EDITORIAL

Anybody may end up in a wheelchair, even you or i. Everybody is at risk, but those who design and build residental accomodation in Sweden today do not give accessibility serious enough consideration. Rooms that are so narrow that a wheelchair cannot turn round, and door handles that cannot be reached from a wheelchair, are more usual today than ten years ago. And at housing fairs dwellings that are absolutely inaccessible are praised in terms such as elegant, spiritual, poetic . . .

Architect Eva Björklund sounds the alarm in an article on page 8.

What is the trend in other countries? Is disablement a factor that is taken into consideration in your housing construction? You, the readers, can answer this question.

The spectacular building on the cover is an ordinary staircase entry block of flats, converted into a sustainable building. The ecological gain is somewhat in dispute, but one thing is certain: The task of thinking and living more ecologically has brought the occupants together and made them care for their building. You can read the researchers' evaluation below.

I hope you enjoy this issue.

Kerstin Franklin
Editor

IN THIS ISSUE

Cover: Ekoporten, converted into an experimental sustainable building.

Photograph: Nino Monastra

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Phone +46 8 617 73 00,
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By Marina Botta

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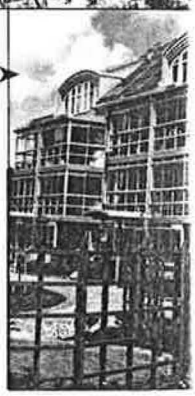
Evaluation of a sustainable

Ekoporten, a block of flats converted into an experimental sustainable building, is now 2½ years old. The building is one of the most visited and debated projects carried out in Sweden in recent years. With the support of the Swedish Council for Building Research, researchers from the Faculty of Architecture, Royal Institute of Technology, Stockholm (KTH) have followed up and documented the experiment.



Ekoporten before and after refurbishment. The low three storey building had an attic storey added with solar collectors on the roof, the building was retrofitted with facade insulation and given large glazed balconies.(se also cover photograph)

Ekoporten was a prefabricated three storey staircase entry block of flats in Norrköping, constructed in the 1960s. The building now represents one of the very few projects in Sweden in which an existing block of flats was converted so as to be sustainable. From the example of Ekoport, the housing company Hyresbostäder Norrköping will collect experience data for use in other sustainable refurbishment projects in the rest of the housing stock.

Some retained, some changed

In Ekoporten, the structure and arrangement of the building, the layout of the flats and their joinery, doors and windows were retained and repaired, or replaced where needed. New materials were selected in view of the environment and the health of the occupants.

The external appearance of the building was however completely changed. Partly because of various energy measures such as the addition of an attic storey with a roof of optimum slope for solar collectors, retrofit insulation of the facades and the provision of large glazed balconies, and partly in order to make the building into a prominent symbol for a previously run-down housing estate and for the housing enterprise itself.

The experimental construction made it possible for new technical systems, new methods and new materials to be tested. Evaluation of the project was therefore an obvious and integral part of the experiment. The measurement programme was planned in great detail right from the outset, with a number of measuring equipments and a fully computerised control system incorporated in the building.

Water supply and sewerage

The flats are equipped with water saving mixer taps and a differenti-

IS EKOPORTEN?

refurbishment project

The old stairway was opened up to the facade. FOTO:NINO MONASTRA

In the attic storey there are large communal areas, very much appreciated by the occupants. FOTO: NINO MONASTRA

FOTO: NINO MONASTRA

ated flushing system for urine (2 decilitres) and solids (4 litres). Consumption of water in the flat was found to be 50–90% of the average water consumption in Swedish households which is 200 litres per person per day.

The urine separating WC pedestals were accepted well by the occupants; their use was however not entirely correct. Saving of flushing water was the same as in usual low flush volume modern pedestals. Collection of urine in two tanks worked well. The stored urine is of good quality as fertilizer and is collected after six months' storage by a farmer from the Norrköping region, about 20 km from Ekoporten.

Some problems were experienced in different parts of the sewerage system and resulted in inadequate treatment of sewage and domestic wastewater. Analyses pointed to excessive concentrations of BOD 7, phosphorus and bacteria. The surface of the water in the outlet was therefore covered with stones so as to prevent people and animals coming into direct contact with contaminated water.

Small scale measures, minor conversions and many adjustments were needed to ensure that the process as a whole was functioning properly. This entailed a lot of work for the property managers and janitorial staff, but caused no disruption to the occupants. The problems were restricted to the service room and had no effect on the flats.

Enhanced natural ventilation

Ventilation in Ekoport was designed as a natural ventilation system reinforced by temperature controlled roof fans. Outside air is admitted through slot terminals in the additional insulation on the facade and further into the flats via inlet terminals situated behind the radiators. Humidified air can be admitted from the stairway via terminals above the entrance doors. Air is extracted through separate ducts in each flat via extract terminals in the bathroom and cloakroom and from the cooker hood in the kitchen.

The measurements showed that air flow rates in the flats were higher than the design values. The fans were run continually, the reason being to speed up drying of the humidityof construction, and also the difficulty of adjusting the control system for the fans. This gave rise to increased energy use for the fans and made the air in the flats somewhat too dry. Discussions were held concerning a change to a demand controlled system, but the occupants were pleased with the existing ventilation.

Pollution, noise and electromagnetic environment were measured

Measurements were made concerning thermal quality, airborne pollutants, noise, airtightness and electromagnetic environment. The temperature of room air was found to be 1–3°C higher than the design value. One of the reasons for this was the intention to achieve more rapid drying of construction water and was to be adjusted later. Measurement of supply air temperature at slot terminals in the facade showed a 0.5–1°C rise in temperature at an outdoor temperature between –1 and +16°C, which means a saving of en-

ergy for heating. Humidity in the stairway was between 40 and 60%, as aimed for in the project. Measurements of airtightness and different pollutants also showed agreement with the targets.

Acoustic measurements showed compliance with requirements, with the exception of impact sound level in bedrooms with linoleum floor covering.

Measurements showed that electrical and magnetic fields complied with requirements prior to occupation but rose later due to equipment owned by the occupants such as unearthed electrical appliances, extension leads, etc.

Does Ekoporten use too much electricity?

The building is heated by municipal district heating supplemented by solar heat. Solar collectors of 90 m² area are built into the south west roof slope and connected to two storage tanks of 3.5 m³ each which are also equipped with immersion heaters. Measurement data show that consumption of district heating during the first year of operation was 155 kWh/m² floor space which is 26% lower than in other similar buildings in the area where consumption is 210 kWh/m² floor space.

Ekoporten is one of two Swedish projects which received a special environmental mention through "Green Building Challenge" in Vancouver in October 1998. The twelve Swedish competition entries are described in the booklet *"Sweden: Green Building Challenge '98*. Presentation of Swedish case studies and posters", G8:1998. The booklet can be ordered free of charge from Swedish Council for Building Research, Box 12866, S-112 98 Stockholm. Tel +46 8-617 73 00, fax +46 8-653 74 62. katarina.chrysogeni@bfr.se. In a few month a report (in Swedish) will be presented containing the summary of experiences from Ekoporten: the building in the service stage with documentation of the problems encountered, solutions that were discussed and the measures taken, as well as a behavioural study of the occupants. (Marina Botta et al, 1999).

Electricity consumption during the first year of operation was ca 33 kWh/m² floor space for household electricity and ca 47 kWh/m² floor space for building services. Household electricity consumption is lower than the average for blocks of flats, but building services electricity consumption is much higher than in other buildings in the area where consumption is ca 22 kWh/m² floor space.

The latter recently gave rise to unfavourable assessments of the project and headlines of the type "Ekoporten guzzles electricity". It is important to bear in mind that the measurements relate to the first year of operation of an experimental building and must therefore be interpreted with extreme caution.

The high consumption of building services electricity can be partly explained by the large communal spaces in the attic storey which were also very often used in the first year for study visits. Energy was in addition used to provide additional heat for the compost room when it became very wet, and to run the roof fans which were operated continually. This type of energy use will decrease after all systems have been adjusted.

Some of the electricity consumption is also due to energy demanding components in the building services systems, and will persist. Such components are pumps for the sewerage system, the solar heating system, fountains in the stairways and courtyard. The control and supervisory equipment also requires some electricity; this is warranted by the fact that Ekoporten is an experimental building which is of great value precisely because of the measurement data that are continually recorded.

The solar heating plant was used to heat 45% of the domestic hot water requirement against the planned 67–89%. This was due to some construction defects in the solar collectors and storage tanks, and has now been put right.

To sum up, total energy use in Ekoporten (excluding solar energy from the solar collector system) is ca 89% of the energy use in similar building types. ■

Marina Botta works at the Department of Architectural Design & Technology, KTH, S-100 44 Stockholm, tel +46 8-790 6650, marinab@arch.kth.se.

Techniques manage do the have

By Eva Bergdahl and Örjan Svane

Ekoporten is intended for "ordinary" tenants, i.e. people without any pronounced interest in environmental and resource management. The reduction in environmental impact was achieved by ecological techniques. But how has the new technique affected local staff and management?

The new technical systems have meant new tasks for the local staff. Attendance of the faeces-mixed compost and the local sewerage system is the task that takes longest. At the same time, the work of the staff has been made easier by the computerised control and supervisory system. Supervision and task allocation by the management is also facilitated by the system.

So far, local staff have been completely spared the task of cleaning up and carrying out repairs because of careless tenants. This and the good relationship with the tenants is a difference that is very evident as far as the staff are concerned.

"There are a few extra things we have to keep an eye on in Ekoporten, but we don't have to do this often, and it is nothing compared with the cleaning we do in other buildings because of carelessness and vandalism", says one of the staff.

As far as the tenants are concerned, the great difference compared with previous dwellings is the good relationship with neighbours and the management. The new task for the tenants is separation of refuse. For this there are containers in the kitchen which are emptied in the refuse storage room that houses the containers for each refuse fraction and the inlet chute to the compost room. In other respects, the tenants had to learn about other differences in function, for instance the urine separating toilets, and to buy