10 pages about

The heating market in Sweden

June 2014

Värmemarknad Sverige

The heating market is, besides the electricity market, the dominating energy market in Sweden. Space heating and hot tap water in homes, premises and industries represent a fourth of Sweden's energy consumption. The largest consumer group on the heating market is the single-family houses, followed by multi-family houses, premises and industries.

The heating market is dominated by four technologies: district heating, electric heating, heat pumps and biofuel boilers. District heating stands for more than 50 percent of the market energy-wise, whereas the electrically based technologies stands for almost 50 percent of the turn-over calculated in economic terms.

The heating market is both energy and resource efficient, and thereby very environmentally friendly. It plays a significant role in Sweden's ambition to achieve a sustainable development. At the same time, the actors on the market have managed to keep heating costs at a relatively low level, calculated as fraction of the household's expenditures. This is of importance since sustainability is not only about the climate issue and energy optimisations, but also about providing energy at reasonable costs.

In the project "Heating market Sweden", the actors active on the market today are represented: property owners and other heat consumers, heat producers, authorities, branch organisations and installation and fuel experts. This publication is summarising the project's analyses and results from the first phase, carried out during the period 2012 – 2014.

The project *"Heating Market Sweden"*
The project analyses the development of the heating market in Sweden as a whole. At the same time, we put the heating market in the perspective of the development of the entire energy system. The conclusions drawn have their ground in this holistic view. But, the analysis of the heating market also takes the local and the regional aspects into account, and is partly based on those.

This booklet is a short summary of the report *"Värmemarknad i Sverige" ("The heating market in Sweden")*

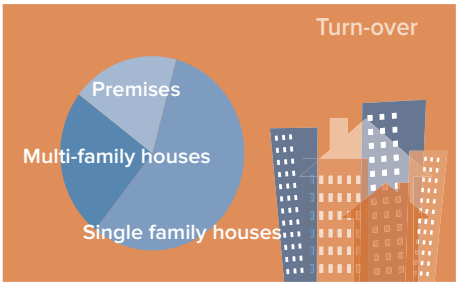
Facts about the Swedish heating market

The heating market turn-over amounts to 100 billion SEK and 100 TWh per year.

The cost of the purchased energy is 75 percent of the turn-over and the cost of the heating installations equals 20 percent. Taxes represents a fourth of the total turn-over and of these VAT and electricity tax are the largest.

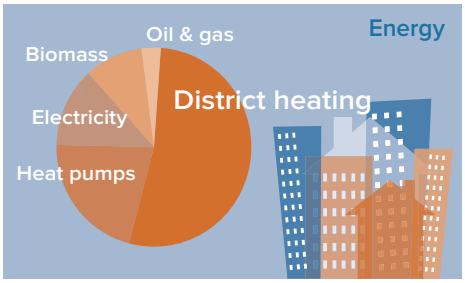
Single-family houses is the largest submarket, in SEK as well as in TWh.

It amounts to more than half of the turn-over in economic terms and covers about 40 percent of the energy demand. Multi-family houses account for 30 percent of the energy demand, and a little more than a fifth of the turn-over, while premises accounts for 25 percent of the demand and a sixth of the turn-over. Industries is the smallest consumer group.



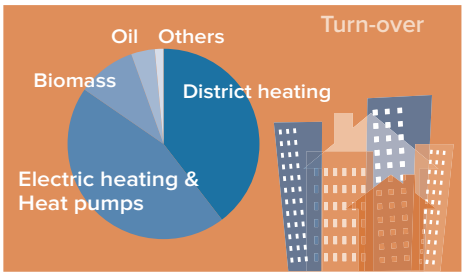
District heating is predominating in TWh and electricity in SEK.

District heating stands for more than half of the total heating demand, and a third of the heating is based on electricity. District heating is the largest heating category in multi-family houses and premises, while electricity based heating is largest in single-family houses. Electricity based heating represents 45 percent of the total turn-over in SEK, and district heating 40 percent.



The heating market has significantly contributed to increased sustainability.

As measured with the sustainability index that has been developed within the project, the heating market is the sector with the most positive development since 1970, and this positive development relates to climate and environmental impact as well as energy and resource efficiency. The industry sector also shows a positive development, while the transport sector has been less successful with its transformation.



The heating costs increase, but seen as the proportion of the household's expenditures the increase is low.
So, the market has been successful in achieving enhanced sustainability, without significantly increasing the heating's share of the housing costs. At the same time as the energy system has been transformed, it has been possible to provide heating at a reasonable cost.

The heating market consists of many local markets.
While, for instance, the electricity market is a cohesive market, the heating actors on local markets are competing with other local alternatives, which create special conditions. For instance, the price of district heating and electricity distribution vary greatly between different local markets, depending on the local conditions, e.g. size, settlement density and (for district heating) production mix.

The direct use of fossil fuels on the heating market has almost ceased,
only 3 TWh remains (30 TWh 20 years ago). Since district heating and electricity production in Sweden have a relative small share of fossil fuels, the emission of fossil carbon dioxide from heat production is small.

Analysis of the heating market's development trends

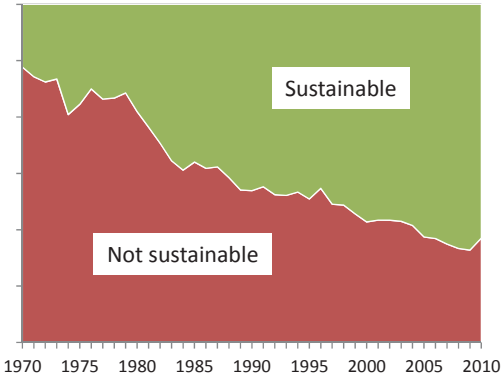
The heating market will continue the sustainable development, and this even if a large part of the transformation is already completed. Our scenarios all show a continued positive trend, and there is every reason to believe that the heating market will continue to contribute to Sweden's ambitions for a sustainable development

Increased competition on the heating market.

District heating, heat pumps, electric heating and biofuels are dominating the market today. Heat pumps are challenging electric heating, but also district heating more and more. But, the district heating's strategic strengths (cogeneration, waste heat, waste incineration and unrefined fuels) together with high heat density still give it a strong competitiveness in urban areas. Our scenario analysis shows a district heating delivery of 25 – 50 TWh by 2050 (compared to 48 TWh today). The difference between scenarios is thus large, mainly due to the magnitude of the energy efficiency efforts and the conversion to other means of heating.

The heating market has obvious and strong connections to other markets.

These connections work directly or indirectly and bring opportunities for development as well as restrictions. District heating has an especially large number of such connections, e.g. to electricity, waste management, industrial waste heat and biomass resources. The relation between the cooling market and the heating market is another example. In many premises there is a need for both heating and cooling. This is of special importance for heat pumps, and it can improve their competitiveness, but district cooling is also an alternative that is affected. The demand for cooling might increase as a result of the greenhouse effect, and from an improved standard of living. The heating market is also associated with markets that are not specifically energy related, e.g. IT, property development and consulting.



Slowly increasing prices are forecasted for energy carriers on the heating market.

For fossil fuels a relatively slow development of real prices is foreseen. This will, however, only have an indirect impact, since they can hardly be seen on the heating market today. The future electricity prices are closely linked to future European climate targets and are supposed to increase from current levels. It is hard to predict district heating prices since they vary from system to system. Also the price models are developing, towards better reflecting the underlying costs. This is most obvious for district heating, but an increasing number of electricity distribution companies are also reviewing their price models.

A continuously decreasing heating demand.

The population is expected to grow by almost 20 percent up to 2050. With a constant area standard (m^2 per person), the heated area will increase accordingly. Owing to improved energy efficiency and a low heating demand in new buildings, lower energy demand are still anticipated on the heating market. By 2050 the total heating demand from housing and premises is calculated to be 60 – 90 TWh (70 – 90 TWh by 2030). This can be compared to the demand today, which is about 90 TWh/year.

The potential for further energy efficiency improvements in existing buildings is large.

If the full potential is realised, the energy consumption for heating of existing buildings can be cut in half by 2050 compared to 1995. A number of factors have an influence on how much of this potential that will be realised, and how fast it will happen. In our scenarios different outcomes and their consequences are analysed.

New buildings will have increasingly lower specific heating demands.

Zero energy houses, passive houses, energy-plus houses – what is really technically reasonable/feasible, and what are the consequences? Our conclusion is that new buildings, since they are energy efficient and few compared to existing buildings, only will represent 10 – 15 percent of the total heating demand by 2050 (5 -7 percent by 2030). This is a relatively small part, which means that for the heating market and its development, even in a long term perspective, the existing buildings and what happens with them is of a far greater importance than new buildings.

The heating market includes an ever growing number of actors, with more and more products and services.

Already today there are many actors on the heating market (e.g. heating suppliers, heating buyers, tenants, end users, consultants, equipment suppliers, financiers, production managers, etc). New actors appear (e.g. IT companies and alarm suppliers), and the current ones expand their services and product lines. For example, the heating suppliers offer energy services, measured data management and statistics, energy performance contracting, facility management, etc. New and enhanced collaborations between the actors on the market are expected to emerge.

Heating buyers/heating consumers expect a distinct product, with a relevant pricing and the right environmental properties.

There are indications that customers are becoming increasingly more active on the market. The relationship between producers and customers are growing more important. Historically, the district heating companies have failed in customer relationship management, which in a sense has been beneficial to the heat pump expansion. Today every supplier has a clear focus on the customer dialogue, and the improved collaboration is useful for all parties involved, as well as for the development of a sustainable energy system. The demand for increased comfort will continue to grow. Voluntary energy and environmental classification of buildings will also become more important.

All technologies on the heating market are evolving, energy converting technologies as well as energy efficiency measures.

Most attention is drawn to the development of heat pumps, where the coefficient of performance is continuously improved. This results in a declining electricity use despite an increasing market share for electricity based heating. New techniques for district heating distribution to heat-sparse areas are being developed, simultaneously with low temperature systems. Pellets boilers are becoming more reliable. Direct use of biofuels for heating is declining as a consequence of decreasing heating demand and better boiler efficiency. The use of solar energy is increasing.

Ever more complex solutions for the energy demand of buildings are emerging

(heating, cooling, electricity, energy storage, etc.), with combinations of different technologies (where buildings are sometimes net producers). New thinking and innovation are key words. Wind power and solar power are today combined with electric heating and heat pumps. Maybe pellets boilers will find a role in combination with heat pumps? Perhaps we will see "district heating connections" in the form of heat pumps extracting heat from the return lines in the district heating system? District heating might also become more important in making use of excess heat from buildings.

Challenges and visions for the heating market

Below are described a number of challenges facing the heating market. Some of them are more like future scenarios, and for them the challenges are rather how to turn these scenarios into something that really happens.

The heating market should have a more central role in politics and planning, in Sweden and the EU.

Today there is no consensus on the status or development of the heating market, neither in Swedish, nor in European politics. There is a lack of knowledge and interest in the heating market and, as a consequence, it is often neglected. Its development is to a large extent ruled by objectives and policy instruments with the focus on other markets, e.g. the electricity market, and in other EU countries also the gas market. Therefore it is a great and important challenge to place the heating market high on the political agenda, in Sweden as well as in the EU.

Taxes, fees, building regulations, and other regulatory systems have a large impact

on the choice of heating system, and on the trade-off between energy efficiency efforts and energy supply. The market asks for stable conditions, but at the same time, regulations and instruments must be evaluated against the objectives of resource efficiency and environmental impact that are governing the development towards a sustainable energy system. Insight in the specific conditions for the heating market is crucial for an effective shaping of policy instruments. Analysis of how current and coming regulatory systems and instruments are influenceing the future heating market is a constant challenge for the actors on the heating market.

Which direction of development will become predominating? Energy efficient houses, more individual heating technologies, or exchange of energy in combined systems?

Our scenarios have these main directions as a starting point and the outcome is widely different, especially in the long run. Which direction the development will take is far from given. Customer expectations, technology evolution, policy instrument design, and price development are examples of influencing factors.

Efficient use of energy – great opportunities, but difficult to implement.

How much will the heating demand on the market decrease? Will it decrease at all? Will the improved energy efficiency of existing buildings really be realized? What are the real costs for the efficiency improvements, and which factors will be influencing? Many of the measures are simple and can be realized without heavy investments, but they are still only implemented at a limited scale. The more extensive actions are guided by the building's investment cycles, and are triggered when buildings are renovated or rebuilt.

The renovation and the improved energy efficiency of "The Million Programme" is a huge challenge.

Even if the houses from the million programme era (1965 -1974) do not show especially large energy demands, they are still in a great need for further actions. They are today 40 – 50 years old, and many of them have not been maintained properly. But, implementing major energy efficiency improvements in these areas with a

limited solvency and high demand for return on investment, is a very large challenge. (Up to now, about 30 percent of the million programme have been thoroughly renovated).

Maintaining profitability when the heating demand declines will be a challenge for the district heating companies?

In spite of dominating the heating market and strengthening its position in some places, district heating is challenged in other areas. Diminishing heating demand and fewer opportunities to add new customers, might cause problems for some companies in keeping competitiveness, since they as investment-heavy actors have a large proportion of fixed costs. These companies are particularly exposed at large and rapid decrements in demand, e.g. when many property owners implement extensive energy efficiency measures, or are changing means of heating.

The market for heat pumps is changing.

As the market share of heat pumps in single-family houses increases, a shift from a converting-market to an exchange-market can be observed. Large scale heat pump installations in multi-family houses might still be a growing market, but the magnitude of this is uncertain. The efficiency of heat pumps is increasing. How far it will reach is influenced by the price of energy and the properties of the buildings, where the possibility to use lower system temperatures is important.

Large heating customers are increasingly asking for total solutions, supporting their business.

Producing and delivering energy is no longer enough. Suppliers are more and more often expected to understand the customers' driving forces and ambitions. This can only be achieved through customer-intimate collaborations. Single-family house owners are also getting more interested in their energy consumption. Consumer influence, local production, net charge, balancing/load balancing and smart grids create an environment with interesting possibilities. A weak interest for energy issues from some customers is working in the opposite direction.

When electricity and district heating production become free from fossil fuels, heating will be fully fossil fuel free - how can we get there?

As already mentioned, the direct use of fossil fuels has more or less ceased. The indirect use in electricity and district heating production is also small and continues to decline. This is driven forward by cost reduction reasons (fuel prices and policy instruments) and by customer demands. Electricity based heating is influenced by what is happening outside Sweden's borders. The ambition of the European electricity generation sector is to be carbon dioxide neutral by 2050.

The sustainable city.

The actors on the heating market deepen their collaboration with municipalities and cities. Common infrastructure solutions and sustainability certifications of buildings and town districts will have an impact on the agenda for the heating and energy systems. But, it is important for the heating actors to safe-guard the resource efficiency on the market. Today we can see examples where certifications and sustainability ambitions have the desired effect – improved energy efficiency – but also both cases where they have led to inadequate sub-optimisations.

In the long term, the heating market might turn into an energy market.

Combined systems and stagnating heating demands shift focus from heat delivery to energy solutions. This will create an integrated energy market rather than a heating market. It might mean that the customers and the energy companies integrate their systems. "Open district heating" is a first step, where the heating market moves

from a one-way consumer/supplier-relation to a marketplace with a bi-directional trade of heat. It can also relate to load balancing that influences how the customers' equipment is run. New products are created. There is a shift from being product oriented to a complex energy solution approach.

The actors on the heating market can expect new collaborations.

The heating market is now a mature market, which indicates that we will see new collaborations, also between parties that are competitors today. At the same time, a new energy landscape is emerging. New actors, renewable and small scale electricity production, demands for new solutions for improved energy efficiency, and active consumers, are all trends that rapidly are changing the prerequisites of the heating market. All this means that the actors on the market must change their thinking to stay one step ahead, and to create new business opportunities.

The heating market will also be influenced by information and communication technologies (ICT), and smart grids.

Individual measurement of heat consumption is, if cost-effective, stipulated by EU directives. Eventually, there is likely to be a digital unit in every apartment, controlling the energy use, also heating. It will become more complex to be a heating or energy actor.

These thirteen challenges and future scenarios show that the opportunities as well as the uncertainties regarding the future development of the heating market are huge, and some of the development directions might bring large consequences for the actors on the market. Since new constructions and renovations, as well as the heating supply, are examples of inert and capital-intensive activities, it is important to try to reduce the uncertainty about the future. Uncertainties cannot, of course, be totally eliminated. But, by – as we have made in this first stage of the project – making an integrated description and analysis of the heating market, and by having a deep discussion with the actors on the market involved, it is possible to accomplish a higher level of understanding and consensus regarding the future development. It is therefore our hope that this analysis and discussion will go on, thereby contributing to creating the conditions for a continued efficient and resource lean development.

Värmemarknad Sverige

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