

Sweden Builds for Sustainability

Ten winning cases from a competition



SB14
Barcelona



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- Swecohuset: Urban Orzelek.
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- Sköna Gröna Lagersberg: Simon Allinggård, Edis Potori, Elinor Ramström.

Sweden Builds for Sustainability Ten winning cases from a competition

Swedish Research Council Formas

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World Sustainable Building 2014, Barcelona

Sustainable Building is the title of a series of conferences adopting a broad-based approach to sustainable development for the built environment and for urban planning. All dimensions of the sustainability concept – ecological, economic, social and cultural – are included.

The conferences attract representatives of research, business enterprise, industry, public administration and politics. Sweden has, since the start in 1998, participated in all the Sustainable Building conferences, presenting initiatives and activities for the promotion of sustainable urban development, and will also be attending the 2014 conference in Barcelona (SB14), with the Swedish Research Council Formas, the National Board of Housing, Building and Planning, and Sweden Green Building Council as initiators and principal organisers.

Why Sweden will be attending SB14

Sweden will be taking part in Sustainable Building 2014 to the following ends:

- Marketing Swedish research and knowhow on the subject of environmentally appropriate building.
- Joining in an international exchange of knowledge and ideas.
- Canvassing experience of internationally sustainable and environmentally appropriate building.
- Presenting Swedish environmentally appropriate buildings and townships.
- Presenting Miljöbyggnad, the Swedish system of environmental assessment and certification of buildings.

The aim of Sweden's participation in SB14 is to convey to an international audience an interesting picture of what Sweden is doing in the environmental sphere with regard to buildings and urban settlement, and to present Swedish building projects of outstanding quality.

Brochure presenting ten winners

During the spring 2014, a competition was organised to nominate the best buildings (both new and rebuilt) and townships in Sweden. The ten winners are presented on the Swedish stand at SB14, as well as in this brochure.

In the case of buildings, entries were judged by the criteria of energy use, energy source, radon, air quality, building materials and chemical content, damp proofing, participation and special environment protection measures. The townships were judged according to the criteria of involvement, social and economic wellbeing, resources and energy, land use and ecology, transport and special environment protection measures. All the winning projects are based on powerful sustainability thinking, use of new technology, creation of green environments, and innovative solutions for putting people and the environment at the centre of attention.

The winners in the New Buildings category are Greenhouse Augustenborg in Malmö, Bäcksippan preschool in Ronneby, Herresta School in Järfälla, Väla Gård in Helsingborg, and Masthusen kvarter 11 in Malmö. In the Rebuilt buildings category, the winners were Rådhus Skåne in Kristianstad and Swecohuset in Stockholm. The winning township projects are Albano in Stockholm, Brunnsåög in Lund and Lagersberg in Eskilstuna.

Conny Rolén, *The Swedish Research Council Formas*

Madeleine Hjortsberg, *The Swedish National Board of Housing*

Bengt Wånggren, *Sweden Green Building Council*

Sustainable urban building and planning in Sweden

Sweden's pursuit of sustainable development in the field of urban building and planning and the Swedish construction sector's extensive activities in the environmental sphere are of international interest. Here we highlight four Swedish examples in the context of urban building and planning: research, investment programmes, environmental indicators and environmental certification system for buildings.

Research into sustainable urban building and planning is a strong sector in Sweden, and Swedish industry has scored export successes, both in the construction industry and in sustainable urban development. Sweden is now stepping up its commitment to sustainable urban planning research. Various sustainable urban building and development projects have been mounted during the 2000s, along with a successful Swedish-developed certification system, Miljöbyggnad.

Research into sustainable urban building and planning

In its research bill "Research and Innovation" (2012), the Swedish government calls for an increase between 2013 and 2016, by upwards of EUR 11 million altogether, in the funding allocation made to the Swedish Research Council Formas for research into sustainable urban development. The level of funding, accordingly, will rise by EUR 11 million in 2016.

Planning and building have a vital bearing on sustainability. Both in Sweden and globally, population is becoming more and more concentrated within the metropolitan regions. This is where a large proportion of the social challenges exist, and it is also where more research into sustainable urban planning is needed. Planning must be co-ordinated for settlement and transport.

Several agents have highlighted the great need for a holistic view of sustainable urban development. All parts of the sustainability concept – social, ecological, economic and cultural – need to be included and illuminated on an interdisciplinary basis.

This research effort is to be conducted by

various research disciplines working together and in partnership with other agencies, both nationally and internationally. The approach will be distinctly proactive, partly with a view to furthering technical progress, innovation and exports of environmental technology.

International collaboration

The Swedish Research Council Formas is taking part in several joint international projects, along with other funding agencies, the most relevant for urban building and planning purposes being JPI Urban Europe and Nordic Built.

Urban Europe – As part of the joint programming initiative (JPI) Urban Europe, co-operation has been inaugurated between research funding agencies in some fifteen European countries, with a view to financing transdisciplinary research and innovation and in this way helping to create attractive, ecologically sustainable and economically viable European cities.

Nordic Built is a joint Nordic programme and one of the so-called Four Tower projects launched in connection with the new programme of co-operation on enterprise and innovation, focusing on green growth, which the Nordic enterprise ministers agreed on in October 2011. The project is being funded by the Nordic Council of Ministers and Nordic Innovation.

The Nordic Built programme is being conducted in the form of three modules for the period 2012-2014 one highlighting aims and strengths of the Nordic construction sector, underscoring its environmental profile.

One a Nordic competition to canvass and demonstrate good, innovative ideas for the renewal of existing settlement. And one a joint call in all the Nordic countries, for R&D projects, innovations and demonstration projects focusing on the renovation sector. The Swedish Research Council Formas is taking part, along with the Swedish Energy Agency, as Sweden's funding body in this call for projects.

As part of the sustainable urban building and planning research programme, Formas has issued four different wideranging calls for funding: strong research environments, Nordic Built, guest researchers and R&D projects. Co-operation has been established with agents in the community at large.

Investment programme for sustainable cities

The Delegation for Sustainable Cities was appointed by the Swedish government for the period 2008–2012, its remit being to promote sustainable development of cities, urban localities and housing areas. Acting in collaboration with the municipalities, market players and other parties, the Delegation was to facilitate and encourage work to create well-functioning, attractive urban environments in which high quality of life goes hand in hand with a better environment, economic growth, social cohesion and minimised climate impact. This was to be achieved partly through integrated, intersectoral planning, higher levels of aspiration and use of new technology. The Delegation was also charged with distributing financial support to pioneering projects in the field. The projects thus supported were to serve as best practices in sustainable urban planning and applied environmental technology.

Between 2009 and 2012, funding support totalling EUR 39 million was provided for 98 projects up and down the country. The Delegation made a selection from applications received and awarded funding support to the projects best serving the purpose of the funding support scheme. Projects were to:

- Have significant climatic effects.
- Have a holistic perspective, encompassing all dimensions of sustainability.
- Span several policy fields.
- Potentially be good "shop windows" for presenting Swedish environmental technology and knowhow.

- Develop and make use of synergies between different technical systems.
- Plan for close co-operation between and involvement of relevant agents (municipalities, business enterprise, residents etc.)

In the Delegation's experience, the importance of funding support has consisted in its leverage effect. The sustainable city demands a holistic perspective, partnership, systematic thinking and perseverance. The availability of funding support has spurred a large number of cities to rally their forces and accelerate their pursuit of sustainable urban development. Government funding has helped to elicit solutions which, probably, would not have come about otherwise. Approximately half the investment support has gone on the refurbishment of existing housing areas.

The Swedish National Board of Housing, Building and Planning has been tasked since 2011 with monitoring the projects receiving funding support and to supervise compliance with the conditions attaching to each individual funding grant. In addition to formal supervision of projects, the Board has also, with effect from 2013, taken over the Delegation's former task of observing, recording and supporting projects throughout their implementation.

Environmental impact of the construction and real estate industry

Various methods will now be presented for describing the environmental impact of the construction and real estate industry and for quality assurance in the construction process.

Environmental indicators for the construction and real estate industry

For several years now, the Swedish National Board of Housing, Building and Planning has been working to develop a method for describing the environmental impact of the construction and real estate industry. A number of environmental indicators are used for demonstrating development over time. The method, devised by the Royal Institute of Technology (KTH), is based on Miljöräkenskaperna, i.e. the SCB (Statistics Sweden) System of Environmental and Economic Accounts. The Board will be uploading chronological series for the development of the indicators on www.boverket.se.

The environmental indicators have been selected for their relevance to the industry and for coverage of its most significant environmental impact, and are based on available data.

The indicators selected for describing the environmental impact of the construction and real estate industry and the road-building and civil engineering industry are as follows:

- Energy use (fossil fuels and biofuels respectively)
- Atmospheric emissions of greenhouse gases, nitrogen oxides and particles.
- Use of deleterious and ecotoxic chemical products.
- Waste generated.

Environmental certification

Why do we eco-certify buildings? For one thing, environmental certifications are concrete tools helping the industry and the end customer to assume environmental responsibility and also to put QA into the construction process. An environmental certification system is a cogently worked-out concept concerning the environmental factors relevant for appraisal in a building and the appropriate scale of such appraisal. Environmental certification also plays an important role in marketing and communication. It gives property companies and developers a means of showing their environmental aspirations, both in-house and externally.

The direct consequences of a certified building from the user's point of view are good indoor comfort in both winter and summer, sufficient daylighting, a good acoustic environment, minimum risk of damp or water leaks, non-diffusion of ground radon within the building, and a ventilation system providing good-quality air. The building material has been checked for the worst chemicals, and property owners notice a low, controlled level of energy use.

There are several different environmental certification systems in the world today. Sweden has developed a system of its own, called Miljöbyggnad. Miljöbyggnad (Green Building) is a system of environmental certification for buildings, created with reference to Swedish environmental targets, Sweden's rules for the construction industry and national authorities, and accepted practices in the Swedish construction industry. The system is founded on previous research initiatives and joint initiatives taken by the construction industry and the

community at large. Miljöbyggnad has criteria relating to energy efficiency measures but also to such vital environmental issues as a good acoustic environment, air quality, thermal comfort, daylight and the use of materials containing a minimum of ecotoxic and health-endangering chemicals. Miljöbyggnad is now managed by the Swedish Green Building Council.

One of Miljöbyggnad's foremost advantages is its lucidity, even to those not active within the construction industry. Green certification of a building or choosing to live in a green-certified building is one way for private individuals and property companies to openly take a stand in favour of environmentally appropriate use.

There are three Miljöbyggnad certification ratings: Bronze, Silver and Gold. Even a Bronze-certified building can have qualities far out of the ordinary. Gold indicates a quality which, hopefully, will become standard practice a little later on.

Compliance with the Miljöbyggnad criteria is monitored both before and after the completion of the building. Pre-construction monitoring is intended to provide an opportunity of rectifying any errors in drawings and descriptions. A finished building is inspected when it has been in use for two years, to verify its compliance with the exacting requirements promised.

In-house, Miljöbyggnad is a practical tool for realising the company management's environmental aspirations. For example, a company may decide that everything it builds is to be certified to Miljöbyggnad Silver.

The winning projects

The Swedish Research Council Formas, Sweden Green Building Council and the Swedish National Board of Housing, Building and Planning appointed a jury of researchers and industrial experts to select the winners from about 50 nominated projects.

The winners are:

New buildings

- Greenhouse Augustenborg in Malmö. (Housing)
- Backsippan in Ronneby. (Preschool)
- Herrestaskolan in Järfälla. (Preschool and School)
- Masthusen kvarter 11 in Malmö. (Offices)
- Väla Gård in Helsingborg. (Offices)

Rebuilt buildings

- Rådhus Skåne in Kristianstad. (Offices)
- Swecohuset in Stockholm. (Offices)

Townships

- Albano in Stockholm. (New development)
- Brunnskögd in Lund. (New development)
- Sköna Gröna Lagersberg in Eskilstuna. (Redevelopment)

Jury for buildings:

Peter Örn (chairman), Catarina Warfvinge, Karin Nyquist, Jerker Nyblom, Ruben Aronsson, Mauritz Glaumann.

Jury for townships:

Peter Örn (chairman), Anna Wickman Hamnö, Björn Hellström, Björn Svensby, Katarina Schyllberg och Mikael Åberg.





△ Greenhouse, a part of Ekostaden Augustenborg in Malmö, comprises a 14-storey tower block, 12 terrace housing units and a pre-existing building converted into new social facilities. The roof is fitted with 200 m² solar cells.

Greenhouse Augustenborg in Malmö

Jury citation. “Greenhouse Augustenborg exemplifies infill and upgrading of a typical 1950s residential area. It is characterised by a pursuit of both environmental and social sustainability, combining very low energy use with measures to inspire a sustainable lifestyle. The stipulation of user participation in the form of a green tenancy contract is an important element.”

Greenhouse Augustenborg is a rental housing development aiming for greener, more climate-smart everyday living. Greenhouse densifies the city and enhances social sustainability in a district developed between 1948 and 1952 in southeast Malmö. The project, deriving from a holistic perspective aimed at reducing the residents’ ecological footprint, comprises a 14-storey tower block, 12 terrace housing units and a pre-existing building converted into new facilities which among other things include a low-tox preschool. The housing units are being planned in accordance with the Swedish system Miljöbyggnad’s Gold certification requirements.

A modern, climate-smart lifestyle must be facilitated by means of energy supply innovations, environmental engineering, growing and social participation. The buildings are passive houses with green roofs, rooftop solar cells and simple, smart refuse pre-separation and cycle storage solutions. Bikes must be easy to store and swiftly retrievable. Transport bikes can be rented from a cycle garage. Bus and train stops are near at hand, and there will be a car pool providing electric vehicles (EDVs). The following description refers to the tower block.

The building

The tower block has concrete in the framework and concrete sandwich elements in the façade.

The building has mechanical heat recovery ventilation (MHRV). There is no comfort cooling. There is a needs-adapted home/away ventilation and power supply system which can be controlled via smartphone. Radiator heating is water-borne.

Energy

The tower block’s total energy use is estimated at upwards of 78 kWh per m² annually. This breaks down into heating 19, hot water 21, other domestic energy 8 and non-domestic energy 30 kWh per m² annually.

District heat is produced without fossil fueling. The energy comes from wind power and in the form of solar energy from the building, whose 200 m² of solar cells generate 4.3 kWh/m² (30,000 kWh/yr). A display in the living room shows the availability of solar energy, which is free of charge to tenants, as an incentive for using it when available. Hot water and energy are metered and charged for separately. In the laundry, tenants book a machine instead of a room and pay according to individual use. The architecture of the buildings permits maximum admission of daylight, thus reducing the need for artificial lighting.



△ Each tower block household can grow food on a balcony measuring about 20 m² and fitted with specially designed grow beds and a butler’s kitchen for managing soil and plants. Half the balcony is glazed in, so as to create different temperature zones.



△ Growing terrace and outdoor kitchen in one of the twelve terrace housing units. Rainwater is trapped for watering.



Environment

The building materials have the least possible environmental impact and are well documented. A high level of damp prevention has been aimed for.

The intelligent refuse disposal room gives the staircase a collective financial incentive if the residents together succeed in reducing their residual waste. Energy and hot water use can, together with waste production, be read off from a display in the home, thereby, hopefully, encouraging residents to reduce their resource utilisation.

The dwelling units are being given growing balconies and growing rooms, so that residents can grow part of their food supply. Two growing collectives are renting two apartments. The students are available as growing coaches and are tasked with giving hints and advice to other residents.

Every prospective Greenhouse client has to sign a green tenancy contract, promising to attend training programmes and seminars on ways of reducing resource utilisation in the home.

△ The 14-storey tower block has 34 flats. The idea is for the tenants to be able to grow part of their food supply on the balconies.



△ Living room, kitchen and growing balcony in the tower block.



The bathrooms have LED lighting ▷ and home/away ventilation settings. An indicator announces abnormal shower duration.

Greenhouse Augustenborg in Malmö

Location: Augustenborgsgatan 5, Malmö

Architect: Jaenecke Arkitekter

Landlord: MKB Fastighets AB

Building contractor: NCC

Project link: www.mkbfastighet.se

Contact person: Linda Ericsson

linda.ericsson@mkbfastighet.se



△ The 1,300 m² of Backsippan are divided into six preschool classes, staff facilities, a dining room and a kitchen. The roof is fitted with solar cells generating 22,000 kWh electricity annually.

Backsippan in Ronneby

Jury citation. “The Backsippan preschool focuses on the children’s reality and everyday life, taking as its vision that of being Sweden’s healthiest. This is reflected by measures expressly t to reduce chemicals and exposure, both in the building and in activities. The wholeness of vision is further underscored by low energy use and solar cells.”

The Backsippan (Pasque flower) preschool embodies a holistic approach. Everything has been thought through – from healthful materials in the building and fittings to non-toxic toys and organic food – with a view to creating Sweden’s healthiest preschool.

This holistic approach has led to many smart solutions, in both the building and its surroundings, inspired throughout by the cradle-to-cradle concept, which among other things means the preschool being built recyclable and non-toxic. The building is prepared for the recycling of building materials through information recorded in a database from Sunda Hus i Linköping AB.

The indoor environment is good, with sound-attenuating carpeting and automatically regulated ventilation. The air quality is metered continuously. Energy use is low. Rooftop solar cells contribute to the power supply, a geothermal heat pump to the heating supply, and waste heat from the kitchen to water heating.

The building

The preschool has a wooden framework and board cladding. The structure is simple and adaptable to future needs.

The ventilation is MHRV with heat exchange. It is automatically governed by indoor CO₂ content. Users can follow the metering on-line, and similarly obtain information concerning solar cell output and energy use. Heat is distributed through a water-borne floor-heating system.

Energy

The building’s specific energy use is approximately 43 kWh per m² annually, which is clearly under the building regulation requirement for this building, which is 84 kWh per m² annually.

Solar cells on the roof supply an estimated 22 kWh per m² annually (22,000 kWh per annum). Purchased electrical energy comes from hydro-electric power and wind power. Recycled heat (20 kWh per m² per annum) from the kitchen cold store and freezer room is used for heating water.

To save energy and make things easier for the users, the lighting is governed by movement detectors and is automatically adapted to the daylight admitted. LED lighting instead of low-energy lights means less electricity consumption.



△ The outdoor environment and a woodland area have been designed in collaboration with researchers from the Swedish University of Agricultural Sciences. The garden has grow beds, fruit bushes and fruit trees. The existing woodland has been preserved and enclosed, with the option of building huts and studying birds and creepy-crawlies.



△ The Backsippan preschool has an in-house kitchen which makes maximum use of organic raw materials.

Environment

A considered choice of materials has been achieved with the aid of a materials database. In other words, the products are known and assessed. Much effort has gone into damp prevention.

The staff have been given training concerning cleaning products, fittings and toys, the overall aim being to shield the children from exposure to emissions and ecotoxins. The problem of noise has been looked into, resulting for example in sound-attenuating matting which also absorbs particles and cleans the air; the particles are retained until the matting is vacuum-cleaned.

A study is planned in which air quality (including carbon monoxide, formaldehyde, volatile organic substances, particles and ozone) will be metered on various occasions. Metering will take place when the building is finished, furnishings, fittings and toys are in place and the children move in. This will result in conscious materials for future procurement of fittings/furnishings, toys and equipment.

A space between indoors and outdoors has been created by means of a two-metre-long roof jetty which also serves as a sunshield in summertime. The outdoor environment and a woodland area have been designed in collaboration with researchers from the Swedish University of Agricultural sciences.



△ Backsippan has two glazed verandas where the children can sleep outdoors.



Toys are selected with the express aim of minimising the amount of harmful substances which the children can absorb.

Backsippan preschool in Ronneby

Location: Abergavägen 6, Listerby

Landlord: Municipality of Ronneby

Architect: Zijad Bico

Building contractor: JSB

Project link: www.ronneby.se/C2Cfor-skolor

Contact: Cefur – Center for Research and Development in Ronneby, cefur@ronneby.se



△ Herrestaskolan, part of the Barkarbystaden township in the Municipality of Järfälla, north of Stockholm, is being built of solid timber. Landscape and building were designed in close conjunction, forming a unit which will be an important and living point in the new township.

Herrestaskolan in Järfälla

Jury citation. “Herrestaskolan – a building for school, preschool and sport facility – is Miljöbyggnad Gold certified. That certification comes as a cachet of low energy use, solar cells and measures to inform users of the importance of environmental adjustment. The building rests on a solid timber framework and has a green roof. Pursuit of greening is a hallmark of Herrestaskolan.”

A brand-new township, planned to comprise 5,000 homes, is taking shape on the old Barkarby airfield, north of Stockholm. Under construction here is Sweden’s first ever solid timber school building. Barkarbystaden is to be characterised by resource conservation in choice of materials, construction and management. This means, for example, energy-efficient buildings, environmentally friendly transport and easy waste management.

Herrestaskolan is expected to be ready to receive 400 children at the start of the autumn term 2015. The school building will be horse-shoe-shaped, comprising an indoor sports facility, a library and a fully equipped kitchen. In keeping with a major commitment to culture and leisure, several school facilities are to be available to clubs and the general public. The dining hall, craft rooms, technology rooms and home economics rooms are being constructed so that they can be rented. The school library will serve as a library for the entire township and will also include a café. The school entrance hall includes an exhibition area, complete with a stage. The school campus will be given an activity park which will serve as the older children’s playground during the day and will be accessible to everyone in Barkarbystaden at other times. Landscape and building are being designed in close conjunction, forming a unit which will be an important and living point in the new township. The big activity park contains generous areas for sports and games, and modulation of the terrain will create both spatial variety and room for an underground garage.

The building

The building is just under 8,000 m² in area. The framework is made of solid timber sections, with insulation and then façade sheeting on the outside. The façade sheeting is faced with glulam pillars retaining a semi-transparent façade of profiled glass. This is illuminated after dark, highlighting the pillar frame behind it. The courtyard side has a wooden façade and a glulam pergola painted several different colours. All load-bearing walls and visible staircases are of solid wood.

The building has low energy use, based partly on MHRV ventilation with heat exchange and VAV (variable air volume). No comfort ventilation will be installed. Airing through open windows is recommended instead during summertime. The heating system comprises hot water radiators, and the preschool premises have water-borne floor heating.



△ The fully equipped sports facility can accommodate some 200 spectators but can also admit larger groups of up to 400. Amenities here include a 14-metre-high climbing wall.



△ Herrestaskolan has a horse-shoe configuration. The sports facility is in the left-hand part, with the library next to the main entrance, opposite. The right-hand part contains the preschool, and the red part includes facilities for crafts and home economics. The dining hall and kitchen (pale blue) are at the heart of the building. The other school premises are located two floors up.



△ The solid wooden staircase in the entrance hall leads up to the school and the sports facility spectator stands. The library and dining hall are on the left. The sports facility is behind the decorated wall on the right. The small café stage can be seen at the far end.

Energy

Energy use is estimated at 70.3 kWh per m² annually. This breaks down into about 25 for heating, 15 for hot water, 12 for domestic electricity and 18 kWh per m² annually for non-domestic electricity.

The school has district heating. A rooftop solar cell unit measuring 1,400 m² generates 16.5 kWh electric energy per m² annually. Power needing to be purchased comes from solar, wind and hydropower or geothermal sources.

The shower blenders in the sports facility are centrally regulated. A screen near the main entrance will enable pupils, staff and visitors to see how much energy the building uses and supplies.

Environment

Herrestaskolan is Miljöbyggnad Gold certified. This means extra requirements, for example, concerning energy conservation, air quality, acoustics and ensuring the absence of hazardous chemicals.

School waste goes to the Barkarbystaden waste suction terminal, and the school's own kitchen is equipped with waste grinders, enabling food scraps to be transferred to a biogas plant producing both biogas and fertiliser.

The school will have a sedum green roof, delaying the escape of rainwater to stormwater pipes. The roof also serves to reduce energy use by insulation in wintertime, while in summertime evaporation has a cooling effect.



◁ Herrestaskolan overlooks the Lilla Torget piazza in the new Barkarbystaden township. The main entrance is characterised by large expanses of glazing, its pillars and its warm shade of red. Above the main entrance is the school staff room, with a pantry and conference facility which can be rented in the evenings.

Herrestaskolan in Järfälla

Location: Lilla Torget, Barkarbystaden, Municipality of Järfälla

Landlord: Municipality of Järfälla

Architect: Liljewall Arkitekter

Building contractor: Skanska

Project link: www.jarfalla.se

Contact person: Ian Craig,
ian.craig@jarfalla.se



△ Visualisation of the Masthusen township, in the heart of the Western Docks district of Malmö kvarter 11 (Mastorget 6) adjoins Mastorget, the township piazza.

Masthusen kvarter 11 in Malmö

Jury citation. “Masthusen kvarter 11 – offices and shops in a building distinguished by its green walls and roof. This is an energy efficient building, with solar cells and an interesting bore hole solution. Great efforts are being made to involve the users. The building is BREEAM certified in a BREEAM Communities township.”

Masthusen is a part of the Västra Hamnen (Western Docks) area of Malmö. Mastorget 6, the new office building, has a total area of just over 8,600 m², of which 6,700 m² are assigned to offices. The building has six storeys above ground, plus a basement whose appointments include equipment for geothermal heating.

The building has attained the Excellent level in BREEAM, the environmental assessment methodology, which among other things covers energy use, indoor climate, waste management, choice of building materials and the building's location in relation to public transport. A building thus classified shows a high level of environmental performance in a life-cycle perspective.

BREEAM certification was decided on at an early stage of things and has permeated the design and system choices all the way from pilot study to construction document. The building, consequently, has been made energy efficient, producing nearly all the energy it needs locally, via bore hole storage and solar cells. It furthers the neighbourhood's biodiversity with green roofs and walls. During the management and operation stage, the building will be monitored for use as planned and for compliance with all the requirements and targets decided on.

The building has optimum daylight admission, with windows two metres high and a view of the verdant atrium court. The office facilities are flexible enough to be easily refurbished, instead of requiring structural alterations, which in itself is both cost effective and environmentally friendly. Good bike paths lead all the way from Malmö City to Masthusen. The neighbourhood is currently served by three city bus routes. The nearest train station is 15 minutes' walk distant, and from there one can go further afield in Skåne or cross the bridge to Copenhagen.

The building

The building has a concrete framework and a prefab sandwich façade. The building materials are of high quality and long-lasting.

The building is made energy efficient partly by means of needs-governed ventilation and climate systems, lighting systems governed by movement detectors and low-energy windows. Comfort cooling is distributed through an airborne system. Heat is distributed through a water-borne radiator system and a floor-heating system.



△ The new office block contributes to local biodiversity through its green roofs and walls.



△ The office building Masttorget 6 is a highly energy efficient office block, producing almost its entire energy requirement via bore hole storage and solar cells.

Energy

The building's total annual energy use is 59 kWh per m², breaking down into 5 for heating, 4 for hot water, 1 for district air conditioning, 32 for non-domestic electricity and 17 kWh per m² for other electricity supply.

Heating and hot water are based on geo-energy supplied via a bore hole store and heat pump. No heating has to be purchased. Comfort cooling is obtained via the bore hole store and a cooling pump.

Electric energy comes from solar cells on the roof, which generate 7 kWh per m² annually, and from hydropower.

Environment

Extensive efforts have been devoted to damp prevention, and the chemical content of the building materials has been kept under close surveillance.

All users have been issued with a building guide based on BREEAM requirements. This guide informs the users of ways in which they can contribute towards the

environmentally appropriate running of the building. It also describes the building's environmental technology and the way in which its green walls and sedum green roof contribute to local biodiversity. In addition, users are told how they can travel sustainably to and from the building and how they can shop and provide services locally so as to reduce transport inputs.

The users have the option of signing green tenancy contracts for better co-operation on environmental issues. Follow-up takes place twice yearly. An on-line questionnaire survey is conducted in the spring, followed in the autumn by a telephone interview in greater depth. The tenants take part in an education programme before moving in.



△ The new office block contributes to local biodiversity through its green roofs and walls.

Masthusen kvarter 11 in Malmö
Location: Masttorget 6, Västra Hamnen, Malmö
Landlord: Diligentia
Architect: Kanozi Arkitekter
Building contractor: Veidekke
Project link: www.masthusen.se
Contact person: Andreas Ivarsson, andreas.ivarsson@diligentia.se



△ The architect-designed office building at Väla Gård is reminiscent of Scanian (Skåne) longhouses. The sun-shielding on the end walls is at the same time a work of art.

Väla Gård in Helsingborg

Jury citation. "Väla Gård – a highly energy efficient office building with solar cells and an innovative sun shield. The building is distinguished by many visible proofs of green building which help to involve the users. The building has been awarded LEED Platinum certification."



△ The sun shielding on the buildings doubles as a work of art.

Väla Gård is a beautiful 19th century building of waste rock in the midst of a nature reserve. Now it also has a new, architect-designed 1,750 m² office block, a building with very low energy use, rooftop solar cells and efficient sun shielding, jointly devised by Skanska and the architect. The sun shielding reduces the need for cooling and at the same time constitutes a work of art – an innovative solution serving more than one purpose.

The users, Skanska's own staff, are proud of the workplace they have had a hand in both planning and building. There is plentiful evidence of the building's green qualities, which helps to keep the employees in a green frame of mind.

In 2013 this was voted Best Green Building by the Sweden Green Building Council, voted best LEED building and presented with the Svensk Solenergi (Solar Energy Association of Sweden) Solar Energy Award.

The building

The framework is concrete, the façade concrete sandwich with wooden boarding. The heavy framework of concrete and the sandwich walls with their concrete and graphite-enhanced EPS boarding add up to a robust, impervious and well-insulated climate shell.

The building has MHRV ventilation, with good heat exchange and variable air flow. Comfort cooling is airborne, using a VAV system. Ventilation is governed by occupancy and temperature and, in the conference rooms, by CO₂. The lighting is governed by movement detectors.



△ A growing wall indoors is one of the visible proofs of the green qualities of the Väla Gård offices.

Free cooling from a bore hole is connected to a cooling battery in the air handling unit. Heat is distributed through a waterborne radiator system.

Energy

The building is highly energy efficient. Its total metered energy use (electricity only) is 41 kWh per m² annually – for heating, hot water, cooling, property management power and operational power. Electricity use breaks down into 0.5 kWh per m² annually for cooling plant, 12 for the heat pump, 3.5 for other property management and 25 kWh per m² annually for operational electricity.

The rooftop solar cells have an annual output of 40 kWh electrical energy per m². This makes the building an energy-plus building with regard to property management energy and gives it a net energy balance of almost zero if operational power is also included (which it usually isn't in Sweden). Other electrical energy is purchased and derives from wind, water, solar and biomass.

Heat and hot water are generated by a bedrock geothermal facility with 22 bore holes 180 metres deep, which also supplies free cooling at no cost. The sun shielding reduces the cooling requirement, and unnecessary lighting has been obviated by daylight studies.



◁ Väla Gård is a modern office block where a combination of many good solutions has created a very good indoor environment.

Environment

Great efforts have been devoted to damp prevention, and the chemical content of the building materials has been kept under close surveillance. All chemicals have been checked in accordance with the guidelines of the Swedish Chemicals Agency, which rule out the use of any hazardous substances. Additionally, all materials have been checked against the Byggarubedömningen (Building Materials Assessment) system, to ensure that all building materials in their entirety are included and not just chemical products.

Being environmentally friendly comes easily at Väla Gård. Water use is low, thanks to lean fittings. Small notices about green solutions augment green commitment, as do an indoor growing wall with air-cleansing plants, a notice in the toilet explaining how the energy-efficient lighting is occupancy controlled, a digital screen showing energy use and production and also where the office respectively buys electricity and sells power from the solar cells.

Väla Gård has an electric car. A notice on the car states that it is charged with Väla Gård's own solar power. The communal bike which stands in the entrance is much in demand, and a notice in the same place gives bus departure times from outside the door.

▽ The Väla Gård offices by night.



Väla Gård in Helsingborg

Location: Kanongatan 100 A,
Helsingborg

Landlord: Skanska

Architect: Tengbom

Contractor: Skanska

Project link: www.skanska.se

Contact person: Johan Nilsson,
johan.p.nilsson@skanska.se



△ Completed in January 2014 – Kristianstad's new joint municipal and regional government building: Rådhus Skåne. The historic city hall quarter now includes a new, modern administrative building with room for 700 – tucked away behind façades and architecture from three centuries. The lit-up part is the newly built main entrance.

Rådhus Skåne in Kristianstad

Jury citation. “Rådhus Skåne – an office development demonstrating the possibility of sympathetically reconstructing an old building so as to make it a modern eco-building with a good indoor climate. The rebuilding followed a careful inventory for the purpose of preserving as much as possible of the earlier buildings. Damp prevention has been a prime concern.”

Rådhus Skåne is a modern building inside an old shell. Formerly, the old city hall quarter housed 230 people in 12,000 m². Today it houses 700 and measures 22,500 m², 17,500 m² of which is a new structure inside the original façades.

When the Municipality of Kristianstad and Region Skåne resolved to merge their central administrations, they drew up a joint vision description: “Skånehuset Kristian IV shall be an open, accessible meeting point and workplace efficiently underpinning the activities concerned, encouraging renewal and opening the way to inspirational meetings for citizens and colleagues.”

The basic project concept became that of preserving as much as possible of the outside of the block, while at the same time radically transforming the interior. Following demolition, rebuilding and new construction, the block comprises architecture from three centuries. Rådhuset (the City hall) and the old police station have been removed and modernised on the inside, the ornate tower caps of the City hall have been thoroughly renovated. The new façade has been pulled back and the roof made higher, to give the south tower of the City hall the same prominence as the north one.

The Façades facing the New and West Boulevards were shored up while construction was in progress, so that they could be preserved and thoroughly renovated. The old balconies were replaced with replicas and the original wrought-iron detailing reinstated. The attic storeys were constructed anew, with the same outward appearance as before. The corroded roofing sheet was replaced with copper, and parts of the building were given sedum green roofing.

Thus the scale of the block in relation to surrounding streets has been preserved, while the inside is a completely new structure, meeting the requirements for modern, efficient office premises. A six-storey volume rising in the middle of the block is flanked by two galleries through which daylight flows down into the inside of the block. The entire entrance floor has been reserved for the council room, foyers, meeting rooms, a civic centre, a reception and other service functions. A staff dining room seating almost 300 diners and with a big terrace facing west has been given the best location on the top storey. The office workstations are on the other storeys. Rådhus Skåne cost roughly EUR 60 million, a



△ The four sides of Rådhuskvarteret (City hall quarter) confront important urban spaces of various kinds. Uppermost in this picture – looking east – is Stora Torg, where the main entrance is located. At the bottom – looking west – is the Central Station, and to the left – looking north – is Heliga Trefaldighetskyrkan (Trinity Church). The Courthouse has sedum roofing to both sides of the centre section, which is a six-storey volume housing the staff dining room, the outdoor terrace and other facilities. The terrace is the paler space visible in the picture.

capital outlay which in the long term will pay for itself through the reduction of running costs. The cost per workstation is no higher than it was in the old buildings, partly because space is being used more efficiently and because the new block is far more energy efficient than the old one.

The building

The new part of the block has a framework of steel and concrete and load-bearing sections of prefabricated concrete. The pre-existing part has a brickwork frame. The façade of the new part consists partly of the pre-existing brickwork fronts of demolished buildings and partly of load-bearing prefabricated concrete and light curtain walls. The façade of the pre-existing part is brickwork. Building materials were selected with sustainability and future maintenance in mind.

The ventilation system is MHRV with heat exchange. Heat is distributed through a waterborne radiator system. Comfort cooling is distributed through an airborne system with constant air flow (CAV) in the pre-existing part of the block and variable air flow (VAV) in the new.

Energy

Rådhus Skåne uses an estimated 123 kWh per m² annually, which breaks down into 48 for heating, 7 hot water and hot-water circulation losses, 13 for district cooling, 30 for facility management power and 25 kWh per m² annually for operational electricity.

District heating is used, derived mainly from biofuel. The building also uses district cooling, and in this way is kept cool during the summer season with free cooling from groundwater. Facility management electricity and operational electricity are hydro-generated.

Environment

Environmental and energy-related issues have been present throughout the project, with special emphasis on damp prevention and preservation issues. Parts in such poor condition as to be not worth saving were

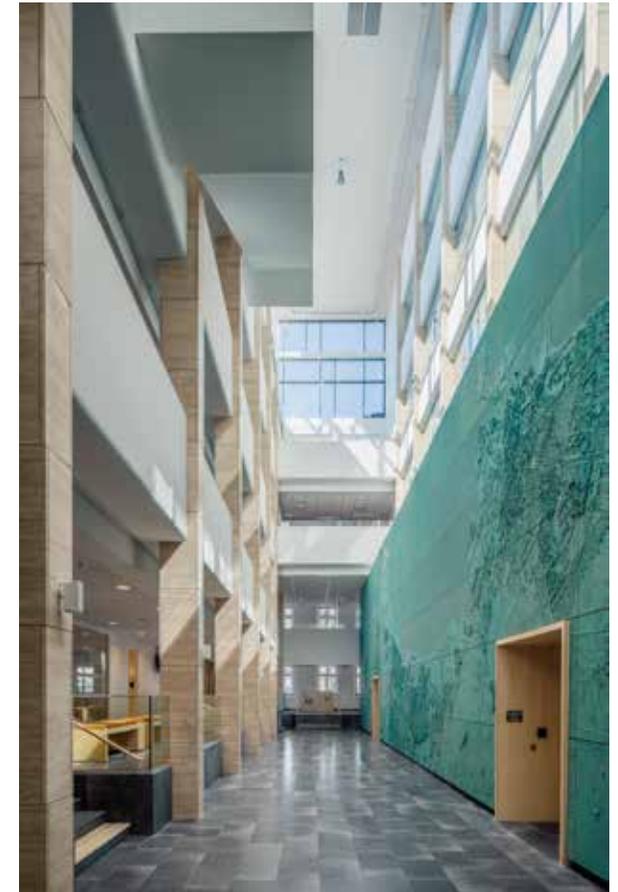
pulled down. Everything in the northwest corner is new, while in the corner overlooking the piazza three whole buildings of outstanding architectural interest were retained. To the south and west, the old stone façade was retained. The chemical content of the building materials is well in hand, and the pre-existing part has been cleansed of hazardous substances.

Rådhus Skåne has been awarded a Silver rating in a Miljöbyggnad assessment based partly on energy efficiency, indoor climate and choice of materials.

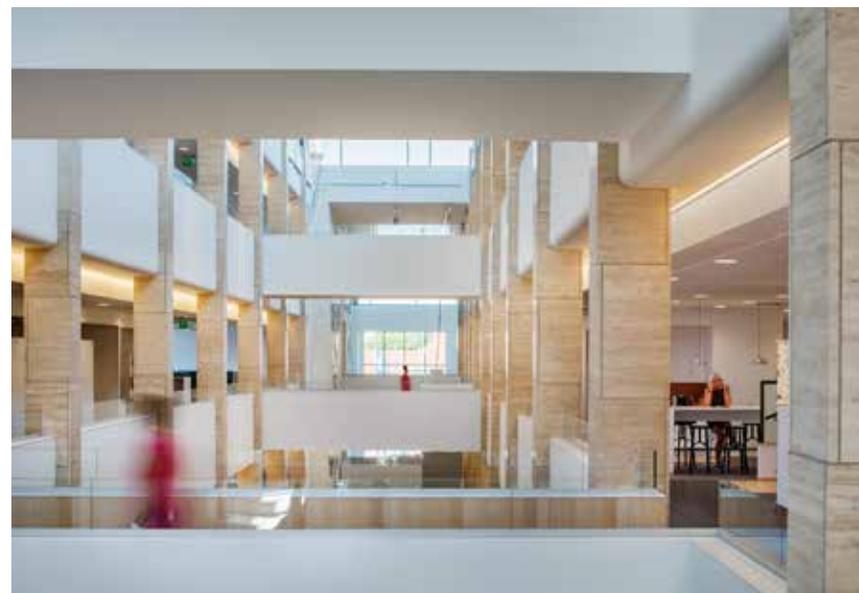
The users are expected to contribute towards a better environment by commuting by train and in biogas buses from the nearby Central Station, pre-separating waste and turning off their computers at the end of the working day. Lighting and ventilation are presence controlled.



△ The main council room.



◁ On the west side (right side in this picture) the 1900s façades have been preserved. A completely new building, with pale travertine cladding, stands on the corner opposite the railway station. There are no parking spaces for the commuting staff, and the staff have to use biogas driven cars from a carpool.



The open-plan, flexible office floors, with ▷ a generous array of meeting rooms and quiet rooms, now accommodate almost 700 workstations.

Rådhus Skåne in Kristianstad
Location: Västra Storgatan 12, Stora Torg, Kristianstad
Landlord: the Municipality of Kristianstad
Architect: Greger Dahlström, FOJAB arkitekter AB
Contractor: NCC Construction
Project link: www.kristianstad.se
Contact person: Patrik Möller, patrik.moller@kristianstad.se



△ Swecohuset (the Sweco Building) Stockholm, is a 43,000 m² office block with a 14-storey high-rise section and a 4-storey low-rise one. The framework is ferro-concrete, the façade brick. The building was erected at the end of the 1960s.

Swecohuset in Stockholm

Jury citation. “Swecohuset, Stockholm – a rebuild with far-reaching environmental aspirations. Here a conventional office building has been transformed into a modern, well-lit indoor environment by radical devices and with energy and the environment at the centre of attention. The project has demonstrated the possibility of a rebuild, despite formidable challenges, attaining Miljöbyggnad Gold certification.”

Sweco has rebuilt its office block in the Marieberg district of Stockholm – instead of moving elsewhere. The rebuild has saved energy and created considerable added value.

The move from Marieberg was already planned. The 50-year-old industrial premises were to be exchanged for a new address. But then came the vision of a new solution, and the old premises, with their 25,000 m² of floor space, were given a complete make-over. Swecohuset today is an office block with 43,000 m² of floor space, and Sweco’s own premises, comprising 27,000 m², are included in the Miljöbyggnad certification.

Sweco cut the Gordian knot through the expedient of a radical demolition creating just one large and high unifying room, the Living Room, ascending right up through the building’s low-rise section. Walling in the building’s pre-existent courtyards has made the outer façades part of the interior. The Living Room is day-lit through the new roof lights of the open courtyards.

The open-plan workstations on this floor face outwards, towards the Living Room. Visuality and visual contact have replaced what used to be quite a deep and secretive structure. This is a place where co-workers and visitors can get together.

The brightly lit open-plan office area, with its flexible structures, enables the consultants to share in each other’s work and to pool their skills. Given that Sweco is actively concerned with developing a sustainable society, they wanted to take the opportunity of making their own offices an example of sustainable building where energy and economy are concerned, and, not least, of getting a socially sustainable workplace.

The building

The building has a ferro-concrete framework and a brick façade. The building today has MHRV ventilation with heat exchange. Comfort ventilation is distributed through a VAV (variable air flow) system. Cooling is achieved with the building’s own cooling machines and with free cooling from a bore hole store which also contributes to heat supply. Otherwise heat is delivered through a district heating system and distributed within the building water-borne, through radiators.

Energy

The rebuilding was distinguished by very lofty aspirations where energy use reduction was concerned. The reduction achieved falls below the energy requirements applying to newly built properties. Energy use in the building (the 27,000 m² office section) has been reduced by 68 per cent, from 180 to 57 kWh per m² annually. This has been achieved partly with new proven technology for building services and power supply. Windows have been replaced, ventilation units with 90 per cent recovery installed, along with heat pumps and forecast control systems, and geo-energy is used.

Electric power supply to the property and operation is eco-labelled. The Sweco Building has been fitted with 7 kW solar cells, which provide a small electric power increment. AMF Fastigheter, the owner of the Sweco Building, purchases only electric power with the Bra Miljöval (Good Environmental Choice) label, and the district heat used is climate-neutral. Climate-neutral district heating means the supplier purchasing holdings in international climate projects matching the impact of district heating on climate.



◁ Visitors to Swecohuset are led into a 50x9 metre light court where staff and guests can meet and socialise.

Environment

Extensive efforts have been devoted to damp prevention, and the chemical content of the building materials has been kept under close surveillance. Miljöbyggnad has awarded the property its highest environmental performance rating, Gold. A Gold rating is considered very hard to get for a rebuild, but this is what the Sweco Building has achieved. As part of the rebuild, the existing part was cleared of hazardous substances.

Users help to reduce environmental impact through a Green Tenancy Contract. This is the property industry's common standard template for reducing the environmental impact of non-housing premises. The Green Tenancy Agreement makes clear the measures which tenant and landlord have agreed on with a view to reducing environmental impact, e.g. information and co-operation, energy and the indoor environment, choice of materials and waste disposal.



The new premises have quite a new openness, aimed at ▷ evoking the ambience of a four-floor living room.

Swecohuset in Stockholm

Location: the property Trängkåren at Gjörwellsgatan 22, Stockholm

Landlord: AMF Fastigheter

Architect: Sweco Architects AB

Contractors: CM-Projekt, Forsen

Project link: www.amffastigheter.se

Contact person: Michael Eskils,
michael.eskils@amffastigheter.se



△ Albano, with its green roofs, will be located in Kungliga Nationalstadsparken (the Royal National City Park), Brunnsvikén, which borders on central Stockholm. KTH (the Royal Institute of Technology) can be seen at the top of this picture, and Kräftriket, owned by Stockholm University, occupies the peninsula jutting out into Brunnsvikén.

Albano in Stockholm

Jury citation. “Albano – a development project, forcefully innovative in its creation of a meeting point between university, business enterprise and the municipal sector. This conjunction often generates and concretises new research projects. Albano highlights the sensitive cut-off point between town and country, expressed in the Royal National City Park’s relation to new building development and in the view taken of eco-system services. Additionally, Albano has established the concept of social-ecological urban planning, thereby opening up new possibilities for the future development of towns and cities.”

Albano is located in the Royal National City Park (Kungliga Nationalstadsparken), Stockholm. The aim here is to reinforce the parkland and countryside by giving the new development a green profile. The project forms part of the development of Stockholm Science City, a whole new township destined to comprise homes, services and university departments. Some 150,000 m² of higher education facilities are to be constructed in Albano, with about 50,000 m² reserved for student and postgraduate housing. Planning of the new development takes the needs of the higher education establishments as its starting point.

Man’s interaction with nature occupies the centre of attention in the planning process, with generous scope allotted to ecology. The green spaces will be, not just spaces, but ecosystems to be sustained and developed. Technical innovations are being combined with ecological systems in a social-ecological planning model of which this will be the first large-scale implementation. The model is based on research now in progress at the Stockholm Resilience Centre, the KTH School of Architecture and elsewhere.

Better communication is needed between KTH, Stockholm University and the Karolinska Institute. A number of traffic studies have been carried out and strategic plans drawn up with a bearing on the Albano site. Among other things, plans exist for a PRT (Personal Rapid Transit) service on campus.



△ The rooftops will be planted with greenery, e.g. sedum, grass, shrubs and pergola climbing plants.



△ Rooftop terraces with growing plots, a field, a sports ground, play areas and games.



△ Surge tank integrated with the walkway.

Energy

The feasibility of eventually making the site CO₂ neutral is being studied in a development project. A zero CO₂ vision is entertained, including an energy self-sufficiency level high enough to obviate the purchasing of a single kWh for the university facilities. The student and postgraduate housing, accordingly, will take the form of passive and low-energy buildings.

KTH is developing a tool for simulating and modelling energy systems and services for building clusters and city districts. That tool has been used for Albano. The energy system solution, based on geo-energy, is local and co-ordinated for the entire township, constituting a cogently worked-out system for the production and distribution of heat and cooling to university department premises, homes and service units. In this way, optimum matching of supply and demand will be feasible over time. This means co-ordinating and optimising for an entire area, so that waste heat from an office block, for example, can be used in people's homes.

"Design for energy-efficient campus living in Albano" is the title of a project to explore ways in which the design of the immediate physical environment can encourage sustainable behaviour and reduce energy use.

Environment

In social-ecological systems, environments and cities are constructed which offer us human beings everything we want while at the same time enabling nature to contribute various ecosystem services, such as shade, recreation, noise exclusion, pollination, water and food in a resilient, sustainable and flourishing environment.

In Albano, new distribution paths for plants and seeds will be created by integrating green roofs and façades. The green roofs, with their sedum, grass or bushes, will also delay the escape of rainwater and improve the building's insulation and heat regulation throughout the day and the changing seasons. The terraces and courtyards have great ecological and recreative qualities and area at the same time an important part of the external social area, interacting with the interior spaces and making nature an integral part of the buildings.

▽ View over the Albano area.



△ The courtyards are an important part of the external social space, interacting with the interior spaces and making nature an integral part of the buildings.

Albano in Stockholm

Location: North Djurgården, Östermalm, northwest of Roslagstull
Landlords: Akademiska Hus and Svenska Bostäder

Architects: BSK Arkitekter, CCO, Nivå Landskapsarkitekter

Project link: www.bygg.stockholm.se/alla-projekt/albano

Contact person: Jerker Nyblom, jerker.nyblom@akademiskahus.se



△ Image 1: Air photograph of the Brunnshög area today. Image 2: Vision image for the Brunnshög area. The western part alongside the E22 highway will be an enterprise zone containing offices and research facilities. The eastern part will be a mixed township with a variety of functions.

Brunnshög in Lund

Jury citation. “Lund Brunnshög – a greenfield project in an expanding city which, like so many others the world over, is constrained to build on valuable farmland. A project which, right at the planning stage, highlights and deliberately pursues management of the conflict between the expanding city and the surrounding country, and, by the same token, society’s future prospects of coping with food supply. Lund Brunnshög is also characterised by an endeavour to link European research facilities now planned with the existing urban structure. In addition, this is a project aimed at creating goals and activities for all sustainability functions.”

Europe has decided to place one of the world’s foremost research centres, the European Spallation Source, ESS, in Brunnshög, Lund, and Sweden has decided to place the world’s most powerful electronic microscope, MAX IV, right next to it.

Creation of an interesting, sustainable urban environment and excursion attractions round about the facilities will enhance the attraction of the place to researchers but also to everyone else. The Solbjer block in Brunnshög is scheduled for construction during 2016, and MAX IV will be commissioned that same year. Work on ESS will start in 2017 and will be completed in 2020, by which time a tramway between the centre of Lund and ESS will be in place. Stage 1 of Central Brunnshög and stage 2 of Science Village will be ongoing in 2020. In 2030 ESS will be up and running and stage 1 of Central Brunnshög completed. The vision is for Brunnshög to become the world’s foremost research and innovation environment.

The aim of the Brunnshög project is to plan a township for up to about 40,000 residents and workplaces covering an area of 250 hectares. The western part alongside the E22 highway will be an enterprise zone, containing offices and research facilities. The eastern part will be a mixed development, densely structured, with workplaces, homes, services and recreation amenities. The workplaces are to be integrated with the housing as far as possible.

Brunnshög is to offer homes of many different kinds with various qualities. A 24-hour public library is under discussion, and the plan is for the future church to be open to all creeds and denominations. Schools and preschools are being built in step with housing production. Retail trade and services will be grouped along the main axis of Brunnshög, close to tram stops.



△ Vision image of Solbjer quarter.



△ Vision image of the Solbjer park.

Three profile areas have been chosen with a view to deepening sustainability work in Brunnshög, namely: minimising, balancing and maximising. *Minimising* is about minimising the development’s impact on climate. *Balancing* means balancing the use of good farmland. *Maximising* is about maximising experiences, sensory impressions and meeting points. The project gives high priority to participation, e.g. in the form of colloquies, urban growing projects and joint groups of various kinds.



△ Vision image of MAX IV.

Travel to and from Brunnshög is to be equally divided between car, walking/bike and public transport, the last mentioned of which includes a tramway with shelters warmed with waste heat. The third target is to be made a tool governing developments. Most parking spaces are to be provided in indoor car parks, which are often a longer walk away than the bus stop.

Energy

The buildings are to be designed for low energy use, low climate impact and low environmental impact. Minimising the urban development's climate impact can be a matter of producing sustainable energy and reducing energy use. Renewable local energy such as wind power, solar power and biogas is to have priority in Brunnshög.

The new township will hasten the emergence of innovations with a potentially important bearing on sustainable urban development. The Brunnshög Contract between the Municipality of Lund, Lunds Renhållningsverk, Kraftringen and VA Syd, forms part of this process. The contract requires the parties to make public utilities user friendly, replace electric power with heat (given that waste heat will be available from the research facilities), create good opportunities for local energy and resource production, close nutrient and material cycles, minimise waste and develop methods for removing pharmaceutical residues and other contaminants from wastewater.

Environment

Agricultural land may come to be in short supply when both energy and food are to be cultivated. Seven per cent of Sweden's land area is arable land, and roughly half the country's food production is based in Skåne. The value of arable land is being taken very seriously in the planning of Brunnshög, the final construction phase of which will take place on prime farmland. To balance the good earth, there is a vision target saying that the land must be used efficiently, that all plant nutrient present in the spoil removed from the site is to be restored to arable land, that 20 per cent of the land utilised must be amenable to reinstatement for farming at some future date, and that half of today's growing in the Brunnshög area must be made good through urban growing.

Brunnshög is to be adapted to cope with a changed climate entailing heavier precipitation. The storm-water system is to a great extent to be open. Extremely heavy falls of rain can be dealt with in floodable piazzas, courtyards and parks. Green roofs delay storm water escape and provide cooling during heat waves, and places with vegetation, wind and water can offer shade and cool. Tree planting reduces the need for cooling and the wind velocities in the neighbourhood.

Brunnshög is to offer a holistic solution in which green and blue – plants and water – are integrated in all parts of the township, such as roofs, walls, courtyards and parking facilities.

Brunnshög is also to offer an out-of-town green recreation area, Kunskapsparken. Parks and green spaces are to be designed to offset the use of built-up areas, and green spaces are to be designed in keeping with the surrounding agrarian landscape. Plantings have already been established with a view to creating a better microclimate, achieving biodiversity and binding carbon dioxide. The plan is to create a zone between town and country for the exchange of ecosystem services. The urban area is to have growing spaces on roofs and in courtyards, on balconies and in parks, and pollinating species are to be assisted by means of bumble bee nest boxes and beehives.

▽ Vision image of Science Village.



Brunnshög in Lund

Location: The site is located northeast of the centre of Lund.

Architects: Many, during the 40-odd years the development is expected to take.

Landlords: Municipality of Lund, Lund Cathedral, Science Village Scandinavia, inter alia.

Contractors: Many, during the 40-odd years the development is expected to take.

Project link: www.lund.se/brunnshog

Contact person: Eva Dalman, eva.dalman@lund.se



Sköna Gröna Lagersberg in Eskilstuna

△ In the Lagersberg township, outdoor settings are being created for face-to-face meetings, e.g. in the form of 170 allotments, most of which are used for home growing. Children, men and women with a variety of backgrounds meet together, swapping hints and comparing notes on their gardening.

Jury citation. "Sköna Gröna Lagersberg (Green-fingered Lagersberg) – an ambitious redevelopment project paying special attention to the socio-economic challenges of the Million Homes Programme, challenges which cities in other countries are also facing and will have to deal with. Green-fingered Lagersberg is an inspiring example of the way in which sustainable cities can be created on a shoestring and with due consideration for residents. This is a project informed by social commitment and perception of the imperative that redevelopment must be underpinned by civic participation and communication."

A plumbing overhaul of the Lagersberg housing estate on the outskirts of Eskilstuna was taken as the cue for a thoroughgoing refurbishment of the neighbourhood, which dates from the end of the 1960s and has about 430 spacious, well-lit dwelling units with many young families. The aim is for energy use in the buildings to be almost halved, and for Lagersberg to be made a sustainable township through dialogue and interaction with the people living and working there. In addition to energy efficiency measures and the plumbing overhaul, the façades are being cleaned, bathrooms tiled and old kitchens re-fitted. There is a challenge involved in devising an effective mix of renovation measures and at the same time ensuring that residents can afford to stay put.

The aim is to heighten environmental awareness and perceived security in the neighbourhood and to make the place more attractive. To this end, the municipal housing utility is partnering residents and other interests. Activities have been initiated to disseminate information and knowledge concerning the environment, energy use, recycling, waste pre-separation, and electricity and water consumption.

The outdoor environment has been mapped in collaboration with interested tenants, maintenance staff and a landscape architect. Thoughts and ideas concerning play apparatus, meeting points, security and maintenance have been canvassed at meetings and on "security walks". The meetings have generated sketches of what the outdoor environment is to look like and contain, e.g. allotments, bike storage facilities, BBQ points and play facilities for different age groups.

Questions concerning traffic, lighting, footpaths and bike paths are being highlighted through a township group and discussed with local authorities and companies. Public transport is amply available.



△ Lagersberg, Eskilstuna, a late 1960s housing estate, is now being renovated with a view to social, ecological and economic sustainability.



△ In connection with courtyard and play area makeovers, residents are invited to help decide, together with maintenance staff and architects, what the end result will look like.



Energy

Energy use is to be cut from 175 to 90 kWh per m² annually by means of supplementary insulation – 50 mm for façade and foundations, 500 mm for attics – window replacement, installation of MHRV ventilation with heat exchange, substitution of energy-efficient, occupancy-controlled stairwell lighting, installation of individual water metering, replacement of main heating valves and regulating valves, and replacement of secondary heat piping between the buildings.

Some 180 m² of solar panels for water heating have been fitted to one building, and about 750 m² of solar cells for power production have been fitted to another three.

Residents are being taught and encouraged to adopt more sustainable behaviour regarding electricity, water, heating and recycling. Four home energy advisers call on residents, offering hints on energy conservation.

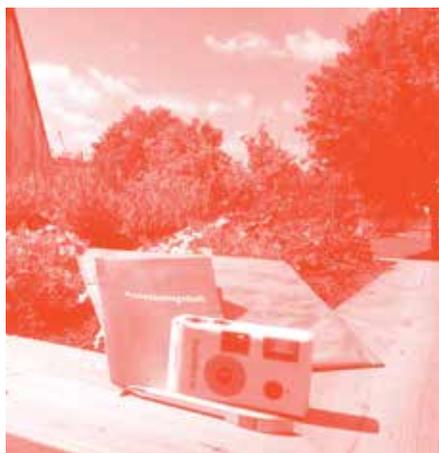
The plumbing overhaul includes the installation of cassette toilet systems in bathrooms, and the Addera “room-within-a-room” bathroom system has been experimentally installed in two of the buildings.

Environment

The building products used are approved according to the Sunda Hus environmental database.

The neighbourhood’s outdoor environments are being reviewed in a dialogue with residents and other interested parties living and working there. Care is being taken to preserve green courtyards and corridors between surrounding woodland and farmland into the housing estate. The children have made nesting boxes which are being put up for birds and bats. Sedum-roofed bike sheds and 170 allotments come as a further contribution to biodiversity.

△ Youngsters can attend weekly recycling courses, learning to design something new out of cast-off clothing and materials and to assemble a new bike from bits of old ones. The bike workshop is open to all residents. There are now also four green bikes which can be borrowed free of charge.



◁ What does a flat need to include so as to make environmentally appropriate behaviour come easily? In one Lagersberg project, a special flat is being fitted out in which residents can learn from each other, the aim being to generate innovative thinking about ageing rental flats. Residents contribute, for example, by recording their habits.



△ Four trainees commanding altogether six languages have been hired for a year full time as Energy Facilitators. Their job will be to reach as many residents as possible with energy conservation hints, as well as distributing shower timers and sink plugs.



△ Schoolchildren up to the age of twelve were invited to help develop a sketch of an environmental education park together with researchers, property management staff and creators. Playful learning will teach them to use electric energy and water with care and to contribute to good recycling.

Sköna Gröna Lagersberg in Eskilstuna
Location: 3 km from Eskilstuna Central Station
Landlord: Eskilstuna Kommunfastigheter AB
No. flats: 430
Architect: AQ
Contractor: NCC
Project link: www.kfast.se
Contact person: Charlotte H Kindmark, charlotte.kindmark@kfast.se

Organisers and sponsors

Organisers

The Swedish Research Council Formas is a central government authority with a mission to promote and support basic research and need-driven research in the areas Environment, Agricultural Sciences and Spatial Planning. The research that is funded should be of the highest scientific quality and relevance to the areas of responsibility of the Council. Formas' activities are divided into three operational areas; support for research, strategy and analysis, and the communication of research information. International collaboration spans all three of these areas. The research is supported in the form of annual calls for proposals, strategic calls and jointly financed research.

The Swedish National Board of Housing, Building and Planning – Boverket – is a central government authority with missions in the areas of the town and country planning, building construction and management of the built environment. One of Boverket's tasks is to analyze the Housing Market in order to describe the current housing market and to make qualified onward prognoses to assist political decisions. Distribution of subsidies and issuing of credit guarantees are other tasks of the authority. Swedish Building Regulations are issued by Boverket. Boverket is also supervising the town and country planning carried out by the municipalities.

Sweden Green Building Council is a non-profit organization owned by its members. Founded in 2009 by 13 industry leaders, Sweden Green Building Council is one of Sweden's fastest growing environmental organisations, with over 240 members in 2014. The goal of the Council is to promote and accelerate the development of sustainable buildings and cities in Sweden. This is achieved by helping the industry certify their buildings according to several environmental certification systems, such as EU GreenBuilding, LEED, BREEAM and the Swedish system Miljöbyggnad. The organisation also develops a Swedish certification system for sustainable neighbourhoods and communities and takes a leadership role in the development of a Nordic framework for sustainable cities.

Sponsors

The Swedish Energy Agency works for a sustainable energy system, combining ecological sustainability, competitiveness and security of supply. For a more efficient energy use, the Agency supports the development and dissemination of knowledge targeted at households, industry, and the public sector. The Agency finances research for new and renewable energy technologies, smart grids, and vehicles and transport fuels of the future. The

Agency supports commercialisation and growth of energy related cleantech. With the aim of attaining energy and climate objectives, the Agency participates in international collaboration and manages instruments such as the EU Emission Trading System and the Electricity Certificate System. The Agency also provides energy system analysis, energy forecasts and official energy statistics.

The city of Malmö is the commercial centre of southern Sweden and an international city. This is expressed, not least, by the fact that Malmö has 300 000 residents from approximately 170 different nationalities. Malmö is also undergoing a transition from being an industrial city to a city of knowledge. A well developed infrastructure makes Malmö very easy to reach, whatever means of transport you use. Over the last years the City of Malmö has received many international awards for its focus on sustainable city development and pilot projects such as Augustenborg and the Western Harbour. Malmö was also appointed as the first Fairtrade City of Sweden. Over the past years Malmö has extended its work from focusing on sustainable buildings to taking a smart district approach.

The Swedish Environmental Protection Agency is coordinating, monitoring and evaluating efforts to meet Sweden's environmental objectives. The Agency's remit comprises compiling knowledge and documentation, helping to develop environmental policy and joining in environmental policy implementation. The Agency works strategically in areas that contribute to a sustainable built environment through programs of investment and is one of five authorities within the national Platform for Sustainable Urban Development. We work with functions and processes that can be viewed as the environmental aspects of sustainable buildings cities as for waste management, contaminated sites, energy efficiency and renewable energy, nature in the city, transportation, and wastewater.

Skanska aim to be an industry leader in sustainable business practices. Skanska's Sustainability Agenda guides the efforts. Skanska's job is to help make living, working and traveling easier. Skanska works to make sustainability part of what they do, and how it is done. Skanska is determined to be the leading green project developer and contractor and aspires to always present to their customers the incentives to go green. Skanska helps to build what society need – schools, homes, hospitals, offices, roads and railways – all necessary for human development and economic progress. This comprehensive/holistic approach gives Skanska opportunities to make important contributions that create value and further sustainable development.

During the spring 2014, a competition was organised to nominate the best buildings (both new and rebuilt) and townships in Sweden. The ten winners are presented on the Swedish stand at SB14, as well as in this brochure.

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