

What is needed for a market breakthrough in the construction of passive houses, and the conversion of existing buildings to passive houses – Analysis from a series of seminars

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Abstract

The area of Västra Götaland is now at the forefront in Sweden regarding the construction of low-energy buildings. Despite the significant increase in the construction of new passive houses and low-energy buildings, a much larger breakthrough is needed in order to reach the national target of 20 % less energy consumption by 2020. But what is needed to increase the rate of construction of low-energy buildings, and particularly, the conversion of existing buildings, locally in Västra Götaland?

Incentives intended to stimulate this construction currently exist through initiatives such as LÅGAN and the Region Västra Götaland's programme for energy efficient buildings, which provide support for sharing experience and knowledge accumulated through demonstration projects. At the same time, the Swedish Energy Agency is studying possible major incentives for low-energy buildings, and has started working with a target of 500 demonstration buildings by 2016.

In order to compile the views of stakeholders regarding future trends, stakeholder needs, and the support required, a series of seminars has been held in Västra Götaland. In June 2011, three seminars including workshops were held at which community planning, good examples, possible forms of support, and expertise regarding the construction of low-energy construction in local communities, were presented.

The results show that there are several factors that are required in order for a marketing breakthrough for low-energy buildings to occur. The main factors are:

- a better understanding on the part of all stakeholders in the industry (customers, consultants, architects, craftsmen, decision-makers, financiers and others),
- stricter and clearer building rules, incentives and penalties, and political decisions,
- more energy-efficient behaviours on the part of the consumers,
- better cooperation and sharing of experience both in building projects (customers, contractors, consultants), administration (operating personnel, consumers, plant management), and
- monitoring, including the measurement of energy consumption and evaluation of projects, through the sharing of experience and the dissemination of information.

Many of these obstacles and opportunities can be resolved locally through cooperation within one's region. However, there is a need for a great deal of support of progress.

In summary, the attendees appreciated this form of information dissemination, and the fact that it can be used as a tool to stimulate activities promoting energy-efficient building on the local level.

Introduction

The construction of low-energy buildings has increased markedly the recent years, but despite the significant increase in the construction of new passive houses and low-energy buildings, a much larger breakthrough is needed in order to reach the national target of a 20 % decrease in energy consumption by 2020. At the same

time, a new report from the IEA show that the climate targets will not be met [World Energy Outlook 2012]. Stronger incentives and/or penalties are needed globally in order to change direction toward the international target, and to limit the long-term increase in average global temperature to 2°C.

Implementation of the recast Energy Performance of Buildings Directive

The recently recast Energy Performance of Buildings Directive [EPBD 2010] provides that the nearly zero-energy standard should be applied to all newly built public buildings by 1 January 2019, and for all newly built buildings by 1 January 2021. Each Member State sets its own definition of nearly zero-energy buildings (nZEB). The Swedish Government determined in a written communication that the new construction requirements for 2021 should contain more stringent requirements for energy conservation than the requirements that apply according to current building regulations (2012), at least, for most categories of buildings and climate zones [Government communication 2012]. In addition, the Government found that there was currently not enough documentation for quantified guidelines regarding how much more stringent the requirements should be made. This issue should be determined on the basis of thorough documentation that would include evaluation of existing low-energy buildings, certain demonstration projects regarding new energy-efficient buildings, financial analysis, etc. Only increases in the stringency of requirements that are justified environmentally, and from the perspectives of property management, and the national economy, should be implemented.

The Government position is that incentives should be implemented in order to facilitate the implementation of nearly zero-energy buildings. These incentives have a two-fold general purpose: reducing learning costs in order to contribute to minimising the added costs of constructing energy-efficient buildings, and gaining a greater understanding that would help to base the final and legally-binding definition of nearly zero-energy buildings on solid documentation. The year 2015 should serve as a checkpoint in Swedish implementation of the requirements of the Directive regarding nearly zero-energy buildings. By that year, the following qualitative objectives should be reached. A sufficiently large number of relevant incentives must be implemented and followed up in such a way so that there has been a significant improvement in the documented understanding of the relationship between more stringent energy conservation requirements and other requirements regarding technical matters, actual additional costs associated with constructing energy-efficient buildings, and actual environmental gains resulting from energy-efficient construction.

As a result of this, the Swedish Energy Agency is studying the possibilities of offering larger incentives for low energy buildings, and has begun working with a target of 500 demonstration buildings by 2016. The details of these incentives are being discussed and should be completed by the autumn of 2012.

LÅGAN and the Region Västra Götaland's programme for energy efficient buildings

There are currently two programmes intended to stimulate progress in this area: LÅGAN and the Region Västra Götaland's programme for energy-efficient buildings, which support the sharing of experience and the development of knowledge in demonstration projects.

The LÅGAN (a Swedish acronym for buildings with very low energy consumption) programme is the result of cooperation among the Swedish Energy Agency, the Swedish National Board of Housing, Building and Planning, the Swedish Construction Federation, the Region Västra Götaland, Formas, property owners, contractors and consultants, in an effort to increase the number and percentage of low-energy buildings being built (www.laganbygg.se). LÅGAN is meant to encourage energy-efficient construction and conversion, increase the focus on a national market for buildings with low energy consumption, as well as contribute to a broad national range of suppliers of products and services and increase customer security. The programme engages in incentives, and is currently involved in 35 projects relating to energy-efficient construction, of which 11 are low-energy building demonstration projects.

The Region Västra Götaland's first programme for energy-efficient buildings (2008-2010) used project subsidies, cooperation and activities to increase the market for, and the construction of, energy-efficient buildings in Västra Götaland. During the period of the programme, new construction of low-energy multi-

family dwellings picked up speed in Västra Götaland. In 2010, it broke all records, when the percentage of newly built apartments in multi-family dwellings that had energy performance at least 25 % better than current building norms accounted for 24 % of newly constructed apartments in Västra Götaland. This can be compared with national figures that show that only 11 % of the total apartments built had at least 25 % lower energy consumption than the building norms [Wahlström et al. 2011]. There are many factors that contributed to this successful outcome, such as the programmes and support of the Region Västra Götaland, enthusiastic and committed individuals, and a tradition of cooperation amongst stakeholders, municipalities and municipal companies in the region.

In the case of non-residential space, there is also progress, albeit at a somewhat slower pace. However, conversions of this category to low-energy buildings show a considerable lag. In response, the Region Västra Götaland has authorised an additional programme period (2011-2013) with the objective of reducing energy consumption in buildings, and creating a domestic market for energy efficient buildings in Västra Götaland (www.vgregion.se/energieffektivbyggnader). The focus is on increasing energy efficiency in conversions and renovations, with an emphasis on the challenges relating to repairing and improving the apartments built from 1965 to 1975, as part of the Million Programme. The target is to implement at least ten new demonstration projects using techniques and methods for energy-efficient conversion.

Building for the future

In light of the major initiative involving demonstration buildings that is being planned for nationwide implementation, and the objectives of the two programmes, LÅGAN and the Region Västra Götaland programme for energy-efficient buildings, more knowledge is needed about what can accelerate the construction, and, more particularly, the conversion, of existing buildings. Issues here include what the stakeholders can do on the local market, and how major incentives can be structured in order to provide the best support of energy-efficient construction. In order to compile the views of the stakeholders regarding future development, the needs they have, and the support required, a series of seminars has been conducted in Västra Götaland. In June 2012, three seminars with workshops were held at which community planning, good examples, support opportunities and skills/expertise for low energy building in localities were presented. This series of seminars was implemented under the title of "Building for the future".

Implementation of the seminar series and workshops

The seminar series was implemented in three locations in Västra Götaland:

- Uddevalla, 5 June, 9.00-13.00, Uddevalla Museum
- Borås, 12 June, 9.00 13.00, Pulsen,
- Skövde, 13 June, 9.00 13.00, Billingeus

The seminars were intended for public and private property owners and managers, as well as consultants and persons working with property issues in a municipality (e.g. city planning office, development, land allotment). Each seminar is introduced by a local stakeholder (public officials, civil servant, or a person active in the industry) who highlighted the current situation and future challenges in the local area.

The seminar series was announced on the websites of LÅGAN, the Region Västra Götaland and the Swedish Society of HVAC Engineers. In addition, a direct mailing was sent to those on the mailing lists of the Swedish Construction Federation, the Region Västra Götaland and the Swedish Society of HVAC Engineers. Mailings were done two weeks and one week before the first seminar.

Objective

The objectives of the seminars were to:

- Promote energy-efficient building locally (new construction and conversion)
- Provide information about opportunities for support

The benefits that the seminar series was expected to give its participants were:

- Increased activities on the local level
- An opportunity to make new connections

- The opportunity to obtain support from the two programmes

The benefits that the organisers were expected to derive were:

- Knowledge regarding the form of support that would be required
- An understanding of opportunities and obstacles

The knowledge obtained by the organisers should be used to affect the design of the Swedish Energy Agency's new incentives.

Good examples

Good examples have previously been identified as one of the most important factors new stakeholders need in order to produce new breakthroughs. In order to present good examples, the seminars were designed so that two good examples from each local area were presented at each seminar by the local stakeholders themselves. In addition, at each seminar, a contractor gave a presentation of how their organisation implements knowledge and experience derived from good examples. See programme in Table 1.

In addition, an information book was produced containing good examples from the LÅGANBygg, which was distributed at the seminars [Wahlström et al. 2012]. This information book contained interviews with stakeholders who chose to construct low-energy buildings. LÅGANBygg (www.laganbygg.se/marknadsoversikt) is one of the tools developed to stimulate a breakthrough on the market, and its objectives are to:

- Present good examples in order to increase the market for low energy buildings.
- Show what is happening nationally, and identify those stakeholders and regions that are actively working to increase energy efficiency
- Quantitatively assess how much new construction and conversion to low-energy houses contribute to reducing energy consumption on the national level.

Table 1: Program for the series of seminars

Uddevalla	Borås	Skövde
Investments in Uddevalla <i>Partik Petr�, Teknisk chef i Uddevalla kommun</i>	Investments in Bor�s <i>Anette Carlsson, Vice ordf�r�nde kommunstyrelsen</i>	Welcome to Sk�vde <i>Maria Skoog</i> <i>Sveriges Byggindustrier</i>
Reconstruction of the multifamily houses area �ng�n. <i>Andreas Sk�leg�rd, Uddevallahem</i>	Tehuset -one of Sweden's most energy efficient hospital <i>Bengt-Ove Str�m</i> <i>V�stfastigheter</i>	H�llekis sports halls, the first passive house for ball sports and gymnastics <i>Fredrik Hedman, G�tene och Skara kommuner</i> <i>Anders Olsson, Paroc</i>
The passive houses in �stra Tjuvsundsberget and Soten�sbost�der's work with low energy buildings <i>Roy Grah�, byggchef Soten�sbost�der</i>	The housing company that are thinking low energy both in new construction and retrofitting <i>Bengt Engberg, AB Bost�der</i>	The kindergarten Tr�dg�rdsstaden -possibilities and obstacles with a passive house <i>Bj�rn Adler</i> <i>Sk�vde kommun</i>
Skansas's experiences and knowledge increase for low energy buildings <i>Anneli M�l�rg�rd, Skanska</i>	NCC's experiences and knowledge increase for low energy buildings <i>Christina Claesson-Jonsson, NCC</i>	Skansas's experiences and knowledge increase for low energy buildings <i>Agneta Wannerstr�m, Skanska</i>
Workshop		
Region V�stra G�talands' programme for energy efficient buildings Kristina K�ck, Milj�sekretariatet V�stra G�tlandsregionen		
L�GAN and L�GANbygg, �sa Wahlstr�m, CIT Energy Management		

Workshops

A workshop was conducted as part of each seminar. Its purpose was to highlight the future needs of various stakeholders in the industry. The combined results are expected to provide local analyses about what we can do, and what is needed for future development, as well as an analysis of the importance of good examples, and a description of present needs and the support needed to enable us to achieve the goals. Each workshop was divided into four stages:

1. A short introduction regarding the global situation and the greenhouse effect, the new nearly zero-energy directive's requirements for new construction, and new opportunities for increased incentives by government agencies.
2. Revolving small group discussions regarding the issue: **What** is required in order to move from "that's how we've always done it" to construction and conversion that brings us down to nearly zero-energy building?
3. Group work for 4-6 persons, who, based on the answers given in the revolving small groups, discussed the issue: **How should** we do this?
4. Reports by each group.

Evaluation

The seminar series was evaluated using an on-line questionnaire sent out the day after the last seminar.

Evaluation of the seminar series

A total of 88 persons attended the seminar. Uddevalla had 23 participants, Borås, 25 and Skövde, 40. In summary, the attendees appreciated this form of information dissemination, and the fact that it can be used as a tool to stimulate activities promoting energy-efficient building on the local level.

Of the attendees, 53% responded to the evaluation questionnaire. Of these, 57% gave the seminar and workshop a favourable evaluation, whilst 41% saw these as mediocre. More than half reported having received information that would be beneficial in their daily work, and an additional 41% felt that they may have some use of it. Regarding new contacts, 26% reporting making new connections that would be beneficial in their daily work, and an additional 43% reported making contacts that might possibly be of some use. A total of 91% want LÅGAN or Region Västra Götaland to arrange additional local activities in order to increase cooperation among stakeholders, while an additional 7% might conceivably want additional activities. In general, the evaluation results were better in the case of the seminars in Uddevalla and Skövde, compared with Borås.

The open-ended comments largely praised the local seminars and local examples. The mix between lectures and presentations was experienced as positive, the response to the workshops was favourable, and the half-day schedule was appreciated. The inclusion of the workshop part was appreciated, but viewed as much too short to actually produce the desired effect. Several respondents felt that the seminars ought to have attracted more attendees.

Results of the workshops

Each workshop began with revolving small group discussions regarding what is required in order to move from "that's how we've always done it" to construction and conversion that brings us down to the nearly zero-energy level.

Key words about what is needed were written on post-its. In Uddevalla and Borås, each post-it was presented separately, and through a common discussion they were combined into different areas/headings. The results showed that the following headings could be used to summarise the various areas:

- Knowledge
A better understanding is required of all stakeholders in the industry (customers, consultants, architects, and craftsmen), as well as of decision-makers and financiers.

- Regulations, incentives and penalties, and political decisions
More and clearer rules are needed, as well as greater control both by national legislation and local public officials
- The users and their behaviour
The users of the building need to behave in a more energy-efficient manner.
- Collaboration
Better cooperation and sharing of experience are needed both relating to building projects (customers, contractors, consultants) and management (operating personnel, users, plant management).
- Monitoring
Measurement of energy consumption and evaluation of projects. Sharing of experience and dissemination of information.

In Skövde, these headings were put up immediately, with the attendees placing their post-its under them (because of the large number of attendees, there wasn't time to read aloud each of the post-its).

Work in groups of 4-6 persons followed, in which the issue of what we should do was discussed based on the answers given in the revolving discussions. The results are reported below, and reflect a focus on the following issues:

- What can I/my organisation do?
- We can we do together on the local and regional levels?
- What support do we need in order to do this?

Knowledge

Education on all levels was proposed as a way to increase the store of knowledge. A good work-related education is needed from the beginning, as well as continuing education in the organisation to which a person belongs. One important task that attendees can do on their own is to utilise the certification systems or energy and environmental expertise represented by coordinators who are active in the market. In such a way, the customer can obtain assistance regarding the necessary knowledge about how to make a purchase, while, at the same time, improving his or her own expertise. The customer's organisation can also pose requirements in the form of number of hours of energy training per employee, and the customer can make corresponding demands in connection with procurements. However, support is needed for education in small companies of all categories (architects, builders, consultants, etc.).

In addition, local networks and forums are considered key factors in skills development, and initial support can be needed here (e.g. seminars similar to these). Support is particularly needed for producing an easily accessible knowledge bank, containing good examples about what is known to work well. In addition, support is needed to communicate knowledge to consumers, in general.

Regulations, incentives and penalties, and political decisions

Requests in this area were for more stringent building regulations, as well as clear and timely information about future legal requirements. In addition, the attendees felt that the municipalities should have higher ambition levels, with long-term decisions that would include clear guidelines for implementation (e.g. how energy, the environment, and the economy should be weighted in decision-making). One recurring obstacle is the Public Procurement Act (LOU), which often blocks projects that have high ambition levels. In this area, one's own organisation can help by working politically to achieve a change in these issues.

Incentives and penalties relating to increased conversion and building were requested, such as exemption from VAT, ROT or similar measures, etc. One's own organisation should also use its efforts to give incentives and rewards. These may include agreements between contractors and customers according to the Sveby model (www.sveby.org). Another example is the Green Deal (a consultant or energy company that reviews savings opportunities relating to property, and then supplies a loan and takes part of the savings. The investment costs are then evened out over time).

One thing, above all, that a person can do is to actively work with LCCs (life cycle costs) , such as taking part in tender procedures. The support needed here is to raise the level of knowledge on the part of decision makers, produce more policy frameworks, incentive tools, LCCs, etc.

The users and their behaviour

Achieving a low level of energy consumption requires the participation of the users, and this is done through various incentives and penalties.

One's own organisation can do a great deal by ordering and installing technology that is comprehensible, and contains information about energy consumption that the users can benefit from. Energy and water consumption needs to be clarified for the users where there is a connection to the users' own consumption. Behaviour can then be influenced using various forms of charges (individual metering).

It is important to promote understanding and commitment on the part of all users (residential, schools, offices, etc), and one can do a great deal within one's organisation. However, outside support in the form of energy counselling, campaigns, information in schools are also important factors. In general, we also need more information about behaviour in this area.

Collaboration

The fact that a greater number of stakeholders are involved in project planning at an earlier stage can be a factor that contributes to success. This is something that an organisation can implement by them self by allowing a little more time, early on, to creating an open process, with clear project goals, where all stakeholders (including users) participate. Enthusiastic and committed individuals are important here. It is crucial to oorganise cooperation with diversity and broad expertise, and then avoiding delegations, but keeping everyone together throughout the project.

A good method is to develop platforms that can help transfer good examples and experience to other building projects. Partnering is a good tool to increase collaboration, but the Public Procurement Act (LOU) often prevents this phenomenon. Support can be needed for the development of standards for collaboration forms and agreements.

Monitoring

Monitoring, on one hand, requires measurement of energy consumption and evaluation of projects, and on the other hand, increased sharing of experience and dissemination of information. When requirements are to be applied to purchasing, the method of monitoring compliance with these requirements must be planned from the very beginning. In addition, it is crucial to ensure that this monitoring will actually take place. This ensures that we get functioning buildings with functioning products. An organisation can work with setting clear monitoring requirements, but more stringent monitoring by municipalities, etc. is also needed.

An understanding of measuring is also important in order to ensure that the right items are compared with other building projects when sharing experience. Support is needed here for the preparation of standards for measurement (such as those prepared via Sveby). Forming networks for optimising operations, benchmarking, and comparison of products can also serve as good incentives. Demonstration projects and reference projects are important factors here. The idea is not just to produce an evaluation, but also to find forms for sharing experience and disseminating information regarding the results.

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