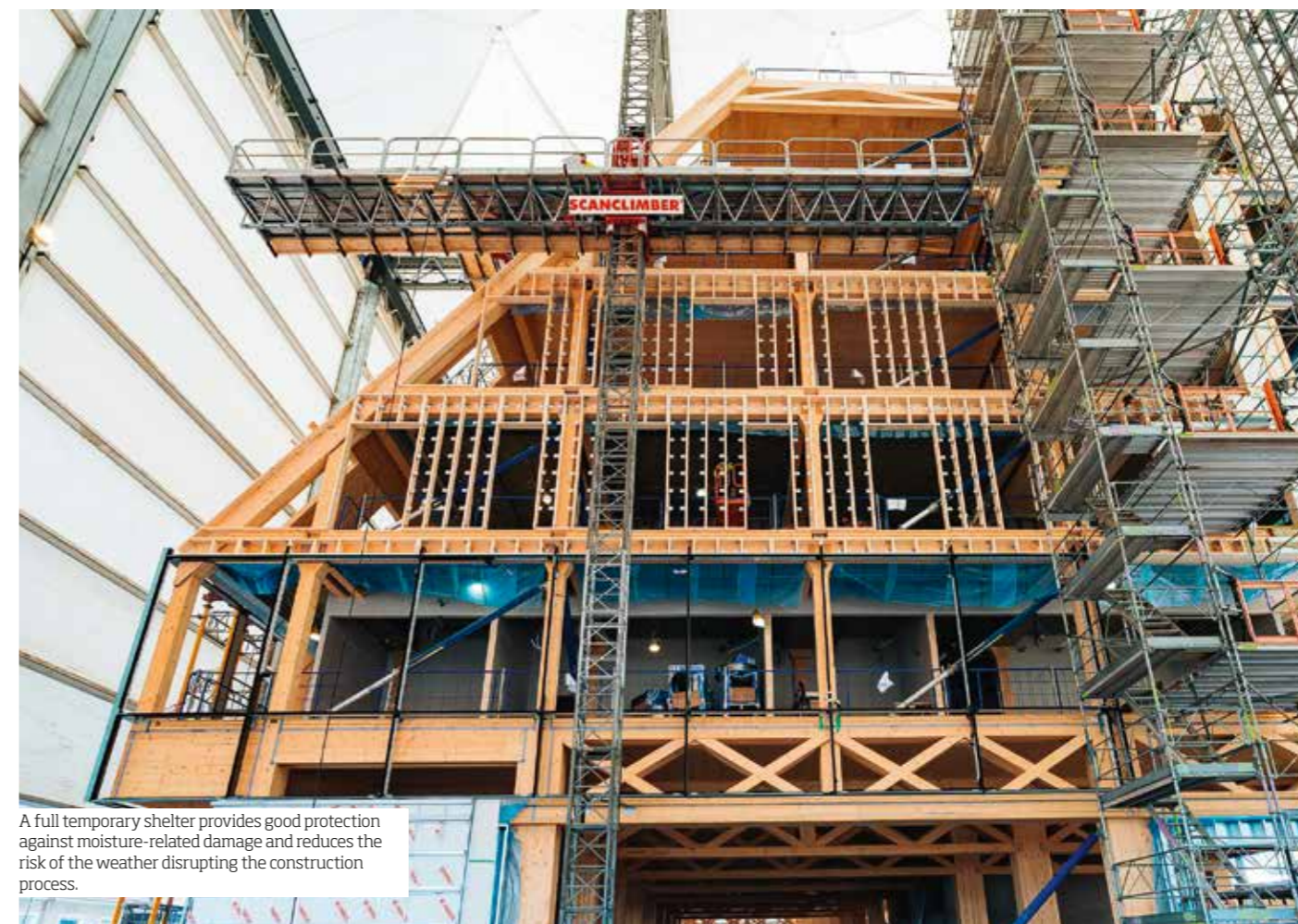
The moisture inside the wood has very little or no effect on mould growth as long as the air can circulate around the wood, because the diffusion of moisture out of the wood is very much slower than the rate at which the air carries the moisture away.

This also means that the moisture content of the material closest to the surface very quickly adapts to the surrounding climate. The generally recognised threshold for permitted surface moisture content when encasing timber, 18 percent, thus offers a good safety margin.

Experiences of moisture-related damage indicate a few recurring issues. Particularly serious damage may occur in buildings left with no weatherproofing during prolonged breaks in the construction process, which can mean that large amounts rain fall and mould sets in before the damage is discovered. Moisture-related damage to sill plates or the lower parts of mass timber walls may occur due to a lack of distance between the wood material and the substrate, leading to capillary absorption of water, combined with slow drying in the space beneath the wood material. Poorly taped joints and openings in mass timber elements could also allow rainwater to pool. Another issue is when wood connections exposed to the outdoor climate have not been designed to be protected against wet weather.

These potential problems demonstrate the importance of organised preparations for handling moisture-proofing during construction, and the importance of details being correctly executed. ☺

svensktrtra.se/publikationer-start/publikationer/fuktsakert-kl-trabyggande-utan-heltackande-vaderskydd (Swedish)



A full temporary shelter provides good protection against moisture-related damage and reduces the risk of the weather disrupting the construction process.



Without a full temporary shelter, preparations must be in place to handle wet weather. Even when joints and other critical details are protected, snow and water should be removed as quickly as possible.

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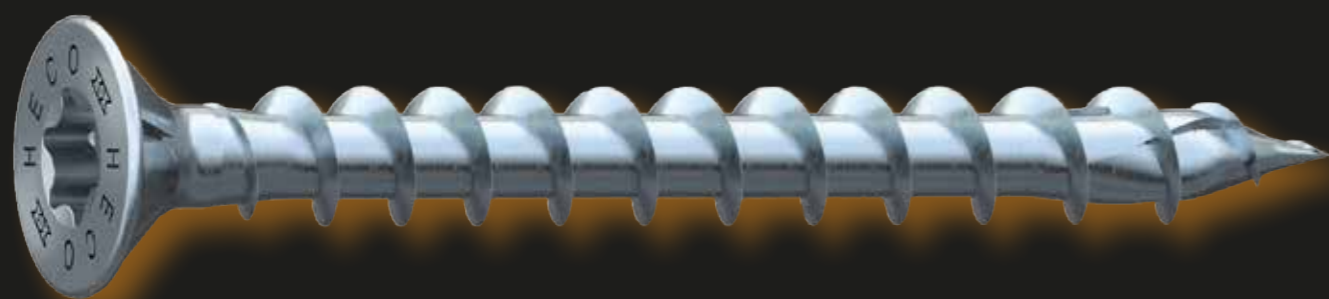
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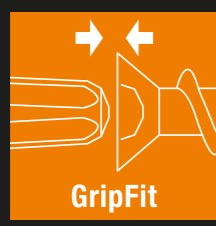
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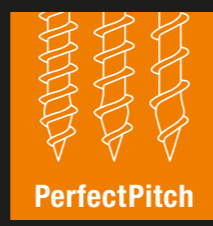
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Tuukka Koski



Inspired by the nearby national park, the client wanted a house that looked like a boulder, but in wood.

A meteorite placed in a forest glade

Behind the dark, sculptural exterior lies a bright home, where vertical flows and an atrium connect the rooms and functions. But perhaps the most exciting feature is not immediately obvious.

TEXT Johanna Lundeberg PHOTO Tuukka Koski

Anyone exploring the forest in Kontiolahti might, at first glance, think a meteorite had fallen in this Finnish glade. The dark colour and silhouette of the multifaceted building that stands here cannot help but spark fantastical associations.

»A key part of our aesthetic is to create buildings that can be freely associated with phenomena and formations in nature, such as rocks and icebergs. We work a great deal with the interface between the abstract and the concrete to create designs that spark people's imagination,« says Kivi Sotamaa, architect and co-founder of Ateljé Sotamaa.

He was the lead architect, but his sister and co-founder Tuuli Sotamaa was also involved in the project.

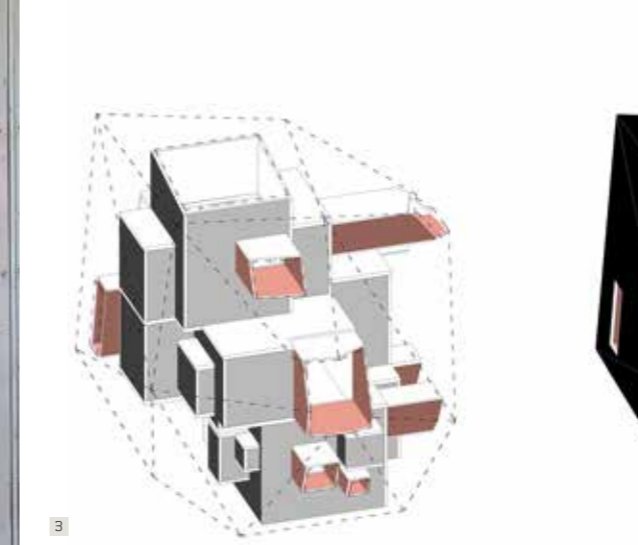
This part of northern Karelia is where client Ulla-Maaria Koivula has her family roots, so she wanted her own holiday home here. She asked the architects to present a

vision of a home like a stone boulder, but in wood, inspired by nearby Koli National Park.

»The end result exceeded my wildest expectations. It's a true work of art, a huge wooden sculpture that's also functional,« she says.

The family has been based in the USA for many years, and the house was meant to be used just as a holiday home. But then came the pandemic, and the family decided to settle here full-time, but the switch to a school, workplace and above all a permanent home threw up new requirements.

»In philosophical terms, you could say that the house encouraged the family to re-examine it and see what role it could have in everyday life, and thanks to the many different spaces and functions, changing it to a permanent residence was no problem. I think that's what I find most satisfying about »



» this project, that it was so open to interpretation and new possibilities,« says Kivi Sotamaa.

Private spaces, the opportunity to withdraw in order to work undisturbed, make a call or simply have a moment to oneself. It was all there from the beginning.

»The only change was that we decided not to have integrated bunk beds on levels two and three, choosing instead to keep the rooms as more flexible, open spaces where you could sit or stand and work. We're trying to keep the furnishings as minimalist as possible,« adds Ulla-Maaria Koivula.

While the exterior – with its dark-oiled, asymmetrical sides in CLT, and walls and roof that merge together into a monolithic egg shape – invites abstract interpretations, there is a whole other feeling in the bright, exposed wooden interior made of spruce. Here, the architecture plays with traditional notions that a family should gather and socialise around the kitchen table, with other rooms arranged around it or in a line. Here the dynamic and the flow is vertical instead, with

all the rooms connected by an atrium in the centre of the home, capped with a 10 sqm rooflight that brings light flooding down through the three levels. The window is electrically heated so that snow melts and the view of the starry sky can be enjoyed even in winter. Each level has large window seats and carved-out niches to climb up into, while another feature, on the third level and 7 metres up in the atrium, is a catamaran net where the children can jump around and play, or the adults can simply relax, looking up through the window and thinking creative thoughts.

»Wherever you are in the house, you have contact with almost all the spaces in the building. When the children are playing on the net, they can talk to their parents at the same time, even if they're way below in the kitchen. On one of my visits, the kids had set up a basket that they lowered down from the net for the parents to load up with sweets. It's a way of being connected while at the house and having your freedom,« says Kivi Sotamaa.

1. Small niches create private alcoves for anyone who wants to withdraw while still having contact with the rest of the house.
2. The interior in light spruce has a vertical flow.
3. 3D model showing the hidden spaces in the house.
4. The catamaran net at the top of the atrium encourages both play and stargazing through the rooflight.
5. The dark-oiled CLT walls and roof merge into one. The insulation inside the façade is simply air.

Meteorite

KONTIOLAHTI, FINLAND

ARCHITECT Ateljé Sotamaa.
CLIENT Ulla-Maaria Koivula.
STRUCTURAL ENGINEER Vahanen group.
LIVING SPACE 65 sqm.
w| ateljesotamaa.net

But perhaps the most exciting attribute is the one you can't really see – the air gap between the building's outer and inner shell. Measuring 3 metres at its widest point, Kivi Sotamaa describes it as being as if the inner core is wrapped in slightly too large a cover that forms air pockets. It is here that all the utilities are hidden away. From each level, small openings run right in and through the gap, with windows placed at the end, connecting the interior and the exterior.

»We were inspired by the stone alcoves in old castles, and these openings are an important and innovative feature of the project, since they can be used in so many different ways. They become like a cosy little cave removed from the social spaces,« says Kivi Sotamaa.

The alcoves are great for both storage and a moment of peace and quiet. Ulla-Maaria Koivula recalls how the first time the family's five-year-old came to the house and saw one of the alcoves, he wanted it as his room – despite it being no bigger than a square metre.

»The smallest alcoves are perfect for

pictures or other decorative objects, and the larger ones provide a private place for our children to read or play,« she explains.

Just as important is the air gap's other function, as insulation. No wool, plastic or other material has been used in the gap between the 90 millimetre thick CLT elements of the outer and inner walls and across the alcoves. The insulation relies solely on air circulating within the space, which is reassuring when it comes to the CLT roof.

»There is always a risk in having a wooden roof, but if it was to absorb moisture, the space on the inside is empty. There is nothing here to go mouldy – all that can happen is that the wood swells and then dries,« says Kivi Sotamaa.

The entire exterior has been treated with a mix of traditional tar and oil to make it weatherproof.

»Beyond that, there is no waterproof membrane covering the outer parts. Because the structure is diffusion-open, moisture can travel in both directions, which seems to work well in the harsh, Finnish climate,«

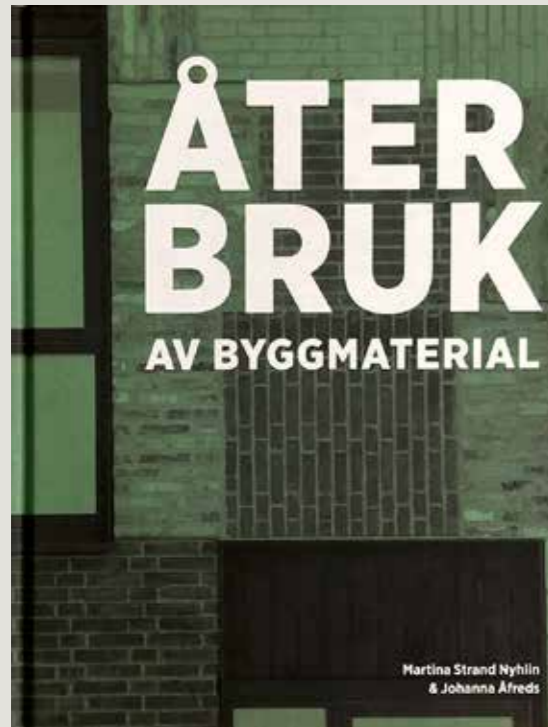
states Ahti Rantonen, CEO of Vahanen-Yhtiöt, which was responsible for the structural engineering.

To achieve the egg shape in CLT, the structural engineers used 3D modelling.

»The elements are fixed to each other with long screws and anchor plates that are placed in the air gap so they aren't visible. The steps we used when assembling the elements have been left inside the space, so they can be used later if anything needs maintaining,« he adds.

Ulla-Maaria Koivula says that the house is exactly what they wanted and that sustainable materials mean they don't need to spend time buying new furniture or changing the decor.

»The atmosphere inside the building is very calming and inspiring. There are many places where you can look out at the trees and fields. At the same time, the organic shape creates a spatial connection between the rooms and the three levels. It's quite a special experience to feel like part of a bigger space both inside and out,« she concludes. ①



Återbruk av byggmaterial
Martina Strand Nyhlin & Johanna Åfreds
Svensk Byggtjänst (Swe)
978-91-985212-3-8

Construction industry journalists and authors Martina Strand Nyhlin and Johanna Åfreds have cast their net wide in search of successful reuse projects. *Återbruk av byggmaterial* (Reusing



building materials) is a new book about reuse and recycling that examines the current situation, but above all discusses the obstacles to and solutions for reuse, while also presenting an example of what a procurement of used material might look like. The authors use various projects to highlight the potential of the materials, in a clear bid to encourage more reuse.

People have increasingly begun to think about how building projects actually affect the environment. Of course, it is fascinating when new buildings emerge, but the construction industry's contribution to carbon emissions is also creating climate anxiety.

The book relates, for example, how concrete from the Copenhagen metro ended up in the floor of a fitness centre in Malmö and how zinc

plate from a Finnish museum was reused in a Swedish space observatory in Onsala. The book also tells of how hollowcore concrete from buildings damaged in the bombing by Anders Breivik took on a new life in an emergency room in Oslo, and how plants removed when the School of Business, Economics and Law in Gothenburg was demolished became a popular reuse-based park. There are no clear examples of reusing wood – but a key tip to enable reuse is to »use screws, not nails«.

The book also runs through the professions that are key to the success of a reuse project, based on interviews with key figures such as a sustainability manager, an architect, a demolisher and a developer.
w| svenskbyggtjanst.se

Nordbygg
Perhaps the most interesting construction event of the year is back. Naturally, Swedish Wood will be there (C14:4). The construction industry is gearing up to finally present all the innovations that have been on hold for the past few years. Everything you need to see will be there.
w| nordbygg.se



STOCKHOLM, SWEDEN
26-29 April

Träprisutställning
Nordbygg will feature something extra – at last there will be an exhibition of the nominees for the Swedish Wood Award 2020, including the winning entry *Ateljé i Södervik*. Don't miss the opportunity to see the best of the best from the past five years of Swedish architecture in wood.
w| svensktra.se



STOCKHOLM, SWEDEN
26-29 April



1 June | **Trä!** nummer 2
A new issue of *Trä!* The Nordic region's biggest architecture magazine is distributed in Sweden and internationally. Would you like to be inspired, enlightened and informed about sustainable and innovative architecture? Subscribe for free here:
w| woodarchitecture.se

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FRAMTIDENS FASADLÖSNINGAR. – PRISAD SVANENMÄRKT SKOLA.

Vi blev överraskade hur många miljöcertifierade referenser vi samlat på oss. Det blev en inspirerande bok om nordisk hållbar arkitektur och fler finns på vår referenssida.

Bilden visar den Svanenmärkta skolan Torvbråten som är ritad av Link och som blev utnämnd till Årets Skola i Norge 2021. Skolan är innovativ och den visar hur man förenar arkitektur, miljö och hållbarhet. Fasad av Cembrit Patina Original fibercementskivor i kombination med träspjälor. Fasadskivorna kommer skräddarsydda färdiga att montera. Det blir finare så och samtidigt blir det dessutom mindre spill. Bra för bygget och miljö.

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