

Step by step to sustainable urban districts: Hamnhuset to Kvillebäcken

The overall aim of the development of Kvillebäcken is to set a new model for sustainable city planning and building in Sweden and beyond. The development of Kvillebäcken is a learning process on how to develop a new city district on the basis of social, economic and ecological values.

The main objectives are to:

- Create attractive and lively urban spaces;
- Link the area to existing districts and develop the island Hisingen as an expansive part of central Gothenburg;
- Build the area with common and rational waste management;
- Provide possibilities for stakeholders to influence the process;
- Create a signature that consists of quality of life, safety and diversity;
- Compile with the City's new environmental standards for housing;
- Build Kvillebäcken for long term sustainability, economic and ecological benefits, based on a lifecycle approach; and
- Enhance possibilities for environmentally friendly mobility.

Kvillebäcken has also been used as an opportunity to expand the use of existing green technology and test and demonstrate new solutions, models and products. Six demonstration projects are included in the development of the Kvillebäcken area:

1. Waste to biogas
2. Cycle storage
3. Buildings as heat storage
4. Fast biogas-powered ferries for pedestrians and cyclists
5. Methane-diesel trucks
6. An innovation platform and dissemination activities

Between 2010 and 2014 the Swedish government decided to support sustainable city planning and building in Sweden by establishing the Delegation for Sustainable Cities. The Delegation funded, promoted and worked as a platform for knowledge-sharing between top-of-the-line projects in Sweden. Kvillebäcken was one project that received funding for the six specific demonstration projects set out above.

The sections below set out how the initiative fulfils the key European Commission and STEP UP lighthouse criteria.

Integration of energy, ICT and transport

Energy

Central smart heating control: in Kvillebäcken a new concept for saving CO₂ emissions on city level has been implemented. The buildings are highly energy efficient and can therefore be used for temporary heat storage. The aim is to decrease the daily heat peak loads during the morning and afternoon when people are using the most heat and hot water. By smart control of the heat supply to the buildings the peak load can be avoided. The heat supply to the buildings is lowered during these hours and thereby the total amount of heat needed at the same time is decreased. On a city level this means that the use of the extra heat plant that runs on oil can be avoided. Consequently, the fossil peak load can, if this is replicated across 25% of the building stock in Gothenburg, be completely avoided and thereby save 15,000 tonnes CO₂ per year.

Energy efficiency in the home: in addition to the central control of the heat supply, tenants can influence their own energy use. The apartments are equipped with energy saving kitchen appliances, water saving shower nozzles and other measures, and the electricity and hot water is measured for every tenant. The tenant is in charge of the amount of energy used in their apartment. This is unusual for Swedish rental apartments but has become more common during the last five to ten years. All these energy saving measures result from a passive house that was built a few years ahead of Kvillebäcken, called Hamnhuset, which has set an example for energy efficient buildings and smart systems in Gothenburg.



Hamnhuset – Passive House – Energy Efficient Building - Gothenburg

ICT

Smart heating control: as set out above, smart control of heating in the buildings helps adjust and align supply and demand at different times of day and ensure the heating system is used more efficiently.

Car pool booking system: online facilities for booking cars in the car pool makes it easier for residents to manage their commuting and other transport needs without owning a car.

Waste collection: the waste collection system in Kvillebäcken consists of an automatic underground vacuum system that handles three waste fractions; bio waste, newspapers and waste for incineration. The vacuum system uses ICT to communicate with the waste bins, and due to this smart system waste trucks have been removed from the small streets within the area. This has had a positive effect on the safety of the local environment and causes less noise and air pollution from trucks locally.

Transport

Modal shift: the mobility and transportation of people and goods is vital for a city but also causes many difficulties such as bad air quality, noise, congestion and land use. In the development of Kvillebäcken several solutions have been tested in order to enable citizens to travel and commute in more environmentally friendly ways. When planning the district the parking standard was set to 0.5 cars and 2.1 bikes per apartment (plus visitors' lots); this car parking standard is almost half compared to nearby newly built districts. To encourage people to commute by bike, cycle storage facilities provide bike parking space that is safe, secure and convenient. The common car pool that the inhabitants of Kvillebäcken can book online is also intended to reduce the need for self-owned cars.

Biogas: the environmental objective is to collect 70% of the food waste generated by the inhabitants of Kvillebäcken and then, by treatment in the region, make it into biogas that is used as car fuel instead of gasoline or diesel. The use of a smart waste collection system makes it easier to separate out different types of waste.

Replication and scalability

The overall aim of the development of Kvillebäcken is to set a new model for sustainable city planning and building. Kvillebäcken consists of a number of demonstration projects, such as smart systems for waste collection, heat storage and the use of district heating for appliances, as well as lower car parking standards and improved cycle storage. Each of these demonstration activities are in general possible to replicate in another context or city, so long as the necessary geographical, economic, political and cultural factors are in place.

The project was funded by the Swedish Delegation for Sustainable Cities and has thereby been promoted as a platform for knowledge sharing between top-of-the-line projects in Sweden. This means that the project is seen as a role model for sustainable building and living. Several studies and reports have been written on it, increasing the possibility for other cities to learn from it.

Kvillebäcken is itself a result of a passive house that was built in 2008 in Gothenburg; Hamnhuset. This building has set an example for energy efficient buildings and smart systems in Gothenburg. With a quarter of the heating requirement of a normal apartment building, 75% lower CO₂ emissions, the same rent and a healthier indoor environment, it has become an exemplar for the building of a new city district. More than 9,000 people have made study visits to Hamnhuset. A conclusion from this is

that, since Kvillebäcken is itself a replication of a previous experience in Gothenburg, it could in turn offer opportunities for replication in other cities.



Hamnhuset – Built in 2008 to Passive House standard

Integrated building blocks

The main focus of Kvillebäcken has, from the beginning, been on energy saving and reduced carbon emissions through an integrated approach. To achieve this a number of private and public sector companies have worked together with the municipality in order to achieve several solutions that all fit together in the necessary way to have a greater impact. The consortium has had to tackle issues such as new building materials, new ways of handling indoor environments, new transport technologies and infrastructure, public spaces and ICT solutions to give the area an improved environmental profile. Throughout the project the focus has not only been on technological issues, but also behavioural, economic and political issues and benefits for the area and wider city.

Monitoring and reporting

The project is monitored in many ways. There is a common vision (Kvillebäcksfördraget) and a common programme for sustainable development in Kvillebäcken, with guidelines and requirements for planning, design and construction.

Every construction project is monitored by the overall environmental coordinator who analyses the project in connection to a common environmental plan. The partners also come together to share knowledge and difficulties and report on the project progress and results. All buildings are certified by a third party through a Swedish system called *Miljöbyggnad* (environmentally adapted building), which makes it possible to compare the project's performance with other projects in Sweden. Every year the project results are reported to the National Board of Housing, Building and Planning.

To date the carbon emissions saved by the energy standards in Kvillebäcken are at least the same as the ones for the Hamnhuset project. In Hamnhuset CO₂ emissions decreased by 75% compared to a regular residential building. It was profitable from day one, with the same rent as other new buildings and good indoor comfort. Hamnhuset has contributed to EU 2020 climate and energy goals by avoiding 60 tonnes of CO₂ emissions per year, from one single building.

Key winning elements of success

Political leadership with a long term approach

The Kvillebäcken project emerged from political decisions taken some time ago, in relation to the transformation of an old shipyard area in Gothenburg. The shipyard was closed down in the 1970s, and the City Council has worked to find new ways to utilise this area since then, which today has resulted in a fast growing and entirely new part of Gothenburg. This process has, during the last decade, had a focus on the key political objectives of housing, eco-living and mobility. A big part of this work has been carried out by the municipally owned property developer Älvstranden Utveckling AB using their model for cross-sectoral development and cooperation. The transformation of this area would never have been possible without the long term political will to do this. Life cycle cost calculations have been a key tool in making the project financially viable.

Collaboration and dialogue with all stakeholders

Major stakeholders in the Kvillebäcken project are the City Planning Authority of Gothenburg and Älvstranden Utveckling AB that runs the project, other project partners (investors), other planning authorities within the city, green tech companies through the network Eco-Ex, the energy company Gothenburg Energy and Business Region Gothenburg.

Älvstranden Utveckling AB is the property developer, a municipally owned public-private partnership with a focus on the development of the area. The partnership has functioned as a type of platform within which the municipality, together with private companies, has planned, through mutual discussions and negotiations, how to use the available land. The partnership has also functioned as the central project manager when it comes to the actual development of the area. It has also taken care of dialogue with stakeholders.

Within the partnership, eight building companies have engaged in the process of developing the area, and through this they will be able to make their mark on the new city district. They have worked together with housing companies, municipal authorities, citizens, architects and developers, the waste authority and the energy company.

In addition, there has been some controversy around Kvillebäcken within Gothenburg because it was built on a much contested brownfield site; there are some actors that think the land could have been put to better use than it has been. As a consequence, the initiative has been communicated and discussed with community groups, NGOs, companies and political organisations, with the aim of generating greater support for the project.

Cross-sectoral cooperation and engagement of the kind described above has been a prerequisite for success in such a complex and unusual neighbourhood development project as Kvillebäcken.

Contribution to multiple policy objectives

The Kvillebäcken project is part of many different political strategies and objectives. One dominant political objective is the provision of housing in the central part of the city. The area is strategic for housing because it is close to the city centre and well provided with public transportation. Densification is also an important policy objective in Gothenburg, enabling the city to more efficiently use existing infrastructure and reinforce the centre. The link between energy and economics is also clear. Achieving energy objectives and not having to raise rents was the driving force of the project from the beginning. A life cycle cost perspective became the solution to this.

Kvillebäcken is also an attempt to find ways to fulfil the city's climate objectives, including those set by the Covenant of Mayors. These issues have been key for a long time in Gothenburg and there is strong support for it.

Business models to attract investment

The project has been modelled around a public-private partnership approach, funded by public and private property developers (building companies) and also by tenants and apartment buyers. For the six demonstration projects the project received 30% of the extra costs (35 million SEK, approximately €4 million) in funding from the national Delegation for Sustainable Cities.

Designing the project to meet the Delegation for Sustainable Cities' core objectives and priorities was key to securing this funding. The work in Kvillebäcken has had a holistic approach that focuses on the design of the buildings as well as the energy systems used, as part of wider sustainable city planning objectives. In this, many of the learnings from working in Hamnhuset have been taken into account. This means that the use of a step-by-step approach, with learnings from previous buildings, has been important for success.

Investment is about 4% higher for passive housing (Hamnhuset FTX) with solar panels compared to the equivalent building constructed according to Swedish building regulations. The return over 10 years is estimated to be 5.8-7.3%, so the investment is therefore profitable. Life cycle cost calculations were seen to be important as this allowed the project to become financially viable.

Promotion of the initiative

The Kvillebäcken project is a much talked about initiative both within Gothenburg as well as internationally, mainly because of its high ambitions for environmental sustainability. Because of this, the project has been promoted within Sweden as well as internationally. It continues to attract study visits from city planning professionals from all over the world. It has also been presented at conferences and seminars by representatives from the municipality as well as from Älvstranden Utveckling AB, the public-private partnership that is in charge of the initiative.