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Policy instruments to improve energy efficiency in buildings

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REGION DALARNA



Summary

The newly adopted energy efficiency directive (2012/27/EU) highlights the importance of energy efficiency in reaching the Union's 2020 targets. The directive commits member states to defining national energy efficiency targets (art. 3), achieving yearly energy savings of 1.5% of the annual energy sales through the energy efficiency obligation scheme (art. 7), and providing a long-term strategy for the building sector that aims at a 3% refurbishment rate for public buildings (art. 4+5). Buildings currently account for 40% of energy use in most countries, putting them among the largest end-use sectors.

This report takes a closer look at the best practices for implementing increasing energy efficiency in different regions and countries in Europe. The final aim is to identify some policy tools to be suggested to the region of Dalarna (Dalarna having been chosen as the pilot county in Sweden) as a means of implementing energy efficiency in the building sector. The final objective is to give analysts and decision-makers a better analytical foundation to explore future policy development in the area of buildings to be proposed and tested at the regional level in Dalarna and later at the national level in Sweden.

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1 Introduction

The building sector has been identified as one of the key sectors to achieve the 20/20/20 targets of the EU. Beyond these targets, Europe also aims to bring about greenhouse gas emission reductions in the building sector of between 88 and 91% compared with 1990 by 2050 [COM(2011) 112]¹.

Directive 2010/31/EU on the Energy Performance of Buildings (hereafter called the “EPBD²”) set the framework and boundaries to proceed along this track. Among other items of the EPBD, two mechanisms will be decisive for the development of the building sector:

- The principle of nearly zero-energy buildings (Article 9 and article 2.2);
 - The principle of cost optimality (Article 5, article 2.14 and Annex I of the EPBD recast).
- In both cases, member states have to report to the European Commission (“EC”) regarding related activities, progress and results.

In Sweden, policy initiatives to reduce energy use in buildings date back to the 1970s. Sweden also has the environmental goal of reducing energy use in homes per unit of area by 20% by 2020 and by 50% by 2050 (Proposition 2004/05: 150; Proposition 2008/09: 163; www.miljomal.nu)

Currently, a mix of regulatory, fiscal, informational and market-based instruments is used to promote energy efficient technologies and behaviour in the residential sector in Sweden. However, there is a lack of research on how different policy instruments encourage energy users to engage in actions that reduce energy use.

Dalarna during the period 2010-2012 has been one of the government designated pilot counties to implement energy efficiency in the building sector. Because Dalarna has been one of the most active regions in terms of this issue, it would be interesting to investigate the implications of national policies for climate change mitigation and energy transition at the regional level to identify gaps, barriers and opportunities, as well as the need for adjustments and additions to current energy efficiency policies in the building sector.

In this report, we present the results of our investigation into the effectiveness of various policy instruments applied to implement energy efficiency measures mainly in some European countries as best practice examples. The final aim of this report is to investigate whether there are grounds for a larger study on existing instruments and how they can be designed and possibly complemented at the regional level in Sweden to improve the implementation of energy efficiency in the building sector. The focus is on the renovation of existing single-family and multi-family dwellings that is being carried out by large construction companies operating in Dalarna.

The overall objective of this report is two-fold:

- 1) identify interesting good examples in Europe of regional policy instruments to implement energy efficiency in the building sector;
- 2) provide a general analysis of the current situation in Dalarna, and in particular point out what obstacles and opportunities exist for regional players operating in the field.

The outcome of this study will provide the basis for a larger study, a regionally-based pilot study, where regionally-based policy instruments designed and implemented and evaluated at a later stage may be implemented at a national level. Moreover, it will provide an overview of the relevant networks/operators affected/involved and what should be included in the larger study.

¹ Communications published by the European Commission

² http://ec.europa.eu/energy/efficiency/buildings/implementation_en.htm

The study includes a literature review with a brief situational analysis of regional policy instruments in various countries and regions across Europe. To gain an overview of the current situation in Dalarna and a deeper understanding of the building sector, we also interviewed six representatives from the construction industry, local energy companies, local energy offices among others.

2 Europe and best practice examples

A great variety of financial instruments are available throughout Europe to support the improvement of the energy performance of buildings. The way member states use them varies from country to country. The conventional financial instruments include the following: grants and subsidies, loans, and tax incentives, while the innovative instruments include Energy Performance Contracting (often known as Third Party Financing) and Energy Supplier Obligations (often known as White Certificates).

Climate and energy policies often deal with the competing interests of different stakeholders. Its long-lasting effect is closely linked to its acceptance by citizens. Involvement of citizens during the course of implementation increases the chances of successfully finalizing the measures or projects. Furthermore, knowledge of public opinion gives policymakers a sound basis for making the required decisions.

When preparing policies to increase energy efficiency in the region, it is always essential to take the needs of local communities into account. However, activities need to vary to fit with the municipalities' current situation, and their advantages and shortcomings so that no community feels it is being left behind.

We begin our overview by explaining the importance of informing citizens, stakeholders and those who work in the building sector, and then we describe a number of other different policy instruments that can be used to improve energy efficiency.

1. Communicate with citizens in order to implement local energy policies successfully

Energy savings, energy efficiency and waste minimization are strictly linked to the behaviour of citizens; the potential of these savings is huge and has a long-term perspective. Therefore, policies addressed to citizens should be more attractive. Communication should be simple, clear and effective; the direct advantages to the citizen have to be identified (e.g. cost reductions or a competition with prizes). Provide training and education as a basis for behavioural change (starting with education in schools and the training of employees).

Saxony, Småland, Emilia-Romagna, Haute-Savoie are regions which have been working closely together on the improvement and implementation of energy efficiency policies. These regions opted for a common approach, exchanging ideas on energy efficiency, instruments and best practices; giving advice; and strengthening the energy efficient behaviour of citizens and local authorities.

Saxony, Germany [11]

- 1) The subproject LEEAN (Local Energy Advice Networks) dealt with communication and information, and developed a comprehensive manual for builders focusing on energy efficient refurbishment and construction. The manual can be adapted to local or regional characteristics.
- 2) EEMTE (Energy Efficiency in Municipality, Training and Exchange of Experience) was dedicated to the topics of user acceptance and behaviour in energy efficient buildings (passive houses) by conducting training courses for communal staff and by developing a passive house user manual.
- 3) Measures for awareness raising and behavioural change among school pupils, who hold a key role as multipliers in their families, were tested and enhanced by the subprojects SCC (Sustainable Climate Challenge) and E-FoxES (Energy Saving Foxes in European Schools). These strengthened and perpetuated, at a regional level, the interest and motivation of students on climate protection and sustainable energy issues in schools.

Emilia-Romagna, Italy [11]

One of the main policies of this axis focuses on facilitating the energy-efficient retrofitting of buildings, in both the residential and the public sector. Local energy planning, information and communication (EnercitEE) has been used as the main strategic regional project for communication and information with the action of identifying and disseminating good practices for energy efficiency. Thanks to LEEAN, the first steps towards the creation of a regional energy network have been taken. More than 80 organizations have been linked, which will facilitate the region's dissemination of information on energy efficiency policies and sharing of technical content.

At the regional policy level, important contributions have been made by ActEE in the area of changing citizens' behaviour and consumption attitudes and in the area of local energy planning by CLIPART. ActEE developed an innovative and low-cost communication tool package that was adaptable for use at both the local and regional levels, and was suitable for local authorities as well as energy agencies. The suggestions and results achieved will make relevant contributions in the design of the energy efficiency communication strategy of the region. CLIPART developed a practical tool (handbook) which describes a number of supporting procedures and tools for local/regional administrators who want to improve or introduce policies for mitigation (i.e. cutting greenhouse gas emissions) and adaptation (i.e. understanding and managing the impacts of climate change on the environment and society).

Haute-Savoie, France [11]

Communication with the stakeholder is the strategy used by this region. Some projects initiated by EnercitEE are still running, without financial European grants, because their outcomes help to consolidate local energy policy: raising awareness among pupils, festival-goers, municipal agents, consumers, tourists, etc. Training of technical staff in charge of event organization and those in charge of fuel poverty Improved thermal performance knowledge among building professionals.

2. **Loans**, with better terms and/or reduced interest rates, provided for building energy efficiency improvements. Typically finance all or most of an investment.

Estonia: The Credit and Export Guarantee Fund (KredEx, Estonian Credit and Export Guarantee Fund) (2001 – ongoing)

France: Green Loan for Social Housing (2009-2020)

Germany, in particular North Rhine Westphalia and the city of Bonn: KfW (German development bank's) Programme Energy-Efficient Construction (2005 – ongoing). The programme is based on a low interest rate for the first ten years, followed by new conditions for the loan. Repayment grant, possible once energy standards 40 or 55 have been achieved for new

residential building and depending of the level of efficiency achieved for full renovations. Loan: up to 100% of construction costs (excluding land). Loan may not exceed 50 000 EUR per living unit. Typical products covered: windows, heating controls, central-heating installations, insulation, ventilation systems, renewable-energy technologies, housing access and other modernization features.

3. Grants

Characteristics Grants for making energy efficiency improvements

Czech Republic: Green Investment Scheme (2009 – 2012)

Hungary: Grants for Renovation & Prefabricated-Panel Residences (2001 – ongoing)

Romania: Programmes for the thermal rehabilitation of multi-level residential buildings (2002 – ongoing).

Belgium: Walloon and Flemish regions

Typical products covered: renewable energy, insulation, draught-proofing, heating systems (including biomass, heat pumps, thermal regulation, Combined Heat & Power (CHP), solar), efficient appliances, windows and doors, district heating.

4. Subsidies

Characteristics Subsidies for making energy efficiency improvements

Poland: Infrastructure and Environmental Operation Programme (2007– 2013)

Slovenia: Financial stimulation for energy efficiency renovations and new buildings (2008– 2016)

UK: Carbon Emissions Reduction Target (2008-2012)

Typical products covered: insulation, lighting, appliances, fuel-switching biomass community heating, CHP

5. Third Party Financing (TPF)

Characteristics Investment is paid for by a third party (e.g. bank, Energy Service Company (ESCO), installer of systems)

Building owner has to pay back investment over time

Different forms of third party financing, ranging from pay-back as share of savings to financial lease

Austria: Successfully establishing a regional market for Third Party Finance (2001 – ongoing).

Netherlands: More with Less Programme (2008–2020)

Poland: Thermo-modernisation and Renovation Fund (1999–2016)

Typical products covered: heating and hot water systems

6. Trading (White/Energy Certificates) [13]

The White Certificate Scheme (certificats d'économies d'énergie or CEE), which operates in France, and the Carbon Emission Reduction Target (CERT), which applies to retail suppliers of electricity and gas serving residential customers in Great Britain. In Europe, several countries have already implemented a white certificate scheme or are seriously considering doing so. **Italy** started a scheme in January 2005, **France** a year later. **Great Britain** has combined its obligation system for energy savings with the possibility to trade obligations and savings (only among the obligated parties and through bilateral contracts). **Denmark** and the **Netherlands** are seriously considering the introduction of a white certificate scheme in the near future. **Flanders (Belgium)** has implemented an energy-saving obligation for energy grid companies without tradability of certificates. Typical products covered: insulation, heating, hot water production, lighting, ventilation and efficient appliances.

7. Tax deductions

Characteristics Deduction of personal income or corporate tax for amounts invested in energy efficiency

Examples

The Netherlands: Energy Investment Allowance (2004 – ongoing)

UK: Landlords' Energy Saving Allowance (2004 – 2015)

Typical products covered: insulation, draught-proofing and CHP. Lists of eligible technologies are frequently updated.

8. Tax rebates

Characteristics: Various forms of personal tax reductions in response to building owners' investment in energy efficiency

Examples range from personal income tax reductions to reduction of building transfer tax (stamp duty)

Examples

Belgium: Tax Rebates for Home Improvements (2003 – ongoing)

UK: Stamp Duty Relief for Zero Carbon Homes (2007 – 2012)

Typical products covered the replacement of old boilers, solar water heaters, roof installation, double-glazing, central-heating systems, energy audit, boiler maintenance, efficient appliances, insulation, draught-proofing, passive houses and zero-carbon houses.

9. VAT reduction

Characteristics Low VAT rate for energy efficiency products and materials

Examples

Belgium: Reduced VAT on home refurbishment (2000 – ongoing)

UK: Reduced Sales Tax for Energy Savings Materials (2000 – ongoing)

Typical products covered: insulation, draught stripping, heating and hot-water controls, solar panels, wind and water turbines, heat pumps, micro CHP, biomass and other transformation/restoration works KfW CO₂ Building Rehabilitation Programme (1996 – ongoing).

2.1 Energy Certificate

The energy certificate is a document prepared by an authorized body that estimates the energy needs of a building. Based on this estimate, an energy class on a scale from A to G is assigned to each building. A **Class A** building requires the least energy, while a **Class G** building requires the most. The certification of a building is intended to improve its energy performance and reward buildings that are more energy efficient. An energy-efficient building provides economic benefit to the owner because it is less expensive to run and because its investment value increases. Specialists in energy-efficient buildings can be consulted to assess a building so as to ascertain how its energy usage might be improved. An energy certificate is valid for 10 years. The certificate must be updated whenever there are renovations made to the building that can modify the performance of the building itself. Existing rules on energy efficiency (such as the control of air-conditioning systems) must be observed. Below are some examples of regions which use the energy certificate.

Lombardy Region

Lombardy records over 3,500 buildings in Class A and A+, with primary energy requirements for residential buildings in climate zone E not exceeding 25 kWh/m² year. This means that designers, builders, construction managers and individual clients and buyers are among the most skilled and innovative when compared with the national market, and perhaps the European market.

Piedmont Region

In the Piedmont region, energy certification of buildings is active from the end of 2009. To date, there are more than 210,000 certifications produced and loaded into the information system and over 6,800 accredited certifiers listed.

2.2 Some other initiatives from the EU

CONCERTO³ [5] is a European Commission initiative within the European Research Framework Programme (FP6 and FP7). Responding to the facts that buildings account for 40% of total energy consumption in the Union, for 33% of CO₂ emissions and for 70% of the EU's energy consumption and a similar share of GHG emissions that take place in cities, with a huge potential for cost-effective energy savings, it aims to demonstrate that the energy-optimization of districts and communities as a whole is more cost-effective than the optimization of each building individually, if all relevant stakeholders work together and integrate different energy-technologies in a smart way. The EU initiative under the European Commission's Directorate General for Energy started in 2005 and with more than 175 Million € has co-funded 58 cities and communities in 22 projects in 23 countries.

The results so far have been very encouraging: CONCERTO cities and communities have shown that existing buildings can cut their CO₂ emissions, with acceptable costs, by up to 50%. CONCERTO does this by implementing renewable energy sources, innovative technologies and an integrated approach. The 58 CONCERTO cities and communities integrate innovative energy efficiency measures with a substantial contribution from local renewable energy sources (RES), smart grids, renewables-based cogeneration, district heating/cooling systems and energy management systems in larger building settlements. These sets of innovative technologies and measures are optimized locally in order to take into account the specific characteristics and possibilities of the local site, climate and cultural differences or local political aspects. CONCERTO cities and communities demonstrate role-models towards zero-energy communities. The experiences and technology performance data from the CONCERTO sites have been thoroughly gathered and analyzed in the meta-projects CONCERTO Plus and CONCERTO Premium. The CONCERTO shows cities and communities how to make their energy systems fit for the future. It helps the EU reach its targets of saving 20% of its primary energy consumption and cutting its greenhouse gas emissions by 20% by 2020 and by 80-95% by 2050 (compared with 1990 levels).

3 The Swedish context

Sweden also has the goal of reducing energy use in homes per unit of area by 20% by 2020 and by 50% by 2050 (Proposition 2004/05:150; Proposition 2008/09:163; www.miljomal.nu).

On November 22, 2012, the government gave the Building and Planning Act and the Swedish Energy Agency the task of drawing up a proposal for a national strategy to improve energy performance through renovations. "A new national strategy will also drive innovation and growth in the construction sector," said the Energy Minister [16]. The strategy will cover the renovation of residential and commercial premises (both public and private buildings).

Alongside this mission, the government will by 2015 also have reviewed construction requirements in order to ensure that all new buildings from 2020 can be called near-zero energy buildings.

³ <http://concerto.eu/concerto/>

The national programme for energy efficiency has developed over time. In 2006, in its Bill entitled A National Programme for Energy Efficiency and Energy-Smart Construction (2005/06: 145), the Swedish Government agreed that energy use in residential buildings and commercial premises should be reduced by 20% by 2020 and 50% by 2050 in relation to energy use in 1995 (Swedish Ministry of Sustainable Development, 2006a). In addition, dependence on fossil fuels in the built environment should no longer exist. In 2009, the Swedish Government presented the Bill called An Integrated Climate and Energy Policy (2008/09:163), which introduced a goal of 20% energy efficiency (i.e. decrease in energy intensity) until 2020.

An important task of the Swedish Government will be to adapt the Swedish energy efficiency programme and legislation to the EU policy agenda, particularly the EU Directive (2002/91/EC) on the energy performance of buildings. Additionally, in accordance with the EU Directive (2006/32/EC) on energy end-use efficiency and energy services, the Swedish Government has submitted its National Energy Efficiency Action Plan (NEEAP) [16].

Different policy instruments have been utilized over the years to influence energy conservation and management in buildings (see Figure 1).

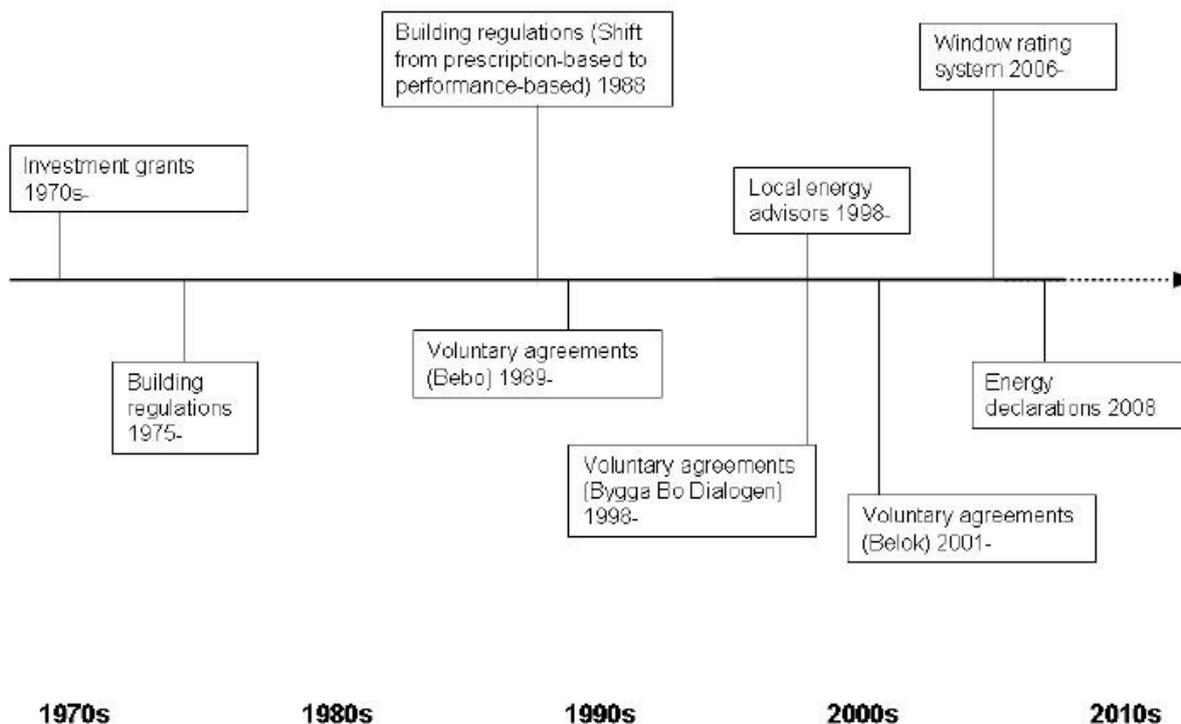


Figure 1- Timeline of key policy instruments in Sweden
Source: McCormick and Neij, 2009

We outline some important instruments used within the building sector within Sweden.

Energy declarations [16]: Energy declarations require that owners of detached houses, apartment buildings and commercial premises provide information on the energy use of buildings. Under Swedish legislation, buildings will be subject to inspections, and certain information about the energy use and indoor environment of buildings will be certified in an energy declaration when buildings are constructed, sold or rented out. An energy declaration includes the following information: the amount of energy that is used in a building each year to meet the needs associated

with normal use of the building (e.g. energy performance); information showing that the mandatory performance inspection of the ventilation system has been carried out; information showing whether a radon measurement has been carried out in the building; a reference value to be able to compare and assess the energy performance of the building; and proposals for appropriate energy-efficiency measures in the building. Only certified energy experts can carry out energy declarations. With the help of information from building owners, energy experts perform the energy certification process. The energy experts examine the data provided and develop cost-effective draft measures. The energy experts send the energy declaration to the Swedish National Board of Housing, Building and Planning, and give the building owner a report with the summary to be set up as information. Only approved companies, accredited by the Swedish Board for Accreditation and Conformity Assessment (SWEDAC), may carry out energy declarations. As energy declarations have just started in Sweden, there are no in-depth evaluations thus far. However, this is a policy instrument where evaluations will play an important role for improving the design and implementation over time.

Information and education [16]: Over the years, a number of campaigns for energy efficiency have been put into application. In 2007, in connection with the EU Directive (2002/91/EC) on the energy performance of buildings, and the EU Directive (2006/32/EC) on energy end-use efficiency and energy services, an energy efficiency home consumer campaign was launched in Sweden. The campaign provided information about energy declarations and addresses of both individual homeowners and owners of multi-dwelling buildings and premises, as well as other relevant key players (Swedish Energy Agency, 2008). The Swedish Environmental Protection Agency (www.naturvardsverket.se) also published an information and educational campaign called Climate Facts (Klimatfakta) in 2008. It provides informative packages of facts, and questions and answers about climate change. All material is free for use and can be used to create training programmes and presentations. In most cases, there have been no evaluations of the effectiveness of information and education.

Instruments for improving networking [16]: A number of voluntary associations have been developed to support a more efficient use of energy, for example, Bygga Bo Dialogen (www.byggabodialogen.se), Bebo (www.bebostad.net) and Belok (www.Belok.se). The main focus of these associations is to improve energy efficiency through improved networking and co-operation. These initiatives can be described briefly as follows: Initiated in 1998, the Bygga Bo Dialogen is a form of cooperation between companies, municipalities, national and local authorities, and the Swedish Government. The common goal is a sustainable building and property sector before 2025 in the areas of indoor environment, the use of energy and the use of natural resources.

Dalarna during the period 2010-2012 has been one of the government-designated pilot counties for green development. “ByggDialog”⁴ of Dalarna has, together with stakeholders in the building sector in Dalarna, developed a strategy to promote an increased number of low-energy buildings in the region.

⁴ A voluntary association to support a more efficient use of energy. The main focus is to improve networking and cooperation. For more details, visit <http://www.byggdialogdalarna.se/>.

4 Conclusions

Our review of the use of policy instruments in Europe leads to the following findings: the form of grants/subsidies appears to be the most frequently chosen tool. Most member states use a combination of different policy tools. Commonly, grants and subsidies are combined with preferential loans and tax reduction with tax-credit measures. All member states determine their own energy performance requirements and their levels of ambition. Sweden, for example, has no financial funding or support for the implementation, and the government is even trying to find a way to stop local authorities from having more stringent energy performance regulations for new buildings than those set down nationally [11]. All regions pointed out the very high cost of applying energy efficiency measures in existing building stock as a main obstacle for future implementation. There is also the fact that although the EU decides the content of the EPBD, it does not provide any means or tools for implementing it.

The main aspects we can point out are as follows: Sweden and Dalarna as well, lacks information, training and networking activities that promote energy efficiency. Sweden, and in particular Dalarna, can still greatly improve its design, implementation and application of policy instruments for energy efficiency. An information campaign and a network with some Nordic countries would be useful. More incentives, training, campaigns and activities aimed at encouraging institutions to be energy efficient – to help them implement the Directive in a practical way (regional/local authorities, companies, builders, citizens, tenants, etc.) – are needed.

One important aspect which became apparent from our interviews is the necessity of skills and competence development for professional people who work within the building sector. In particular, it has been noticed that at the county level, there are few experts who are qualified to work in the building sector, especially when it comes to Energy Performance Certificates at the county level. Training sessions should be set up for energy consultants, especially at the local level.

Interviews with some local representative experts in the building sector have also pointed out the importance of citizens' involvement as a specific way to achieve local and regional energy efficiency goals. The experts evaluated different approaches to involving citizens and gave an overview of new trends in soft measures.

This revealed that different framework conditions for local authorities in the different countries meant that certain energy efficiency solutions could not simply be transferred and implemented in the same way. Nevertheless, the information gained during this study could inspire local stakeholders to further promote their own energy efficiency strategies in Dalarna. Even though the topic was broad, and several local and regional initiatives existed, the discussion was still able to continue.

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