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Kokstadvegen 23, Norway

Case Study 139

Kokstadvegen 23 is a modern and flexible office building that meets Norwegian passive house standards, which ensures that the building requires very little energy for space heating. The project is certified according to BREEAM NOR Very Good.

Aspects of Sustainability

This project highlights the following:

Green Aspects

Energy

Carbon

Materials

Water

Local Impacts

Social Aspects

Human Resources

Corporate Community Investment

Business Ethics

Health and Safety

BREEAM® NOR

"We expect our new building in Bergen to put us in a good position for further growth. Equally important is to give our employees the best possible working environment and inspiration to deliver optimal solutions for our customers."
- Jan Skogseth, Aibel CEO

Project Sustainability Highlights

Economic

- Financial savings from 35% **energy** savings
- The building is designed to cost-effectively allow two stories to be added in the future

Green

- 35% less **energy** than Norwegian energy standard
- 97.5% of construction **waste** was diverted from landfill

Social

- Promotion of healthy working environments
- Focus on promoting more sustainable modes of transport - cycling and light rail

Project Introduction

Kokstadvegen 23 is a four-story office building situated in Kokstad, 12 km south of Bergen. Kokstadvegen was a turnkey project, purpose built for the energy company Aibel AS as their new global headquarters. Aibel employees worked in various offices in Bergen prior to occupying the building, and the new headquarters has allowed employees to work more closely together. The building is an initial development phase of the Kokstad Business Park, which includes 120,000 m^2 of planned office space, and is situated adjacent to the new Kokstad light rail station.

Skanska developed and constructed the US$ 48 million project in close cooperation with property owner Ferd Eiendom AS and the tenant. The 15,895 m^2 triangular-shaped building can accommodate around 800 employees.

Energy ✓

Carbon ✓

Materials ✓

Water ✓

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According to the 10-year lease, Kokstadvegen is designed to allow the building to be expanded in the future by an additional 7,700 m^2 to provide space for 500 additional employees. Around 80 percent of the office space is open planned, and the remaining space includes cellular offices, meeting rooms and quiet rooms. The building also has an auditorium, 350-seat restaurant, gym, a large atrium with a glass roof and façade, and lobby with reception. A basement garage can accommodate 300 vehicles. The supporting structure consists of steel columns and beams, and cast-in-situ concrete walls and stairwells. Aibel relocated to Kokstadvegen in March 2015.

Kokstadvegen meets Norwegian passive house standards, which ensures that it requires very little energy for space heating. Kokstadvegen 23 is certified according to BREEAM NOR Very Good. BREEAM is a leading global assessment method for green buildings and BREEAM-NOR is specifically adapted to Norwegian standards and criteria.

Contributing Toward Sustainable Development

Kokstadvegen uses around 35 percent less energy than the current Norwegian energy standard for office buildings. The building promotes healthy working environments in terms of indoor air quality, natural lighting and thermal comfort. Kokstadvegen was also designed to be a highly flexible office building that can be easily expanded in the future to meet the client's future growth aspirations. The building was designed to promote more sustainable modes of transport, such as cycling and commuter rail travel via the adjacent commuter light rail station. During construction, environmental impacts were minimized and around 97.5 percent of waste materials were diverted from landfill. Environmentally responsible materials were prioritized and the project used regional construction contractors and materials.

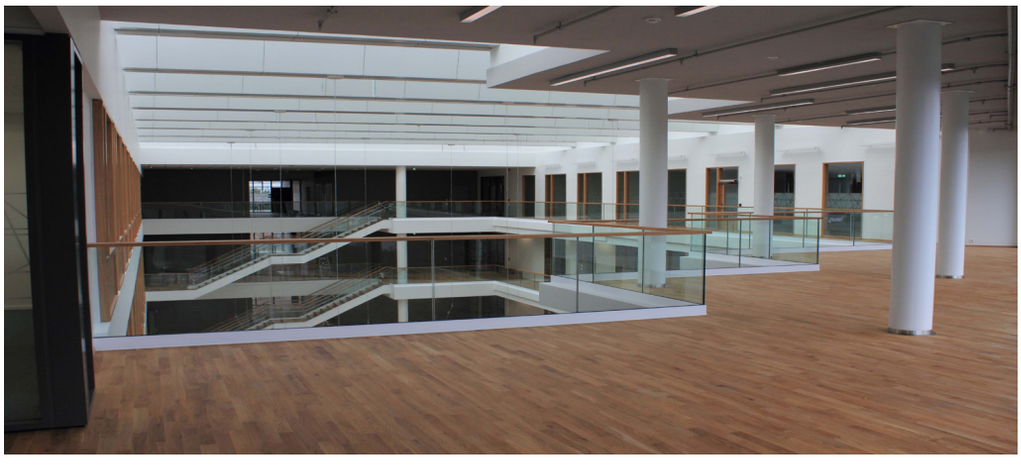
Green Aspects

Energy

Energy efficiency

The energy class B building is designed to use 97 kWh/m^2 in total, which is around 35 percent less than the Norwegian energy standard for office buildings (150 kWh/m^2 net energy). Kokstadvegen is designed to annually use 18.4 kWh/m^2 for heating and 4.4 kWh/m^2 for cooling, which ensures that it meets the Norwegian passive house standard (NS3700 / 3701). Heating is provided by an efficient local district heating network. The building envelope is well insulated with 30 cm thick insulation in the walls and 40 cm thick insulation in the roof. The walls, roof and floor have U-values of 0.22 W/m^2K, 0.15 W/m^2K and 0.14 W/m^2K respectively and the triple-glazed windows, doors and glass facade have U-values of 0.8 W/m^2K. Pressure testing has proven that the building has an air tightness of 0.35 air exchanges per hour, compared with the passive house requirement of 0.6.

Efficient mechanical systems include Variable Air Volume (VAV) heating, cooling and air conditioning (HVAC) systems, which vary the airflow at a constant temperature to allow lower fan energy consumption. The air handling units are designed to recover 84 percent of the heat from outgoing air and waste heat is used to heat the basement garage.



The glazed roof of the atrium consists of angled glass panes that reduce excessive solar gain and the need for cooling. The atrium can also be opened up on one side to allow excess heat to be exhausted in the summer. In addition, energy efficient light fittings have been installed with presence detectors as well as efficient elevators. Building Information Modeling was used to optimize the building's energy efficiency during the design phase.

Carbon

Carbon footprinting

A comprehensive embodied carbon footprint was not carried out, but the team calculated embodied carbon emissions from electricity and diesel fuel. Electricity and diesel use during construction resulted in 129 tCO_2e and 23 tCO_2e of emissions respectively.

The project's embodied carbon emissions were reduced by drawing on low-carbon concrete solutions. Flyash binder content sourced from Danish coal-fired power plants was used in most of the ready-mix concrete used on the project, which reduced the carbon emissions of cast concrete by around 35 percent. In addition, precast hollow core slabs were used that reduced slab embodied carbon emissions by around 5 percent.

Materials

Environmentally responsible materials

In accordance with the project's BREEAM and ISO 14025 requirements, Environmental Product Declarations were obtained for the major building materials, including the load bearing concrete and steel, aluminum façade, floor slabs, windows, doors and insulation. Indoor paint and finishes used on the project were certified according to the Svanen Nordic Ecolabel. Materials with recycled content included the insulation made from recycled glass and structural steel. Natural materials included clay blocks and slabs used for the interior walls.

Low Volatile Organic Compound (VOC) materials that also meet the voluntary NS-EN 15251:2007 (M1) standard include all wood panels, wood floorings, textile and laminate flooring, suspended ceiling tiles, flooring adhesives and sealants. All products and materials containing small fibers were used in a manner that prevents the fibers becoming airborne.

Waste management

Around 97.5 percent of the construction waste was diverted from landfill. The creation of construction waste on site was reduced by the use of BIM, which allowed the quantity of materials to be accurately calculated in order to reduce surplus materials and potential waste. During construction, measures to reduce waste included the incorporation of prefabricated materials, the return of packaging to suppliers and minimizing material storage time on site to avoid weather damage.

Water

Water efficiency

The building is equipped with dual flush toilets and water meters to allow tenants to monitor and control their own water use. The site is landscaped with species that thrive in the local climate, are drought resistant and do not require irrigation.

Other Green Aspects

Minimizing environmental impacts during construction

The construction site was certified according to Skanska Norway's internal Green Workplace environmental management system (Grønn arbeidsplass), which is aligned with Skanska's ISO 14001 certification. The system has higher emission standards for site machinery, energy efficient indoor and outdoor site lighting, and stricter standards for chemicals and waste management than Norwegian regulations demand.

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Raising awareness of more sustainable buildings

The project has been covered in various national building industry publications, which have focused on the passive house nature of the building, its lifecycle carbon emission savings and its capacity to add two additional office floors in the future.

Social Aspects

Project partner cooperation

Skanska developed the building's challenging energy and design requirements in close cooperation with the property owner and tenant. The flexible nature of the building, which allows it to be expanded in the future, and the fit out were based on the tenant's working methods, organizational model and long-term development.

Occupational health and safety

There were five lost time accidents during construction, including four minor incidents and a leg flesh wound. The team followed Skanska's normal safety procedures.

Healthy working environments

Low emission substances were used inside the building and clay bricks and slabs were used for the interior walls. Clay is a natural and non-toxic material that helps to regulate the indoor temperature and humidity. Almost 60 percent of the façade is glazed, which allows natural light into the building. The HVAC system provides precise temperature control and less noise than conventional systems.

Flexible office building

In order to allow Kokstadvegen to meet the tenant's future requirements, the building is designed to facilitate the future addition of two floors with 7,700 m^2 of office space. The heating, cooling, ventilation and communications systems all have redundant capacity to facilitate the future expansion.

In addition, the office spaces can be easily modified to accommodate alternative office layouts and multiple tenants as required in the future. This flexibility, together with the building's efficient energy performance, promotes a long useful building lifespan by meeting future tenant requirements.

Promoting more sustainable modes of transport

Kokstadvegen has good bicycle storage and cyclist changing facilities to encourage tenant employees to cycle to work. The site is adjacent to a new commuter light rail station and rail is expected to be the primary mode of transport for office workers. The Kokstadvegen project, as a workplace for 800 people, influenced the development of the new Kokstad light rail station. Established bus routes also serve the neighborhood.

Economic Impacts

Regional construction contractors and materials

An average of around 110 people, and approximately 160 during the peak of construction, worked on the project. Most of the construction contractors were from Bergen, including the carpentry, concrete, electrician and plumbing companies.

Financial savings for tenants

The building is designed to use 35 percent less energy than the Norwegian energy standard for office buildings, which results in financial savings for Aibel.

Learning From Good Practice

Close cooperation between Skanska, the property owner and tenant was a key to the success of the Kokstadvegen project. Cooperation allowed various innovative solutions to be identified to meet the strict energy demands of the project, and the specific needs and future requirements of the tenant.