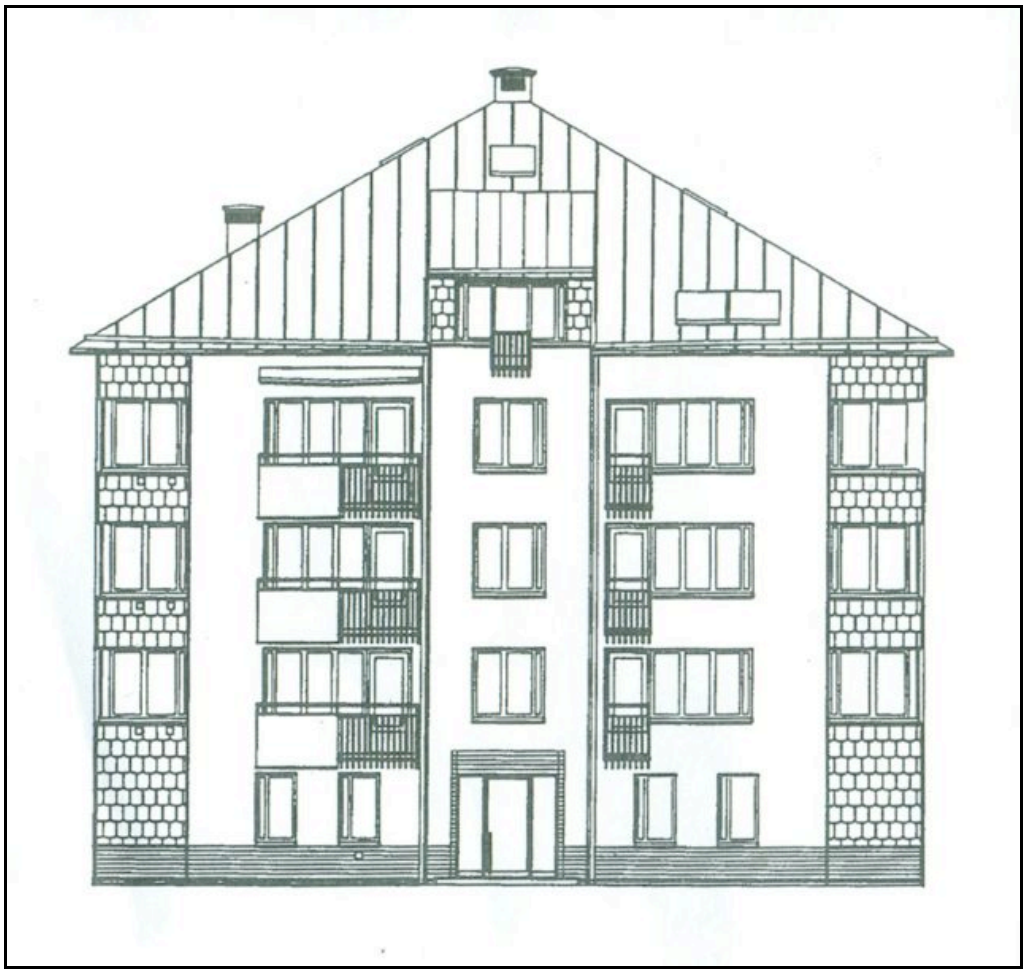
The Haubitsen environmental housing project



An apartment building was erected in Uppsala, Sweden, to house people with electrical hypersensitivity and reactive airways (asthma, MCS, etc.).

The building was finished in 1996. It was an early attempt at environmental housing and considered experimental, to see if it could improve the quality of life for people with these ailments. A group of scientists from universities and government institutions followed the project, interviewed the residents and conducted objective measurements. This pioneering project was not very successful.

Keywords: environmental housing, low-EMF housing, MCS, multiple chemical sensitivity, electrical hypersensitivity, EHS, multi-unit housing, apartments, Sweden

The building

The building has 17 apartments. There are four apartments on each of the floors, while a single apartment is located under the roof.

The four apartments on the ground floor were constructed for people with electrical hypersensitivity (EHS).

All apartments had measures to improve the indoor air quality, mostly by using a ventilation system.

All apartments are accessed through an enclosed stairwell and elevator, which goes up through the center of the house. This is a standard setup in this climate.

The building is owned and managed by Uppsalahem, which also owns other rental properties in the area. The project cost more than a conventional building, with the extra expenses covered by a government grant and contributions from foundations.

The neighborhood

The house was built in the Haubitsen neighborhood in Uppsala, Sweden. Uppsala is the fourth-largest city in Sweden, with about 200,000 inhabitants. It is located about 75 km (45 miles) north of the capital Stockholm.

The building is located at Dobelnsgatan 20, adjacent to other four-story apartment buildings owned by the same property manager. The neighborhood also contains single-family homes and a medical center.

One side of the building borders a local park and woods with public access. A bike path passes within 7 meters (22 ft) of the building.

The neighborhood is still today described as “calm,” with little through-traffic, though it is only 2.5 km (1½ mile) from the center of Uppsala.

There were no major industry or transmission towers in the area when the building was erected in 1996.

Indoor air quality measures

The house attempted to have better indoor air quality, so people referred to as “asthmatics” and having “sensitive mucous membranes” would do well there.

This probably includes people with MCS, though that terminology had apparently not reached Sweden in the 1990s.

The building is located in an area with good outdoor air quality. There is little traffic, no polluting industry in the area, and a park next door. Scented laundry products were not available in those days, so dryer exhaust was not yet a problem.

All of the apartments have registers in the wall between the kitchen and the bathroom, through which stale air is sucked out of the apartment and up to the attic, where it leaves the building. This is a forced-air system, with the fans located in the attic.

The building tested two methods of providing fresh air to the apartments. The central stairwell divides the building into two vertical halves, with each of the halves using a different fresh-air supply system.

One set of apartments has operable registers in the exterior walls which let fresh air enter directly from the outside. This system relies on the negative air pressure generated by the exhaust system, and has no fans in the apartments.

The other set of apartments uses a central fresh-air supply system. It has an air intake on the roof (well above street-level air pollution) with fans in the attic that direct the fresh air to the apartments through air ducts. The air enters the apartments through registers in the bedroom and living room.

The idea with both ventilation systems is that the air is the freshest in areas where people spend the most time, and drifts towards the areas where it becomes more polluted (i.e. kitchen and bathroom). No heating or cooling was applied in either of the fresh-air systems.

The roof-mounted air intake and outlet can be seen on the drawing of the building on the first page.

The house does not have any gas appliances. The heating comes from a district heating system, which provides hot water through underground pipes. This is used for both bath water and room heating.

Each apartment has a private washing machine, though there is also a shared laundromat.

It is not clear what other air quality measures were taken in the house. The walls are gypsum drywall with wallpaper, while the floors are concrete with glued-on

carpeting or linoleum. These materials can be very problematic, especially the glue and the carpet.

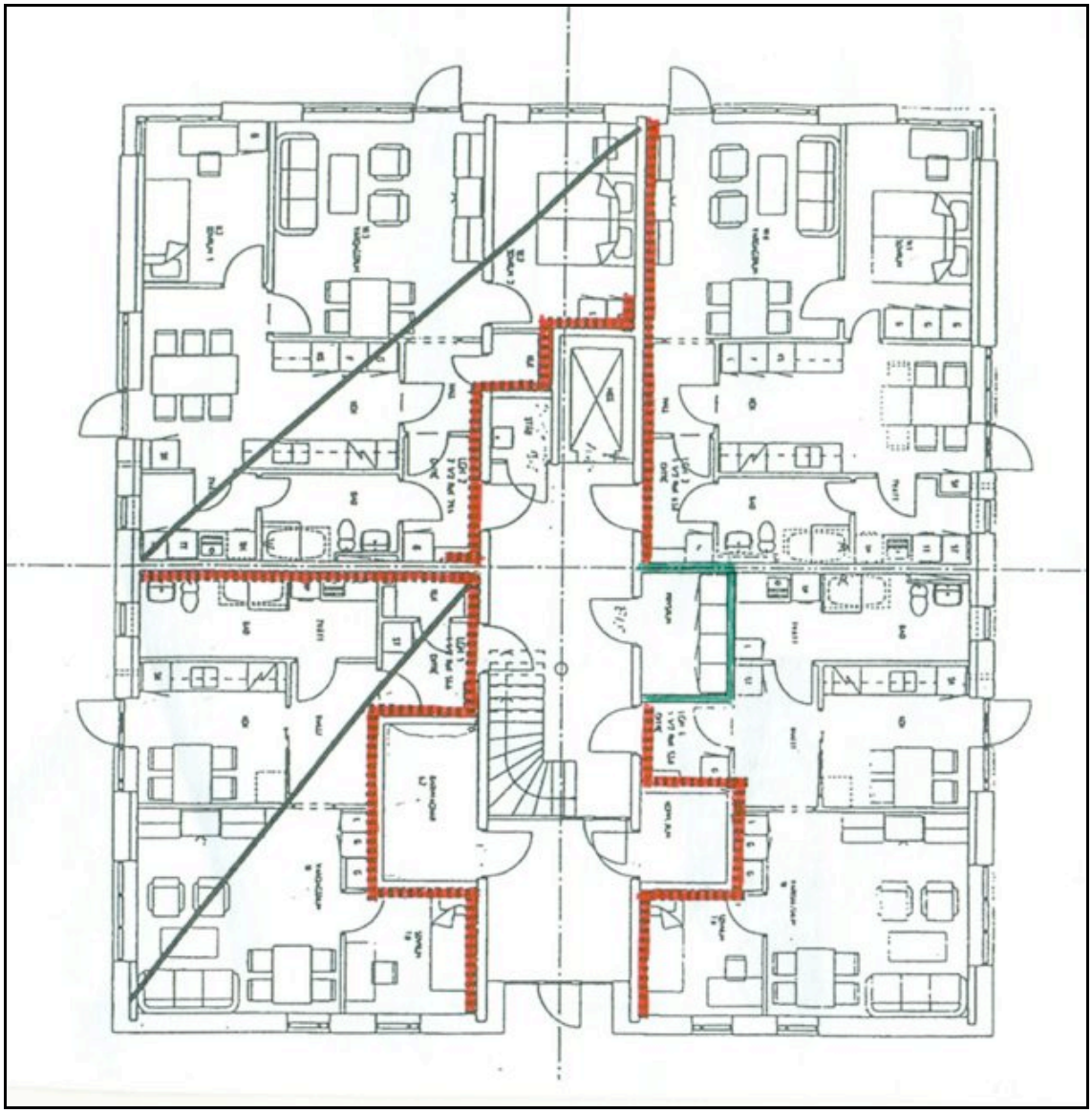
The builder, Uppsalahem, published a report with more details about the house design, before it was built. It is titled *Hus med sunt inneklimat, rapport efter projektering 1994*, which was not available to this author.

Low-EMF measures

The house is designed around providing a low-EMF environment for the four apartments on the lowest level.

The overall features include

- Transformer located outside the building
- Main electrical panel and meters located in separate building
- Ventilation system, elevator motor and other electrical systems located in the attic
- The pipes from the outside (water, sewage and district heating) have dielectric couplers to prevent stray currents
- The wiring system makes ground currents unlikely (see later)
- The lights in the stairwell use incandescent light bulbs
- The stairwell lights are only turned on when actually needed, using a pushbutton with a timer for each floor
- No water heaters in the apartments



Floor plan of the four low-EMF apartments. The shared entrance, stairwell and elevator to the upper floors are in the center of the building. The walls shielded with aluminum foil are shown in red. The two apartments with shielded ceilings are shown on the left, with a black stripe across. The heavily shielded freezer room is outlined with green.

Special features in the low-EMF apartments

- Automatic demand switches, which automatically disconnect power to unused circuits (electronic version of a kill switch)

- Master breaker for each apartment, located inside the apartment

- All cables in shielding conduit
- All cables have a ground wire
- All light fixtures are grounded
- Daylight available in all rooms, including bathroom
- Bedrooms located away from high electrical uses (kitchen, electric service entrance, etc.)
- Kitchen and wash located together (no long wires carrying high current through the apartment)
- Pantry cooled with outside air, so it can replace refrigerator use during the cool season
- Freezer located in a shared room with heavy shielding
- Shielding of apartment walls and ceilings

The four low-EMF apartments are located on the bottom floor. This is presumably to provide maximum distance to the mechanical systems on the top floor, and so the people there do not need to use the elevator. The bottom floor location also provides the greatest distance to the electronics in the other apartments, at least when lying down on a bed.

The wiring system

The building uses a wiring system which reduces stray currents, especially in the ground. It also reduces the electrical fields in the building, compared to the more common Swedish wiring practice.

The system uses five separate wires: three phases, one neutral and one grounding wire. All wires are separate from each other all the way back to the transformer. It is only at the transformer that there is a bonding connection between the neutral and the ground wire, at the same place where both are connected to a ground rod.

Since there is only one ground connection on the secondary side of the transformer, there will be no ground currents (unless there is a neutral-to-ground short).

This system violates the electric code in the United States, which requires a ground rod and bonding at the main breaker panel for a building. This creates an alternative path for the electricity through the soil, and is a problem for sensitive people.

Most Swedish houses do not have a grounding wire (protective earth). Instead, they use the neutral wire as the ground, which saves copper but does not provide a good ground connection. The wiring system used in the Haubitsen project is the superior method.

Shielding of the low-EMF apartments

A variety of shielding methods were used in the four low-EMF apartments.

Two apartments have a grounded shielding foil in the ceiling and on the walls facing the neighbors and the common area in the center.

The other two apartments have a simpler perforated aluminum foil on the walls towards the neighbors and common areas, but not in the ceiling.

The shielding foils are mounted on the gypsum drywall boards, before they are mounted. Self-adhesive aluminum tape is used to cover the gaps. The foils are perforated, presumably to allow the walls to breathe (prevent condensation).

The exterior walls of the building were not shielded.

Heating and cooling

The building is heated by hot water radiators located on the walls of each room, as is the standard practice in Scandinavia. Heat is not applied to the air supplied by the ventilation system.

The hot water for the radiators comes from the outside of the building, using a district heating system. Such systems are common in Scandinavian cities.

The building has no air conditioning, which is not needed in the Swedish climate.

EMF measurements

Extensive EMF measurements were taken of the building before and after people moved in. The background levels for the Haubitsen site were somewhat low for a densely populated area. The low-frequency magnetic level was 10 nanotesla (0.1

milligauss). Before move-in, the low-EMF apartments had the following typical EMF readings:

Frequency	**Magnetic**		**Electric**
Hz	nT	mG	V/m
5 – 2000	6 – 10	0.06 – 0.1	< 0.1
2 kHz – 400 kHz	< 0.8	< 0.008	< 0.2

Two upstairs apartments were measured for comparison:

Frequency	**Magnetic**		**Electric**
Hz	nT	mG	V/m
5 – 2000	10 – 15	0.1 – 0.15	1 – 20
2 kHz – 400 kHz	0.6	0.006	< 0.2

When the building was occupied, the low-EMF apartments were measured again. Their electric fields increased to around 10 V/m. This was due to unshielded floor lamps and other electric devices which had been added.

The magnetic fields did not change for most areas, though the fans inside the refrigerators were a problem. Two televisions on the floor above could also be picked up, which was a problem as they were located right above the beds in two of the low-EMF apartments.

Radiofrequency measurements were also taken in the Haubitsen house. These picked up distant radio stations and some cell phone signals. This was 1996, before cell phones, wireless networks, etc., became so common. The RF measurements were considered low.

The four electrosensitive people were visited in their old homes, before they moved to Haubitsen. Each home was measured. The readings of each home were low, and only one of the four people got lower levels from moving to Haubitsen.

Experiences with the building as of 1999

People moved into the new building over the summer of 1996. The available report focuses on the low-EMF apartments, and says little about the rest.

It is clear that the people moving to the low-EMF apartments, and several in the other apartments, had problems with the indoor air quality. There were a lot of complaints about coughing and asthma-like symptoms. This is not surprising with a new house, especially with new carpeting that is glued to the floor. The report mentions condensation problems on the concrete floors, and suggests that to be the cause of the many respiratory problems.

Reports focusing on the indoor air quality were planned, but since several people didn't tolerate the air quality and moved out, these reports were never produced.

The following refers to the four low-EMF apartments alone:

Four people moved in. One was unable to live there for more than a few days at a time. She then moved back to her remote cabin to recuperate, before trying again. She much preferred the apartment to her remote cabin, but couldn't make it work and gave up after a few months.

The three other people stayed, though one switched apartments and some stayed in their remote cabins over the summer.

All four people were interviewed a year after they first moved in. They reported that they liked living in a populated area with easy access to shopping and visiting neighbors. It was also more comfortable to have central heating, rather than woodstoves which left their cabins cold in the mornings and gave off unpleasant soot and smoke. Some of the cabins were also damp and moldy, which is common for poorly heated houses.

The three people who stayed reported that they felt a little better from living there, overall. Some became less light sensitive and could use things like their radio a little more. They still had problems using the electric stoves, washing machines, etc., but made do. All three complained about respiratory problems, though they thought the air inside smelled clean enough. Two of them said they were bothered by tobacco smoke from other renters in the building, who all had to pass through the hallway outside the low-EMF apartments. The common area was apparently not ventilated, so the smoke from cigarettes could linger there for a long time.

The report was published in 1999. It stated that by then, only one of the four original EHS renters was still there. The report concluded that the three renters did better at Haubitsen than in their previous homes, though it couldn't say that special low-EMF housing would work for people with EHS in general.

Status in 2013

The Uppsalahem property manager was contacted in 2013 and asked about how the building was used today. He replied that they had no renters with EHS in that building. He was not sure about people with MCS, but was not aware of any.

Comments

This is the first multi-unit environmental housing project in Europe, and one of the first in the world.

It was successful in allowing some people with EHS to live in a populated area, instead of the isolated cabins they used to live in. The cabins were moldy and poorly heated, so the Haubitsen apartments provided an increased quality of life. The project was not able to provide a home that made their symptoms go away, but overall they were better off. People with environmental illnesses are often affected by mold, and the improvements they did report may simply be because the new building wasn't moldy.

The Haubitsen house was not successful in providing good indoor air quality. What little information was provided about the materials used makes it clear that some very poor choices were made, especially the use of glued-down carpeting.

No information about how well the two air handling systems worked is available. Experiences with other MCS housing shows that supplying air to living space through air ducts can be very problematic. The newly installed air ducts and air compressors may need to offgas for awhile and later on both ducts and machinery tend to accumulate dust and mold. The system with the best chance of success is thus the one with ducts for sucking out stale air, while fresh air enters through registers in the exterior walls.

An enclosed stairwell is standard in the Scandinavian climate, but a poor choice for environmental housing. The confined airspace will be polluted by fragrances, laundry products and cigarette smoke from people passing through. Even if all residents are chemically free, there will still be problems with visitors, maintenance people and delivery services. The pollution will linger in the area for several minutes after the person has left. The pollution can enter an apartment when the door is opened, and people are exposed as they enter and leave the building. All the American housing projects have avoided this problem by using outdoor stairwells.

The EMF levels in the apartments were similar to where the four renters came from, and in three cases were low enough that they could live there.

The measurements showed that the low-EMF measures did lower the overall radiation levels in the four apartments, though not dramatically.

The ambient low-frequency magnetic level was 10 nanotesla (0.1 milligauss) in 1996, which is on the high end of what many people with EHS can live with, and excludes the more severe cases.

The world has changed dramatically since 1996. The average home now has a multitude of wireless gadgets, such as cell phones, cordless phones, wireless network, etc. There is also an overall increase in electronics, which dumps transients (dirty electricity) onto the building wiring and may also increase the level of ground currents.

It is not surprising that no one with EHS lives in the Haubitsen building any more. It no longer seems feasible to attempt to integrate people with EHS in houses with other people. Densely populated areas are also often unsuitable nowadays.

EHS housing is more likely to succeed if constructed as individual dwelling units in a rural setting. As the level of sensitivity varies dramatically, even an all-EHS apartment building is difficult to make work, and would require detailed, well-designed rules for the tenants.

Source

Halsomaessig och teknisk utvaerdering av fyra elsanerade bostaeder i kvarteret Haubitsen, Uppsala, (Health evaluations and technical measurements in four apartments with measures to reduce electrical and magnetic fields), by Carl-Gustaf Bornehag, Yngve Hamnerius, Marie Hult, Olle Johansson, Christina Norrby, Ulrika Aaberg, Karolinska Institute, 1999.

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