

10th International Symposium on District Heating and Cooling

September 3-5, 2006

Monday, 4 September 2006

Sektion 2

District heating in areas of low density

**Competitive district heating marketing
to owners of Swedish single-family dwellings**

W. Mårtensson, S. Frederiksen,
Lund Institute of Technology/Sweden

Competitive District Heating Marketing to Owners of Swedish Single-Family Dwellings

Wilhelm Mårtensson & Svend Frederiksen
Lund Institute of Technology*)

*) Corresponding author: Svend.Frederiksen@vok.lth.se

Abstract

In Sweden, district heating today enjoys a very strong position regarding heat supply to larger buildings. But in the market sector of single-family dwellings it is only a niche product. Although in the last few years district heating companies in general have shown a significant interest in the potential represented by this sector, market advancements have so far been rather modest. By contrast, heat pumps adapted for small houses are currently being sold in staggering numbers.

Results from a market survey made in a part-district of the town Malmö are reported. Based on indications from this empirical evidence and on other, more general observations, the paper advances some suggestions as to how marketing of district heating for single-family dwellings could be shaped better than hitherto, making it more fit for meeting strong competition. It is imperative that marketing is based on a clear picture of real customer expectations. For instance, our survey indicated that to most consumers price is more important than the environment.

Some Swedish district heating companies have introduced differentiation of price structures in the single-family dwelling sector. This is completely in line with general theory about how successful marketing of various commodities can be achieved. As an elaboration of this line of approach, the paper suggests a new type of price structure that should be particularly suited for meeting competition from heat pumps.

Market situation

Among the various methods of supplying building with heat, district heating is the method serving most people in Sweden. This does not, however, imply that most people have actively selected district heating, since the majority of these final customers live in larger buildings owned by a company that normally have made the decision about heating method.

Thus, it is only natural that marketing of district heating has by tradition mostly been directed towards professionals representing those companies, not final customers. Within the market segment of larger buildings, district heating marketing has certainly been very successful: Currently around as much as 81% of the total inhabited building area within multi-family houses is served by district heating, and the corresponding figure for other big buildings (offices, hotels, etc.) is 68%. Having gained almost market saturation within this market segments, district heating companies wanting to expand their business significantly must look towards other buildings, mainly single-family dwellings, where market penetration is only about 9%.[1]

Here, however, geographical heat load density is rather low, posing a huge challenge, since networks are capital-intensive. For that reason some district heating companies have more or less written off this market segment as inherently unprofitable. In any case, for district heating schemes serving single-family dwellings to become profitable it is essential that a high local market penetration is achieved. In many cases this means that at least 70% of all buildings can be counted on as customers to become connected within the first few years of operation.

Annual Connections of Single-Family Dwellings

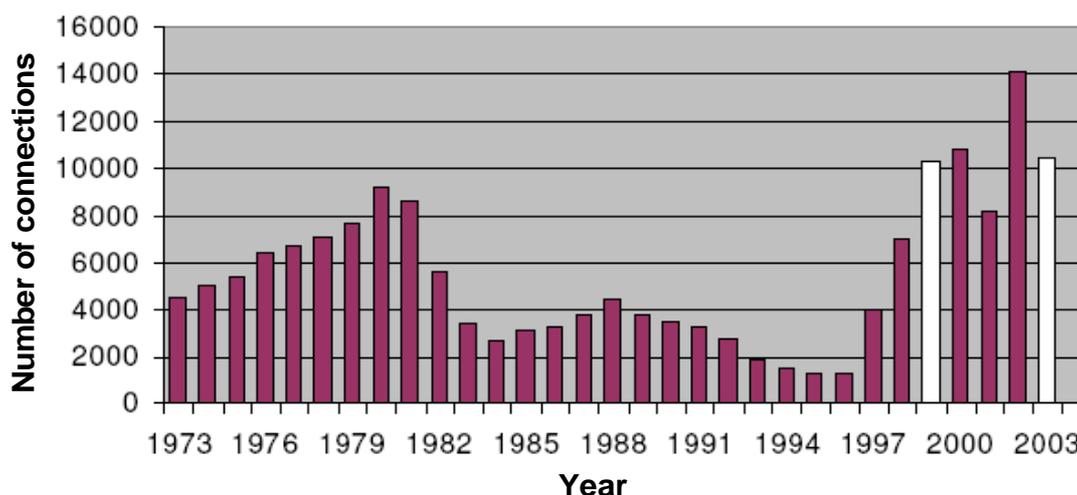


Fig. 1. Yearly number of Swedish single family houses connected to district heating. Source: Swedish District Heating Association [2]. Unfortunately statistics lag behind. The figure reflects most recent, available data.

Fig. 1 shows that yearly connections of single-family dwellings to district heating subsided in the 1980ies, when oil and electricity prices were historically low, reaching a very low in 1996, from which year there has been a burst of renewed activity. Without efforts on part of district heating companies, there would surely have been less increase in connections. However, in the same last 10 years there has been a sharp increase in the total number of single-family dwellings being fitted with a heating system of any kind. Many of these buildings were built in the 1970ies and were 'ripe' for a substitution of heating system. Thus, it is open for discussion whether or not the increased connection rate to district heating can be attributed to effective marketing.

A heating method that has gained ground in later times is central heating by wood-fuelled boilers, mostly supplied with wood-pellets. Although a significant proportion of dwellings served by such systems are situated in sparsely populated regions, they are also installed in built-up areas, thus to some extent representing a competition to district heating.

The fiercest competition to district heating of single-family dwellings, however, in the last few years has come from heat pumps. In 2004, as much as 40 000 dwellings were fitted with this method of heating, selling of heat pumps thereby currently outnumbering district heating by a factor in the order of 4 [2]. Swedish heat pump sellers have thus been very successful, so much so that Sweden is the European country counting by far the largest stock of small heat pumps having been installed. The general explanation for this popularity is probably that electricity prices, not least due to a high proportion of hydro-electrical generation, are significantly lower in Sweden than throughout most other parts of Europe. However, seen in an historical context, sales of heat pumps have previously surged, only to dwindle again, as a reaction to many equipment failures. Due to dedicated engineering in the meantime, heat pumps sold today are probably more robust. Still, in terms of equipment reliability, Swedish district heating, with it's more than half a century record of generally reliable supply to customers, should have an upper hand.

In spite of the current rather gloomy statistics about connections of single-family dwellings, there seems to be ground for some optimism about the future. One such ground is that electricity prices will probably gradually go up in future, when electricity markets become ever more trans-national.

Another ground can be derived from the fact that a high proportion of Swedish single-family dwellings built in the last decades were equipped with direct, resistance electricity heating. So far, both district heating and heat pump sellers have not entered massively into this market. But some district heating companies have in fact turned to this market segment where they are rather well prepared for meeting competition: Probably due to a strong local representation, district heating companies are sometimes in a position of being able to offer their customers installation of central heating at a much lower price than a private house owner can obtain. In general, a heat pump seller cannot afford to enter massively into the trade of installing central heating

Yet, heat pumps will probably far out in future represent a serious problem to marketing of district heating. An important reason for this is that a relatively small number of heat pumps, scattered around within otherwise attractive district heating markets, can 'punctuate' these markets, due to the prerequisite of a high, local market share for district heating schemes to become viable. Given this prerequisite, it is only logical that district heating companies sometimes must abstain from reflecting positively to some house owners expressing a wish to become district heating customers. Nevertheless, such events may prompt an impression on part of public that district heating companies really do not care about their market.

For a seller of heat pumps, effective marketing is a matter of simple survival: If his selling efforts are too weak, his heat pump competitors will take the market. Another immediate incentive is that the turn-over of a heat pump company is almost completely affected by the number of installations made. By contrast, the income earned by a district heating company will usually to a large extent result from a capitalisation of future payments made by customers.

When marketing district heating changes focus from owners of larger building to those of single-family dwellings, a basic shift in markets methods is called for. It is our impression that in general, full consequences have not been drawn from the fact that the target group is private people rather than professionals. Perhaps the very success of district heating within the sector of larger buildings has even been a disadvantage in this respect, conditioning companies to be less aggressive in their marketing.

Colleagues of ours (Sernhed et.al.) interviewed a selection of district heating marketing people. Based on this it could be established that, while the interviewees in general possessed ample information about 'physical factors', such as for instance oil consumption of prospective customers, they had to admit to a remarkable lack of knowledge of, what could be lumped together as 'social factors'. Examples of such factor could be customers' financial liquidity, solidity, etc. Knowledge about such factors are elementary to a seller of almost any commodity, who is dependant on having a fairly accurate picture of what will govern his customers' attitudes.[4]

To be fair, many Swedish district heating companies in the last few years have stepped up marketing efforts and initiated activities serving this goal. Thus, companies have sent out questionnaires to map consumer attitudes. So have we, in co-operation with a number of companies. The next paragraph is an account of such an investigation.

Results from a field study

On a date in November 2005 a questionnaire was distributed among house owners within a district known as 'Limhamn', a district within Sweden's third biggest town, Malmoe. The survey was conducted in a co-operation with E.ON, a big multi-national energy company who owns and operates the local district heating system. Within this community, a total of around 200 questionnaires were sent out to be fairly equally divided among district heating households and households being heated in other ways. Around 24% of the total amount of households responded, admittedly a rather modest fraction, but not judged to be so low as to render systematic analysis pointless. Similar investigations made in Sweden confirm a number of our results ([5,6]).

The Limhamn district is known to be one of the most fashionable parts of town, a fact confirmed by the yearly incomes reported by our interviewees. (Readers outside Sweden may be startled by our directness about such a sensitive matter, but in Sweden incomes for taxation are in fact public). Other surveys conducted in various parts of Sweden have included both well-off districts and more humble ones. In various trades, there is a trend that well-off customers become trend-setters. We do not know if this applies to district heating. We have learned, though that in the UK, district heating was at least formerly associated with almost a social stigma, a reason for some British district heating engineers in later years to label their commodity 'community heating'.

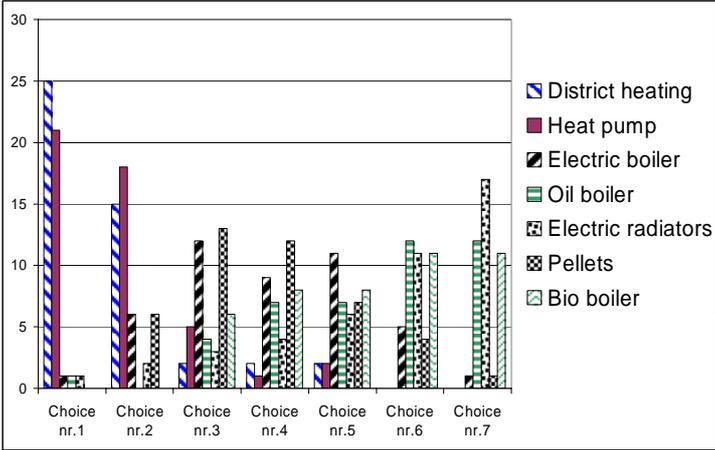


Fig. 2. Consumer ranking of various types of heating method. Survey made in Limhamn, Malmoe, 2005.

As can be from fig. 2, according to our survey, district heating was the type of heating method that was generally rated to be first choice, followed by heat pumps and wood-pellet boilers. The fact that these three methods together topped our ranking only confirms findings made in previous surveys ([5,6]), although district heating did not always hit the very top of rankings made. Our questionnaire was designed so as to permit us later to focus on a major group of possible, prospective district customers, by making statistics on attitudes among households neither being connected to district heating nor possessing a heat pump. Within this segment of interviewees, once again district heating turned out to be the most popular heating method.[7]

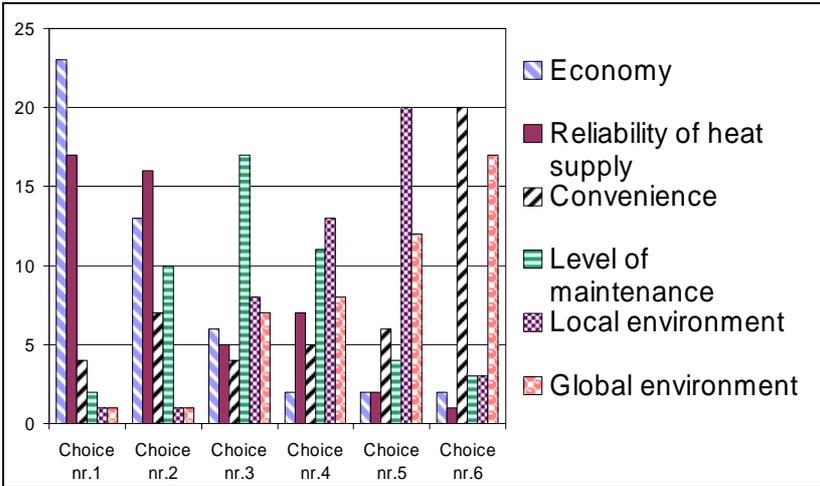


Fig. 3. Consumer ranking of grounds when making priorities among various, alternative heating methods. Survey made in Limhamn, Malmoe

Our next figure (fig.3) is a histogram displaying ranking underlying motives behind priorities when judging attractiveness of differing heating systems, as recounted by our interviewees. As can be seen, the most important priority was regarded to be that of 'economy', a finding that repeats what has appeared in other questionnaire surveys made in Sweden. More surprising, perhaps, is the rather low rating of environmental grounds.

Given the fact that district heating generally has been marketed very much on its environmental merits, this finding may at least serve as a warning that the environmental argument, however well-based it may be, for marketing to become effective, should preferably be made within a carefully designed context. There seems to be a risk that strong underscoring of the environmental argument may in fact scare some prospective customers away. Some may, at least to themselves deduce short-cuttingly: 'Good for the environment, but I have to pay'. In order to create what with a somewhat warn-out expression could be designated a 'win-win' option, the companies could direct their main efforts to convincing the customer that he or she will gain economically, while referring to the environment rather in a flanking argument. Thereby, to continue our fictive dialogue, the customer may instead think: 'Good for the environment and good for my conscience as well as my purse'.

We realise that our interpretations of attitudes expressed to certain wordings cannot be more than mere hypotheses. As with the environmental argument, we were surprised that 'convenience' was also ranked low by our interviewees. In spite of this finding we do believe rather firmly that convenience in fact is a strong argument in favour of district heating, having wisely been underscored in most marketing campaigns for district heating. On reflection, we may have chosen a rather unlucky Swedish wording to cover the English term 'convenience'; the word we used could bear connotations to 'laziness', always dangerous to hint at in any way in a country where attitudes are firmly rooted in a Lutheran tradition.

The high priority attached to economy to some extent contrasts with the fact that for many years of recent history, electrical heating in Sweden has been the most commonly adopted method of building heating, given that this method is associated with rather high running costs. In the 1970ies, predominantly direct electrical heating was preferred, which makes sense insofar as this method at least is associated with low investment costs. Within the last 10 years, however, electrical heating has mostly been combined with central heating [8,9].

Making district heating a differentiated commodity

'Any product or service can be differentiated, even if the commodity that seems to differ from competitors' offerings only in price' (Theodor Lewitt [10]).

The point with differentiating a commodity is that it offers a prospect of increasing profitability by designing variations of the commodity in question that will meet specific needs characteristic of various customer segments. Sometimes a product or a service can advantageously be designed to target one very specific such segment. District heating, as we have underscored several times, for its commercial success in low heat-density areas, depends heavily upon a high degree of local market penetration. Therefore, this commodity by contrast should be offered in a wide range of variants, seeking to present almost any prospective customer with a variation that will attract that specific customer, meeting his or hers specific priorities and needs.

The most common method of differentiation so far applied within the trade of district heating has been to differentiate pricing structures. One ground for such differentiation can be different weightings of fixed and variable costs. Another kind of differentiation will be based on having different price structures for bigger buildings and single-family dwellings. A third method relies on a granting a rebate when a big quantity of heat is sold. Thus, price differentiation as such is not new within the district heating business. However, if we narrow down the scope to the segment of single-family dwellings, it is a fact that most companies do not adopt any price structure differentiation within this segment.

So, how can this be effectuated, to meet the expressed requirement of attracting as many customers as possible?

Before advancing to answers to that question we shall make the observation that we are dealing with a customer segment that is very heterogeneous indeed: Probably the only thing that is typical of a house-owner is that he or she on the average will belong to a relatively better-off part of the population. This does not necessarily imply that a given house-owner will possess ample liquidity; in fact rather the contrary will often be the case with young families who have recently bought their first home. On the other hand, people who have owned their house for many years will often enjoy both solidity and liquidity.

The Gothenburg Energy Company, operating the district heating system of Sweden's second largest city, has been one of the most innovative companies regarding price structure: This company in the last couple of years has adopted a price structure differentiation that is tailored exactly to such wide ranges in customer financial profiles. As can be seen from table 1, owners of single-family dwellings are offered a range of as much four price structure alternatives. As another example, the table also recounts price structures offered in the neighbour town of Borås.

	Investment, €	Monthly fixed cost, €	Energy price, €/MWh	Maintenance, €/month
Gothenburg				
DH1	0 €	35,0 €	82,7 €	included
DH2	3 337 €	0,0 €	82,7 €	10,2 €
DH3	8 827 €	0,0 €	55,4 €	10,2 €
DH4	13 994 €	0,0 €	38,2 €	10,2 €
Borås				
DH1	0 €	75,3 €	72,1 €	included
DH2	4 736 €	28,5 €	70,0 €	included
DH3	9 150 €	14,0 €	56,0 €	included
DH4	14 532 €	0,0 €	44,1 €	not included

Table 1. Price offerings to single-family dwellings in Gothenburg and Borås.
Source: Gothenburg Energy [11] and Borås Energy [12].

Price structure 'DH1' will be respond to a financial profile of customers not enjoying ample liquidity, while the opposite applies, above all to 'DH4'. In fact, this last price structure has been further tailored to facilitate an economic comparison with ground-source heat pumps: This alternative heating method is known to require a significant investment cost, on the average at the same level as the fixed part of chosen for the district heating price structure, while the variable price component of DH4 will appear lower than that applying to heat pumps. As we have reported, heat pumps currently pose the biggest threat to district heating in the single-family dwelling sector of the heating market. Although in fact only a relatively small fraction of customers in Gothenburg, according to our knowledge, have so far chosen DH4, the very fact that the district heating company is capable of offering a price structure matching favourably with that of the fiercest competitor is believed to promote a good reputation of district heating.

Taking this idea one step further, we suggest a tariff structure based on an indexation of the DH price (in terms of first cost, energy unit cost etc. – many variations are possible) that reads as follows:

$$DH = DH_0 \frac{CPI}{CPI_0} \frac{EL}{EL_0}$$

- Ratio $\frac{EL}{EL_0}$ being maximised far into future, for instance to a value of 2, 20 years ahead.

That is, the current DH price is being indexed by two factors: First changes in consumer price index (CPI), and second by the change in price of electricity, EL, as determined in a way that of course must be stipulated in a legally precise way, preferably as the price established on a certain electricity exchange market, relevant to Swedish customers. As a consequence of the indexation offered, if the price for electricity goes up, so will the price for DH. Such a prospect in fact seems very plausible, given that current Swedish electricity prices are remarkably low in a European context. However, the price structure offered explicitly warrants that customers selecting this specific price structure, long time ahead will not ever be hit by more than a doubling of the district heating price, as measured in real terms, i.e. adjusting for general inflation.

There are three main ideas behind suggesting such a tariff:

First, both CPI and EL are out of the control of the district heating company, which meets an often expressed and widespread worry among customers that a district heating company some time in future may choose to raise district heating price levels, to improve profitability. Such a fear is not farfetched as is testified by the fact that some district heating companies have in fact adopted such changes, typically after having been purchased by a big energy company demanding a high rate of return on invested capital. By voluntarily giving up price control, the company sends a heavy signal to the market that their customers are at no risk of being such victims of what may appear as whims on part of the shareholders.

The second idea is that, as with the Gothenburg tariff 'DH4', indexation coupled to the price for electricity paves the way for a direct comparison with heat pumps that are almost exclusively driven by electricity. Having understood this, the customer should be very easy to convince that the maximum tag of 2 cannot be met by sellers of heat pumps: In the first place the price for electricity is basically not in the control of anybody; some big electricity companies or governments may have an influence on the price, but certainly not the seller of the heat pumps. To put it crudely: Who can guarantee that there will be no more than a doubling of electricity prices 20 years ahead?

The third consideration is in fact a counter-argument to a concern a district heating company may raise, as related to our suggested price structure: If the district heating company issues a maximum warranty of the kind suggested, a consequence could be that the company in future will lose those marginal earnings that could have harvested if the price for electricity should rise beyond the limitation. True, but if the price for electricity goes up drastically, this would make combined heat and power very profitable. In such an event a bigger district heating load, attributable to the very price model presented, would represent a big asset that may not have been established in the first place, without making connection to district heating more attractive to the customer than the heat pump alternative.

Price structure, of course, not the only theme upon which the idea of differentiation of the commodity 'district heating for single-family dwellings' can be modelled. Another theme, which has so far, in our view undeservedly, been developed very little, is that of ownership structure. As an example of a non-conventional model of this kind, a district heating company could take responsibility for establishing a local heat distribution system. A legal arrangement could be made such that this local system is owned by a limited company, the shares of which are initially owned by the district heating company, conditioned by a contractual obligation on part of the company to, on request, sell off its shares, entirely or partly, to the owners of connected houses, at a pre-determined price.

In our view there are several advantages with such a model, compared to the virtually only two alternatives that exist today: Either the district heating company takes on complete ownership, or a community is left to establish their own system, without any interference from a district heating company. Compared to the first alternative there will be the advantage, as seen from the point of view of the company that invested funds will only temporarily be fixed, which can be an advantageous arrangement, especially if the company conducts an investment policy requiring a high return on investments. At today's low interest rates, most

house owners by contrast will not be able to make equally safe investments offering an equivalent return on invested capital.

Furthermore, as seen from the house owner's perspective, our suggested model will offer him or her a prospect of being less dependent on the decisions made by the district heating company. As an example, such a network may initially be served exclusively by heat supplied from a connection point to a big network owned by the district heating company. At a later stage, the house owners, by virtue of exercising a majority vote in the local company suggested, if necessary, could become owners of their own heating plant. Especially when the district heating company is owned by a multi-national energy company, such an alternative may appear attractive to many people who are hesitant to give away control of their own situation.

Such an arrangement could be tailored legally to limit the number of shares of any shareholder, such that no one physical or legal person will have a dominating vote. Such a prescription will serve to protect house owners from the whims of dominating neighbours. By contributing to such an arrangement, the district heating company could in the eyes of many costumers change from a feared, profit-oriented company into an organisation that represents stability and professionalism. Also, in such an arrangement, customers can profit from the engineering and legal professionalism offered by the district heating company, regarding engineering standards, contracts with suppliers, etc.

Acknowledgements

We would like to thank E.ON Sverige AB (represented by Dr P. Rosén and Mr H. Andersson, MSc), Göteborg Energi AB, Lunds Energi AB, Växjö Energi AB & Öresundskraft AB for good co-operation. Our report (Mårtensson & Frederiksen), was based on a co-operation with these companies, providing us with a clearer picture of current trends in the single-family dwelling market.

References

- [1] Swedish Energy Agency, *Energy in Sweden, facts and figures 2005*, publication number ET:2005.25, 2005.
- [2] Swedish District Heating Association, *Sales figures*. Personal contact 2005-04-25.
- [3] Swedish Heat Pump Association, *Sales figures*. Personal contact 2005-04-25.
- [4] Sernhed Kerstin, Abaravicius Juozas, Tommy Persson, *District heating expansion strategies in detached house areas*, Lund institute of Technology, Department of Energy Science, 2005.
- [5] Swedish District Heating Hssociation, *Kunskap och attitydundersökning för svensk fjärrvärme (Knowledge and attitudes survey for Swedish district heating)*. Dec 2004.
- [6] Mahapatra Krushna et al, *Diffusion of energy-Saving Innovative Heating systems in Sweden – A consumer Survey Approach*, Mid Sweden University, 2006.
- [7] Mårtensson Wilhelm and Frederiksen Svend, *Effektiv marknadsföring av småhus fjärrvärme, (Efficient marketing of district heating in single-family areas)*, Lund institute of Technology, Department of Energy Science, 2005.
- [8] Mårtensson Wilhelm, *Uppvärmningssystemens påverkan på villors värde –en studie av transaktioner utförda 1981-1995, (Heating systems effect on single-family dwellings –a survey conducted on transactions made 1981-1995)*, Lund institute of Technology, Department of Energy Science. 2005.
- [9] Sandberg Eje, *Direktverkande elvärme i nya byggnader, (Electric radiators in new buildings)*, ATON Teknik Konsult AB, 2002.
- [10] Levitt Theodor, *Marketing success through differentiation of anything*, Harvard Business review Jan-feb, 1980.
- [11] www.goteborgenergi.se, 2005-04-25.
- [12] www.borasenergi.se, 2005-04-25.