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Väla Gård, Sweden

Case Study 100

The Väla Gård office building in Helsingborg, southern Sweden, is Skanska's greenest office building to date. The building achieved LEED Platinum and became Sweden's first Deep Green building by achieving net zero energy, and by being constructed with zero hazardous materials and with zero waste sent to landfill.

Aspects of Sustainability

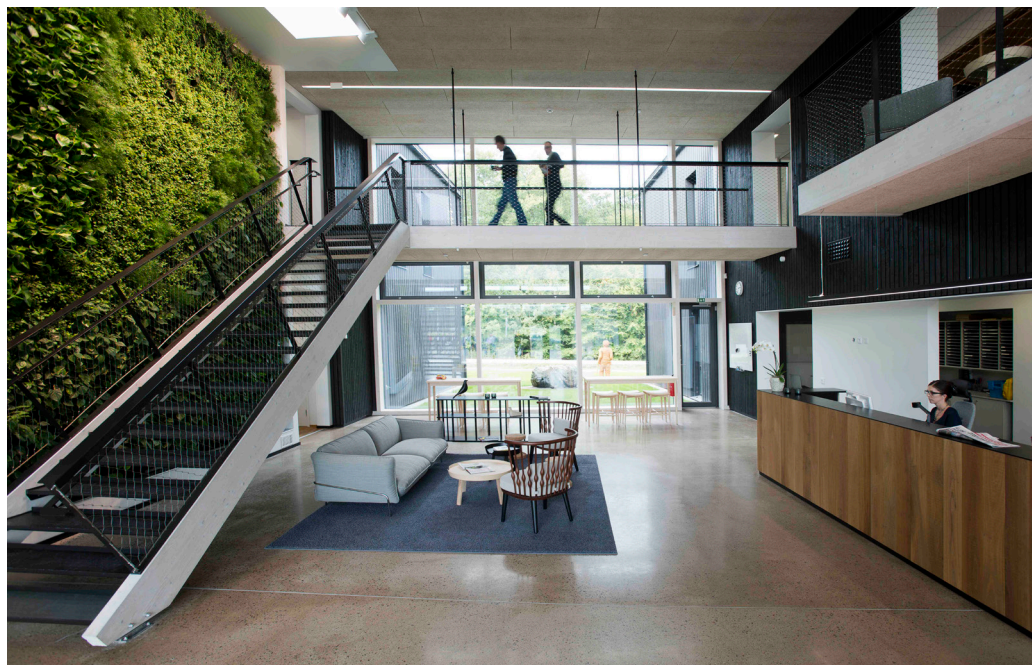
This project highlights the following:

Green Aspects

- Energy
- Carbon
- Materials
- Water
- Local Impacts

Social Aspects

- Human Resources
- Corporate Community Involvement
- Business Ethics
- Health and Safety



Project Introduction

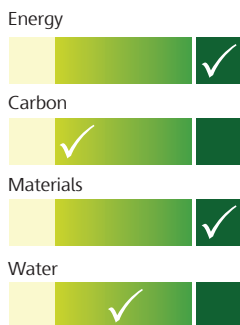
The Väla Gård office was constructed on the site of an old farm, and is located 5 km northeast of Helsingborg. Phase 1 of Väla Gård involved the construction of a 1,777 m² office building, which was built between October 2011 and October 2012. The building has around 70 workstations and is Skanska's regional office in Helsingborg. Various Skanska divisions relocated to the office, which almost halved Skanska's regional office space costs. Phase 1 of Väla Gård was a new construction, but the site includes several existing farm buildings that may be incorporated in subsequent phases of the project. The site has beech and oak forests, park-style outdoor areas, and is adjacent to a nature reserve.

Skanska Sweden constructed and owns the US\$ 5 million office building. The development consists of two three-level buildings that are connected by a glazed entrance and reception building.

The building's frame consists of prefabricated concrete elements, and wooden panels were used for the roof and façade.

Väla Gård is the Skanska Group's greenest office project to date and is the first to achieve the Deep Green level according to Skanska's Color Palette™. A Deep Green project must achieve three of the following six objectives: net zero primary energy, zero waste, zero unsustainable materials, zero hazardous materials, near zero embodied carbon and net zero water. Väla Gård achieved zero energy, zero waste and zero hazardous materials. The project also achieved LEED Platinum, and is one of the highest LEED scoring projects in Europe to date. 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 Väla Gård project received financial support from LÅGAN – Sweden's program for buildings with very low energy use.

Skanska Color Palette™



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The US\$ 75,000 award is to support a thorough evaluation of the energy system and indoor environment for the first few years of operation. Väla Gård has won several awards, including the Sweden Green Building Council's awards for the best green building in Sweden and best LEED building in 2013. Väla Gård also won the Solar Plant of the Year 2012 award from the Swedish Solar Energy Association (Svensk Solenergi) for its solar electricity system. The jury concluded that the building is an excellent example of how to combine building energy efficiency with an integrated solar electricity system.

Contributing Toward Sustainable Development

The Väla Gård office building is an energy plus building, which annually delivers more energy than it uses by being energy efficient and generating its own electricity. The building is equipped with a photovoltaic (PV) solar system and a ground-source heat pump, which delivers efficient heating and cooling. The office also uses around a third less water than a conventional Swedish office building. Väla Gård promotes healthy working environments for occupants and a long useful lifespan through flexible office design. The project contributes toward sustainable urban development and promotes more sustainable modes of transport, such as cycling and electric vehicles through providing charging stations. Skanska achieved the ambitious objective of zero construction waste to landfill, and only selected environmentally responsible materials for the project.

The project's carbon footprint was calculated and Skanska and the project partners have worked to raise awareness of more sustainable buildings by using Väla Gård as an example.

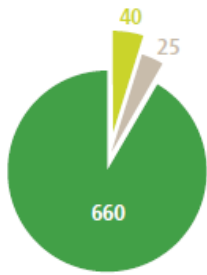
Green Aspects

Energy

Energy efficiency

Phase 1 of Väla Gård is an energy plus building, by minimizing energy demand and generating more energy than the building uses over the course of the year. The building annually uses around 16 kWh/m² for heating, cooling, hot water and facilities management power, which is over 80 percent less than the national energy code. An airtight and well-insulated building envelope promotes energy efficiency. The windows meet Swedish passive house standards, with a U-value of 0.9 W/(m²K), and the base, roof and external walls have U-values of 0.10, 0.08 and 0.13 W/(m²K) respectively, which exceed international passive house standards.

Efficient heating, cooling and air conditioning are provided by a Variable Air Volume (VAV) system. Heat recovery units recycle 82 percent of the heat from outgoing air, which exceeds the voluntary Swedish passive house heat recovery value of 70 percent. The building was designed to make use of extensive natural daylighting to minimize the need for artificial lighting. Solar shading, including artwork on the façade, helps to avoid excessive solar heat gain and the need for summertime cooling. The building is also equipped with energy efficient appliances and LED (Light-Emitting Diode) lighting to further minimize energy use.



Väla Gård Carbon Footprint (tCO₂e)

Materials – 660
 Material transportation – 25
 Site energy use – 40

Renewable energy

Väla Gård is equipped with a 455 m² roof-mounted PV solar system that annually generates 40 kWh/m², which by far exceeds the building’s energy use. The building sources electricity from the local grid when the PV system cannot deliver sufficient energy. Although the system delivers more electricity to the grid over the course of the year than the building uses.

The ground-source heating and cooling system consists of 20 energy boreholes, which are around 150 m deep. The system generates over 3 kWh for every kWh it uses to generate space heating and hot water. It also generates “free” summertime cooling from the boreholes, which are cooled during the winter, to provide 35 kWh of cooling for every kWh the system uses. The boreholes have an estimated lifespan of 75 to 100 years.

Intelligent energy management

Skanska has installed a building energy monitoring and control system, which consists of around a dozen temperature and carbon dioxide sensors, and light meters to control the intensity of artificial lighting. Skanska plans to evaluate the data from the system against the building’s design parameters to further refine and optimize the building’s energy efficiency. Skanska will use the data to develop an internal energy database, which will be used to model future low-energy projects. The monitoring and control system is also connected to a display in the reception, which shows the building’s real-time energy use and energy generation.

Carbon

Carbon footprinting

Skanska conducted a carbon footprint for phase 1 of the Väla Gård project using its own ECO₂ carbon tool, which calculates carbon emissions from the extraction of raw materials, production of materials, transport to the construction site, and site activities. The embodied carbon footprint was estimated to be 725 tCO₂e, and demonstrated that the building’s frame, installed systems and façade were responsible for the most significant part of the footprint.

Materials

Environmentally responsible materials

No potentially hazardous substances were used on the project and all substances fulfilled the criteria in Skanska’s chemical database, which is in accordance with the EU REACH requirements on substances with properties of high concern. All construction materials were logged and validated against environmental criteria, which resulted in the selection of more sustainable materials. For example, over 50 percent of the wood used was FSC (Forest Stewardship Council) certified with a stated Chain of Custody. Over half the project’s timber was regionally sourced, including locally sourced wooden panels were used for the roof and façade. More than 20 percent of construction materials were made of recycled content, such as the insulation, gypsum/drywall and steel studs. Other environmentally responsible materials included low emitting adhesives, sealants, paints, coatings, flooring and environmentally certified carpets.



Waste management during construction

Skanska worked closely with the waste management contractor to ensure that no construction waste was sent to landfill. This cooperation included comprehensive waste management education for the entire project team. Waste was sorted into 8 fractions. Waste insulation was sent back to the supplier and reincorporated into their production process, and waste concrete was used as fill material.

Waste management during operation

The Väla Gård office building has comprehensive waste sorting and collection facilities, including paper, corrugated cardboard, glass, metal and plastic.

Water

Water efficiency

The building uses around 35 percent less water than a conventional Swedish office building. Low-flush toilets and water efficient fixtures and fittings were installed. Water efficiency also contributes to a lower energy use by reducing the demand for hot water. Only plants that do not require irrigation were used to landscape the site.

Stormwater management

A stormwater retention pond was created on the site to ensure that the site's runoff will not overload the municipal stormwater system. The pond also minimizes sediment entering the municipal system.

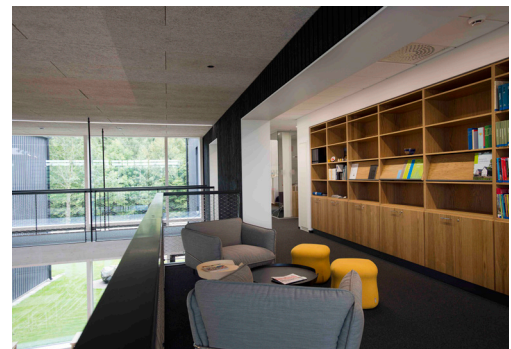
Other Green Aspects

Raising awareness of more sustainable buildings

The Deep Green aspects of the Väla Gård project has received significant attention from the Swedish and international media. Skanska considers Väla Gård to be a Deep Green demonstration project, which can be used to demonstrate to prospective clients what is possible. Skanska has arranged study visits and uses Väla Gård as a Deep Green building example at relevant regional and national seminars and meetings.

Green roofing

The entrance building has a sedum green roof. Green roofing provides additional thermal insulation and extends the roof's lifespan by protecting it from weathering and UV light. In addition, roof vegetation can provide habitats for birds and insects, filter airborne pollution and reduce stormwater runoff. The reception also has an indoor green wall, which is made up of living plants. The wall is primarily a decorative feature, but also helps to filter the indoor air.



Social Aspects

Project team cooperation

The entire project team was involved early on to ensure they understood the Deep Green requirements and to encourage the development of innovative solutions to meet these demands. Skanska formed a knowledgeable and experienced team that could achieve Deep Green, including many Skanska specialist units and personnel, the architect and the waste management contractor. Cooperation with the local energy company was also a fundamental part of the project, which identified the most suitable technical, economical and environmental solution to allow Väla Gård to feed its surplus electricity into the grid. A PhD student at Lund University was involved throughout the project to create an energy model for the building and to analyze its energy performance.

Occupational health and safety

There were no accidents involving workers on site during construction and the Lost Time Accident Rate was zero. Safety was a major consideration throughout construction.

Healthy working environments

The Väla Gård office building is designed to promote high quality and healthy indoor environments. The building's meeting rooms and canteen are equipped with carbon dioxide monitoring sensors, and low Volatile Organic Compound (VOC) substances and materials have been used to ensure a good indoor air quality. Natural daylighting is promoted and a large outdoor terrace is accessible from the ground floor. A questionnaire will be conducted a year after occupation to assess perceptions of the indoor environment and how it can be improved in the future.

Flexible office design

The space has been designed to allow various office layouts and to enable the interior to be easily modified to meet future requirements. The office building could also be easily converted to accommodate multiple tenants in the future. Such flexible design features, together with the energy plus nature of the building, should ensure that the building has a long useful lifespan.

Cultural preservation

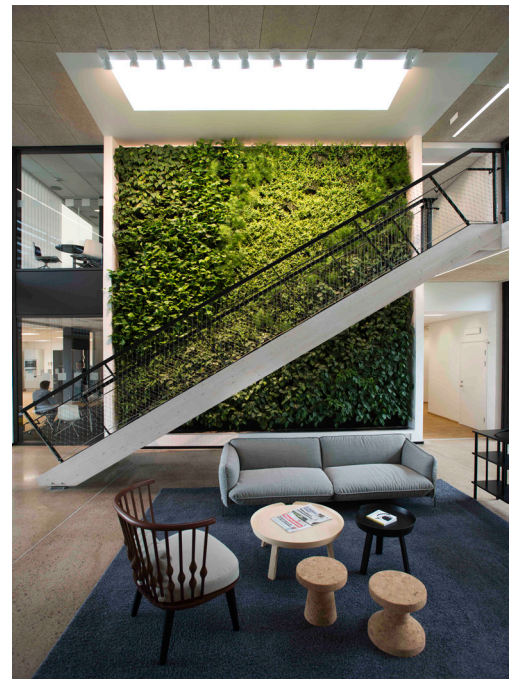
The Väla Gård site was a farm that dates from the 1800s and includes several historical buildings. The project aimed to preserve the farm's architectural style and character. Future phases of the project may retain and redevelop the existing farm buildings on the site.

Contributing toward sustainable urban development

Väla Gård was constructed on a previously developed site on the outskirts of Helsingborg. The project did not directly impact on greenfield land or natural environments. Existing trees and green space on the site were preserved.

Promoting more sustainable modes of transport

Skanska constructed a new bus stop outside the Väla Gård office. The bus stop is a short walk from the office and a 7-minute bus journey to central Helsingborg. Cycle parking was included on the site along with showers to encourage occupants to cycle to work. The car park has been equipped with electric car charging stations.



Economic Impacts

Regional construction workforce and materials

Up to 20 skilled trades people worked on the project, almost all of which were from the Helsingborg area. Nearly all contractors were also based in Helsingborg. Around 60 percent of the project's materials were regionally sourced.

Efficiency financial savings

The energy plus Väla Gård office building will make significant financial savings for occupants throughout its lifespan. The building also has the potential to command a higher property value than a conventional Swedish office building with relatively high operational costs.

Learning From Good Practice

Skanska used the Color Palette™ to guide the development of Sweden's greenest office building to date, and LEED was used as an independent validation of the project's green performance. Skanska intends to use Väla Gård as a pilot project to demonstrate what the company can offer potential clients that are interested in very green buildings. Skanska Sweden aims for over 10 projects of its new construction projects to achieve Deep Green™ by 2015 (by turnover).