Chapter 3

A Portrait of Nine Ecovillage Communities

What are the ecological villages really like? What is their story? How are they similar? What makes each unique?

The case studies in this paper are a sampling of the ecovillages in Sweden. The profiles highlight the unique character, history, social, organizational style, and technical composition of each. Part II considers in more depth particular aspects of the communities.

The nine ecovillages below are presented in chronological order. The technical sheets following each profile are short summaries of different aspects of the ecovillage. The technical summaries are complete to the extent that information was available. Significant published sources of information for the ecovillages are listed after each description.

Fig. 1

T u g g e l i t e

Fig. 2

Move in date:	**fall 1984**
Location:	**Skåre** **8 km NW of Karlstad**
Project initiators:	**future residents**
Size:	**16 households**

Tuggelite, the first completed ecovillage in Sweden, is a source of inspiration for many ecovillage associations in Sweden. The seed for Tuggelite was planted, long before the first stone was turned, by a group of academics from Gothenburg who, in 1974, were working on the Välsviken ecological housing project. The Välsviken group splintered in 1979 when the developer backed out, but a core of diehard members persisted. Three families who joined the Välsviken project in 1977 still live in Tuggelite today. Most of the others who later joined the Tuggelite project, were either friends, or acquaintances of this core. Over the fourteen years of its existence turnover in Tuggelite has been minimal. Only three families have moved away. Tuggelite is the only area I surveyed where the majority of residents revealed that their closest friends live in the ecovillage. However, it isn't an exclusive club. The newest residents, who moved in just three years ago, said they

felt immediately welcome. Their children made new friends right away. Neighbors stopped by to help orient the family. It wasn't long, they said, before they felt like one of the "gang."

I was curious to know if the residents had over the years, become complacent about environmental conservation. The responsibilities and interests of work and family have a tendency to crowd out youthful energy and optimism. As parents, these residents carry a large load of responsibilities. The number of adults, 27, has been constant over the 14 years, while the number of children has soared from 9 to 39. Nonetheless, the residents seem to have retained their original commitment to environmental concerns. Respondents to the survey were quick to critique their own behaviors and cite areas for improvement. The residents could have contented themselves with the satisfaction of knowing they had done their part for the environment by building the ecovillage and receiving countless numbers of visitors. But that was just the beginning, they said. Tuggelite is *"a place to live where concern for the environment plays a daily role."* On the other hand, progress can always be made, and living in an ecologically oriented neighborhood isn't a sufficient excuse for apathy for a resident who sees, *". . . only marginal differences between Tuggelite and other similar homes. Looking at the total environmental impact, in that Tuggelite residents travel by plane or car several times a year to the other side of the world, it is a question as to whether there is any difference."* Residents made dozens of the other comments on how they can do more to protect the environment. With this continued fire of commitment I have little fear that Tuggelite will become more environmentally friendly over the years even while the original buildings stay the same. The years have apparently fueled, not dwindled, their commitment.

Fig. 3 - Lunch time at the common house

I arrived in Tuggelite on a workday in March. Workdays are held every fifth Sunday; each adult takes part in at least 5 work days a year. Residents meet in the commonhouse in the morning and divide a list of tasks to be done. On the day I arrived people had already split up and were planting, shaking out rugs, cleaning out the refrigerator in the common house, and so on. A resident who had been in on the planning from the very beginning, proudly showed me the central furnace. He shared stories of the trials of finding the right system at a time when no one was selling small scale, wood pellet, furnaces. Another resident gave me a tour of her house, which included an important trip to see the dry toilet and compost. Inside the greenhouse, just off the living room, a row of seedlings were poking through the soil in old milk cartons lined up along the sill, almost as if to spite the snow falling outside. At noon, we returned to the common house for lunch. The foyer was

overflowing with shoes and the kitchen was full of home-made breads and cookies. People were chatting about what to plant in their gardens, their children, and what could be done during the next work day. I was soon involved in a heated discussion about the ideal environmentally-friendly toilet system.

Tuggelite - Getting there

The first interest group for Tuggelite was established in 1981. This interest group began with ten member households. Just three years later, in the fall of 1984, 16 families moved to the newly built area. The creation of Tuggelite was expedited due to the knowledge and experience of several members brought to the group. Three households had participated in the Välsviken project in Karlstad for 4 years, and brought their knowledge and skills with them. Many local contacts had already been established during the planning of the Välsviken project. The idea of an alternative residential community had been under discussion for some time. The architectural firm for Tuggelite, EFEM, had also consulted on the Välsviken project. The architects, therefore, were already familiar with the principles involved. Many of the ecovillage members had been active in the campaign against nuclear power and were ready and eager to do what it took to say "yes" to Tuggelite. *"We wanted to try a new alternative and we wanted to say YES for once. There was so much to say no to in questions about the environment and planning. It was a chance to say yes, to show something positive"* (Tidäng 17). Lars Nilsson, civil engineer, and Tuggelite resident, was an invaluable asset as project leader and spokesman. He had experience with building projects, and above all, unrelenting motivation. Nilsson invested over 4,000 unpaid hours in the planning and execution of the project.

Fig. 4 - South Facade & Garden [Bokalders1995]

The residents did much of the planning work themselves, including overseeing the building process, filling the role of developer, and the landscape design. It was not an easy task. There was no frame of reference for such a project in Sweden. The residents had to gather, from scarce resources, all the information they could. As one resident noted, *"there was no one else finding the answers for us*" (Tidäng 24). Several members took it upon themselves to travel to see a Danish collective and report their findings to the rest of the group. The residents' personal time investments paid off financially and in other ways. As one resident noted, "*It takes a lot of time and energy, but it welds the members together in a way that is beneficial once you move in."*

City officials and the builders had little knowledge of ecological principles. Consequently, problems surfaced. Delays arose due to concerns about sanitation standards in the use of composting toilets and ash from pellet furnaces. These particular concerns were voiced

by the city board of health, the county commissioners' office and neighbors. A compromise was reached when the future residents agreed to to allow the systems to be altered for 'standard' use at a later date, if necessary. The necessity for building in a "back-up" system raised building costs. Another snag occurred because the builders were not familiar with the methods for building a highly insulated house. The plans required windtight walls and the avoidance of all "cold bridges". A cold bridge is an object (such as a nail or board) that penetrates the insulating windtight shell. The penetrating object provides a "bridge" by which cold and vapor enter the house. With this type of construction flaw, maximum energy savings are not achieved. Nevertheless, in Tuggelite, the energy savings are still higher than standard housing. Solar panels were added to the roof of the commonhouse a few years after the houses were built.

In comparison to the planning of other ecovillages, the planning of Tuggelite went smoothly, quickly, and without major disappointment.

Tuggelite - Location

Tuggelite is located eight kilometers northwest of the center of Karlstad in a suburb called Skåre. Karlstad is a mid-sized city in central Sweden, population 75,000. Tuggelite is on a main bus line that runs through the center of Skåre. Skåre's center is just one kilometer from Tuggelite, a 3 minute bicycle ride, a 10 minute walk. All the basic services, including as a grocery store, post office, schools, banks, and medical care, can be found in Skåre. Most of the adults in Tuggelite commute by bicycle or automobile to Karlstad for work.

Two sides of the Tuggelite site are edged with woods. The remaining two sides are edged by roads and other residential housing.

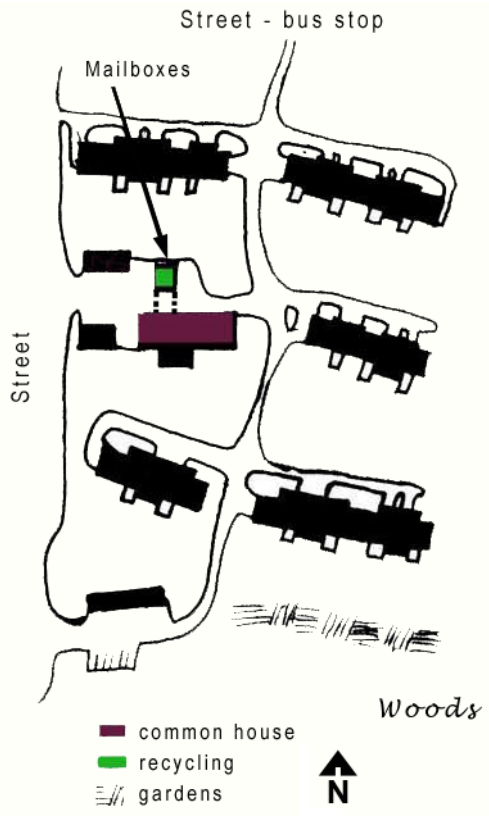


Fig. 4 - Site Diagram

A note on organization of Swedish cities.

Swedish cities are compact. The typical organization is: a main city center surrounded by districts, or neighborhoods, each with a smaller center. The districts are often defined by their own name, and have stores, schools, and services such as a post office, bank, and medical care. Six of the nine ecovillages presented are located in a residential neighborhood within walking distance of a district center. All nine are located within bicycling distance of the town or city center. District residents may have to travel to the main city center for work and specific purchases, but basic needs can be met locally, within the district. The largest cites in Sweden are still small in comparison to the typical sprawl of American cities. Even Stockholm can be traversed from end to end, by a bicyclist, in a less than an hour. The edges of more

and more Swedish cities are being covered with strips of huge single-story discount stores, but this suburbanization is less advanced than in American cities. Northern Sweden is far less populated than southern Sweden. In the North, the cities and towns are significantly smaller, therefore it is often necessary to travel long distances between towns to reach work or special services.

Tuggelite - Design

Top priorities in Tuggelite are energy efficiency, resource conservation and a strong social network as evidenced by; small windows on the northern face of the houses and broad glassed-in verandahs on the southern face, and the common house which is a hub of activity.

The 16 households are located in five attached sets of three and four, each with the long side facing south. The houses reflect traditional Swedish style; copper red paint with white trim. Only the small northern windows on the houses, and solar panels on the roof of the common house, prompt a second look. The houses were designed with passive solar principles to take advantage of the sun's free energy. Each household has a greenhouse on the south side which some residents use as an additional room. In winter months, a portion of incoming air is drawn from the greenhouse where it has been pre-heated by the sun. Houses surround the commonhouse on three sides. Garages are located on the edge of the site. Each house has a its own garden plot located next to a larger, shared, garden plot on the southern end of the site, where the compost heaps also reside, and there is a larger shared plot. Residents have not been as successful in their gardening attempts as they might like, because the soil contains a large amount of clay.

The houses use about 30% less energy, per year, than a standard Swedish house built in 1980. A result of combined energy and resource conservation measures for water, electricity, heating, and hot-water-heating needs. (Blomsterberg 11). The residents do their laundry in the common house. This saves the energy that would be embodied in the production of fourteen separate washers and dryers. (see the discussion of Life cycle analysis in the Design chapter, for further information on embodied energy). Tuggelite has a district heating system provided via a central wood pellet furnace, which incorporates 120 m^2 of solar panels. Initially, Tuggelite had problems with their heating because in 1984, no mid-sized wood pellet furnaces were being produced. Residents had to fabricate a solution until the right furnace became available.

District heating is a hot water heating system common in Sweden. A central furnace provides the energy to heat the water stored in a central hot water tank called the accumulator. The hot water is then pumped via underground insulated culverts, to the homes' radiators. The water, after giving off its heat to the room, returns to the central accumulator where the water is then re-heated. Solar panels are easily incorporated into this system. District heating can be very small scale or for a large city. In addition a district heating system usually incorporates delivery of hot water for washing as well as bathing.

Water (both tap water and sewage) is connected to the municipal system. The gray water, from the shower and kitchen, runs into a settling tank. In the spring and summer, the gray water can be used for watering the gardens. Overflow from the settling tanks leads to the municipal sewage system. All the toilets are composting toilets. The trials and triumphs of the composting toilet are discussed in the Design chapter in

Part II.

Tuggelite - Social and organization

The common house forms the hub of activity. Residents make regular trips to the common house to: collect mail, do laundry, drop off their children for daycare, relax in the sauna, drop off recyclables, work in the woodshop, meet for coffee, enjoy the occasional meal prepared by the gourmet club, or any other of a number of reasons. Until 1998, Tuggelite home owners' association rented out the first floor of the common house for a city daycare facility. The daycare had 4-5 employees and 14 children; up to half of the children were from Tuggelite. When I visited, the daycare had recently been closed. A public school, adjacent to the ecovillage, had just opened. The school had larger facilities to house the city daycare. The residents were somewhat at a loss for what to do with the space, remarking that the area, inside and out, seemed quiet and empty without the bustle of young children about especially during weekdays.. Although there were some conflicts between the resident's and daycare's need for space and resources, the benefits of the daycare seem to far outweigh the disadvantages.

All of the residents surveyed agreed that the social network in Tuggelite was better, or much better, than in "regular" housing. Although they indicated that neighborliness can occasionally be "*too close,"* benefits such as, "*If you have a problem there is always help nearby for babysitting, company, rides or loaning things,"* clearly outweigh the disadvantages.

Residents themselves maintain the property and the association's finances. Daily and weekly maintenance is attended to by five different work teams. The work includes such tasks as: mowing and snow removal, small repairs such as changing lightbulbs, general cleaning in the commonhouse, or monitoring the central furnace. Workdays are held every fifth week to attend to larger tasks such as planting flowerbeds or defrosting the commonhouse refrigerator. Residents participate in, at least, five workdays a year. Residents can add tasks to a list in the commonhouse. To address shared concerns association meetings are held every other month. The association steering committee meets more frequently, but most decisions are made in the larger forum.

Tuggelite - Resources

Tuggelite is the most well documented of all the ecovillages.

The most comprehensive book about Tuggelite, *Att bo i Tuggelite*, was sponsored and published by Byggforskningsrådet. The author, Kristina Tidäng, is an architect at EFEM Architects, the firm which designed Tuggelite and other resource efficient homes. The book covers both social and design aspects. It has many quotes from the residents addressing both the pros and cons of the design and function of Tuggelite.

Tillämpad Passiv Solvärme: Resurssnål bebyggelse i Karlstad by Åke Blomsterberg and Hans Eek, presents the results of a two year study of the efficiency of the energy saving measures, especially passive solar, built into the Tuggelite homes. The research was sponsored by Statens Råd för byggnadsforskning, now known as Byggforskningsrådet.

Karlstads Kommun - Stadsbyggnadskontoret (city building office) produced, an eight page brochure, *Bostadsområdet Tuggelite, - en presentation* (author, Gunnar Sewén), and a 10 minute video, in cooperation with Tuggelite residents. The brochure is a concise overview. The video can be loaned from the city of Karlstad, tel. 054- 15 69 20.

Newspaper articles on Tuggelite contain little that is not already covered in the above resources.

Tuggelite - Overview

Planning start:	Fall 1981	Number of Households:	16 households, circa 65 people
Move in date:	Fall 1984	Size of homes:	4 at 96m2 - single story
Location:	Skåre		12 at 120m2 - two stories, some later additions made
	8 km NW of Karlstad	Type of ownership:	home-owner's association
Project initiators:	future residents	Project developers:	residents
Number of Households:	50		
Project leader:	Lars Nilsson	Builder:	Pltzer Bygg AB general contractor
Architect:	Hans Gronlund, Helena Westhol	Building cost:	SEK 5,370 SEK per m2 at 1985 of EFEM arkitecktkontorprices
Landscape architect:			residents
S I T E			
Location:	walking or short biking distance to schools, childcare, stores, and the woods		
Transportation:	bus line to the center of Karlstad twice an hour, 25 minute bike ride to center		
Design:	total area of site is 1205m2 five groups of houses encircling common house house placement to maximise sun exposure, minimize wind exposure asphalt pathways no automobile access except for emergencies parking garages on edge of site, plus space for guest parking play areas - two playground areas, one ball field, TV room in common house		
Landscaping:	some trees, many flower beds, stunted growth due to clay soils		
Gardens:	small individual lots and large shared lot		
food storage:	four earth cellars, not well used due to insufficient insulation and ventilation pantry - cellar in home used for food storage		
compost:	multiple compost bins for organics from food, yard, and bathroom		
Common house:	324 m2, similar in design to houses with large green house, 120m2 of solar panels laundry room used by all residents, large kitchen, meeting room, sauna, loft with weaving stools and television, photography studio, and a ping pong table Childcare - city rented space during daytime for day care		
other structures:	Adjoining common house - central furnace, recycling/trash room, mailboxes, woodworking shop		
House exterior:	traditional style: copper red wash on wooden siding with white boarders red tile roof large awnings shade house from summer sun one greenhouse per household on south side		

TUGGELITE - Overview continued

I N T E R I O R	
General:	houses designed on passive solar principles
Floor plan:	some individual variation between houses - bedrooms & entry on north side, kitchen & livingroom facing south, greenhouse on south side, unheated front vestibule, bathrooms by front entry directly over one another in 2 floor plan
Foundation:	concrete slab foundation on gravel, insulated underneath with polystyrene plastic, extended polystyrene skirt around foundation, mildew and mold problems avoided by well insulated slab and underlying drainage
Frame:	bearing interior frame of cement for passive solar heat storage, double outer wall of to ensure windtight construction - outer wooden boards bear the facade, inner frame of steel, with mineral wool between the two, the two frames do not touch
Insulation:	mineral wool: walls - 36 cm (*U-value 0.12 W/m2 C*), roof - 56 cm (U-value 0.08 W/m2 C), foundation 14 cm (U-value 0.12 W/m2 C)
Floors:	parquet or linolieum
Walls:	drywall [[[paint]]]
Woodwork:	window sills - laquered pine, doors - oiled or painted pine
Windows:	triple glazed windows (2 + 1), double glazed doors, minimal window area on north side, northern windows have additional low-emissive coating, reflective venetian blinds to reduce heat loss
Glass rooms:	wooden frame, double glazed glass, acrylic roof with air chanels, ventilation originally manual some changed to automatic
Kitchen:	different plans, most open to living room, recycling space under sink, energy efficient appliances
S Y S T E M S	
Heating:	district heat: central wood pellet furnace (100 kw), with oil back-up (60 kw), 120 m2 solar panels, attached to two accumulator tanks (total 20 m3) [original furnace required hand feeding replaced with automatic feeding and more efficient burning furnace]
Ventilation:	original system without air canals, summer intake on northern side, othertimes through greenhouse to be prewarmed, air circulated via fans mounted in walls and floors, problems with noise, experimentation being done for best remedy
Water:	tap water from city water saving attachment on shower
grey water:	collects in two chambered settling tank, one for every two houses, water used in garden and greenhouses, excess runs to city sewage, a high water table precluded soil infiltration
black water:	no black water - composting toilets, Snurredass
Electricity:	energy efficient lights and appliances
Trash/Recycling:	standard under the sink storage, centrally located recycling next to common house

Fig. 5 - Inside the sun poarch

Fig. 6 - Small windows on North side [Bokalders 1995]

Fig. 7

Move in date:	**winter 1987**
Location:	**Dalby** **10 km SE of Lund**
Project initiators:	**future residents**
Size:	**50 households**

SOLBYN

You have to watch your step when you enter the common house in Solbyn. The entry is overflowing with dozens of small boots and jackets belonging to children in the parent cooperative daycare. The large, central meeting room was welcoming with sunlight streaming in onto the yellow walls, the warm wood tones of the floor, and the brightly colored bassinets. The children were romping about the playground out back, while the chef for the daycare was cleaning up the large kitchen after serving a lacto-vegetarian lunch. The common house at the "sun village," Solbyn, is always bustling with activity. The sign up sheets for the shared sauna and laundry room, are full. You must plan ahead if you intend to reserve a bed in the visitors' guestroom.

Twice a year the residents have a big party in the common house, after a hard day of planting, cleaning, painting and doing repairs around the site. Our guide, for a group of about 15 international students, explained the philosophy behind the party as follows, "*At first we tried to pressure people to behave this way or that way, do this or that, then we realized it was easier, and much more important, to have fun. We have a lots of fun*." She should know. She has been active since the very beginning, when a vegetarian cooking group, in 1979, decided to take their aspirations a step further. Although their first planning priority was the natural environment, the social benefits are now considered the best part of Solbyn. Seventy-three percent of respondents to a survey, conducted by Karin Palm Lindén, when asked what is best about Solbyn, cited social factors.

Solbyn is the largest ecovillage, with 50 households and about 130 people. My first view, from the bus stop, was of the parking lot and car port. A wooden sign stated "Solbyn" (sol - byn means the sun village). The parking lot is a prime site for impromptu meetings with the neighbors, ironic as it may seem for an ecovillage bent on decreasing energy consumption. The parking lot is the only entrance and exit, making it a natural meeting point for those on their way to take the bus, bicycle, drive, or drop off their trash and recyclables. The gravel pathways promptly lead between beige brick and black wood sided houses, past flower beds, tricycles and bicycles, past the copper red common house with bell tower, past the gardens and new hen house, and all the way back to a new playing field prepared by the residents to accommodate the growing number of pre-teen children. The houses are huddled together to leave room on the site for gardening, about 80 m2 per family. Residents who do not care for gardening can loan their plot to a neighbor and buy or trade for their fresh,

organic, produce later that summer. Fruit trees, nut trees and herbs were planted around the site, along with 50 centrally located, black current bushes; one for every household.

Solbyn - Getting There

In 1979, a vegetarian cooking club set their sights on creating a sun village where the "community is built upon a positive attitude towards life and spiritual matters, towards nature and animals and thereby environmental protection, towards energy conservation and renewable energy, towards a vegetarian and resource conserving lifestyle and care for each other" (Persson and Karsten 3).

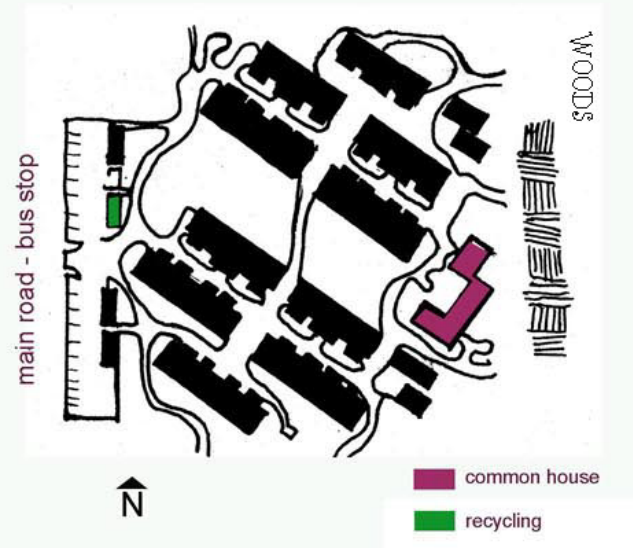


Fig. 8 - Site Diagram

Unlike Tuggelite, where several members had experience in building and planning, members of the fledgling Solbyn association were not fluent in the jargon of bureaucrats, architects and engineers. This problem besieged them throughout. A lot of information was lost or misconstrued in the translation between parties. Members soon got a crash course in the politics of building development. The members knew what they wanted even if they did not yet have a detailed picture in mind. A "general idea" proved insufficient. When they approached the planning commission with their ideas they were patted on the back and sent on their way. Fortunately, politicians on the planning commission saw promise in the idea and urged further discussions. The association could go no further with their project until the planning commission approved their plan for a specific site, but the planning commission was not eager to accept their first proposal. A planning official explained, "the Solbyn project, in 1979, was not well thought-out. The planning commission has therefore, had several meetings with Solbyn association representatives and more recently with architect, Krister Wiberg and HSB. A significant amount of work had to be done to give the project a realistic design" (Persson and Karsten 6)

After the initial setback, the Solbyn association sought the advice of Krister Wiberg, an architect with experience in solar design. Wiberg was a strong supporter throughout the process and has gone on to design numerous other ecological projects. However, the support of an architect was not sufficient. The group was urged to work with an established developer, if they hoped to finance and carry out their ideas. Some members had contacts with the housing developer, HSB (see below). These contacts helped the group to sell the idea to HSB and secure HSB's commitment to the project. Four years and many meetings later, in June of 1983, a site for Solbyn was added to the city's master plan. The site did not have all the qualities they had hoped for. It was too small to accommodate the associations ideas for, office spaces, an assisted-living center (*hälsohem*) and a small store. The houses would have to be crowded to allow space for gardens and the common house. However, the location does have a

clear southwest exposure which facilitates passive solar heating.

HSB: "Hyresgästernas Spar och Byggnadskassa" or the "Tenants´ Saving and Building Association." HSB is a Swedish cooperative housing association founded in 1923. HSB provides assistance in building, financing and managing housing units. Today, HSB manages about 20% of the housing stock in Sweden. HSB has multiple regional branches. Actions described as being done by HSB in this text refer to actions by branch officials. Three different HSB branches have been involved in three ecovillage projects.

The next step by the Solbyn association was to prepare detailed plans to be passed onto the builder. HSB, as developer, and chief financial backer, was in a position to control all decisions. All consultants, except for the architect and landscape architect, were contracted by HSB. HSB specializes in working with residents after they move in, not in working with future residents, in the planning process. Some members of the Solbyn association felt HSB was acting more as an adversary than as a supporter. This view probably reflects the results of later negotiations with the contractor. Fortunately, most of the association's ideas were retained in this stage, due to architect Krister Wiberg's role as translator and as a representative of the resident's interests. The one disappointment, at this stage, was the waste water system. The association had wanted to treat their gray water (water from the shower, laundry and kitchen) on-site, but it was cost prohibitive.

The problems began in earnest when bids for a builder were sent out. The bids for construction were very high. Many cuts were made in order to reduce the cost. Most of the cuts consisted of small substitutions of inexpensive materials for more expensive, but more environmentally sound materials, such as laminate floor instead of ceramic tiles. Two cost cutting measures were particularly damaging to the function of the passive solar principles (active solar was ruled out early due to the high expense). First, the double pane glass with a low emissive coating in the glassed-in porch was changed to single pane glass. Second, the houses were planned to be built on a series of terraces with a total of six meters height difference between the highest and lowest terrace. The descending height of the houses would allow light to shine on both floors of the glassed-in porches in all seasons. The builders, to save money, leveled the site,[1] which caused the closely placed buildings to shade one another most of the winter, when sunlight is most desired. These two cost cuts, which may have seemed insignificant to the builders at the time, have had significant impact on the residents' daily life. Without the terraces, the houses seem crowded. The first floor is dark in late fall, winter and early spring, precisely when people are craving more light and most in need of the passive solar heat. The single pane glass in the terrace, dramatically reduces the length of time it

Fig. 9 - Inside sunroom

Fig. 10 - Current bushes (one per household) and the red commonhouse

can be used during the year. Some residents have installed unattractive reflective curtains to help even out the temperature, others gave up on using their porch for growing plants, and instead use it for extra storage. The problems Solbyn encountered were not the last of such problems for ecovillage hopefuls. For decades, builders and developers have designed houses without accountability to the future homeowner's quality of life in the home. The building contractor showed little, if any, concern with advancing environmental protection or other ideals. The builder did a job, no more, no less.

Not everyone was willing to weather the long wait, costs, and disappointments of building an ecovillage. Seven households persevered through the whole 10 years of planning. Most of the others, circa 70%, joined the group in the last few years of planning, between 1985-88. Thirteen of the households, circa 30%, felt they had participated a great deal in the planning process (Karsten 40).

Solbyn - Location

Solbyn is located in Dalby, a small town located in southern Sweden, mid-way between, Malmö (30km) and Lund (20km). Malmö is Sweden's second largest city, population 260,000. Ferries travel from Malmö to Copenhagen, Denmark several times an hour. Lund is a university town, population 80,000. A bus line runs from Lund to Malmö (and Malmö to Lund) twice an hour. The center of Dalby is just a few blocks west of Solbyn. The closest grocery store is about a 15 minute walk, a five minute bicycle ride. Other services are located in the center of Dalby. Schools for all ages are in walking or biking distance. A large recreation facility, with a track and playing fields, lies just down the hill to the south. Woods line the eastern edge of Solbyn.

Solbyn - Design

The fifty houses in Solbyn have a south-west exposure. They were built in 10 sets, in six rows, with four to six units in each set. The parking lot, carports, and the trash/recycling room are at the entrance. The commonhouse and storage sheds are located at the opposite end. Behind the commonhouse, and up a small hill, are the organic gardens, a hen house and a playing field. The gardens are bordered by woods. Two root cellars are located on a south facing hill by the gardens. Gravel pathways run between the houses.

The houses have a black wood, and yellow ochre brick, facade. The black roof and the facade are intended to absorb the sun's heat. The internal concrete framing of the houses, and extra thick insulation, help keep the houses warm in the winter and cool in the summer. The ventilation system is comprised of two fans, one in the kitchen and one in the bathroom. The bathroom door is kept closed and all other air, intake and outflow, passes through the fan over the stove. This fan is equipped with a heat exchanger. The outgoing air heats up the incoming air. The combination of concrete, insulation, and heat exchanger, save about 30% more energy than a house built to the 1980 minimum standard (13,300 kWh per year in Solbyn vs. 19,200

kWh in a comparable standard house) (Blomsterberg and Bülow-Hübe 7). The glass rooms, which line the southern facade of the houses, were not shown to contribute measurably to energy savings. Due to cost considerations, the homes are heated by electric radiators instead of a water-based solar and furnace combination. All of the houses were equipped with chimneys and about half of the units have installed a wood stove or ceramic stove for heating. The Solbyn handbook, *Vi bor i Solbyn - en hjälpreda för Solbybor*, explains how to burn the wood effectively, minimizing air pollution. Water, both tap water and sewage, are connected to the Dalby municipal system. The toilets are dry composting toilets with a composting container in the cellar. Some residents use this composting container for kitchen wastes as well. It took some time for residents to get the correct recipe for the toilet compost. This has been a source of frustration for them. The larger apartments, 3 rooms or more, have a low-flush toilet as well.

Solbyn - Social and organization

The most notable aspect of Solbyn is their success in fostering a sense of community. Solbyn, like Tuggelite, has had great success in maintaining a positive social network. It is also, always looking to improve upon the ecological aspects of the ecovillage. The commonhouse, as mentioned above, is a focal point for activities. In addition to day-to-day informal contact with neighbors while doing laundry, the residents, over the 10 years since Solbyn was built the residents have organized a cooking club, a baby club for parents at home with their children, a sauna club, a Friday coffee club, classes in crafts, dancing, yoga and more. Residents can reserve the large room in the common house for special events, and external groups can rent the space for meetings. Solbyn members often hold celebrations for major holidays, and residents can raise the Swedish flag on the flagpole in front of the commonhouse for major birthdays (i.e. 30, 50, 75 years), or other major life events. The commonhouse isn't the only meeting point. Many informal meetings occur in the entry to Solbyn, near the parking lot. Gardening has also been a good way for neighbors to exchange advice and stories. In the spring, Solbyn holds a exchange of seeds and plants.

The day care is a parent cooperative with space for 15 children. The day care is staffed by the city of Dalby. The childrens' parents participate in work groups and other administrative tasks, a few days a year. The children in the daycare live within Solbyn or in the Dalby surroundings.

Solbyn is somewhat unusual in that, as a newly built development it housed many retirees and other small households without children (Karsten 33). Only 18% of the original households had a traditional nuclear family (two parents with children). Over half of the households were singles, two-thirds of which were over 50 (Karsten 34). The number of households with children has risen over the years, from 34% to 54%, and the number of individuals over 65 has also risen from 12% to 20% (Lindén 29). This change means that there are more people home during the daytime

Fig. 11- Daycare

hours, which helps dispel the feeling of a "bedroom community." However, the increasing number of older residents, whose mobility is decreasing, raises questions about the accommodation of their changing needs.

Solbyn is managed by the residents for the residents. An open meeting is held every month to discuss concerns. The attendance at meetings is low, unless a particular topic of interest is being addressed. The Board, all residents themselves, hopes to introduce themes to the meetings to increase interest and attendance. Sometimes as few as three people, in addition to the Board, show up. The Board is left to make decisions on their own, which has the effect of creating an "us vs. them" attitude, which is not conducive to democracy or harmony in the group at large. It is hoped that increasing attendance at meetings, and increasing the participation in workgroups and decision-making will help recapture the sense of solidarity in the group. Residents can chose with discretion which of the 19 workgroups in which they wish to participate. The work groups are currently in the process of being reorganized to insure a better distribution of tasks.

Each of the ten groups of houses is in charge of the outdoor maintenance of their immediate area. Maintenance tasks include mowing, repairing roof tiles, and other chores. Twice a year, everyone participates in a big clean up day, and congratulates each other at the end of the day on a job well done. A big meal and party then follows.

Information exchange is an important part of the successful function of Solbyn. A newsletter, the *Solby Bladet*, founded in 1988, is distributed once a month. It contains information about upcoming events, tips, recommendations, recipes, a summary of decisions effecting the group, skills for trade or sale, reminders about recycling; birth, birthday and party announcements, work groups, work days, tasks to be completed, and much more. Solbyn has also developed a handbook for residents, *Vi bor i Solbyn - en hjälpreda för Solbybor*. It is very comprehensive and includes such items as tips on disposing of your wood ash; whom to see when you get locked out of your house, and tasty vegetarian recipes. The handbook is a good reference for old and new residents alike.

Solbyn has also made great efforts to inform and engage others outside of their neighborhood. To increase awareness and acceptance of Solbyn by surrounding locals, the residents have several times held "Solby Day." Activities included guided tours of the houses, common house and root cellars in Solbyn; a yard sale, a café; a candle, art and photo sale. In addition, the Solby orchestra provides music. Tours of Solbyn are given frequently throughout the year. The information workgroup and other volunteers have over the years, led literally hundreds of tours.

Solbyn - Resources

Solbyn is well documented, particularly from the social perspective. The project has received a good deal of media coverage. The information workgroup is responsible for collecting documents, news clips, and other coverage of Solbyn. In addition, there are several reports written by academics, ten years of the newsletter Solbybladet, and *Vi bor i Solbyn - en hjälpreda för Solbybor*, the handbook for Solbyn residents. Copies of the Solbybladet and handbook are available for viewing, but are not offered to the general public because the group at some point would like to compile and publish these resources.

Solbyn före inflyttningen: Tillkomst, inflyttning och befolkning is the first of a two part study of the collective organization and responsibilities of Solbyn residents. It was written by Bengt Persson and Eva Karsten and sponsored by Statens Råd för byggnadsforskning and Lund Tekniska Högskola. In this study future residents were interviewed prior to occupancy. The report gives an in-depth description of the Solbyn planning process and the residents' goals, disappointments and successes. This study is an excellent resource for others' involved in planning similar projects. It contains many examples of the planning process which reveal helpful hints.

Ekologi och Vardagsliv: En studie av två ekobyar by Karin Palm Lindén is the follow-up study to the above work by Persson and Karsten. The report looks at two ecovillages, Solbyn and Myrstacken. "The main theme of the report is how living in an ecovillage influences the inhabitant's everyday lives." In other words this study focuses on the resident's experience and the effect of design on behavior.

Solbyn i Dalby: utvärdering av en energisnål raduslägenhet med glasrum by Helena Bülow-Hübe and Åke Blomsterberg, presents the results and recommendations from their two year study of the energy use and indoor air climate in one row of apartments in Solbyn. They proves that a heat exchanger and extra insulation have contributed to energy savings for residents. The study was sponsored by Statens Råd för byggnadsforskning and Lund Tekniska Högskola.

Ekologiskt Byggande: En studie av tre ekobyar i HSB:s regi by Hans Bergström provides a technical description of all the facets of the ecovillages HSB has helped develop; Solbyn, Myrstacken and Understenshöjden.

Solbyn - Overview

Planning start:	Spring 1979	Number of Households:	50 households, circa 130 people
Move in date:	Winter 1987	Size of homes:	20 at 63m2, 2 room + 8.5 m2 terrace
Location:	Dalby		10 at 74m2, 3 room + 11m2 terrace
	10 km SE of Lund		10 at 92m2, 4 room + 11m2 terrace
Project initiators:	future residents		10 at 116m2, 5 room + 11m2 terrace
Project leader:	Lars Olderius, HSB	Type of ownership:	home owner's association
Architect:	Krister Wiberg	Project developers:	HSB
Landscape architect:	Bengt Persson	Builder:	Kullenbergbyggen, steered total contractor
		Building cost:	10,600 SEK/m2 at 1988 prices

S I T E	
Location:	medium walk or short bike to Dalby center (population 6,500), stores and schools and other services - most commute to Lund or Malmo for work daycare on site, woods right next to site for hiking/walking, athletic facilities around corner
Transportation:	bus route - every half hour - 25 minute bus ride to Lund, 35 to Malmo, 35 - 50 minute bike ride to Lund
Design:	18, 040 m2, 6,380 m2 of which is gardening space 10 groups of two story houses with 4-6 apartments in each houses with souhwest orientaion to utilize passive solar principles parking and car ports on street side, common house and gardens on far side from entrance automobile free gravel pathways play areas - playground behind common house, ball field behind gardens, music room in commonhouse
Landscaping:	all original plants were edible or otherwise 'useful' (t.ex for fruit, berries, herbs, textile dyes), flowers and other ornamentals since planted homes terrassed, space with 50 black currant bushes - one for each household - as central green space consideration of plants in regulating the micro-climate, such as wind breaks
Gardens:	each household has a plot - sizes vary according to apartment size, t.ex. 2 room = 69m2, 5 room = 96 m2, day care has plot too. Common plot for perennials and spice plants. plots are each household's responsibility - can loan plot to another household in one year intervals No chemicals - every spring common supply of manure purchased separate compost heaps for household, toilet, and yard waste - some compost kitchen waste with toilet compost, others have individual outdoor compost which they later add to the shared heap four fiberglass root cellars
Common house:	253 m2 - ca 5 m2 per household, single story, similar materials to those in other houses laundry room used by all residents, large kitchen, meeting room, sound proof music room, library, guest room, weaving loom, and photography dark room day care in common house
other structures:	additional spaces include a garage/storage space for shared machinery, shed for wood, bikes and extra storage for apartments

House exterior:	brick and wood facade - lower 1/2 beige bricks, upper half black stained pine siding black roofing tiles made of cement one and two story glassrooms on southern facades
I N T E R I O R	
General:	houses designed on passive solar principles
Floor plan:	variation between different sizes, generally bedrooms on north side, kitchen and living room on south side by glass room, small apartments have shared entry, foyer in units with single entry have inner and outer door, 10 units have second floor entry
Foundation:	reinforced concrete slab on 20 cm ground insulation (Sundolitt) over 15 cm drainage layer of macadam, and 60 cm skirt around foundation (U-value 0.13 W/m2 C)
Frame:	bearing concrete frame for storage capacity of solar heat
Insulation:	outer walls - 28.5 cm Rockwool mineral wool *(U-value 0.14 W/m2 C*), 26 cm cellplast over concrete frame, attic - 50 cm Rockwool mineral wool (U-value 0.11 W/m2 C)
Floors:	oak laminate in living room/kitchen, linoleum in bedrooms, plastic mat in bathroom and clinkers lining bathtub/shower and sink
Walls:	interior concrete heart wall for storage capacity of solar heat, interior walls wood frame and drywall, dividing walls - concrete, outer walls have plasitc diffusion layer, walls are painted or wallpapered
Woodwork:	stairs and railings laquered pine, baseboards pained with latex paint
Windows:	less and smaller windows on north side, 2+1 glazing - innermost glazing is low emissive glass (U-value 1.6 W/m2 C), painted wooden frames
Glass rooms:	aluminum framed single glass with concrete floor and wooden planters
Kitchen:	cabinets painted with enamel, white plastic laminate countertops, larger units have pantry in addition to refridgerator/freezer
S Y S T E M S	
Heating:	electric radiators and water heaters, some heat stored in concrete walls, a portion of members have bought shares in wind turbines to offset impact of electricity consumption from non-renewable sources, over 1/2 of units have ceramic stoves
Ventilation:	all intake and outtake through fan over stove with cross stream a heat exchanger - manual or automatic control, bathroom has separate fan - intake from within house, out through attic
Water:	municipal tap water, had drilled a 130 m well but were required by city to use municipal supplies instead shared storage of rain water watering
gray water:	connected to municipal sewage
black water:	composting toilets (Snurredassen and Lindens Multrum), in units with two toilets - second toilet is a low-flush water toilet (Gustavsberg) connected to municipal sewage
Electricity:	standard, households have separate meters
Trash/Recycling:	standard under the sink container for recyclables, municipal recycling pre-sorted at site - containers by parking area

Fig. 12

Move in date:	**summer 1990**
Location:	**8 km NE of Västerås**
Project initiators:	**developer**
Size:	**28 households**

ÅKESTA

Five kids were racing around the backyard when a neighbor came by in search of the hand lawn mower. The hand mower my family had when I was growing up took all my might to push. I skeptically inquired about the mower's efficiency. "It works great," she says, "and my ears don't ring for two hours afterwards, like they do with a gas mower." Each household is responsible for its own lawn. The association voted to leave some of the shared space uncut for meadow plants and divided up the responsibility for the rest.

I had heard all types of stories about Åkesta before I arrived, most of them negative or skeptical. I was glad to find the rumors untrue. Åkesta did have a very rough start, but the residents have turned that around. The initiative to build Åkesta was taken in by a developer 1986. The project was supposed to be complete for the 1990 building fair being held in the city of Västerås. The developer initially sought out a group of interested persons to participate in the planning and received over 200 inquiries. An excited architect, full of ideas, was hired. The trouble, however, started when the developer realized they did not have time to incorporate the architect's or future residents' novel ideas. The first architect's sketches were replaced by slightly modified blueprints from a previous project. Costs spiraled and the future residents felt excluded from the entire process. Finances were shaky in the first few years after building. The home owners association considered declaring bankruptcy and several families had to move. Eight years later, the residents have the upper hand. They have made a success out of what appeared to be a catastrophe. They have taken the initiative to try new techniques and formed a positive social network. One of the duplexes has been converted to a parent cooperative daycare. When I was wandering about with only a name and no house number to the man I was to meet I had no trouble getting directions from a woman who was out weeding her flowerbed.

Åkesta - Getting There

The president (VD) the development company, Riksbyggen, Ulf Karlsson, saw ecovillages as the new trend in building. "We must meet the growing interest for this type of living. Today there are just a few ecovillages in Sweden, but I am convinced that will have twenty or more within five years. . . We want to be a part of developing housing which is kind to nature." [1] Karlsson wanted to be ahead of the game. The importance of the resident's taking responsibility for maintenance was not lost on him, "The heating and ventilation systems should be simple. It all builds on the idea that the residents are active and their own caretakers,"[2] said the Ulf Karlsson. However, the value

of resident participation in the planning process was unfortunately subjugated to the need to finish the houses for the building fair.

What happened to the future residents in all this? "*Nothing was as we planned. . . We were run over towards the end by the building company. They were focused on the prestige of it all. The project was to be finished for the building fair and all of it was pushed through."* But, notes another resident, "*Who knows when or if the ecovillage would have been finished if it hadn't been for the exhibition."*

To Riksbyggen's defense, their idea was not immediately embraced by municipal officials causing unexpected delays. Only after the Social Democrats stated in their support of the ecovillages in their election campaign did the city gave the go ahead on the program in the fall of 1988. That left precious little time to design and build the project. The average time, from idea to move in, for a housing development is about five years, and that is without resident participation. Only half of the houses were finished in time for the June 1990 exhibition. The residents were left to deal with the consequences of the rushed job. The most dire consequence was inflated costs. The home owner's association considered declaring bankruptcy. Several families could no longer afford to move in at the increased price. Some houses stood empty for some time and the association had to pick up the slack. Every single survey I received from Åkesta mentioned the financial difficulties. Only a handful of the surveys from other sites mentioned financial woes. The experience is best summed up by this resident, "*It was hard in the beginning, we were duped by the building company. Now, after eight years, it has all fallen into place. We are happy here."*

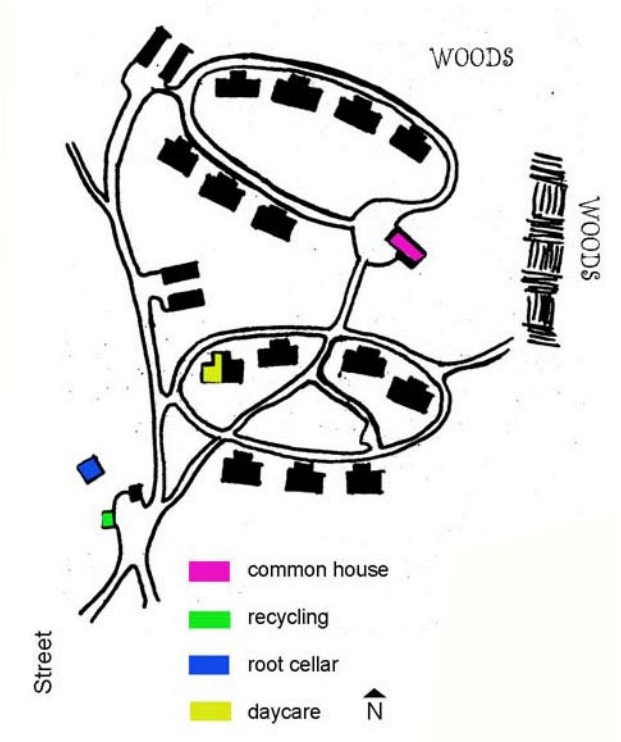


Fig. 13 - Site diagram

Åkesta- Location

Åkesta is prized by many residents for being *"in the country, but close to the city."* It is a twenty minute bus ride north west of the center of Västerås. Västerås is a mid-sized city, population 120,000, in central Sweden. Arial photos show Åkesta surrounded by woods and farmlands, but it is not as isolated as it first seemed to me. Åkesta is just three kilometers from the center of the nearest suburb, Rönnby, where basic services, a grocery store, post office, are located. Not close enough to walk, but close enough to bike. A bus line runs every fifteen minutes during the week, but only once every hour, or every second hour on weekends and evenings. A bike path runs parallel to the road to Västerås. Several residents bicycle to work, some take the bus, but the predominant form of transportation is the private automobile. The location has its advantages.

It fosters communication between neighbors. Since residents do not have a corner store where they can run for a liter of milk, they borrow from each other and get to know one another better. The woods on the north edge of the site are a common destination for walks on beautiful days.

Åkesta - Design

The appearance of Åkesta bears shades of Tuggelite, which is not surprising. Riksbyggen paid a visit to Tuggelite which appears to have had quite a formative impact on the consequent design of Åkesta. The 14 duplexes are traditional, red with white trim. The houses are sited around two wide oval paths, the entrances are on the north side, and glassed in verandahs grace the south side. The houses are attractive with little touches such as: a corner windows and an outside door on the green house. Inside, the livingroom has high ceilings (two story) with high windows through which the sun shines in the winter and reflects off the opposite white wall down into the living room, without creating a glare. The awnings are just long enough to keep out the summer sun when it is high in the horizon. The open spiral staircase is made of pine and the kitchen wall is made of red brick. The red brick wall gives a warm, slightly rustic feel to the room and also stores solar heat which shines through the abundance of windows. I did not see many plants growing in the glassed-in verandahs, but I did see a lot of tables and chairs indicating the space is used as an extra room. The glass room has the advantage of having a door to the exterior which supports informal visiting between neighbors. The houses are heated by an electric, forced air system. However, many families heat with the compact, but powerful, wood stove in the kitchen. Some families have installed an additional hot water accumulator and hot water radiators to maximize the benefit of the wood stove. Half of the survey respondents made disparaging comments about the heating and sewage systems. The bathrooms have two separate toilets, one for urine and one for feces and the gray water leads, after a settling tank, to a soil infiltration bed. Comments about the toilets did not have to do with the dual system, but rather with maintenance - hard to clean, awkward to empty. The residents, especially the children, had little trouble getting used to the dual toilet set-up. The next evolution in toilets was to have one toilet that separated urine and feces. The evolution of alternative toilet systems is discussed in Part II, Design. Each household has it own garage, but some use the garage for storage and park their car by their homes. One gentleman has a part-time business selling environmental products - from compost holders to environmentally friendly cleaning supplies. His business is housed in an old timber building near the entrance. He sells to neighbors and outside of Åkesta as well. The old timber house provides better facilities than the common house may, at some point, be used for crafts.

Fig. 14 - Entrance to houses

Åkesta - Social

Residents surveyed sited concern for children's happiness and safety was listed as often as the

Fig. 15 - Natural wood features

environment when asked what their primary reasons were for moving to Åkesta. In a way, Åkesta, is like one large playground with expansive meadows, wide paths for bicycling, and acres of woods with wide paths. One of the duplexes is used for a parent cooperative daycare. The common house is small and doesn't see the traffic that those in Solbyn or Tuggelite, in part because everyone has their own laundry machines and the daycare is in another building. Like the other ecovillages, Åkesta holds regular meetings and maintenance responsibilities are divided among workgroups.

I had a very positive experience at Åkesta. Although I had had trouble getting an initial appointment, once I was there I was referred from one household to the next, and even invited to join in a mother's day celebration with a delicious cake made with hand-picked berries. Åkesta has received some flack, even called a "mess," and a "failure" and perhaps it did seem that way for a while at the beginning, even to those who lived there. Some were so disappointed that they chose not to remain. But the residents have made the difference. They have made it work. They have pushed to keep native meadow flowers growing instead of mowing, and fixed the glitches in the sewage system, among other things. Åkesta is a good example of how important the people, and not the packaging, are to making an ecovillage.

Åkesta - Resources

There is no information published for the general public specifically about Åkesta, aside from a few newspaper articles. The Åkesta home-owners association printed a beautiful promotional brochure for the purpose of attracting new residents. The brochure contains just a brief technical and organizational overview. The bulk of the information I gathered was printed by the developer and builder themselves. Riksbyggen, the developer printed more brochures than BPA, the builder. This material was obtained the personal files of architect, Varis Bokalders.

"Mångfalden gav splittrat intryck," *Energi och Miljö*, July/ August 1990. Pages 21, 21.

Kubu, Mert, "Ekologiskt boende ända in på toa," *Dagens Nyheter*. June 1, 1990.z

ÅKESTA - Overview

Planning start:	fall 1986	Number of Households:	28 households, circa 80 people
Move in date:	summer 1990	Size of homes:	14 at 114m2, 3 room
Location:	3 km N of Ronneby		14 at 125.5 m2, 4 room
	8 km NE of Vasteras	Type of ownership:	home owner's association
Project initiators:	developer	Project developers:	Riksbyggen
Project leader:	Leif Johansson, Riksbyggen	Builder:	BPA-Bygg AB, total contractor
Architect:	Rein Wirma, Sune Lindqvist	Building cost:	47 million SEK
Landscape architect:			Lars-Ove Safstrom

SITE	
Location:	daycare on site, site surrounded by woods and agricultural land, 3 km to nearest store
Transportation:	short walk to bus stop, bus runs every 15 minutes during peak hours, as little as once every 1 1/2 hours on weekends, safe bicycling route to center takes about 30 minutes safe bicycling route to center takes about 30 minutes
Design:	total area of site is x m2, gardening space on west side and woods across north edge of site 14 duplexes arranged in two wide ovals, parking and garages on edge of site trash, recycling, supply store, and root cellar located at southwestern corner of site small common house located towards northeast side gravel pathways in two wide loops two formal play areas and lots of open green space
Landscaping:	a few trees, mostly bushes and open green space, with individualized flower beds builders disturbed as few existing trees as possible, land formally used for grazing
Gardens:	200m2 garden plot for each family
animals:	extra space alloted for animal grazing and fruit trees - not yet implemented
food storage:	root cellar by entrance to site small cellar space in home could be used for cool storage
compost:	individual compost bins for kitchen waste near house, yard waste composted in garden area
Common house:	small single story common house built in style similar to duplexes contains a sauna, extra capacity washer, and meetingroom other common space: one duplex converted into a parent cooperative daycare, existing timber house now used for a small business, eventually may be used for crafts, weaving, etc.
House exterior:	traditional style: cooper red wash on wooden siding with white boarders red tile roof large awnings shade house from summer sun one greenhouse per household on south side
INTERIOR	
General:	houses designed on passive solar principles
Floor plan:	two story duplex - living room (livingroom open to second story), kitchen and glassroom on southern side - bedrooms, bathrooms, main entry, laundry/storage on north side
Foundation:	concrete slab

Frame:	wood frame
Insulation:	mineral wool with a diffusion layer of plastic - attic = 30.5 cm (*U-value 0.13 W/m2 C*), walls 24.5 (U-value 0.16 W/m2 C)
Floors:	clinkers in kitchen, laundry, and entry - birch parquet in bedrooms and livingroom - plastic mat in bathroom - linoleum in storage/workroom
Walls:	heart wall of brick - other walls wallpapered or painted - ceramic tiles on bathroom walls - ceilings white painted wood panels
Woodwork:	laquered or soaped or painted pine - ceilings soaped or white painted wood panels
Windows:	double glazed
Glass rooms:	double glazed, woodframe, door opens to back yard
Kitchen:	standard, recycling space under sink
S Y S T E M S	
Heating:	forced air electric furnace - wood burning stove in kitchen connected to 300 L hot water accumulator tank, one resident added solar panels other residents have expanded size of accumulator tank
Ventilation:	heat exchanger over stove, intake via glass room and springventilators under windows
Water:	own tap water from a 70 m well
grey water:	on-site settling tank to soil infiltration bed to constructed stream bed to natural stream
black water:	two separte toilets, one for urine the other for feces, second floor toilet only for urine - feces composted (Snurredass and Wolgast), urine collected in tanks emptied by local farmer
Electricity:	standard
Trash/Recycling:	open containers for trash and recycling under a carport near entrance to site

Fig. 16

Move in date:	**winter 1991**
Location:	**4 km SW of Bergsjo60 km S of Sundsvall**
Project initiators:	**future residents**
Size:	**5 households**

BÅLARNA

The gravel road went deeper and deeper into the woods. I began to wonder if we had made a wrong turn, but soon we turned the corner to reveal the most charming red houses with decorative white trim perching on the edge of a wide vista of rolling hills and peaceful lake. The field between the lake and the houses was a lush green. The green spilled over into peoples' yards which were filled black current bushes, herbs and vegetables, and flowers. Cords and cords of wood were stacked between the entrance and the carports. Across from the carport were several horse stalls, bee hives, and a hen house. Bålarna has five households and nineteen people who live in two duplexes and a single house all in a row with a view of the lake from the breakfast table. The families knew each other years before becoming neighbors and still appear to be very happy after eight more years together. "*It is hard to imagine a better home,*" says a resident. "*Here will I live and here I will die,*" (Lanne - 7/94) says another.

I almost didn't make it to Bålarna because it presented a distinct public transportation challenge. Although a distance on foot, it makes a manageable bike ride to town. I sheepishly admit that I received a ride in an automobile, but it was well worth the sacrifice.

Bålarna - Getting There

The group of friends had been talking about living together for years. The Chernobyl nuclear accident was the final straw to convince the group to commit to living according to ecological principles. The group had chosen a site and begun to design their houses but they just could not get the necessary financing. The group was ready to throw in the towel when Leif Stegenius, president (VD??) for Stiftelsen Nordanstigs Bostäder[4] the municipal building association, read about the group's idea in the local paper and stepped in to offer assistance with financing and finding a good builder. Leif Stegenius helped secure the bid from Skansa, a major Swedish building company. Skansa was interested testing the waters of ecological building on a small scale before committing to larger projects. Bålarna was a good candidate. Bålarna's motto has become - "Nothing is impossible - some things just take a little longer."

I was eager to visit Bålarna, even though it does not quite fit in with the size and social organization of the other ecovillages, because of the very positive feelings expressed about their planning process. All of the participants were exceptionally accommodating; the developer, the builder, the residents, and the municipality. The residents had a real opportunity to be involved and influence every stage of the planning process. The residents have been and still are active members of the

nearby Bergsjö community. Their idea received support from local officials who personally knew the residents and could trust that they would be responsible and committed to the ecovillage project. Municipal support helped to smoothly expedite the approval of zoning codes, such as approval of on site waste water treatment. The developer and builder were notably more open to communication and learning from all the actors than in any other ecovillage. The developer's, Leif Stegenius', attitude was, "*You can't just sit down and plan an ecovillage yourself. There must be a group of people who are interested when you begin,*[5] *which is the opposite of what we normally do."*[6] Neither residents, developer, nor builder had much experience with building "green." Skansen, made some initial attempts to muscle in their experience, but soon conceded to the importance of trying new ecological building techniques. Skansen even hired outside consultants which is unusual for them. The residents did their homework too and took field trips to look at several other ecological projects and attended a Njord conference on ecovillages in Stockholm. The resident's had an additional advantage. They had sketched very clear plans of what they wanted well before the builder and developer got involved, which left less factors open to negotiation. The results were not perfect; the paint used in the houses is not environmentally friendly, some cabinetry had particle board with formaldehyde, there are no green houses/glass verandahs, and the toilet system is not what they wanted, nonetheless the residents are very satisfied. "*It may not be the best quality materials but, no way would never trade it for my old house . Living here is such a time saver after that big old house that needed constant attention and repairs."*

Fig. 17 - Back faces lake and gardens

Bålarna - Location

Bålarna is distinct from other ecovillages discussed in this report due to its location. The nearest community of Bergsjö, a small town of 5,000??, in northern central Sweden. Bålarna is only four kilometers from Bersjö, but the distance seems long because the roads to Bersjö are lined with woods. Bergsjö is located midway between two cites, Sundsvall (40 km northeast), and Hudisksvall , population 15,000 (25 km southeast) has the nearest train station and other significant amenities.

Despite their remote location, total driving time for the residents has reduced dramatically since moving in. Two men, and sometimes others part-time, have the strenuous commute of 20 meters across the path to their on site computer firm. The residents share rides and help each other out with driving the children when it is too far to bicycle. Three of the families have sold their second car.

Bålarna - Design

The houses reflect the traditional design of the region, right down to the gingerbread trim on the front porch. The solar panels on the common house are the only exterior clue of something special about these homes. The two toilets, one for liquids the other for

Fig. 18 - Rear of homes

solids, in the bathroom are, however, a dead give away. The residents had hoped to a single urine separating toilet, but they were not available in the necessary time frame. Therefore you must plan you bathroom visits according to you needs. The residents are used to it now. It has become just another part of daily life. Bålarna is the only ecovillage to spread their collected urine on site. The results have been positive. The composted toilet waste is buried out in the woods. Gray water is treated on site as well, in a gravel infiltration bed. The ecovillage is self-sufficient in heat production. They chop all of the wood they need from the 48 hectars of woods collectively owned by the group. Fortunately, they do not have to run the furnace all year round, the heat for the hot water heater is furnished by 24m^2 of solar panels in the spring and summer. The group raises chickens and sheep and grows some fruits and vegetables, but they do not claim to be self-sufficient.

Bålarna - Social/organization

The residents, although longtime friends, do not see Bålarna as a collective. Each family has their own home and own style of doing things. Residents expressed no sense of isolation. The adults and children are all active in local activities such as school and politics. Two men run an on-site computer firm which entails dealings with customers on a global basis. At times other members have helped out with the business. Another man makes a living from his bee-keeping. The form of ownership in Bålarna is unique for the ecovillages. The residents own the land but rent the houses from Nordanstigs Bostäder.

The families have known each other for so long a lot of decisions are made informally. Formal meetings are held occasionally. The most time consuming maintenance task is chopping wood for heating. "*The idea of the association was that it is more fun to take care of the hard jobs when there are many people working together.*"[7] Other tasks are performed as needed without formal workgroups.

Bålarna - Resources

Published information available on Bålarna is limited. The articles I do have were acquired second hand and without complete citations.

"Bålarnas ekoby paradis för 20 personer," in *Kretslopp* magazine by Lotta Lanne (7/94, pages 16-17) is the most complete publication and citation I had.

A student from the Netherlands, Maj M. Andersen, visited Bålarna in 1994 and wrote a 16 page draft report in English, with an emphasis on the word *draft*. The resident I spoke to does not know if there is going to be a follow-up report.

Rita Selén and Anette Nybom together wrote a seven page report for their Environmental Studies class. I do not know for which school.

The technical information in both student reports is limited. The presentation of the character of the ecovillage and its residents is what is interesting. The information on the planning process came from these reports and various newspaper articles.

Fig. 19 - Wood for heating is sustainably harvested

Bålarna - Overview

Planning start:	mid 1980's	Number of Households:	5 households, 19 people
Move in date:	winter 1991	Size of homes:	160 m2
Location:			4 km SW of Bergsjo
	60 km S of Sundsvall	Type of ownership:	renter's association
Project initiators:	future residents	Project developers:	Stiftelsen Nordanstigs Bostader
Project leader:		Builder:	Skanka, total contractor
Architect:	future residents	Building cost:	10,000 SEK/m2 at 1990 prices
			consultation with Anders Nyquist
Landscape architect:			future residents

S I T E	
Location:	facing lake, surrounded by 48 hectares of forest collectively owned by residents
Transportation:	automible or 20 minute bicycle ride to town
Design:	two duplexes and single house in row, set back from entrance, back door facing lake (south side)
	open marshy field between lake and houses, surrounded on three sides by forest
	commonhouse and other structures near entrance
	gravel pathways
Landscaping:	most of existing foliage retained
	grazing area for horses
Gardens:	individual garden plots by each house
animals:	horses, sheep, hen house, bee keeping - 25 hives
compost:	central compost for yard and household waste, toilet compost buried in woods
food storage:	root cellar, pantry in each house

Common house:	computer firm, shared laundry, furnace room, trash/recycling room,
other structures:	storage rooms under carport, horse stalls, work room
House exterior:	traditional style: cooper red wash on wooden siding with white boarders red tile roof, copper sheeting on front awning
I N T E R I O R	
General:	
Floor plan:	living room, kitchen, storage on first floor - bedrooms on second floor, bathrooms by front entry, entrance on north side
Foundation:	concrete slab
Frame:	wood
Insulation:	ecofiber, airtight diffusion layer of paper
Floors:	clinkers and linoleum
Walls:	painted
Woodwork:	painted
Windows:	double glazed
Glass rooms:	none
Kitchen:	pantry, other is standard, recycling under sink
S Y S T E M S	
Heating:	district heat: central wood furnace (circa 120 m3 wood per year) - wood gathered on site, solar panels, two accumulator tanks, floor heating - no radiators
Ventilation:	thermostat regulated fans on vents on outer walls
Water:	own tap water from a well
grey water:	gray water to two-chambered settling tank and infiltration bed
black water:	two separte toilets, one for urine the other for feces, second floor toilet only for urine, entrance to compost cellar outside
	feces composted (Wolgast), buried in woods, urine collected in 10m3 shared tank -spread on site
Electricity:	standard
Trash/Recycling:	no municipal collection - recyclables transported by residents to recycling center, non-recylable combustibles incinerated in central furnace, organic waste composted barely one bag of trash per week for all five families that must be taken to landfill

Fig. 20

Move in date:	**winter 1990**
Location:	**Övertorneå100 km NE of Luleå**
Project initiators:	**municipality**
Size:	**9 households**

RUSKOLA

The ecovillage, Ruskola is unlike the other ecovillages in many ways; because of its location, its design, and its founding/establishment. The town of Övertorneå lies 20 km south of the Arctic Circle with a population of circa 2,000. On weekends only one bus a day travels from Luleå, the closest train station, 100 km to the south. When I arrived on April 24 the landscape was still blanketed in a meter of snow. The climate here is extreme. The growing season is just over three months long. For twenty-five days of that season the sun never sets. In the winter the sun does not rise for three weeks. Northern Sweden is sparsely populated. The entire municipality of Övertorneå, 2,400 square kilometers, has 6,000 inhabitants. Distances between towns are long and the weather can make those distances many times as far.

Swedish municipalities - Sweden reorganized its system of local government several times in the 20th century. Today Sweden is divided into 288 municipalities (*kommuner*). In 1931 Sweden had 2,531 municipalites. At that time the municipalities were comprised of local town and city governments. Rural inhabitants were left without representation in this system. The system was reorganized in 1971, forming 464 *kommuner*; and again in 1996, creating today's 288 *kommuner.* Today's municipalites are more like American counties. Each municipality/county is comprised of one or several towns/cites and a certain geographical area. This system streamlines government and the administration of services such as schools and medical care.

Two kilometers from the center of Övertorneå lies a cluster of nine homes surrounding around a wide oval central lawn covered with trees. Unlike the other ecovillages, where the houses are clustered close together, each of the lots here is 2500 m2, with one household per lot. The large lots are intended to allow for additions to the homes as families grow; a spare room or small cottage for a teenage son or for grandparents who want their family nearby but not under their feet. A small ice hockey rink and barn for pigs border the gravel road up to the ecovillage.

Getting there - Ruskola

Distinct from other ecovillages the development of the Ruskola ecovillage was is integral part of a larger initiative in Övertorneå to become Sweden's first ecological municipality in 1983. The municipality of Övertorneå was suffering greatly from the urbanization and high unemployment in the 1960's and 70's. Many people, especially young people, moved away from the

area. The area experienced almost a 40% drop in population, from 10,000 to 6,300 from 196? - 198?. Businesses, capital and jobs were fleeing as well. Unemployment was at 8-10%. Morale was low and the *kommun* was very concerned about its future. Övertorneå needed hope. They needed a plan.

In 1983, Övertorneå, was declared an eco-municipality. The idea of a "green" municipality was originated in Suomussalmi, Finland in 1981. A native of Övertorneå, Torbjörn Lahti, returned to his home town to help establish Sweden's first eco-municipality. Today Sweden has 60 eco-municipalities, all of which Lahti and his consulting firm, Esam Utbilding, has had a part in developing.

Övertorneå *kommun* has been successful in improving both the morale and the economy of the area through "green" planning projects such as: organically grown produce, eco-tourism, honey production, education and training to raise environmental consciousness, recycling, aquaculture, research and development on birch forests, and, of course, ecovillage Ruskola.

Eco - municipalities

Conditions for an eco-municipality:

1) strive to be **an example and a forerunner** in the the change of the society towards a sustainable
2) strive to be **more and more self-supporting** in question of goods and services
3) strive for **diversity in nature and the community** change
4) all goals **incorporate a global perspective**, since the the final objective of change is global
5) the community should be an **interactive leader**, encouraging grassroots and democratic initiatives

Six phases of development of an ecomunicipality:

1) **Initial phase** - establish interest in change
2) **Problem oriented phase** - identify problem areas society
3) **Enlightenment phase** - information gathering
4) **Experimental phase** - implement pilot programs
5) **Structural change phase** - carry out system
6) **Exporting phase** - exchange knowledge with others

More about eco-municipalities in part III, where next

In 1987, the municipal council decided to initiate plans for an ecovillage. The current site for Ruskola was chosen. Later that fall an informational meeting was held for interested citizens. Almost forty people attended the meeting. The "pioneer" group of interested members began to research and draw up plans for the project. A steering committee composed of municipal officials oversaw the "pioneer" group. Another work group consisting of architects, environmental consultants, and experts from the University of Luleå consulted on the project. This second group worked closely with the "pioneer group." A prerequisite for purchasing a lot in Ruskola is to participate in a study circle for at least sixty hours. The study circle discussed topics such as: environmental awareness, ecology, and ecological design. Five families participated in the initial study circles. The next four families participated in a second study circle.

Distinct from all of the other ecovillages, the residents in Ruskola were responsible for arranging the construction of their own homes. The houses are detached homes on large lots. The site plan was the only collective design. Some guidelines were established. The houses were to have extra insulation, a renewable heat source, and on-site waste water treatment. The houses had to be placed on the lot in such a way that the lot might be subdivided at a later date, adding a small house or office/work space. The purpose of this was

to encourage multiple generations of a family to remain in close proximity, but not necessarily in the same house.

Location - Ruskola

Ruskola, in actual distance, is very close to the center of Övertorneå, just 2 kilometers to the south. It seems further away because the land in between is not developed. All basic services are located in Övertorneå, schools, stores, post office, restaurants, and so on. It is a short walk or bicycle ride to town. The residents of Ruskola are integral members of the larger community. It is a common to run into people you know when out and about the town. Everyone I met was tremendously friendly, even in the grocery store. The chairman of the city council, Kurt Larsson, personally took me on a site-seeing tour of the municipality and the ecovillage.

Two main roads border the east and west side of Ruskola. The site is mostly wooded. An open field, part of which is used for gardening, is at eastern entrance. The children's hockey rink and area for animals are also located on this south eastern corner. Most of the houses face east towards the river. The river, Torne Älven, is the northern border between Sweden and Finland. Övertorneå overlooks the river as well. A number of Swedes and Finns commute across the river to work in the other country. The culture of this area has significant Finnish influences. Principle employment in the area is in public sector jobs (childcare, education, healthcare, administration, etc.), almost 50%. Manufacturing, agricultural and forestry jobs comprise another thirty percent of the labor force.

Övertorneå itself is about 100 kilometers from Luleå, population 70,000. Two daily overnight trains travel from Luleå to Stockholm. Luleå has the closest train station and airport to Övertorneå. The province of Norrbotten, which includes the municipality of Övertorneå, has an extensive bus system. All towns are have some type of bus service. Automobile travel is the predominant form of transportation.

Design - Ruskola

The houses in Ruskola are single detached homes. Each family chose their own design, therefore, appearances vary a good deal. All of the houses have wood panel facades and a peaked roof. The houses were built on large lots around a wide oval gravel road. The center of the oval is thinly wooded. The view from one side of the oval to the other is not blocked by the trees. Most of the houses face east towards the river. This is not merely to have a view of the river. Because of the strong northern winds and the long days and strong summer sun in the south it is best to have the north and south exposure as small as possible.

Each family chose its own design. The houses were chosen from catalogs of designs from local builders. The builders are able to make a profit by prefabricating multiple homes from predetermined plans, therefore any variation from the catalog design is very costly. It was hoped to have many more natural materials and other fine details but this proved cost prohibitive in many cases. The houses are well insulated. Each house has its own heat source, mostly from wood stoves with a back-up electric furnace. In at least two homes the massive wooden stove forms a focal point of the house. One family installed a heat pump (find correct english translation).

Seven of the houses have a sauna. A sauna is not considered a luxury in this climate. It is an aspect of the culture. Eight of the houses share three waste water treatment systems (3 houses to 1 system, 3 to 1, and 2 to 1). The toilets are low flush. All water goes to a chambered settling tank and then to a soil infiltration

bed. Cold winters and a high water table made it difficult for to find an effective solution for waste water. The system must be built deep enough into the ground to avoid freezing in the winter, but high enough to not leak directly into the water table. Residents met with Nils Nyberg, an expert in waste water treatment at the University of Luleå, to find the best solution for their waste water treatment. One family chose to install a unique system. They have a dual toilet system, one for urine and one for feces. The feces are composted and the urine is collected in a tank. The gray water travels first through a peat filter, then to a collecting tank (from here water can be taken for garden use), finally to a rock infiltration field. All families received significant communal subsidies for their waste water treatment systems.

Social and organization - Ruskola

The nine families know each other quite well. They borrow items from one another and help each other out. The residents are responsible for maintaining their homes and common spaces. Most of the adults feel collective responsibility. The group functions reasonably well. A commonhouse was neither built nor planned. Some residents have taken part in raising pigs together. Everyone pitched in to build a hockey rink.

Resources - Ruskola

Most of the literature about Ruskola was produced by Övertorneå municipality in conjunction with the development of an eco-municipality.

Kurt Larsson, chairman for the town council for the municipality of Övertorneå composed a twenty-five page description of Ruskola; *Ekobyn Ruskola: Framtidens Bostadsområde*. The booklet describes the project and the principles behind it. It includes the results of a survey of the residents assessment of the ecovillage. A smaller, eight page version was produced as a promotional brochure - published by the Övertorneå Kommun.

Övertorneå: The First Eco-Municipality in Sweden is a brochure published by Övertorneå Kommun in 1991. The brochure, available in four languages, describes the various projects initiated as a result of the establishment of Övertorneå as an eco-municipality.

The information on eco-municipalities comes from a booklet written by Esam Utbilding, *Ekokommunen: Et koncept för förändring i Agenda-21:s anda.* The booklet describes the history , composition, and importance of eco-municipalities.

Försörning, Vardag och Miljö, written by Mona Mårtensson and Ronny Pettersson, was published in 1998. This report is the first in a three part series of

Fig. 21- The snow is still deep in late March

studies on the environment and culture in the daily life of Swedish households. The study compares attitudes and habits regarding the environment in nine communities around Sweden. Ecovillage Ruskola and the ecovillage association planning Understenshöjden participated in surveys and interviews for the study. Four "control" communities were compared to five communities with an ecological or collective focus. The study was sponsored by Byggforskningsrådet och Forskningsrådsnämden and is published by the sociology department of the University of Stockholm.

Ruskola - Overview

Planning start:	fall 1987	Number of Households:	9 households, circa 30 people
Move in date:	winter 1990	Size of homes:	109 m2 to 169 m2
Location:	2 km S of Overtornea	Type of ownership:	individual ownership
	90 km NE of Lulea	Project developers:	residents
Project initiators:	municipality	Builder:	Team Boro, Hortlaxhus
Project leader:	varied		Tornedalens Byggnad AB
Architect:	builder, residents		Polar Hus AB
Landscape architect:	residents	Building cost:	6,200 SEK/m2 to 8,400 SEK m2

NOTE:	each household planned their own solutions - descriptions are general
S I T E	
Location:	located along Swedish-Finnish border, a main road from town passes site, town of Overtornea 2 km north; schools, stores, other services in Overtornea center, closest large city - Lulea (40 km), woods and river adjacent to site
Transportation:	several buses a day to other towns, limited service on weekends, bicycling a possibility, most transportation by automobile
Design:	total area circa 9.5 hectares - 3.2 ha of which is private, 6.3 ha shared each lot 2,500 m2, can only build on one half of the lot houses set back from road, located around a large oval road of gravel long side of houses face east, towards river - best orientation for climate can only build on one half of the lot hockey rink on site
Landscaping:	many existing trees retained, other landscaping by residents
Gardens:	ample gardening space just north of entrance
compost:	responsibility of individual households
food storage:	root cellar (3 houses)
Common house:	no common house some residents raising hogs collectively
other structures:	garages next to or built onto houses
House exterior:	wooden siding of various colors roofs of steel or ceramic tile

I N T E R I O R	
Floor plan:	varied, one and two story houses
Foundation:	cement slab (one insulated with cell-plastic) or crawl space
Frame:	wooden
Insulation:	mineral wool - attic 60 cm, outer walls 29-30 cm (*U-value 0.14 W/m2 C*)
Floors:	wooden flooring, plastic mat in bathrooms
Walls:	-
Woodwork:	-
Windows:	tripled glazed low emissive glass (*U-value 1.2 W/m2 C*), varies between houses
Glass rooms:	none
Kitchen:	standard
Other:	7 houses have saunas - a cultural aspect of northern Sweden
S Y S T E M S	
Heating:	wood stove, electicity back-up, one house has earth-heat pump, forced air or+B17 water circulation of heat
Ventilation:	mechanical ventilation
Water:	tap water from a well, city responsible for maintenance, houses metered individually
gray water:	8 households connected to 3 systems - 3 chambered settling tank to infiltration bed; last household - peat filter, to watering tank, to stone infiltration bed
black water:	8 households as above, one with urine and feces toilets (Wolgast), feces to compost
Electricity:	standard, a transformer station is centrally located Ruskola
Trash/Recycling:	city collection of trash and recyclables, city has had trouble establishing an effective recycling system

Fig. 22 - The internal street

Move in date:	winter 1992
Location:	Oxie7 km SE of Malmö
Project initiators:	municipality
Size:	37 households

MYRSTACKEN

I trudged over the hill from the commuter train on a rainy day. I wondered if I would ever find my way to the former site of the ancient Viking village, Torup, when I saw the row of red roofs dabbled with solar panels across a shallow valley. Inside the warm, wood heated house, my hosts and I sat sipping tea in an bay window overflowing with plants.

Entering Myrstacken seems a little like taking a step back in time. It lies adjacent to the site of a Viking village, called Torup. The houses enclose a curving central pedestrian street opening into four courtyards. The yellow ochre houses are separated from the street by a grassy terrace. All this harks back to a small country town. A former country road remains on the southern side of the site. Residents from surrounding neighborhoods often follow this road which lies between the houses and the gardens because of the expansive view it offers over surrounding the farmland edged by forests. It is hard to believe Sweden's second largest city lies just twenty minutes away by commuter train. Near the gardens is the common house, complete with laundry facilities, guest rooms, a sauna and a Ping-Pong table. Adjacent to the commonhouse is a marshy field, which attracts birds and other critters. The marsh is a component of the on-site waste water treatment system. Behind the common house the residents have built a hockey rink where several children were trying out their skills on their skates.

The idea for Myrstacken was initiated by the city council[8] in 1988. One-hundred fifty families quickly expressed their interest in the project. Many people were familiar with Solbyn, the ecovillage that lies thirty kilometers northwest. Solbyn had received a lot of publicity. The proposal for another ecovillage was quickly embraced. However, even though Myrstacken had more commercial and municipal support than Solbyn, something went awry, and only two families involved in the planning from the beginning moved into Myrstacken.

Myrstacken - Getting there

Malmö and Lund, lie just thirty kilometers apart. If Lund had an ecovillage (Solbyn), Malmö wanted one too. In 1998 the city council of Malmö, in cooperation with the developer -HSB, proposed to build an ecovillage just east of Malmö.

Myrstacken had the same architect, landscape architect and developer as Solbyn. In a way, Myrstacken was a chance to do what failed to be done in Solbyn. In the flurry of activity to build a "better" ecovillage, in a technological sense, the importance of the social side - the participation of the future residents in planning -

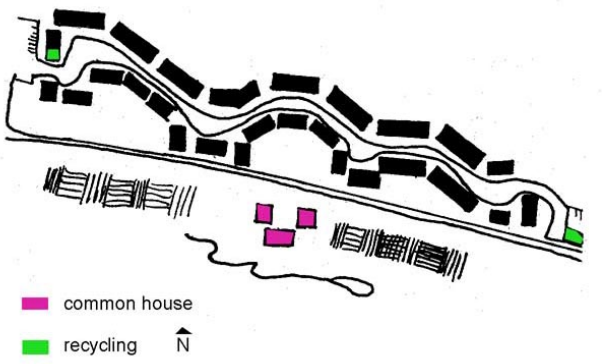
Fig. 23 - Sun Porch

was neglected. An article in the member's magazine for HSB in March of 1989 explains: due to the higher demands on the residents in the maintenance of an ecologically friendly lifestyle, "we want those who will live in this sun village to be part of the planning from the beginning." However, HSB's words seem to have been merely propaganda to ensure there would be interested buyers once Myrstacken was built. When interviewed by Fredrika Mårtensson the project leader from HSB admits that " what it [resident participation] should entail was never really defined. I have looked at the articles we put in the media . . . here it states the residents plan their homes, but that is not really the same as saying they are, in fact, participants in the planning." [Mårtensson 102] Other HSB representatives implied resident planning was not really necessary because we "to a large degree already know how an ecovillage should be."[Mårtensson 48] The role of the residents was neither clear to the developers, nor the architects nor to the residents. Of the one-hundred fifty families that initially expressed their interest in the Myrstacken project, two moved in. HSB had trouble selling all thirty-seven homes and turnover has been high.

Myrstacken was built in record time. The first whisper of the ecovillage was in 1988. By February of 1990 the initial plan proposals were finished. The final plans finished by February 1991, and building began in the November of 1991. The first residents moved in December 1992. From a technical perspective Myrstacken is an good example of the ecovillage principles.

Myrstacken - Location

Myrstacken lies on the edge of the town of Oxie. Residential neighborhoods lie adjacent to the west and farmland to the south and east. Oxie is considered a suburb of Malmö, Sweden's second largest city on the southern tip of Sweden. The commuter train to Malmö stops at Oxie two - five times an hour. A shopping center is a few blocks from the site. While trying to find my way without a proper map I passed stores, a post office, a school, and a ball field.



Myrstacken - Design

The site for Myrstacken was well chosen with: a beautiful view, southern exposure to capture the winter sun, and a hill to the north to protect homes from harsh winter winds. A line of houses hug the northern hill and face another row of houses running east to west across an interior pedestrian street. The street is lined with flower beds, trees and grass. The street opens into four courtyards, perfectly sized for young children to try out their bicycle riding skills. A parking lot, car ports, and recycling cottage is located at either end of the street. The houses are plastered a warm yellow ochre, with red tile roofs, the accents over the entrances and bay windows are red wood paneling with white trim. Bay windows are located on the southern side of the houses.

The southern side of the site opens towards the gardens, a small pond, and the common house. The common house might better be described as common buildings. Three buildings surround a courtyard. One building houses a large meeting room with a Ping-Pong table and small kitchen. Another houses a sauna, guest room, and small laundry room. The third building contains storage space and a control room for the water and electricity. The gardens were being prepared for spring planting when I visited and heaps of compost and mulch were waiting to be distributed. Proud hens and roosters in two nearby chicken coops caught my eye as well. Household compost is tended to in a large rotisserie compost bin in the same shed with the trash and recycling room.

Fig. 24 - Hill north of houses, narrow space between

Adjacent to the common house is the waste water treatment area, which, if you did not know any better, would be indistinguishable from a marsh connected via a small stream to a small pond. The waste water treatment area has works well, with occasional snags. Many more difficulties have arisen with the toilet system than with the treatment of gray water in the submerged wetland (marsh). The original toilets were composting toilets, but the residents had trouble with overflow, flies, etc. The residents, despite frustrations with the composting toilets, did not want to change wholesale to low-flush toilets. Several solutions are being experimented with. The water system is independent from the municipal system. Tap water comes from a 65 meter well and all water must be treated on-site. The original treatment system was not designed to process toilet waste. A student and professor from Germany, Imke Fittschen and Janusz Niemczynowisz, have evaluated the system and made recommendations.

Homes are heated by wood stoves and solar panels connected to a water accumulator tank. The ventilation system is similar to the one installed in Solbyn. The main intake and exhaust fan is located over the kitchen stove. The fan is equipped with a heat exchanger.

Fig. 25 - Gardens and yards south of houses

Myrstacken - Social and organization

The majority of families in Myrstacken are young parents with small children. I asked a resident about the social cohesion in Myrstacken he explained that there are many families with small children, therefore, they have less time to devote to shared interests and interaction. This would make sense if it were not for all the other projects with many families with children and a strong sense of community. ===quote==== The residents have had trouble seeing eye to eye and participation in work groups is spotty. It is the only ecovillage that relies on outside help for work other than snow removal and trash/recycling collection. One of the residents has been hired part-time to carry out maintenance on the site. Some maintenance work has occasionally been contracted from outside. Additional maintenance is carried out by the residents in eight workgroups.

The commonhouse is valued by residents. Starting a daycare has been discussed but not yet implemented. The laundry room is used mostly for large items such as rugs or blankets.

Opinions on the quality of the social life vary. According to Lindén, 47% of surveyed residents see the social side of Myrstacken as its best quality, while 32% list social factors as the worst quality. (with 36 and 34 people responding, respectively) In comparison, in Solbyn, 73% list social factors as the best quality and 19.5% as the worst. Solbyn has, although, has had a few more years to establish a strong social network.

Myrstacken - Resources

Ekologi och Vardagsliv: En studie av två ekobyar by Karin Palm Lindén evaluates the social and design aspects of two ecovillages, Solbyn and Myrstacken. "The main theme of the report is how living in an ecovillage influences the inhabitant's everyday lives," focusing on the resident's experience and the effect of design on behavior.

Att bosätta sig - en kreativ process is an insightful sociological assessment of the planning process of Myrstacken. It includes revealing quotes from the residents, builders, city officials, architect and HSB - the developer. The author, Fredrika Mårtensson, conducted the research for her thesis in environmental psychology at the Institute for Building Research (Statens Institut för byggnadsforskning) in Lund.

Ekologiskt Byggande: En studie av tr ekobyar i HSB:s regi by Hans Bergström provides a technical description of all the facets of the ecovillages HSB has helped develop: Solbyn, Myrstacken, Understenshöjden.

Water Management in the Swedish Ecovillage Toarp by doctoral candidate Imke Fittschen focuses almost entirely on waste management in Myrstacken. It contains the results of extensive testing and monitoring of the waste water treatment system at Myrstacken. His rapport provides some insight into the resident's behavior in regards to frequency of water usage and the cleaning products they use. The project was sponsored by Lund University in Sweden and Karlsruhe University in Germany.

Myrstacken - Overview

Planning start:	winter 1989	Number of Households:	37households, circa 110 people
Move in date:	winter 1992	Size of homes:	8 at 74m2, 2 rooms
Location:	Oxie		12 at 88.5 m2, 3 rooms
	10 km SE of Malmo		17 at 120 m2, 4 rooms
Project initiators:	city officials	Type of ownership:	home owner's association
Project leader:		Project developers:	HSB
Architect:	Krister Wiberg	Builder:	PEAB, steered total contractor
Landscape architect:	Bengt Persson	Building cost:	

S I T E

Location:	stores, schools and childcare, and other services within a 15 minute walk, open fields and woods adjacent to site, view of southern Swedish farmland
Transportation:	10 minute walk to the commuter train to Malmo - ride takes 10 minutes, local bus routes can bicycle to Malmo in 30-40 minutes
Design:	37 households arranged along one east-west street containing four courtyards the 20 houses on the south side of the street are single story, 17 on north side are 2- story gardens and small common house and laundry across pre-existing narrow gravel road paths and internal street of hard pressed gravel carports and parking at either end of street play area in south grassy lawn, skating rink by common house trash, recycling and household compost in small utility building at either end of site pond located near gardens/common house
Landscaping:	terassed flower beds with room for trees and grass on internal street southern grassy area has trees and bushes, terrrased down to garden area vegetation still very young and therefore small soil improved with topsoil and sand
Gardens:	about 50m2 per family
compost:	yard waste composted in gardens, household matter composted in round warm composter
food storage:	4 root cellars built into northern hillside with wooden staircase over entrance to shade entrance from southern sun
Common house:	three buildings (total 400 m2) create a common courtyard - one for meeting room, small kitchen, second for laundry, guest rooms, sauna, third for storage and water and electric
other structures:	car ports and recycling/trash/compost service building at each parking area
House exterior:	majority of facade - cream/beige plastered bricks copper red and white wood accents on gabels over bay window and entry red tile roof

INTERIOR	
General:	heavy, heat absorbing construction of houses
Floor plan:	front entry to homes from internal street, varies depending on placement and size of home
Foundation:	concrete slab over double insulation layer and capillary layer of singel/gravel, skirt of insulation around house foundations (U-value circa 0.19 W/m2 C)
Frame:	wood and leca blocks
Insulation:	mineral wool and plastic diffusion layer - exterior walls with lecablock & 17 cm mineral wool (U-value 0.197 W/m2 C), attic 60 cm mineral wool (U-value 0.098 W/m2 C)
Floors:	pine parquet in bedrooms, plastic mat in bathrooms,
Walls:	spackeled plaster walls or wall paper, latex paint in kitchen
Woodwork:	laquered pine
Windows:	wood frames, triple glazed low-emission glass (*U-value 1.6 W/m2 C*)
Glass rooms:	bay window in all houses, one house took the option to add an aluminum framed greenhouse
Kitchen:	standard, white fiberboard cabinets, recycling under sink, ceramic tiles over sink
SYSTEMS	
Heating:	wood stove, solar panels (7.5 m2), & back-up electric furnace with 500 liter accumulator tank
Ventilation:	all intake and outtake through fan over stove with cross stream a heat exchanger - manual or automatic control, bathroom has separate fan - intake from within house, out via attic separate ventilation over wood stove, fan is equipped with carbon filter
Water:	tap water from 65m well
gray water:	settling tank - submerged wetland - soil infiltration - constructed stream - retention pond
black water:	began with all composting toilets, now experimenting with urine separating composting toilets, even regular low-flush toilets
Electricity:	standard, households have separate meters, central vaccum system
Trash/Recycling:	trash and pre-sorted recyclables collected by municipality

Fig. 26

Move in date:	**winter 1993**
Location:	**Ljungarum4 km S of Jönköping**
Project initiators:	**political initiation**
Size:	**24 households**

S M E D E N

Look up. That is the very first thing I did when I entered a house in Smeden. The architects were emphatic about the importance of an attractive home for quality of life. The entry has a gabled ceiling and a glass wall. The living room and kitchen have a two story ceiling which you can look down onto from the second floor. The spring sun, still low in the sky, shone through the windows and was most welcome. Large overhangs over the windows shade the house from the sun's rays when it travels higher in the summer sky.

I was glad to finally arrive at Smeden. The site lies just outside of the map sent out by the tourist office and the bus map is a jumble of colored lines, a few street names and no map. I took a lucky guess and called my host to double check. What a relief it was to find her waiting for me at the bus stop. It is only a short walk to Smeden from the bus route but the pathway is a circuitous walk not on the map.With home-made cinnamon rolls my hosts lured several others to come join in our discussion. We discussed difficulties with the heating, ventilation and toilet systems. When it came to the interior architecture of the houses, however, the endorsement was clear. Before the architects joined the planning discussions there was a lot of debate in the planning about the floor plan, but as soon as the architects showed their proposed plan it was unanimous, "That's what we want." (get exact quote) While cleaning up from coffee I noticed a large collection of children's drawings on the refrigerator, but I had not seen any of the tell tale signs of young children in their house. My host, when asked about the artist of the drawings, replied, "*The children in Smeden have many parents, and the parents have many children. We never want for contact with children."*

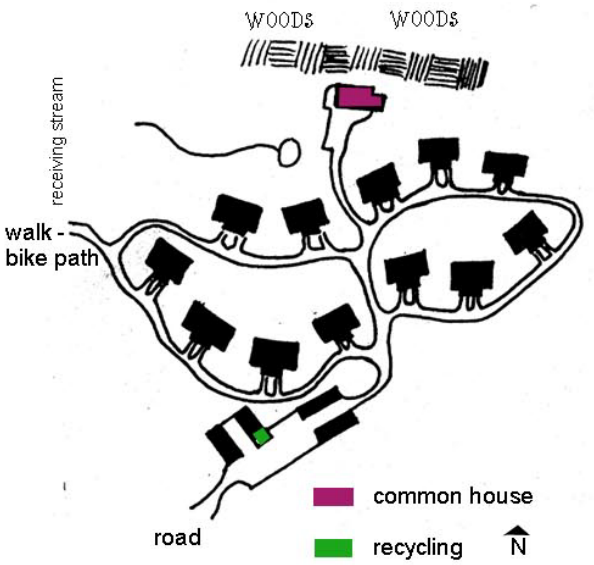
Fig. 27 - Livingroom/kitchen flooded with light

Smeden - Getting there

Smeden was initiated by politicians, but it was a small group of die-hard individuals and a pair of architects who saw the project through. In 1998 the Center party (*Centerpartiet*) made a motion to increase attention to ecological principles in building. Jönköpings planning commission, as a result, inquired about the interest to live in an ecovillage with those on the city's waiting list to buy a home (*tomtkön*). Eighty-one families expressed their interest, and those families were just from the housing list. In May of 1990 the office of the planning commission invited these families to an informational meeting. The city proved supportive, at least, administratively, throughout the process. Sixteen families decided to delve into the planning process after the informational meeting. These families sought out other interested families, bringing the number of participating families up to thirty.

The families divided into groups and delved into creating a list of fifty specifications for the project. The points were very detailed. For example: triple glazed windows, gardening space no less than 100 m^2 per family, houses placed far enough apart so that they do not shade each other even when the winter sun is no higher than 8° over the horizon. The group did their homework, and did it well. This list laid the ground work for all future plans.

Fig. 28 - Livingroom



The time came for interested families to invest in hiring an architect. Just a few families were prepared to make the necessary financial commitment. The group did not want to hand over their project to a contractor who would be free to make whatever changes they wanted. An article about the project was printed in the local paper. It attracted the attention of the architects of Arkitectrådet AB, Jan Moeschlin and Peo Oskarsson, who agreed to receive payment upon completion of the project. Sixteen families agreed to go forward.

The architects were not especially versed in ecological housing, but they had built many homes in close consultation with the future owners. The architects wanted to hear what the new home owner's had to say. The architects also had experience in working as the project leader and developer in building projects. This reduced the number of "chef's in the kitchen," so to speak.

Finding a builder, within the proposed budget proved to be problematic. Not as many builders bid on the project as was hoped which reduced the pool of choices. Once market prices were attached to the plans changes were necessary to stay within the allowed budget. Some

of the changes made for financial reasons compromised environmental considerations. Extremely high interest rates for loans at the time made the financial woes even greater. Several families left the group during this time. The remaining families recruited others to join once the footing for the project was solid again.

The builder finally chosen was Mjöbäcks AB. The owner of Mjöbäcks was very interested in ecological housing such as Smeden. The builder worked under a steered total contract. The first house was finished in December 1993. In 1994 the architects were awarded city building prize in 1994 for good ecocycle design.

Fig. 29 - North side is sheltered. Retention pond in foreground.

Smeden - Location

Smeden is located in Jönköping, a mid-sized city in southern central Sweden, population 110,000. Smeden is located in the residential suburb Ljungarum, formally the Ljungarum parish, established in the 12th century.

Easy access to the city and services was of paramount importance to members involved in planning. Smeden is less than two blocks from a district shopping center, where you will find: a grocery store, hair salon, newsstand, postal services and a recycling center. Two bus routes, running twice an hour, pass by the shopping area, just a five minute walk from Smeden. The elementary school is just around the corner, so to speak. A walking/biking path runs to the middle and high schools. The center of the city of Jönköping is just twenty minutes away by bicycle. The adults walk, bike, bus and drive to work.

Even though Smeden lies just meters away from other residential areas, it is easy, when there, to forget how close you are to the city. The houses are built on a hill, with tall trees on three sides. One of these clusters of trees marks the edge of a nature preserve. A road passes right in front of the area but it is not visible over the rise between the houses and the road.

Smeden - Design

Children were running around a somewhat melted snowman in a centrally located playground when we strolled around to look at the site. Gravel pathways loop around in two large side by side ovals. Twelve duplexes line the ovals with their glassed-in entries facing south. The houses wear the traditional colors of the region, Småland, copper red paint with yellow trim. A small path leads from the houses towards a nearby grocery store and bus stop. The parking lot and garages lie on the south end of the site by the main road. Near the garages are two long low buildings containing storage space for each house and the trash and recycling rooms. At the north end of the site lies the common house. A day care was run at the commonhouse, but when the lease was up the residents decided to try having the commonhouse to themselves for a while. The commonhouse contains a small laundry room, for large bulky items, a sauna, a meeting room, and a small kitchen. Behind the commonhouse lie expansive gardens. In March there are already signs of residents preparing their plots for the spring season. We took a short walk into the woods, a nature reservation adjacent

to the ecovillage. The woods are a frequent destination for residents.

Between the houses and the gardens I discovered several ducks swimming in a small pond. The pond, it turns out, is the retention pond for gray water from the houses. A small constructed stream meanders downhill from the pond to the receiving stream. Residents of Solbyn do not forget where their water comes from or where it goes after they have used it. Tap water comes from their own 115m well and the walking path to a nearby store passes right over the receiving stream. Three-fourths of the respondents to the survey made a point of listing their on-site waste water treatment system as one of the most successful ecological measures in the ecovillage. Smeden is the first multiple household development in Sweden to install urine separating toilets. Despite some initial problems resulting from errors in installation the system works well.

You won't have any need for shoes inside in Smeden. Your feet will be warmed by the heating elements under the wooden and ceramic tile floors. The living room is graced by the presence of a common fixture of Swedish homes, a large, wood burning, ceramic stove. The ceramic stove is has an extra layer of copper pipes under the surface. Water is pumped through these pipes to gain heat from the stove. The hot water is then piped to an accumulator tank. Seven and a half square meters of solar panels and a back up electric furnace are also connected to the accumulator tank.

The houses in Smeden are a treat to visit in: a large sunny glassed in entry, warm pine floors, a wide swath of windows, inviting cream colored walls finished with a beeswax milk paint, and an open floor plan. The houses are designed to have a light and airy feeling. The ceiling in the living room and kitchen start at normal height by the front door and slant upwards to end at the top of the second floor. The architects explain this design "creates a good visual contact between floors. Especially valued by the children who like to stand on the second floor and "have contact with what is going on below" (Moeschlin, Oskarsson 19).

Smeden - Social and organization

The sections on the social aspects of the ecovillages will become more brief as I go along. All the projects experience a positive social atmosphere to a greater or lesser degree. All the projects have similar resident administration.

I had a very positive experience in Smeden. The residents I met with clearly care about the welfare of others in Smeden. Disagreements and bickering inherent in a group making decisions does not seem to detract from the overall positive experience. Maintenance is performed by residents divided into work groups. Administration is carried out by the residents and managed by a board elected from and by the residents. The commonhouse had been a hub of activity when the daycare was there. Now things have quieted down a bit.

Smeden - Resources

Smeden received a lot of press. The local daily paper ran more than twenty articles about Smeden. Special interest magazines and national newspapers ran stories about Smeden as well. The following three citations provide a comprehensive overview of Smeden. One additional source on Smeden's toilet systems is cited in the Design chapter.

The discussion on "Getting there" is exceptionally long in this case due to the excellent information provided by the architects, Jan Moeschlin and Peo Oskarsson, in their book *Smeden - ekologiskt byggande med brukarplanering (Smeden- ecological building with*

the user's imput). This book describes each crucial step in the process of planning Smeden and the positive and negative sides of these steps. It is frank and informative account.

"Brf Smeden - sex års slit bakom ekobyns idylliska fasad" (Home Owner's Association Smeden - six years work behind the ecovillage's idyllic facade), *Correspondenten*. September 26, 1995, A10. This newspaper article, written by Inga Wallenquist is chock full of technical descriptions of the ecovillage.

"Tionde Ekobyn Klar för Inflyttning!" (The tenth ecovillage is finished) in the newsletter for Njord, *Eko-Njord* (2-93), written by Lotta Lanne, summarizes the creation and design of Smeden. Lanne's has an excellent writing style again proves to entice and inform the reader. Lanne has written numerous articles about ecovillages and ecological building.

Smeden - Overview

Planning start:	winter 1988	Number of Households:	24 households, circa 70 people
Move in date:	winter 1993	Size of homes:	8 at 81m2, 2 rooms
Location:	Ljungarum		12 at 117 m2, 4 rooms
	4 km S of Jonkoping		4 at 137 m2, 6 rooms
Project initiators:	politicians		also 13 m2 glass veranda on all
Project leader:	Arkitektradet AB	Type of ownership:	home owner's association
Architect:	Jan Moeschlin, Peo Oskarsson	Project developers:	architects
Landscape architect:	architects	Builder:	Mjobacks Entreprenad AB
			steered total contractor
		Building cost:	7,500 SEK/m2 at 1995 prices

S I T E	
Location:	walking distance of stores and schools, forest with paths adjacent to site
Transportation:	two bus lines run regularly to city center - bus stop one block away, 20 minute bike ride to center of town
Design:	total area of site: 38,500 m2 12 duplexes arranged in two adjacent irregular ovals foot path to road with bus lines and food store parking on south side, two long garages - one space for each house extra building by garages for storage/trash/recycling common house on far side from parking by pond and gardens play areas in center of houses, ball field on south side
Landscaping:	little original landscaping, residents adding bushes, some trees drainage problems and poor soil make planting difficult flower beds and other foliage planted next to residents' homes
Gardens:	200 m2 garden space for each household
compost:	household compost near houses, yard waste in garden, individual compost - not collective
food storage:	pantry and small cellar that can be used for cool storage
Common house:	145 m2 a small kitchen, guest room, sauna and space for large laundry items
additional buildings:	garage - one 15m2 per household, connected garages - in four sets - garages include extra space for trash/recyling room and some storage

House exterior:	cooper red wash on wooden siding with yellow trim (linseed oil paint) yellow trim pieces on corners of houses and around all window panes in the glassed in entry red cement tile roof
I N T E R I O R	
Floor plan:	living room and kitchen and glassed-in porch on south side: bedrooms, pantry, utilitiy room, storage, and cellar on north side. High vaulted ceilings in kitchen and living room. Some have second story rooms over kitchen
Foundation:	insulated crawl space, with reduced foundation depth
Frame:	wood
Insulation:	eco-fiber: foundation - 22 cm, outer walls - 24cm (no plastic diffusion layer), attic - 52cm, rockwool in separating wall between duplexes
Floors:	living room & kitchen -soaped pine floor;other rooms -linoleum floor; plastic mat in bathroom
Walls:	interior walls treated with beeswaz milk paint over a microlite weave; ceramic tiles on wall in bathroom
Woodwork:	oiled beech and pine, all trim natural wood, natural wood interior doors
Windows:	triple glazed with low emissive coating on innermost glazing, double glazing in glass room extra long windows and a high half round window on side wall in living room, window sills angled 10 to let in more light
Glass rooms:	13 m2, unheated, wooden frame, double glazed windows, clinkers on the floor, 9.5 cm insulation
Kitchen:	standard, recycling under sink
S Y S T E M S	
Heating:	heating elements under floor, individual heating systems: ceramic stove with water mantle, 7.5 m2 solar panels, back-up electric furnace - attached to 500 L accumulator tank
Ventilation:	thermostat regulated intake thru vents in walls, backed up by thermostat controlled fan in attic, outflow channel in attic
Water:	tap water from 115 m well
gray water:	three chambered settling tank (15m3), to biological reator (Bioclere), to settling tank, to resevoir (water from here used to water gardens), to constructed stream, to recipient
black water:	urine separating toilets(Dubbletten, WM-toaletten) with Aquatron, water separated from feces by centrifuge (Aquatron), compost used in flower beds, water to gray water treatment, urine to tanks (30 m3 each) picked up by farmer
Electricity:	standard
Trash/Recycling:	trash/recycling space by garages, picked up by city, indoor recycling containers under sink

Fig. 30 - overview, common house in center

Move in date:	**spring 1995**
Location:	**2 km NE of Kronoparken8 km NE of Karlstad**
Project initiators:	**future residents**
Size:	**18 households**

M J Ö L N A R T O R P E T

Like a spider in its web, the common house sits in the center of a circle of nine duplexes in Mjölnartorpet. The placement of the buildings reflects the planners' desire to foster positive contact between neighbors. Children are playing in the center of the web, on a wide grassy field, under the watchful eyes of many parents. Many people are outside, despite a chill in the air. One gentleman outside painting furniture takes a moment to greet me and pose for a picture. A three year-old runs by sharing multiple hellos. Her father soon follows, offering words of encouragement on my project. My host refuses to let me try my hand at camping in the nearby woods and insists I stay in the common house and join his family for breakfast.

Karlstad is now the home of two ecovillages, Tuggelite and Mjölnartorpet. Mjölnartorpet is by no means a carbon copy of Tuggelite. A comparison of the two clearly reveals the trend in ecovillage planning to "look further at the greater whole." In the design of Tuggelite, energy conservation was the primary focus. Later, in planning Mjölnartorpet, "energy conservation, in of itself, is not seen as important and one pays more attention to other values. Aesthetic and social aspects were weighed in and one emphasized other things, such as, the significance of which food one eats and not taking the car to work," observes Lotta Lanne, an architect who specializes in ecological design. [Hardestam]

Getting there - Mjölnartorpet

After Tuggelite was built, citizens of Karlstad began to dream of another ecovillage. The association for ecovillage SOLA (now Mjölnartorpet), was organized in the fall of 1990. The group broke into study circles to learn more about ecological housing. Simultaneously discussions were begun with city to find a suitable home for the project. The apprehension shown by Karlstad city officials to Tuggelite had faded by the time the new association approached the planning commission. Within a year a site was proposed. The city helped to secure a sixty percent reduction in the price of the land.

The members were actively involved in the planning process. They broke into nine groups to work out different details of the plans. The architect, Gunnar Persson, spent countless hours on the project. Persson had a personal investment in ensuring the members got what they wanted at an affordable price because he would be living in Mjölnartorpet too. Having an architect with such a great personal investment in the project has its pros and cons. Because he was designing his future home, as well as others', he had a greater stake in designing according to his own preferences, than he might have in another project. However, the value of his dedication far outweighed the drawbacks. An outside

architect could not have produced similar results without much greater costs. Mjölnartorpet was being planned at a very bad time for the building industry. Prices and interest rates were uncertain. Persson, in cooperation with other members, was able to come up with a project with flexible floor plans, and high quality materials, at an affordable price - lower than comparable newly built housing at that time. A great savings was achieved through having the residents do much of the finishing work themselves, such as: painting/papering the walls and ceilings, painting outside, finishing the woodwork, and landscaping.

The group chose to fill the role of developer themselves, giving them more control over the building, but more responsibility if something went awry. In March 1993, the group sent out bids for builders. Ten of nineteen builders responded with bids. Meetings were held with the four builders who expressed greatest interest. Solstahus presented the best offer and appeared most willing to work with, not against, the members interests. Home owner's association, Ecovillage Mjölnartorpet, was established in the fall of 1993. The establishment of the home owner's association made it easier to secure a loan. The loaning bank was very supportive, which proved invaluable later.

The first six houses were built, and two families had moved in, by April of 1994. Unbeknownst to the members, the builder, Solstahus, had been having financial troubles with projects in Germany. Solstahus declared bankruptcy on April 6, 1995. Fast work was made of finding another builder to finish the work. By April 24th, PEAB was contracted to finish the project. Thanks to the support of the loaning bank, Sparbanken, the extra costs incurred from the bankruptcy of Solstahus were covered by building insurance. By the end of September the new residents of Mjölnartorpet were able to join together in the common house to celebrate the completion of the project with organic beer and video tapes from the building process.

Despite the crisis, Mjölnartorpet had a happy ending, but the experience did shake up the residents. Over half of the respondents to the survey specifically noted the bankruptcy of the builder. One resident remarked, *"Choosing the right company is very important. It shouldn't be too cheep or else you risk bankruptcy."* The emphasis on savings did play a part in choosing Solstahus, but that is not the whole picture. Soltsahus expressed a greater interest in collaboration with the residents than any other contractor. ~~~quote~~~.

Location - Mjölnartorpet

Mjölnartorpet is located in a field that has been used for grazing for centuries, and most recently used for community gardens. The garden plots I passed on

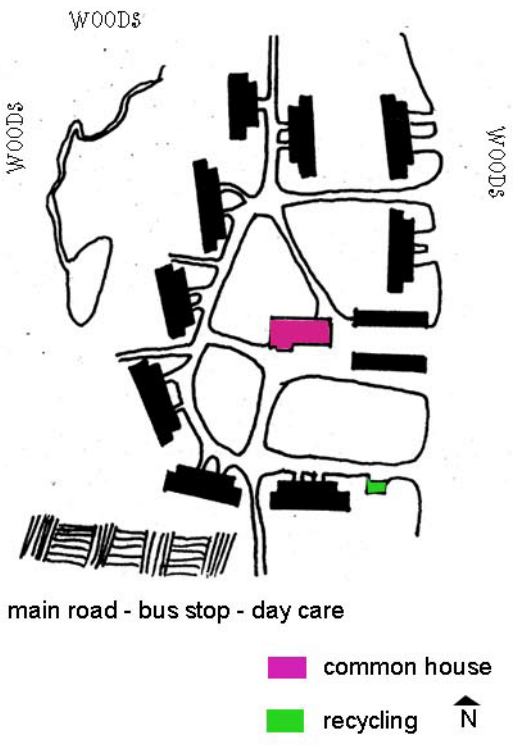



Fig. 31 - Main room in commonhouse

the way in seemed to be reaping good results. The houses are surrounded on three sides by woods, the fourth, by residential housing. The location of the houses provides a sense of living in the country, while still being within walking distance of schools, stores, a daycare, and two bus lines. The houses are located in a small valley. The nearby houses are barely visible over the ridge between. Beavers have been seen in the nearby stream, and a moose was even seen one morning standing in the middle of the houses.

The city bus stops in front of a daycare, which is less than a block from the houses. A wide range of services are located within walking distance: a university (1.2km), a hospital and pharmacy (1.7 km), grocery store, post office, bank, and schools (no more than 2 km).

Design - Mjölnartorpet

Off the main street a gravel road loops in front of the south side of the houses and around to the eastern side of the site. The gardens lie on the south side between the gravel road and the houses. A walkway runs between the gardens to the houses for pedestrians, the eastern part of the road leads to the two rows garages. The garages are located just east of the common house. The nine duplexes are arranged in an oval around the common house. The promotion of positive social interaction between neighbors bore more weight in planning the site than maximum sun exposure, therefore the houses sit at varying angles, facing one another, instead of lined up to salute the sun. The front entrance of five of the duplexes look directly onto the common house and a wide lawn and play areas. The other four duplexes complete the oval, but their front entrances are slightly more secluded. The houses have clearly defined, backs and fronts. I saw few signs, such as bushes or fences, defining people's yards. Although this may change, *"Some want open and discrete boarders, while others want high bushes or fences."* For now, it seems people respect the distinction between public and private space without fences.

The main components of the waste water treatment system are located in plain view. The settling tank, urine tank, and biological reactor are buried in the ground, but the lids to them are visible next to the common house. The final reservoir for the water, before entering the nearby stream, is located on the western side of the site. The current system does not work optimally in the winter. Options for improvement of the current system are being discussed. (see Design chapter) The houses have urine separating toilets.

The design of the houses reflects a traditional 1800's cottage. The wooden siding is finished with the traditional copper red wash and the window sills and other trim are finished with a white linseed oil paint. The front entrance has a small covered (but not enclosed) porch. Some have chosen to build an open, or closed, back patio. Inside, the houses are warm and welcoming with an abundance of natural wood, warm colored walls, and an open kitchen - livingroom plan. Great care was taken to design a home that was

Fig. 32 - Garages off commonhouse

pleasant and healthy to be in. The first floor bathroom is cozy. The tile floor is heated by warm water running through pipes underneath. The shell of all the houses is the same size which simplified planning. The number of rooms per house varies according to how much of the second floor is finished. The houses with greater floor space, a full second floor, have finished all of the attic space, dormer windows are added to the second floor rooms. The most common size is one and a half stories. The kitchen is outfitted with energy efficient appliances and a pantry.

The houses are heated by district heat. The common house has a pellets furnace and 81 m^2 of solar panels (and a back-up electric furnace). The heat is stored in a large accumulator tank and distributed to the houses via culverts.

Social and Organization - Mjölnartorpet

Nearly all of the families now living in Mjölnartorpet were involved, to some degree, in planning the project. Participation in planning laid the groundwork for the current positive social sphere. *"We lived through the good and the bad together even before moving in,"* and, *"...got to see what a complicated composition of individuals we are."*

The common house is both a visual and social focal point for the residents. Residents meet in the commonhouse for coffee, meetings, parties, pub nights, to play games, attend workshops, relax in the sauna, or to do their laundry. Residents had the option to install washing machines in their homes, but several have chosen not to. At least eight families, according to my survey, use the laundry facilities in the commonhouse on a regular basis.

Maintenance of Mjölnartorpet is similar to all the other ecovillages. Responsibilities are divided among workgroups. A steering committee, comprised of residents elected by residents, meets often and large meetings are held less often.

Resources - Mjölnartorpet

Numerous newspaper articles were written about Mjölnartorpet, but it is mentioned in few other published sources.

The most valuable resources for the above information, aside from the site visit and interviews, is information written by the residents. The architect wrote a detailed description of the technical aspects of the houses and systems and brief descriptions of the reasons behind some of these aspects (Projektbeskrivning, January, 7, 1996). Anders Claesson wrote a four page history of the planning of Mjölnartorpet (October 15, 1995), and at least one article on the waste water treatment system ("Ekobyn Mjölnartorpet," *VAV - Nytt*, April 1996. Page 16.) Anders Magnusson has run tests on the waste water treatment system and created a list of proposed improvements for the system. He wrote an extensive report of his findings which may be published at some point. The current title for Magnusson's report is *Om Avloppssytemet vid Mjölnartorpets Ekoby*.

The two best articles I found were:

Hardestam, Cecilia. "Karlstad - ett eldorado för ekoboende,"

NWT, January 20, 1996. In *Helg Magasinet*. The article compares Tuggelite and Mjölnartorpet and describes each project. It describes how ecovillages have changed and developed and highlights a few social aspects.

Westmar, Bo. "Nya generation ekologiska byar," *Dagens Nyheter*, October 22, 1996. The third of a three part series on ecological housing in one of Sweden's largest newspapers. The article describes the differences between Tuggelite and Mjölnartorpet. Another small article on the same page describes fifteen ecovillages in brief.

Mjölnartorpet - Overview

Planning start:	fall 1990	Number of Households:	18 households, circa 70 people
Move in date:	summer 1994	Size of homes:	2 at 65.4 m2, two rooms
Location:	2 km NE of Kronopark		7 at 77.5 m2, three rooms
	8 km NE of Karlstad		2 at 106.2 m2, four rooms
Project initiators:	future residents		2 at 115.5 m2, five rooms
Project leader:	future residents		5 at 148.8 m2, six rooms
Architect:	Gunnar Persson	Type of ownership:	home owner's association
Landscape architect:	residents	Project developers:	architect
		Builder:	Solstahus - went bankrupt
			PEAB finished project, total contractor
		Building cost:	10,100 SEK/m2

S I T E	
Location:	walking distance to- schools, stores, post office, day care one block away
	surrounded on three sides by woods, the fourth by residential neighborhood
Transportation:	two bus lines to city center - twice an hour, bus stop one block away,
	bike/walking path to college and whole way to city center
Design:	total site - 19,842 m2
	nine duplexes encircling the common house, first goal of site plan to promote social
	gravel road and pathway to site, road leads to eastern edge by garages and storage
	gardens located on south side - between houses and road - walking path cuts through gardens
	play areas in center of site
Landscaping:	surrounded by woods, but few trees on site, site was grazing land before it became community gardens
	flower beds, a few bushes
Gardens:	fromer site for community gardens, good soil, collective purchasing of food staples
compost:	kitchen waste - in 3 shared rotisserie warm compost containers, yard waste - composted in gardens
food storage:	pantry with separate ventilation in each house
Common house:	137 m2, style similar to the other houses, attic could be finished
	sauna, small laundry//drying room, meeting room, small kitchen, coat closet, small workroom
additional buildings:	2 rows of connected garages (with electric outlets), a pump house/storage space,
	compost/trash/recycling house (compost room insulated)

House exterior:	traditional style: copper red wash on wooden siding with white boarders(white paint - linseed oil) small porch over each entrance (not enclosed), houses with attic rooms have dormers red cement roof tiles
INTERIOR	
Floor plan:	all houses same size, but finished to different degrees - finished attic or unfinished attic,houses prepared for further finishing (or already finished second floor) have second story dormer windows
Foundation:	insulated crawl space, skirt of insulation around foundation, 7 cm cell-plastic
Frame:	wooden frame
Insulation:	cellulose fiber (Thermocell): walls - 24 cm, attic - 50 cm, extra insulation on pantry wall, insulation between floors, paper - not plastic - diffusion layer
Floors:	oile or soaped pine, clinkers in 1st floor bath & some entries, plastic mat in 2nd floor bath
Walls:	dry wall - finished with wallpaper, emulsion paint or egg tempera
Woodwork:	exterior portion of windows and doors finished with akyld paint, interior wood oiled or soaped pine
Windows:	triple glazed (2+1), wooden frames
Glass rooms:	available by choice
Kitchen:	solid wood cabinets of ash or pine (oiled or soaped), counter-top of solid beech, energy efficient appliances, recycling under sink, pantry of pine with thick/sauna-like door
SYSTEMS	
Heating:	district heat: pellets furnace (90kW/h) and solar panels (81m2) located in commonhouse (back-up electric furnace), connected to accumlator tank (4,800 liters), [heat loss in culverts due to poor insulation] radiators in floor in bathroom and entry, preparation for ceramic stove in every household
Ventilation:	natural ventilation assisted by a fan in chimney, intake vents over windows are controlled by temperature, separate ventilation for pantry central vaccum system
Water:	tap water from 100 m well, high levels of flouride in water, flouride filter on faucet in common house rain water - led via pipes and dikes to reservioir
gray water:	treated on site: to three-chambered settling tank (15m3), to biological reactor (Emendo Minibed), to sedimentation tank (7m3), through UV-filter, to reservoir (122m3), to watering on-site or to stream
black water:	urine separating toilets(Dubbletten) - all water and waste treated in on-site treatment system, urine to 20m3 tank, to farmer, feces go through treatment process
Electricity:	energy efficient outdoor lighting, electric magnetic fields considered, all lines grounded
Trash/Recycling:	trash/ recycling space by garages, city does not pick up recyclabes - must be transported to recycling center by residents

Fig. 33

Move in date:	**spring 1995**
Location:	**Björkhagen12 km SW of Stockholm**
Project initiators:	**future residents**
Size:	**44 households**

U N D E R S T E N S H Ö J D E N

As I turned the corner, I saw a cluster of sliver gray houses with contrasting red-orange tile roofs and a proud rooster preening in the middle of the sidewalk. I knew I had come to the right place. The next sure sign of reaching the my destination was the 25m smoke stack rising from the furnace room in the common house. By the time I walk 100 meters into the site, I am enveloped by birch trees. Their stark white trunks meet my eye in every direction. I find it hard to believe that I am just minutes away from a subway to the center of Stockholm.

Understenshöjden seems to have risen up out of the birch forest in which 44 households are nestled. The trees would be growing inside the houses if they were any closer. The construction crew had been sternly warned to only cut the marked trees or else pay a fine for any tree cut down that was meant to be preserved. The silver gray facade, treated with ferric sulfate (vitriol),[9] further complements the forest atmosphere. Here the stark white of the birch bark is the showcase, while the houses blend in with the background.

The color of the houses is a sensitive subject in Understenshöjden. Many color schemes were proposed. The current gray color won the vote by just a hair. The gray color had the added advantage of being vastly less expensive than the other options. The dissenting residents had to accept that they were outvoted. This compromise on color demonstrates both the strength and weakness of the democratic rules which dominated the process of planning Understenshöjden. The weak majority in favor of the gray may not, however, prevail in the long run. *"Come back in ten - fifteen years, it will most likely be a patchwork of colors. Some renegade resident will sneak out and paint his house and others will follow, "* says a resident who voted for the gray color.

Before my meeting I wandered about. I followed a small stream along the edge of the site. On my right were multiple playing fields and an athletic center, on my left was a birch forest, with rabbit cages and compost bins tucked in among the trees. I followed the stream up into the adjacent nature preserve. Over a rocky hill I found evidence of young children at work. A small playhouse had been erected from scraps of wood left over from building Understenshöjden. The kids do not play in the play house anymore, the fun was in building it, but there is no end of adventure nearby. Between the two chicken coops, and the neighboring athletic fields and nature preserve, there is an abundance of activities for the children. For the very young, two sandboxes have been built, and a daycare is located just next door. The welfare of children was a prime consideration in the planning of Understenshöjden.

Getting There - Understenshöjden

Residents in the Stockholm suburb of Björkhagen were fed up. Fed up with living in "sick buildings," exposing their children to allergy producing materials, and tired of living in cramped anonymous apartments. The Bjökhagen association was born out of this frustration. Over one-hundred families were first interested in the project. Association members did their homework; attending study circles, going on field trips, and inviting experts to speak. The association, in order to secure the land they wanted, were encouraged to work with an established builder. The group worked with two developers, HSB and SMAÅ.

The architect for the project bent over backwards to ensure families had the floor plan and solutions they wanted. Democracy was a very important aspect in this planning process. The whole group voted on nearly every aspect of the project. This process, according to the survey, was very time consuming but worth it.

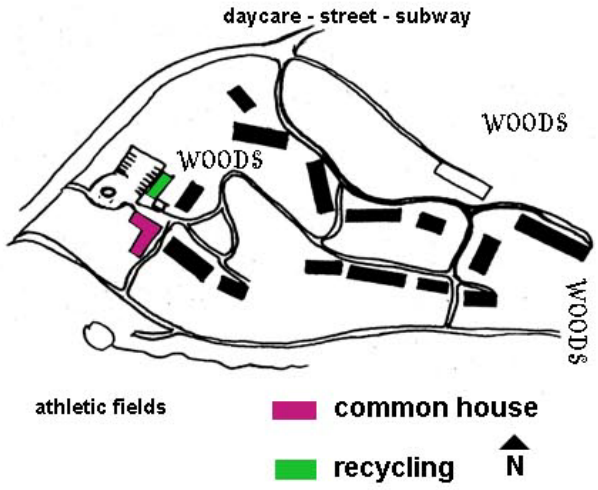


Fig. 34 - View between houses

Location - Understenshöjden

Understenshöjden has been touted newspapers, magazines and planners alike, as the first "urban" ecovillage in Sweden, tucked in between rows apartment buildings. The entrance to Stockholm subway is just four blocks away. The district center for Björkhagen is next to the subway stop, with a community center, restaurants, a grocery and other stores. HSB, in a promotional brochure touts it a solution for "big-city people engaged in ecological thinking, but not ready to move out to the country, where other ecovillages are located." [Brf Understenshöjden i Björkhagen, 3]. I agree Understenshöjden has a great location, however, it is misleading to categorize the other projects as being in the country. Other projects may appear less urban because they are located in areas surrounded by detached, single-family homes in stead of apartment buildings. This does not, however, mean they are estranged from the cities in which they are located.

Understenshöjden is edged by an athletic field, a nature preserve, a day care and apartment houses.

There is no shortage of resources for children. The youngest children, under three, noted some concerned parents, do not have a safe place to play since there are so many rocks and different ground levels. Two sand boxes have been built to help accommodate very young children.

Björkhagen is located five kilometers south of the center of Stockholm. Stockholm, naturally, has every type of resource and service imaginable. The bus and subway system are extensive. It is not even necessary to own a car when living so close to a subway. Seven households in Understenshöjden do not have a car.

Design - Understenshöjden

The design of Understenshöjden marked a profound shift in ecological design towards a commitment to the larger picture. "*Ecological housing has been discussed as more than just energy efficiency. It has to do with that which is healthy for the body as well as the soul."* The houses and landscaping are riddled with such details. The window frames are profiled at an angle to improve light infiltration. The lamp posts are made of wood, not metal. The kitchen has a special space for recycling that is easy to use, a welcome and awaited innovation. The walls are painted with egg tempera, a paint made of natural materials whose color that becomes richer with age. Even the signs in the parking lot are attractive - made from small wooden markers posted on thick birch branches.

The silver gray houses are arranged in five groups of no more than eight households. The groups are defined by different landscape qualities and names evocative of nature: Birch Wood, Spruce Heights, Pond, Farm, and Plantation. The site is on a hill of bedrock which required creative solutions for the foundation.

Fig. 35 - Houses on piers

The two main solutions are to place the house on wood and cement stilts or a concrete slab. The stilt solution was chosen to keep the amount of blasting to a minimum.

The houses have extra high ceilings and a large kitchen and living room area. The materials are as natural and unadulterated as possible. The homes provoke a feeling of serenity. The houses are heated both centrally and locally. Each house has a set of solar panels on the roof connected to an accumulator tank. Additionally, the common house has a wood pellet furnace. The heat from the central furnace is circulated by warm water via culverts to the accumulator tanks in the houses.

It was intended to have an on-site waste water treatment system. In fact the system was built and is used. The toilets are urine separating. The urine is collected in a tank and the black and gray water go to a settling tank, to a one of two biological reactors, to a second settling tank, under a UV filter, into a reservoir and down a constructed stream to a second reservoir. The last stage of the system, the reservoir and constructed stream bed, cannot be used. The water is instead pumped to the municipal sewage system. This decision was made by the local water treatment company. The phosphorus count in the water is too high as the water comes out of the system to the

reservoir. However, the reservoir and constructed stream bed are an integral part of the treatment system. Samples taken at the end of the water's cycle, at the second reservoir, show acceptable levels of phosphorus and all other elements. The issue is more political than practical. Hopefully, a compromise can be reached so that the system can be used as it was intended.

The district of Björkhagen collects pre-sorted recyclables from the recycling shed by the parking lot. The trash/recycling room is not conveniently located for all the residents, but a central location of the shed would make it difficult for the city to collect, resulting in the current solution. Next to the recycling room is a another similar sized room which serves as a second hand exchange for goods; a place to leave old clothes and find "new" clothes.

Social/Organization - Understenshöjden

The majority of the residents living in Understenshöjden today got to know one another in the planning process. Neighbors drop by regularly to borrow items, share news or just to say hello.

The frequency of meetings has decreased a good deal. People are still in recovery from the intense planning process. Parties are held at the common house. A handful of residents do not have washing machines, but instead use the laundry facilities in the common house where they are likely to run into others on the same mission.

The five groups of houses define five local maintenance groups as well. Each group is responsible for maintaining the immediate surrounding grounds and the compost. I ran across a sign listing the "compost captains" for each month. My host was pleasantly surprised to see the creative solution taken by that group of houses to divvy up the responsibility for the compost.

Resources - Understenshöjden

Many articles were written about Understenshöjden. The following list includes just a few of the best articles.

HSB. *Brf Understenshöjden i Björkhagen: Stockholms första ekologiskt inriktade bostadsområde,* (Homeowners association Understenshöjden in Björkhagen: Stockholms first ecologically oriented housing development) 1994.

Lanne, Lotta. "Björkhagens Ekoby Är Klar," (Björkhagens ecovillage is finished) *Kretslopp,* December 11, 1995, pp. 12,14,16-17.

Maechel, Ingela. "Den demokratiska arkitekturen." (Democratic Architecture) *Form for Living* (FORM), April 1995, pp. 24-30.

Ekologiskt Byggande: En studie av tr ekobyar i HSB:s regi by Hans Bergström provides a technical description of all the facets of the ecovillages HSB has helped develop: Solbyn, Myrstacken, Understenshöjden.

Försörning, Vardag och Miljö, written by Mona Mårtensson and Ronny Pettersson, was published in 1998. This report is the first in a three part series of studies on the environment and culture in the daily life of Swedish households. Members of the association planning Understenshöjden were isnterviewed for this study.

1 The site was not completely level, but it may as well be because the terraced effect was made absolete.

2 "Ekologiskt boende i balans med naturen" p 20-21, Bärande idéer. The source of this article is still unknown.

3 Ibid.

4 Nordanstigs Bostäder took the initiative under the umbrella support from SABO (Sveriges Allmännyttigas Bostadsföretags Organisation) a national organization.

5 Sigtryggsson, Anita. "Gemenskap som gav eko," *BoFast*, Number 14, September 10, 1992. Page 18.

6 Similar quote with different ending in a student report by Rita Selén and Anette Nybom

7 Invarsson, Torbjörn. "Boende i samklang med naturens lager," *Nordanstig*, December 12, 1991. Page 21.

8 City council is translated from *socialdemokratiskts kommunalråd*

9 Vitrol, is an iron oxide wood treatment which speeds up the coloring process of the wood while creating a protective coat.

Understenshöjden-Overview

Planning start:	spring 1990	Number of Households:	44 households, circa 130 people
Move in date:	fall 1995	Size of homes:	101-145m2
Location:	Bjorkhagen	Type of ownership:	home owner's association
	5 km SE of Stockholm	Project developers:	HSB and SMAA
Project initiators:	future residents	Builder:	Platzer Bygg AB
Project leader:	??		steered total contractor
Architect:	Bengt Bilen	Building cost:	10,880 SEK/m2 at 1995 prices
Landscape architect:	Marie Aslund		some variation due to self-finishing options

SITE

Location:	walking distance of stores, services, childcare, schools, athletic fields, and subway station borders a nature preserve
Transportation:	5 minute walk to subway station - 12 minutes by subway to center of Stockholm, multiple bus routes, safe bicycle routes to city
Design:	total area of site (xx), site on a hill, houses arranged along slope houses arranged in 5 clusters, and 14 rows of houses (2 to 7 houses per row) around looping pathways gravel pathways (most cables under paths to minimize need to disturb ground) play areas: two sandboxes, rope swings, nature preserve athletic facilites for older children
Landscaping:	as much as possible of woods left undisturbed landscaping details of natural materials such as stone or wood walls resident's own responsibility to develop immediate yards as flower beds or otherwise bushes and trees planted for wind protection and division between site and athletic fields
Gardens:	little gardening space, some households have a larger yard than others
compost:	five compost areas - yard and household compost
food storage:	pantry off kitchen
Common house:	250 m2 - not finished as of 5/98 - furnace room & laundry room finished will have: kitchen, play room, storage and party/meeting room with an open fireplace appearance similar to houses
other structures:	storage shed for each house located near houses,workshop-recycling/trash rooms/machine storage - located by parking lot, similar in appearance to houses with some insulation
House exterior:	silver gray (treated with ferrric sulfate - vitriol) wooden siding, bright colored doors (red, yellow, blue) red ceramic roof tiles

INTERIOR

Floor plan:	extra high ceilings (2.7 m, first floor, 2.5 m second floor), standard- three bedrooms, equal size kitchen and living room; floor plan individualized in consultion with architect
Foundation:	two types of foundations:on bedrock - meets ground at entrance, on pillars in back & layer of macadam, on clay - ventilated crawl space first floor - wood and cement with insulation

Frame:	several types of materials, primarily masonite joists, brick for first floor bathroom
Insulation:	eco-fiber: first floor - 30cm (*U-value 0.14 W/m2 C)*, between floors - 15cm, between houses - 22cm, B62 attic - 50cm (U-value 0.11 W/m2 C), outer walls - 25 cm (U-value 0.18 W/m2 C),
Floors:	solid pine floors - soaped or oiled
Walls:	egg tempra on spackeled dry wall [egg tempra - 20% cold-pressed linseed oil, 4% egg, 45% water, 30% pigment, 1% perservative], ceramic tiles and brick in bathroom
Woodwork:	painted with linseed oil paint or natural - oiled or soaped
Windows:	double glazed with low emissive coating on inner pane, angled wooden frames (linseed oil paint) to let in more light, open to the inside for ease of cleaning, (U-value 1.9 W/m2 C)
Glass rooms:	no glass room
Kitchen:	cabinets of veneered pine plywood and masonite, solid wood cabinets an option, cabinets to ceiling (no wasted space), lots of counter space, pull out island with recycling underneath, energy efficient appliances, pantry off kitchen
S Y S T E M S	
Heating:	central pellets furnace connected to houses via culverts, plus each house: 400 liter accumulator tank, 8.3 m2 solar panels, back-up electric furnace (3kW), floor heat in bathroom (option for more), radiators in rest of house, ceramic stove an option
Ventilation:	natural ventilation assisted by temperature regulated centrifugal fans over stove and in bathroom - condensation collected in tray in attic (emptied maunally), intake under window sills - manual regulation
Water:	tap water from municipal source
gray water:	on-site waste water treatment: 3-chambered settling tank, to two biological reactors (Bioclere), to sedimentation tank, to UV filter, to resevoir, to constructed stream, to resevoir [water not permited to pass to resevoir due to regulations - as of 5/98]
black water:	wall mounted urine separating toilets (Dubbletten), to two urine tanks - total 80 m3, feces/black water to on-site waste treatment
Electricity:	energy efficient appliances, electric magnetic field minimized by twisting & shielding cables, electricity to bedroom can be shut off at night, each house has separate electric meter
Trash/Recycling:	recycling, second-hand (exchange between residents), and trash rooms by parking, picked up by city