6. Living in the 21st century

The ecological community of Braamwisch

Silvia Schubert

6.1 THE ECO-COMMUNITIES MOVEMENT

6.1.1 Eco-communities is an increasing trend

If you search the Internet for ecological communities (*Ökosiedlungen*) you will find in the website www.oeko-siedlungen.de a very good summary of current projects in Germany, Austria and Switzerland. Especially in new housing developments, an attempt is being made to set an ecological emphasis in the form of sustainability.

The examples presented feature very different models. For several, the initiative stems from those wishing to build themselves, who want to see that a number of ecological criteria are considered during house construction (e.g. the ecological community of Braamwisch). For others, the initiative comes from cities and regional districts, as is the case for the community of Kronsberg in Hannover.

In general, a trend is emerging that is growing due to public grant programs, e.g. for the construction of low-energy houses or the installation of solar facilities. Those wishing to build are mostly young middle-class families with a high level of environmental awareness, who see a possibility to contribute towards effective action through the construction of an "eco-house" whilst at the same time significantly improving their own standard of living.

6.1.2 Building the eco-community of Braamwisch

The ecological community of Braamwisch developed from the idea of a few committed persons who were looking for an opportunity to build and live ecologically together in Hamburg. Already in the early 1990s, initial negotiations with the authorities took place with a view to establishing an ecological community in an allocated new housing development area.

To enable communication with the authorities, a non-charitable cooperative was founded that formulated the goals of those wishing to build. Low-energy houses with environmentally friendly building materials, the use of solar energy, composting toilets and a private vegetation-based sewage treatment plant were planned as well as the construction of a communal house and an environmentally responsible transport concept, probably without private cars (car-free community).

Negotiations with the authorities proved at times to be difficult. The cooperative's urban building design – or-

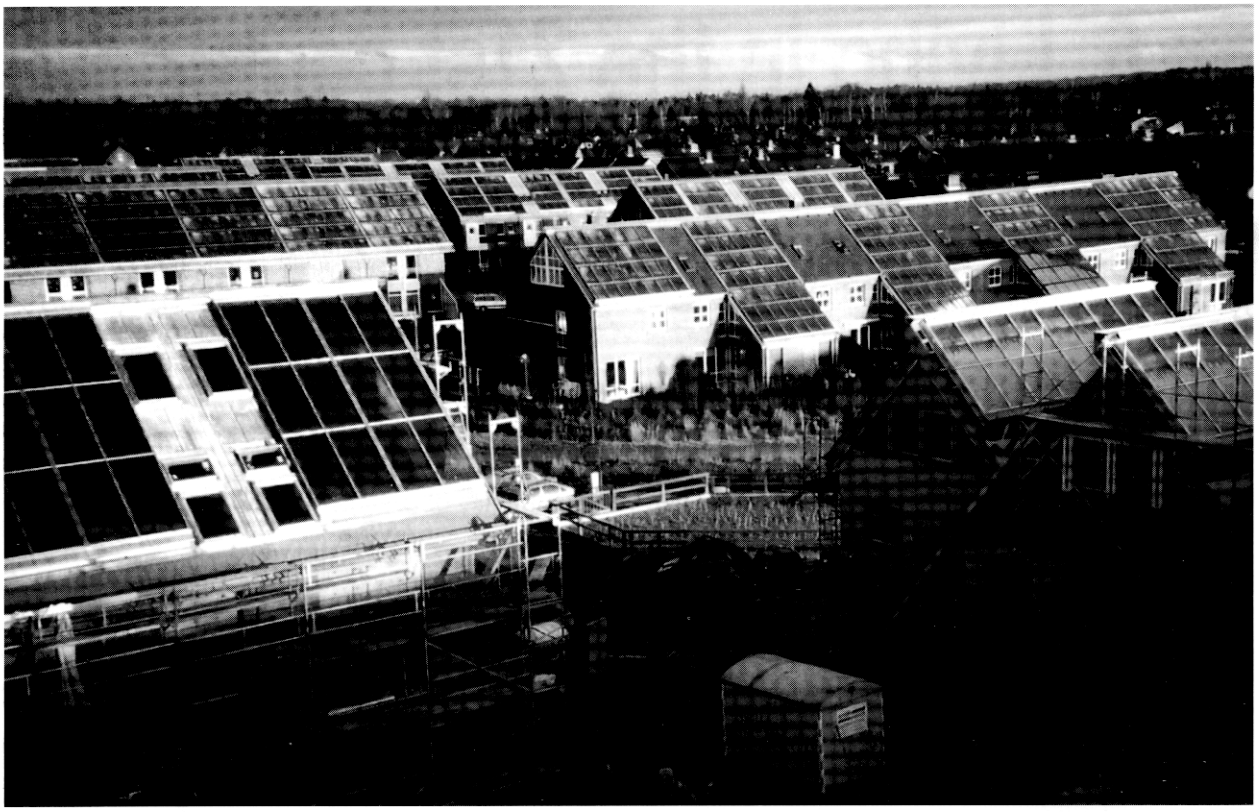

Figure 6.1 View over the "Solarsiedlung Karlshöhe" (in the background) and the " Ecovillage Braamwisch" (in the foreground) during the constructions phase in 1997. Photo: Silvia Schubert.

ganic structures with rounded forms – had to be changed. Finally, a right-angled, standard town house layout was created, but only in the central area could a car-free green space designated as a "market place" be accepted. Some goals failed due to internal conflicts, e.g. not all of those willing to build wanted to forgo a private car or to take part in a communal house.This caused the break up of the original cooperative into several smaller groups and the community was finally built in five construction phases with different architects.

Construction began in 1996. In summer 2000, the last occupants of the 40 housing units could finally move in. The results are impressive despite the difficult planning and construction phases. There are five rows of town houses and two duplexes built in solid brick or with wood frame construction. Almost all houses are equipped with composting toilets; a few have toilets that use rain water. The community's own vegetation-based sewage treatment plant purifies grey water from the houses directly on the premises of the community. The parking spaces were placed at the edge of the community, so that car-free play areas for the children were created within the housing area.

A great disadvantage of such planning using several builder groups and building in several construction phases is the lack of coordination of the entire project. Problems arose with the coordination of the design of individual areas, e.g. design and location of communal spaces. On the other hand, through the commitment of individual builders who jointly planned down to the smallest details, identification with "their" ecological community is extremely great. Good neighbourly contacts developed that are supported by community projects like food co-ops (collective purchases of organic food), flea markets or festivities.

6.2 GOOD ENERGY MANAGEMENT

6.1.3 The local solar heating supply project

The ecological community of Braamwisch is taking part in the "local solar heating supply" project of the Hamburg gasworks (HeinGas). In cooperation with the Federal Department of Research and Science, the Department of Environment of the city of Hamburg and the University of Stuttgart, one of the two first German pilot facilities for local solar heating supply with long-term heating storage was built in 1996 in Hamburg's new housing development area, Karlshöhe. The total costs amounted to approx. 6 million German Marks. A second facility is presently being realized in Friedrichshafen.

A total of 124 single-family town houses (40 of them belong to the ecological community of Braamwisch) are connected to the 3000 m^2 collector surface. The solar heat captured is supplied to an underground 4500 m^3 hot water storage tank and covers almost 50% of the demand for heating and process water. According to demand, a small unitised heating plant operating on natural gas supplies the remaining heating energy.

Individual furnace facilities are not necessary, i.e. no hot water boilers or chimneys in the houses. The occupants only make available the surface of their roofs, (oriented to the south) for the installation of the solar collectors and pay a one-time connection fee (12,000 DM). The

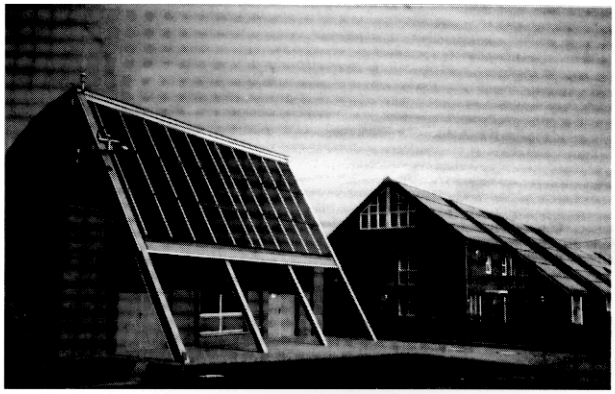

Figure 6.2 The gas heating plant as part of the local solar heating project in Karlshöhe. Photo: Silvia Schubert.

heating facilities in the individual homes must be adapted to the supply temperature of 60°C and the return temperature of 30°C. Only in this way can the entire system operate optimally. Actually, the return temperature sometimes lies below 50°C. This shows, that the adaptation is still insufficient.

Scientific monitoring of the local solar heating project is conducted by the Institute for Thermodynamics and Heating Technology at the University of Stuttgart. Although the facility is rated as satisfactory after the first year of operation, the coordination of private heating still needs to be optimised for the entire system.

6.2.2 Low energy houses

All 40 houses in the ecological community of Braamwisch were built using low-energy home construction methods. The heat energy requirement of approx. 50 kWh per m^2 and year is only half as large as the heat energy requirement of standard houses that satisfy the requirements of the 1995 thermal insulation ordinance.

Since 1990, public grants have been available in Hamburg for the construction of low-energy houses (NEH). House builders can obtain subsidies for energy-saving measures such as the insulation of walls and roofs or heat-insulating windows. In 2001 this subsidy program was cancelled. Now the building of low-energy houses is the standard and the construction of passive houses is sponsored.

Among others, the following energy-saving measures were implemented in the ecological community of Braamwisch:

- Exterior walls: Structure has double shell exposed brick wall with 15 cm Perlite-core insulation, alternative: Isofloc
- Basement ceiling: 15 cm cork insulation between basement ceiling and flooring concrete, alternative: foamglas
- Roof: Vapour-barrier paper and 30 cm Isofloc-insulation
- Windows: Wooden windows with a special high thermal-insulating glass (k-value = 1.3), connecting seal made from coconut fibres

(Perlite: little porous stones of volcanic origin; *Isofloc:* flocks made from old paper.)

Figure 6.3 The "blower-door-test" was conducted for quality control of the low-energy house standard. Photo: Silvia Schubert.

Special importance was given to the selection of natural, environmentally friendly insulation materials, so that even after demolition of the houses, hazardous waste will not occur. A requirement for construction companies was to build without the use of PVC, mineral fibre insulation, foam and Styrofoam.

A wind tightness test (blower-door-test) was conducted for quality control of the low-energy house standards.

To guarantee sufficient air circulation in highly insulated houses, the installation of regulated ventilation is necessary. Air in the moist rooms (bathroom, toilets, and kitchen) is continually extracted by means of an exhaust ventilator. Equivalent fresh air flows through fresh air valves in the wall or in the window frames. In three of the houses, the exhaust is supplied to a heat exchanger. Thus, up to 70% of the exhaust heat can be transferred to the cold fresh air and further energy can be saved.

Crucial for all energy saving measures is a very exact execution of the construction work by competent specialists. Only then is the additional expenditure worth it from an ecological and economical point of view. In general practice, many of the companies lacked sufficient experience with ecological standards.

6.2.3 Green electricity

Since the deregulation of the German electricity market in January 2000, several families have changed to electricity suppliers who acquire their electricity mainly from renewable energy sources or from power-heating-linkage. In addition, photo-voltaic elements were installed on two town house rows. The power generated is conducted into the network and is remunerated by the local power supplier at a rate of 0.99 DM per kWh.

6.3 TOILET WASTE AND WATER

6.3.1 The composting toilets

A great concern of all of those wishing to build in the ecological community of Braamwisch was to lower water consumption through the use of composting toilets. In doing so, approximately 20,000 litres of drinking water per year per person can be saved.

The decision in favour of composting toilets is surely a most effective one. While the occupants have become accustomed to the daily use of dry toilets, visitors are pleasantly surprised ("it doesn't smell at all!"). By comparison, other ecological measures are hardly noticed.

Different systems were implemented in the ecological community of Braamwisch. 15 houses have a Biolett composting toilet and 18 houses have a Clivus multrum model. Seven houses decided to use rain water for flushing toilets.

In principle, the method of operation of the different composting toilet systems is the same. The faeces fall through a fall pipe into the large compost container. Compostible kitchen waste enters the same container through its own disposal chute. An exhaust ventilator provides for the transportation of moisture, for the ventilation of the compost material, and prevents the formation of odours.

In the case of composting toilets, human excrement is not simply "out of sight, out of mind" at the push of a button like with standard toilets. For better composting, carboniferous material such as bark mulch or wood chips as well as lime must be added regularly to regulate the pH value. The first compost can be collected after approximately three years. The occupants have realized that after installation of the compost toilets maintenance of the system would be necessary, which however is not offered. Problems (e.g. temporary fruit fly plagues) must be solved by the user through "learning by doing".

There were no objections on the part of the authorities. However, a sewer connection had to be laid up to each house, so that if necessary, there could be easy conversion to a conventional toilet.

6.3.2 The grey water treatment facility

The decision to construct a communal, vegetation-based sewage water facility for all household waste water (washing machines, dishwashers, bath tubs and showers) was also a decision made in order to husband the water resource.

Waste water that is not polluted with street grime and industrial water can be treated safely and easily in reed bed treatment facilities. This relieves city sewage facilities, the occupants do not pay sewage water disposal fees, and the water is quickly returned to the natural water cycle.

However, additional space has to be available for such a grey water sewage treatment plant, approximately 2 m^2 per inhabitant. In addition to a higher space requirement, strict hygiene regulations and higher construction costs must also be considered. The purification performance must be regularly examined and evaluated by a specialized company.

Despite the fact of communal construction and operation of the facility, the costs can be kept low and no sewage connection fees incur, making this "eco-component" a worthwhile investment in the long term.

A significant side effect is that the occupants of the community develop a high level of consciousness for clean water. The facility functions optimally as long as toxic household chemicals do not get into the waste water.

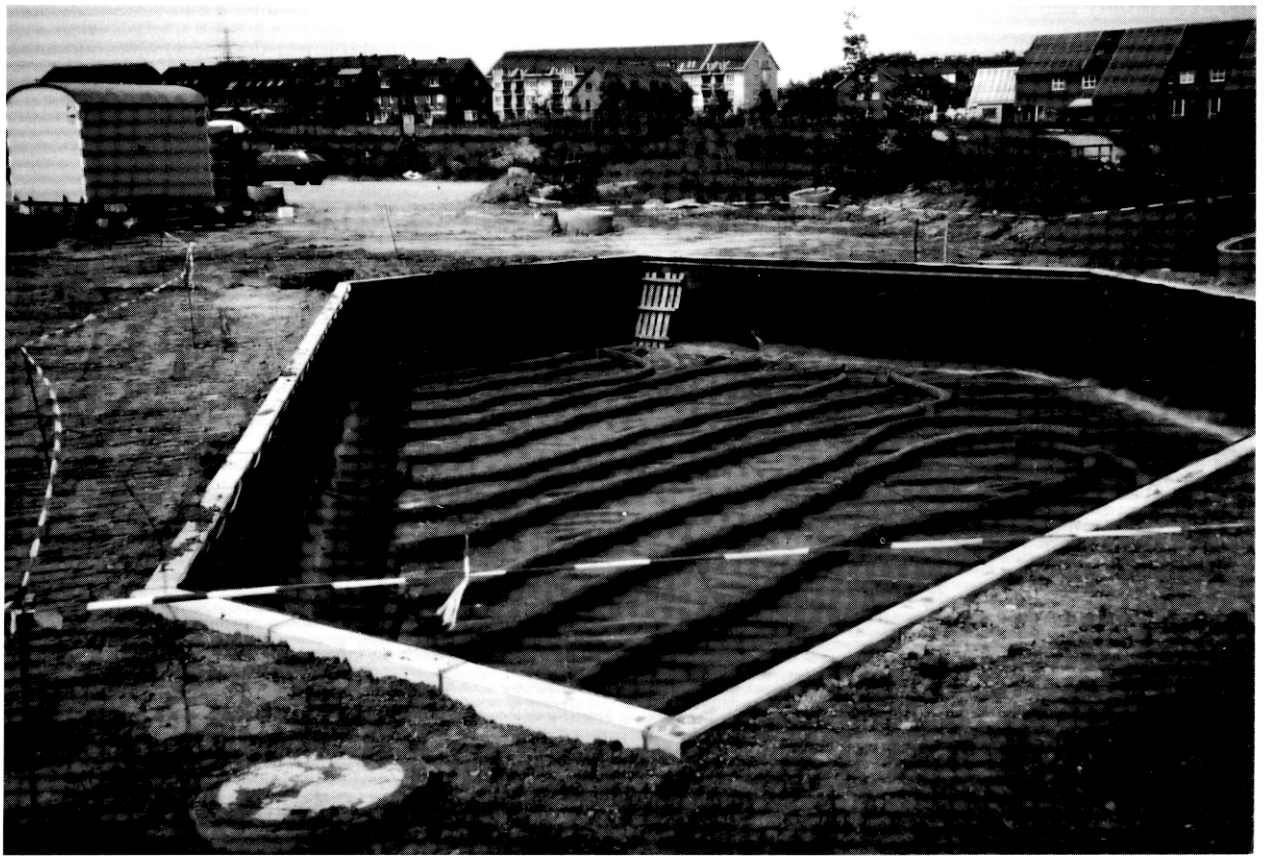

Figure 6.4 Construction of the vegetation-based grey-water treatment facility. Photo: Silvia Schubert.

THE BRAAMWISCH ECO-COMMUNITY

Figure 6.0
Braamwisch low-energy houses.

Location of the community: Bramfeld in the north-eastern part of the city of Hamburg

Size of the community: 40 housing units (WE) in five town house rows and two duplexes

Construction period: 1996–2000

Cost per house: approx. 580,000- DM incl. building site and development

Area/WE: approx. 125 m² living quarters and 300 m² land (of which approx. 100 m² community areas, e.g. vegetation-based sewage treatment plant, sidewalks)

Structural type: low-energy houses, partially solid brick construction, partially wood frame construction

- Power supply through the local solar heating project of the Hamburg gasworks
- Southern oriented roofs with solar collectors and some photo-voltaic modules
- Primarily equipped with waterless composting toilets; seven units with toilets using rainwater
- Regulated ventilation system, partially with heat recovery
- Grey water treatment in three reed beds
- Car-free living area; parking is located at the edge of the community; car-sharing
- Use of environmentally friendly building materials, such as paint, flooring, insulation materials
- Planting on the roofs of sheds and house facades

6.3.3 Use of rain water

Closely related to the subject of waste water is the use of rain water. Rain water cannot percolate above ground surfaces in urban areas with their high portion of sealed surfaces. It is collected in special rainwater drainage canals before it flows into rain water retention basins or it enters into mixed water drainage canals together with household waste water into the sewage water treatment plants. The rain water cannot recharge the groundwater aquifer, as would be the natural case.

In the ecological community of Braamwisch, most of the rain water percolates on site. Walks and parking areas are not asphalted, but are paved with walking stones, cobblestones or checkered bricks, whereby the rainwater can easily percolate in their joints. The remaining rainwater flows through trenching and ditches into a small rainwater retention basin.

The rainwater is used in many ways. Seven houses collect the rainwater in underground storage tanks and use it for flushing toilets, while some families use it for their washing machines. Almost all occupants have a rainwater barrel in their yard, to collect rainwater to water their gardens.

The children of the community have learned to appreciate the exploration and play possibilities that the presence of the fascinating element of water presents them in many locations.

6.4 MOBILITY

6.4.1 Car management

For many people, living in the city is synonymous with heavy traffic, noise and exhaust. This should not be the case in the ecological community of Braamwisch. Cars must remain outside of the community, so that children have more safe open spaces available for play. In order to achieve this goal, the occupants were involved in the planning of the urban design. Therefore, parking spaces were only made available outside the housing area. Several families do not own a car or have rented a parking space outside of the community. The reduction of traffic has also proved to be very advantageous for the city. Access to the houses occurs by means of sidewalks that the occupants purchase as part of their property. The public street ends with a turn-about in front of the community.

6.4.2 Access to public transport

However, families do not need to sacrifice mobility. Connection to the local public transportation system is good: the nearest bus-stop can be reached in three minutes by foot and the nearest subway-station in ten minutes by bicycle. In addition, a car-sharing vehicle is kept available at a communal parking space. A kindergarten, an elementary school, shopping facilities, and doctors' practices are within easy walking distance.

Table 6.1 The economy. Additional costs and possible savings in ecological building.

Construction measures	Additional costs (approx)	Savings
Connection to the local solar heating system	6,000 DM	No maintenance costs, fewer roof tiles on the south side due to collector field
Additional insulation of walls and roof for the low-energy house standard	8,000 DM	
Regulated ventilation with heat recovery	10,000 DM	Reduction of hte heat energy consumption by approx. 50%
Thermal insulated glass	12,000 DM	
Composting toilets (Clivus multrum)	7,000 DM + 14,000 DM for the necessary basement	Reduction of the drinking water consumption by approx. 30% No waste water disposal fees
Vegetation-based sewage facility	16,000 DM (proportional)	No sewer connection fees

6.5 ECO-COMMUNITIES AND LIFESTYLE

6.5.1 Ecological lifestyle – a social agenda for resource conservation

Individual families in the ecological community of Braamwisch try to implement the principle of sustainability in other areas such as consumption and recreation. Neighbourly contacts reinforce the individual trends towards an ecological design in everyday life. One could call the community a social agenda project, which can be illustrated by the examples:

Food. There are many families who buy almost all of their food from organic farms. A milk delivery service from an organic farm and food-coops for organic bread, wine and oil supplement the selection.

Waste avoidance. The separation of waste (packaging material, glass, paper, compostible organic material, residual waste) functions well. Furthermore, considerable waste is avoided, by e.g. toys or children's clothing sold at flea markets or special tools shared by the community.

5.5.2 The cost of ecohouses

To date, there has been no study on the actual added expenditure for the ecological construction measures used in the individual houses and the relation they bear to the long-term savings.

A summary of the additional costs and possible savings using the example of one house can convey an initial impression. (Table 6.1)

In addition, extra costs have been incurred for biodegradable paints, clay plaster, hardwood, cork or linoleum flooring. However, these costs are minimal in comparison with the total sum, since considerable work on the interiors was carried out by the builders themselves and purchase costs were minimised through collective ordering.

In the community, people with different social status have come together: families with children, single parents, singles and pensioners as well. The eco-houses are also affordable for average income earners because the extra expenditures are partially absorbed through the grants for low-energy houses from the environmental agency of the city of Hamburg (5,600 DM per house), favourable terms for loans from the *Wohnungsbaukreditanstalt* (housing construction finance agency) in Hamburg, as well as tax allowances for several years (house owner allowance).

5.5.3 Living in the 21st century

It is a difficult decision for environmentally-conscious people to build a house in a countryside which is already spoilt by urban development. On the one hand, families with children in particular want to own their own small plot of land, but on the other hand they are very aware that a piece of nature is lost with every new housing development. Therefore, it was clear to the occupants of the eco-community of Braamwisch that only environmentally compatible and resource-conserving building methods could be considered. Bearing this in mind, all possibilities were utilized in the Hamburg eco-community.

It would certainly be interesting to take stock of the situation of the community from an ecological point of view so as to determine whether ecological construction in this form is sustainable and future-oriented.

Living in an eco-community is only authentic when the occupants identify themselves with the ecological idea behind it. In addition, city planners and architects must always include the requirements of the people who want to live there.