TECHNICAL

Construction

The cultural center is built with glued laminated timber (glulam) and cross-laminated timber (CLT).

What kind of materials are they?
Glulam is a type of structural engineered wood product formed by layers of dimensional lumber bonded together with durable, moisture-resistant structural adhesives. Relative to its own weight, it has a higher load-bearing capacity than both steel and concrete.

CLT is made of stacked layers of wood, glued together to form solid a wooden material, with adjacent layers fixed perpendicular to each other. CLT, as a result, is hugely strong, and because it can be used for massive beams, columns and floors, it's very fire-resistant. It also has advantages for the indoor climate through moisture-buffering.

What other materials are used in the construction?
There are steel trusses on the 5th floor under the hotel rooms, which stand on glulam pillars. Concrete floors are located on floors 5-6 (the Technical Plant floors), mainly to dampen the noise from the fans in the Technical Plant area. In addition, there are concrete slabs on floors 19 and 20, as well as on the roof above floor 20 to reduce the effect of wind on the tower.

How is the hotel part structured?
The hotel room modules on floors 6-18 were manufactured by Derome in Renholmen. The finished "blocks" are placed on top of each other, with glulam pillars in each corner that take the vertical loads. The roofs of the modules are Interconnecting so that they bear the loads out to what we call the towers, i.e., the elevator shaft and the stairwells at the far north and south of the hotel.

How did the room module construction facilitate the process?
We saved one year in construction time by building with finished hotel room modules. There was also lighter construction traffic in the area, as production of wooden modules took place remotely.

Why is there glass on the hotel facade?
Its purpose is to reflect the ever-changing nature of the sky and give the impression that the tower floats above the cultural center. At the same time, the glass facade exposes the spectacular wooden roofs inside the building.

Are the elevator shafts also built of wood?
Yes, all elevator shafts are made of CLT massive timber.

What role do the trusses in the south foyer have in the building?
The trusses, with beams and supports of glulam and steel drawbars, bear the load. Thanks to this, for example, not as many pillars are needed in the southern foyer.

Who is behind the construction technology used?
It is TK Botnia who, together with Martinsons, have developed the design solutions used.

The top floors of the building sway a bit in the wind. Should that happen?
Yes, it is perfectly normal for such tall buildings to sway. Wood is an elastic material, which means that strong winds will make the top floors sway slightly. To dampen the effect of the wind, heavy concrete slabs are installed on floors 19 and 20, as well as on the roof above floor 20.

Details

How many elevators are there in the house?
In total there are 8 lifts in the house.
Elevators 1-3 go as far as floor 4
Elevators 4-5 go as far as floor 20
Elevators 6-7 go as far as floor 19
Elevator 8 goes as far as floor 5

How should the large staircase in the entrance be used?
In whichever way people and performers want to use it! Its usage can range from being a casual meeting place to a grandstand for spontaneous performances. The cultural staircase is a staircase, a meeting place, a place to sit and work, a stage, and a place to just sit and dream.

Why do the windows have awnings?
The awnings are controlled by the sun and create a better indoor climate, while the thin fabric means that the outside is not blocked off.

Will the wooden floors in the interior walkways be durable?
These are mainly glued ash floors, which are about 15 mm thick, so they can be sanded if necessary.

What type of wood is used on the north terrace on the 4th floor?
The decking is in pine and is treated with OrganoWood®. Even the glulam pergola is treated with OrganoWood®. OrganoWood® is an environmentally classified wood protector modified with silicon that provides long durability and a beautiful silver-gray shade. The technology gives the wood rot protection, creates a water-repellent surface, and improves flame resistance.

How do the acoustic tiles in the ceiling in the southern entrance work?
They help to reduce sounds, including vibrations, echoes, and footsteps from the floor above, which creates a better sound environment in the building.

What is the big black ”box” on the roof of the cultural center?
It is the spa of The Wood Hotel located on the 20th floor, which includes an infinity pool. The facade is covered with black solar panels, which are part of the energy solution for Sara kulturhus.

Sustainability and energy

How does the energy solution in Sara kulturhus work?
A control system, run by artificial intelligence (AI), monitors energy and heat, and adapts the settings to the number of people who visit the building. Over time, it learns the energy requirement patterns of the building – when a lot of energy is needed and when less is needed, when cooling is necessary and when heating is required. The AI continuously calibrates how much energy is required and when. In this way, the entire system is always perfectly optimized whatever the requirements.

The building also communicates with nearby buildings as well as the entire energy system in Skellefteå. When there is an abundance of energy in Sara kulturhus, it is sent, for example, to our new travel center. Or saved in batteries. And if the cultural center needs heat, the energy generated when a nearby building is being cooled down can be used. All excess heat is funneled back into the system. Nothing is wasted.

Where does the energy come from?
Everything is powered by 100% renewable energy. Sara kulturhus is equipped with solar panels, batteries and a heat pump that works with the electricity grid and water and district heating networks. The sprinklers, which in other buildings are usually powered by diesel, also use renewable energy.

How many solar panels does Sara kulturhus have and how many kW of installed power do the solar cells have in total?
The house has four photovoltaic systems, one of which is on the facade. The others are on the roof. The installed power is a total of 170 kW, of which 120 kW comes from the solar cells on the roofs.

What type of energy storage/battery is used? What is the capacity of the battery storage?
The house has two forms of energy storage. The entire building body, including for example the pool, is a thermal layer. In the face of an expected shortage of heat, you can run a little higher heat for a period and then turn it down, even turn off the heat, and manage on the saved heat. The other form of energy storage in the house is batteries, for a total of about 500 KWh.

What are the benefits of Sara kulturhus's energy system?
It has created an environmentally friendly, sustainable, and energy-efficient building, with a system that allows us to reduce both costs and emissions. The building is designed in such a way that the energy consumption is 25% lower than Swedish building regulations require. In addition, the energy solution optimizes energy use in the building so that energy consumption is reduced by an additional 20%. This means that the property is consuming more than 40% less energy than the norm. Add to this the fact that Sara kulturhus reduces energy use most when it has the greatest effect, and the real climate impact is greater than the percentages suggests.

In what way is the building's environmental impact enhanced by the fact that it is built from wood?
Wood is a renewable raw material and the production of CLT wood and glulam is energy efficient and has minimal environmental impact. Thanks to the fact that the house is built of wood, it also "stores" carbon dioxide throughout its life. In fact, the glulam and CLT timber in Sara kulturhus will "store" 9,000 tonnes of carbon dioxide during the time the house is standing.

Where does the wood come from?
It came from the region's forests and was harvested within a radius of 60 km from Skellefteå. In total, the building used about 12,200 cubic meters of wood. All this wood has since been replenished.

Where are the components manufactured?
All building parts were manufactured here in Västerbotten, the finished hotel room modules at Derome in Renholmen and all glulam and CLT timber at Holmen's production facility in Bygdsiljum.

What is re-using and how does it affect the sustainability of the building?
Re-using means renovating old and worn products instead of disposing of them and buying new ones. By extending the life of the products, the environmental impact is minimized, especially in comparison with recycling and manufacturing, which require a lot of energy and have a major impact on the environment. In Sara kulturhus, furniture and furnishings are largely recycled or re-used.

Safety

What happens if the building starts to burn?
In the event of a fire incident, a loud evacuation alarm sounds with a recorded voice in all parts of the house, which is evacuated in line with the fire protection plan and with a gathering place at Möjligheternas Torg. The house also has a sprinkler system that starts when necessary.

Is there a greater fire risk in a wooden building than in other, non-wooden, constructions?
No, because glulam has large homogeneous cross-sections which means that it has good protective properties that make the material stable during the initial stage of a fire. The material is slow to ignite, burns slowly and has a slow heat development – something that influences whether the fire develops or weakens. A charred carbon layer is also formed on the glulam surface in the event of a fire, which protects the internal parts and means that glulam retains its load-bearing capacity throughout the duration of the fire.

Is the wooden construction treated to reduce the risk of fire?
Yes, visible wall surfaces are treated with flame retardant to counteract the rapid spread of fire. The flame retardant product is supplied by the company, Eld & Vatten.

Has anything been done to protect against extreme weather?
Sara kulturhus is built in line with current rules to deal with wind, snow, fire, etc.

Technical solutions for performances and exhibitions

How do acoustics work on the big stage?
The digital acoustic enhancement system RAES makes it possible to adapt the acoustics and reverberation on stage 1 to suit pop, rock, jazz and classical music, genres that all need their own specific sound in the room. The system also works as a complement in situations where you want a solution with 5: 1 or 7: 1 sound in the space. The sawn wood wedges on the walls act as diffusers to minimize the sound bouncing around the room.

What kind of technology is used in the exhibition space in Skellefteå Art Gallery?
When climate-sensitive art is exhibited in a whitebox, it is possible to select ”climate mode”. Then the goal is for the temperature to be between 20.5 and 23.5C, with a humidity of 45-55% rh.

The lighting consists of rails on the ceiling, where floodlights with extra high color reproduction can be placed freely. Each spotlight has its own dimming control on the luminaire, so that the brightness can be regulated individually. Each lighting rail has three ignition phases, which means that you can have three different scenarios in the rooms and quickly switch between them.

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How can the premises be adapted for different types of events?
There are several pull-out and retractable walls that allow rooms to be adapted to everything from small exhibitions, to concerts and large conferences.

Accessibility

What has been done to make the house accessible to everyone?
The Sara kulturhus app and AR solutions make Sara kulturhus accessible and safe, regardless of the impairments visitors might have. We can help to facilitate accessibility for those with visual impairments and impaired fine motor skills through to various cognitive challenges. Of course, there are hearing aids available for all stages.

How does the app improve accessibility in Sara kulturhus?
The app’s purpose is to make the house accessible and safe, regardless of the impairments visitors have. Those visitors who need some assistance can, for example, have support in finding and navigating around the house, but can also access information about the different exhibitions or shows that are in the house. It can also mean having the security of preparing for a visit via the app.

How is AR (Augmented Reality) used in the building?
There is an AR solution for navigation in Sara kulturhus, that can be used as a visual support to navigate between different places, to assess how far it is between various locations, and to find the nearest toilet or a certain stage, for example. The navigation is adapted with sound and vibration for people with visual impairment.

How does the app help people with, for example, visual impairments, hearing impairments, impaired fine motor skills or various cognitive challenges?
We have used service design to develop the app and to aid test users with different functional variations to help us to discover aspects of the app that need to be adjusted. There are also some areas where we know the app’s coverage can be improved. In the app’s accessibility report under ”Content that is not available”, we describe in more detail what these areas are.

Can people in wheelchairs get around the house?
Yes, absolutely, there is a wheelchair ramp at Norra Entrén (North Entrance). Floors 1 and 2 are largely a uniform floor area with a minimum of thresholds. There are also several lifts in the buildings if you need to move up or down within Sara kulturhus. See also www.sarakulturhus.se/en/your-visit/accessability/

Where can suggestions for improvements be sent / submitted?
By increasing our awareness of what works well and what does not, we can jointly achieve a higher degree of accessibility. If anyone feels that any content is not available or has suggestions for improvements to our accessibility, we can be contacted via email: info@sarakulturhus.se. We need to know:

- Where did you encounter problems?
- With which part of the app are you experiencing problems?
- What type of content does not meet the requirements?
- In what way do you feel you have a problem?

Is it possible to get to Sara kulturhus by public transport?
Yes, by bus to Skellefteå bus station and then walk 250m along Södra Järnvägsgatan.

Is there an entrance for a transport service / taxi to stop?
Yes, at the southern entrance.

Are there parking spaces at the entrance reserved for the disabled?
Yes, on Torggatan.