

Energy efficient construction in Växjö, Sweden

Background

Quality program

In 2005, Växjö municipality sold land in the area called Biskopshagen to Växjöhem AB. Växjöhem AB were interested in building housing units on the land. The municipality had expressed a number of requirements through a quality program, which Växjöhem AB had to fulfil in order to build on the land. The aim of having the quality program and the requirements is to ensure the quality of the buildings and the surroundings.

Requirements

One of the requirements in the quality program concerns the level of energy consumption per square meter during the operation of the buildings. The total energy consumption is not to exceed 90 kWh/m².

Another requirement in the quality program concern individual meters for hot and cold water, heating and electricity. The meters have to be installed visibly in every apartment to make the inhabitants aware of their energy consumption.

There are also requirements on district heating; the buildings have to be connected to the local district heating system.

All of the requirements are very specific and easy to follow in a checklist. In the municipality quality program it is assumed that most of the requirements will not bring extra costs if they are considered early in the planning process.

Sesac

Växjöhem AB is involved in the project Sesac (Sustainable Energy Systems in Advanced Cities). Sesac aims to demonstrate how a more sustainable local energy economy can be achieved through the implementation of energy efficiency measures in new and refurbished buildings. It also aims to increase the use of renewable energy sources, technology and systems for electricity supply, as well as for heating and cooling systems.

The buildings on Biskopshagen are part of the Sesac project. Through the project Växjöhem AB is committed to carrying out continuous metering of energy consumption in the buildings when taken into operation. The total energy consumption is not to exceed 85 kWh/m² BTA.

Objectives

In Sweden the National Board of Housing, Building and Planning (Boverket) has recently presented new regulations for new buildings. In these regulations there is a minimum standard for energy consumption in buildings.

The overall aim of the requirements for the constructions in Biskopshagen is to go beyond this to find a new, stricter standard for energy consumption that can be used in the future. The building on Biskopshagen is not a lead project but rather part of a long term plan to decrease

energy consumption in buildings and to identify these new standards. The aim is also to decrease the use of energy and the emissions of CO₂ in Växjö municipality.

Implemented measures

A general contract is used in the project. To be able to fulfil the requirements in the quality program, Växjöhem AB assigned consultants to determine the measures to be taken considering for example windows, ventilation, insulation, walls etc.

The contractor working at Biskopshagen, for example has to ensure:

- Strict and properly tested air tightness levels
- Efficiency standards for the ventilation equipment
- Metering of energy consumption
- Training for tradesmen

During building of the energy efficient houses on Biskopshagen, representatives from Växjöhem AB set up special meetings to inform and discuss with the tradesmen the importance of energy efficiency in buildings. The tradesmen are typically highly skilled and experienced, but they need training in building energy efficient and how to, for example, insulate for the best energy efficient results. If the tradesmen do not build properly, all calculations on energy efficiency and requirements are in vain.

Results and impacts

The buildings are not completed yet, so no tests have been carried out. Two years after the buildings are completed and taken into operation there will be energy consumption tests according to the requirements in the quality program. Within the Sesac project continuous measuring on energy efficiency is required.

During the building period information about the outcome of the requirements has to be given to the municipality. An employee from the municipality will check that all requirements are fulfilled when the constructions are to be taken into operation.

Transferability and lessons learned

There were four contractors interested in the project that submitted a tender. No contractor objected to the requirements concerning energy efficiency or environment.

Experience from the Biskopshagen building project shows that it is important to define clear and measurable requirements and to do so at the beginning of the project. It is also important to follow up the requirements during the project and after. With clear and measurable requirements there is a smaller risk of misunderstandings and subjective judgements.

In projects such as building projects it is important to make sure that every link in the chain has the right competence to achieve the targets set. Education and understanding from the tradesmen is possibly the most important experience, because without that everything will fail.

With every new project there are new experiences and knowledge in what kind of requirements will work and what requirements the market is ready for. Prior to this activity

there were no energy efficiency requirements, but now there is knowledge of the topic and it is possible in the future to continue with such requirements.

There are no negative experiences (yet) in the building projects on Biskopshagen. The planning process was a bit longer than usual and therefore the project cost slightly more than usual. When carrying out the next project the knowledge and experience will be useful and the planning process should not take such a long time.

Växjöhem AB has started another building project on Biskopshagen with similar criteria. They have used the experience from the first project and are taking a similar approach. One thing that is done differently is to stress even more the requirements in the call for tenders and to clearer describe what the important requirements and obligations are.

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