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## Eko-Viikki, Finland

### Case Study 38

Eko-Viikki is an ecological suburb in Helsinki, Finland, which has pioneered sustainable construction techniques to minimise the overall impact of residential buildings throughout their lifespan and to promote more sustainable living.

#### Aspects of Sustainability

This project highlights the following:

##### Social Aspects

Human Resources  
Corporate Community Involvement  
Business Ethics  
Health and Safety

##### Environmental Aspects

Energy and Climate  
Materials  
Ecosystems  
Local Impacts

##### Economic Aspects

Project Selection  
Supply Chain  
Value Added



#### Project Introduction

Eko-Viikki is an ecological suburb located 8km from the centre of Helsinki in the northern district of Viikki. Eko-Viikki was the first ecological neighbourhood to be built in Finland and has created 64,000 m<sup>2</sup> of living space for 1,900 residents. Experimental buildings have been developed in Eko-Viikki to meet the high standards of sustainable construction that were established for the suburb. Innovative techniques, such as wind powered street lighting and an area wide stormwater management plan have also been tested in Eko-Viikki. A nature conservation area has been created adjacent to Eko-Viikki, which includes an ecological recreational park for children and young people.

Skanska was the general contractor on five residential projects in Eko-Viikki. Auringonkukka,

Niittyleinikki, Valkoapila and Ahomansikka are low-rise apartment buildings with 31, 63, 21 and 31 dwellings respectively and the Keltavuokko development consists of 21 semi detached townhouses. Skanska completed the projects successively and Ahomansikka development was the last to be completed in autumn 2004.

Special sustainable construction criteria, which were more rigorous than for conventional Finnish residential buildings, were established for Eko-Viikki, and included indoor environmental quality, energy usage, water consumption and waste management. The Eko-Viikki project is part of the Sustainable Cities of Europe initiative, which intends to make the entire Viikki area a highly sustainable suburb accommodating over 10,000 residents by 2010.

## Contributing Toward Sustainable Development

The Eko-Viikki suburb has contributed toward sustainable urban planning, local biodiversity and domestic recycling, and pioneered the use of solar district heating and stormwater management. Individual Skanska projects provide high quality indoor environments, promote energy and water efficiency, and will reduce carbon dioxide emissions throughout the lifespan of the buildings. During the construction, Skanska developed more sustainable construction methods and reached high standards of externally assessed occupational health and safety. The projects promoted regional economic development by employing local people and sourcing regional construction materials. Environmental impacts during construction were minimised by conducting an impact assessment for each project and by working to reduce construction waste.

## Social Aspects

### Learning from more sustainable construction techniques

The same basic team worked on all five Skanska projects, with different project managers. This enabled previous experience from projects to be learnt from and regular Skanska practices were developed to meet the Eko-Viikki sustainable construction targets. Some of the innovative techniques developed for Eko-Viikki have been adopted by subsequent Skanska Finland projects, such as the use of low-emission materials to create high quality indoor environments.

### Occupational health and safety

All the Skanska projects exceeded the 80 percent Finnish TR construction site safety assessment target for Eko-Viikki. The Valkoapila project was rated at 91 percent and Niittyleinikki at 88 percent in external safety assessments. The Finnish TR safety assessment is a comprehensive construction industry safety assessment involving over 100 criteria.

### High quality indoor environments

Skanska's Eko-Viikki dwellings are healthy living environments that incorporate low-emission materials, are well ventilated, designed to reduce damp and are lit with natural daylight. The projects pioneered the voluntary Finnish M1 standards for low emissions and all indoor materials and substances exceeded the standards, which demand less than a total Volatile Organic

Compound (VOC) value of 200 micro g/m<sup>2</sup>/hour. The dwellings are equipped with fresh air ventilation systems, which provide good indoor air quality. The area is susceptible to damp and features such as ventilated suspended floors and communal laundry and sauna facilities, were incorporated to reduce indoor moisture levels. Natural daylight in the dwellings was maximised by incorporating large south-facing windows in the designs.

### Constructing flexible and long-life buildings

The Skanska Eko-Viikki projects were designed to be flexible in order to meet the present and future requirements of residents. The houses and apartments use space efficiently and were designed to easily accommodate structural modifications to facilitate future conversions.

### Sustainable urban planning

Amenities in Viikki include a grocery store, restaurants, a healthcare centre and five community centres offering various facilities for hobbies, fitness, festivities and social activities. There are also two nurseries and the Viikki Teacher Training School, which includes all levels of education for almost 1000 pupils and trains approximately 250 teachers. In the interest of sustainable living, every development provides opportunities for residents to cultivate their own food on allotments and edible perennial plants, such as fruit trees and bushes have been planted in communal areas. Residents of Viikki have good access to public transport and several bus routes to central Helsinki and other parts of the city serve the area. A maximum limit of 1 car-parking space per 80 m<sup>2</sup> residential area was enforced for all Eko-Viikki projects and parking spaces were sold separately to motorists in one of the Skanska projects. All the Skanska projects have bicycle storage space and a national cycle route runs adjacent to Viikki, which links the area to central Helsinki.

### Resident assessment

An assessment was conducted following the completion of the projects, which concluded that Eko-Viikki residents were largely satisfied with their dwellings and that their lifestyle had become more sustainable through recycling and lower energy and water consumption. Residents also commented positively on Eko-Viikki's village feeling, the allotment spaces and the natural surroundings. Residents declared four of the five Skanska projects completely defect-free, and only minor defects had to be resolved in the Keltavuokko houses.

## Economic Aspects

### Local construction employment

Skanska undertook its Eko-Viikki projects successively with between 20 and 30 workers. Approximately 70 percent of the workers were from the Helsinki Metropolitan Area.

### Regional construction materials

No materials were sourced from the Helsinki area, but most of the construction materials originated from within Finland, such as wood, glass and insulation. Only specialist equipment was imported from abroad, such as the solar heating systems.

### Financial savings due to energy and water efficiency

The average Eko-Viikki building was approximately 5 percent more expensive to construct than a conventional residential building in Finland due to their efficiency features and use of more sustainable materials. However, Skanska's Eko-Viikki buildings consume up to a third less energy and water than a typical new residential building in Finland, and residents consequently pay lower utility bills. All the Skanska projects are equipped with individual electricity and water meters and Valkoapila residents can monitor their real-time water consumption on a website. The resident feedback study confirmed that residents find it easier to monitor and control their energy and water consumption with such tools.

### Regional economic development

The Viikki area is developing into a self-contained sustainable suburb, which provides space to live, work and study. In 2010, the area is expected to support 6,000 jobs, 6,000 student places and provide homes for 13,000 people.

## Environmental Aspects

### Eko-Viikki environmental construction criteria

The Eko-Viikki community workgroup created a unique set of sustainable construction targets specifically for the project. The targets included a minimum level for all projects to meet and two higher point levels depending on how well a project performed against each criterion. The maximum score a project could achieve was 30, and a project score of 10 was considered to be an ecologically excellent scheme. Valkoapila was the highest scoring Skanska project with 12.3 points and Keltavuokko the lowest with 9.2 points.

### Environmental impact assessment

Skanska Finland's Ecometer environmental assessment tool was used to assess and minimise the environmental impacts of the buildings throughout their entire lifespan. The Ecometer is a web-based tool, which uses a construction material database based on the results from buildings designed by Skanska to assess the overall environmental impacts of a building. An environmental impact assessment was also conducted for the entire Eko-Viikki development.

### Minimising environmental impacts during construction

An individual environmental plan was established for each project to minimise the environmental impacts. Soil removal was avoided in all Eko-Viikki projects and the fertile top layer of soil was often used on the plot or reused elsewhere in the suburb. Natural and renewable materials, such as wood, were used where possible to minimise resource consumption.

### Construction waste management

All the Skanska projects fell just short of the Eko-Viikki construction waste target of 5.5 kg/m<sup>3</sup>. However all the projects recycled over 45 percent of the total construction waste and Niittyleinikki recycled 52 percent, compared to Skanska Finland's 2004 average of approximately 30 percent. Site waste was minimised by prefabricating repetitive materials off site, such as facade panelling, and delivering household appliances to the site without packaging.

### Energy efficient housing

All Skanska projects consume below the Eko-Viikki average of 120 kWh/m<sup>2</sup> for space and water heating and Skanska's Niittyleinikki project used 91.2 kWh/m<sup>2</sup> in its first year of operation, which is over a third less than a conventional new residential building in Helsinki. Energy consumption is reduced through thick insulation, heat recovery systems, passive solar heating, efficient appliances and the provision of common facilities. All the Skanska projects had over 20 percent thicker insulation than Finnish regulations to reduce heat loss. Each air conditioning system is fitted with a heat recovery unit, with efficiencies of between 50 and 70 percent, and heat is recovered from under floor heating and the water heating systems. Large south-facing windows and two-story high conservatories allow the use of passive solar heating and the Auringonkukka and Valkoapila projects have glazed balconies, which allow passive solar heating and act as buffer zones



to reduce heat loss. The properties have been equipped with energy efficient under-floor heating and domestic appliances, and the Auringonkukka, Ahomansikka and Valkoapila projects save energy by sharing laundry and sauna facilities, which is unusual in new owner occupied properties in Finland.

### Reducing carbon dioxide emissions

The Eko-Viikki carbon dioxide emission target was 20 percent less than conventional Finnish buildings for the first 50 years of a building's lifespan. The Skanska Niittyleinikki building is estimated to emit 2,575 kg/gross m<sup>2</sup> in 50 years of operation, which is approximately 30 percent less than a conventional Finnish building.

### Operational water efficiency

The Skanska projects use significantly less water than the Eko-Viikki average of 126 l/person/day, which is around 22 percent less than the Finnish average for residential buildings. The Skanska projects Auringonkukka and Ahomansikka consume about 105 l/person/day and Keltavuokko approximately 100 l/resident/day, which is between 30 to 40 percent less than the typical water consumption in Finland. Skanska buildings are equipped with water efficient fixtures and appliances, shared laundry and sauna facilities and rainwater collection systems for garden irrigation.

### Stormwater management

An area-wide stormwater management plan has been established in Eko-Viikki, which is designed to absorb rainwater and ensure that surface run-off is as clean as possible. A network of green 'fingers' absorbs, filters and directs surface run-off to an

adjacent stream. The stormwater management features also serve as important visual and recreational elements and help to break up the urban nature of the suburb. Individual developments, such as Skanska's Keltavuokko building, contribute toward the stormwater management plan by collecting rainwater in a communal pond for garden irrigation.

### Biodiversity

One of Eko-Viikki's objectives was to maximise biodiversity in the various gardens, allotments and urban wetlands. Skanska projects, such as Keltavuokko, features internal courtyards with biodiverse gardens consisting of several different layers of low-maintenance plants.

### Solar heating project

Around half of the Eko-Viikki buildings, including the Skanska projects, are part of the solar heating project, which provides approximately half the energy for hot water and 18 percent of the energy for space heating for 380 apartments. The project uses roof-mounted solar panels and was carried out with the support of the European Union and the National Technology Agency of Finland (Tekes). The Skanska constructed Auringonkukka building produced 400 kWh/m<sup>2</sup> in its first year of operation, which was a new record for a solar energy system in Finland.

### Domestic recycling

The Eko-Viikki domestic waste target is a maximum of 160 kg per resident per year, which is approximately 20% less than the average in Finland. Every household has a designated area for sorting waste and Eko-Viikki has good waste recycling facilities, including communal recycling points and the collection of biodegradable waste to create allotment compost. Awareness initiatives educate residents to produce less waste and to recycle more efficiently.

### Learning From Good Practice

The Skanska Eko-Viikki project team developed company practice to meet the high sustainable construction standards. Some of this evolved practice has become the norm for subsequent Skanska Finland projects. Learning from international experience was also useful for Eko-Viikki and the project partnered Hammarby-Sjöstad in Stockholm and Ørestad in Copenhagen through the Sustainable Cities of Europe initiative. Many of the solutions pioneered at Eko-Viikki can be replicated on other projects in Northern Europe.