Smart Housing Småland – A ten year innovation process for smarter city housing

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1. Summary

The vision for Smart Housing Småland is that the Swedish region of Småland, in ten years will be an internationally leading innovation environment that creates smart housing and sustainable built environment based on glass and wood, with focus on the user.

The innovation environment aims to redirect a technology-driven industry to a market-focused business with increased service content. Business opportunities are created through innovative technology and industrialized construction processes to meet the housing shortage in Sweden and internationally, and contribute to more sustainable housing and buildings of high architectural quality.

New ways to combine glass and wood create new values for future smart housing. Smart means housing and built environment that is sustainable, desirable, flexible and affordable. Transparent intelligent glass products are combined with new bio-based materials and industrial construction for increased functionality, attractiveness and environmental benefits, including energy efficiency.

The renewal in the region will be achieved through:
- Active forums for collaboration
- Design and architecture processes for innovation with the user in focus
- New values by industrialized construction, transparent intelligence and bio-based materials
- Increased capacity for innovation and internationalization

The initiative builds on a broad mobilization of industry, research at Linnaeus University, Jönköping University, Glafo – the Glass Research Institute, SP and county councils, regional councils and other public bodies in all three counties of Småland. The initiative is co-funded by VINNOVA – Swedish Governmental Agency for Innovation Systems. The total funding for the ten year program will be around 20-25 M€.

2. Background

Wood and glass are two of the most important industrial branches in the Småland region. For most companies, the market trend has been weak during the last decades, especially for the industrialized housing production industry in the region.

Sweden’s housing production collapsed after the financial crisis 20 years ago. The current construction rates corresponded for many years to approximately half the levels per capita in surrounding countries. In recent years, most European counties have experienced a corresponding housing supply collapse, despite increased urbanization. Significant needs for new urban housing construction are therefore anticipated.

At the same time there is an increased demand on the sustainable use of energy and natural resources, thus increasing the attractiveness of renewable resources such as wood and bio-based materials. A long-term specialization in industrialized wood construction in Sweden, and particularly in the Småland region, in combination with significant forest resources, makes Småland and Sweden an interesting test market for internationally viable housing solutions based on renewable resources.

The first industrial revolution in Swedish wood construction was initiated by the 1930’s single-family housing programs in the cities, see figure 1. A prefabrication industry was created, primarily in Småland to deliver single-family houses to the larger Swedish cities. This industry has ever since delivered the vast majority of single-family houses in Sweden, which we believe is internationally unique.
The second revolution began in 1994, when the construction regulations were changed to allow the construction of multi-storey buildings with wood. This has led to a steady but slow development of industrially produced multi-storey buildings with wood structures, now about 10-15% of the Swedish multi-family housing market. One successful forerunner in this development has been the city of Växjö in Småland. However, we believe that there is a significant potential for increasing this market share through an increased number of suppliers of industrially produced housing concepts.

Smart Housing Småland aims to contribute to the necessary re-start of housing construction and boost the share of wood based construction in Sweden by supporting innovation in the wood based housing industry, currently dominated by small and medium-sized companies with weak research and innovation capacity. The initiative will also contribute to an increased international focus for the companies.

Småland is also historically a region of glass industry. Particularly well known are the design oriented manufacturers of domestic and art glass products. But the region also houses a dominant share of the plane glass and windows industry. In recent years, innovative solutions for plane glass applications have been developed – an area we call “transparent intelligence” – but the use is still very limited in the window and building industry. By applying innovations such as load-bearing wood-glass combinations, transparent solar panels, interactive surfaces etc, the industrialized wood construction industry may be able to supply more attractive while still more space and energy efficient and economical housing solutions.

The major challenges for the success of the initiative are:
- Lack of industrial development and innovation, primarily in the house industry, but also other relevant part of industries.
- Weak culture of collaboration in innovation clusters.
- High-quality but fragmented academic research in the region within the Smart Housing Smålands focus areas with a rather weak overview of housing and the built environment.
- Long public decision-making processes for housing construction in Sweden complicates the use of urban development projects as innovation driving processes.
3. **Strategy to achieve the strategic idea and vision**

Smart Housing’s vision will be achieved by creating a comprehensive customer-driven *innovation pressure* that encourages the development of innovative products and production methods. The overall approach in the mobilization phase (years 1-2), is to actively work to create that pressure, focusing on a broad range of innovation areas, see figure 2.

![Figure 2: Innovation areas that will be addressed in Smart Housing Småland.](image)

The starting point for the development of the environment is a core group of companies working with architecture/design, manufacture/construction of houses with a high degree of industrialization and product development within transparent intelligence. These companies should lead the way and actively develop the industry. We have identified six key strategies and two supporting strategies to achieve this:

- **Meeting places** to stimulate *innovation willingness*. The successful “future workshops” in the planning process confirms that there are many innovative ideas not yet applied commercially. A main reason is a lack of communication. By establishing communication forums between companies in the core group, researchers and students, users and clients, development opportunities are identified and collaborations initiated.

- **Feasibility study and business development projects** will demonstrate the *opportunities for innovation*. Companies will be offered support and assistance for short projects with quick decision-making. The intention is to develop their business and to create a continued willingness and ability of companies to develop, individually and in networks. The projects are to a large extent initiated via the meeting places.

- **Prototypes and demonstration projects** will create *demand and interest* from customers and users of innovations for smarter building and housing with high architectural values, and thus the commercialization. Prototype activities will include digital and real prototypes, showcasing individual products and components that are results of feasibility studies and business development projects. Also, full scale housing concepts/prototypes, e.g as volume module elements, will be built and demonstrated. At least one new version per year is planned.

- **Urban development projects** to stimulate *innovations in urban development* with respect to housing. Using the Växjö development project “Välle Broar” as one model, we will actively work with urban development projects both in Sweden and internationally to create a demand for innovations among customers/developers and in municipalities. There is also a possibility and need to influence city planning and building regulations. The projects will contribute to and increased communication between producers and major customer groups and will create new business opportunities for innovative companies.
Research and innovation projects will create the basis for new cutting-edge innovations within Smart Housing. During the first phase, a number of research programs based on needs from enterprises and society, identified through feasibility studies, etc will be initiated. In order to be able to deliver new cutting edge knowledge in 5-6 years, resources will be allocated in the initial years to search for further external research funding nationally and internationally, such as through Horizon 2020.

Internationalization A goal is that a substantial part of innovative housing products, components and concepts will reach international markets. This requires new approaches for exports and other forms of internationalization of concepts, through a long-term international engagement of companies.

The learning and communication strategies are supportive strategies in Smart Housing. The continuous learning process will focus on evaluation linked of the performance within the strategies outlined above. The communication strategy will support a continuous interaction between stakeholders in the environment, and the development of strategic partnerships nationally and internationally. A main strategy for the communication is to use the visibility of urban development projects and the prototype activities.

4. Contact details

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