



LKR INNOVATION HOUSE

History | Transformation | Architecture | People & Planet



HISTORY

1941

Engineer Villum Kann Rasmussen founded a company dedicated to improving daylight and ventilation in buildings, specializing in glass roofing.

1945

Villum patented the first roof window bringing fresh air and natural light (VE for ventilation, LUX for light).

1946

The first VELUX workshop opened in Østbirk, Denmark, later growing into a full-scale production. The site was chosen for its railway access and efficient transport.

1950

A small craft workshop in Østbirk transitioned into an industrial production site, marking a decisive shift from handcrafted window making to scalable, modern manufacturing.

1992

Østbirk expanded its testing capabilities with northern Europe's largest wind tunnel, enabling precise, repeatable performance tests under controlled wind and rain.

1995

The 9,500 m² Østbirk warehouse was completed as a full-scale experiment in untreated wood, based on Lars Kann Rasmussen's idea to use timber as the main material.

2025

LKR Innovation House opens as a 14,000 m² timber-based workspace, transforming the original warehouse into a low-carbon workplace.

Workshop

Warehouse

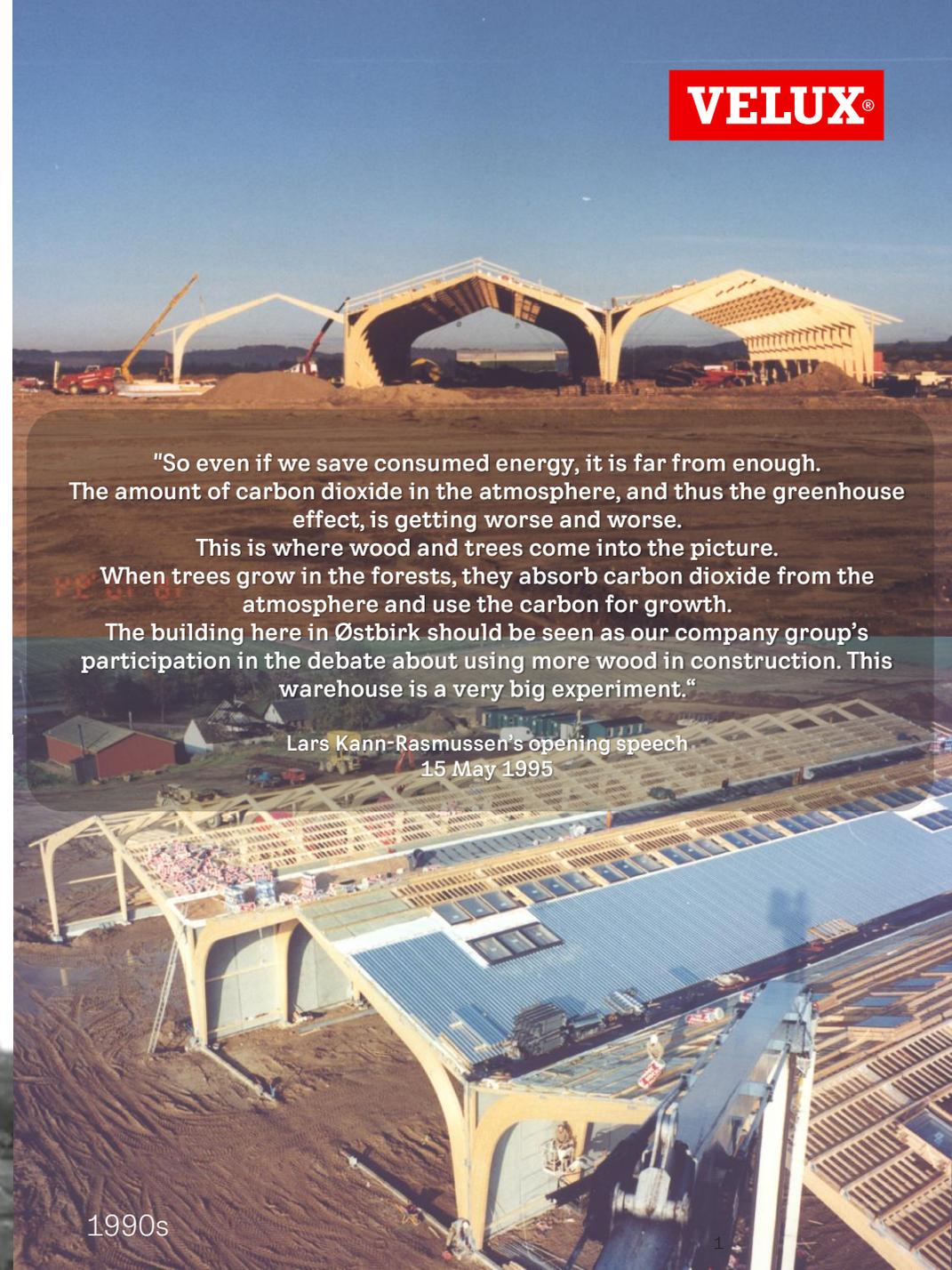
LKR Innovation House

AN EXPERIMENT WORTH MORE THAN 1000 EXPERT VIEWS

- In 1994, under the direction of Lars Kann-Rasmussen, the focus moved toward greater experimentation and innovation
- This led in 1995 to the decision to build a full-scale warehouse in untreated wood to explore new possibilities in sustainable, large-span timber construction
- Environmental concerns highlighted in Lars Kann-Rasmussen's opening speech, addressed rising CO₂ levels and positioning the warehouse as a major test of wood's potential in low-carbon construction



1950s



"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

1990s

STRATEGIC UNTREATED TIMBER DETAILS

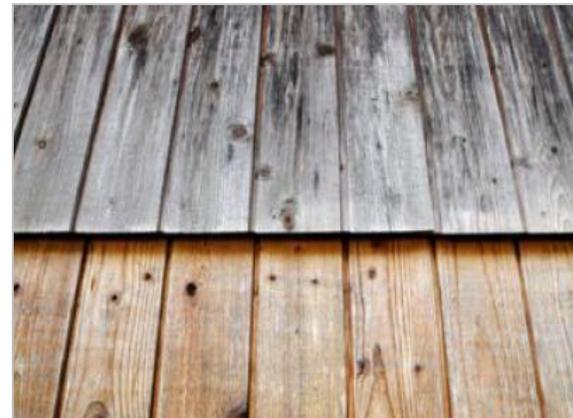
- The new building, completed in 1995, tested untreated Swedish and Danish spruce as an exterior façade material
- No visible difference was observed between Danish and Swedish spruce after long-term weathering
- The timber cladding showed no structural damage after 25 years of exposure



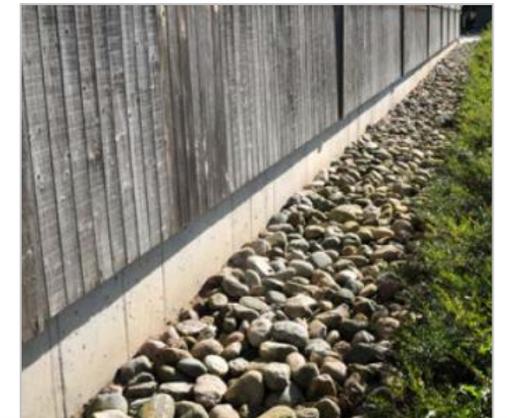
A large roof overhang contributed significantly to protecting the façade from rain



A modular façade system used both vertical and horizontal board orientations



Surface greying occurred naturally; cleaning tests on the north façade showed the wood darkened again over time



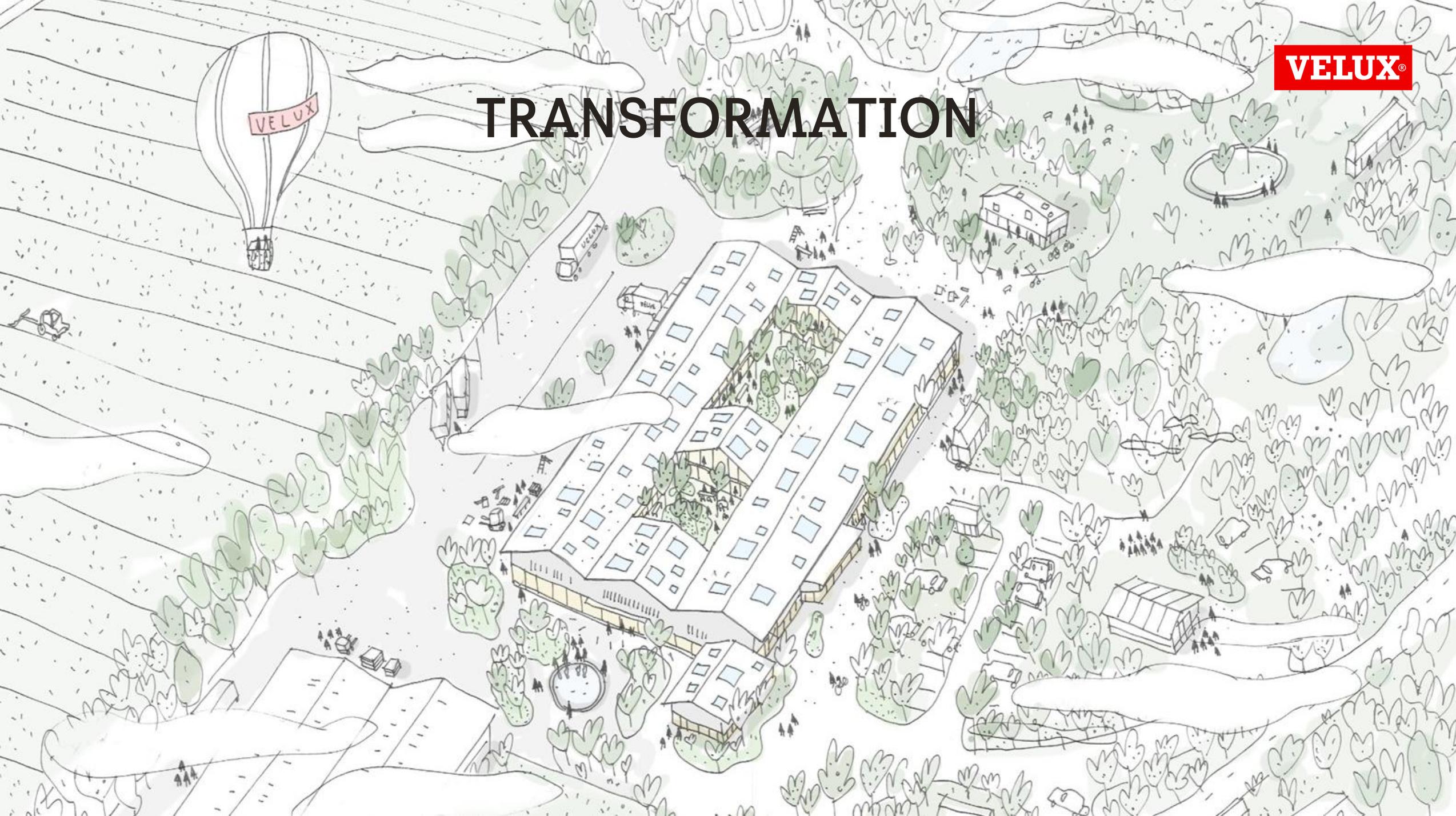
A high concrete plinth and a layer of stones along the base prevented rainwater splash back

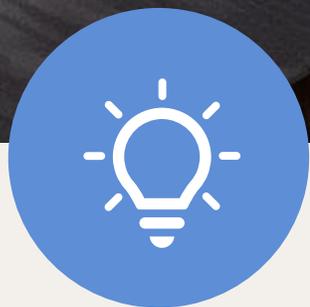
VELUX®





TRANSFORMATION





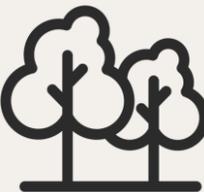
The vision

To further lift our ability to innovate and build capabilities in product innovation within daylight and fresh air, we will create a new innovation center located in Østbirk.

LKR Innovation House will be the future center for all main R&D activities in VELUX.

What we aim to achieve with LKR Innovation House

Sustainability



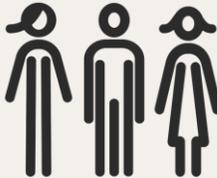
The building is a role model for sustainability in all physical aspects.
A building that is good for people and the planet, providing users with an exceptional indoor climate and access to daylight and fresh air.

Landmark



The building acts as a landmark for innovation.
Visual and functional it is attractive for existing and coming employees as well as the suppliers, collaborators, visitors and the peers.

Diversity, Equity & Inclusion



The building supports diversity in the workplace.
By having a multicultural community, including start-ups and students, the workplace gather a diverse group of people with different competencies.

Ways of working



The building acts as a lighthouse for an inspiring and collaborative innovation community.
The house motivates to practice practical, integrative and experimental product development. Transparent and flexible workplaces help optimizing the employees' workflow, support daily knowledge-sharing and efficient use of qualifications.

Collaborative Innovation Community

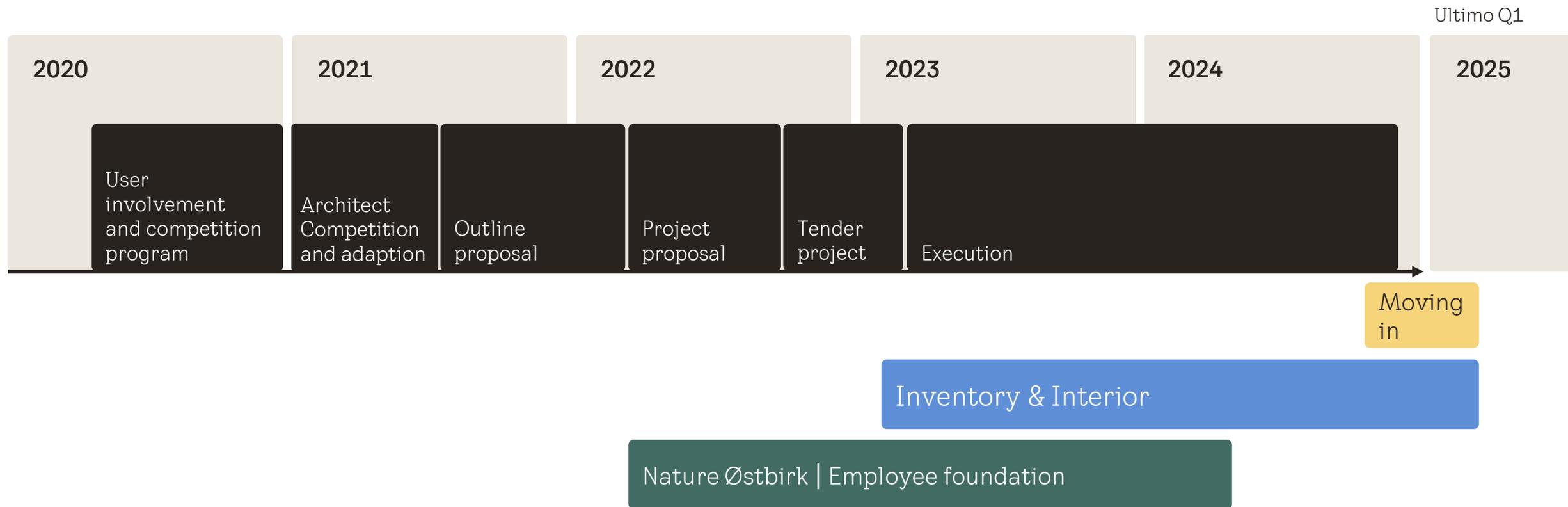
- Moving 500+ employees under one roof
- From fragmented locations into one main collaborative innovation hub
- The house motivates to practice practical, integrative and experimental product development.



Skjern, Brædstrup,
Kolding, and Hørsholm



Key activities



User involvement & competition program



Competition program, February 2021



Interviews

Interviews and close dialogue with a wide range of managers and employees in VELUX in order to identify expectations and requirements

Focus group interviews

Interviews with small start-ups and students



Workshops with VIP ambassadors

Involving VELUX employees in order to understand and identify the requirements and wishes for LKR Innovation House



Workshops with internal competencies

Involving VELUX internal competencies in order to identify key sustainability parameters

User stories as foundation for our final design

“Vi har brug for at se et fysisk vindue, så vi går ned i vores **bibliotek hvor alle vores produkter er opmaganiseret i et reolsystem** der kan tækkes ud.”

“Vores **borde er placeret således at der er fri ryg**, dvs. vi bliver ikke forstyrret af kollegaer der går bag vores borde. **Fra mit bord har jeg mulighed for at se ud på de grønne områder** der er omkring vores Bygning.”

”... der er lagt så meget vægt på **luftkvalitet og temperatur regulering**, det giver en meget bedre arbejdsdag end i de gamle kontorer.”



Architect competition



October 2020

Competition Program: describes the vision and physical requirements for the innovation building, used as the basis for the architect competition



December 2020

Pre-qualification: out of 10 architect firms in a prequalification, 4 teams were selected for the architect competition



April 2021

Architect proposals: four architect proposals were presented to VELUX management the 21st of April





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

REUSE OVER DEMOLISH

- The original roof structure was retained and upgraded with new roofing felt, improved insulation, and new skylights
- Existing structures preserved; glulam frames removed for courtyards are reused and upcycled
- Existing façade reused; wooden modules demounted, insulated, and remounted; modules reused for new courtyard façades or replaced where necessary
- Internal concrete walls reused for paving and outdoor furniture
- Lightweight plasterboard and mineral wool recycled from interior walls
- Canopies reused elsewhere in the construction
- Existing concrete floor retained, except in courtyards where it is cut into tiles and reused as outdoor paving and furniture
- SF stones removed and reused elsewhere for pavements, carpark infill, and landscape paths

Keeping existing concrete floor



Preserving the facade



“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.”

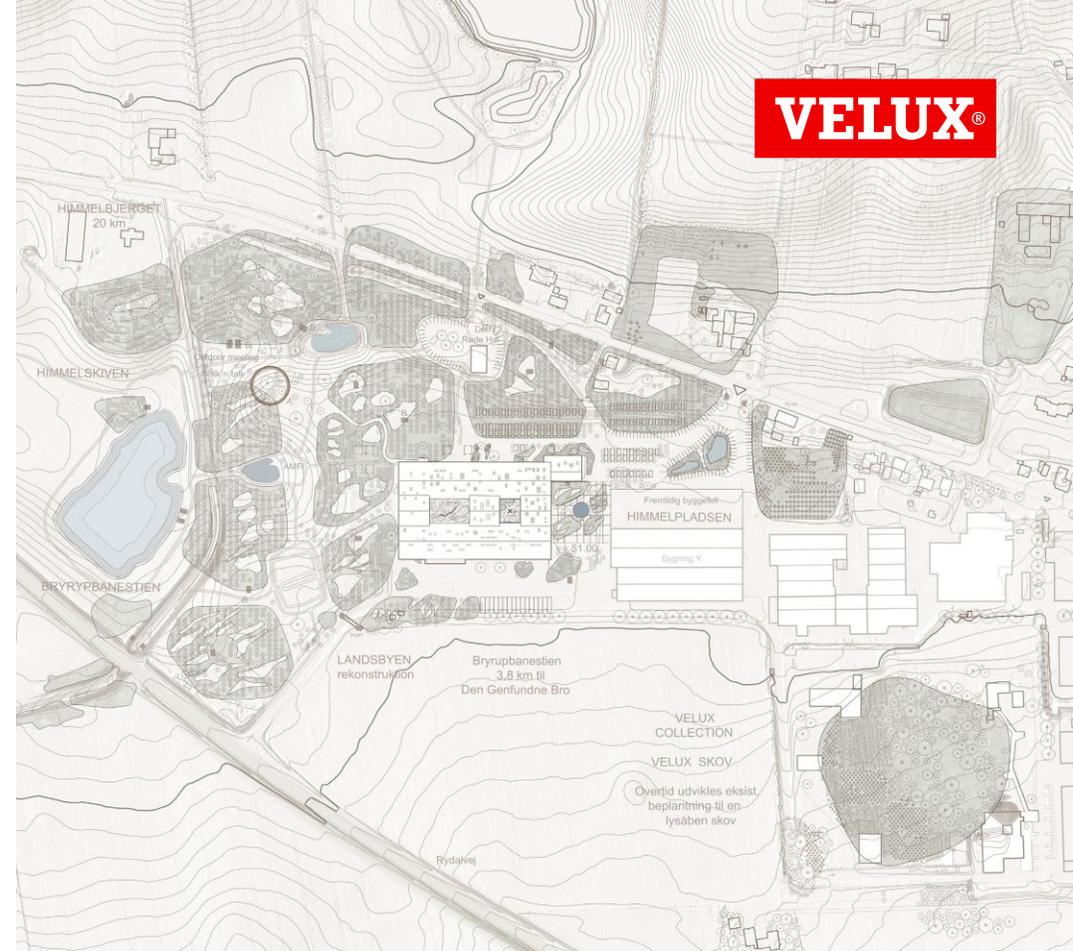
Mette Tony, PRAKSIS Arkitekter

Material selection

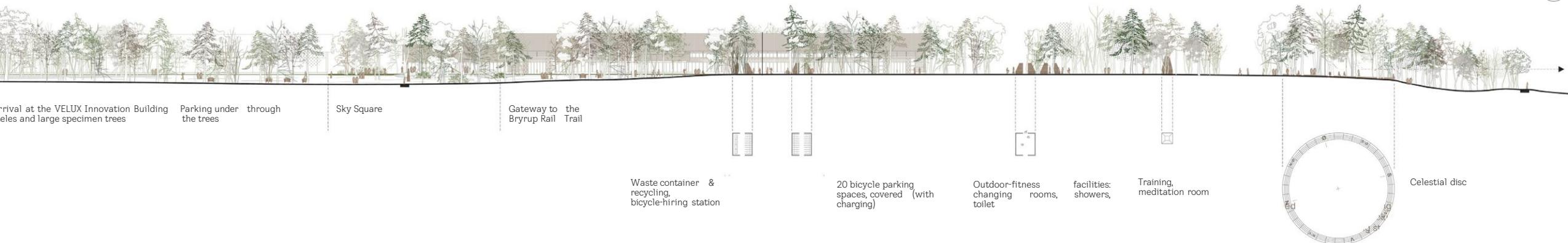


ONE WITH THE NATURE AT ALL SCALES

- Nature Østbirk, a 70,000 m² landscape park surrounding the LKR Innovation House, forms the natural setting for the new VELUX innovation headquarters and extends its green, low-impact design strategy into the wider forest landscape
- Designed by DETBLÅ, the landscape brings nature right up to and inside the building through tall grasses, rock creeks, and interior trees that soften the former industrial site
- The former asphalt forecourt has been reworked into a pond, new planting areas, bike facilities, and informal outdoor seating directly connected to the building's north façade
- The surrounding park includes pathways, bird-watching towers, and Douglas-fir picnic shelters that enhance biodiversity and support local wildlife
- Linked to the regional forest system and the Bryrup Rail Trail, the park creates a continuous green corridor connecting the LKR Innovation House with the VELUX campus and Østbirk's town center



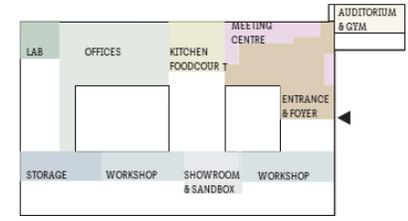
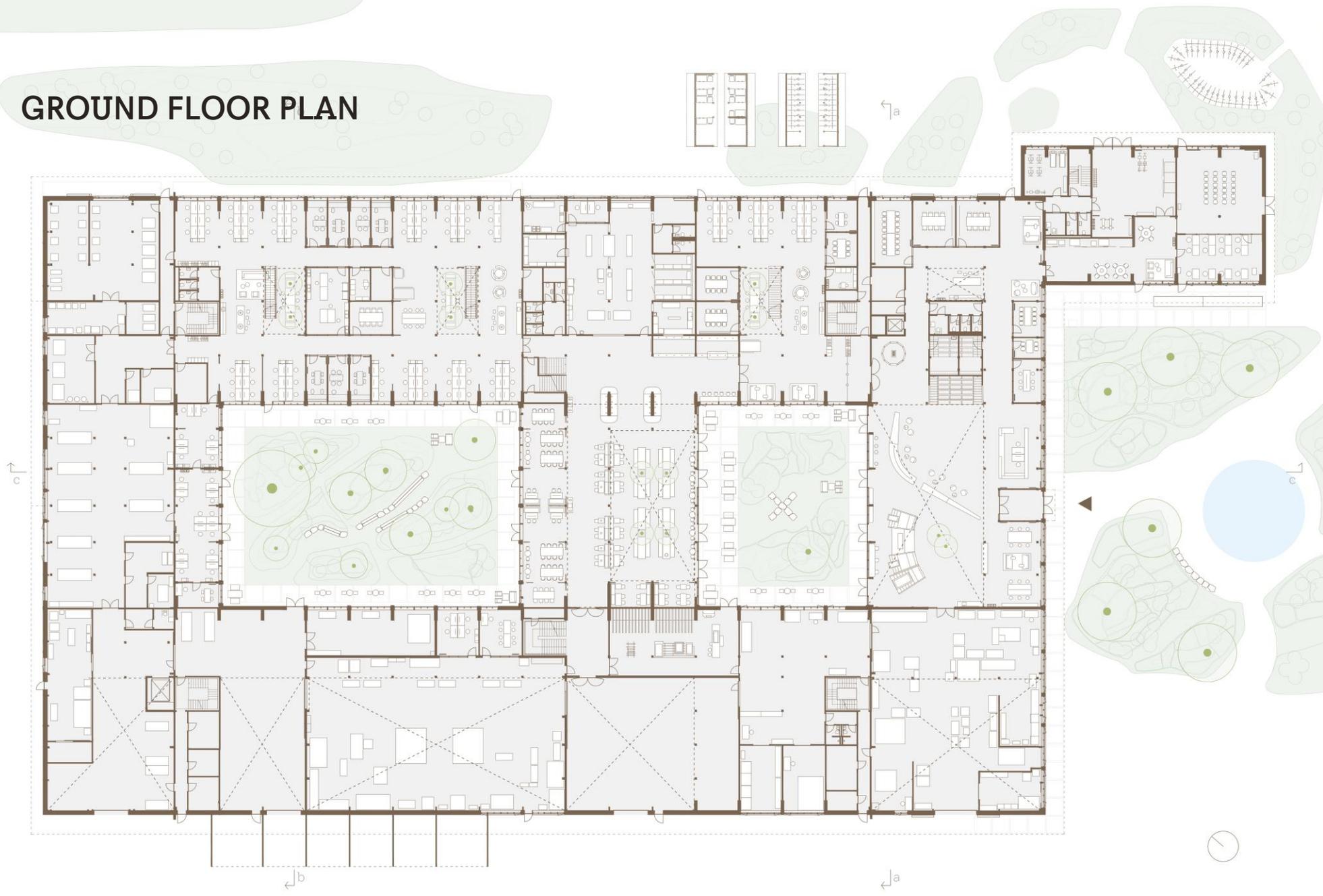
Above: Siteplan showing the LKR Innovation House in the newly designed landscape park and entrance square
Below: Section through the terrain along the north façade, showing the landscape, showing the small-scale structures around the building and in park



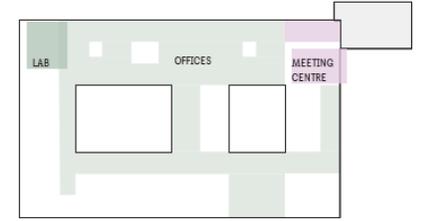
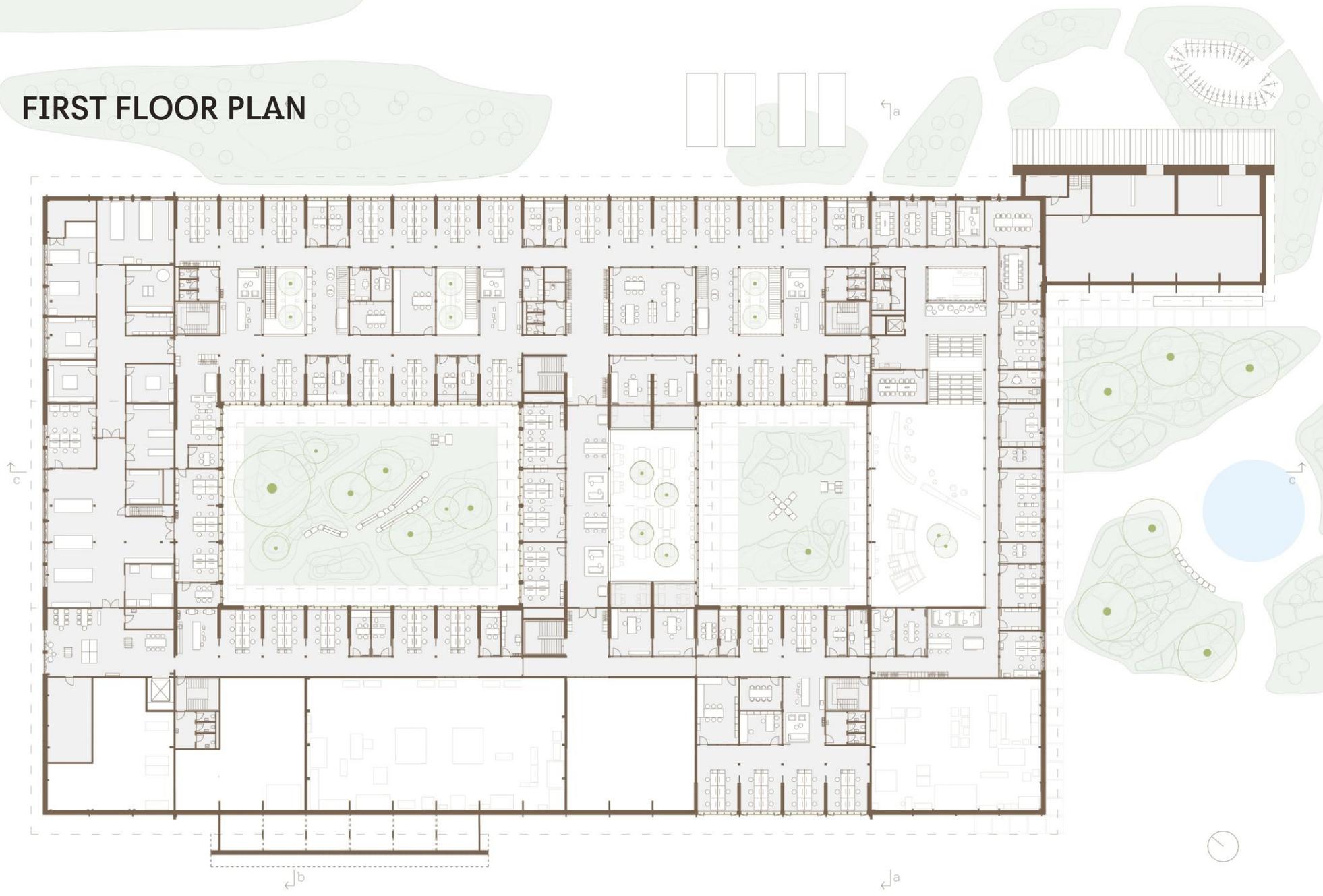
ARCHITECTURE



GROUND FLOOR PLAN



FIRST FLOOR PLAN



SECTION A-A



SECTION B-B



SECTION C-C

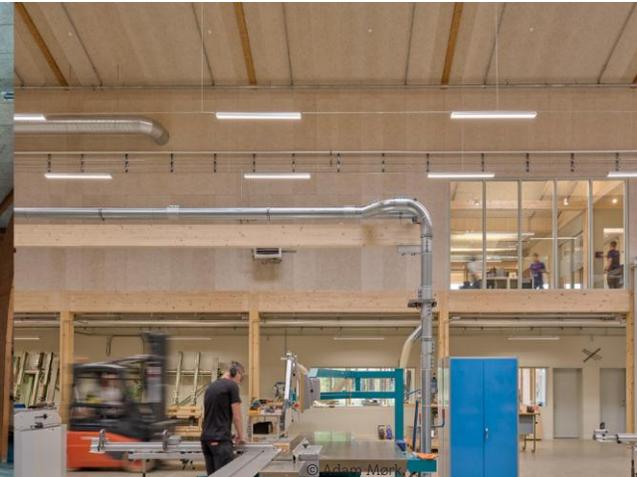
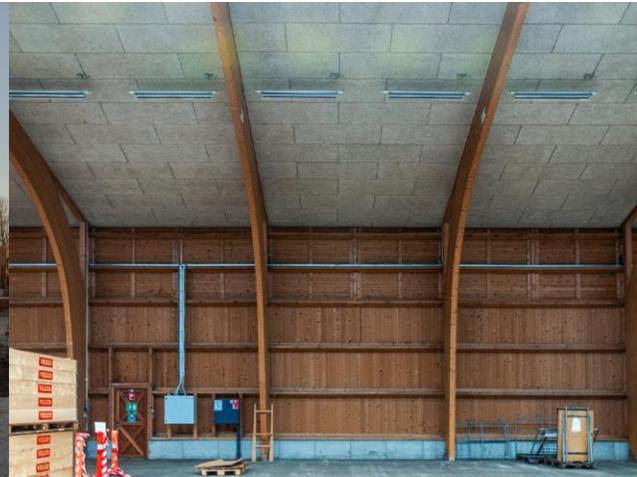


Rear façade, before and after refurbishment. The modular panels allow new elements to be inserted wherever required with ease. The first-floor windows are concealed behind timber slats.

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



Longitudinal 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



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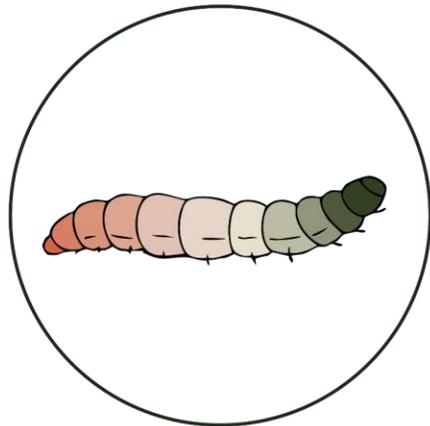
PEOPLE & PLANET



FRAMEWORK FOR TRANSFORMATION

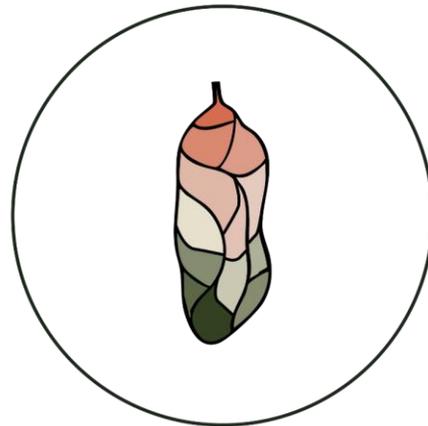
How can a 1995 timber warehouse evolve into a state-of-the-art Innovation House?

RE:Scope



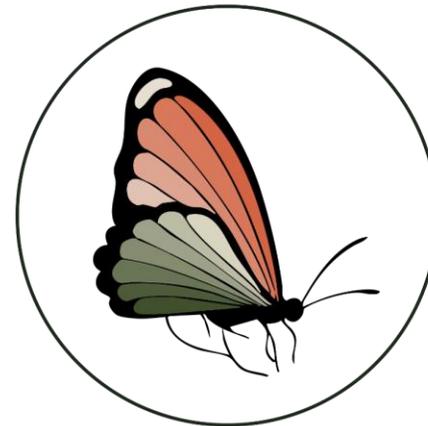
Focuses on the origins of the existing 1995 warehouse, an early experiment in timber construction. The transformation builds on this foundation, extending the life of the structure through renewal rather than replacement.

RE:Think



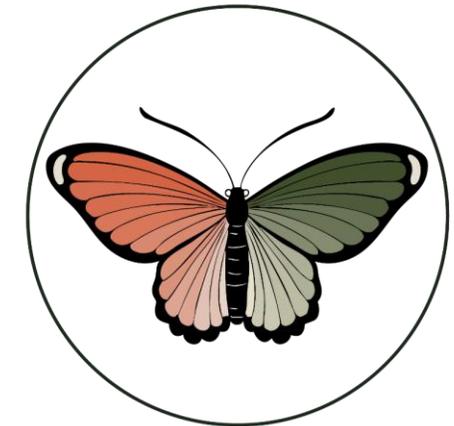
Examines how onsite resources can be reused and reimagined through circular design principles. By prioritizing reuse over demolition, the project retains materials, reduces waste, and preserves embodied carbon within the existing structure.

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.

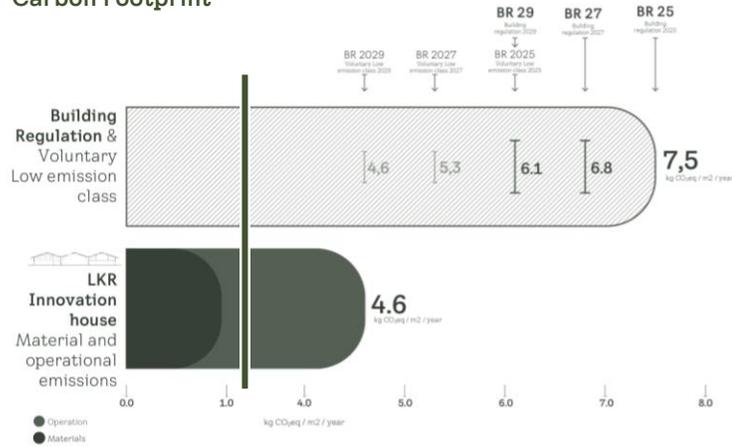
RE:Generate



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.

FUTUREPROOF PERFORMANCE FOR PEOPLE AND PLANET

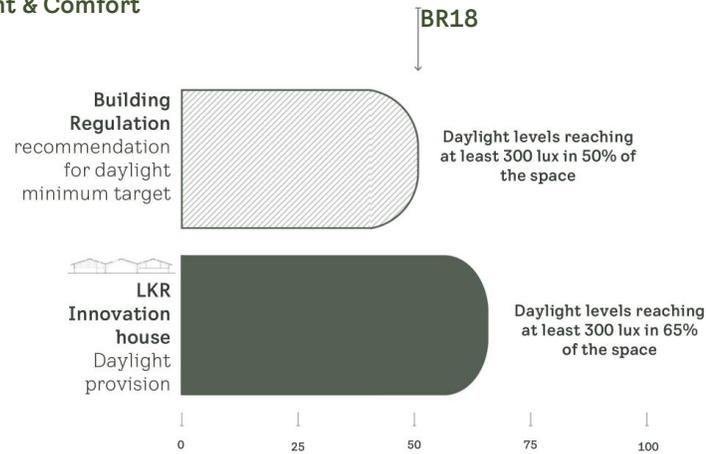
Carbon Footprint



The building footprint is future proof: 4.6 kg CO₂ eq/m²/y

- Danish building regulations for offices
 - 2025: 7.5 kg CO₂ eq/m²/y.
 - 2027: 6.8 kg CO₂ eq/m²/y.
 - 2029: 6.1 kg CO₂ eq/m²/y.
- LKR-IH is **4.6 kg CO₂ eq/m²/y**
 → LKR IH is **future proof** on CO₂ footprint.
- The calculation is done by SJ engineers and validated by Artelia as **third-party verifier**.
- Through consistent focus on data and decisions, we **reach a very good result**.

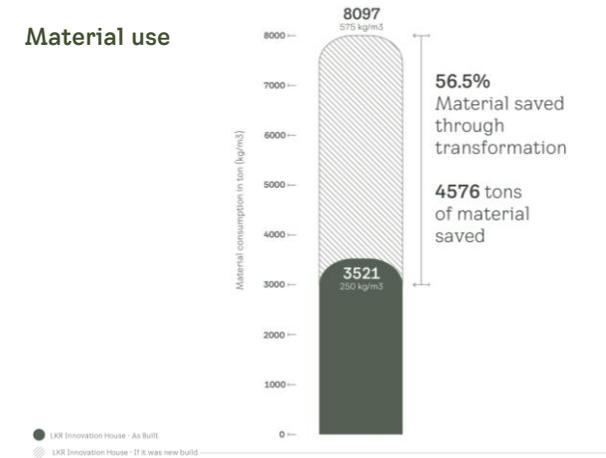
Daylight & Comfort



Daylight performance exceeds compliance levels

- Comfort assessed with a **human-centric approach**, analyzing the effect of daylight on people’s experience in the building, looking at **Vitality** and **Emotions** as indicators.
- Improving alertness and cognitive performance and supporting how **daylight benefits health and well-being (Vitality)**. The daylight flow creates contrast and variability (**Emotions**) between “exciting” common spaces and “calming” workspaces, inviting to use different spaces to boost **creativity and productivity**.
- **Top class thermal comfort and indoor air quality**, thanks to a tailor-made natural ventilation design through a rich number of roof windows.

Material use



We saved more than 50% material, some examples

- Keeping the concrete slab
- Keeping existing structure of glulam purlins and the main roof construction
- Remounting ground floor wooden facades into the new atriums
- Reuse and replace canopies, internal concrete walls and SF stones where possible.
- Prioritized **reuse over demolish**.



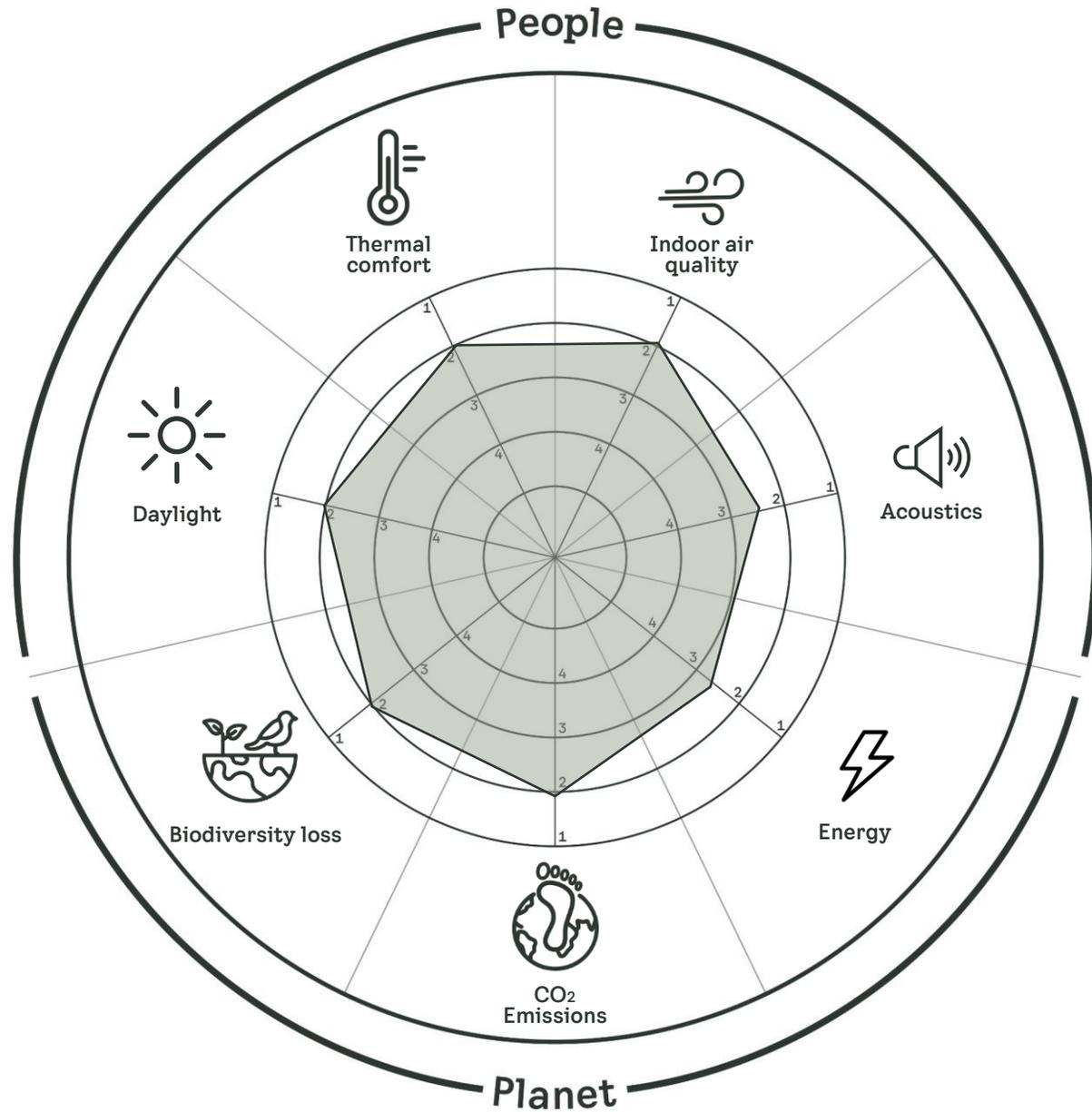
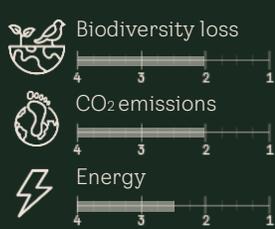
LKR Innovation House Results

Location: Østbirk
 Program: Office
 Size: 14100 m²
 Typology: Renovation
 Materiality: Re-use & wood

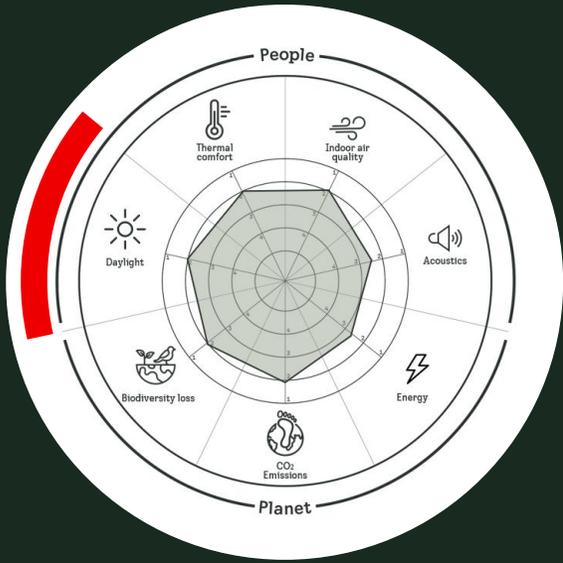
People



Planet



Score:
 1 Highest
 2
 3
 4 Lowest



- The daylight in LKR Innovation House has undergone one of the most advanced analysis available by **Oculight Dynamics** and performs outstanding
- Apart for a grid-based evaluation of the mandatory lux level in LKR Innovation House, the evaluation contains an in-depth evaluation of how the daylight in LKR Innovation House affects human vitality, comfort and emotion. The evaluation takes into account the various conditions for daylight during each day around year
- Especially the design of the 5th façade with the roof window “**patchwork**” has proven to provide LKR Innovation House with the right variety of daylight thought the house

LKR Innovation House

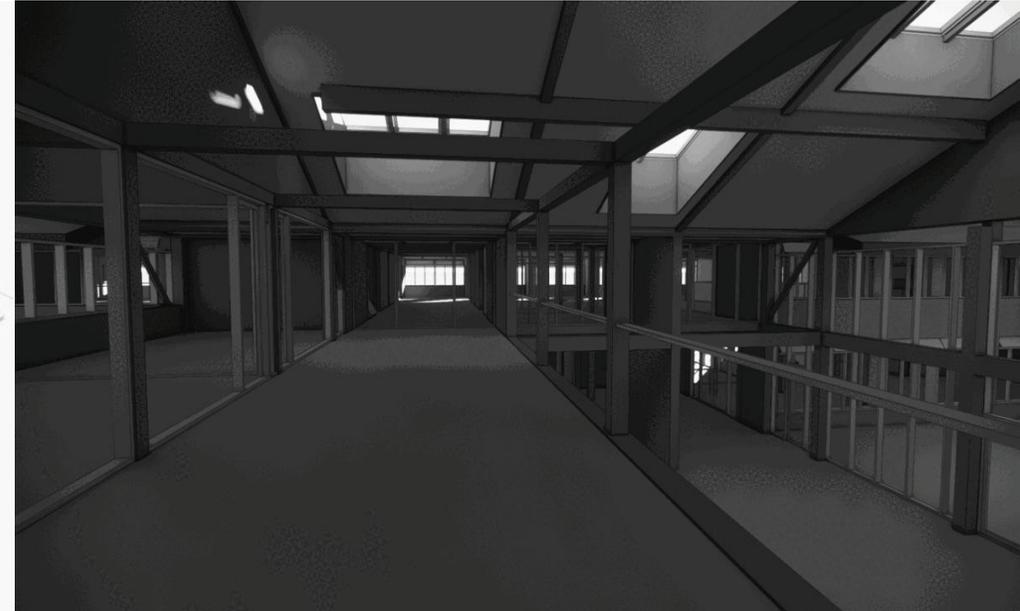
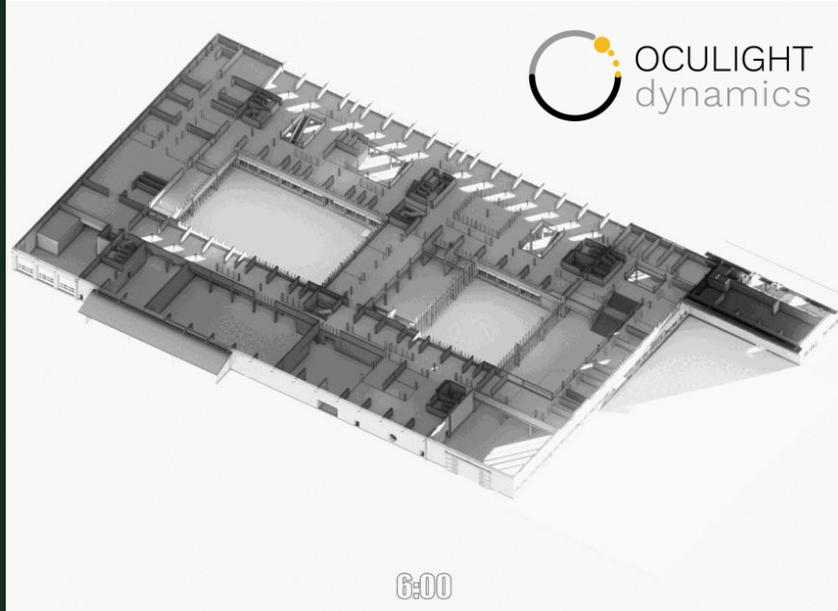
Daylight

People



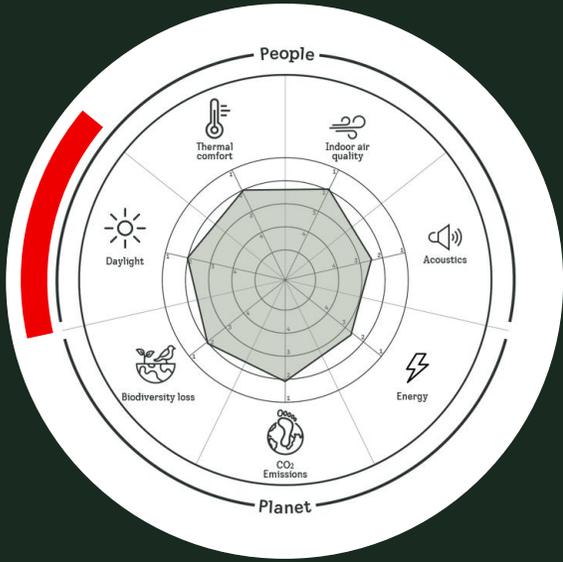
Score 2 on Daylight and Views, based on the Daylight provision (EN 17037)

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..



Daylight provision (EN 17037)

Derived from $sDA_{300lx/50\% (daytime)}$: daylight reaching 300 lux (minimum, BR 18), (or more) over at least 50% of daylight hours, in 65% of the space.



LKR Innovation House

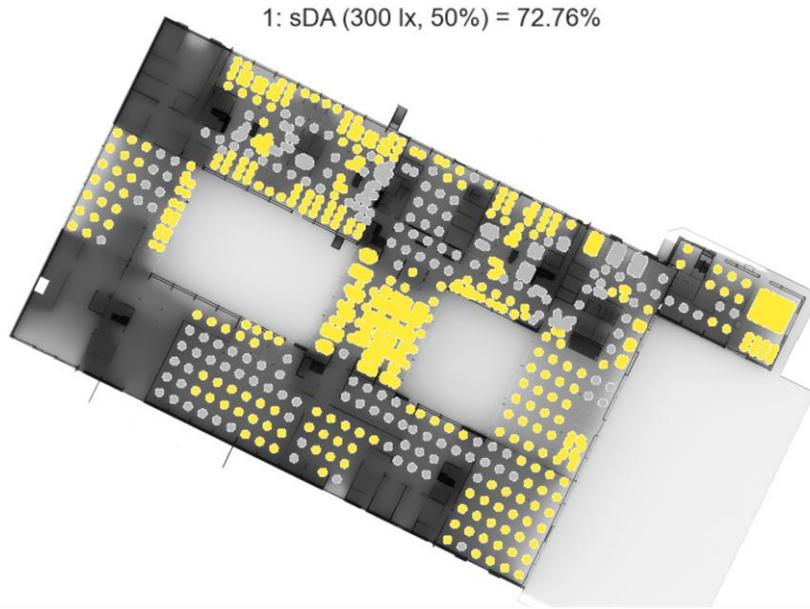
Daylight

People

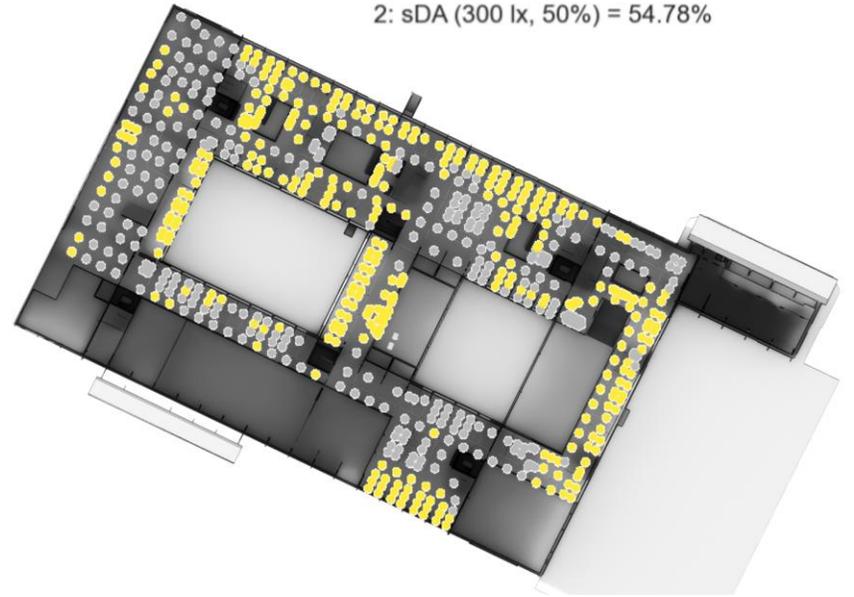


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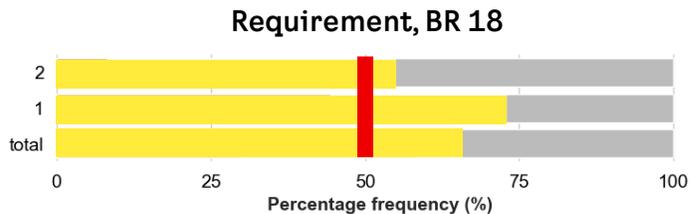
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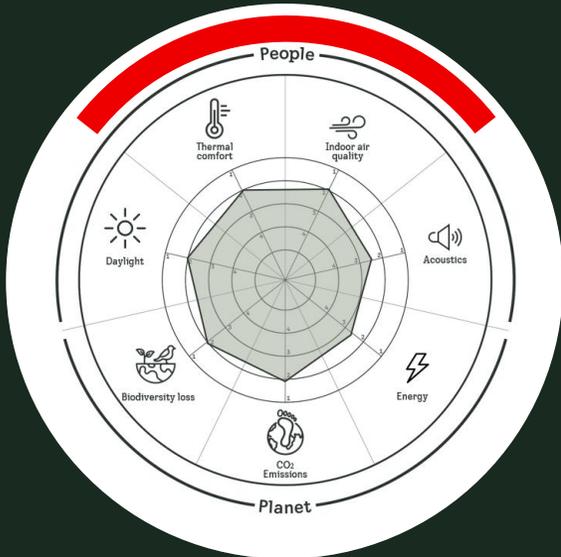


Ground floor



First floor





Two ventilation principles applied:
Natural (hybrid) and Mechanical ventilation

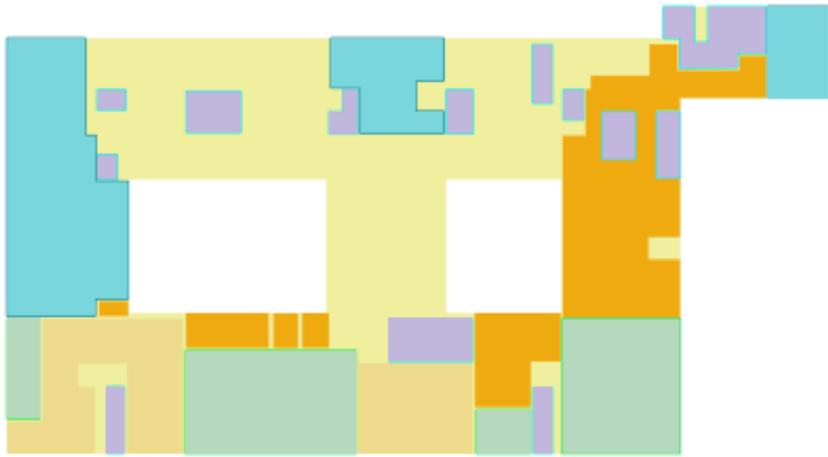
LKR Innovation House

Ventilation

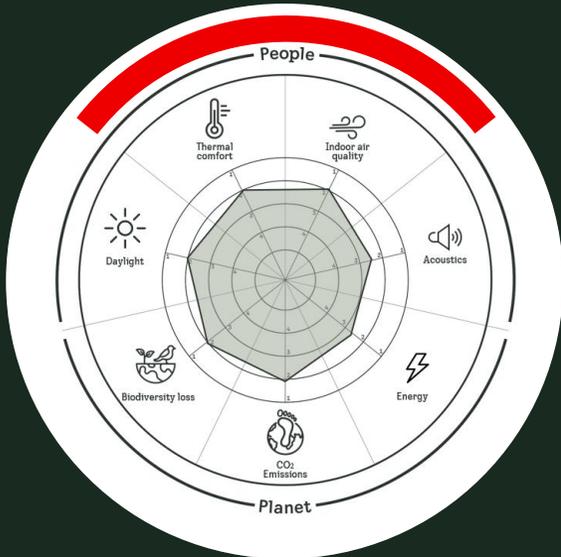


Ventilation scheme of the building

- Natural ventilation accelerated by ventilators on the 1st floor and VELUX automated CO₂ 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 for Indoor Air Quality and Thermal comfort based on EN 16798



LKR Innovation House

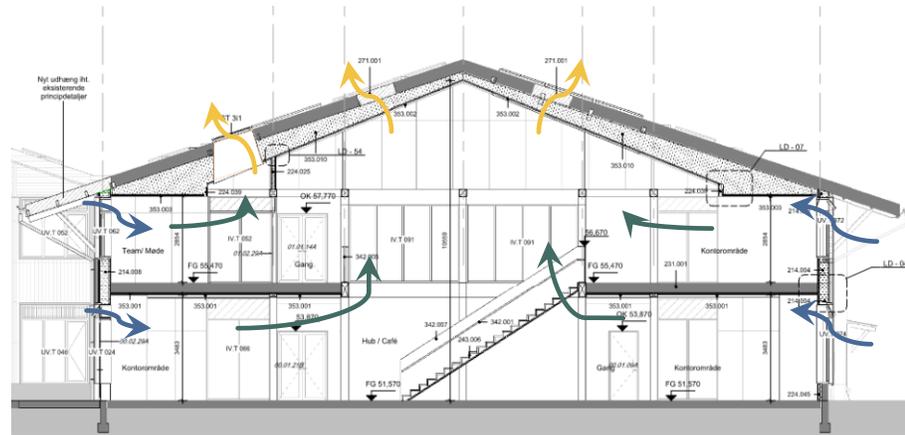
Ventilation



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

Design for Natural ventilation:

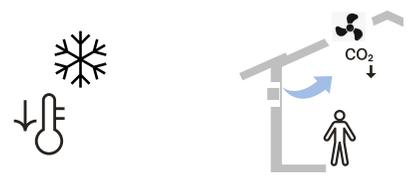
- Large room volumes
- Ventilation openings in facades and roof
- Open connection between floors
- External shading on roof windows & Large overhangs on floor 01
- Smart ventilation & shading control
- Supplement exhaust fans



Smart control of natural/hybrid ventilation:

Sensor and schedule-based control of indoor comfort*

Open office area:

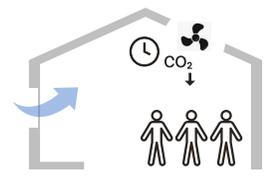


Background ventilation via highly-placed façade flaps assisted with exhaust fans – driven by CO2 levels

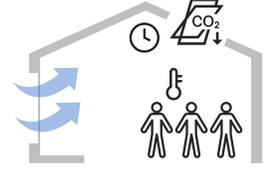


Natural ventilation driven by room temperature and CO2 levels + night ventilation

Canteen:

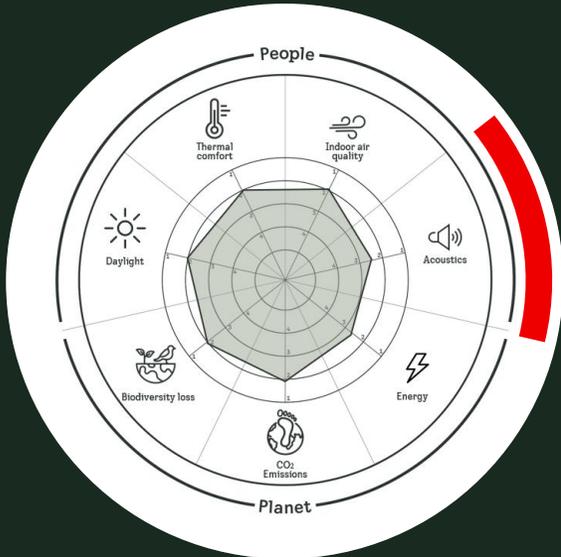


Background ventilation assisted with exhaust fans driven by CO2 levels + scheduled airing



Natural ventilation driven by room temperature and CO2 levels + scheduled airing

*LKR-KLG300 two-way communication with CTS, better data exchange, better and accurate steering/control of windows/shutters. Customized solution to LKR-IH.



The **acoustic quality** is evaluated against limit values tailored for internal and external system noise, wherein the limit values are based on the principles outlined in ISO 140-4.

- Most of the spaces have an acoustic class II for indoor system noises and outdoor noise wherein all the spaces are <30 dB for both indoor system noise and outdoor noise.
- However, the spaces such as cafe or eating space are in the range of acoustic class III and IV. Wherein, the inside system noises are <40 dB and the outside noise is <30 dB.



LKR Innovation House

Acoustics

The design of the innovation house follows the “acoustic privacy” principle, with walls, floors, etc meeting standards for airborne and impact sound.

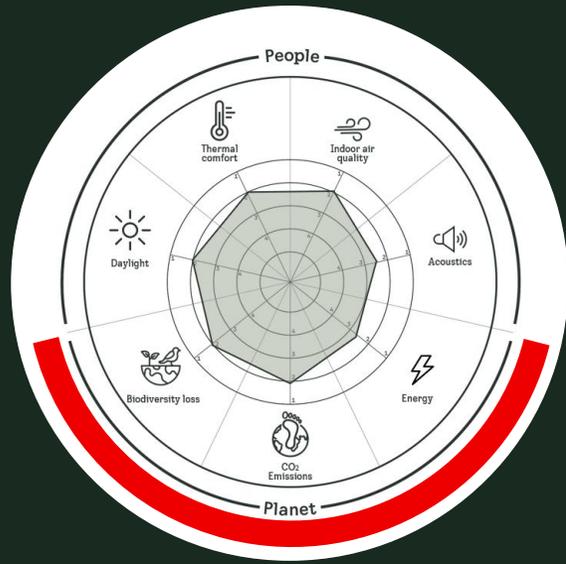
Comfortable room acoustics is insured through the strategic placement of sound absorbents in the ceiling, floors and walls. Where necessary thick curtains and partition doors have been incorporated.



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



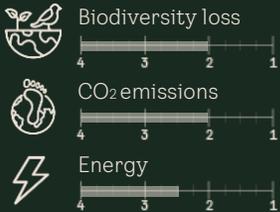
Sound transmission from dining to office areas



LKR Innovation House

Planet Results

Planet



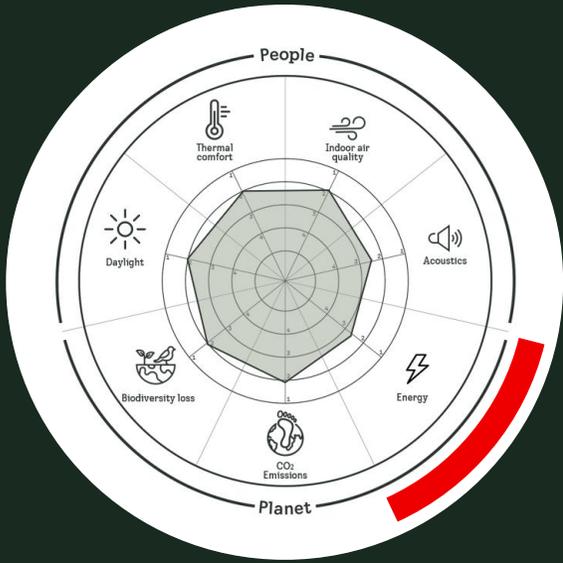
Foundation	Terrain deck	Exterior wall construction	Floor deck	Roof Build up	Exterior wall cladding	Roof Cladding	Windows	Interior walls	Solar panels
Strip foundation, concrete	Concrete slab on EPS insulation	Concrete back wall with mineral wool (batts)	Hollow core slabs concrete	Roof structure with timber rafters and mineral wool	New timber facade	Clay bricks	windows (incl. 3-layer glass)	Existing concrete interior wall	Solar panels (monocrystalline) Mounted on frame
Strip foundation, concrete with FutureCem	Concrete slab on XPS insulation	Brick wall with glass wool (batts)	High-performance concrete slab	Roof structure with timber rafters and wood fiber insulation	Existing timber facade	Fiber cement (Eternit)	Wood/Wood windows (incl. 3-layer glass)	Cast-in-place interior walls	Solar panels (polycrystalline) Mounted on frame
Pad foundation, concrete	Concrete slab on cellular glass	Lightweight exterior wall with glass wool (batts)	Existing concrete slab element	Roof structure with steel rafters and mineral wool	Slate	Bitumen roofing (rooffelt)	VELUX wooden top hung safe 3-glass	Autoclaved aerated concrete (AAC) block interior walls	Solar roof tiles (thin-film)
Pad foundation, concrete with FutureCem	Lightweight slab on EPS insulation	Lightweight exterior wall with wood fiber insulation	Timber cassette floor	Existing roof structure with added insulation mineral wool	Tile	Steel sheets	VELUX GGLS Centre Pivot 3in1	Steel studs with gypsum and mineral/glass wool	Ventilation & HVAC
Pile foundation, concrete	Lightweight slab on high-compression mineral wool	Lightweight exterior wall with hemp fiber insulation (batts)	Timber cassette floor with reclaimed wood	CLT structure with wood fiber insulation	Brick	Zinc	VELUX CVU INTEGRA	Steel studs with fiber gypsum and glass wool	Natural Ventilation
Pile foundation, Steel	Existing concrete slab without insulation	Existing lightweight exterior wall with mineral wool (batts)	CLT (Cross-Laminated Timber) slab		Aluminium	Copper	VELUX Ventic Curb Mount Skylight	Timber studs with gypsum and mineral/glass wool	Hybrid Ventilation
Screw pile foundation	Light wooden cassette - on polystyrene	Wood cassette straw	Ribbed timber slab		Composite	Slate	VELUX Cabrio	Timber studs with gypsum and hemp insulation	Mechanical ventilation
	Light wooden cassette (raised) with hemp insulation	CLT Wood fiberinsulation				Secum (green roof)	VELUX Skylight system	Timber studs with plywood and grass insulation	Heating & Cooling
						xxxxx	VELUX Flat roof		District heating
									Heat Pump



4,6 kg CO₂ / m² / year
Score 2

48,6 kWh/m² year
Score 2.5

4,0 E-14 PDF.year/m² year
Biodiversity loss
Score 2



Electricity

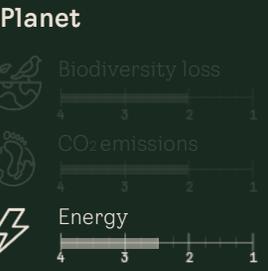
48.6 kWh/m² year according to the energy frame calculation (DK standard)

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 **public power grid**

LKR Innovation House

Energy



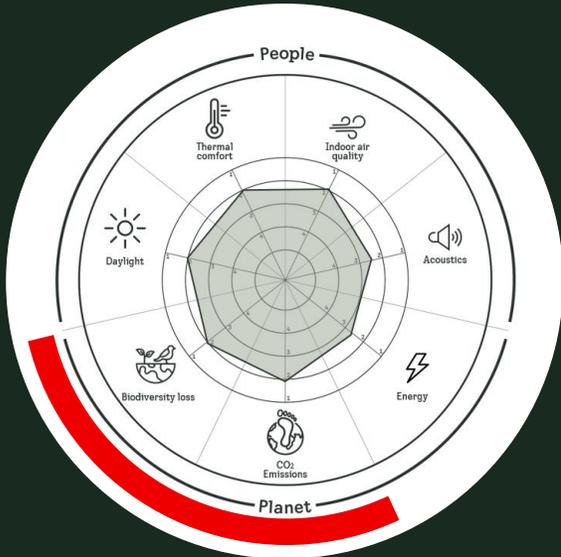
Heating & Cooling

LKR IH is 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.**

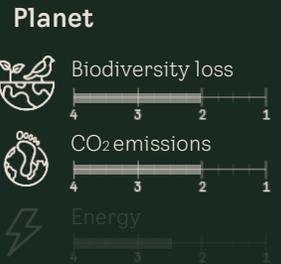
High-load zones—such as laboratories, meeting rooms, and office spaces with limited solar shading—are served by **mechanical ventilation** with variable air volume (VAV) systems, which adjust the airflow based on the specific cooling or ventilation needs of each space and also **supply cooled air via**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

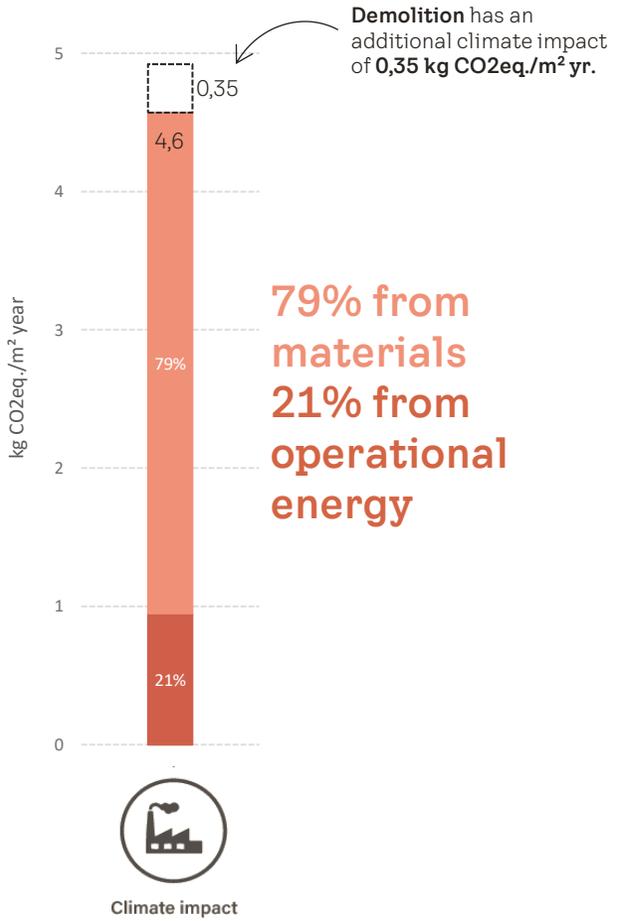


LKR Innovation House

CO2 emissions

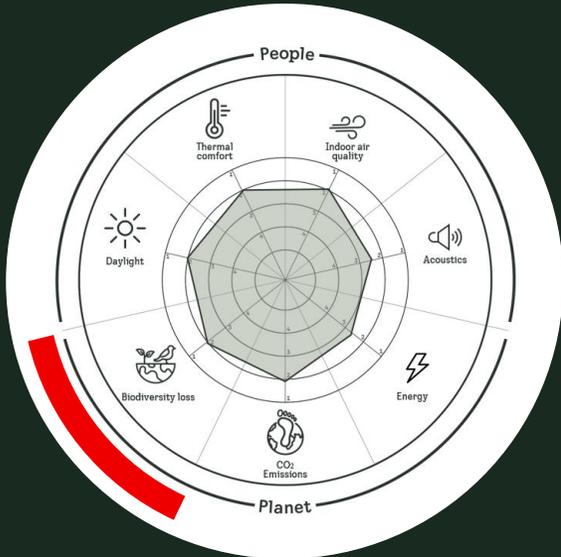


CO2 emissions:
4,6 kg CO2eq./m²/year



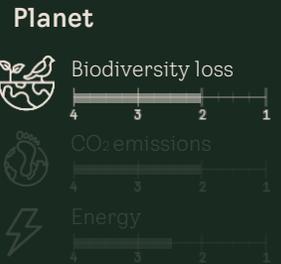
- Materials
- Operational energy
- Demolition

- Over **50%** of the building’s material was **saved** by **transforming** the LKR Innovation House compared to **building the same building as new**
- This was achieved through the **reuse, preservation and repurposing** of materials such as the original concrete floor, glulam frames and purlin, roof construction, remounted ground floor façades in the courtyards, and reused pavement stones.
- The project achieved a carbon footprint of **4.6 kg CO₂e/m²/year**, well below the projected Danish Building Regulations threshold for 2029 (6.1 kg CO₂e/m²/year for office buildings).
- **Daylight, fresh air, material reuse** and careful new material choices created a workplace that maintains the building’s historical significance while offering a healthy and inspiring environment
- The project’s results have been **3rd-party verified** by Artelia



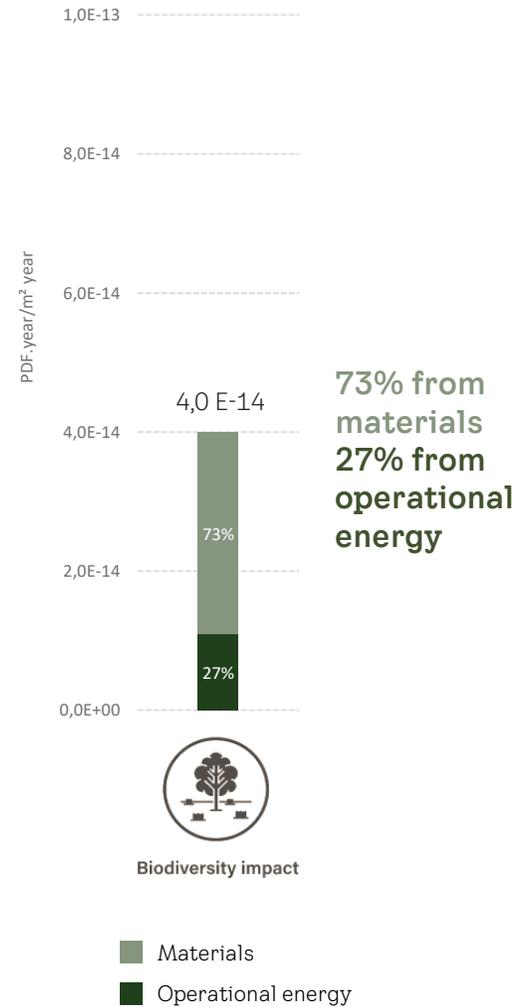
LKR Innovation House

Biodiversity Loss



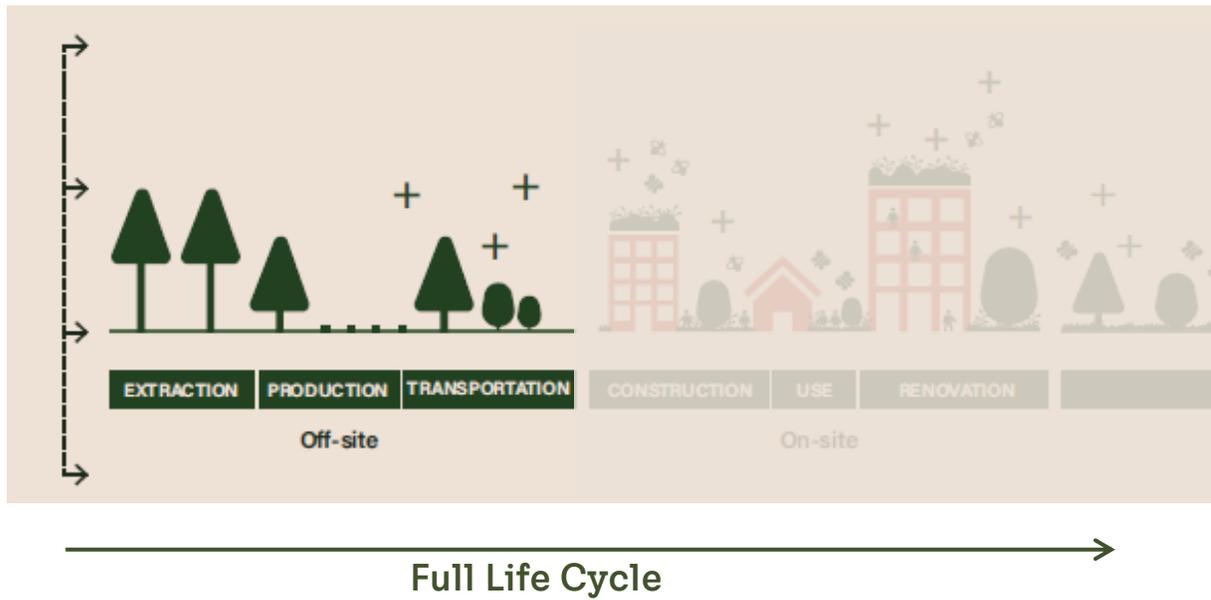
Biodiversity Loss Off-Site:
 $4,0 \text{ E-14 PDF}\cdot\text{year}/\text{m}^2 \text{ year}$

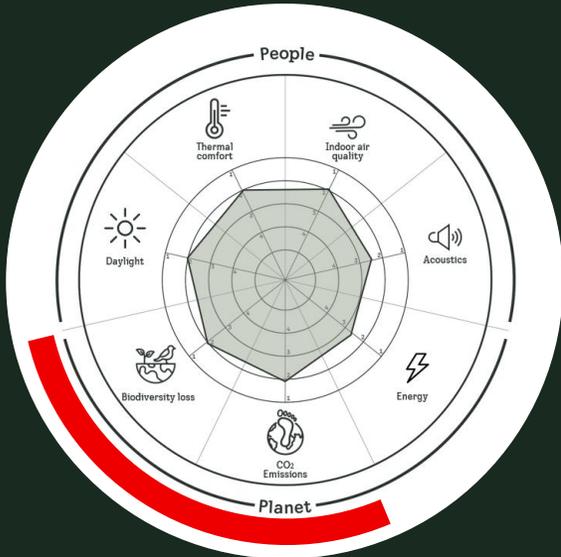
PDF.year/m²yr is the new recommended unit measure for biodiversity loss. It indicates the **Potentially Disappeared Fraction of Species over a certain time** (PDF=0 no species will go extinct as a result of the activity, PDF=1 species will go extinct as a result of the activity)



The biodiversity impact calculation for LKR Innovation House consider only the **off-site impacts of materials in the production phase**, which is by far the largest contributor to biodiversity impact.

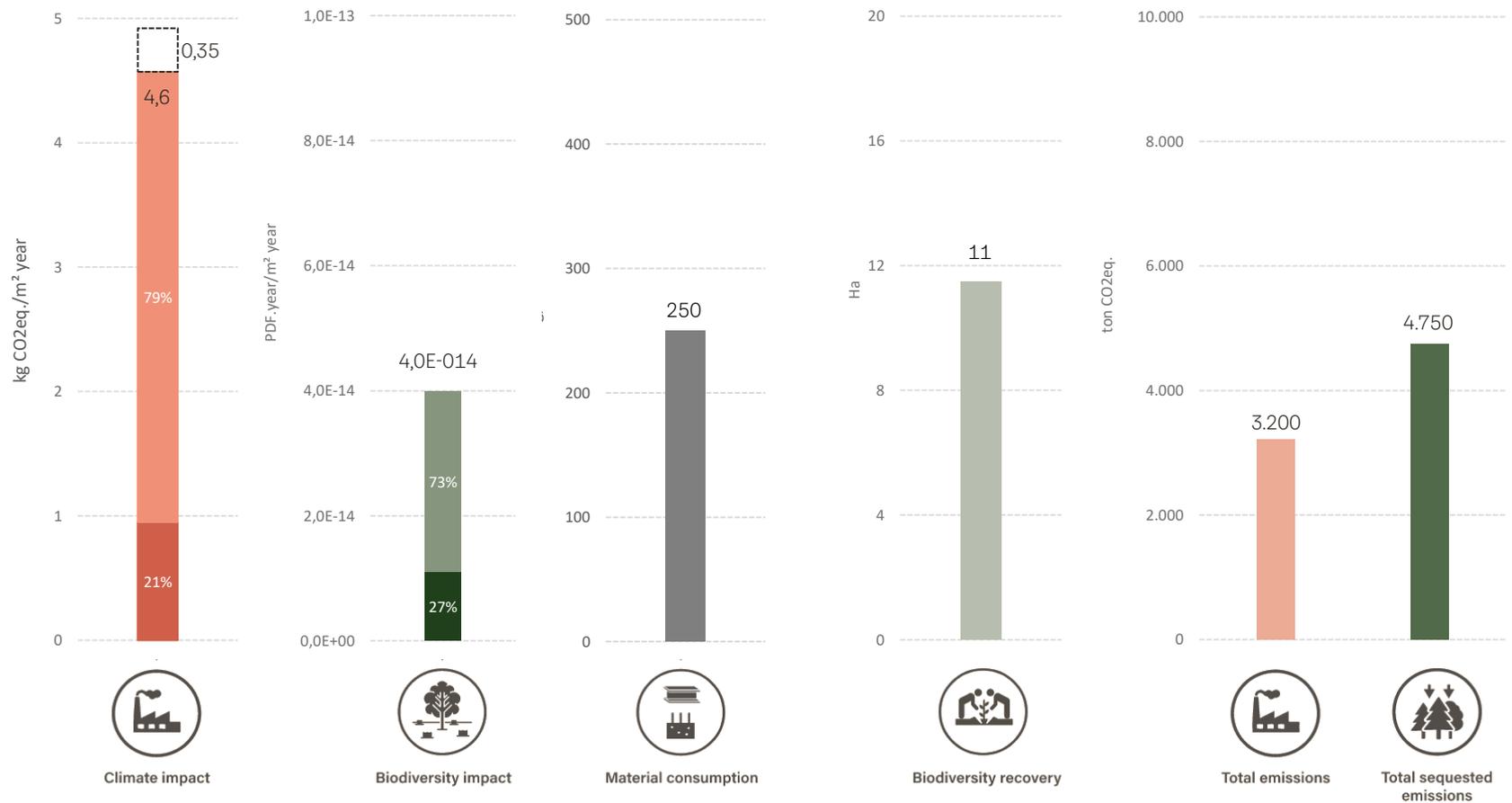
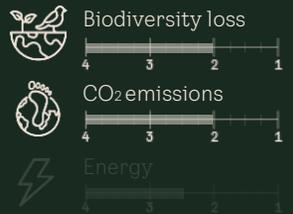
The methodology used follows the recommended method **Impact World+**. It considers the **impact on biodiversity given by all materials** as well as by the **operational energy use**.





LKR Innovation House

Planet



- Materials
■ Operational energy
 Demolition
- Materials
■ Operational energy
- Amount of used materials
- Hectares of protected forest to be restored
- CO2eq. emission
■ CO2eq. uptake

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.



VELUX®



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 symbolized 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.