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Kvarteret Mästaren, Sweden

Case Study 91

Aspects of Sustainability

This project highlights the following:

Green Aspects

Energy

Carbon

Materials

Water

Local Impacts

Social Aspects

Human Resources

Corporate Community Involvement

Business Ethics

Health and Safety

Skanska Color Palette™

Energy

Carbon

Materials

Water

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The Kvarteret Mästaren office building in Kalmar was the first building in Scandinavia to be awarded LEED Platinum for New Construction and is certified according to the EU GreenBuilding programme.

"Our green building is part of Länsförsäkringar Kalmar län's commitment to the environment. We have been environmentally certified for many years and carry out an environmental audit of all our properties. Skanska was able to provide us with a complete solution, which led to the LEED certification of our new office building. It was therefore natural for us to strive to create a top class environmentally certified building."

Lars B Danielsson, CEO Länsförsäkringar Kalmar län

Project Introduction

Kv. Mästaren, otherwise known as LF House (Länsförsäkringar House), is located in Kalmar, southeast Sweden. The building is situated on Kvarnholmen in central Kalmar and is the headquarters of Länsförsäkringar Kalmar Län, which is an insurance company based in Kalmar County.

Skanska Sweden constructed the US$ 16 million building for Länsförsäkringar Kalmar Län, who moved into the building in December 2010. The four story Kv. Mästaren has a total floor area of approximately 6,000 m^2 and is designed for around 100 employees. The building has a lunch restaurant and common spaces, such as conference facilities, meeting rooms, and outdoor terraces, which occupy the two top floors. The building also has two ground floor retail premises and 37 car parking spaces in the basement garage. Kv. Mästaren was constructed in a dense urban area with limited space, and the project team used Just In Time delivery and a prefabricated frame to avoid the need to store materials or assemble large construction components on site.

Kv. Mästaren was the first building in Scandinavia to achieve LEED Platinum for New Construction (v2.2), and was Skanska Sweden's first LEED project constructed for an external client. LEED is a voluntary U.S. Green Building Council (USGBC) certification process intended to

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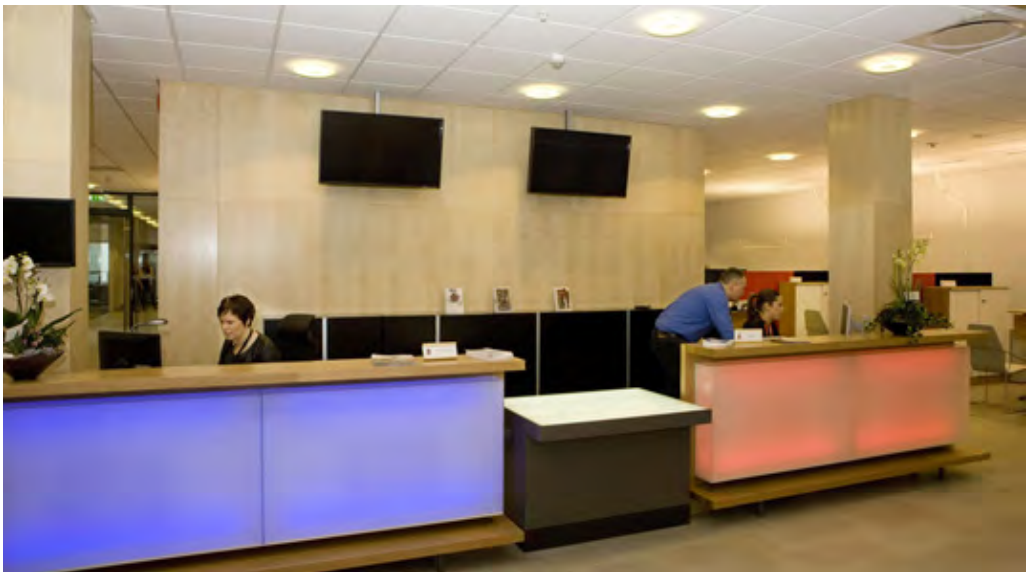


encourage and guide the construction of more sustainable and energy efficient buildings. The building was also certified according to the EU GreenBuilding programme, which is a voluntary initiative aimed at improving the energy efficiency of non-residential buildings in Europe. The project won the Kalmar Urban Building prize in 2011 for contributing toward the urban renewal of Kvarnholmen, whilst preserving the historic character of the area.

Contributing Toward Sustainable Development

Kv. Mästaren is an energy efficient building that is equipped with intelligent energy monitoring capabilities and a Photovoltaic (PV) solar energy system. The building has water efficient fixtures, and was designed to promote healthy office environments and a long useful lifespan through flexible office design. Kv. Mästaren has an extensive green roof and the development has contributed toward sustainable urban development and the preservation of the historical and cultural identity of the surrounding area. Skanska incorporated environmentally responsible materials into the project and recycled a very high proportion of the project's construction waste. During construction, Skanska worked to minimize public disturbance in a dense urban area and ensured that no accidents occurred on site. The project benefited the regional economy by contracting local workers and procuring regionally manufactured construction materials.

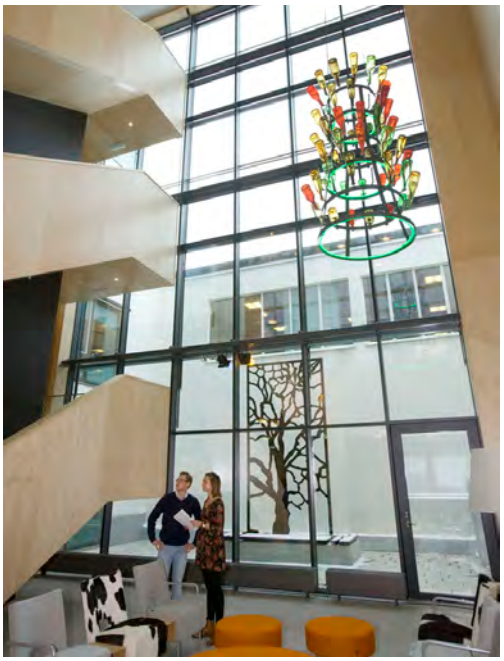
Green Aspects

Energy

Energy efficiency

Kv. Mästaren is designed to annually use 67 kWh/m^2, which is around 37 percent less than the Swedish building code that demands commercial buildings use no more than 100 kWh/m^2. Early in the project planning phase, Skanska conducted energy simulations and identified various techniques to enhance energy performance that were incorporated into the project from the outset.

Kv. Mästaren is well insulated and the windows have a U-value of 1.0 W/m^{2}K. A rotating wheel heat exchanger system was installed to recycle approximately 85 percent of the heat from outgoing air back into the building. District heating from the municipal system provides the building with energy efficient space heating and hot water. Energy efficient light fittings were installed, including both energy efficiency T5 lamps and LED (Light Emitting Diode) lamps, which use 80 percent less



electricity than halogen lamps and have a lifespan of up to 10 times longer. All the windows have a tinted finish, which avoids excessive solar gain by providing a sun factor of 0.33 that reduces sunlight by between 55 and 60 percent. Windows on the south, east and west facing façades are also fitted with external sunshades, which are automatically controlled by individual light sensors. The sunshades ensure that natural light can still enter the building to reduce dependency on artificial lighting.

Skanska is also working with the client to monitor and further improve the building's energy performance. The building has been equipped with monitoring equipment, which records energy and indoor climate data at 5-minute intervals in a database. Skanska used this data to verify that the building has fulfilled its energy design expectations, and will allow the building's energy use to be further fine-tuned and optimized in the future.

Intelligent energy monitoring

The building is equipped with sophisticated monitoring and sensor capabilities, which automatically control and optimize the lighting, heating/cooling and ventilation systems.
All lighting fixtures are controlled by presence detectors to avoid wasting energy, particularly out of office hours. The heating, cooling and ventilation systems are regulated by temperature demand and indoor CO_2 concentrations. Every room has sensors to ensure that its specific ventilation and heating/cooling requirements are met. The heating and cooling systems are also intelligently linked to avoid the risk of simultaneously heating and cooling rooms.

Renewable energy

Kv. Mästaren has a PV solar energy system that consists of 78 panels and is designed to produce 15,000 kWh per year. The system generated 14,200 kWh of energy in 2011. The building's externally sourced electricity is supplied by wind power plants, according to an initial four-year contract with the electricity supplier.

Carbon

Operational carbon emissions

Kv. Mästaren has very low operational carbon emissions due to its energy efficiency, use of on site PV solar energy and sourced electricity generated from wind energy. The building's only energy-related greenhouse gas emissions arise from efficient district heating that utilizes biofuels

Materials

Environmentally responsible materials

Low Volatile Organic Compound (VOC) materials included adhesives, sealants, paints, coatings and carpets. Many of the construction materials were sourced from the surrounding region, including locally sourced limestone and birch wood, which minimized the environmental impacts related to transportation. Recycled content amounted to over 9 percent of construction materials (total recycled content). Materials with recycled content included the steel reinforcement, frames and other metal products, plasterboard, insulation and doors.

Waste management during construction

99.8 percent of the project's construction waste was processed into new materials, with only 0.2 percent being sent to landfill. The efficient recycling

of waste resulted from Skanska's close cooperation with the waste contractor, and the contractor's efforts to thoroughly sort mixed waste materials.

Waste management during operation

The office and retail outlets have comprehensive waste sorting facilities. Both street level entrances have central waste collection facilities that are serviced by specialist waste management companies.

Water

Water efficiency

Low-flow fixtures and fittings, such as taps and toilets, have been fitted throughout the building and no portable water is used for irrigation. The building uses over 30 percent less water than the LEED baseline, which equates to annual potable water savings of approximately 1,700 m^3.

Other Green Aspects

Project partner cooperation

Skanska worked closely with the client to incorporate various green solutions and ensure LEED certification throughout the project from planning to post-occupancy energy analyses. This cooperation included a thorough needs analysis during the planning phase to establish how the building would be used and to optimize energy performance.

Green roofing

The roof has been covered with a drought resistant sedum roof, which provides additional thermal insulation and extends the roof's lifespan by protecting it from weathering and ultraviolet light. Sedum roofing can also provide habitats for birds and insects, filter airborne pollution and help reduce stormwater runoff.

Areas of the roof that are not covered with sedum plants have ClimaLife roof tiles, which have a coating of titanium dioxide that neutralizes airborne nitrous oxides through photocatalysis. The coating converts harmful nitrous oxides into harmless levels of nitrates that are washed away by rainwater.

Reducing the urban heat island effect

Kv. Mästaren's green roof, underground garage and white façade reduce the urban heat island effect in central Kalmar by decreasing the extent of dark surfaces on the site.

Reducing light pollution

The building is fitted with downlighters to avoid light pollution, over illumination and energy wastage. Light pollution can cause adverse human health impacts and disrupt urban ecosystems.

Social Aspects

Occupational health and safety

No accidents occurred on site during construction and the Lost Time Accident Rate per hours worked was zero. Skanska's standard health and safety measures and procedures were followed.

Historical and cultural preservation

The surrounding urban area is characterized by buildings from the late 1600s and early 1700s, and includes the prominent Kalmar cathedral, which was built in 1702. Kv. Mästaren was designed to preserve the area's historical and cultural identity. Kv. Mästaren has a contemporary feel, but is designed to not overshadow or distract from the neighboring historic buildings. For example, larger windows were incorporated into a traditional façade structure that is intended to complement the historical architecture in the area, whilst giving the building a contemporary feel. The four level building also only appears to have two levels from both adjacent streets to blend in with the neighboring buildings. The adjacent historical buildings had poor foundations that were originally made from wood, and the project involved comprehensive reinforcement work around the site prior to piling.

Healthy office environments

The creation of healthy office environments for Länsförsäkringar's employees was an important element of the building's design, which aims to further the company's low absence rate through illness. The ventilation system delivers a high airflow and is equipped with outdoor air monitoring. Skanska also implemented an indoor air quality management plan during construction and prior to occupancy. The building has extensive glazing to allow natural light and external views, and all workspaces are lit with natural daylight. A central courtyard with an 8 m wide 12 m high glazed facade lets light into the core of the 60 m wide building. Control switches and dimmers are

fitted throughout the building to allow occupants to manually adjust local thermal comfort and lighting levels. In addition to the automatic sunshades, manual blinds have been fitted to some windows to allow occupants to further reduce the level of natural light when necessary. The building's terraces give occupants access to pleasant outdoor spaces.

Flexible office design

Flexible design was an important feature of the project, with the aim of easily allowing necessary building adaptations in the future to promote a long useful lifespan. The internal walls are relatively easy to remove or rearrange, and the building has several separate entrances to potentially allow multiple independent tenants to occupy the building. The interior décor and design is intended to be sober and elegant so as to not become outdated. The building also offers a mix of individual small offices and open planned spaces to fulfill various functions.

Contributing toward sustainable urban development

The site was a previously developed brownfield site that had been used as a car park since the 1960s. The project involved the urban infill and development of this under-used site in Kalmar's historical city center. Being located in a dense urban area, the site has good access to a variety of services and amenities.

Promoting more sustainable modes of transport

The building is located 400 m from Kalmar central station and bus terminal, with numerous regional connections. As the site was previously used as a car park, the project has reduced the number of car parking spaces in central Kalmar by around 25 spaces, which will encourage more commuters to use alternative and more sustainable modes of transport.

Economic Aspects

Regional construction workforce and materials

Approximately 60 people were involved in the construction of the project. Around 65 percent of the workers were from the surrounding Kalmar area. 63 percent of the construction materials were manufactured and sourced regionally, including concrete, timber, steel, plasterboard and insulation.

Efficiency financial savings

Kv. Mästaren uses 37 percent less energy than the Swedish building code, which corresponds to significant financial savings for occupants throughout the building's lifespan. One example of the building's cost effective energy efficiency measures is the demand controlled ventilation system. The system annually saves 14 kWh/m^2, which equates to a net present value of approximately US$ 71,000 (over a period of 15 years with a discount rate of 5 percent), with minimal investment costs compared with a constant airflow ventilation system.

Learning From Good Practice

Skanska developed the client's brief to deliver a project that exceeded their expectations and created a green building certified to the highest LEED standard and the EU GreenBuilding programme. Close cooperation between Skanska and the client was fundamental to the project's success.