

TIMBER

Multi-storey Timber Buildings



ARKITEMA & COWI TIMBER

Arkitema and COWI are among Scandinavia's leading architecture and engineering companies. We work strategically with sustainability and we have formed an advisory team of specialists within timber construction - Arkitema & COWI Timber

Our focus is to deliver high quality solutions and design modern timber constructions. We consider timber to be the building material of the future. Timber buildings have a small CO₂ footprint, they are durable, fast to build and above all, healthy for people to live in.

Our Scandinavian collaboration is leading the way within architecture and timber technology. We are able to offer the latest knowledge and solutions that future generations will benefit from.





VISION OF A SUSTAINABLE BUILDING

Our goal is to create the best framework for quality of life, and actively contribute to a green transformation within the building industry. With a construction made of timber, we can realize the vision of CO₂ reduction, increased productivity and a more sustainable building culture.

Arkitema & COWI see modern multi-storey buildings in timber as the future due to their architectural, technical and environmental qualities. Wood is a renewable resource that grows using solar energy and we consider it to be one of the most environmentally friendly materials to build with today. Our aim is to create buildings that are durable, healthy to live in and beautiful.

TIMBER CONSTRUCTION

It is fast and easy to assemble structures in timber, which results in a significantly shorter construction time.

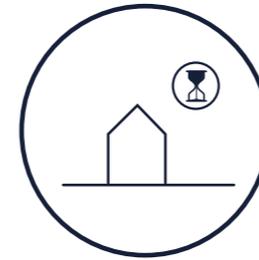
The low weight of timber allows use of larger elements, fewer lifts during assembly, lighter foundations and a substantial decrease in the amount of transports to and from the building site. Moreover, timber contributes to a healthier work environment with less pollution and noise.

The development of solid wall and floor slab elements e.g. in CLT (Cross laminated timber) has made it possible to build higher and safe with timber. Multi-storey buildings can now be built with a load-bearing timber construction. Arkitema & COWI have experience in designing 10+ storey timber buildings.

BENEFITS OF TIMBER

Timber stands out from other building materials as it requires considerably less energy to manufacture. The energy consumption and the CO₂ emission from steel and concrete buildings is twice as much as from timber buildings.

A modern timber building has load-bearing timber structures that are protected from the weather and require no maintenance. The facade materials can be chosen with great freedom and we apply quality assured solutions for fire and moisture protection.



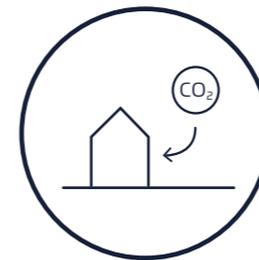
Long lasting



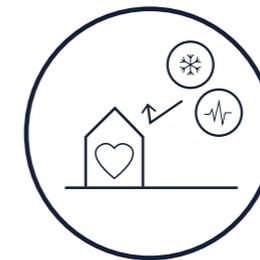
Renewable resource



Life-cycle cost benefits



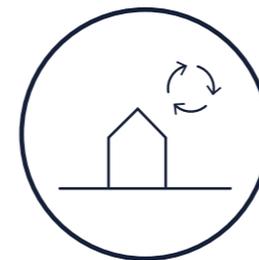
Low CO₂ emission



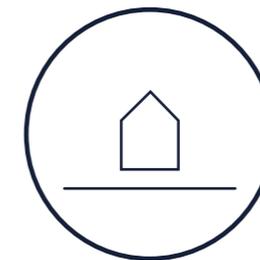
Healthy indoor climate



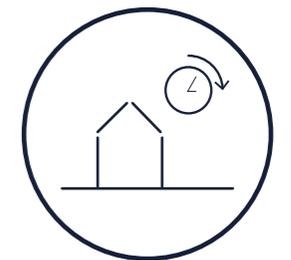
Safe



Recyclable



Light-weight



Fast to assemble



”

TIMBER IS ONE OF THE MOST SUSTAINABLE BUILDING MATERIALS. WOOD IS A RENEWABLE RESOURCE THAT GROWS ON SOLAR ENERGY AND IS REGENERATED IN THE FOREST DURING A BUILDING'S LIFETIME

— Kasper Kristensen, Technical Manager, Timber construction, COWI (DK)



”

The new ÖR center will be a modern, vibrant and inclusive area, and one of the world's biggest timber housing blocks.

KRISTINA PETERS

Partner, Arkitema Architects (SE)

ÖR CENTER, SUNDBYBERG, SWEDEN

Sustainability is of great importance in ÖR center.

From the beginning, timber was an obvious choice for both the clients and the municipality, due to its environmental qualities.

The architecture of ÖR Center consists of six different volumes that vary in height between 4 and 10 storeys. The timber frame is reflected in the design of the facades.

The area will have a mixed housing typology (condominiums, rental and senior housing), making the quarter socially sustainable.

”

Timber was a natural choice for our client already in the competition proposal, due to the sustainable properties. The load-bearing structure is mainly in timber but reinforced concrete has been used on the first three floors that are semi-buried.

OLA GÖRANSSON
Partner, Arkitema Architects (SE)

RIBBINGS VÄG, SOLLENTUNA, SWEDEN

With a total area of 5000 m², Ribbings väg consists of small and efficient 30-60 m² student apartments.

The buildings are erected with a timber construction. A large communal roof terrace, plenty of balconies and stairs located on the outside create good conditions for a social and safe living environment.



TIMBER AS MATERIAL

For Arkitema & COWI Timber, the right solutions within building technology and construction details are crucial. We have in-depth experience in designing and building in wood with the latest knowledge about wood building systems.

We encourage our clients to use locally grown timber from sustainably managed forests. For the load-bearing structures, softwood species such as spruce and scotch pine as well as other Nordic wood species like larch and douglas fir are preferred. Softwood is suited to load-bearing structures due to its dimensional stability, and being both light and strong material. Hardwood can be applied in timber construction as well but is mostly used in other carpentry such as floors etc.

The low weight of timber allows use of large elements, e.g. CLT elements (Cross laminated timber) which are available in up to 3 m x 16 m today. The elements are suitable for load-bearing interior and exterior walls, as well as floor decks and roofs and come with a cut-out for installations, doors and windows.

BUILDING SYSTEMS IN TIMBER

All building systems are prefabricated with a high degree of detailing and efficient assembly. Building systems in timber include elements such as:

- CLT panels (walls, floor slabs, roof slabs)
- Glulam (columns, beams, trusses, arches)
- LVL (columns, beams, trusses)
- Solid timber (columns, beams, trusses)

Timber buildings are often a combination of different timber building systems where their properties have been used strategically. Hybrid solutions are also very common, where steel and concrete have been added to achieve specific structural properties.



”

We are really happy to win this project. The municipality has a focus on building a school for the future. Our main focus was to create a school that fits well with the nature and surrounding.

ASTRID CHARLOTTE SEEBERG

Associated Partner, Arkitema Architects (NO)

**SOPHIE RADICH SCHOOL,
LILLESTRØM, NORWAY**

Sophie Radich School in Lillestrøm will be constructed in timber and have space for 720 pupils. The school will have a distinctive architecture shaped as a four-leaf clover. With a strong focus on the surrounding nature, the students will experience an interaction between the indoor and the outdoor environment.

The new school will be visible in the area and be an attractive and inviting meeting place that evokes curiosity and pride. It will be open to the local community and serve as a gathering place in the area.



Sophie Radich School, Lillestrøm, Norway

”

The maximal use of timber, both in the exterior, load-bearing construction and the interior, will create a visually attractive building that emphasizes the environmental aspect.

ASTRID CHARLOTTE SEEBERG

Associated Partner, Arkitema Architects (NO)

—

TILLER, TRONDHEIM, NORWAY

The new school in Tiller is meant to be a gathering place for cross-disciplinary knowledge sharing, creativity, culture and community. In addition to more space and a better framework for pupils, the aim is to open the school up to the local community and in this way created a gathering place for the whole of Tiller. Therefore, this proposal keeps the main area open outside of teaching hours. Here the locals will have access to the canteen, café, auditorium and library.

A simple design principle offers great flexibility, as the extension is designed as a modular system that makes it easy to add or change areas and solutions if the needs change over time.





Sofemyr School, Sofemyr, Norway

”

MOST OF THE MATERIAL IS IN THE LOAD-BEARING STRUCTURE. THERE IS A GREAT POTENTIAL TO REDUCE THE ENVIRONMENTAL IMPACT BY CHOOSING TIMBER CONSTRUCTION.

— Birger Hauge Lundgård, Senior Specialist, Building structures, COWI (NO)



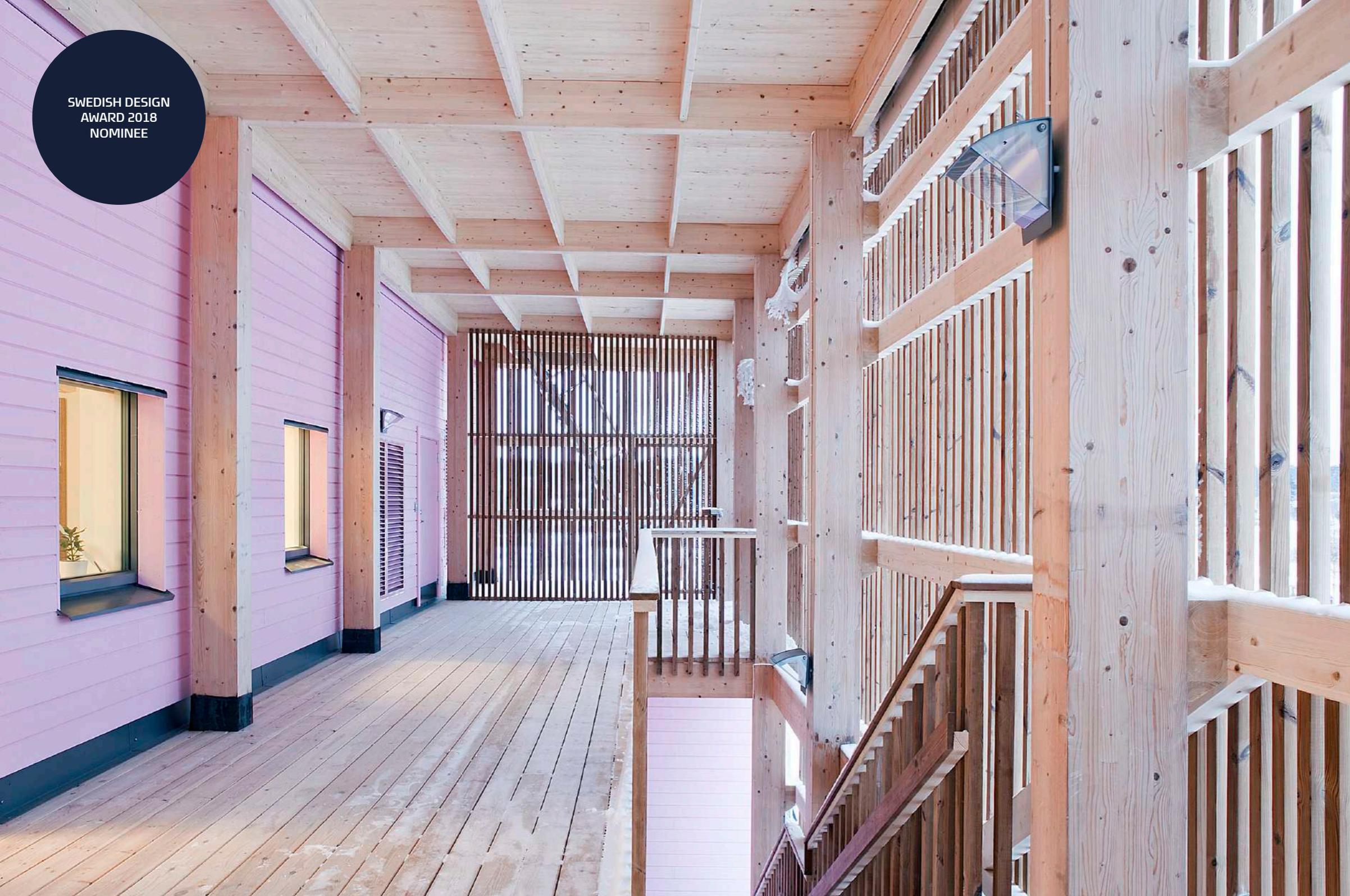
FACADE SOLUTIONS

The facades of a timber building do not need to visually reflect a building in timber but can be made out of masonry, painted or covered in sheet metal or glass.

When we talk about timber buildings, we mean buildings where the load-bearing structures are mainly made of timber.

Our services within facade solutions include:

- *Facade design and materials*
- *Surface finishing (color, patina, durability)*
- *Structural design and fire safety*
- *Ventilation and moisture control*
- *Acoustics*
- *Operation and maintenance*
- *Energy and indoor climate*
- *Daylight and shading*



SWEDISH DESIGN
AWARD 2018
NOMINEE

”

Timber is an excellent material in school and preschool environments. Children absorb what is around them, they are close to the surfaces and experience the physical space in a different way than adults. The sensory experience becomes important with scent, feeling, sound, warm and visually interesting surfaces.

In addition, wood is durable, which is of great interest to our clients.

BRITTA FORESTIER

Business Unit Manager, Arkitema Architects (SE)

**LUSTIGKULLA PRESCHOOL,
KNIVSTA, SWEDEN**

Lustigkulla preschool was completed in 2018, it is a passive house certified building and was nominated for the Swedish Design Award 2018.

The building does not have a timber load-bearing construction but timber has been used extensively in both the exterior and the interior. Exposed timber creates a pleasant warm and tactile preschool environment for the children, with good indoor air quality and acoustics. In addition, the surfaces require less maintenance than white painted plaster walls as minor wear becomes part of the material's natural color variation.

”

Modellvillan has a modern design language, that is beautifully integrated in the surrounding architecture.

OLA GÖRANSSON

Partner, Arkitema Architects (SE)

MODELLVILLAN, ENSKEDE, SWEDEN

Modellvillan consists of two buildings with 15 apartments and is a renovation and extension project of an existing property in Enskede south of Stockholm.

The existing property dating back to 1920s has been completely renovated and expanded with a new extension in timber. The project is a good example of a gentle development in connection with existing buildings. The roof and the facade in larch board will age well and get a silvery shade over time.



STOCKHOLM
BUILDING OF THE YEAR
2018 AWARD
WINNER



Modellvillan, Stockholm, Sweden



”

Viktor Hanson's concept houses are based on the need for an economically accessible housing for a broad target group. The economic efficiency is achieved through a serial produced construction in cross-laminated timber that cuts both construction costs and construction time.

KRISTINA PETERS

Partner, Arkitema Architects (SE)

**VIKTOR HANSON'S KONCEPT HOUSES,
STOCKHOLM, SWEDEN**

The use of a cross-laminated timber construction reduces the concept houses' environmental footprint and shortens the construction time. The shorter construction time and the serial production compensate for the higher material cost of timber. An important aspect of the project is that the architectural quality should not be compromised. The new houses will have facades in brick or slate and higher ceilings on the ground floor. In addition, extra effort was given to the design of courtyards and common facilities.

”

We see the main building as a bookcase with open and flexible shelves that can be rearranged easily according to the current needs.

BRITTA FORESTIER

Business Unit Manager, Arkitema Architects (SE)



NYA KUNGSBERGET, LINKÖPING, SWEDEN

The new building has a pillar-beam frame in solid wood which is combined with a rational building shell that lets in a lot of daylight. The design is highly energy efficient with an external building shell which exploits and channels passive energy supplements in the form of heat and cooling. The roofs also have space for solar panels and / or solar cells to minimize the amount of purchased energy.

CONSULTING & DESIGNING TIMBER BUILDINGS

We provide locally based consulting services within architecture and sustainable construction throughout Scandinavia, and work for private and public clients.

At Arkitema & COWI Timber, we have specialists in timber technology, fire safety, acoustics and building physics. We are familiar with the nature of wood and have the experience and expert knowledge needed in order to build in timber.

Our expertise includes both new construction renovation, cultural restoration, infrastructure, bridges and high-rise buildings. Through our projects and strategic collaborations with the timber industry and universities, we have created a Scandinavian network of specialists who can ensure safe, profitable and future-proof projects.

CONSULTING & DESIGNING TIMBER BUILDINGS

We advise in all architecture and engineering disciplines, including:

- *Architecture*
- *Timber technology*
- *Life Cycle Assessment - LCA*
- *Sustainability certifications e.g. DGNB, BREEAM, LEED*
- *Facade engineering*
- *Fire safety*
- *Acoustics*
- *Structural design*
- *MEP building services*
- *Energy strategy*
- *Indoor climate*

METHOD

We work cross-disciplinary to ensure the right total solutions for our clients. We have specialists with many years of experience within timber construction at our Scandinavian offices in Denmark, Sweden and Norway.

Timber construction has unique advantages when the material is applied and detailed correctly. This requires great technical knowledge from the consultants. In close cooperation with contractors, universities and manufacturers, we ensure that we can provide the best advice. At Arkitema & COWI Timber we are familiar with the properties of timber and we work with the nature and tectonics of it, both in design and detail. From an early sketch to the finished project, we have a strong focus on:

- Technically sound solutions (fire safety, acoustics, moisture)
- Total economy (construction process, maintenance, long-term value creation)
- Rational material choices (quality, environmental benefits, material life cycle)

”

**WE HAVE A UNIQUE SITUATION AT ARKITEMA & COWI,
WHERE WE QUICKLY AND EASILY CAN CALL IN
THE RIGHT SPECIALISTS FROM ANY DESIGN FIELD NEEDED,
FROM ANY OF OUR OFFICES, IN ORDER TO FIND
THE BEST SOLUTIONS FOR OUR TIMBER PROJECTS.**

— Daniela Grotenfelt, Head of Sustainability, Arkitema Architects (SE)



”

The municipality of Viborg has ambitious plans for future proofing Overlund School, allowing us to come up with some of the most innovative solutions, where we really focus on creating the best learning environment not only for the students who will learn here in five years, but also for those who will be here in 50 years.

PERNILLE SVENDSEN

Associated Partner, Arkitema Architects (DK)

LYSNINGEN, VIBORG, DENMARK

We have named our proposal “Lysningen” - the clearing, which, combined with the use of timber, fits to the architectural principle of the building; a forest of green pillars, held together by plateaus of different heights - like tree crowns forming a roof over the forest floor.

The school is designed to provide many possibilities for its users. In the center there is an atrium around which different floor plateaus spread out. These form an interesting and dynamic central space where all floor are closely connected and create a natural flow thorough-out the building. Stairs that connect the different plateaus are also used as amphitheatres for teaching and gathering.



”

The vision for Sønder Otting School is to create a model for future sustainable and playful school buildings.

PERNILLE SVENDSEN

Associated Partner, Arkitema Architects (DK)

—
**SØNDER OTTING SCHOOL,
HADERSLEV, DENMARK**

The school will be a children's universe built in timber with space for 500 children.

By building the school primarily in timber, we get a beautiful and light architectural expression that in addition, is very sustainable. Timber has remarkable qualities that give a great opportunity to create a learning universe that undoubtedly will make a difference to the people using the school and the facilities around it, in the next decades. Both socially, economically and environmentally, the project has a high sustainability score.. Sønder Otting school will have a very low carbon footprint and will be one of the first schools in Denmark built in timber.





Sønder Otting School, Haderslev, Denmark



”

Skogskvarteret will be a balanced and cohesive neighborhood built in timber with a strong architectural identity and a focus on the social and environmental sustainability

ELIN ANDREASSEN
Competition Manager, Arkitema Architects (SE)

SKOGSKVARTERET, UPPSALA, SWEDEN

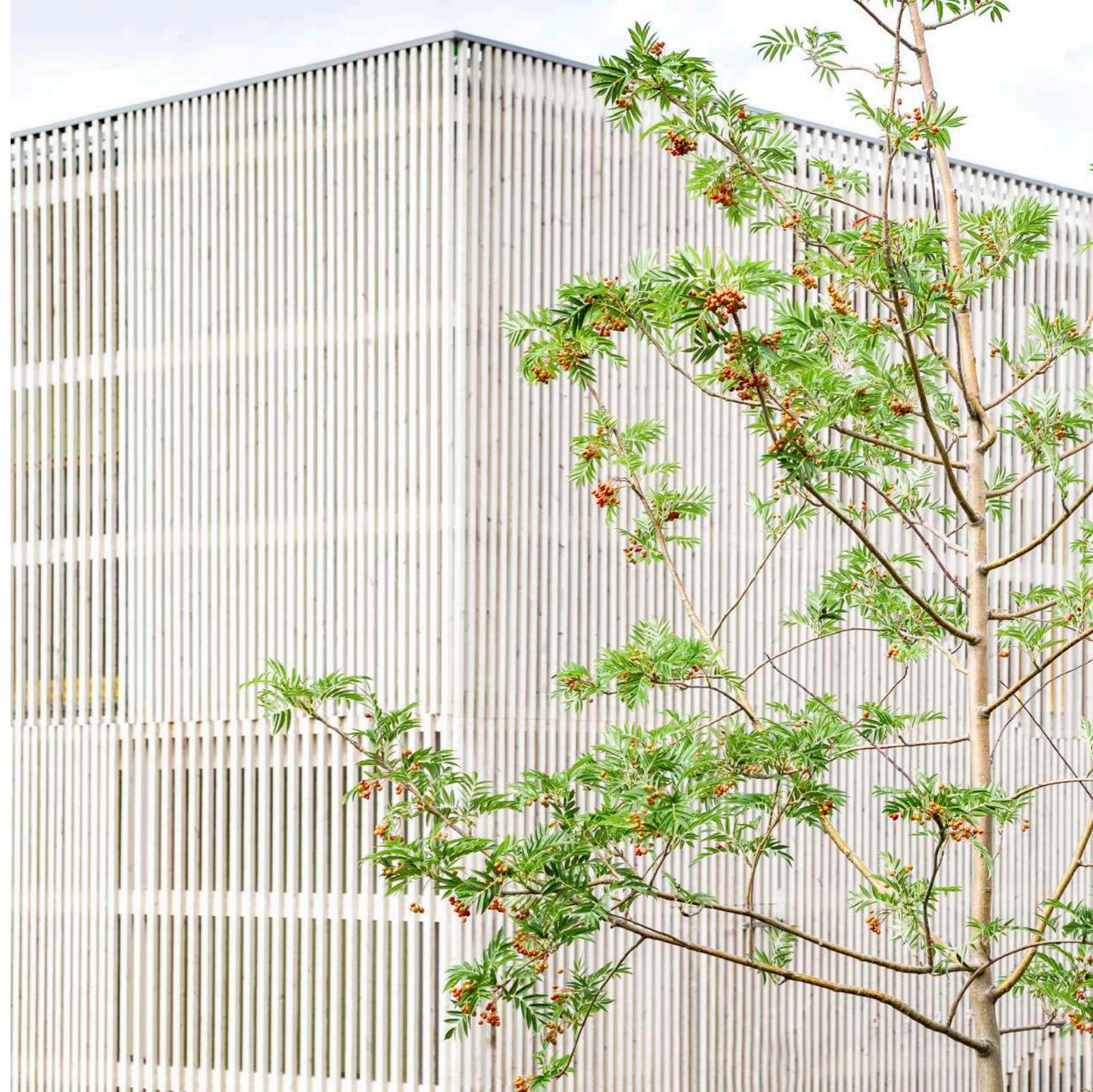
Timber was a natural choice for the ambitious clients, as it has a significantly lower climate impact than traditional steel and concrete constructions. Partly, due to less carbon dioxide emissions during construction and partly, because timber binds carbon dioxide throughout the life of the building.

Skogskvarteret will have a strong focus on the social sustainability with common spaces for spontaneous meetings between the residents. In addition, the apartments will consist of a mix of rental and condominiums as well as accessible living for people with disabilities.

”

**SUSTAINABLE REQUIREMENTS AND AMBITIONS
POSITIVELY CHALLENGE THE FIELD OF ARCHITECTURE,
RESULTING IN VALUABLE SOLUTIONS FOR
BOTH CITY DISTRICTS AND BUILDINGS**

— *Kim Risager, Partner, Arkitema Architects (DK)*



Nye Hopperen School | 6.800 m² | Hopperen | Norway | 2018

Asko Coffee roastery | 12.000 m² | Vestby | Norway | 2018

Karlshus School | 2.900 m² | Karlshus | Norway | 2017

Kringsjø Student housing | 12.000 m² | Kringsjø | Norway | 2017

Egil Norli Office building | 1.100 m² | Fredrikstad | Norway | 2017

Lager 12 Office building | 10.800 m² | Fredrikstad | Norway | 2017

Preschool Rymarksvej | 1.000 m² | København | Denmark | 2016

Fantoft Housing and preschool | 10.000 m² | Bergen | Norway | 2016

Bjølstad Student housing | 5.000 m² | Fredrikstad | Norway | 2015

Præstø Multicenter | 7.800 m² | Præstø | Denmark | 2013

Naturum Tåkern | 680 m² | Glänå | Sweden | 2012

Utzon Center | 2.900 m² | Aalborg | Denmark | 2008

Gigantium Sport Arena | 7.000 m² | Aalborg | Denmark | 2000 - 2010

Universeum Göteborg | 10.700 m² | Göteborg | Sweden | 2001

CASA NOVA Housing | 34.000 m² | 8 cities in Denmark | 2000 - 2002

Aalborg Airport | 6.000 m² | Aalborg | Denmark | 2000

Lysningen | 10.800 m² | Viborg | Denmark | 2019-

Oksenøya Living and Treatment Centre | 18.400 m² | Bærum | Norway | 2019-

Oksenøya Preschool | 4.500 m² | Bærum | Norway | 2019-

Sofiemyr School | 20.000 m² | Sofiemyr | Norway | 2019-

Sophie Radich School | 11.700 m² | Lillestrøm | Norway | 2019-

Tiller School | 17.000 m² | Trondheim | Norway | 2018-

Nya Kungsberget | 31.000 m² | Linköping | Sweden | 2017-

Ör Centrum | 16.400 m² | Sundbyberg | Sweden | 2017-

Tåsenhjemmet | 14.300 m² | Oslo | Norway | 2017-

Sønder Otting School | 5.800 m² | Sønder Otting | Denmark | 2017-

Ribbings Väg | 5.000 m² | Sollentuna | Sweden | 2016-

Kronborg Strandby | 15.000 m² | Helsingør | Denmark | 2018

Lustigkulla Preschool | 1.900 m² | Knivsta | Sweden | 2017

Bardufoss School | 7.500 m² | Målselv | Norway | 2017

Prästgården | 2.800 m² | Gustavsberg | Sweden | 2011

Nørre Vosborg | 4.000 m² | Vemb | Denmark | 2008

ARKITEMA & COWI TIMBER

Arkitema & COWI Timber is a knowledge-based consulting group that provides specialized consulting services within architecture and sustainable construction, and solves tasks for private and public clients.

With experience from Denmark, Norway and Sweden, we have a large and well-founded base for knowledge in timber construction, which ensures the best results for our customers.

We focus on generating and spreading our knowledge about sustainable timber construction to our colleagues, customers and the external stakeholders. Our designers and timber specialists, with many years of experience, enable us to advise our clients in all aspects of a sustainable timber building; in design and construction and at a small and large scales.

Main locations with Arkitema & COWI Timber competences:



WWW.ARKITEMA.COM

+45 7011 7011 / info-danmark@arkitema.dk

WWW.COWI.COM

+45 5640 0000 / cowi@cowi.com

ARKITEMA
ARCHITECTS

| COWI