Timber Buildings

IMPROVING LIFE FOR PEOPLE AND PLANET

CF MØLLER ARCHITECTS

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Timber Buildings – Improving Life for People and Planet

Buildings and construction emit large amounts of greenhouse gases, with the production of materials such as cement, steel, and aluminium having a significant carbon footprint. In contrast, loadbearing timber buildings have been shown to considerably reduce the carbon footprint of new builidngs.

C.F. Møller has worked for many years with timber construction as a strategy for minimising the climate impact of buildings. We are European market leaders, with a current portfolio of over 200,000 m^2 timber buildings, either completed, on the construction site, or under detailed project design.

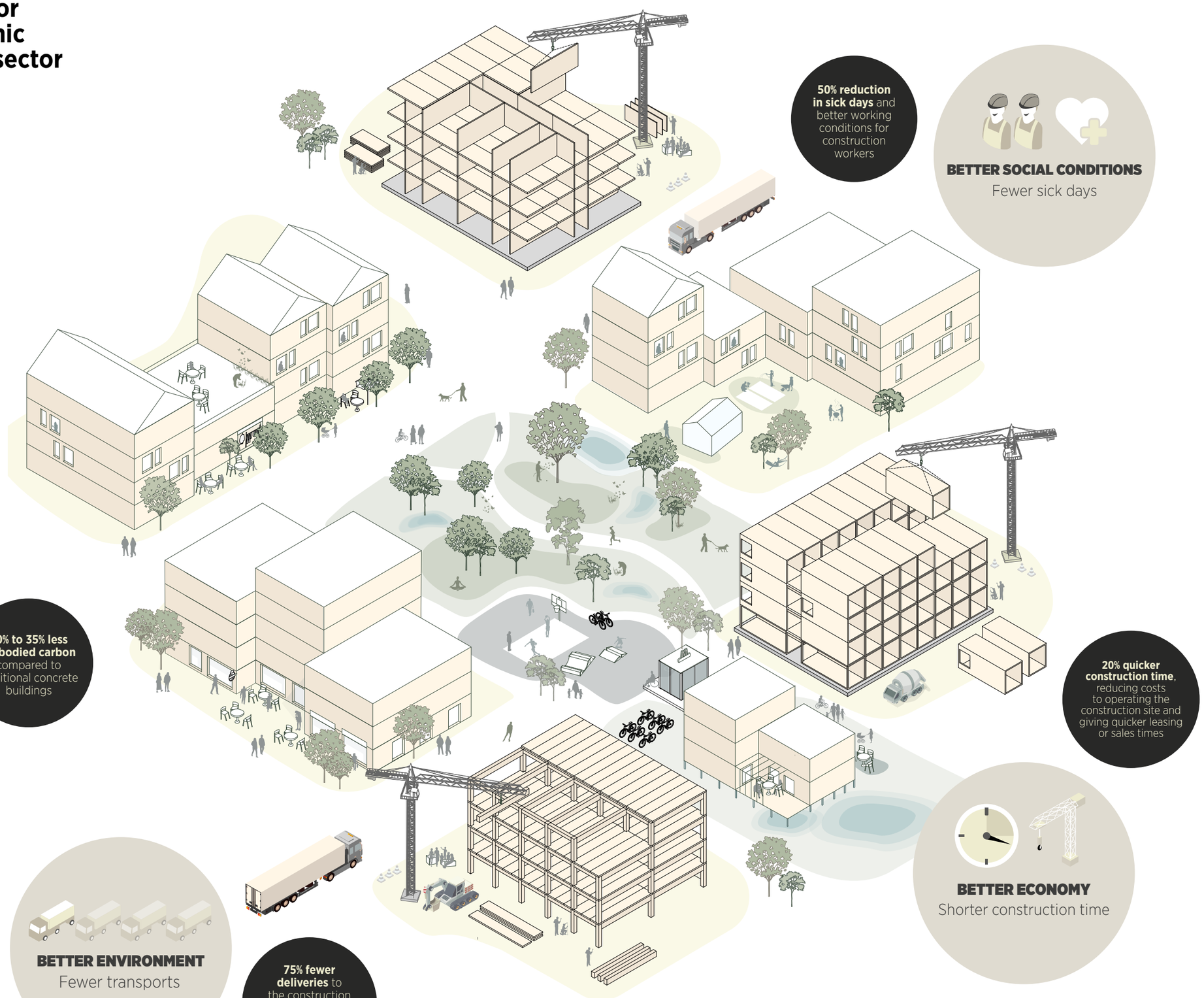
We have worked with the design of residential, office and educational buildings in timber for both private and public clients.

We have worked on timber projects of all scales, from 500 m^2 to over 50,000 m^2.

We have developed design strategies around grid size and the choice of structural system to create resource-efficient solutions that minimize construction costs. We have also developed construction strategies relating to moisture, fire, acoustics and the construction process to minimise risk during the design and construction phases.

This publication presents examples of C.F. Møller's market-leading timber buildings in Denmark, Sweden, Germany and Norway.

Timber buildings are key drivers for environmental, social and economic sustainability in the construction sector



BETTER CLIMATE
Reduced carbon footprint

20% to 35% less embodied carbon compared to traditional concrete buildings

50% reduction in sick days and better working conditions for construction workers

BETTER SOCIAL CONDITIONS
Fewer sick days

20% quicker construction time, reducing costs to operating the construction site and giving quicker leasing or sales times

BETTER ECONOMY
Shorter construction time

BETTER ENVIRONMENT
Fewer transports

75% fewer deliveries to the construction site, reducing congestion and pollution in our cities

REFERENCES

Better Climate
Steffen, S.F. (2024), CO_2-besparelser og omkostningseffektivitet ved træbyggeri, Rambøll, Copenhagen.

Better Social Conditions
Halseth, P.T. (2019), Boligbygging i massivtre: Sammenligning av boligblokk i massivtre og betong, NTNU, Trondheim.

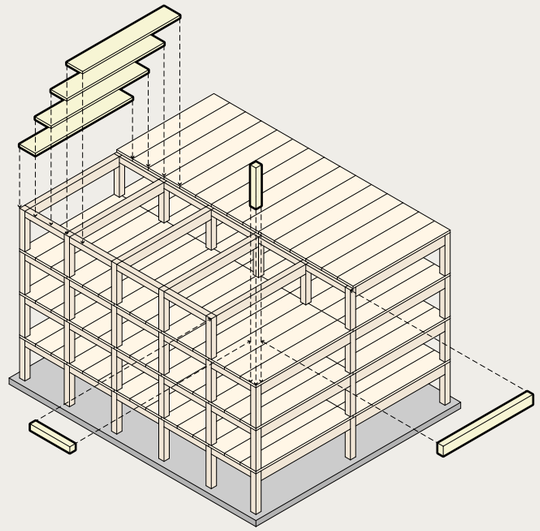
Better Environment
https://markidesassociates.co.uk/news1/109-cross-laminated-timber-the-benefits-in-transport-terms

Better Economy
Halseth, P.T. (2019), Boligbygging i massivtre: Sammenligning av boligblokk i massivtre og betong, NTNU, Trondheim.

Mass Timber Building Typologies

Mass timber construction offers climate friendly and versatile solutions for modern building needs, blending natural materials with innovative architecture and engineering. Different timber solutions have differing qualities in relation to structural solution, size of grid module and building scale. Broadly speaking there are three mass timber building typologies, each with its own unique usage profile and advantages.

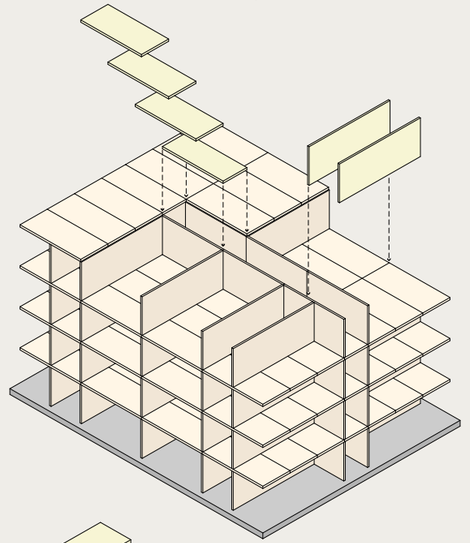
C.F. Møller have experience in all three mass timber building typologies, spanning from highly modularised and prefabricated housing to high-end bespoke column and beam office buildings. With our unique design methodology, we are able to tailor our design solutions to optimise the timber design in a holistic way, creating beautiful architecture with cost-optimised construction solutions.



Timber column, beams and floor decks

Mass timber buildings using timber columns, beams and floor decks can create large, open-plan spaces, and is well-suited to administration, school and university buildings between 4 to 10 storeys. See the following projects for examples of our buildings with prefabricated timber frame modules:

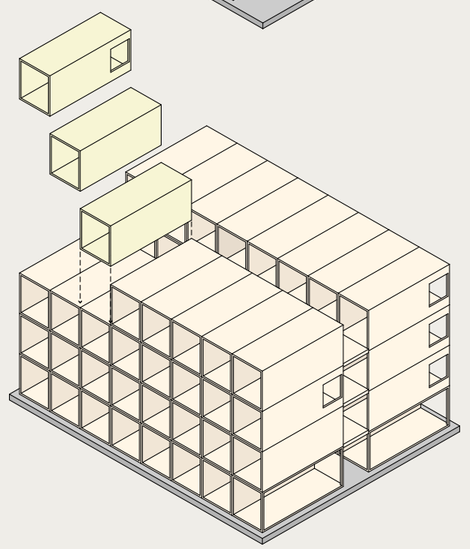
- WoodHub, Government Office Hub, Odense
- i8, iCampus, Werksviertel Munich
- Open School in Waldau, Kassel
- New Harstad High School.



CLT walls and floor decks

Mass timber buildings using CLT floor decks and walls are well-suited to multistorey housing, hotels and educational buildings between 3to 10 storeys. See the following projects for examples of our buildings with CLT floor decks and walls:

- Kajstaden Tall Timber Building, Västerås
- Gråalen, Norrtäjle Harbour
- Campus Bøgehøj, Ebeltoft.



Prefabricated timber modules

Timber framed buildings using prefabricated modules or elements give many advantages in relation to construction time and quality. This typology is well-suited to multistorey housing between 2 to 6 storeys. See the following projects for examples of our buildings with prefabricated timber frame modules:

- Rullestenen, Musicon, Roskilde.

WoodHub, Government Office Hub, Odense

This new office building, which brings together several government agencies under one roof in the center of Odense, is a pioneering project in sustainable timber construction and the largest timber building in Denmark.

The new office hub in Odense will gather 1,600 public employees in a sustainable, modern and optimal multi-user building that fits carefully into its surroundings. The spatial construction of the building sets a robust and flexible framework for variation between office workspaces and social meeting places. This means that the users may expand or reduce their varied facilities as required.

With its 31,000 m² of solid timber constructions, the project is a flagship project in sustainable office buildings in Denmark. The entire building is constructed with mass timber, except for the basement and stair cores. Visible gluelaminated timber columns and partially visible CLT floor constructions are used as load-bearing and recurring construction materials. Additionally, timber braces are used to establish lateral stability. This contributes to a sensuous architecture that will have a positive effect on the atmosphere in the building.

WoodHub has a carbon footprint that is 30 % lower than the mandatory LCA requirement stipulated by the Danish Building Regulations.

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FACTS

Client: Bygningsstyrelsen
Size: 36,500 m²
Address: Odense, Denmark
Year: 2021-
Architect: C.F. Møller Architects
Landscape: C.F. Møller Architects


© C.F. Møller Architects


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FACTS

Client: Slättö; Trenum Västerås AB
Size: 2,400 m²
Address: Västerås, Sweden
Year: 2016-2019
Architect: C.F. Møller Architects
Landscape: C.F. Møller Architects

Kajstaden Tall Timber Building, Västerås

The Tall Timber Building residence in the new district of Kajstaden at Lake Mälaren in Västerås has become a landmark and, during construction, became Sweden's tallest mass timber building. All parts of the building are made of cross-laminated timber (CLT), which includes the walls, joists and balconies as well as the lift and stairwell shafts.

The high precision technology involved in CNC-milled solid timber with glulam elements results in air-tight and energy-efficient houses without other unnecessary materials in the walls. The low weight of the material means fewer deliveries to the construction site and a more efficient, safer and quieter working environment during construction. Circularity becomes an important part of the projects, as the use of mechanical joints and screws means that the building can be taken apart and the materials can be reused. When using wood instead of concrete, the total carbon dioxide saving is estimated to be 550 tons of CO_2 over the building's lifespan.

Rullestenen, Musicon, Roskilde

Rullestenen (the Rolling Stone) in the creative Musicon area of Roskilde is a housing project that imagines residential development in new ways by focusing on sustainability and prioritising community.

The building is built with prefabricated timber modules, with a strong focus on minimizing the carbon impact through the choice of the timber structural system and the individual building materials with long lifetimes documented through EPDs. Rullestenen has a carbon footprint that is 50 % lower than the mandatory LCA requirement stipulated by the Danish Building Regulations.

FACTS
Client: EcoVillage, MT Højgaard and Scandibyg **Size:** 4,966 m² **Address:** Roskilde, Denmark **Year:** 2021-2023 **Architect:** C.F. Møller Architects **Landscape:** C.F. Møller Architects

FACTS

Client: Slättö Förvaltning AB
Size: 13,500 m²
Address: Norrtälje, Sweden
Year: 2015-2022
Architect: C.F. Møller Architects
Collaborators: Executive architect: Brunnberg & Forshed Arkitektkontor

Gråalen, Norrtäjle Harbour

Gråalen is a new housing project based on the use of timber as the main building material. Norrtälje municipality, which has a clearly stated sustainability profile, sat 40 sustainability goals for the development of the entire harbour area. Together with architects and builders, they made the decision to use timber as the main construction material in both the structure and facades.

The decision to use timber as the main building material was based on taking responsibility for the project's overall environmental impact and life cycle, which also includes production, operation and maintenance. The varied design of the neighbourhood becomes an extension and modern interpretation of Norrtälje's historic centre, where there are many well-preserved older wooden houses. The project consists of around 140 apartments spread amongst eight buildings, four of which have cross-laminated timber for the loadbearing construction.

i8, iCampus, Werksviertel Munich

The new i8 office building reflects both the heritage of the former industrial area and the character of the emerging “Werksviertel” in München, Germany with its focus on modern workspaces and knowledge sharing. The efficient timber hybrid construction contributes positively to the buildings carbon footprint while reducing the buildings overall weight by up to 50 % compared to a conventional steel reinforced concrete construction.

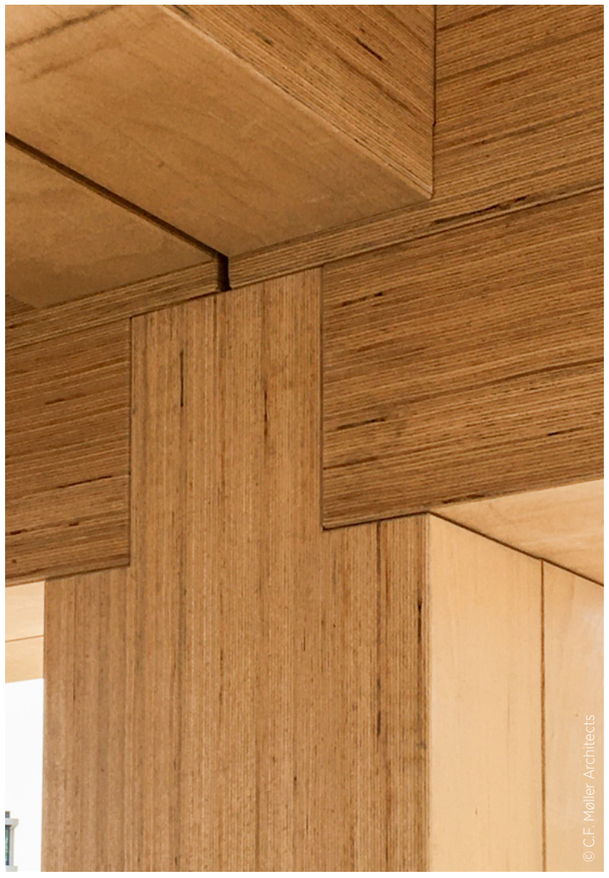
With a variety of spaces that can adapt to the changing needs of the user while maintaining a unified identity, the i8 offers a flexible number of workspaces and opportunities for collaboration and networking.

Through a modular approach and the use of prefabricated elements the construction time could be reduced by up to 40% compared to conventional construction systems. For this a grid of 5,4m was selected as the optimal dimension to reduce cost while allowing the necessary spatial flexibility.

Hardwood laminated veneer beech lumber with its structural superiority was chosen to reduce the cross section of load bearing elements and thus enhancing spatial flexibility. The internal and structural organization of the building is brought together by one unifying green façade that extends along the entire building.

FACTS

Client: R&S Reality III GmbH & Co.Kg
Size: 20,000 m²
Address: Munich, Germany
Year: 2020-2025
Architect: C.F. Møller Architects
Collaborators: RKW Architektur+, Merz Kley Partner, BWP Ingenieure GmbH, Drees & Sommer



Campus BØGEHØJ, Ebeltoft

In Ebeltoft, Denmark lies Campus BØGEHØJ, owned by Salling Group. Every year up to 20,000 guests are hosted, including the corporation's students, executives, and staff. It serves as the primary training ground for all of Salling Group's trainees. The buildings are undergoing a major renovation and expansion, and an entirely new three storey training centre, with teaching and social spaces and 80 bedrooms, is being built in loadbearing timber.

The loadbearing structure for the 80 rooms consists of CLT walls combined with CLT floor decks. In the center of the building, where larger teaching and social spaces are located, the loadbearing system is a glulam column/beam construction. The elevator core and stair core are also constructed with CLT elements. Campus BØGEHØJ has a carbon footprint that is 30 % lower than the mandatory LCA requirement stipulated by the Danish Building Regulations.

FACTS

Client: Salling Group
Size: 5,100 m²
Address: Ebeltoft, Denmark
Year: 2022-2025
Architect: C.F. Møller Architects
Landscape: C.F. Møller Architects

Dilling, Herning

New domicile, logistics centre, and landscape park for Danish wool and textile company Dilling reflecting the company's sustainable profile.

The hybrid construction of the two-storey office building primarily consists of loadbearing timber structures with gluelaminated timber columns and CLT floor decks. In order to create a connection to the park and nature at one end of the building, the building is curved. The façade of the logistics centre is slatted with timber that creates a varied expression, and glass providing the employees with natural daylight and a view of the new park, where nature restoration, biodiversity and rainwater management have been a major focus.

© Julian Weyer

FACTS

Client: Dilling
Size: 6,700 m²
Address: Herning, Denmark
Year: 2019-2024
Architects: C.F. Møller Architects
Landscape: C.F. Møller Architects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Netto, Bygholm Bakker

Salling Group, Netto and C.F. Møller Architects are working together on a new concept for the convenience store of the future that focuses on sustainable solutions, a good indoor climate and architectural quality for the benefit of customers and employees.

The building's facades are made up of prefabricated timber elements, and the roof structure is made of Danish-produced laminated timber. The entrance area is lined with heat-treated Nordic pine. The building elements and mechanical joints are such that it is possible to separate parts of the building into complete elements for recycling and use in other construction projects.

FACTS

Client: Salling Group A/S
Size: 1,198 m²
Address: Horsens, Denmark
Year: 2019-2020
Architect: C.F. Møller Architects
Landscape: C.F. Møller Architects

Enköpings Kommunhus

A new flexible and modern office building for the municipality of Enköping is centrally located in the city. The four-story building covers an area of approximately 5,300 m² and serves as a workplace for around 450 employees. With the new town hall, Enköping Municipality has a modern and efficient meeting place for its employees and citizens.

The town hall is constructed with a hybrid design and the goal is to create a strong sense of wood. The environmental impact is very low, due to timber being the primary building material, complemented by climate-improved concrete. Both the facade and the structural system are constructed with timber. The building is certified according to the BREEAM Outstanding level and complies with Swedish Energy Class A Regulations.

FACTS

Client: Skanska
Size: 5,500 m²
Address: Enköping, Sweden
Year: 2022-
Architects: C.F. Møller Architects
Landscape: C.F. Møller Architects

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FACTS

Client: Stadt Kassel Immobilien GmbH & Co. KG represented by GWG Projektentwicklung GmbH in collaboration with Montag Stiftung Jugend und Gesellschaft
Size: 17,000 m²
Adress: Kassel, Germany
Year: 2021-
Architect: C.F. Møller Architects
Landscape: C.F. Møller Architects
Collaborators: Wenzel + Wenzel, EPEA, Ingenieurbüro Hausladen, Transsolar, IBC Ingenieurbau Concept, a.g. Licht

Open School in Waldau, Kassel

The Open School in Waldau (OSW) sets a new standard for learning environments in German schools, by uniting nature and education in a flexible and sustainable multi-use building and landscape. C.F. Møller architects was tasked to design a school which would serve as a nationwide precedent for sustainable construction, new learning environments and pedagogical frontiers within the German school system.

The hybrid timber construction is designed with the necessary spatial flexibility in mind to allow for a more open and group orientated learning environment over the classical front-of-class approach. The internal structure is based on a glulam fabricated column/beam system and CLT floor panels. For a maximum of spatial flexibility, a grid of 7,5 m was selected over a more standardized 5 m grid. To reduce the overall material usage, the thickness of the structural CLT floors has been optimized using lightweight glulam rib panels. The envelope is designed as a prefabricated timber frame construction, reducing the construction time for loadbearing frames with 30-40% compared with conventional solution, whilst the environmental impact of the material choice reduces the CO_2 emissions. Additionally, the project is designed for deconstruction to meet the demands of the circular economy.

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BMU German Ministry for the Environment, Berlin

The BMU is a timber-hybrid building located in Berlin Mitte, close to Pottsdammer Platz. C.F. Møller architects is designing a new extension for the ministry that sets a national precedent for sustainable architecture. The building volumes are arranged in a green and permeable composition that allows for a strong focus on daylight and shared green spaces. The facade follows a Low-Tech approach, integrating shading and natural ventilation strategies within the building envelope. The branch like arrangement further optimizes the efficiency of the façade-integrated solar panels.

The building's vertical circulation and the connecting floors between the individual building cores are reinforced concrete due to fire safety. and are used to optimize overall shear and load distribution. This helps in reducing the overall size of the timber elements such as floors, beams, and columns at the building perimeter. As such, the new extension lends the site a new quality, and at the same time caters to the very high demands for sustainability, security and integration of the surrounding historic monuments and outdoor facilities. Upon completion the building will be certified according to the "BNB Gold" standard.

FACTS

Client: Bundesanstalt für Immobilienaufgaben (BImA) represented by: Bundesamt für Bauwesen und Raumordnung (BBR)
Size: 51,000 m²
Address: Berlin, Germany
Year: 2019-
Architect: C.F. Møller Architects
Landscape: C.F. Møller Architects
Collaborators: SINAI Gesellschaft von Landschaftsarchitekten mbH BAL

Lunakvarteret, Södertälje

Lunakvarteret is the development plan that transforms the Luna district into several open city blocks and improves the city centre of Södertälje. The transformation is one of the most extensive urban development projects in Södertälje's city centre ever undertaken. The overall strategy for the project includes a careful yet innovative combination of demolition and construction with low climate impact. By creating new public spaces and avenues, Lunakvarteret opens to the city and the sky, while preserving the city's historical heritage.

The project includes the reconstruction of several existing office buildings. The existing brick buildings are preserved and extended with three additional storeys that consist of loadbearing timber. Environment and sustainability will be an integral part of the choices made in the design reusing existing buildings, increasing circularity, resource efficiency and using material with low climate impact.

FACTS

Client: Telge Fastigheter Södertälje kommun
Size: 75,000 m²
Address: Södertälje, Sweden
Year: 2023-
Architect: C.F. Møller Architects
Landscape: C.F. Møller Architects
Collaborators: Bjerking

Gårdsvägen Tömmen 1, Solna

In the new sustainable office building in Solna, industrial character meets modern architecture. The project includes the reconstruction of an older industrial building which will be expanded to 10 floors. One of the existing brick houses, Tömmen 1, is preserved and will be built with additional timber floors. Environment and sustainability will be an integral part of the choices made in the design with clear elements of reuse, circularity, resource efficiency and healthy material choices.

The craft house in Solna was designed in 1952 and has an industrial character that is preserved and refined, with the new wooden floors built on top of the existing house. A wave-shaped wooden facade is a modern addition to the industrial design language of the existing façade and large window sections provide the opportunity for views and good lighting conditions. The project shows in a magnificent way how existing buildings can be a canvas for a sustainable architectural development.

FACTS

Client: Fabege
Size: 20,000 m²
Address: Solna, Sweden
Year: 2022-
Architect: C.F. Møller Architects
Landscape: C.F. Møller Architects

New Harstad High School

New Harstad High School is more than just a school. It is a new focal point in the Norwegian city of Harstad, breathing new life into a former industrial area and connecting the city to the sea and the past to the future. New Harstad High School accommodates approximately 1,100 students aged 16-19 and stands as a cultural landmark and a centre for learning and social interaction on the waterfront in Harstad.

The learning spaces are flexible and can be used for various teaching methods, including project-based interdisciplinary learning.

Overall, the school is inviting and open, with over-lapping functions. Through a vertical atrium, one can walk up through the floors with varying views of the fjord, the city, and the mountains. The base of the building is made of concrete to accommodate large spaces and heavy machinery with hard usage.

Above the base, the structure is made of loadbearing timber. Together, this creates a robust and warm aesthetic and a comfortable indoor environment.

FACTS

Client: Troms og Finnmark fylkeskommune
Size: 18,500 m²
Adress: Harstad, Norway
Year: 2023-
Architects: C.F. Møller Architects in collaboration with Ola Roald Arkitekter
Landscape: SLA

FACTS

Client: Skellefteå kommun
Size: 25,360 m² (3,720 m² station, 12,070 m² mobility hub, 3,400 m² offices, 6,170 m² housing)
Adress: Skellefteå, Sweden
Year: 2024-
Architect: C.F. Møller Architects in collaboration with Nordmark & Nordmark
Landscape: C.F. Møller Architects
Collaborators: WSP Trafik Bjerking Konstruktion

Skellefteå Travel Centre

Skellefteå's new travel centre links to the city through distinctive wooden structures, green connections, and strategically placed activities. The architecture reflects the historical craftsmanship and modern wood construction techniques that shape contemporary city of Skellefteå. The roof's horizontal character interacts with the verticality of the existing high-rise, Sara Cultur Center. Sightlines are maintained, connecting the city north and south of the railway. Skellefteå's new travel centre aims to fulfil Skellefteå's vision, "A sustainable place for a better everyday life," with a robust, functional building designed to endure over time.

The building's light wooden structure stands on a solid stone base, reminiscent of a delicate pine forest on heavy rocks. The base forms steps and terraces that blend indoor and outdoor spaces. The roof follows the site's topography but rises to create welcoming entrances. A large roof lantern acts as a beacon, visible within a long, uninterrupted sightline in the city.

Sustainability

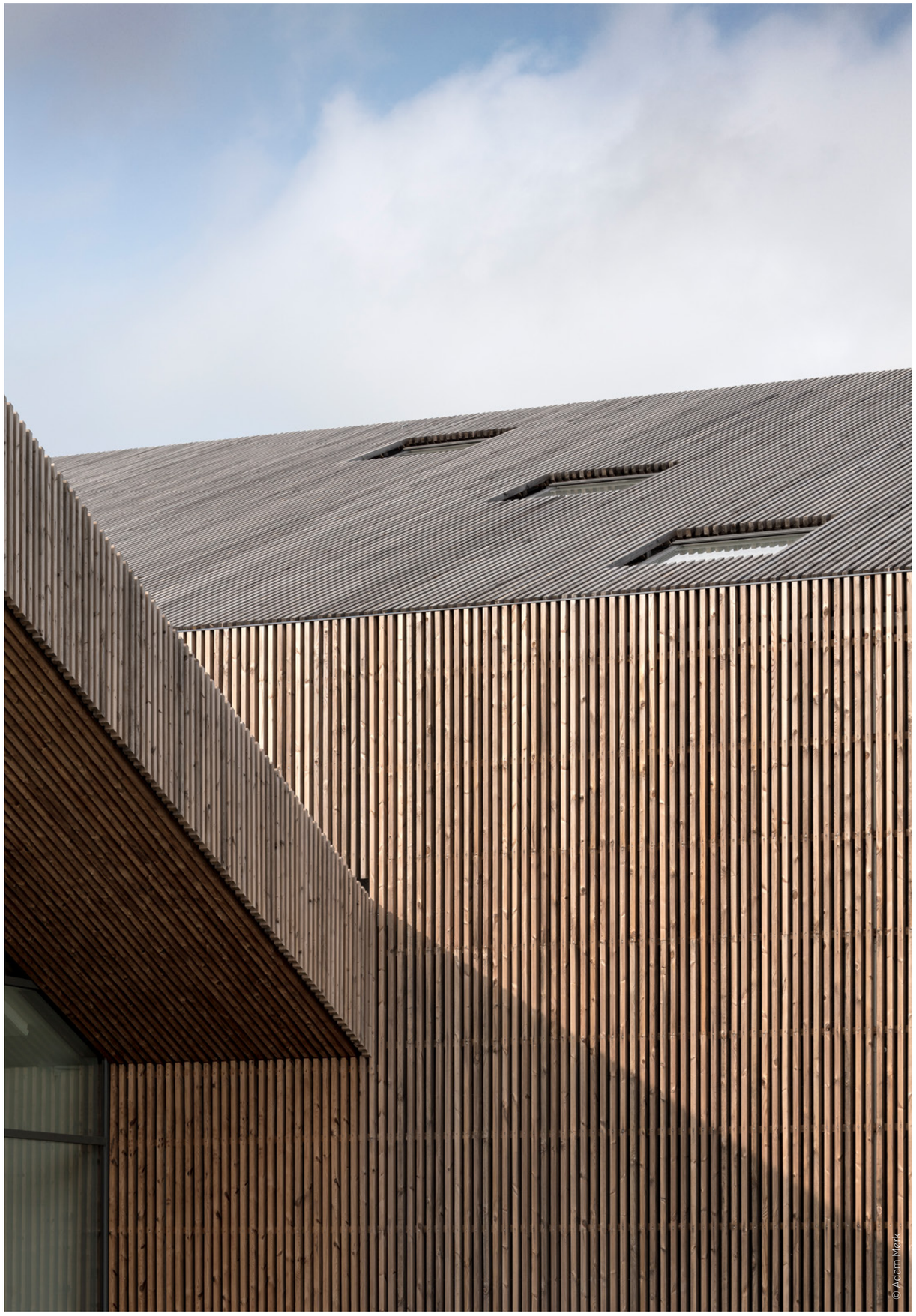
C.F. Møller's vision is to Improve life for people and planet. With 100 years of award-winning architecture inspired by our Nordic values and holistic approach, we place social, economic and environmental sustainability at the heart of our work.

As architects, we play a central role in creating societal and economic value for our clients and for society at large. We interpret our clients aims, and create architectural solutions with lasting functional, technical and aesthetic qualities that meet today's needs, whilst also contributing to the long term cultural quality of the built environment.

We integrate sustainability directly into our architecture from the earliest stages, where individual sustainability concepts work to achieve specific goals, and are also part of a clear, holistic architectural vision, where the whole is greater than the sum of the parts.

We use specially developed parametric tools to analyse LCA, daylight, microclimate, biodiversity, etc. from the earliest stages of the design process.

C.F. Møller is a member of the UN Global Compact, and actively works with the Sustainable Development Goals.



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About C.F. Møller Architects

C.F. Møller Architects is one of Scandinavia's leading architectural firms, with 100 years of award-winning work in the Nordic region and worldwide.

Every day we create architectural quality based on innovation, experience and Nordic values. This assures sustainable and aesthetic solutions with lasting value for clients, occupants and society.

We regard environmental concerns, resource-consciousness, healthy project finances, social responsibility and good craftsmanship as essential elements of our work. This ethos is fundamental to all our projects, a thread which runs from masterplanning to detail design.

Since our founding in Denmark in 1924, we have contributed significantly to the development of welfare societies in Scandinavia and the rest of the world. We are continuously recognised and awarded internationally for setting new architectural standards, due to our strong focus on the functional, artistic and social value of architecture.

Today C.F. Møller has app. 300 employees. Our head office is in Aarhus, Denmark and we have branches in Copenhagen, Aalborg, Oslo, Stockholm, Malmö and Berlin.

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