

Co-operation for sustainability

Swedish focus on  
the built environment

**SB08**  
**MELBOURNE**



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**Co-operation for sustainability**  
**– Swedish focus on the built environment**

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# Contents



## Page 3

Fast growing cities  
– a world wide challenge



## Page 7

Reducing green-house  
gas emissions



## Page 11

Building a sustainable  
society through dialogue



## Page 17

Strategic European networking



## Page 21

Energy research and innovation  
– a collaborative venture



## Page 25

Environmental assessment  
– implementation in sight



## Page 29

Active region supports  
passive houses



## Page 33

Sustainable building as driving force



## Page 37

Producer responsibility  
– visions and tools



## Page 41

Environmental appraisal  
of building products



# Fast growing cities – a world wide challenge

Cities and urban areas are becoming increasingly important for the environment, for economic development and for the security, welfare and quality of life of an growing share of the world's population. Holistic and sustainable urban planning is needed to meet both present and future challenges.

There are severe problems associated with many fast-growing cities, particularly in developing countries. An appallingly large proportion of urban citizens live in slums under poor conditions and environmental degradation, and with limited access to clean air and water. The cities in developed countries too have environmental and other challenges to tackle. Many European cities, including Stockholm, were heavily polluted thirty years ago. Today Stockholm is in many respects one of the cleaner cities in the world. This shows that it is possible to change the urban environment – and to have an advanced economy at the same time.

## **Climate impact by increased urbanisation**

Developing countries are now experiencing the urbanisation processes that industrialised countries to a large extent have been through, but on an unprecedented scale. 18 million people move from the countryside to cities each year in China alone. A major part of all construction in the world takes place in cities in the large developing countries. How these cities are built will have an enormous impact, not only on the environment and on quality of life for their citizens, but also on the long-term possibilities of tackling climate change.

The challenge is twofold. We must continue to improve the sustainability of existing cities. And we must also do our best to make sure that new cities and neighbourhoods are sustainably built from the very outset. However, the Swedish experience is that cities, if planned and managed correctly, also hold possible solutions to many of these problems, for example through efficient infrastructure, energy and transport solutions.

Sustainable urban development can not only help boost local economies and quality of life, but also be an important part of the transformation into a global, competitive and

welfare-producing zero-carbon economy. Striving towards sustainable urban development thus makes sense, not only from an environmental perspective but also for economic reasons. Knowledge and environmental technology can play important roles in shaping sustainable urbanisation. In fact, sustainable urban development can be an important part of achieving competitive and thriving societies.

### **Sweden focusing environmental challenges**

Sweden has a long history of focusing on the environment. The Stockholm Conference on the Global Environment in 1972 was a notable milestone. Since the oil crises of the 1970s, a national focus on energy conservation and efficiency measures as well as development of renewable energy has been present. This has been strengthened by increasing awareness of the threats of climate change. We have dramatically reduced our dependence on oil. Today, 40 percent of energy supply derives from renewable sources. By 2020, it is estimated that it will be 50 percent.

The Swedish municipalities have played an important part in this development. Sustainable development is nowadays mainstreamed into a normal part of their ordinary activities. Swedish industry has also been at the forefront in developing energy-efficient technology solutions. Important applications have, for example, included urban infrastructure solutions for water, energy and waste. Close and long-term co-operation between different municipal departments, housing organisations, planning and engineering consultancies and the manufacturing industry has been a key factor in delivering many of the solutions that are established today.

One example of this is district heating, which today is established in large parts of Sweden and serves 90 percent of all multi-family housing. Bio-fuelled combined heat and power plants and the use of surplus industry heat increasingly constitute efficient and sustainable energy supply. Since 1990, the share of fossil fuel for district heating has been reduced from 80 to less than 5 percent. One prerequisite for the positive development of district heating has been that physical planning and urban design have enabled energy-efficient, low-average-cost district heating networks.

There are also other promising solutions. Pre-separated household waste can be used for district heating and electricity production in combined heat and power plants. Wastewater sludge can be converted to biogas for public transport. These are areas in which Swedish industry has pioneered technical solutions.

The introduction of the carbon tax in the 90s and the European system for emissions trading have been two of the driving forces in the transformation of Sweden's energy system.

## **Supporting investment programmes**

Along with general policy measures, dedicated investment support programmes aimed at encouraging conversion to sustainable solutions have also been put in place. Rooted as they are in the ordinary work of municipalities and industry, these support programmes have allowed novel solutions and increased environmental ambitions. In a number of schemes, the focus has been on developing whole new urban areas with an environmental profile. The two best-known examples are Hammarby Sjöstad in Stockholm and the Western Harbour in Malmö.

## **SymbioCity – a technology network**

International trade and co-operation are also fundamental for enabling sustainable urban development globally. Swedish urban planning expertise and a network of more than 700 environmental technology firms are presented through the initiative Symbio-City. This platform serves to facilitate the international activities of the Swedish environmental technology industry. The Symbio-City concept builds on the increased environmental, economic and social performance that can be achieved, e.g. by integrating the different parts of the urban infrastructure systems through smart urban planning.

## **Upcoming agenda**

The Swedish International Development Co-operation Agency, Sida, has been involved in sustainable urban development since a number of years. The Swedish national policy for global development, which aims at co-ordinating different policy areas for coherent development activities, highlights sustainable urban development as one prioritised focus area. Sweden has long been a major donor to and co-operates with both UNEP and UN-Habitat, the two UN arms that grew out of the Stockholm Environment summit in 1972. Both organisations are vital for global sustainable development and environmental protection. Sweden will be broadly involved in the World Urban Forum to be arranged by UN-HABITAT and China later this year. Sustainable urban development is also a topical issue in the EU. Sweden will be arranging a high-level meeting on sustainable cities during the Swedish EU-presidency in 2009.

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# Reducing greenhouse gas emissions

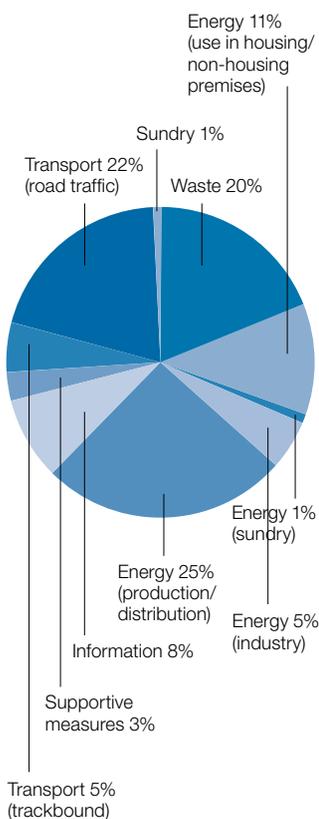
Government grants to investment programmes have given local environmental efforts a massive boost in the last ten years. They represent Sweden's biggest single effort to augment the ecological sustainability of human settlements. The investment programmes are estimated to reduce greenhouse gas emissions by 2.1 million tons carbon dioxide equivalents a year, corresponding to just over 3 percent of Swedish greenhouse gas emissions.

Through the climate investment programmes (Klimp), municipalities, county councils, companies and other local agents have obtained grants towards long-term investment reducing emissions of greenhouse gases. This is a continuation of the local investment programmes (LIP) which operated between 1998 and 2002 in 160 municipalities and 2 inter-municipal associations at a total cost of MSEK 6,200, covering about 1800 environmental actions in 211 local schemes. The investments and the commitments made by municipalities have created a ripple effect throughout the country. The results show that the municipalities have speeded up their ecological adjustment and that the intended environmental effects have been achieved. The forecast is that the completed LIP programmes will help to reduce carbon dioxide emissions by a total of about 1 million tons per annum.

## **New governmental initiative**

To build on the Klimp experience, the Swedish government is now presenting a new, dedicated programme for supporting sustainable urban development with a focus on climate change. The aim is to raise the standard of urban development even higher and to stimulate the development of new, exemplary urban initiatives that take cities several steps further towards sustainability and can serve as inspiration and showcases for integrated planning and environmental technology. The programme will encompass financial support for environmental

**Klimp grants by policy measure category, 2003-2008**



investment in sustainable urban areas. A national task force will also be launched to facilitate concerted action by state, industry and municipalities in the pursuit of sustainable urban development.

**Strengthening local climate policy**

Between 2003 and 2008 the Swedish government contributed a further MSEK 1,800 towards the Klimp programmes, the focus of which is on investments reducing greenhouse gas emissions and aimed at increasing energy efficiency or achieving an energy conversion to renewables. The investment support is helping to achieve Sweden’s climate target, in the sense of work on a climate investment programme strengthening local climate policy work and partnership between different agencies.

Knowledge and experience concerning climate investments are a stimulus to continuing climate policy work in different parts of the country, and independent evaluations have shown the grants to raise the level of aspiration and the pace of ecological adjustment. Altogether 126 climate investment programmes and 22 freestanding schemes have been awarded grants, distributed between 67 municipalities, 6 inter-municipal associations, 5 county councils and 3 business undertakings in all the counties of Sweden. The programmes comprise about 879 policy measures and have a combined investment volume of around SEK 8 billion.

The Klimp projects are expected to reduce emissions of greenhouse gases by approximately 1.1 million tons of carbon dioxide equivalents annually. This equals approximately one-third of the Swedish climate target, which is to reduce Swedish greenhouse gas emissions by 4 percent between 2008 and 2012 in relation to their level in 1990.

**Focus on waste, transport and energy**

The Klimp investments are being made in the sectors with the heaviest impact on climate, above all through measures in the transport and energy sectors. These include the expansion of district heating, substitution of bio fuels, digestion of organic waste to biogas, energy efficiency measures and local information on the climate issue and the ongoing projects. Roughly one-third of the grants have gone to biogas initiatives, e.g. in the form of production facility investments. The Klimp programmes are estimated to give an annual energy

saving of 1.2 TWh. The biggest energy reductions will be in the transport sector (road traffic) and the energy sector (production/distribution).

### **Programme evaluation after four years**

The climate investment programmes normally run for four years. The final investment grant is determined after final reporting and hinges on the degree of target achievement.

Klimp grant applications are examined by the Swedish Environmental Protection Agency, acting in collaboration with the National Road Administration, the National Board of Housing, Building and Planning and the National Energy Administration. Programmes are judged according to how convincingly they point to good climate strategies, holistic perspectives, partnership, “bang for buck” and environmental effects. Grants are awarded by the Investment Support Council (RIS), the members of which are appointed by the Government.



#### **Green Investments in Sweden – MIR**

Web directory, showing investments in Sweden within the Local Investment Programmes (LIP) and Climate Investment Programmes (Klimp).

An overview of all programmes in progress or completed. In total 338 programmes and 2,755 projects, granted MSEK 6,200 for environmental investments of MSEK 24,600 resulting in a reduction by more than 2 billion tons carbon dioxide equivalents per year.

[www.naturvardsverket.se/mir](http://www.naturvardsverket.se/mir)



#### **Further information:**

Swedish Environmental Protection Agency (Naturvårdsverket)

[natur@naturvardsverket.se](mailto:natur@naturvardsverket.se)  
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# Building a sustainable society through dialogue

The project Building-Living and Property Management for a Sustainable Building and Property Management Sector, called the Building-Living Dialogue, BLD (for short), is a unique form of co-operation between companies, municipalities, national and local authorities, and the Swedish Government, based on voluntary agreements between the participants. Today, about forty participants are committed to carrying out their undertakings in order to realise the vision of a sustainable building and property sector by 2025, primarily in three prioritised areas: the indoor environment, the use of energy and the use of natural resources.

Those participating in the BLD actively take responsibility for leading development towards a sustainable building and property sector. The list of participants includes companies and national and local authorities within the building and property sector, companies and organisations that in different ways have dealings with the sector (e.g. credit institutions, insurance companies and other suppliers of services or goods) municipalities and the Government.

## Environmental goals for 2025

The BLD's goals for 2025 support the overall environmental objectives, adopted by parliament in 1999 ([www.miljomal.nu](http://www.miljomal.nu)).

1. The environmental stress caused by the amount of energy used in housing and public buildings will be reduced, and by no later than 2025 only a limited amount of fossil fuels will be used to supply heating and warm water. By 2015 at the latest, more than half of the energy required annually will come from renewable sources.
2. The use of purchased energy within the sector will be cut by at least 30 percent by year 2025 compared to 2000. Energy use will be lower in 2010 than in 1995.
3. By 2005 at the latest, sector specific information will be available, making it possible to choose construction materials and structures that neither contain nor give rise to substances or constructions known to be detrimental to health or the environment.



4. By 2009 at the latest, all new buildings and 30 percent of the existing stock will have been surveyed and classified with regard to building-related effects on health and the environment.
5. The building and property sector will phase out the use of those substances and metals included in the Government's guidelines for chemical substances; this will be achieved no later than the timelines given in Government Bill 2000/01:65 "A chemicals strategy for a non-toxic environment".
6. The amount of deposited waste (all waste, including domestic refuse), mining waste excluded, will be reduced by at least 50 percent by 2005, calculated from the level reached in 1994. At the same time, there will be no increase in the total amount of waste produced. By 2010 at the latest, a maximum of 25 percent of the waste from new stock and refurbishment, property management and demolition, calculated in tons from the level reached in 1994, will be deposited. A maximum of 10 percent will be deposited in 2025.
7. In 2010 the extraction of natural gravel will not exceed 12 million tons per annum, and at least 15 percent of the material used for ballast will consist of recycled materials.

### **Committed forerunners**

The BLD participants are forerunners in their lines of business with regard to converting the building and property sector towards sustainable development. They invest their own resources to raise the level of competence not only in their own companies, but also among their suppliers.

The participants have agreed on approximately thirty commitments which are summarised under seven main headings.

- Plan for a sustainable community!
- Adopt a holistic approach and a life cycle perspective to buildings!
- Create an efficient and quality-controlled building and property management process!
- Make property management environmentally friendly and energy efficient!
- Classify buildings!

- Invest in research, development and training for a sustainable building and property sector!
- Follow up and evaluate!

## **Improved knowledge of building materials**

The participants in the BLD have also set their own goals regarding the composition of building materials and the environmental classification of buildings. Today, several web sites provide information on suitable building materials from a health and environmental point of view. (See page 37 and 41).

## **Environmental classification of buildings**

A large number of the BLD's participants are involved in the development of a voluntary system for the survey and classification of a building's environmental qualities. The system covers both new production and existing stock and lead to an environmental classification based on a building's level of energy use, impact on the environment and indoor environment. (See also page 25.) The final report on the classification of buildings (April 2008) can be downloaded from [www.byggabodialogen.se](http://www.byggabodialogen.se). As a driving force for necessary investments, a building can, for example, be rewarded with lower tax, lower insurance premiums or better financing terms. The Government, insurance companies, credit institutions and banks have undertaken to work towards contributing to these types of incentives.

## **Governmental incentives**

The government has agreed to work for a more economical use of natural resources. Since the building and property sector uses approximately 40 percent of these resources, incentives which promote investments in the built environment, which in turn lead to a reduction in the level of use, are of considerable importance. One example of such an incentive is the Government's support of the environmental classification of buildings, in which energy use and streamlining of the use of other resources are included. Another is the examination of rates and charges set out in municipal decisions, to ensure that they are in line with the Government's intentions.

### **The Government is committed to working to:**

- stimulate the exchange of heating systems based on fossil fuels and direct electric heating

- ensure continued access to impartial consumer information about measures that can be taken for a more effective use of energy, and things to take into consideration when renewing heating systems
- stimulate pilot projects to develop and demonstrate solutions aimed at reducing housing costs for the country's population in the long term and to promote sustainable development of the housing stock

## **National competence programme**

In order to present a comprehensive view of building and maintenance processes, to increase knowledge about cause and effect, and to show how the building process affects the maintenance of completed buildings, education programmes are linked to the BLD's goals and three prioritized areas. It covers management of waste and environmentally hazardous substances, the effects on health of moisture and ventilation, and the use of chemicals and energy.

### **Education programmes are provided for three target groups:**

- construction workers, plumbers, electricians and janitors etc. (the workers)
- clients, architects, designers, planners and project leaders etc. (the planners)
- maintenance technicians and engineers, property managers etc. (the caretakers)

## **Examples of on-going projects**

Hamnhuset (Harbour House) in Gothenburg is a joint project involving four companies committed to the BLD. The project comprises 115 flats and is the first large low-energy residential block in the country to be constructed without compromising on the standard of living or level of comfort. The building will use 50 percent less energy than a similar block constructed using conventional methods.

In the residential area Brogården in Alingsås, Alingsåshem is renovating 300 units in apartment blocks built in 1970. Solar collectors and a district heating system fuelled by pellets supply the flats with domestic hot water. Future energy use is estimated to fall from 216 KWh to 92 kWh per square metre, which is more effective than the required standard for new buildings.

## New community planning processes

The Constructive Dialogue is a pilot scheme with, so far five municipalities taking part. The aim is to find sustainable solutions and to apply a holistic view to any given situation and to find sustainable solutions in the early stages of a construction or renovation project. This involves an open-minded exchange of ideas on community planning between different public administration offices and directly concerned parties.

Within this scheme the municipality of Karlstad has worked with Wermlandskajen (Wermland's Dock), a soon-to-be ex-harbour area, and the construction of residential buildings in an area exposed to a high level of noise. In Kalmar, the municipality is working on a transformation of Folkets Park (the Community Park) and the development of Ölandshamnen (the Öland Harbour). The municipality of Hofors is working on planning issues relating to new living accommodation for senior citizens and with traffic solutions in the vicinity of a school. In Malmö the further development of the Western Harbour is underway and a number of interested clients took part in the dialogue process to decide on the design of a new residential area.



### Further information:

The Building-Living Dialogue  
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*On the Building-Living Dialogue's website you can follow developments, read about experiences gained, find tips about education and contact the participants for details of their involvement and reports on how work with their commitments is progressing.*





# Strategic European networking

Eracobuild and Urban-Net are two networks dedicated to sustainable development within the built environment, funded by the European Commission's Framework Programme under the European Research Area Network (ERA-Net) initiative. The Swedish Research Council Formas takes active part in both net-works.

The construction and facilities management sector makes up a substantial part of the European economy and has considerable environmental impact. With the whole value chain included, this sector accounts for over 23 percent of GNP and 70 percent of national assets, providing job opportunities for over 20 percent of the workforce.

Changes will be forced on this sector by global driving factors such as climate change, open borders and scarcity of natural resources. Compared with other sectors, the construction sector has a big potential for improvement as regards both efficiency and sustainability, and so it has a key part to play in achieving Europe's targets for a sustainable development in which economic, social and environmental factors are balanced together.

## **Sustainable construction of buildings**

**Eracobuild**, a new European network for research and innovation on sustainable construction and operation of buildings, started in September 2008, its purpose being to strengthen and deepen existing European co-operation between national programmes promoting sustainable construction and operation of buildings.

Eracobuild, which is planned to continue for three years, is a direct continuation of the Erabuild project, which took place between 2005 and 2007. Eracobuild includes 35 partners responsible for research programmes in 21 countries. Sweden is represented by Formas together with the Swedish Construction Sector Innovation Centre, BIC, the Swedish Energy Agency and the Centre for Energy and Resource Efficiency in Construction and Facilities Management, CERBOF.



## Partnership with industry

Sustainable Renovation and Value-Driven Processes are two transnational programmes which were planned and prepared for during the Eracobuild project.

Within the framework of Eracobuild, partly new R&D priorities were identified and new fields developed for common activities, this time with special reference to collaboration with the industry. Ambitious targets have been set as regards funding transnational research and offering access to and dissemination of resources in other countries. Another aim is for the construction sector to make more extensive use of research findings and in this way to improve its quality and efficiency, thereby safeguarding the value of the assets.

Eracobuild co-operation will focus on five key areas:

*Developing integrated strategies* for the construction and operation of buildings. This will be achieved by integrating economic, environmental and research policies, which are often determined by different government departments and DGs in EU, leading to suboptimal approaches for the construction sector. Furthermore, a global approach will be adopted to find relevant networks in non-European research programmes.

*Creating a structured dialogue* for co-ordinating sectoral research priorities with priorities conforming to national and European policies. The dialogue is to be conducted between regional and national policy-makers, the European Commission and representatives of the sector, through the European Construction Technical Platform (ECTP) and its national technological platforms.

*Enhancing and launching joint activities* between ongoing programmes, e.g. in transnational programmes.

*Advising national governments and the European Commission* on suitable measures to improve the prospects of transnational co-operation.

*Bridging the gap between research and development and practice* by linking implementation strategies to the research programmes.

### State-of-the-art reports

Within Erabuild, state-of-the-art inventories and situation reports were compiled in three fields.

- *RFID in Construction* - Review of the current state of Radio Frequency Identification technology, its use and potential future use in construction. (July 2006)
- *Review of the Development and Implementation of IFC compatible BIM*. (January 2008)
- *Building Renovation and Modernisation in Europe: State of the art review*. (January 2008)

The reports can be downloaded from [www.formas.se](http://www.formas.se) or [www.erabuild.net](http://www.erabuild.net).

### Sustainable urban development

**Urban-Net** is a newly started ERA-Net aimed at stimulating European interdisciplinary and intersectoral research co-operation on sustainable urban development. Sixteen partners in thirteen European countries and UN-Habitat are participating in this new network of research-funding agencies.

A pilot joint call for project funding was launched at the beginning of 2008 and resulted in 26 research proposals. The pilot call involves ten partners from eight countries. A new full call will be launched in September 2009.

Four main themes for deeper research co-operation have been further defined at an international workshop in June 2008.

*Urban sprawl or compact city – integrated re-use of land* deals with the problems of growing and decentralised single function areas and their antithesis compact cities.

*Integrated urban management through multi-sector/actor governance* includes studies both of the processes in themselves and of the importance of an approach bridging the gaps between different planning and administrative levels and sectors in the other themes.

*Health and quality of life in the urban environment*, for example, clean air, security in public spaces of importance when people's everyday lives are taken as the starting point.

*Climate change and risk management* could be long term visions on zero-emission cities or research on mitigation of climate change.



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[www.urban-net.org](http://www.urban-net.org)



# Energy research and innovation – a collaborative venture

The Swedish Energy Agency has a co-ordinating responsibility for energy-related building research, development and demonstration. Together with the construction and facilities management sector, the Agency is running several programmes for improving energy efficiency in buildings.

The work of the Agency is characterised by a systems approach. One goal is to further reduce the use of oil and electricity for heating purposes; another is to improve the efficiency of operational and household electricity use in buildings and a third to replace fossil fuels with renewable alternatives. The Agency's funding of research, development and innovation and the collaborative work with the construction sector aim at fulfilling the national objective to reduce the energy use in buildings for heating, hot water and electricity by 20 percent in 2020, reaching 50 percent in 2050.

## Commercialisation of research findings

CERBOF – the Centre for Energy and Resource Efficiency in Construction and Facilities Management – is a research and innovation programme which was initiated by the Agency in 2007. The vision is efficient and sustainable use of energy and resources in the construction sector, as well as buildings with high-quality indoor environment. The programme is being run in collaboration with various partners in both the public and private sectors and within the academic community. In this new forum the partners meet to catalyse relevant research and innovation projects. The two main concerns are the building as an energy system and behaviour, processes and control systems. The projects are to be conducive to the commercialisation of research findings. Supported research, development, innovation and demonstration shall contribute towards the attainment of national energy and environment objectives, as well as towards strengthening the competitiveness of Swedish trade and industry. The programme is also interlinked with international co-operation within Eracobuild (see page 17) and the International Energy Agency, IEA. The total programme budget for 2008–2009 is MSEK 130, of which the Agency is contributing 40 percent and sectoral participants 60 percent.



So far, two calls for proposals have resulted in funding of 20 projects in total, focusing on technology and systems for energy efficiency in the existing building stock, and incentives for end-users and property owners to reduce energy demand. Priority is being given to business-initiated innovation resulting in new products, services, processes and methods.

CERBOF's present concern is with two key areas:

- development of energy efficient building components such as windows, doors, insulation, fans etc.
- the early stages of design, when incentives and critical factors for success are important for the decision-making process concerning energy efficient construction or renovation of all types of buildings.

### **Strategy for technology procurement**

Fourteen major owners of commercial and community buildings in Sweden and the Agency co-operate within BELOK, (The Facilities Procurement Group). Ideas are turned into action and development projects on energy efficiency within the non-residential segment of the building sector. BELOK was established in 2001, as part of the Agency's strategy for technology procurement in order to improve energy efficiency and provide better indoor climate and economy for real estate owners and end-users.

Part of the strategy is to communicate the existing potential on commercial buildings and important building elements and point out the needs for further innovations. BELOK members together own about 20 percent of the heated area in commercial buildings and the yearly investments cover one third of the total investment in the commercial building segment.

Some examples of technology procurement, innovation and demonstration projects:

- office buildings with glass façades
- ventilation with variable air flow
- electro filter in ventilation
- cooling towers for hydronic cooling
- electricity demand
- control and monitoring systems

The Agency's strategy of using innovative real estate owners as brokers for implementing new and improved energy technology and methods in the construction and facilities management

sectors has proved successful. BELOK is now in the process of developing and extending the strategy, focusing on the next innovation steps and on other segments of building and building elements, e.g. electricity demand. More focus will also be put on the end-user in facilities management, on ways of improving the efficiency of the design and construction process, and on how the results can be disseminated on a wider scale.

## Demonstration stimulates implementation

Passive houses is a term for very energy-efficient buildings which are heated almost entirely with internally generated energy, i.e. without conventional heating systems. The concept focuses on decreasing energy losses by means of well-insulated walls, efficient ventilation and heat exchange of outlet air. Solar energy is used to heat both the indoor air and domestic hot water when possible. A joint programme for demonstration and development of passive houses and low energy buildings was initiated in 2006 by the Agency and the region Västra Götaland. The programme budget is MSEK 36 for the first period, ending in 2008, with the Agency putting up 25 percent and regional building developers 75 percent.

In order to stimulate market development and to follow-up and systematically evaluate passive houses, the Agency is financially supporting a number of demonstration projects, including both single-family and multi-family homes as well as schools. The market development for the passive house concept is positive, with an increasing number of real estate companies placing orders and construction clients making policy decisions to construct only low-energy buildings and passive houses in the future. It is expected that a total of some 900 dwellings will have been completed by the end of 2009. (See also page 29.)



### Further information:

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# Environmental assessment – implementation in sight

By 2009 at the latest, all new buildings and 30 percent of the existing building stock are to be classified with respect to building-related health and environmental impact in accordance with the aims of the Building-Living dialogue. As a move towards achieving this aim, three Swedish research groups have jointly devised the Environmental Classification System for Assessment of Buildings and have cleared it with the industry and the relevant national authorities.

The proposed Swedish Environmental Classification System has been used, together with EcoEffect, another Swedish method for environmental assessment, and the LEED rating system, for evaluating a residential building in Gothenburg and an office building in Stockholm. The purpose of the comparison is to find out whether different rating systems yield different marks and different signals as to what should be improved in order to achieve a higher environmental classification.

## Assessment tools

*The Environmental Classification System* covers the areas of energy, indoor environment and chemicals. Water and waste water are also included when buildings have their own facilities.

The system comprises four levels: areas, aspects, indicators and classification criteria. Each area is characterised by a number of aspects linked to specific environmental problems. Areas, aspects and indicators are classified on a four-point scale from A to D, with A standing for best, D for worst and C for basic requirements. The aggregation system is constructed to give the worst marks a heavy impact.

The following issues are assessed:

*Energy* – use, demand, source.

*Indoor environment* – sound, air quality, thermal indoor climate, daylight, moist, water quality.

*Chemicals* – occurrence, documentation and elimination of hazardous substances.



*EcoEffect* is a tool to improve sustainability in buildings with aggregated assessment of their impact on the internal (indoor and outdoor) and external (global) environment. The quality of the internal environment in existing buildings is mainly measured as the degree of user satisfaction. Results can be summarised as comparisons between different buildings or building components displayed as environmental profiles or key values.

Some characteristics: Real estate companies, buildings and building elements can easily be compared in terms of environmental impact. The results have a direct connection to different types of environmental problems, e.g. acidification, noise etc. and their significance for people's health and well-being. Environmental loads are related to the usefulness of the building, for example the number of users it is designed for. The aim has been to cover all essential environmental impact and weigh results with reference to their relative significance. Life Cycle Analysis, LCA, is included.

*The Leadership in Energy and Environmental Design rating system, LEED*, developed by the U.S. Green Building Council, is a third-party certification programme for measuring the environmental impact on buildings' performance and a benchmark for the design, construction and operation of high-performance green buildings.

LEED gives points for meeting the criteria for various environmental issues. The final rating is based on the sum total of points. The system covers sustainable sites, water efficiency, energy and atmosphere, materials and resources, indoor environment and innovations.

Project Certification provides independent verification that a building project is environmentally responsible, profitable and a healthy place to live or work. Accreditation is given to professionals who have demonstrated a thorough understanding of green building practices and principles and familiarity with LEED requirements, resources and processes.

## Comparison of assessment results

The assessment results concerning the residential building in Gothenburg (Hamnhuset - the Harbour House) and the office building in Stockholm (Novartis) and comparison of the three methods will be presented at the World Sustainable Building Conference in Melbourne at the *SB08 Challenge*.

### Further information:

[www.byggabodialogen.se](http://www.byggabodialogen.se)

[www.ecoeffect.se](http://www.ecoeffect.se)

[www.usgbc.org](http://www.usgbc.org)





21A

21B

# Active region supports passive houses

Region Västra Götaland has plenty to be proud of from an environmental standpoint. Thanks to active networks, environmental expertise and far-sighted development of sustainable products, services and building technology, the region abounds with good ideas on how to reach environmental goals. The challenge today is to move from best practice to energy-efficient buildings as an obvious choice, helping to maintain the region's spearhead position.

The western Swedish region of Västra Götaland, with 1.5 million inhabitants and 49 municipalities, is extensive self-governing. It is responsible for health and medical care and regional development, including trade and industrial development, public transport, culture and the environment. The region co-ordinates and promotes local sustainable development initiatives in cooperation with industry, local authorities and research institutions.

## Programme for energy-efficient buildings

The region's long-term goal is a sustainable energy system based on renewable energy. A regional programme is underway to strengthen the market for energy-efficient buildings, e.g. passive houses (see also page 23). New modes of co-operation between research, business enterprise and public administration are being encouraged. The programme, which provides support for innovations and for development and demonstration projects, has been devised in consultation with the business community and with communities and research institutions in Västra Götaland, including the Chalmers University of Technology, the University of Gothenburg, the SP Technical Research Institute and the Swedish Environmental Institute. Interim goals of the programme include at least 10 percent of all new homes being built as passive houses by 2010 and the majority of all municipalities in the region actively pursuing energy-efficient construction, so that the market can be further developed without public funding.

New concepts are being tested in demonstration projects. The region allocates financial support for additional costs and evaluation in order to meet the demand for energy-smart



homes and help reduce energy use in buildings, which in Sweden is almost 40 percent of the total energy consumption.

### Recent renovation and new construction

*Brogården* in Alingsås, where in 2008 the Alingsåshem community owned housing company embarked on a thoroughgoing renovation of 300 flats from the 1970s with the aid of passive-house technology. The energy saving is estimated at 60 percent. Alingsåshem is the first housing company in Sweden to decide only to build in accordance with passive house standard. The Brogården housing district is also an international demonstration project as part of REBECCE (Renewable Energy and Building Exhibitions in Cities of the Enlarged Europe), a project within the EU programme Intelligent Energy Europe.

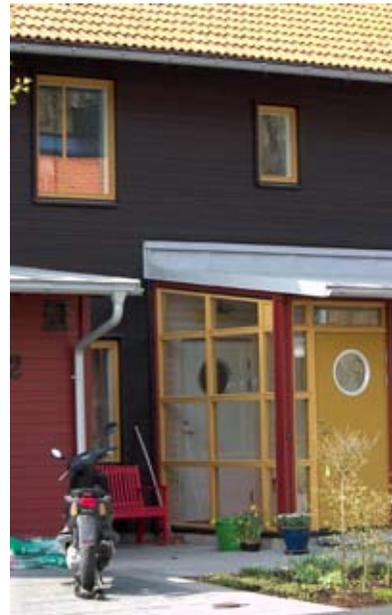
*Misteröd* in Uddevalla is another example of passive housing development, where the community owned housing company Uddevallahem in partnering with the constructor erected 27 terrace houses and a group of 12 detached houses in 2007. Energy demand is expected to be 65 kWh per m<sup>2</sup> annually, which is roughly one-third of that in similar buildings based on conventional technology. This is to be achieved by means of careful design based on detailed calculations, a production process with focus on moisture safety and information to tenants about user impact on the energy load. In addition, energy use and indoor climate will be closely monitored and feed back given to the end users.

### Largest passive housing development

Älvstranden Utveckling AB in Gothenburg is a community-owned company with the mission to lead, impel and catalyse the development of the North and South River Banks. The company has moved forward the positions for implementing passive houses on a larger scale by building *Hamnhuset* (the Harbour House), the largest multi-family house in Sweden built without conventional heating systems, completed in 2008 (see photo on page 24). The energy consumption for heating and hot water of the 115 rental flats is estimated at a quarter that of a conventional newly built apartment building, simply by optimising current standard building practices. Environmentally certified materials, combined with an energy-efficient design using improved climate shell and heat recovery ventilation system, is used to create low environmental impact and a good indoor climate.

## Passive House Centre – implementation platform

In association with the local authority of Alingsås, the region has taken the initiative in founding a Passive House Centre (Passivhuscentrum), which was formed in 2007 to promote the implementation of passive houses and energy-efficient building by means of information campaigns and development projects. The Centre also serves as a platform and interface for players and suppliers in the passive housing market. Among other things it offers counselling and training, arranges conferences and debates and maintains an exhibition showing how passive-house technology works and presenting the different passive houses in the region.



### Further information:

Region Västra Götaland  
(Västra Götalandsregionen)

[info.miljo@vgregion.se](mailto:info.miljo@vgregion.se)  
[www.vgregion.se](http://www.vgregion.se)

[www.passivhuscentrum.se](http://www.passivhuscentrum.se)



# Sustainable building as driving force

Turn a worn-down old manufacturing city into a prosperous, knowledge-based, ecologically minded modern urban community? It can be done! Malmö, with its 270,000 residents the third largest city in Sweden, has demonstrated the possibility, given visionary political leadership, strategic investments and civic participation, of pulling a community out of the doldrums. Malmö today is a leading “green” city.

Sweden’s third largest city, Malmö, experienced high unemployment, population decline and social problems during the shipbuilding downturn of the early 1980s. Environmentally oriented urban development has been one of the driving forces for change, the idea being to move the city from an industrial society to a knowledge-based one with high environmental awareness. The Öresund Fixed Link between Malmö and Copenhagen, opened in 2000, led to increasing cross-border mobility with positive influences on working and living conditions for Swedes and Danes alike. But the Malmö City Council’s internal processes and collaboration with developers and construction companies also made it possible to turn Malmö into a prosperous “green” city and raise its level of sustainability.

## Developing city districts

A number of city development measures have been undertaken, focusing to improve the city districts with regard to social, environmental and economic aspects. One example is **the Augustenborg district**, a residential area with houses originally built in the 1950s and 60s, which suffered from sever floods in case of heavy rainfall. In consultation with the inhabitants, the area was improved by installing an open rainwater management system, a system of green roofs, small channels and ponds that retain the water and contribute to a more varied residential area.

**The Bo01 area** in the Western Harbour was built in 2001 on more or less barren land. Support from the EU and from the Swedish Government, through local investment grants (see page 7), made possible a number of environment initiatives and applications, also presented to the public at a housing exposition and attracting a great deal of attention both



nationally and internationally. Several groups of researchers have been involved in evaluating the environmental impact. Experiences from the planning and construction processes and the researchers' evaluation have been summarised in an anthology, published by Formas. (See inside cover).

Focal areas for Bo01 included architectural design, renewable energy supply and rich biodiversity. A quality programme was developed, touching on a great number of different issues, from usage of construction material to colour schemes in the area to a cap on energy consumption. The programme was the result of a long consultation and negotiation process between the city and the construction. Many of the measures in the Bo01 were pilot projects, the aim being to test solutions and new technologies in order to find out which ones were successful. The quality programme made it possible to apply these pilot projects and to give the developers a framework tool. Although the quality programme was not legally binding, the consensus made all parties identify themselves with it and adhere to it.

### **The good dialogue**

In 2005 the planning process for the so-called **Flagghusen** started. This housing area, adjacent to the Bo01, consists of 16 houses, a mixture of rental and freehold, and will house some 600 residents. As part of the Building and Living Dialogue, a national initiative aimed at the production of more sustainable housing (see page 11), the city made a plot land available to the 13 developers and construction clients who agreed to participate in this process. As in the development of the quality programme, the city and the construction companies met in order to create a holistic vision for the entire area and discuss topics such as low energy consumption, reduced toxic substances in building materials, or damp-proofed construction. During the dialogue, the participants developed and signed an agreement which set a number of criteria and targets for the housing development. For example, diverse architecture; low energy consumption (max 120 kWh/m<sup>2</sup>); healthy indoor environment; safety measures; green points to increase biodiversity; waste separation in the houses. The agreement that came out of the Flagghusen planning process is to be used directly in some other development areas in the city.

### **Sharing experience**

Over the years Malmö has collected quite considerable experience of sustainable construction, with regard not only

to processes facilitating more sustainable construction but also to construction itself. A number of projects and initiatives have been carried out and are being implemented to adapt new-built and existing buildings to a more sustainable way. From 2004 to 2007 the city was involved in an EU-funded project called SmartLIFE with the aim of promoting sustainable construction by providing training and education for the construction industry. The project resulted in the establishment of centres of competence in Malmö, Cambridgeshire (UK) and Hamburg (Germany) where training courses for construction workers are held as part of the formal education system of the country concerned. In addition, a guide to sustainable construction in the North Sea and Baltic Sea Region was produced, giving examples of best practices.

The City of Malmö, however, is working, not only on sustainable construction but on a wider front. This includes, for example, traffic measures, aimed at increasing the use made of public transport, bicycles and bio-fuelled cars. Other initiatives are concerned with education. The Regional Centre of Expertise (RCE) was developed through a partnership led by the cities and universities of Malmö and Lund and Region Skåne. RCE conducts formal and informal education and training and acts as a catalyst in strengthening citizens, businesses and organisations who are striving for sustainable development in the region.

## Making sustainability attractive

Making sustainability attractive was the theme for the second Sustainable City Development Conference, held in Malmö 2007 and attended by around 450 people from the private and public sector as well as academia. This conference served as a regional SB07 conference for northern Europe. Thus, a number of workshops during the conference dealt specifically with city development issues. One of the results of this part of the conference was to stress the importance of local and decentralised planning systems, where societal interests are balanced against commercial. The importance of renovating and refurbishing the building stock was another topic at the conference. However, upgrading the existing housing stock also means improving the often existing social and economic situation predominant in social housing. Increased or altered use of existing buildings is also a way of decreasing resource-demanding new investment, i.e. in new construction.



*“... We have a lot to gain by learning from each other, comparing experiences and stimulating new ways forward, across borders. ...”*

Andreas Carlgren,  
Minister of the Environment

### Further information:

City of Malmö  
(Malmö stad)

[malmostad@malmo.se](mailto:malmostad@malmo.se)  
[www.malmo.se/sustainablecity](http://www.malmo.se/sustainablecity);  
[www.malmo.se](http://www.malmo.se)

[www.smartlife-project.net](http://www.smartlife-project.net)  
[www.lifestyleproject.eu](http://www.lifestyleproject.eu)  
[www.constructingexcellence.com](http://www.constructingexcellence.com)  
[www.rceskane.se](http://www.rceskane.se)



# Producer responsibility – visions and tools

The building and real estate sector presents its voluntary commitment on producer responsibility in the Environmental Programme 2010, compiled by the Ecocycle Council, on which practically all organisations in the sector are represented. The programme formulates visions and targets and devises tools for sectoral work on energy efficiency, conservation of materials and phasing-out of hazardous substances, as well as the pursuit of a good indoor environment. This unique co-operation is founded on interaction with national authorities and operates in accordance with the principles of the market economy.

The building and real estate sector accounts for many of the prerequisites of a good life – good housing and non-residential facilities, workplaces and meeting points, bridges and roads, technical distribution systems etc. It grosses more than MSEK 400,000 annually, employs nearly half a million people and accounts for roughly 40 percent of material and energy turn-over. This adds up to a great responsibility, and the sector is making its know-how available for efforts to achieve a sustainable built environment.

## **Reduced climate impact**

The vision is for the sector's environmental impact to have declined substantially within a generation and fossil fuels to have been eliminated. The target is for the sector between 2000 and 2010 to reduce its energy use (per m<sup>2</sup>) by 10 percent and its total use of fossil fuels by 20 percent. The sector's climate impact is declining more rapidly than expected. Oil input for heating purpose has declined by over 40 percent since 2000.

## **More efficient materials management**

The vision is for waste management to run smoothly within a few years, with a substantial reduction in the extraction of natural resources. The sectoral target is for the proportion of waste deposited to be halved between 2004 and 2010. So far, the proportion of waste deposited has fallen to 30 percent.

An industrial standard for waste management in connection with building and demolition was presented in 2007.



The guidelines are aimed at raising the level of the building sector's waste management and they have quickly achieved a wide-ranging impact on the entire sector.

### **Eco-labelled building materials**

The vision is for all building materials to be declared within a few years and for databases to exist documenting the building materials used in construction. The agents in the sector will have a good knowledge of undesirable substances and will choose solutions accordingly. Manufacturers will provide good information concerning their products. The aim is to minimise the use of unwanted substances and for the building products in use to be declared.



The Ecocycle Council devised an initial model for Building Product Declarations in 1997, and the third generation appeared in 2007. Today between 6,000 and 8,000 building materials are declared, and several systems have been developed for the environmental evaluation of building materials. At the New Year 2009 the Ecocycle Council will be opening a web portal to provide easy access to the Building Product Declarations.

### **Phasing out of hazardous substances**

The Swedish Construction Federation has taken the initiative in devising a tool (BASTA), financed partly by the EU Life Fund, for phasing out the use of very hazardous substances. The system is based on criteria for these substances agreed by the sector. The burden of proof is up to the supplier, who has to confirm that the product meets the stipulated criteria. This system of self-declaration is supplemented by a quality assuring auditing.

### **Moisture safety and a good indoor environment**

The vision is for the buildings which the sector provides to have a healthy indoor environment and for this to be documented. The environment must be free from harmful moisture and must have a good acoustic environment, good daylighting conditions and a good thermal climate. The users must have access to clear and straightforward information. Moisture issues are important here, and the Ecocycle Council has actively concerned itself with work to devise methods of moisture safety in connection with the design, construction and operation of buildings. This work has to a great extent proceeded with support from the Swedish Research Council Formas and has

been carried out by the Moisture Research Centre (Fukt-Centrum) in Lund, which is a group of around 40 researchers from Lund University and SP Technical Research Institute.

### **Guidelines for appropriate building**

The Ecocycle Council is working on guidelines for environmentally appropriate building which will express the building and real estate sector's consensus interpretation of the national requirement of a sustainable built environment. The guidelines will form the basis of stipulations by clients and municipalities concerning new buildings and will be applied both in the building and real estate sector and in local (municipal) government.



#### **The Ecocycle Council –An unique form of co-operation**

The Ecocycle Council is an association of around 30 organisations within the Swedish building and real estate sector – developers and building clients, property owners, architects and engineers, the building industry and the building materials industry.

The aim is to succeed in conducting credible, effective, co-ordinated and systematic environmental work that results in permanent environmental improvements, through voluntary efforts, on a commercial basis and in close co-operation with authorities and the legislature.

#### **Further information:**

The Ecocycle Council  
(Kretsloppsrådet)  
[info@kretsloppsradet.com](mailto:info@kretsloppsradet.com)  
[www.kretsloppsradet.com](http://www.kretsloppsradet.com)  
[www.bastaonline.se](http://www.bastaonline.se)



# Environmental appraisal of building products

Asbestos, PCB, freon, cadmium – a long list could be made of the hazardous substances that were built into our buildings during the 20th century, substances which have adversely impacted on the environment and have contributed towards the occurrence of serious diseases and more diffuse health problems, such as the Sick building syndrome, SBS. Property owners and developers with large stocks of buildings have now developed a joint system for the environmental appraisal of building products, to prevent unpleasant surprises in future.

Various systems of environmental appraisal are to a great extent a direct consequence (extension) of the building materials declarations and the environmentally adapted product development which have taken place on the initiative of the Ecocycle Council (see page 37).

The aim of an environmental appraisal system is to evaluate, proactively and systematically, the content of a product, and also such aspects as production, use and recycling.

## Common standard

Some of Sweden's biggest and most important property owners and developers have joined forces to devise a standard for the environmental appraisal of building products. The system is called Byggarubedömningen (BVB for short). Large and stable clients ensure both a high standard of knowledge and large-scale use of the system. The aim is for tomorrow's buildings to be constructed using only products which have been environmentally appraised and approved. A common standard for appraisals and a user-friendly system support for searching for approved building products are necessary means to this end.

Developing products which measure up to the appraisal system's exacting requirements must be made an attractive proposition. All companies affiliated to BVB therefore insist on the use of environmentally approved products in their construction and management projects. BVB welcomes new members, both profit-based and non-profit, public organisations.

The database currently contains upwards of 6,000 appraised building products and new ones are being entered all the time. In the first instance it is products which property owners and developers need which are being added, and so the most widely used products enter the system early on and new products are being entered continuously. The web-based tool makes it easier for the contractor to live up to the environmental stipulations.

### **How the system works**

The strength of BVB lies in the widespread endorsement of its appraisal criteria.

The product can be given the rating “Recommended”, “Accepted” or “To be avoided”.

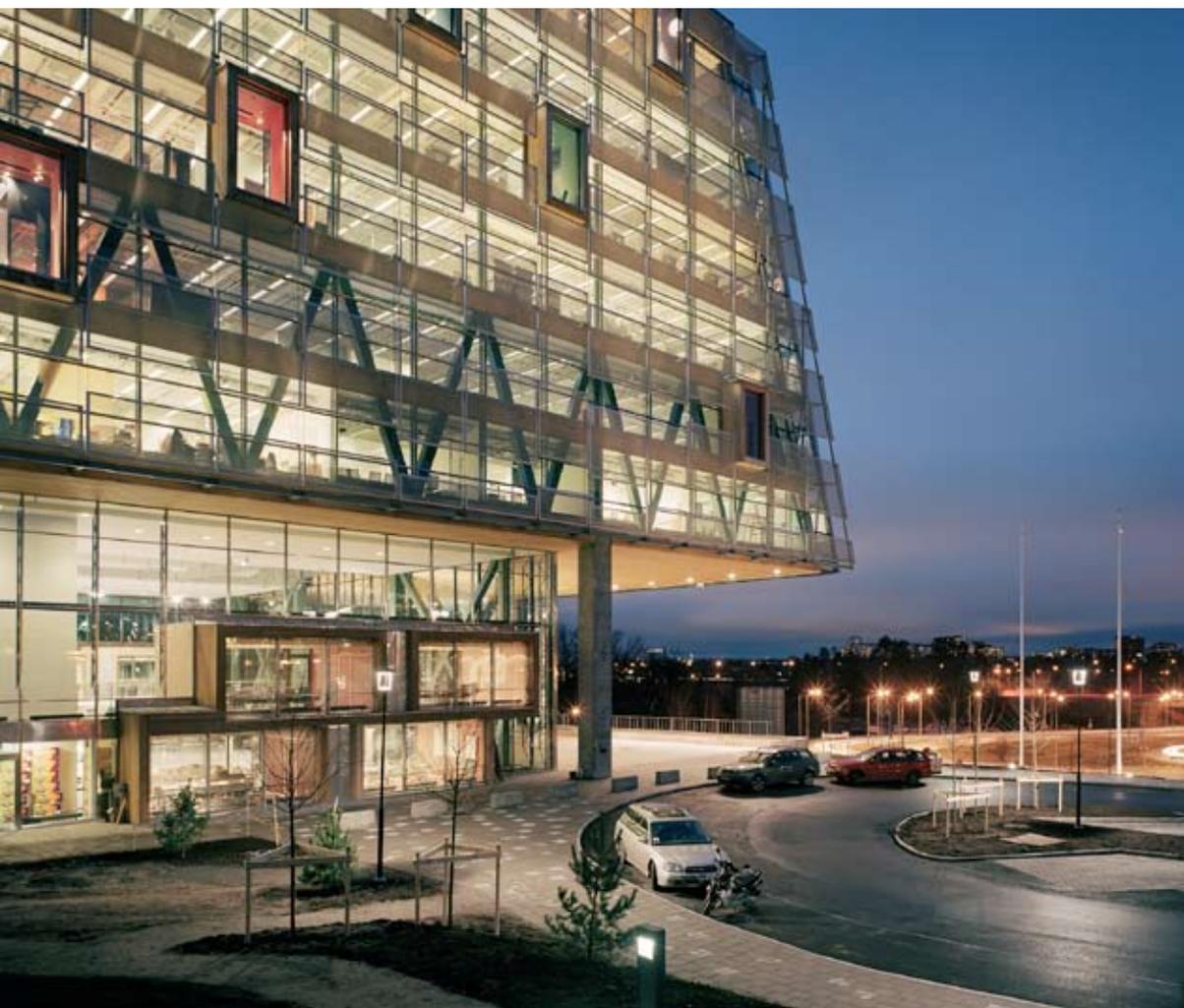
The products are appraised in the following seven areas, each of which is separately evaluated. The areas are then weighted before the overall environmental appraisal is finalised.

- Chemical content (declaration of contents)
- Input materials (raw materials)
- The construction phase
- The management phase
- Demolition
- Residual and waste products
- Indoor environment

Chemical content is assessed with reference to criteria concerning the properties of the various substances. There is a consensus in the industry that certain properties are not to be allowed, e.g. carcinogenic, allergenic, toxic for reproduction, persistent and ozone-depleting properties.

A building product can come up for appraisal when a need arise among the member businesses, but it is also possible for a building materials producer to make the first move towards getting his products appraised. The interaction between BVB, member enterprises and producers is intended to guarantee a continuously updated database of relevant products.

Use of the BVB database requires a licence. The backbone of the system is the search function for finding out how a building product has been appraised. Different search terms can be combined, or else one can search for a building product



with a specific ID number. Every product has a product card containing the declaration of contents and the appraisal outcome. The product cards are adapted for inclusion in the supporting documentation for product procurement and in the documentation of the construction project.

The system also includes a function for uploading information about the client's or property owner's projects and the building products involved in them. This makes it easy to go back and check which products were used and how they have been rated.

The BVB as a project tool is being developed continuously and is intended to facilitate the systematic use of environmentally approved building products.

**Further information:**

Swedish Tenant Owner Co-operative  
Housing Association  
(HSB Riksförbund)

[info@hsb.se](mailto:info@hsb.se)

[www.hsb.se/environment](http://www.hsb.se/environment)

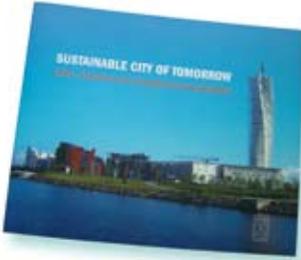
[info@byggvarubedomningen.se](mailto:info@byggvarubedomningen.se)

[www.byggvarubedomningen.se](http://www.byggvarubedomningen.se)

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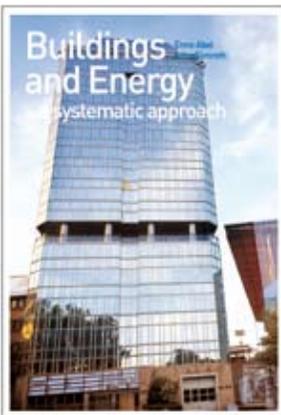
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## **SUSTAINABLE CITY OF TOMORROW – Experiences of a Swedish Housing Exposition**

The Bo01 housing expo area, in Malmö's Western Harbour, is one of the biggest and most ambitious projects in Europe for sustainable urban development. An old industrial site was to be transformed into a diversified inner city environment with the aid of good architecture and environmental initiatives. Support from the European Union, from the Swedish Government, through local investment grants, and from the City of Malmö made possible a number of applications and experiments, which would otherwise have been out of the question. Since the expo in 2001 this new city district has attracted international attention as an inspiring example of sustainable urban development. This anthology summarises experiences and lessons learned from the Bo01 environmental projects, based on the researchers' evaluations. It also presents examples of functioning public – private partnerships that produce results, and provides glimpses of other parts of Bo01. The book is useful to local authority practitioners and decision-makers, consulting firms, construction and housing companies and the general reader interested in sustainable spatial planning, environmental technologies and innovative construction.



ISBN 978-91-540-5997-3, 285 pp, ill.

Price: SEK 295 (incl. VAT 6%)

+ shipping

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## **BUILDINGS AND ENERGY – a systematic approach**

In many existing buildings, energy conservation measures have significantly reduced the demands for heat supply. In new buildings, advances in a wide range of technologies have led to even greater reductions. On the other hand, demands for electrical energy have risen noticeably. Unfortunately, it now seems that the use of both heat and electrical energy is starting to increase, especially in non residential buildings, and without any corresponding increase in the quality of the indoor climate. In this book, the authors present a systematic and holistic approach to both conserving energy and ensuring good indoor climate when designing new buildings or renovating existing ones. In their opinion, the harmonization of the design of a building and its HVAC systems is fundamental to these issues. The authors - Enno Abel, professor emeritus of Building Services Engineering at Chalmers University of Technology and Arne Elmroth, professor emeritus of Building Physics at Lund University - wish to share their knowledge and experience in this field with developers, planners and builders.

This brochure presents some of Sweden's joint efforts towards achieving a sustainable built environment. Examples are given of ongoing activities by governmental authorities and a number of networks in the fields of planning, construction and facilities management.



Swedish Research Council Formas



SWEDISH ENVIRONMENTAL PROTECTION AGENCY



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Ministry of the Environment



Swedish Energy Agency



ByggaBoDialoger



City of Malmö



REGION VÄSTRA GÖTALAND



Ecocycle Council