Borlänge and Falun
Brundtland Cities

Development of an Infrastructure for
Brundtland Renewable Energy Network - BREN

Report from participation in a
European Commission Alterner Project
(English version)

Sigvard Gertzén

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- Development plan and information of renewable energy in the Border-region Germany - Denmark, Morten Tony Hansen, Lisbet Holst, January 1997
- Annexes to Final Report, October 1998
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- Newsletter no 1 August 1998
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INTRODUCTION
Development of an infrastructure for Brundtland Renewable Energy Network - BREN is a European Commission Alterner Project with Contract no XVII/4. 1030/Z96-032:

The project has its origin in the UN-report “Our Common Future”, 1989. A change in and reduction of the use of energy was fundamental in order to reach the goals which the report proposed. Denmark decided on an action plan on how energy consumption could be reduced “Energi 2000 - Handlingsplan för en bäredygtig udvikling”. The ministries of energy in Denmark and Schleswig-Holstein both agreed to start an energy saving project in a smaller town. The project was called “Brundtlandby” and the two first were Toftlund in South Jutland and Bredestedt in North Friesland. After a short period a further two German Cities, Rheinsberg and Viernheim, and Rajec in Slovakia joined the group. A network for the exchange of knowledge and experience between the cities was formed. The network, Brundtland City Project, inspired the participating cities in the continuing work with energy saving measures. The Brundtland City Project was presented at an international conference “Cities and Energy” in Trondheim, Norway, in December 1995. Great interest was shown in the project and it was decided that a network should be developed in northern European countries as a pilot project to be enlarged with other European countries later on. A steering committee was formed with representatives from the nordic countries.

An application was sent to the European Commission, Alterner Program, and was approved in July 1996. The project was subdivided into nine activities. Activity 1, consisted of summarising the experiences of the Brundtland City Project in Toftlund, Denmark and the Brundtland Cities network in Slovakia, Germany and Denmark. The Scandinavian part started with Activity 2, to engage municipalities/cities in Finland, Norway and Sweden in the project. The Solar Energy Research Center, SERC, Högskolan Dalarna was appointed as co-ordinator for the Swedish part. The project was presented at a seminar on the 30th September for representatives from the municipalities of Borlänge and Falun. On the 10th of December 1996 the two municipalities accepted the invitation to join the Northern network. Pelle Helje, Borlänge Energi, has been informant for the municipality of Borlänge and Anders Goop, Department of Urban Planning informant for the municipality of Falun with Jan Kaans, Estates department providing information to the basis for the Newsletter.

Reports on the work in Borlänge and Falun municipalities have been made to Brundtland Center Denmark on three occasions; Activities 2-5, 16-12-1997, Activities 6-7, including parts of activities 8-9, 03-03-1998, and the basis for the Newsletter, 01-07-1998. The Nordic reports have been compiled at the Brundtland Center Denmark for submission to the European Commission. English has been the common language. After the report of activities 2 - 5 the participants were invited to a project meeting and a workshop at Brundtland Center the 23rd and 24th March 1998. This was the first occasion the participants in the project met and the network thus took a more concrete form. It also was decided that the next meeting should be in Borlänge in August 1998, with Borlänge Energi and Solar Energy Research Center SERC as organisers. As Brundtland Centre Denmark was wound up for financial reasons, the project meeting in Borlänge was cancelled.

Compilation of the Final Report was carried out by Esbensen Consultants in October 1998

Future development of the network
It is intended to continue the work with the Brundtland City Network as an “EU Thermie B-project” and the network will be enlarged with the addition of four new Brundtland Cities from Austria, Germany, Italy and Great Britain. In addition the village of Putja in Estonia will join the network but this will be financed by the EU-Phare programme.
Brundtland renewable energy network, BREN
FALUN - BORLÄNGE
(Submission 1997-12-16)

Activity 2: Selection of cities

Presentation of BU Alterner project: Development of an infrastructure for Brundtland renewable energy network, BREN.

Steering committee
The execution of the project will be followed and controlled by a steering committee with the following members:
Anders Kveiborg, manager of Brundtland Center Denmark, Toftlund, Denmark.
Torben Esbensen, MSc, Esbensen Consultants, Denmark.
Anne Grete Hestnes, Professor, The Norwegian University of Science and Technology, Trondheim, Norway.
Peter Lund, Professor, Helsinki University of Technology, Finland.
Mauritz Glauman, Dr, Solar Energy Association of Sweden.

Högskolan Dalarna, Solar Energy Research Center, SERC, will act as a consultant to execute the project in Sweden.

Information about the project
The project was presented at a seminar, held at the Natural Resources Center NRC Vassbo, Borlänge the 30th of September 1996.
The project was presented by the members of the steering committee, Anders Kveiborg and Torben Esbensen from Toftlund, Denmark and Mauritz Glauman. Leading politicians and officials from Falun and Borlänge municipalities, and also researchers and persons who had been assumed to be interested in the project were invited to the seminar. A summary of the seminar has been made in a report published by the Solar Energy Research Center, SERC October 1996.

In a letter dated 1996-11-18 Högskolan Dalarna, Solar Energy Research Center, SERC invited Falun and Borlänge municipalities to join the Brundtland renewable energy network.

The municipalities decisions to accept the invitation to join the network:
Falun municipality
Falun municipality, Working committee of the municipal executive board decided 1996-12-10 § 251 to accept the invitation, together with Borlänge municipality, to join as a Brundtland city in a European network.
to commission the Agenda 21-group to appoint a member for Falun municipality in the project.

Borlänge municipality
Borlänge municipality, The financial committee of the municipal executive board decided 1996-12-10 § 427 to join as a Brundtland city in a European network of Brundtland cities.
to commission Borlänge Energi AB to deal with the project.

Interest in the project
After the information at Vassbo great interest was shown in the project and the possibilities of working in a network were interpreted as inspiring and the expectations of exchange of experiences from energy planning were high. Since then some politicians have shown a relatively great interest in the project, but as there has not been any report from the project, there has really not been any possibility to create more interest. After all some status was shown by the municipal executive board supporting the project a year ago when the invitation was made.

As the project now has been in an introductory phase with inventory of the prerequisites it has principally been officials, who work with planning for the use of energy, who know about the project. One can expect a rising interest, when the network has developed and project ideas from other Brundtland cities have been presented, and hopefully some common project may be carried out in the network.

A short description of the network municipalities
Falun and Borlänge municipalities together form the central parts of the county. The area lies about 220 km North-west of Stockholm and about 460 km North-east of Gothenburg. The two municipalities together have 103 400 inhabitants, of which the town of Borlänge has 40 800 and Falun town 35 900. For a longer period of time, the two municipalities have pursued a policy of co-operation in order to strengthen the region, and have taken a prominent position in environmental work. The work to increase efficiency in the use of resources and to use renewable energy is a part of this engagement.

From the historical point of view, the area is most well known internationally for the Falun copper mine and it was this that lead to the growth of an important market and meeting place and the industrial development of the area. The copper mining company received its first known official charter in 1347. In the surroundings there were a number of minor iron and copper works. At this time and into the 15th century Falun was the second largest town in Sweden. The copper mine was of national importance and therefore Falun developed as a centre for administration in Dalarna. Both the County Administration Board and the County Council are situated in Falun.

Borlänge has its origins in the farming on the Tuna plain and during the 13th and 14th centuries it was the political and religious centre of the area. When work could no longer be carried out rationally at the minor works in the area, and techniques had been developed for using hydro-power in the river Dalälven, which had a number of rapids in the Borlänge area, it was decided to build a new and modern iron works in Domnarvet (Borlänge). The choice of place was also influenced by the extension of the railway to the area in 1875. The operation of the iron works started in 1878, now Swedish Steel SSAB. In 1900 the paper mill at Kvarnsveden, now STORA Kvarnsveden, was completed, which meant that yet another big industry had been placed in the area. In a short time the former farming area had changed into a modern industrial and communication society.

Larger industries in the municipality of Falun are STORA Grycksbo, a fine paper mill, SAAB-SCANIA and Ericson Cables.

On the decentralisation of government authorities during 1979-80 the Road Administration was placed in Borlänge, and when the Rail Administration was established on 1 July 1988 that was also placed in Borlänge. To improve the development of the region "Högskolan
Falun - Borlänge” was founded in 1977, with campuses in both Falun and Borlänge. To further emphasise its regional importance for the Dalarna area the university college changed its name to Högskolan Dalarna in 1997. The university college now has 5 000 students.

Review for Falun municipality.
Informant: Anders Goop, Department of urban planning

Activity 3: Technical survey of the energy consumption in the municipality
A survey of energy consumption is made every year for the geographic area, Falun municipality. When breaking down the information into separate sectors, however, the figures are not so complete and detailed. The account given below is based partly on actual figures partly on calculated figures.

3.1 Composition of the electricity production in %
Relative figures are calculated exclusive of losses. The entire consumption of electricity in the municipality is aprox of 800 GWh/year, from which about 764 GWh/year constitutes the supplied amount of electricity on which the relative figures below are based.

<table>
<thead>
<tr>
<th>Kind of energy</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydro-power</td>
<td>83,8</td>
</tr>
<tr>
<td>Wind-power</td>
<td>0</td>
</tr>
<tr>
<td>Biomass</td>
<td>4,2</td>
</tr>
<tr>
<td>(generation from the combined power and heating plant)</td>
<td></td>
</tr>
<tr>
<td>Nuclear-power</td>
<td>10,3</td>
</tr>
<tr>
<td>Oil</td>
<td>1,7</td>
</tr>
<tr>
<td>Coal</td>
<td>0</td>
</tr>
<tr>
<td>Incineration of industrial and household waste</td>
<td>0</td>
</tr>
</tbody>
</table>

The account is based on the fact that AB Falun Energi only purchased green electricity, i.e. only hydro-power the year 1996/97 (this will not apply 1998). For other suppliers in the municipality a break down corresponding to that of the whole country 1996 has been made, hence nuclear-power and oil.

3.2 Composition of district heating in %
Total consumption is about 165 GWh/year.

<table>
<thead>
<tr>
<th>Type of energy</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biomass</td>
<td>80,4</td>
</tr>
<tr>
<td>Oil</td>
<td>3,8</td>
</tr>
<tr>
<td>Coal</td>
<td>0</td>
</tr>
<tr>
<td>Natural gas</td>
<td>0</td>
</tr>
<tr>
<td>El</td>
<td>9,5*</td>
</tr>
<tr>
<td>Surplus heat</td>
<td>0</td>
</tr>
<tr>
<td>LP gas</td>
<td>5,3</td>
</tr>
<tr>
<td>(Gasol)</td>
<td></td>
</tr>
<tr>
<td>Landfill gas</td>
<td>1,0</td>
</tr>
</tbody>
</table>

*(from co-generation, but this is reported under electricity production)
3.3 Total energy to heat the houses, institutions and public buildings, in %
Here it is difficult to make a good subdivision, therefore a large part has been calculated. On the whole however the account is as reliable we can make it today.

<table>
<thead>
<tr>
<th>Type of energy</th>
<th>Dwellings</th>
<th>Industries/businesses</th>
<th>Public buildings</th>
<th>Municipality</th>
<th>County council</th>
</tr>
</thead>
<tbody>
<tr>
<td>District heating</td>
<td>9,7</td>
<td>34</td>
<td></td>
<td>93,9</td>
<td>31,0</td>
</tr>
<tr>
<td>Electricity</td>
<td>42,1</td>
<td></td>
<td>5,7</td>
<td>5,7</td>
<td>31,8</td>
</tr>
<tr>
<td>Biomass</td>
<td>8,1</td>
<td>66</td>
<td></td>
<td>0</td>
<td>1,0</td>
</tr>
<tr>
<td>Oil</td>
<td>37,2</td>
<td></td>
<td>0,4</td>
<td></td>
<td>29,5</td>
</tr>
<tr>
<td>Coal</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Natural gas</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Surplus heat</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>LP gas</td>
<td>2,9</td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
</tbody>
</table>

Activity 4 Survey of existing renewable energy systems in the municipality

<table>
<thead>
<tr>
<th>Type of renewable energy</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind-power</td>
<td>0</td>
</tr>
<tr>
<td>Solar heating,</td>
<td>3</td>
</tr>
<tr>
<td>[larger singel-family houses]</td>
<td>100</td>
</tr>
<tr>
<td>Solar cell (photovoltaics)</td>
<td>0</td>
</tr>
<tr>
<td>Biomass,</td>
<td>3</td>
</tr>
<tr>
<td>[district heating multi-family dwellings]</td>
<td>24</td>
</tr>
<tr>
<td>combined systems</td>
<td>110</td>
</tr>
<tr>
<td>one-family houses</td>
<td>550</td>
</tr>
<tr>
<td>combined systems</td>
<td>4100</td>
</tr>
<tr>
<td>Heat pumps,</td>
<td>1 (sewage treatment works)</td>
</tr>
<tr>
<td>[larger one-family houses]</td>
<td>1240</td>
</tr>
<tr>
<td>multi-family dwellings</td>
<td>830</td>
</tr>
<tr>
<td>Biogas</td>
<td>1</td>
</tr>
<tr>
<td>Incineration of industrial and household waste</td>
<td>0</td>
</tr>
</tbody>
</table>

Comments
Solar heating:
About 100 m² solar collectors are being tested, connected to the combined power and heating plant. They have produced 20 000 kWh/year. If the economic outcome is satisfactory, a larger solar collector field may be built to supply heat to the district heating system in the summer. Solar collector fields also may be built in other places connected to the district heating system, see below. On the roof of the athletic hall at Lugnet there are 50 m². The third object is the artificially frozen bandy rink, which functions as a combined solar collector and heat...
pump and which in the summer heats an outdoor swimming bath, about 1400 MWh/year with a heat exchange factor of about 6.

Apart from these installations there are no statistics available. Approximately 50 owners have received state grants for the installation of solar collectors on dwellings, and a somewhat smaller number have probably been installed without grants.

Biogas:
Landfill gas from the refuse tip, Varggården, is used in the district heating system. All compostable waste, sorted at source, from the autumn -97 is delivered to the Fägelmyra plant, a joint plant for Falun and Borlänge.

Biomass:
Biomass is used to a large extent in the district heating system. Over and above the central system in Falun urban area there are smaller systems in the urban areas of Bjursås and Svärdsjö, where the main part of the heating also comes from biomass.

For dwellings the figures are taken from FoB-90 (Population and Housing Census - 90) and we do not think there have been any radical changes since then. At the time there were about 550 one-family houses reported as using only biomass for heating and further about 4100 which had the option of burning wood in combination with oil or electricity. For multi-family dwellings 24 furnaces were reported as only using biomass and about 110 with combined systems. The total one-family houses numbered 12742 and the number of multi-family dwellings was 11880.

The judgement, we can make about biomass, is that the total number burning wood has hardly increased to any great extent, except as complement in the form of wood burning stoves or similar installations. On the other hand pellets installations have begun to be used and they are normally installed in existing oil furnaces.

Heat pumps:
The number of heat pumps is also taken from FoB-90. The number of one-family houses with some form of heat pump was about 830 and the number of multi-family dwellings was about 1240. Probably, however, some of these are heat recovery heat pumps in the ventilation system, which only make a small contribution to the heating supply. At the sewage treatment works there is a larger heat pump for recovery of heat from the waste water.

Our judgement on the progress for heat pumps since 1990, is that the numbers of heat pumps in one-family houses have increased during the last two years. It is above all as a complement in houses with electric resistance heating. We estimate the number to be about a 100 heat pumps during recent years.

Some multi-family dwellings which previously had heat pumps have installed district heating.
Activity 5  Review of the public buildings in the network cities to evaluate their suitability for implementation of renewable energy systems

In the different groups given under this item, the number of buildings with district heating is already high. The sports hall, indoor swimming bath, camping site, hospital, the military camp 13 and also most of the hotels in the town are already connected to the district heating system.

Other public buildings which are not connected to district heating are some health centres and a number of nursery schools and other institutions and about 25 schools. Some are planned for connection to district heating in the next few years and others are planned for a changeover to biomass burning to the greatest possible extent. This is mainly planned as purchase of so called ”ready made heat”, i.e. heating is bought on contract from external companies.

Project ideas for improving energy efficiency and changeover to renewable energy

“Lokala investeringsprogram för ekologisk hållbarhet”¹ (Local investment programmes for ecological sustainability)

Example of projects
Within the framework of the “Lokala investeringsprogram för ekologisk hållbarhet” the municipality has presented a number of ideas for energy saving projects, which can be implemented if financing can be arranged.

Energy efficiency at large consumers of energy
Project participants: Falun local authority, Scania, Ericsson Cables, Stora Grycksbo, County council of Dalarna and others.
Goals and objectives: In collaboration with the companies, to reduce energy and resource requirements for heating, ventilation, lighting, refrigeration and process water. The future energy requirement shall be minimised as far as possible and to the greatest extent be provided for by renewable energy sources, which means that electricity and oil shall be replaced. Even means for saving water can be investigated.

In 1996 the above named project members together had a yearly energy consumption of about 440 000 MWh (excluding the local authority) within the borders of Falun municipality, which accounts for about 20 % of the total energy consumption. The energy used consists of about 34 % electricity and about 66 % oil.

Low energy city core
Project participants: Property owners in the centre of Falun, Falu Energi AB and also Falun local authority.

¹ All municipalities in Sweden have prepared “Lokala investeringsprogram för ekologisk hållbarhet”. The programmes were sent in to the Department of the environment on the 15 of September 1997.
Goal and objectives: To reduce the requirement for energy for heating, ventilation, lighting and refrigeration, in collaboration with the project members in the city core. The future energy requirement shall, to the greatest extent, be provide for by district heating based on biomass, which means that electric heating and oil-heating shall be replaced. Co-ordinated solutions with, for example, common control systems, ventilation systems etc, can be of interest.

In the whole city core the total electricity consumption at present is about 32 400 MWh/year, district heating about 38 000 MWh/year and oil consumption about 850 m³/year (the equivalent of about 6 000 MWh/year. The energy savings, besides reducing expenses, also give an improvement of the environment in the city core.

Local district heating system in Grycksbo - recovery of surplus heat

Project participants: Falun local authority, Falu Energi AB, Stora Grycksbo AB and also property owners in Grycksbo.

Goal and objectives: In Grycksbo there is a paper mill from which surplus heat could be recovered and used in a common district heating system for some ten larger properties in the urban area. The energy consumption in these properties is 550 m³ oil/year and about 2 400 MWh electricity/year. By using heat pumps to recover low grade surplus heat, considerable energy savings can be made regarding of the need for purchased energy in the form of electricity or oil.

Local district heating system in Aspeboda

Project participants: Falun local authority, Mellanskogs Bränsle, VEKO (local biomass businesses), the Swedish church.

Goal and objectives: In Aspeboda there are 6 larger buildings, all of which have individual heating systems using oil or electricity. The aim is to build a small local district heating system which can supply the 6 customers, including a church, a school and a day nursery with heating mainly based on biomass. About 75 m³ of oil and 280 MWh electricity a year for heating could thereby be replaced. Mellanskog Bränsle and VEKO intend to offer “ready made heat” to the local authority and church buildings.

Heating of one-family houses - conversion from electric resistance heating to biomass in Hosjöstrand

Project participants: Property owners, Korsnäs-Hosjö property owners association, Falun local authority, Kopparstaden, Falu Energi AB

Goals and objectives: The aim of the project is to replace electricity and oil for heating. It should be possible to create a local district heating system in Hosjö with the school and the multi-family dwellings owned by Kopparstaden as a basis for operation. In the vicinity there are one-family houses of differing construction and also a housing area with about 160 one-family houses with electric resistance heating, which could be connected to a common district heating system.

Solar collector construction - complement to the district heating system

The district heating system of Falun urban area has a big need of electricity for heating when the combined power and heating plant is closed during the summer. The local authority want
to complement the district heating system with further renewable energy. Construction of 1200 m² solar collectors on the roof of a store-house is being investigated.

**Review for Borlänge municipality**  
Informant: Pelle Helje, Borlänge Energi AB.

**Activity 3: Technical survey of the energy consumption in the municipality**

**Summary of the energy consumption.**  
The given figures are taken from a survey of the energy consumption in Borlänge municipality 1996.

**Electricity:**  
The total electricity consumption reached nearly 376 GWh in 1996 (degree-day corrected consumption). Of this about 29.1 % is heating and 70.9 % is for operation. The energy breakdown is 26.7 GWh for multi-family dwellings, 155 GWh for one-family houses, 174 GWh for businesses /industry, 20 GWh for others. Total purchased energy is about 426 GWh.

**District heating:**  
The number of district heating customers in one-family houses has increased from 2101 to 2130 during the years 1992 - 1996. The degree-day corrected consumption in the district heating system has remained at about 50 GWh/year. There have been on the whole an unchanged number of customers to the district heating system in multi-family dwellings, about 150 - 160. During the last few years district heating consumption has increased from about 201 to 209 GWh/year.

**Oil:**  
According to figures for -95 from Statistics Sweden a total of about 39 000 m³ oil for heating (EO 1) and diesel have been delivered. Somewhat over 34 000 m³ was delivered to industry. Parts of the diesel delivered may have been used as vehicle fuel. Almost 26 000 m³ oil was delivered for heating (EO 2-5), mainly to the industries.

**Biomass:**  
The survey of biomass consumption in the municipality, by interviewing the owners of one-family houses, showed that the degree-day corrected consumption was about 19 GWh/year. That is somewhat lower than the last few years, when the consumption has been about 23 GWh/year.
3.1 Composition of the electricity production in %
The year 1996 the total electricity consumption reached about 376 GWh, corrected consumption, purchased is 426 GWh. Of this about 29,1% is for heating and 70,9 % is for operation.

Type of energy %
Hydro electric power 100
Wind-power 0
Biomass 0
Nuclear-power 0
Oil 0
Coal 0
Incineration of industrial and household waste 0

3.2 Composition of district heating in %
The total consumption is about 324 GWh/year. The number of district heating customers have increased from 2449 in 1992 to 2553 in 1996.

Type of energy %
Biomass* 28
Oil 7
Coal 0
Natural gas 0
Electricity 18
Surplus heat 47
L P gas 0
Landfill gas 0
*Sorted burnable waste, which is classified as biomass.

3.3 Total energy to heat houses, institutions and public buildings, in %

<table>
<thead>
<tr>
<th>Type of energy</th>
<th>Multi-family dwellings</th>
<th>One-family houses</th>
<th>Industries/businesses</th>
<th>Public buildings</th>
</tr>
</thead>
<tbody>
<tr>
<td>District heating</td>
<td>98</td>
<td>17</td>
<td>14</td>
<td>69</td>
</tr>
<tr>
<td>Electricity</td>
<td>1</td>
<td>36</td>
<td>36</td>
<td>1</td>
</tr>
<tr>
<td>Biomass</td>
<td>0</td>
<td>10</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Oil</td>
<td>1</td>
<td>33</td>
<td>60</td>
<td>30</td>
</tr>
<tr>
<td>Coal</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Natural gas</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Surplus heat</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>L P gas</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Activity 4  Survey of existing renewable energy systems in the municipality

<table>
<thead>
<tr>
<th>Type of renewable energy</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind power</td>
<td>0</td>
</tr>
<tr>
<td>Solar collector, some-family houses</td>
<td>approx. 45</td>
</tr>
<tr>
<td>Solar cells (Photovoltaics)</td>
<td>1</td>
</tr>
<tr>
<td>Biomass, district heating</td>
<td>1</td>
</tr>
<tr>
<td>one-family houses</td>
<td>1200</td>
</tr>
<tr>
<td>Heat pumps, lager</td>
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</tr>
<tr>
<td>one-family houses</td>
<td>450</td>
</tr>
<tr>
<td>Biogas</td>
<td>1</td>
</tr>
<tr>
<td>Incineration of industrial and household waste</td>
<td>1</td>
</tr>
</tbody>
</table>

Comments

Wind-power:
Prerequisites to construct wind turbines have been investigated, but suitable sites have been rejected on other restrictions. Borlänge Energi AB wants to erect a wind turbine in order to gain experience of wind turbine constructions.

Solar heating:
There are no statistics on numbers of solar collectors, but the number of smaller systems for one-family houses which have received state grants are approx. 45, some additional have been constructed without grants.

Compared with Sweden in general the number of solar collectors are high in both in Falun and in Borlänge, which probably depends on the increased interest created by Solar Energy Research Centre situated in Borlänge and a number of small companies giving courses in self-build.

Solar cells:
A smaller group of solar cells, 30 m² and top effect 3,2 kW, is erected on the roof of Högskolan Dalarna. The greater part is connected to a converter and the 220 V grid, approx 1900 kWh has been delivered to the grid during the first year. The reason for erection was research and education.

Biogas:
All compostable waste, sorted at source, within the municipalities of Falun and Borlänge is digested and later composted at the Fågelmyra plant. It started operation during the autumn 97. The bio gas will be used partly as vehicle fuel and partly for heating of the plant. The gas production is expected to be equivalent of about 5000 m³ of oil.

Heat pumps:
District heating in Borlänge consists till 2/3 of industrial surplus heat which is recovered with heat pumps.
Biomass, Incineration of industrial and household waste:
One third of the energy supplied to the district heating system comes from incineration of sorted waste in the winter. The waste is stored during the summer.

Activity 5  Review of public buildings in the network cities to evaluate their suitability for implementation of renewable energy systems

The main part of these buildings are already connected to district heating. The potential for a conversion to renewable energy has been investigated in different projects. These are given as examples in the local investment programme.

Project ideas for improving energy efficiency and conversion to renewable energy
“Lokala investeringsprogram för ekologisk hållbarhet”\(^1\) (Local investment programme for ecological sustainability)

Within the framwork of the “Lokala investeringsprogram för ekologisk hållbarhet” the municipality has presented a number of ideas for projects, which can be carried out if financing can be arranged.

Examples of projects:
Goals covering the whole of the property sector in Borlänge during a three year period:
- Theoretical and practical energy advice to all property owners.
- Reduce the consumption of energy by at least 15%.
- Halve the use of electricity for heating.
- Increase the use of renewable energy sources for the production of light, power and heating to at least 90%.
- Increase the share of the market for district heating/combined heating and power generation.

Improvement of energy efficiency in Borlänge, project 15%  
Borlänge was the first municipality in Sweden to sort solid waste at source. This project proved that it was possible to motivate the inhabitants of Borlänge to change their way of life. With experience of the project “sorting at source” as a basis the next large goal, which is improving energy efficiency in Borlänge, can be tackled. By the spread of information and the phasing in of efficient and environmentally friendly technology Borlänge will take a big step towards a more sustainable energy system. The project goal is to reduce the consumption of measurable energy in privately owned properties in Borlänge by 15 % by the 31 December 2000. The measurable energy includes electricity, district heating, oil, and biomass fuels. The amount of oil and electricity shall also be reduced in favour of district heating, biomass fuels and solar energy.

The first target group is the owners of one-family houses and especially those who have electricity or oil as the heating source today. Neither electric resistance heating nor oil are

\(^1\)All municipalities in Sweden have prepared “Lokala investeringsprogram för ekologisk hållbarhet”. The programmes were sent in to the Departmentet of the environment on the 15 of September 1997.
suitable as a heating source in the future, and the prices for both types of energy are also expected to rise in the future. Measures for multi-family dwellings are of lower priority, as the occupant of the flat can only affect the amount of household electricity used, but of course information on more efficient use of household electricity will be available. Regarding businesses in Borlänge, concentration will be on information for each branch in order to come in contact with their specific requirements in this way. In general it is important to create information with concrete examples adapted to the customers' situation.

To obtain examples for use as information to the owners of one-family houses a pilot study has been started with four houses in different categories. The goal was to save 25 % of the previous yearly consumption.

House 1, built 1938: The old oil fired furnace has been replaced by district heating. A "kronometer" (see description below) has been installed to show the cost of household electricity. Connection to district heating gave an energy saving of 42% during 1996.

House 2, built 1969: The oil-fired burner has been replaced by a pellets burner. A "kronometer" shows the cost of household electricity. The measures gave an energy saving of 28 % and a reduction in cost of 34 %.

House 3, built 1975: More energy efficient household equipment has been installed (labelled with the "Eloff" energy saving label). A "kronometer" shows the cost of household electricity. The measures gave an energy saving of 28 %.

House 4, built 1965: The existing oil/electricity boiler has been supplemented by closed loop ground source heat pump. A "kronometer" shows the cost of both household electricity and heating. The measures gave an energy saving of 44 % and a reduction in cost of 42 %.

"Kronometer" (The kronor meter)

"Kronometer" is a tool in the work of creating a more energy efficient customer behaviour patterns. The "kronometer" shows the energy consumption as kronor/hour. It can also show the amount of energy consumed per month or during other optional periods.

Conversion from electric resistance heating

Conversion from electric resistance heating is estimated to comprise approx. 500 one-family houses (50 %) during a five year period.

District heating - next best after solar

In the plan of action it is estimated that a further 1500 one-family houses and a number of multi-family dwellings will be connected to the district heating system during a five year period. The change will be from oil-fired furnace or electrically heated boiler to a heat exchanger connected to the district heating system.

Pellets furnaces and heat pumps

It is estimated that approx 500 pellets furnaces and 200 heat pumps will be installed in one-family houses. In addition the conversion of a number of smaller oil-fired furnance to pellets or wood powder is planned.

Other energy saving actions

Other energy saving actions in property are expected mainly to include smart windows, better insulation, more effective ventilation and advanced control systems.
Combined generation of electricity and heat
An investigation is being carried out into the combined generation of heat and power. Three alternatives have been presented.
Brundtland renewable energy network, BREN
FALUN - BORLÄNGE

(Submission 1998-05-03)

Activities 6 and 7

Review for Falun municipality
Informant: Anders Goop, Department of urban planning

Conversion to biomass fuel in smaller oil-fired central heating plants.
Ready made heat.

The municipality of Falun has set up ambitious goals (The Energy plan 1995-1998, Overall goals) concerning the reduction of the consumption of energy, types of energy and which types should be concentrated on in the first place, within the geographical area of the municipality. This is part of the development of Falun towards a sustainable society.

The municipality, in its role of energy consumer, has an influence quote of 10-12% of the total use of energy within the geographical area. The role of the municipality will therefore be to set a good example regarding buildings, transport etc. and as far as possible work with information to the municipality’s inhabitants, companies etc.

An important part of this work is to convert from heating with electricity or oil to renewable sources of energy. In the urban areas this will be done by connecting the municipal buildings to district heating which is based on over 90% (1997) biomass in the form of chips and wood briquettes. The municipality also has a relatively large number of smaller central heating plants which are located outside the present or planned area covered by district heating (or local central heating area). The project “ready made heat” is aimed at these plants. There are about 15 central heating plants within the municipality which are suitable for conversion and they have a consumption of between 10 and 100 m³ oil.

Project idea
As in many other municipalities Falun’s the economy is strained at present, the scope for investments is very limited. This means that it can be difficult to motivate investments even if they will be profitable in the relatively near future. As early as the winter of 95/96 the municipality of Falun went out to tender on ready made heat for a local central heating plant in Bjursås (1850 inhabitants). Heat is produced in a central heating plant at the school and provides heat for an old peoples’ home, a block of service flats and three private premises as well as the school. The heat is principally produced from wood briquettes and with the existing oil-fired boiler for peak load and as a reserve. The plant is run on a contract basis by a contractor who has stood for all the investments and the municipality pays for this “ready made heat” according to the agreement. The contract is for 15 years and the total heating requirement in the network is the equivalent of approx. 400 m³ oil/year.
It is hoped that this course of action will give:
- lower heating costs,
- no investment costs for the municipality,
- the municipality the option of taking over the equipment at the end of the contract period (probably 5 years) without extra cost, or at a predetermined rest value, or alternatively of coming to a new agreement at a lower price,
- the replacement of fossil fuels by renewable sources of energy and thereby a better environment,
- local job opportunities in forestry, transport and service.

An enterprise with “ready made heat” can be of interest to several property owners by someone (a contractor) taking on the operation of existing central heating plants, which may be considered for conversion from the present oil-fired heating to heating with pellets or briquettes.

Activity 6  The choice of suitable projects

With good experience from the heating plant in Bjursås the municipality has gone out to tender for the production of ready made heat in a further two municipally owned properties, Främby Riding school and Aspeboda.

**Främby Riding school.**
The central heating boiler uses 25 m³ oil today, and it is supplied from a provisionally placed oil tank. Measures must be taken to change this as soon as possible.

**Aspeboda**
A preliminary study “Alternative heating in Aspeboda” was carried out for Aspeboda. The following were included as possible units with consumption:

<table>
<thead>
<tr>
<th>School</th>
<th>225 MWh/year</th>
<th>30 m³ oil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nursery school</td>
<td>220 MWh</td>
<td>electricity</td>
</tr>
<tr>
<td>Flats (previous old peoples’ home)</td>
<td>170 MWh</td>
<td>23 m³ oil</td>
</tr>
<tr>
<td>Church</td>
<td>120 MWh</td>
<td>17 m³ oil</td>
</tr>
<tr>
<td>Parish hall</td>
<td>60 MWh</td>
<td>electricity</td>
</tr>
<tr>
<td>Rectory</td>
<td>40 MWh</td>
<td>6 m³ oil</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>835 MWh/year</strong></td>
<td><strong>59 m³ oil, 280 MWh electricity/year</strong></td>
</tr>
</tbody>
</table>

After negotiations only the school remained for conversion. The choice made for the church buildings was to change to a newer oil-fired boiler which the church administration committee had used in another property. The costs for the church administration committee were somewhat less by making such a change.
Activity 7  Realisation of conversion

Främby Riding school. The conversion means that a pellets burner has been installed in the existing boiler and a fuel store has been built adjacent to the boiler room. The total cost of the alterations has been estimated as approx. 50 000 SEK.

Aspeboda school. The conversion requires the building of a fuel store, a new central heating plant for combustion of pellets and also approx. 100 m culvert. It may be possible to connect the school heating plant to a nearby nursery school heated by electric resistance heating. A contract has been signed with a contractor. The building work has not yet been carried out so that the total cost for the alteration is unknown at present.

The municipality has achieved the aim of the project, to obtain heating at a fixed price for the municipally owned buildings.

The proposed contract between the municipality and the contractor is attached in Swedish.

Review for Borlänge municipality
Informant: Pelle Helje, AB Borlänge Energi

Improvement of energy efficiency in Borlänge, project 15%

During the last centuries modern society has plundered the earth of its resources. The handling and use of resources have lead to future generations not having the same access to the earth’s wealth as earlier generations. To prevent this it is necessary for us human beings to rethink and adapt society to laws and regulations which in any case are immutable, that is the laws of nature. One of the greatest problems is the use of energy which requires enormous resources today, normally in the form of oil, coal, natural gas or uranium. It is very important to find functioning alternatives to the traditional energy systems at as early a stage as possible.

By spreading information on a broad front and phasing in efficient and environmentally correct techniques Borlänge will take a big step towards a more sustainable energy system.

Goals
Project goals  To educate/inform the inhabitants of Borlänge so that they become smart energy users.

Effect goals  To reduce Borlänge’s energy consumption in buildings by 15 % by the end of the year 2000. The proportion of electricity and oil shall be reduced in favour of district heating, biomass fuels and solar energy.

Time limits  The first stage is being carried out up to 31-12-1998. The project shall be concluded by 31-12-2000.
The project started during autumn 1996 and is administered by a small flexible organisation where work is carried out in limited sub-projects. The aim is for the daily work to be carried out as usual but some parts of it will be moved into the project.

Activity 6  Organisation of the information campaign

The first target group is the owners of single family houses in Borlänge urban area and principally those who have electricity or oil as the source of energy today. Neither electrical nor oil fired heating is acceptable as a future source of energy, and at the same time the price of both is expected to rise in the future. The reason for starting with house owners is because they have the opportunity of influencing their total energy consumption. Information has been adapted to the category of users and it contains concrete examples which makes it understandable for the customers. This includes pilot projects with measures in four single family houses which have been described in an earlier section, “The improvement of energy efficiency in Borlänge, project 15 %” (page 10).

Thus, to begin with, activities have been aimed at the individual single family house owners, but will later also be aimed at different categories of companies and institutions.

Content

- Direct information to single family home owners through information meetings in nearby meeting rooms and village halls. The owners will be given information on what influences energy consumption in their homes and how they can reduce this. Motivation is found in reduced costs and synergy effects such as better indoor climate, less environmental impact. An information video has been produced.
- Home visits where well-informed people come to the individual home and see which measures are suitable for just that house. The house owner will be given information on how the house shall be run as efficiently as possible and suggestions for measures which should be carried out. Written documentation will be handed over.
- Lectures with colourful personalities from the energy world. The inhabitants of Borlänge and/or companies are given suggestions by the real experts in their respective spheres.
- To create pricing which encourages reduced use of energy by low fixed charges and high consumption costs.
- A permanent exhibition at Borlänge Energi offices where the good energy solutions such as heat exchangers, pellets stoves, heat pumps, windows etc. can be seen and well-informed personnel can give pertinent information.
- Exhibitions in connection with open houses, lectures, fairs and other activities. The aim is for the information to be where the people are.
- To develop the “The Kronor meter” (Kronometern) to a product owned by everyone. A technical aid which makes energy visible and increases the awareness of the user.
- To organise energy saving measures on a large scale. For example by offering the inhabitants of Borlänge good prices for the improvement of windows by large purchase agreements with local companies (see below Package concepts).
- To use the media in a smart way. Both to spread information and to follow up the project. Energy hints on the radio are an interesting variation of the spread of information.
- In co-operation with Högskolan Dalarna and companies produce information and educational programmes for schools and companies (theme days).
- Dissemination of information via Internet.
Borlänge Energi has carried out energy counselling actively since 1990. Until 1994 the resource was one person. Gradually the resources have been increased and at present the unit consists of seven persons, who are engaged in energy counselling/improvement of energy efficiency in some form. Two of these are attached directly to the district heating operation.

Traditionally energy counselling has been a sort of “care of the sick”, where what is wrong is corrected afterwards. The aim is to be a step in front by being more active and in this way to motivate people to choose more efficient equipment and to change their habits.

Package concepts
For the work to have a break through and to continue in the long term it is important that there are companies which can meet the customers’ requirements. Customers need to know where to turn, what products/services they will get, and there must be clear and explicit pricing.

Borlänge Energi has therefore made contact with companies to be able to refer customers to package concepts. For example five plumbing companies together with Borlänge Energi have produced a proposal for conversion from electrical resistance heating. As far as possible, the companies shall use fixed prices for all solutions.

Examples of package concepts
- Installation of pellets burner
- Installation of heat pump
- Installation of district heating
- Extra insulation of the ceiling
- Change of windows/addition of a third sheet of glass
- Conversion to a waterborne radiator system
- Installation of “Kronometern”
- Solar heating installations

An example of the scope of a package concept
Basic package for the installation of district heating includes:
* heat exchanger complete with control and operating equipment and also expansion tank,
* pipework, heat exchanger is connected to the heating and domestic hot water systems and also the district heating system,
* electrical work, the old pump is disconnected. The pump and control equipment on the new heat exchanger are connected to the electricity supply,
* all new pipework is insulated and also where the connection was made
* the old boiler is disconnected, removed and taken away.

Giving of information and preliminary preparation for energy saving measures.

The goal for the project is that “Theoretical and practical energy counselling to all property owners” should be given during a three year period. During autumn 1997 and spring 1998, 11 000 single family house owners have been invited to take part in information on energy saving measures. Up to now 30 information meetings have been held and 3 500 property owners have taken part. On these occasions general information is given by the information video which has been produced and information material adapted for Borlänge on the above named “package concepts” and on the companies taking part in the campaign is handed over.
After this examples of measures, based on information given by the participant house owners, are gone through with the help of a computer programme. The approximate yearly energy saving, the reduced costs as well as the pay-off time, is estimated for each measure. Every property owner is given the chance of a home visit and a run through of suitable measures. A clear and easy to understand economic statement for the different measures is a prerequisite for a successful project.

**Reduced consumption of hot water**
Most people are ignorant of the cost of using showers and baths. Changes in habits and reduction of flow are the measures which are easiest to carry out and energy saving and reduction of costs are incredibly large. The recommendation is for the installation of a better shower nozzle combined with a reduction in flow. For a family of four people with 30 minute shower time the reduction of flow from 15 l/min till 7 l/min gives a saving of as much as 2 945 SEK per year. If the shower time is also reduced a further saving is given proportional to the reduction of time. All the property owners attending the information meetings are given a free shower nozzle.

**The energy line**
In order to be available whenever someone wants information AB Borlänge Energi has opened a free telephone line “the energy line” for energy information. A number of informants have been trained to deal with the most common energy questions and they can pass on other enquiries to the company’s specialists. In this way it is hoped to reach even those who have not taken part in the information meetings. It is important to be able to give information when it is asked for.

**Activity 7  Concept solutions carried out**

- Installation of pellets burners has been carried out in approx. 200 examples from 1995 to the present day.
- Installation of heat pumps has been carried out in approx. 150 examples during the year.
- The emphasis in the campaign has been on the exchange of oil-fired boilers and the installation of district heating and also the conversion from electrical resistance heating. During 1998 approx. 250 single family houses will be connected and approx. 2500 will have been offered connection to district heating by the end of 2000. Conversion to waterborne heating with district heating as the source will be offered to approx. 100 single family houses during 1998 and 500 single family houses will have been offered conversion by the end of 2000.
- Additional insulation of ceilings has been carried out in an area comprising a group of 116 single family houses.
- The “Kronometern” has been installed free of charge in 80 single family houses and some of these have been connected via a modem to develop distance reading of consumption.
- Solar heating installations are considered to be relatively expensive, and to have a long repayment period, which is why only a few have been installed.
Basis for *Newsletter*
Falun-Borlänge
*(Submission 1998-07-01)*

**Conversion to biomass fuel in smaller oil-fired central heating plants. Ready made heat.**

The municipality of Falun has set up ambitious goals (The Energy plan 1995-1998, Overall goals) concerning the reduction of the consumption of energy, types of energy and which types should be concentrated on in the first place, within the geographical area of the municipality. This is part of the development of Falun towards a sustainable society.

An important part of this work is to convert from heating with electricity or oil to renewable sources of energy. In the urban areas this will be done by connecting the municipal buildings to district heating which is based on over 90% (1997) biomass in the form of chips and wood briquettes. The municipality also has a relatively large number of smaller central heating plants which are located outside the present or planned area covered by district heating (or local central heating area). The project “ready made heat” is aimed at these plants. There are about 15 central heating plants within the municipality which are suitable for conversion and they have a consumption of between 10 and 100 m³ oil.

**Project idea**
As in many other municipalities, Falun’s economy is strained at present and the scope for investments is very limited. This means that it can be difficult to motivate investments even if they will be profitable in the relatively near future. As early as the winter of 95/96 the municipality of Falun went out to tender on ready made heat for a local central heating plant in Bjursås (1850 inhabitants). Heat is produced in a central heating plant at the school and provides heat for an old peoples’ home, a block of service flats and three private premises as well as the school. The heat is principally produced from wood briquettes and with the existing oil-fired boiler for peak load and as a reserve. The plant is run on a contract basis by a contractor who has stood for all the investments and the municipality pays for this “ready made heat” according to the agreement. The contract is for 15 years and the total heating requirement in the network is the equivalent of approx. 400 m³ oil/year.

It is hoped that this course of action will give:
- lower heating costs,
- no investment costs for the municipality,
- the municipality the option of taking over the equipment at the end of the contract period (probably 5 years) without extra cost, or at a predetermined rest value, or alternatively of coming to a new agreement at a lower price,
- the replacement of fossil fuels by renewable sources of energy and thereby a better environment,
- local job opportunities in forestry, transport and service.

An enterprise with “ready made heat” can be of interest to several property owners by someone (a contractor) taking on the operation of existing central heating plants, which may be considered for conversion from the present oil-fired heating to heating with pellets or briquettes.
Contractors have been accepted for further two objects. **Främby Riding school.** Främby Riding School is situated in the outskirts of Falun urban area. The central heating boiler uses 25 m³ oil today. The conversion means that a pellets burner has been installed in the existing boiler and a fuel store has been built adjacent to the boiler room.

**Aspeboda.** Aspeboda is a village in the rural area. For the village a pilot study has been made “Alternative heating in Aspeboda”. The study included possible units with a consumption equivalent to 835 MWh/year, out of which 59 m³ oil and 280 MWh electricity. After negotiations remained for conversion, a school, a nursery school and some flats for pensioners with a consumption equivalent to 615 MWh/year, out of which 53 m³ oil and 220 MWh electricity. The conversion requires the building of a fuel store, a new central heating plant for combustion of pellets and also approx. 100 m culvert.

The municipality has achieved the aim of the project, to obtain heating at a fixed price for the municipally owned buildings.

**Low energy city core, Renewal of the city core in Falun**

The national association Renewal of the City core have appointed Falu city core as the “The City Core of the year”. The work for renewal of the city core have been carried out by the association “Centrala Stadstrum” which include the district council, property owners, tradesmen’s association etc. The motivation of the jury is stated - *From an overall vision the city actors has been joined in a way worthy of imitation in a renewal project that has given measurable commercial success increased cosiness and beauty and that further more has been carried out with a conscious aiming on husbandry of natural resources.*

The project, Low energy city core, has included surveys of current use of energy, and of what could be done to improve energy efficiency and also how a co-ordinated energy provision could include further energy conservation and thereby reduced cost for energy.

In Falun city core several properties are heated by electricity or by their own oil fired furnace, offices and shops are ventilated without heat recovery, building envelope and windows are badly insulated, street and squares are light by floodlighting, illuminated sign boards and streetlighting. There is probably a great potential here for energy conservation. Instead of every participant in the area acting on their own a co-ordinated activity could give a greater penetrative power and be more economically advantageous. The work has been carried out through the city association.

Three central blocks has been surveyed to start with, statistics has been compiled for heated area, floor usage, amount of heating and consumption of electricity. The three blocs has been compared with a relatively newly constructed building and a potential saving in the three blocs has been estimated. The potential exceed 2,5 miljon kr a year. For the three selected blocs there has been a good accessibility and amount of energy statistics. The great potential of saving energy in the three blocs reveals the necessity to compile statistics of energy use also in other blocs. The size of the buildings, age and use vary extensively in the city core, why it could be doubtful to estimate the possible total amount of energy conservation in the city core, but it will likely not be less than 10 miljon kr a year, which shows that it is an urgent project.
The important part of the project is to show that one with co-operation can reach results, that are entirely unattainable with separate measures.

**Improvement of energy efficiency in Borlänge, project 15%**

Borlänge municipality has given Borlänge Energi the task to administer and to develop one in use and established infrastructure towards a customer made ecocycle society. The enterprise in the future will focus more pronounced on property service and infrastructure. Borlänge Energi to a greater extent will actively work to keep down the costs of our customers the property owners offering products and services based on a comprehensive view, perseverance and long term.

One of the greatest problems in the ecocycle society is the use of energy that today demands enormous resources, generally in the form of oil, coal, natural gas or uranium. It is of great importance in an early stage as possible to find useable alternatives to the traditional energy systems and to use the correct kind of energy for correct purpose and the effective use of the exergy.

**The information campaign**

By spreading information on a broad front and phasing in efficient and environmentally correct techniques Borlänge will take a big step towards a more sustainable energy system.

**Goal for a five year period**

During the coming five year period together with our customers/owners we want to achieve the following goals:

- 15% reduction of energy use in the properties in Borlänge,
- 90% of the heated area in the buildings in Borlänges shall be heated with the use of renewable energy resources,
- 50% of electric heating shall be replace with renewable fuel,
- 100% of the property owners in Borlänge have been offered theoretic and practical energy guidance.

Thus, to begin with, activities have been aimed at the individual single family house owners, but will later also be aimed at tenants in flats and different categories of companies.

**Contents:**

- Direct information to single family home owners through information meetings in nearby meeting rooms and village halls.
- Motivation is found in reduced costs and synergy effects such as better indoor climate, less environmental impact. An information video has been produced.
- Home visits with an energy survey. The house owner will be given information on how the house shall “be run” as efficiently as possible.
- To create pricing which encourages reduced use of energy by low fixed charges and high consumption costs.
- A permanent exhibition at Borlänge Energi offices where the good energy solutions are exhibited and well-informed personnel can give pertinent information. Exhibitions in connection with open houses, lectures, fairs and other activities. The aim is for the information to be where the people are.
- Dissemination of information via Internet.
Package concepts
For the work to have a break through and to continue in the long term it is important that there are companies which can meet the customers' requirements. Customers need to know where to turn, what products/services they will get, and there must be a clear and explicit pricing. Borlänge Energi has therefore made contact with companies to be able to refer customers to package concepts.

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* electrical work, the old pump is disconnected. The pump and control equipment on the new heat exchanger are connected to the electricity supply,
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* the old boiler is disconnected, removed and taken away.

Giving of information
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Reduced consumption of hot water
Most people are ignorant of the cost of using showers and baths. Changes in habits and reduction of flow are the measures which are easiest to carry out and energy saving and reduction of costs are incredibly large. The recommendation is for the installation of a better shower nozzle combined with a reduction in flow. For a family of four people with 30 minute shower time the reduction of flow from 15 l/min till 7 l/min gives a saving of as much as 2 945 kr per year. All the property owners attending the information meetings are given a free shower nozzle.

"Kronometer" (The kronor meter)
"The Kronor meter" shall be developed the to a product owned by everyone. "The kronor meter" is a technical aid which makes energy visible and increases the awareness of the user. The kronor meter shows energy consumption as kr/hour. Via Internet the kronor meter can be connected to a computer to e.g. prepare energy statistics.

Energy saving bungalow
In 1997 Borlänge Energi invested in an one family house in one of the bigger housing areas in Borlänge. The bungalow will be used for practical information about energy saving. Borlänge Energi intend to halve the energy consumption in the bungalow by a number of energy saving measures. Some measuring devices are installed to show the result continuously. The information also will be accessible on Borlänge Energi homepage on Internet. In addition will be shown conversion from electric resistance heating to waterborne heating. Demonstration will be arranged for the general public.
The energy line
In order to be available whenever someone wants information AB Borlänge Energi has opened a free telephone line “the energy line” for energy information. The energy line is open 08:00-20:00 every day 7 days a week.

Why Internet - web-service
This web-service in contrast to many homepages is extensive and contains many services the customer can use.
We look at Internet and the IT-technics as a great possibility for us to develop our services in the future. This is a first step. We will be able to make the service more effective, create better contacts with the customers, further develop our different products and services and furthermore save money, something that in the end will be of use to our customers. It is to facilitate, increase the level of services and our accessibility for the customers.
We have developed the service beginning with the customers and their need. The customers are not firstly interested of how we look at the services. The customers want information about matters that affect themselves. The foundation for the web-service we therefore have developed in the first place from the customers requirements, report of meter reading, notification of varying kind, renting of a container, opening times, explanation of the invoiced amount, all you need to know about district heating in Borlänge and effective energy saving suggestions. An important function is report of meter reading and besides reporting the reading one can follow up the consumption back in time.