



Location on map of Helsinki



- location:** Helsinki, Finland
- dates:** 1989 – 2000 first phase, final phases by 2010
- type:** New construction in greenfield area
- use:** Mostly residential, some services, including University expansion
- size:** First phase 23 hectare
- people:** 7000 residents in 2007
by 2015 the target is to have more than 15000 residents, 7000-8000 work places and 6000 students in the area
- actors:** Eco-Community Project, City of Helsinki (established by Ministry of the Environment and the Finnish Association of Architects (SAFA)), National Technology Agency of Finland (Tekes), Helsinki City Planning Department, architect Petri Laaksonen (who won the competition for the area according to which the detailed plan was made)
- goals:**
 - reduce consumption of natural resources in both building construction and maintenance
 - reduce heating, electricity, and water consumption among residents by a considerable percentage compared to the typical average residential use in Helsinki
 - replace fossil fuel use with renewables natural resources

energy use	KWh/m ²	construction	amenities
heating&electricity, goal <i>(33% less than a conventional Helsinki residential building consumes)</i>	105	<ul style="list-style-type: none"> ▪ low-rise mostly wood construction ▪ elimination of thermal bridges ▪ use of conservatories for passive solar ▪ low-energy house construction ▪ use of non-toxic and certified material 	<ul style="list-style-type: none"> ▪ daycare and community playfields ▪ community clubhouse ▪ shared saunas and laundries ▪ pedestrian streets ▪ garden cultivation centre ▪ allotment gardens ▪ church ▪ health services
heating&electricity, achieved	120		
heating&electricity, best household energy, achieved	45		
systems		special projects	site ecology
district heating	x	<ul style="list-style-type: none"> ▪ district solar heating ▪ adaptable multi-storey wooden housing ▪ resident participation 	<ul style="list-style-type: none"> ▪ storm water retention and collection ▪ land for food-growing ▪ inclusion of bio-diversity within plan
combined heat & power			
solar panels	x		
solar cells	x		
biomass and refuse			
wind power			
natural ventilation	x		
forced vent.w/heat recovery	x		
non-renewable energy	x		
individual metering	x		

process and history

The Eco-Community Project was a collaborative project established in 1993 by the Ministry of the Environment and the Finnish Association of Architects (SAFA) with the intention of testing “ecological principles in practical design and building.”



Timber bridge



Experimental area for timber construction

process and history, continued

An inquiry throughout Finland for interest in providing a testing ground for the project led to 16 proposals for new projects. The area of Viikki, 7km north and east of Helsinki's city center and bounded by a nature conservation area and the University of Helsinki's School of Agriculture and Forestry, was chosen as the site. Preliminary plans to settle Viikki had already begun in 1989.

The starting point of the local plan was to extend the university area, specialising in bio-sciences and bio-technology, and to construct an extensive new residential area connected to the Science Park, whilst preserving the natural and cultural values of the area. The City of Helsinki and the Eco-Community Project organized competitions that were held throughout the entire planning and building development process, which generated a huge amount of interest. The final plan for this project, which was to support 1700 people and contain daycares, a school, and a shop, was selected from 91 proposals. The winning proposal oriented the majority of the buildings facades to the south to maximize solar exposure, dealt with wind abatement through graded building massing and vegetative wind breaks, and included 'green fingers' of land between the buildings to provide areas for planting and allotment gardens, the managing of stormwater runoff, and habitat for birds.

The competition structure allowed Viikki to be a testing ground for both actual building solutions and, as importantly, the collaboration between people with different areas of expertise that is required in creating new ecological solutions. In the competition for building solutions, proposals had to be the result of a collaborative workgroup that included the architects, the developer, a structural engineer, and an expert in ecology. In this way, there could be some guarantee that the schemes were buildable and would be able to achieve the level of ecological performance proposed, all within a realistic economic framework.

The main parts of Viikki are the Viikki Science Park and Latokartano housing area.

Eco-Viikki is the southernmost section of Latokartano housing area. In this ecological experimental area the target has been to find housing solutions for improving the ecological quality of high-density housing construction through design competitions and pilot projects.

description of special project features

Viikki's ecological planning was steered by a set of ecological criteria called PIMWAG. A competition was held for its creation. The PIMWAG criteria (an acronym for the names of the groups members) was selected. While it was decided that no specific requirements would be made of the buildings in terms of their construction, the PIMWAG ecological criteria would establish a high standard for the baseline performance that the proposals for the buildings competition would have to achieve. Proposals that achieved this baseline would be considered and solutions that went beyond the minimum criteria and were feasible would have a better chance of selection and becoming realized. The 5 main factors addressed by the criteria were:

- pollution: CO₂ emissions, water consumption, building material waste, household waste, environmental labelling
- natural resources: primary energy, heating energy, electrical energy, and spatial adaptability
- health: internal climate, moisture risks, noise, wind, and sun issues, and organization of floor plans
- bio-diversity: plant selection, stormwater management
- nutrition: cultivation of useful and edible plants

A PIMWAG notification including calculations and explanations were included in the building permit documents, and would also be signed by the developer; this would show that the project "fulfilled the obligatory demands of the criteria."

results

Besides high targets for energy consumption, water consumption in Viikki was targeted to 22% (125 lit/person,day) less than normal. The average daily achieved is 126 lit/inhabitant, but the consumption varies depending on the house type, form of ownership, and presence of sauna.

In addition higher targets than normal were set for the utilization of the soil dug from plots, amount of waste produced by an inhabitant (160kg/per.year=20%less than normal), max level of CO₂ emission by each building (3200kg/m² = 20% less than normal, achieved 9% more than target), max amount of building waste (18kg/m²= 10% less than normal, achieved 5-15kg/m²). Social aspects of sustainability are also included in the project and the results are monitored by the University of Helsinki Department of Social Policy. The best features of the area are the 'green fingers' which link the plots and their allotment gardens.

The solutions that characterise the area are various, from promotion of more ecologically responsive construction to utilization of various technologies for energy production and savings.

Utilization of solar energy was tested the most, while other solutions such as improved intermediate floor solution with respect to moisture and sound insulation properties, HPAC equipment solutions, special spatial configurations and technical systems, use of low-emission materials and others were also present.

With respect to solar energy utilization applied systems include passive and active strategies. Passive strategies involve building orientation, green houses and glazed balconies, while active strategies involve solar-generated heating or electricity systems. With respect to the later, an integration of photovoltaic cells was tested on a multi family building, where 200m² of photovoltaic cells were incorporated into balcony railings, producing 15-20 per cent of property's needs. Being connected to the grid allows export of sufficient electricity in the summer times and import of needed energy during the darker winter days. The system generates approximately 80-100 kWh/m² and has the capacity of 24kWp. An important part of the project includes information and management systems of the applied photovoltaic cells.

Solar heating systems are another exploitation of the solar energy in Eco Viikki. Nine properties have solar heating systems installed, mostly focusing on the integration of various solar energy collectors in roof construction and canopies. The energy is utilized mostly for the heating of domestic hot water, and at some locations for sub-floor heating of wet spaces. More than 1200 m² of solar collectors were installed so far for 368 apartments.

Out of the nine properties, a special project called SUNH (Solar Urban New Housing) has tested solar instalment of 157m² of solar collectors and 18m³ of energy storage cells. The area has 44 apartments with 4505 m² floor area. Solar heating is used for domestic hot water as well as a supplement of the indoor heating.

funding

National Technology Agency of Finland through the KEKO programme supported the development with the objective to test and apply the principles of sustainable development and eco-construction to housing production. The Housing Fund of Finland subsidized the housing production within this new district. Expense of building foundations on difficult clay soil was compensated for with a reduction in the land rents by the City of Helsinki. 4 million Euros were granted to the project through the EU, and were primarily devoted to research and project development within the TEKES Programme for Building.

"Instead of an experimental building subsidies system...it was agreed to channel the economic support through research and product-development funding. This was then developed by the Ministry of the Environment and TEKES and implemented between 1989 and 2000." This funding went into such projects as researching building materials and methods, environmental management, waste management, and organizing the building site waste.

contacts: Project director Heikki Rinne, Helsinki City heikki.rinne@kkanst.hel.fi
Project manager (land use planning) Riitta Jalkanen, Helsinki City riitta.jalkanen@ksv.hel.fi
Architect Pirjo Pekkarinen-Kanerva, The Finnish Association of Architects/Eco Community Project pirjo.pekkarinen@safa.fi

sources:

- Viikki-Kivikko: new districts by the green zone, City of Helsinki City Planning Department web page: http://www.hel.fi/wps/portal/Kaupunkisuunnitteluvirasto_en/Artikkeli_en?WCM_GLOBAL_CONTEXT=/en/City+Planning+Department/Town+Planning/City+planning+projects/Viikki-Kivikko
- 'Viikki - Science Park and Latokartano Guide', a brochure by the City of Helsinki's City Planning Department issued in 2004
- 'Eco-Viikki Aims, Implementation, and Results', City of Helsinki Ministry of the Environment. Published by Dark Oy, Vantaa 2005
- Energie Cites: http://www.energie-cities.org/db/helsinki_139_en.pdf retrieved on 04/10/06
- SIBART: http://www.sibart.org/page_3.html

SECURE: www.secureproject.org **IVL:** ivana.kildsgaard@ivl.se ; **City of Malmö:** tor.fossum@malmo.se