LKR INNOVATION HOUSE

History | Transformation | Architecture | People & Planet

VELUX®

HISTORY

"So even if we save consumed energy, it is far from enough. The amount of carbon dioxide in the atmosphere, and thus the greenhouse effect, is getting worse and worse. This is where wood and trees come into the picture. When trees grow in the forests, they absorb carbon dioxide from the atmosphere and use the carbon for growth. The building here in Østbirk should be seen as our company group's participation in the debate about using more wood in construction. This warehouse is a very big experiment."

Lars Kann-Rasmussen's opening speech
15 May 1995

AN EXPERIMENT WORTH MORE THAN 1000 EXPERT VIEWS

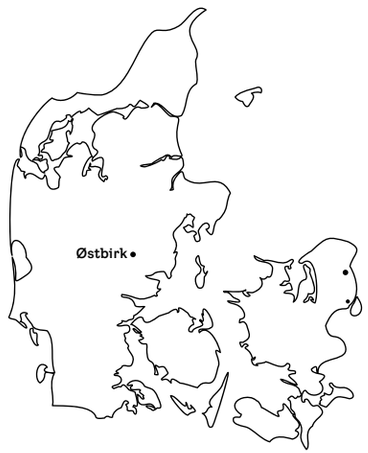
In 1941, engineer Villum Kann Rasmussen founded a company devoted to improving daylight and ventilation in buildings. His first roof window, patented in 1945, brought fresh air and natural light together, with VE standing for ventilation and LUX for light.

The first VELUX workshop opened in Østbirk, Denmark, in 1946 and soon evolved into a full-scale production site. The location was chosen for its proximity to the railway, which enabled efficient transport. Villum's inventive spirit, reflected in 55 patents and his 1956 statement of purpose, continues to define the company's values.

Østbirk became a centre for testing and innovation. In 1992, the largest wind tunnel in Northern Europe was established there to test product performance under real-life conditions.

In the early 1990s, Villum's son, Lars Kann-Rasmussen, carried this experimental legacy forward with a pioneering idea: a warehouse built entirely from untreated, locally sourced timber. Using modular construction and fitted with VELUX roof windows, the project anticipated today's low-carbon and circular building practices.

Guided by Villum Kann Rasmussen's belief that "one experiment is worth more than a thousand expert views," the project embodied the forward-thinking mindset that continues to shape VELUX architecture and innovation.



The first VELUX building was constructed in 1946 in Østbirk on a site which later became an industrial area housing multiple facilities of the company, including the LKR Innovation House.

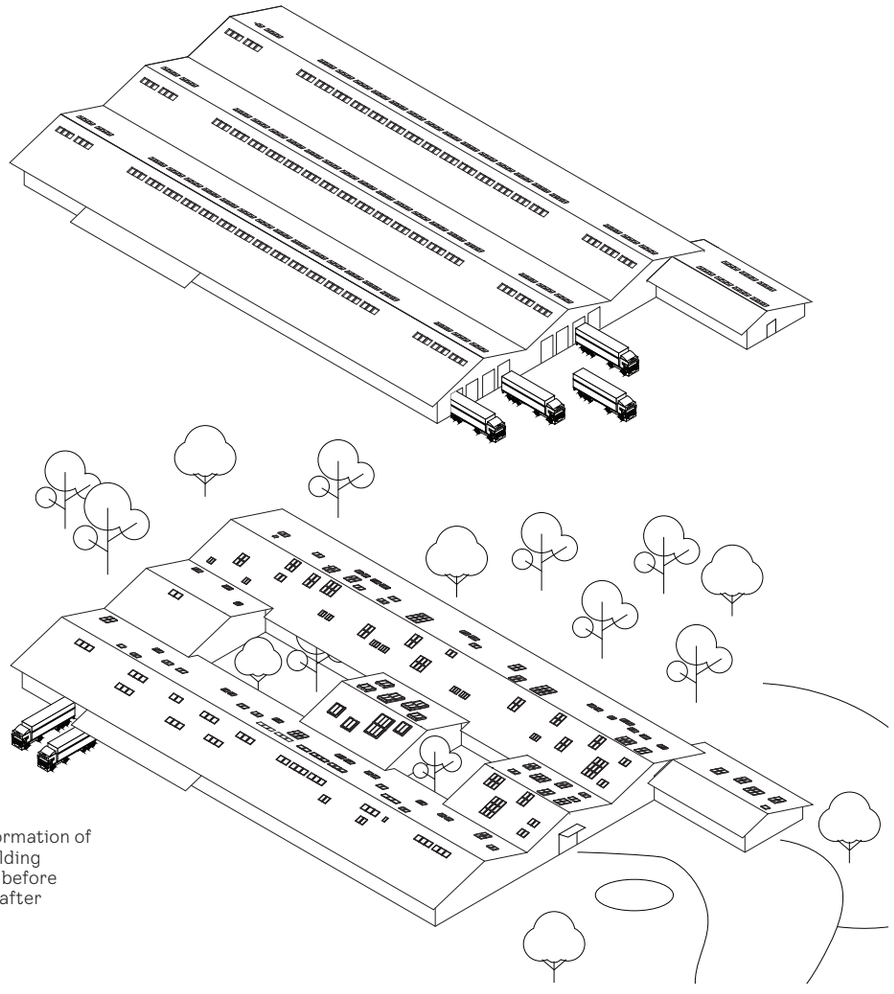
TRANSFORMATION

FROM WAREHOUSE TO INNOVATION HOUSE

One of the project's main objectives was to bring daylight and fresh air to every corner of the building while retaining as much of the existing structure as possible. PRAKSIS Arkitekter achieved this by introducing two courtyards and adding a variety of roof windows as well as façade glazing.

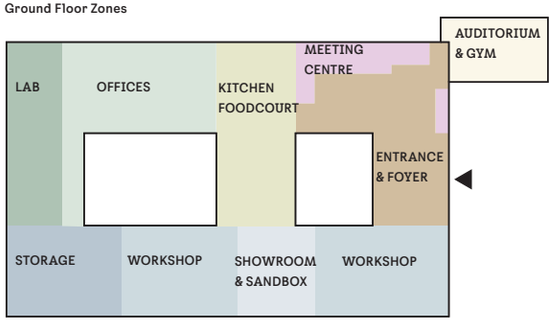
A new address has been created and the former truck docks have been converted into an entrance façade with a welcoming plaza, named Daylight Square. Leisure areas around the building merge seamlessly with the landscape park to the north of the industrial area.

The winning proposal had to feature spatial design that would foster synergies among 500 employees from across VELUX's research and development, including design, product development, and implementation. Furthermore, the LKR Innovation House will host events and meetings with the press, industry stakeholders and students.

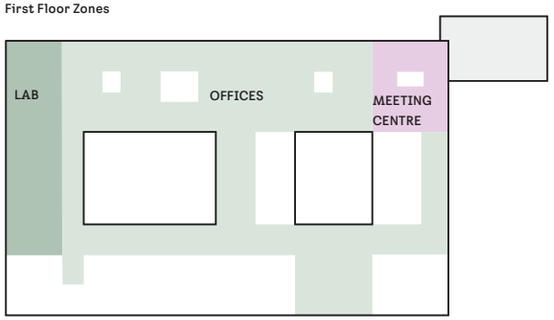


Transformation of the building
Above: before
Below: after

Ground Floor Zones



First Floor Zones



Future products will be designed and developed in the LKR Innovation House and tested in nearby production facilities before entering production at VELUX manufacturing sites across Europe.

The building is designed to accommodate a diverse and inclusive community, including people outside the company. The LKR Innovation House features a dedicated area for students and start-ups, fostering an environment that encourages creativity and collaboration. This area supports innovative projects, provides resources for young entrepreneurs and students, and creates a dynamic ecosystem where start-ups can thrive and develop their ideas. It features flexible workspaces and access to selected facilities within the LKR Innovation House.

Flexibility is key to the design of the LKR Innovation House. The entire space has been designed to accommodate changing needs. Shared seating optimises use of the building and helps create a flexible, lively and welcoming workplace.

1994–1995: The Original Warehouse – "An Experiment in Wood"

Lars Kann-Rasmussen	VELUX, project initiator
Jan Christensen	CEO of Østbirk Bygningsindustri
Bjarne Thomsen	VELUX Group
Knudsen & Halling	Architecture
Poul-Erik Larsen	Workshop Lead, VELUX Østbirk

2021–2025: Transformation into LKR Innovation House

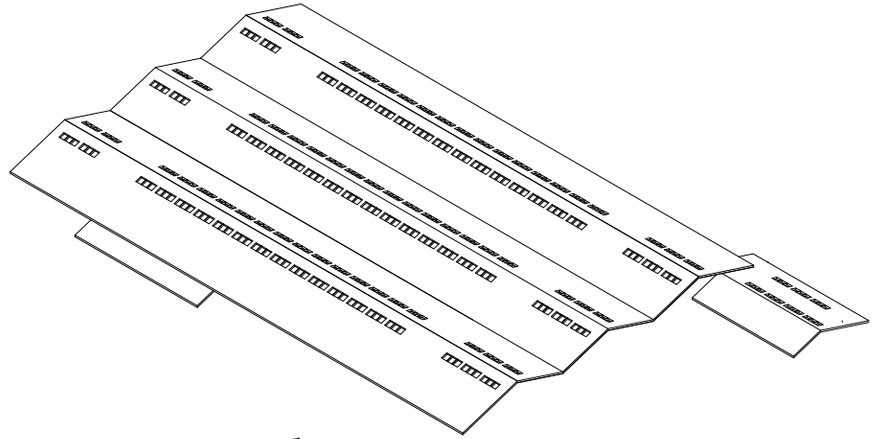
Praksis Arkitekter	Architecture
Søren Jensen	Engineering
DETBLÅ	Landscape Architecture
KG Hansen	Main Contractor
SPANT FRIIS & MOLTKE KASPAR MOSE	Interior Design
Holmris B8	Furniture
Adam Mørk	Photography

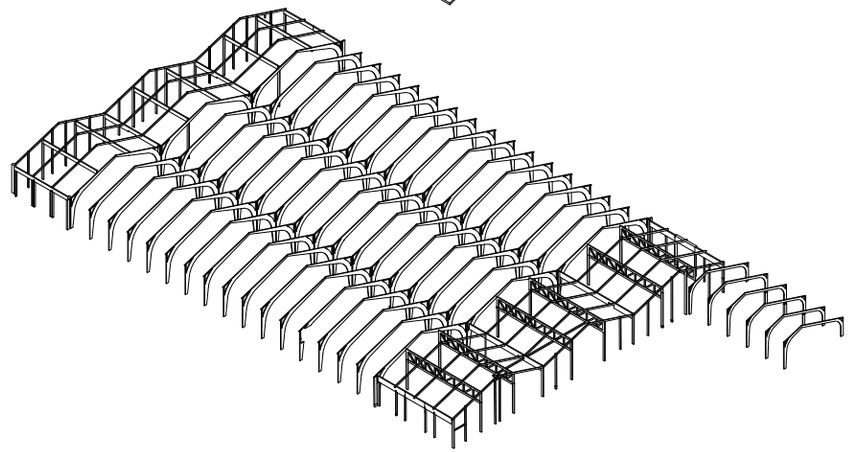
"Our primary ambition was to preserve as much of the building as possible and carry it forward into the future with a new purpose."

Mette Tony, PRAKSIS Arkitekter

The structure of the 1995 warehouse was in a great shape and ready to live on for another decades to come – much longer than the 50 years calculated in sustainability regulations.

THE FLEXIBILITY OF A MODULAR STRUCTURE





The original warehouse consisted of three halls formed by identical timber arches, flanked at both ends by column-and-beam structures.

The roof elements are dimensioned to match the grid of the load-bearing structure. An adjacent, smaller building to the north-east housed the offices. The façades used modular wooden panels, enabling rapid alterations and repairs. Alternating plank directions, combined with slightly projecting frames, created maximum architectural impact using modest, rational means. Over time, sun and rain weathered the timber to varied shades of grey, bearing witness to the building's history.

Such clever design enabled PRAKSIS Arkitekter to implement a highly effective refurbishment strategy by removing single structural fragments, reusing panels with added insulation, and replacing some with glazing. No element has been put to waste, big or small.

THE CELESTIAL FAÇADE

In a low-rise building where the ‘fifth façade’—the roof—occupies the most significant area, a carefully considered approach to zenithal daylight is essential. A composed array of VELUX roof windows in varied sizes ensures optimal daylighting and opportunities for natural ventilation. Their range mirrors the diversity of the rooms below, creating distinct atmospheres across the building. A total of 415 roof windows, all automatically controlled, open and close to maintain an optimal indoor climate.

"GREEN LIGHT BOXES"

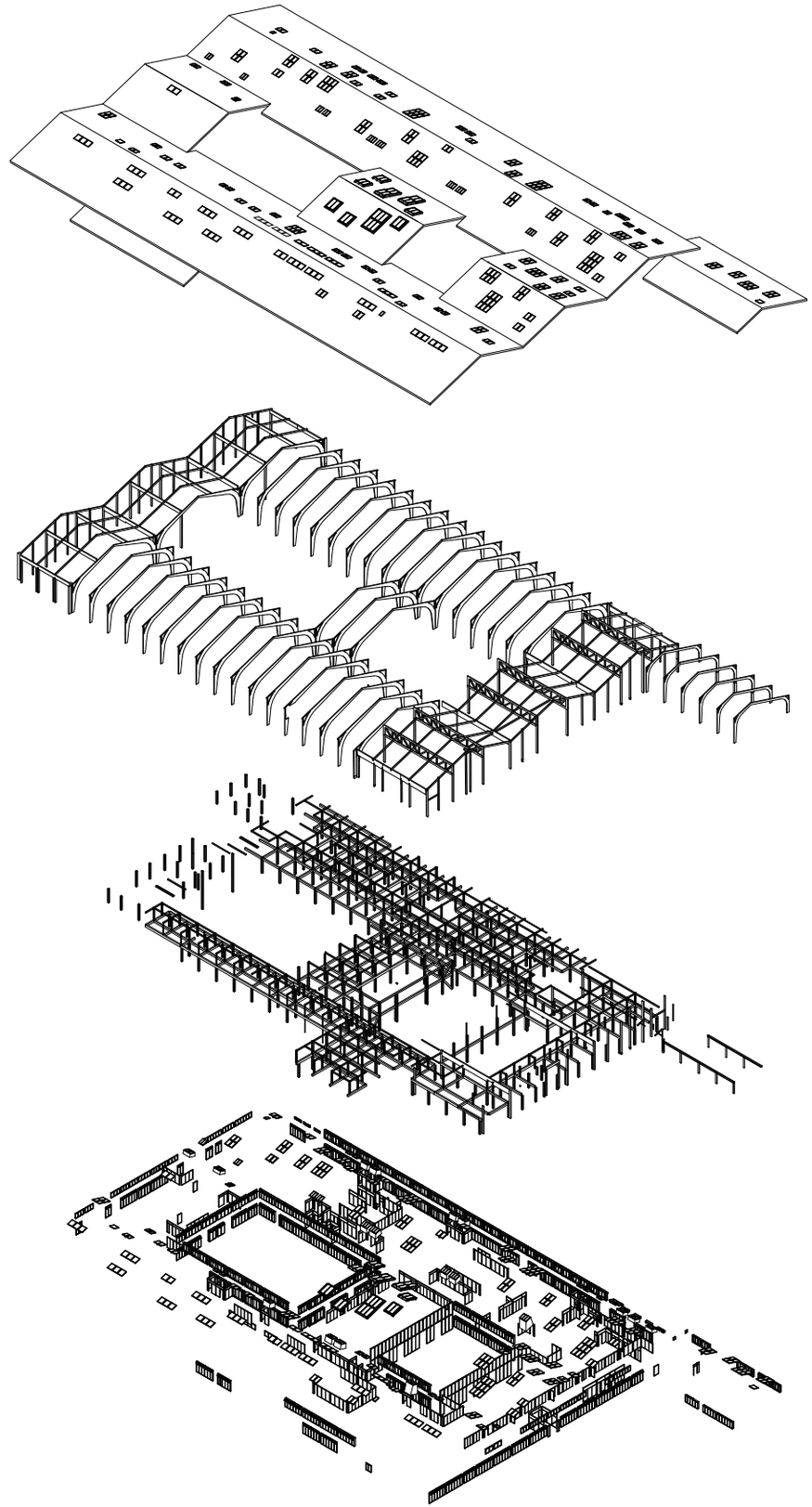
Two courtyards were created by removing structural frames. Between them sits the canteen—the building’s central meeting place.

ADDITIONAL FLOORS

To accommodate the building’s new purpose, additional storeys were introduced. The architects selected a freestanding timber structure set out on the grid of the existing beams. The first floor—primarily offices—features a series of cut-outs that foster visual and acoustic connectivity between levels. These internal courtyards channel zenithal light from the VELUX roof windows deep into the building, reaching the ground floor.

FAÇADE OPENINGS

The initially closed façades were enlivened with bands of glazing, framing views from workstations towards the new landscape park. The new courtyards are fully glazed, seamlessly connecting inside and outside.



Former truck docks were converted to a generous entrance foyer: a multifunctional meeting place, full of life, overlooking a green courtyard in the centre of the building.

"Our reuse ambitions were high and meeting them required genuine experimental work. I'm especially pleased that we could reuse so much of the original concrete, keep the warehouse floor as a high-quality surface for everyday life, as well as retain the roof, façades and timber structure—so you can see and feel that the old building lives on."

Mette Tony, PRAKSIS Arkitekter

RECYCLE AND REUSE

Maintaining the load-bearing structure was itself a strong statement in favour of reuse. Also, the existing concrete floor is retained except in the courtyards, where it is cut into tiles and reused as outdoor paving and benches. Many of the surrounding SF stones (concrete pavers) are removed to soften the transition to the landscape; these are recycled as pavement, car-park fill, secondary buildings, or paths in the area.

The roof surface was preserved, re-insulated, and fitted with new roof windows. Elements that cannot be reused on site—such as old windows and ceiling panels—have been sold for reuse.

In the courtyard cut-outs, the glulam frames are removed and will be reused and upcycled in various ways. The existing façade is retained; its wooden modules are dismantled to create a new insulated outer wall, which was then reassembled. Where new window openings were made, these wooden modules are used for the new courtyard facades; other modules repair parts that need maintenance or replacement.

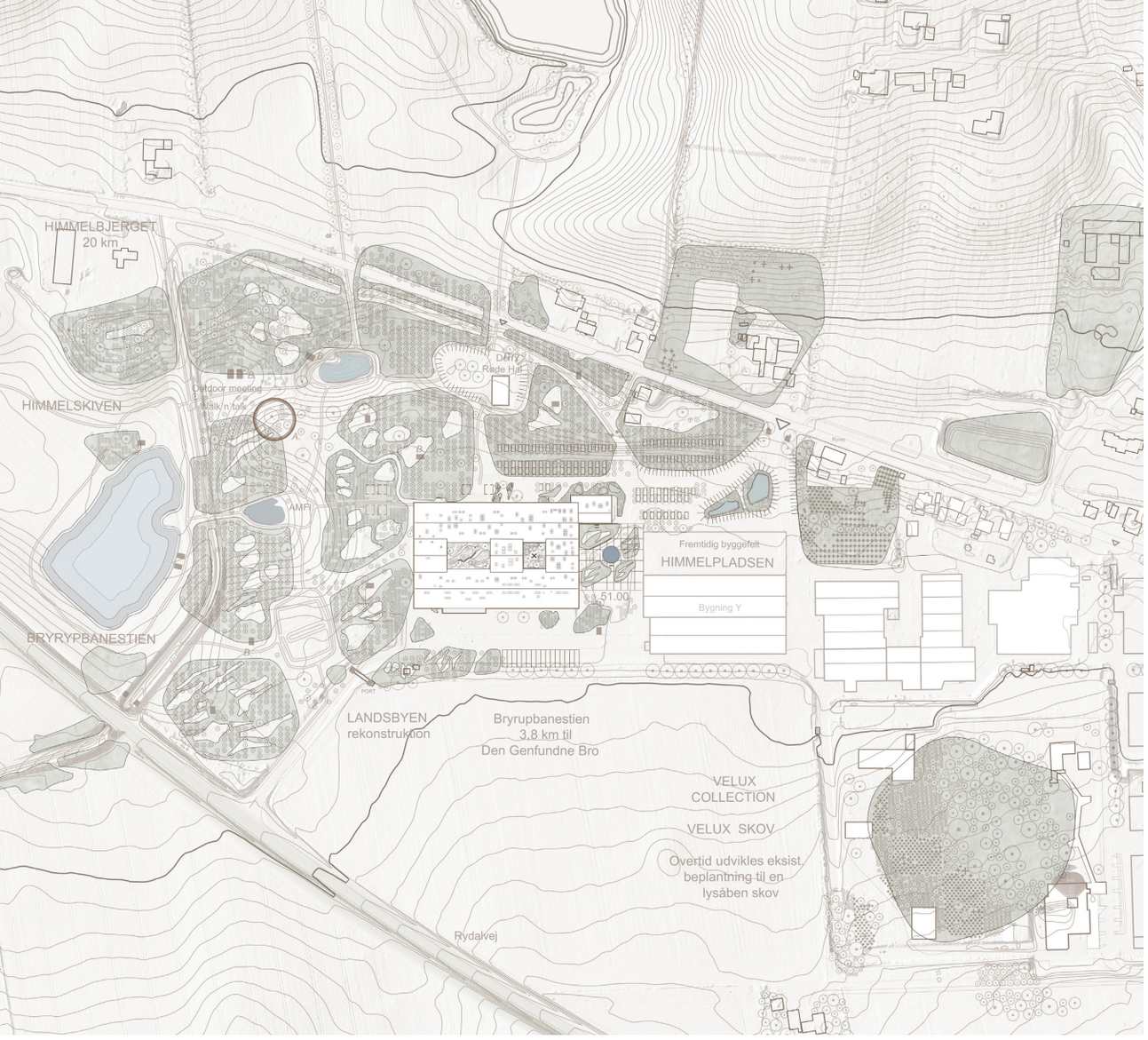
Internal concrete walls are reused as the walls of the new staircases, with remaining concrete repurposed for paving, outdoor furniture, and other uses. Lightweight internal partitions made of plasterboard are sent for recycling with return plaster; the same applies to the mineral wool within these walls. Existing canopies are reused elsewhere in the project.

Even the office furniture from the old building has been refurbished and put back into use.

This circular approach diminishes resource use and CO_2 emissions; the savings are substantiated by extensive research and evaluated against IPCC-aligned methods (more about it in chapter "People & Planet). Beyond ecology, material reuse also carries an emotional significance: the site's history and VELUX's long-term commitment to building for life remains tangible, with the original wood and upcycled furniture forming integral parts of the atmosphere.

"We've reused everything we possibly could in this project—from wood and concrete to every other material available. And that in itself tells a beautiful story. When you sit on one of the benches, you're not just sitting, but also engaging with the history of the building. That connection between the materials, the house, and its past becomes something you can feel."

Mette Tony, PRAKSIS Arkitekter



Above: Siteplan showing the LKR Innovation House in the newly designed lanscape park and entrance square
Below: Section through the terrain along the north façade, showing the landscape, showing the small-scale structures around the bulding and in park

EMPLOYEE FOUNDATION

ONE WITH THE NATURE AT ALL SCALES

A simple truth, sometimes forgotten: human beings are meant to live in nature. Yet today, cities, homes, and workplaces do not always provide the exposure to nature needed for healthy living, industrial areas, built for efficiency, often lack vegetation.

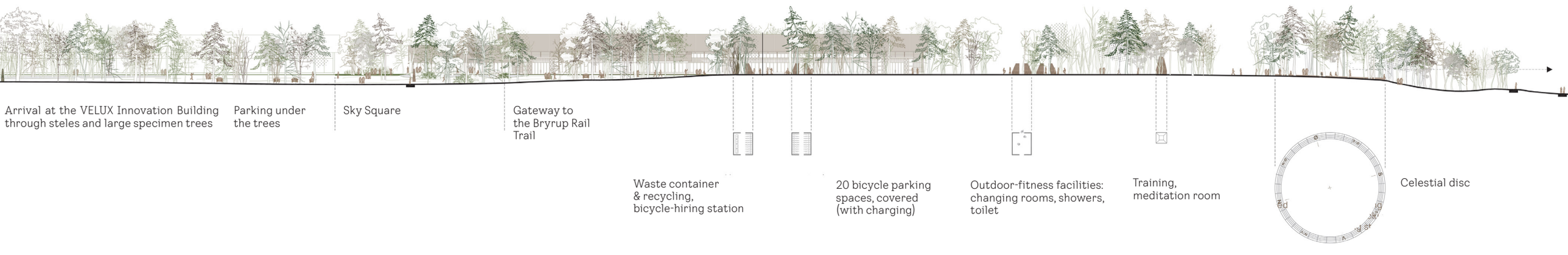
As the infrastructure and built environment expand, green areas tend to shrink. Every new construction also relies on materials whose production has off-site impacts on biodiversity. Each building should therefore be designed to compensate for these off-site losses.

The LKR Innovation House takes this challenge seriously, in both the design and the calculations, proving the results. The project features courtyards that provide high-quality outdoor spaces and promote biodiversity. Tall grasses and rocks create habitats for many non-human inhabitants, while trees inside the building bring the nature inside. The green areas within and around the building were designed by the landscape office DETBLÅ.

The wider site has also been upgraded: part of the asphalt forecourt was opened to introduce a pond and new planting. Along the northern façade, bike sheds and seating set within lush greenery create secondary spaces for employees.

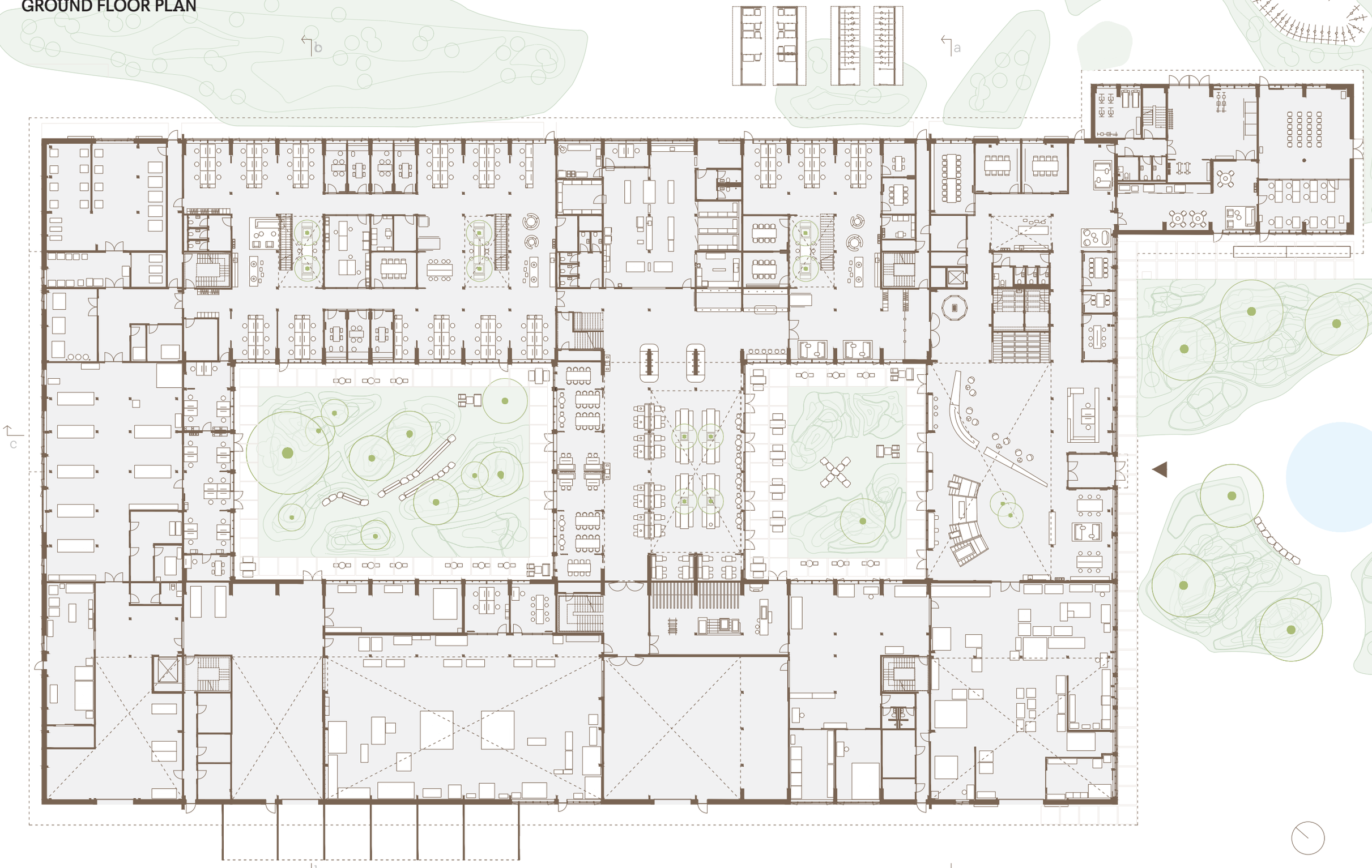
The area's most significant ecological improvement is Nature Østbirk, a 70,000 m² landscape park owned by VELUX. A 30-year-old forest has been enhanced to boost biodiversity and provide inspiring nature trails and rest areas. The park is open to all—a gift from VELUX and the VELUX Employee Foundation to the residents of Østbirk.

The park features pathways, bird and nature-watching towers, and picnic shelters made from local Douglas fir. Integrated into the local forest network, the new landscape improves wildlife movement. As part of the Bryrup Rail Trail project, it also creates a continuous green connection between the VELUX campus and the centre of Østbirk.

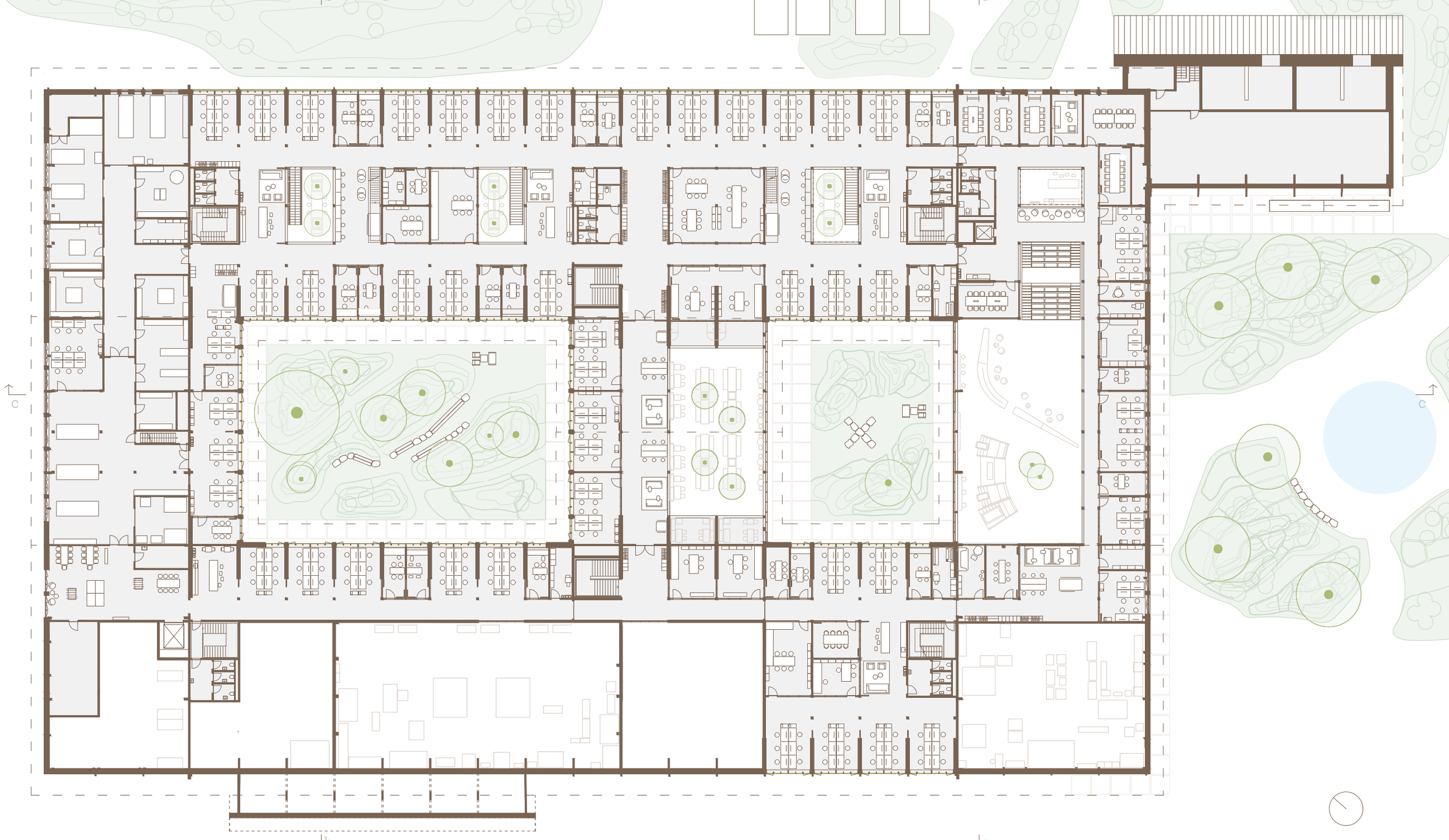


ARCHITECTURE

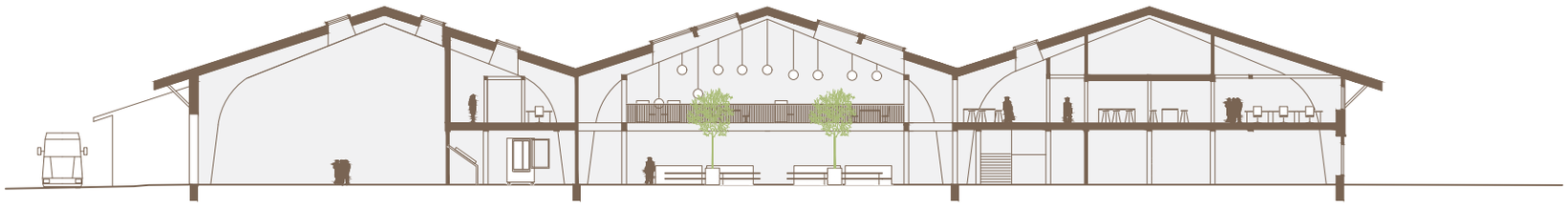
GROUND FLOOR PLAN



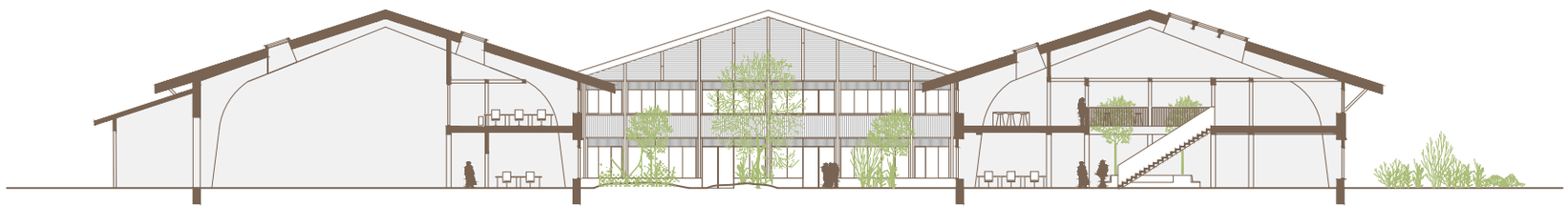
FIRST FLOOR PLAN



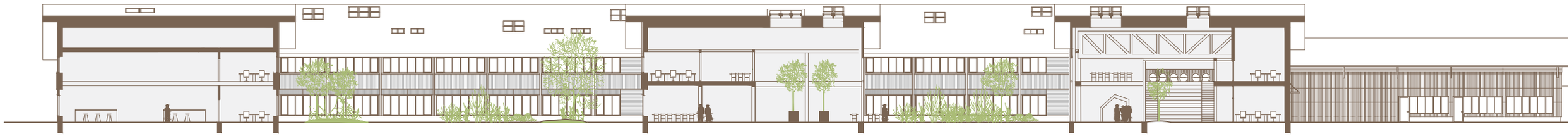
SECTION A-A



SECTION B-B



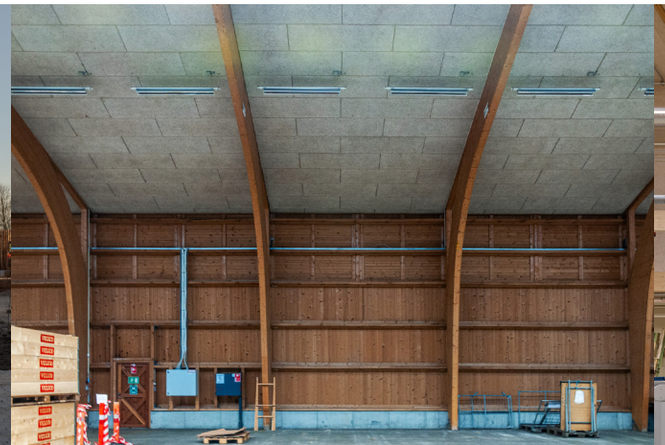
SECTION C-C



Rear façade, before and after refurbishment. The modular panels allow new elements to be inserted wherever required with ease. The first-floor windows are concealed behind timber slats.

The walls between the three halls have been partially opened to enable views across the building. These visual connections symbolise collaboration across departments and help users orientate themselves within the building.

Longitudal section through the courtyards.



There is a strong link between our products and the environment because we help people connect with the outside world. Through our products, you can see the sky, observe the trees, and open the windows to let in fresh air – we're making people feel much better indoors.

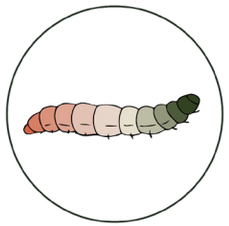
Tina Mayn, EVP Products & Innovation VELUX

PEOPLE & PLANET

FRAMEWORK FOR TRANSFORMATION

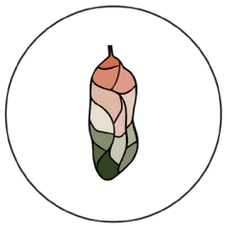
How can a 1995 timber warehouse evolve into a state-of-the-art Innovation House?

RE:Scope



Focuses on the origins of the existing 1995 warehouse — an early experiment in timber construction. The transformation builds on this foundation, extending the life of the structure through renewal rather than replacement.

RE:Think



Examines how onsite resources can be reused and reimagined through circular design principles. By prioritising reuse over demolition, the project retains materials, reduces waste, and preserves embodied carbon within the existing structure.

RE:Define

Explores how adaptive reuse can redefine architectural practice by regenerating existing buildings for contemporary needs. The project integrates new spatial, daylight, and indoor climate strategies while maintaining the architectural integrity of the original warehouse.

RE:Generate

Establishes the LKR Innovation House as a reference for regenerative transformation in architecture. The building demonstrates how industrial structures can be reimagined to support modern working environments and long-term sustainability ambitions.

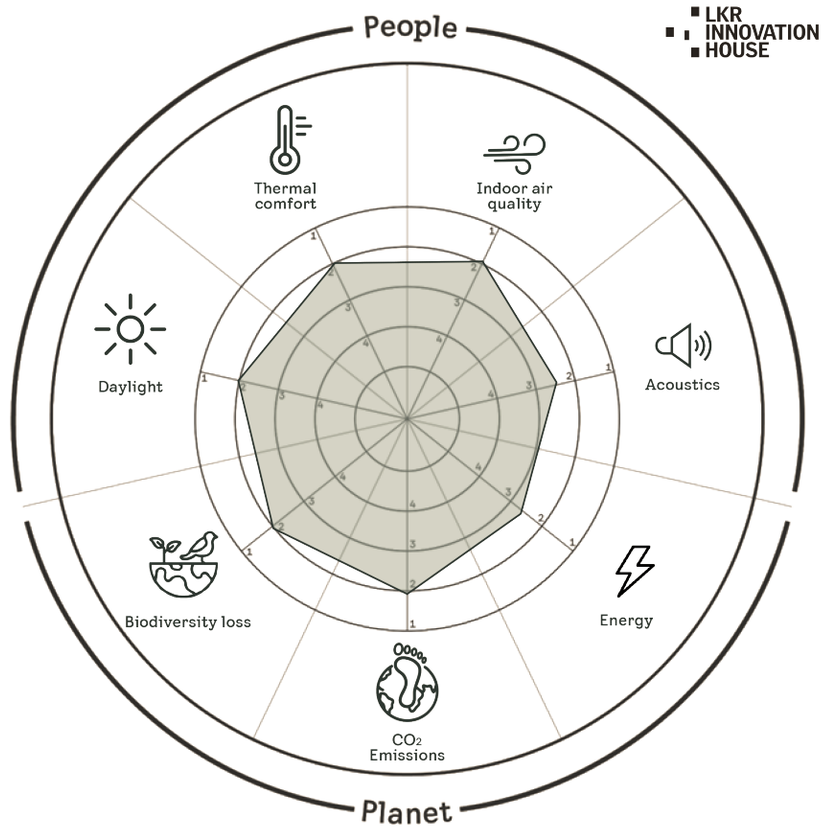
PEOPLE AND PLANET MODEL

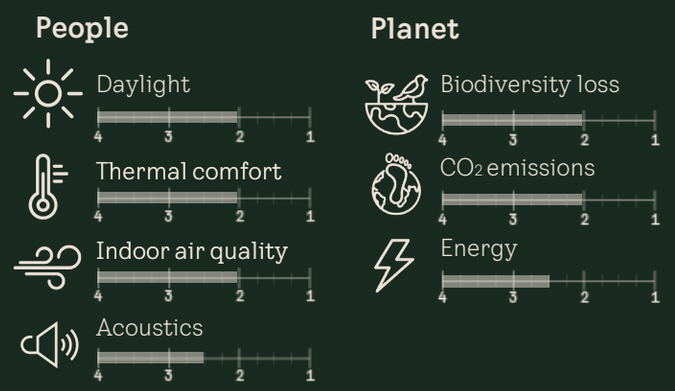
Every building project involves choices; better choices come from weighing human wellbeing alongside environmental impact. To steer the industry towards a truly holistic approach, VELUX developed the People & Planet model, which unites the limits that keep the planet stable with the defining conditions people need to thrive indoors.

Building on this foundation, the People & Planet model adapts the Active House Radar to assess performance across three key pillars: Comfort (for People), Energy, and Environment (for the Planet).

It builds on the Active House principles and expands them by integrating biodiversity and CO_2 metrics grounded in climate science. Applied in both design—through simulations and calculations—and in operation—through monitoring—it provides each project with a clear radar profile showing how well it serves both people and the planet.

By highlighting the interdependence of comfort, energy and environmental performance, the method helps to prioritise and make informed decisions to reach the optimal result for both people and the planet.

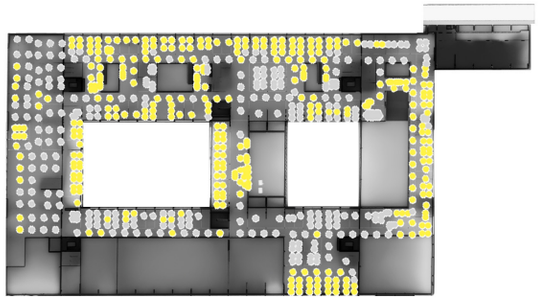




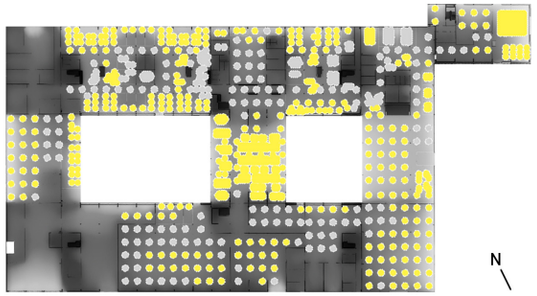
DAYLIGHT

Daylight at LKR Innovation House was assessed by Oculight Dynamics using one of the most advanced methodologies available. Beyond a grid-based assessment of mandatory illuminance (lux) levels, the study examined how daylight affects human vitality, comfort and emotion across the changing conditions of every day of the year. The analysis took a human-centred approach, focusing on health, comfort, and well-being, while ensuring ample access to daylight, in complete alignment with EN 17037: Daylight in Buildings. To explore the impact on occupants, the key themes of comfort, emotion and vitality were used.

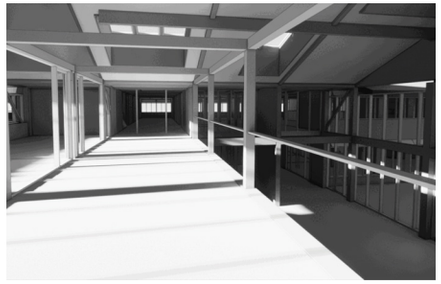
In particular, the design of the 'fifth façade'—a patchwork of VELUX roof windows—provides a rich variety of daylight. Side façades are protected from glare by deep roof eaves, originally intended to shield the timber. Thanks to abundant light brought deep into the plan through the roof windows, offices enjoy optimal daylight conditions and glare-free views of the surrounding forest. The courtyard elevations feature generous glazing that blurs the boundary between the inside and the outside.



First floor: sDA(300lx/50%)=54,78%



Ground floor: sDA(300lx/50%)=72,76%



Daylight studies for the ground and first floors showing the share of floor area that reaches ≥300 lux for at least 50% of annual daylight hours, expressed as sDA 300 lx/50%. the day and across seasons, using the Oculight Dynamics method.

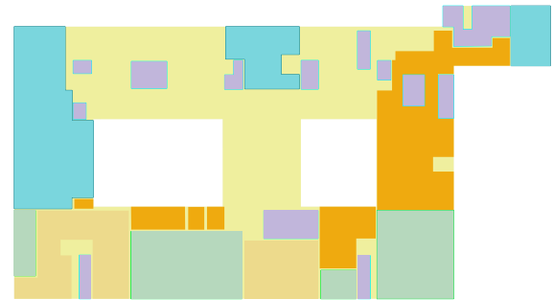
INDOOR AIR QUALITY

In Denmark's temperate, breezy climate, well-designed natural ventilation can keep offices comfortable for much of the year by flushing out excess heat and CO_2 while using a fraction of the energy compared to air conditioning.

LKR Innovation House demonstrates how daylight, cross-ventilation, and automated openings can provide a first-class indoor climate without relying on active cooling.

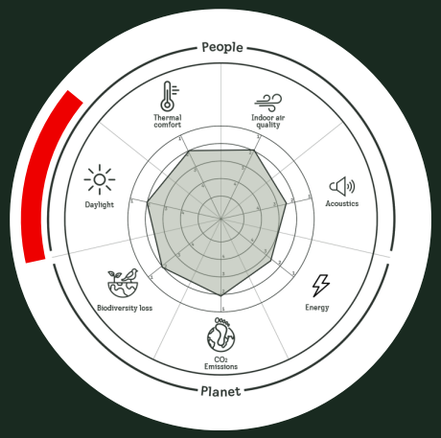
Operable roof windows and atria enable buoyancy and wind-driven airflow, along with night-purge cooling, which dissipates accumulated heat after working hours to reduce next-day overheating. Visibly mounted ventilators, placed alongside other services, enhance this effect and become a deliberate interior feature.

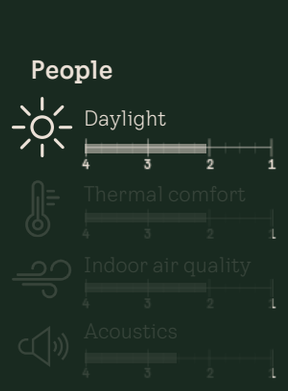
Central to the concept are 415 VELUX roof windows equipped with CO_2 and rain sensors, complemented by the generous volume of the original warehouse. Façade windows are situated beneath deep roof eaves to minimise solar gains and glare.



Ventilation scheme of the building

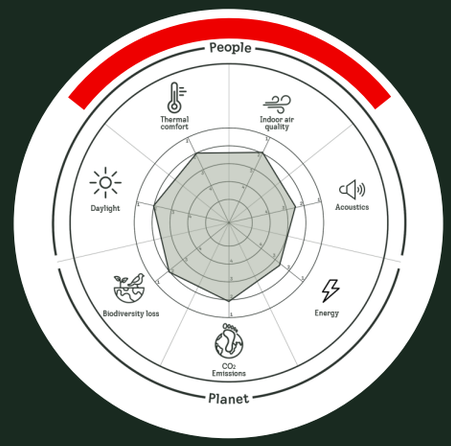
- Natural ventilation accelerated by ventilators on the 1st floor and VELUX automated CO_2 sensors
- Natural ventilation via openings in the façade and roof windows
- Natural ventilation via openings in the façade and roof windows (workshop)
- Mechanical ventilation without cooling
- Mechanical ventilation with cooling (industrial kitchen, southwards facing offices, auditorium)

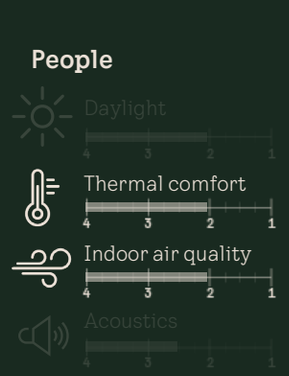




Score 2 on Daylight and Views, based on the Daylight provision (EN 17037)

Daylight reaching 300lx (minimum, DK Building Legislation) or higher as a percentage of the space for least half of the daylight hours during the year..

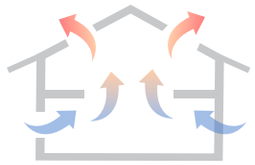




Score 2 for Indoor Air Quality and Thermal comfort based on EN 16798

Design for Natural Ventilation
Geometry and openings

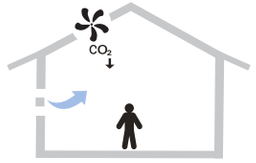
Open Space



- Buoyancy-inducing room geometry
- External shading on roof windows
- Deep roof eaves
- Smart ventilation & shading control
- Supplement exhaust fans

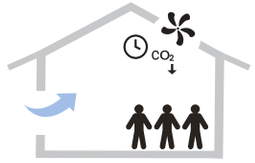
Smart Control of Natural/Hybrid Ventilation
Sensor and schedule-based control of indoor comfort

Open office area



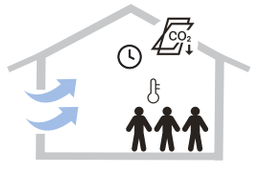
Background ventilation via highly-placed façade flaps assisted with exhaust fans – driven by CO_2 levels

Canteen



Background ventilation assisted with exhaust fans driven by CO_2 levels + scheduled airing

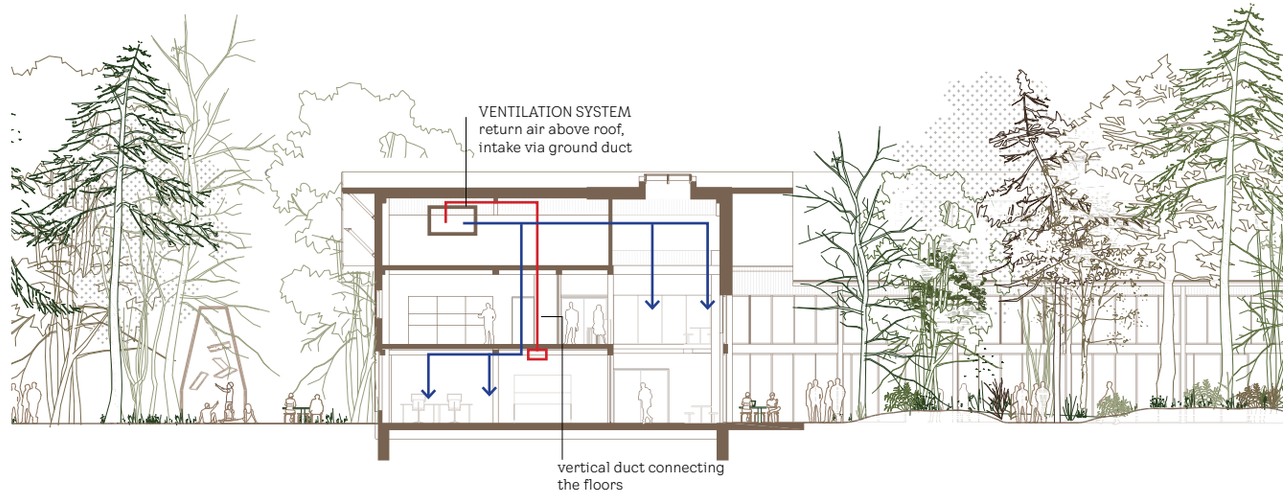
Natural ventilation driven by room temperature and CO_2 levels + night ventilation

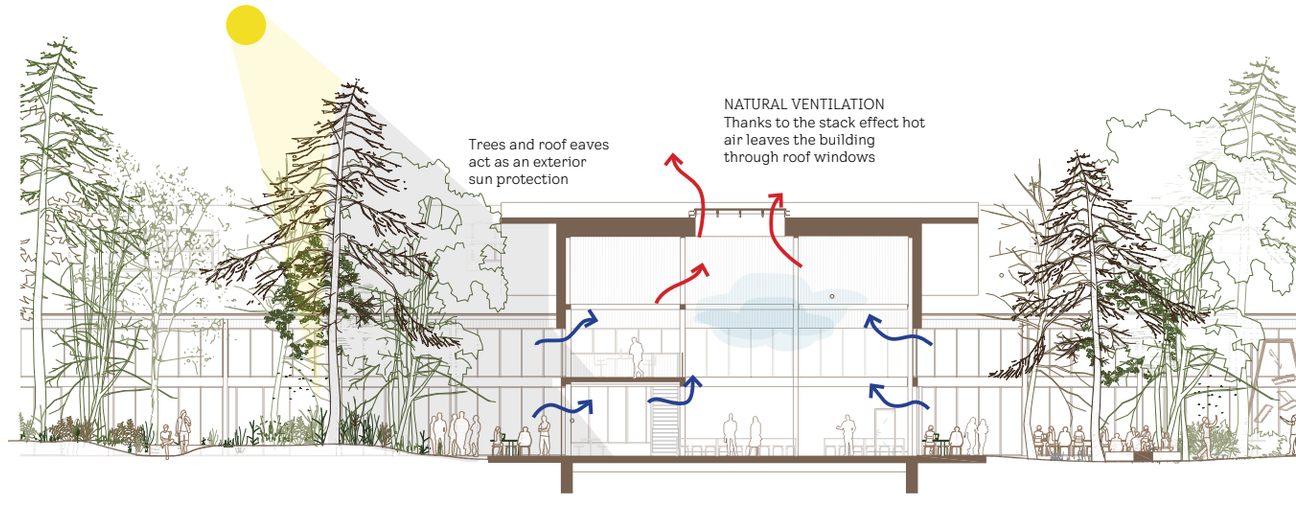


Natural ventilation driven by room temperature and CO_2 levels + scheduled airing

"The LKR Innovation House features a surprising variety of spaces. What's remarkable is that, within this old warehouse, you can always find a spot with the type and amount of light, acoustics, and temperature that suits your personal preferences."

Mette Tony, PRAKSIS Arkitekter





THERMAL COMFORT

Thermal comfort describes how the human body perceives temperature in relation to its thermal balance. In buildings, it involves reducing overheating in summer and maintaining comfortable indoor conditions in winter with minimal energy use. Naturally ventilated or occupant-controlled spaces allow broader comfort ranges, as people adapt to varying thermal conditions.

The model links indoor comfort to outdoor temperature rather than fixed standards, assuming occupants use windows or clothing adjustments to regulate comfort. This supports flexible, low-energy design strategies.

The People & Planet model applies the Active House rating system, defining four comfort levels for buildings without mechanical cooling and with effective natural ventilation. The upper temperature limit applies when outdoor conditions exceed 12 °C. LKR Innovation House achieved score 2.

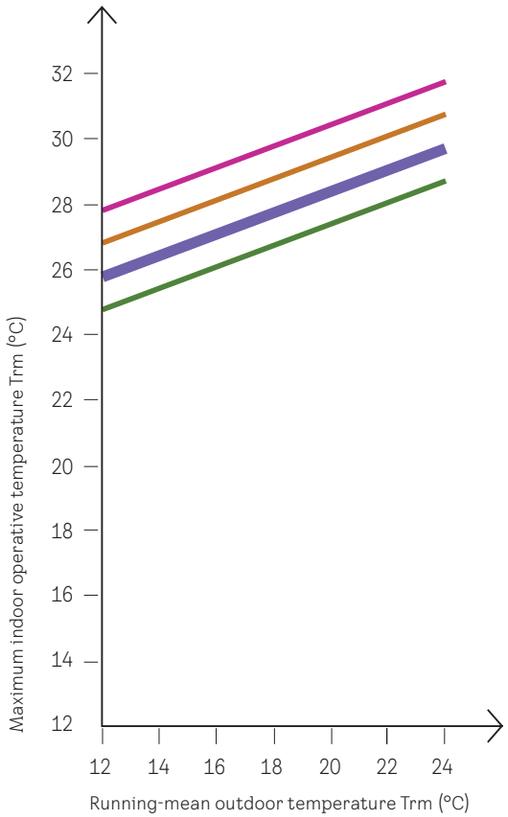


Diagram illustrating the maximum indoor temperature in relation to the running-mean outdoor temperature, based on the Active House rating system adopted in the People & Planet model for thermal comfort. The LKR Innovation House achieved score 2.

ACOUSTICS

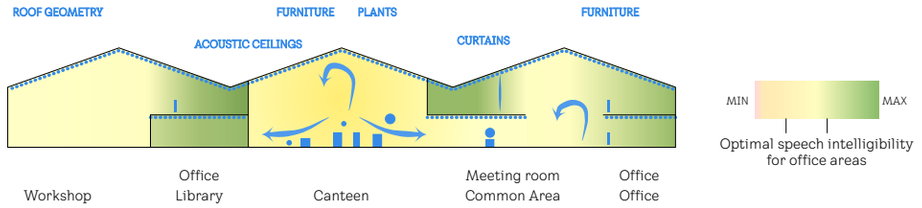
The acoustic environment must actively support the work climate. In open areas, the goal is to strike a balance between speech clarity and overall background sound, allowing knowledge sharing and ideation to occur without distraction.

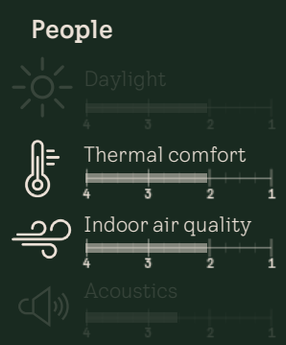
Comfortable room acoustics are achieved through a mix of sound-absorbing ceilings, wall panels and curtains used throughout. Furniture groupings and clear zoning limit the distance sound travels, while noisier functions are placed in enclosed rooms or niches with additional absorption or solid partitions.

In office zones, an open plan can be either too loud or too silent—both reduce productivity. Effective collaboration requires clear speech at close range and low intelligibility at a distance.

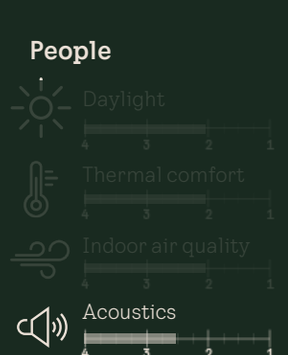
By managing reverberation and combining absorption with diffusion, conversations stay understandable for those nearby while blending into unobtrusive “background” noise for others, helping to maintain focus.

The canteen naturally produces more noise around lunchtime. To stop it from spilling over into the first-floor work areas, sliding doors or lobby buffers are combined with high-performance absorbers and optimised ceiling and wall treatments. Soft finishes and a carefully planned layout further cut down unwanted noise in neighbouring spaces. Meeting areas near the open stairs use furniture and planting to absorb and scatter excess sound, maintaining a pleasant ambient buzz that enhances the sense of community.





Score 2 for Indoor Air Quality and Thermal comfort based on EN 16798



Score 2,5 for acoustic quality based on ISO 140-4.

CO_2 EMISSIONS

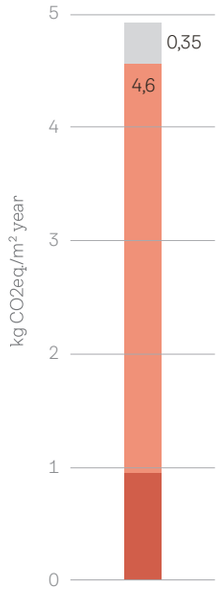
A strong focus on reuse and recycling adds complexity to the building process, and today's norms—including financial planning—rarely account for this ecological necessity.

The LKR Innovation House construction site shows that a near-zero-waste approach is achievable in both budget and logistics.

During the selective disassembly of the 1995 warehouse, all removed materials were sorted on site. What could not be reincorporated into the project was sent to a recycling centre.

The potential for significant material savings when adapting an existing building is clear. More than that, reusing structures for a new programme opens possibilities for novel spatial typologies that a ground-up build might never allow.

CO_2 emissions:
4,6 kg CO2eq./m²/year



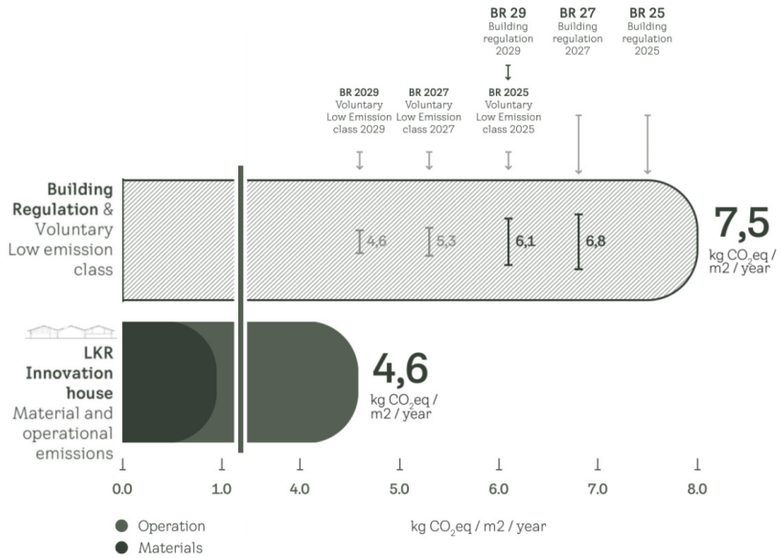
Demolition has an additional climate impact of **0,35 kg CO2eq./m² yr.**

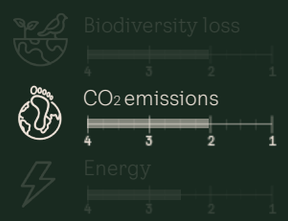
79% from materials

21% from operational energy

Climate Impact

- Materials
- Operational energy
- Demolition





BIODIVERSITY LOSS

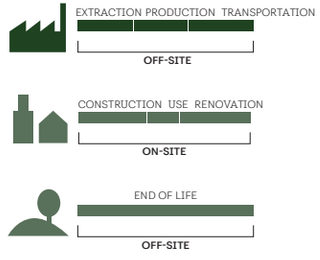
Most biodiversity harm linked to buildings occurs off-site, in the supply chains that extract and process materials; globally, these activities drive about majority of biodiversity loss, so what we specify in a building's bill of materials really matters. Land-use change for raw materials is the single biggest direct driver of nature's decline, which is why a building's "biodiversity footprint" must look beyond the plot boundary.

The biodiversity impact calculation for LKR Innovation House considers only the off-site impacts of materials in the production phase (extraction, production, transportation), which is by far the most significant contributor to biodiversity impact.

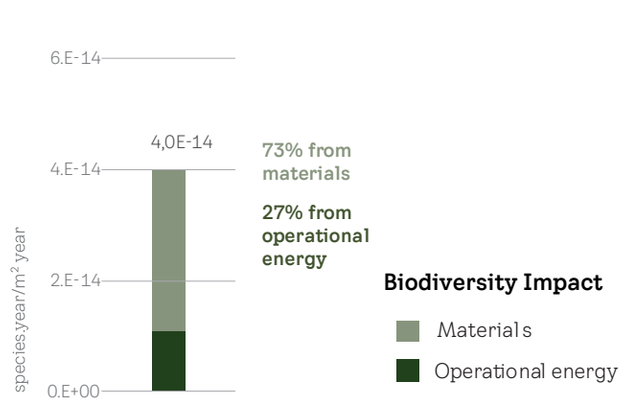
In construction, biodiversity loss is not measured directly but estimated using models such as Impact World+. These translate pressures like land use, material extraction, and pollution into effects on ecosystems, expressed as the fraction of species potentially affected over a given area and time.

The results can be made tangible by comparing the calculated impact to the effect of converting a piece of Danish natural land into urban area.

Such local impacts accumulate globally and relate to the planetary boundary for biodiversity, which has already been crossed—calling for both impact reduction and active restoration of nature.



Biodiversity Loss Off-Site
4,0E- 14 species.year/m² year



ENERGY

ELECTRICITY

38.6 kWh/m2 year according to the energy frame calculation (Danish standard)

560 m2 of solar panels (monocrystalline PV), installed on an adjacent building. Estimated annual production: 8.6 kWh/m²/year, totaling approximately 120.7 MWh/year

Electricity in the building is supplied via the **public power grid**

The remaining renewable power needs of LKR Innovation House are covered by a dedicated solar park in Spain, just like VELUX production sites in Østbirk and across Europe.

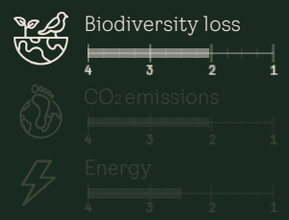
ELECTRICITY

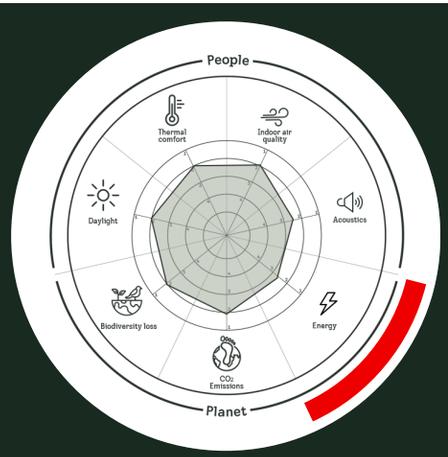
Heated and cooled through a **central heat pump** (heating performance 865 kW, cooling performance 447 kW), connected to the local power grid.

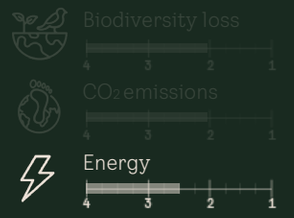
The majority of the building is **naturally ventilated** and heated using radiators connected to the same heat pump.

High-load zones—such as laboratories, meeting rooms, and office spaces with limited solar shading—are served by **mechanical ventilation** with variable air volume (VAV) systems, which adjust the airflow based on the specific cooling or ventilation needs of each space and also supply cooled air via the heat pump.

Active cooling is provided to approximately 21% of the total floor area, specifically in spaces with elevated thermal loads or solar exposure.and across Europe.







In May 1995, Lars Kann-Rasmussen planted the first tree beside his newly completed timber warehouse in Østbirk — a gesture that ushered in a new era of building sustainably at VELUX. The warehouse represented an experimental approach to building with natural materials and daylight, long before sustainability became a mainstream architectural concern. This moment captured the company's early ambition to unite design innovation with environmental responsibility.

Thirty years later, during the grand opening of the LKR Innovation House, Lars Kann-Rasmussen planted a new tree on the same ground. The act symbolised both continuity and renewal — linking the pioneering spirit of 1995 with a new generation of sustainable and regenerative design. The transformed building continues this legacy, demonstrating how thoughtful innovation can evolve while staying rooted in the same guiding values of care for people and planet.