



location on map

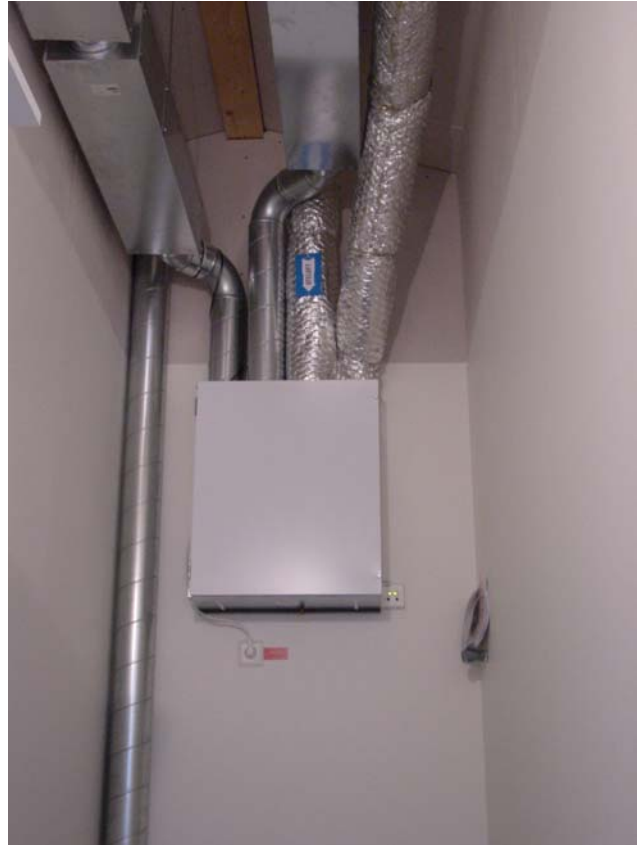


# Kvarteret Nornan

## Passive houses

- location:** Landskrona, Sweden
- dates:** 1999 design competition, constructed in 2003-2004
- type:** New construction in passive house technology, rental apartments
  
- use:** Residential
- size:** 35 apartments
- people:**
- actors:** Client: AB Landskronahem (municipal housing company); Contractor: Skanska, Project leader: Prime Project AB, Architect: Mernsten Arkitektkontor AB. Tenants
  
- goals:**
  - to get a rental cost for the apartments of maximum 100 €/m<sup>2</sup> usable floor area during the operation period to use highly thermal performance of constructions in order to exclude conventional heating i.e. radiators or floor heating systems
  - to secure moisture proof buildings
  - sustainability e.g. special solution for achieving good air tightness, choice of materials.

energy use	KWh/m <sup>2</sup>	construction	amenities
total energy demand, goal	50-60	<ul style="list-style-type: none"> <li>▪ floor construction: 10cm concrete, 35cm polystyrene insulation, 20cm macadam (U value= 0,10 W/(m2K))</li> <li>▪ external wall construction: framework from wooden studs and aluminium profiles with 45cm polystyrene and mineral wool insulation, in 4 layers, internally gypsum board (U value= 0,10 W/(m2K))</li> <li>▪ roof: lightweight roof trusses filled with 55cm mineral wool insulation (U value= 0,08 W/(m2K))</li> <li>▪ windows: triple glazed with low emission coating (U value= between 0,09 and 1,0 W/(m2K))</li> </ul>	
space heating demand	0-5		
domestic hot water demand	25-30		
household electricity	20-25		
heating & electric, achieved			
heating & electric, best 2006 regulations for new building (BBR), goal	110		
systems		special project features	site ecology
district heating		<ul style="list-style-type: none"> <li>▪ Energy efficiency</li> <li>▪ No heating system</li> <li>▪ Energy efficient household appliances</li> <li>▪ Moisture control</li> <li>▪ Dehydration issues</li> </ul>	
combined heat & power			
solar panels			
solar cells			
biomass and refuse			
wind power			
natural ventilation			
forced vent.w/heat recovery	x		
non-renewable energy			
individual metering	x		



### process and history

In Glumslöv, outside Lansskrona, the Landskronahem housing company has decided to build rental houses in passive house technology. As a result of a competition in 1999, 35 houses were designed and built using passive house principles. It was a project without financial support, so the focus was on building affordable energy efficient houses for rent. The houses cost not more than conventional building, where savings for the heating costs were used for improvement of energy performances of the building shell (wall and roof insulation as well as types of windows).

One of the goals was to have low rental costs, which was achieved by reducing operational costs by approx 25% through minimal space heating demand. The achieved costs were about 100€/m<sup>2</sup> year compared to the rental costs of apartments built at the same time which were approx. 130€/m<sup>2</sup> year)

A project team was formed and it consisted of: project leader from the municipal housing company, an external project leader, an architect, a building physicist, a structural engineer, a technical engineer, an electric engineer, a landscape architect, a contractor and two tenants.

### description of special project features

Each apartment has a supply and exhaust air ventilation system with heat recovery (air-to-air heat exchanger). The efficiency is approx. 85% depending on the outdoor temperature. The very limited space heating demand is covered by electric resistance heating, 700 W, in the supply air. The air flow rate is according to the Swedish Building Code and corresponds to approx. 0,5 ach, depending on the size of the apartment. Household appliances, e.g. refrigerator and freezer, as well as the hot water boiler are energy efficient. The domestic hot water is heated by electricity.

In order to control the heat gains through windows, the apartments were equipped with windows with low g-value and large roof overhang, 1m.

Besides energy efficiency, the project has considered moisture and dehydration issues. The construction has during the design phase been examined and improved concerning moisture prevention. The goal has been to dehydrate the concrete constructions to 85% relative humidity and wooden constructions to a moisture content by mass below 18%. Measurements and mechanical dehydration have also been made during the construction phase. Regarding air tightness of buildings, besides special attention during design phase, two carpenters were specially engaged to explicitly work with the plastic sheet making the apartments air tight. A blower door test was carried out after the plastic sheet was fixed. The air tightness was measured as 0,1 litre/(m<sup>2</sup>·s) at 50 Pa differential pressure.

The indoor temperature and space heating demand were calculated with the computer program IDA Indoor Climate and Energy 3.0 (Equa, 2003).

### funding

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No special subsidies were received.

### results

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**sources:** Landskrona, Sweden, A Demonstration House Brochure from the IEA – SCH Task 28 / ECBCS Annex 38: Sustainable Solar Housing, available at: [http://www.iea-shc.org/task28/final\\_reps/Sweden\\_Landskrona.pdf](http://www.iea-shc.org/task28/final_reps/Sweden_Landskrona.pdf)

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