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Skanska House, Finland

Case Study 92

Skanska House is Skanska Finland's head office in Helsinki that was designed to achieve LEED (Leadership in Energy and Environmental design) Core & Shell Platinum certification, as well as EU GreenBuilding certification.

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

Project Introduction

Skanska House is situated in the Manskun Rasti quarter of Helsinki, 3 km northwest of the city center. The development is the first phase of a Skanska project that includes four adjacent buildings on the corner of Mannerheim Street and Hakamäki Street, which will provide a total of 33,000 m² of office space.

Skanska Commercial Development Nordic developed and owns the building, which was completed in February 2012. Skanska House has a total leasable area of 9,100 m², and includes eight above ground floors centered around a glazed atrium and three basement garage levels. The project team used pioneering 4D Building Information Modeling (BIM) to plan the construction of the project with a delivery timeline. The BIM model incorporated construction scheduling, safety and site logistics information, existing underground utility lines and the site's terrain, which was laser-scanned prior to the project. The BIM model helped to improve productivity, reduce waste, enhance safety and reduce disturbance during construction. The project was awarded "Best Project" in the 2011 Tekla Global BIM competition and the "Work Site of the Year 2011" by the Rakennuslehti construction magazine, also for the pioneering use of BIM.

The Skanska House project was part of Skanska's Green Initiative and the project was designed to achieve LEED Core & Shell Platinum certification, which is the highest level possible. LEED is a voluntary U.S. Green Building Council (USGBC) certification process intended to encourage and guide the construction of more sustainable and energy efficient buildings. The project is also to be certified according to the EU GreenBuilding Programme, which is a voluntary initiative that requires buildings to use at least 25 percent less energy than the national standards demand in order to be certified.

Skanska Color Palette™

Energy

Carbon

Materials

Water

Click here for more information

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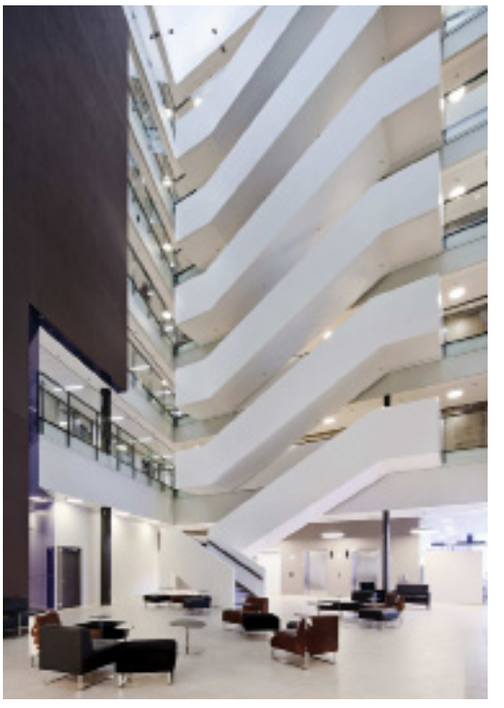
Contributing Toward Sustainable Development

Skanska House uses around a third less energy than the Finnish energy code requires and has been equipped with the necessary infrastructure to accommodate a photovoltaic solar system in the future. The building uses around half the water than a typical Finnish office building and is equipped with a rainwater harvesting system that collects water for toilet flushing. The office spaces are designed to promote healthy working environments and a long useful lifespan through functional and flexible design. Low Volatile Organic Compound (VOC) substances and materials with recycled content were incorporated into the project. The development has also contributed toward sustainable urban development and the promotion of more sustainable modes of transport. During the design phase, the BIM model was used to calculate the building's embodied carbon emissions from construction materials, which has established a carbon footprint benchmark that will be used to promote carbon savings on future projects. A high proportion of the construction waste was diverted from landfill through efficient waste management. Skanska also prioritized regional workers and materials during construction.



Green Aspects

Energy

Energy efficiency

Skanska House annually uses 75 kWh/m², which is 35 percent less than the Finnish energy code. The building is equipped with an efficient demand based ventilation system, with occupancy sensors and low-speed air handling units that use significantly less energy than conventional ventilation systems. The building envelope has a very high degree of air tightness with a measured air leakage rate of (n50) 0.46 per hour, compared with the intended design value of 1.0 air changes per hour. This additional airtightness was achieved through the construction team's attention to joint grouting and other junctions in the envelope, and improved the building's design energy use from 78 kWh/m² to 75 kWh/m². The building has an efficient lighting system that is optimized by daylight and occupancy sensors, which uses around 5 percent less energy than a system without sensors. LED (Light Emitting Diode) lamps have been used on the garage floors, which are powered by occupancy sensors that reduce lighting levels to around 20 percent when human occupants are not present. Other energy efficiency features include optimal window placement, sunshades to avoid excessive solar heat gain and the need for additional cooling. The building uses energy efficient district heating and cooling from Helsinki's municipal system.

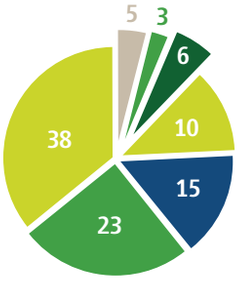
Renewable energy

Skanska installed solar panel mounting framework to facilitate the installation of a photovoltaic solar system in the future. The building's roof can accommodate up to 1,000 m² of panels. Skanska also has signed a renewable energy contract to supply the building with 100 percent hydro electricity, which is in accordance with Renewable Energy Certificate System (RECS).

Carbon

Carbon footprinting

Skanska Finland (BIM Competence Center) in cooperation with Skanska Norway, trialed use of BIM carbon analyses during the design of Skanska House. The technique cost-effectively calculated the building's embodied carbon emissions from construction materials to be 7 481 tCO_2e or 274 $kgCO_2e/m^2$. During the BIM design analysis, Skanska compared various steel and concrete combinations to identify the most energy and carbon efficient arrangement. However, the primary objective of the carbon footprint was to establish a project benchmark, which can be used to make reductions in embodied carbon during the design phase of future projects.



Embodied Carbon Emissions

Concrete – 38%
Hollow core concrete – 23%
Steel – 15%
Breeze blocks – 10%
Gypsum – 6%
Bricks – 3%
Other – 5%

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Materials

Environmentally responsible materials

Low-VOC materials, such as sealants, adhesives, paints, coatings and flooring were used throughout the project. Recycled material content accounted for 11 percent of the total construction materials used on the project. Materials with recycled content included steel bars (99 percent recycled content), gypsum boards (90 percent) and insulation (70 percent). The project's ready mixed concrete also contained pulverized fly ash, which is a byproduct from coal-fired power stations that can reduce embodied carbon by up to 30 percent compared with conventional concrete mixtures.

Waste management during construction

99 percent of the construction waste materials were diverted from landfill. Approximately 85 percent of the waste was sorted on site into fractions, including wood, insulation, gypsum, plastic, steel, stone and waste for incineration at a local power plant. The remaining 15 percent of the waste was then sorted at a specialist facility off-site with an efficiency of 95 percent. The waste insulation accumulated on site was collected by the insulation suppler, which recycled the material back into their production process as part of a trial project.

Waste management during operation

The building has comprehensive waste sorting facilities on every floor, and a central collection area, which is capable of storing all types of office waste and is serviced by specialist waste recycling companies. Each workstation has containers for paper, combustible and mixed waste, and print rooms have waste bins for paper, cardboard and confidential waste materials. The restaurant collects biodegradable, combustible and glass waste containers, and staff rooms on each floor collect biodegradable waste. Reception personnel collect batteries and printer toners, and the IT department is responsible for collecting redundant electronic devices that are collected by specialist recycling companies.

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Water

Water efficiency

Skanska House uses around 50 percent less water in total than the LEED baseline for the building. The building is equipped with efficient water fixtures and a rainwater harvesting system that collects water for toilet flushing. Native and drought resistant plants, which do not require irrigation, were selected for site landscaping.

Stormwater management

A rainwater harvesting system, with a total roof collection area of around 2,200 m^2 and storage capacity of 70 m^3, collects runoff from Skanska House and the adjacent building. The system reduces stormwater runoff, which can cause water pollution and localized flooding during periods of extreme rainfall.

Social Aspects

BIM & project efficiency

The BIM model was used to create construction schedule simulations, including production slideshows, videos and weekly 4D schedules. The team used such materials to simulate and visualize construction processes, and to verify the quantity of precast elements in production. Skanska Finland is considering using BIM as a regular project tool on all its projects, and in the bidding phase to facilitate the planning of complex structures.

Occupational health and safety

Four minor accidents occurred on site during construction and the Lost Time Accident Rate per million hours worked was 18.4. The BIM model included safety-related information, such as temporary site structures, storage areas, site roads, cranes, identified dangerous areas and safety equipment. The location of prefabricated modules was also modeled in the interest of safety and ergonomics. During Skanska's Safety Week 2010, a new BIM-based safety communication system was tested on the Skanska House project, in collaboration with the VTT Technical Research Centre of Finland. The system involved screens placed in the project office and locker room that displayed presentations of production schedules to be carried out along with the potential safety risks. The system proved to be useful and was used throughout the rest of the project. Other safety initiatives included the assembly of the atrium roof at ground level to ensure fewer dangerous construction procedures.

Healthy working environments

Skanska House is extensively glazed and the windows have been positioned to optimize the amount of natural light entering the building. The building is equipped with an outdoor air delivery monitoring system and provides greater ventilation than is required by LEED certification. The building's occupants can also easily control the indoor temperature locally to promote individual comfort.

Functional and flexible office design

Skanska House is designed to be functional and flexible to meet the requirements of present and future tenants, in order to promote a long useful lifespan. The building provides modern office spaces with state-of-the-art IT and communications infrastructure. The office floors are open planned to allow tenants to easily customize their office spaces to suit their requirements. Skanska has compiled tenant design and construction guidelines, which aim to facilitate building redevelopment and upgrade work that future tenants might undertake.

Contributing toward sustainable urban development

Skanska House was constructed on a brownfield site, which was previously used as a depot. Skanska decontaminated the site prior to construction. The building is situated in a built up urban area in Helsinki, and has easy access to various services and amenities.

Promoting more sustainable modes of transport

The site has good access to Helsinki's public transport network, including several bus routes, train and a tramline. The building has indoor bicycle storage and facilities to encourage tenants to cycle to work. Charging points and priority parking for electric vehicles are also available, and Skanska offers one electric vehicle and two regular vehicles that employees can reserve through a company car share scheme. The building has less car parking spaces than Skanska's previous headquarters, which encourages employees to use alternative means of transport.

Economic Aspects

Regional construction workforce and materials

Around 75 percent of the workforce was based within the Helsinki area. A significant proportion of the construction materials were sourced from within 800 km of the site. Regional construction materials included the insulation and gypsum boards. The hollow concrete slabs were sourced from within the Helsinki area.

Financial savings from efficiency measures

Skanska House uses around a third less energy than the Finnish building code requires, which leads to financial savings for the building's tenants. The additional investment for the demand-based energy efficient ventilation system will be repaid in 12 to 24 months, depending on occupancy rates. The building's airtight envelope yields around US$ 6,000 per year in energy savings, with minimal investment costs. The occupancy and daylight sensors have a payback period of around 10 years, and the LED garage lighting has a payback of around 20 years. The Building Management System (BMS) monitors the building's total energy consumption and includes sub meters, which can promote more energy efficient tenant behavior.

BIM & project efficiency

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Learning From Good Practice

The LEED Core & Shell Platinum certification process proved to be a useful framework for the team to design and deliver a project that fulfilled Skanska's Green Initiative principles.