



**Fiscal incentives and
other control
instruments for creating
a sustainable energy
system in Hillerød**

SECURE




Hillerød is geographically situated in North Zealand and part of the capital region of Denmark. The municipality covers 212.99 km² and has 46.500 inhabitants, with 30.000 living in the city of Hillerød.

Fiscal incentives and other control instruments for creating a sustainable energy system in Hillerød

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Hillerød kommune
in cooperation with EU's



Intelligent Energy  Europe

Preface

The note is prepared by Hillerød Heat A / S as a part of the SECURE project. The note is partly funded by the EU's Intelligent Energy Europe - program, which is part of the EU subsidy frame, which facilitate activities that reduces energy consumption and CO2 emissions. The note is connected to the Energy Action Plan 2008

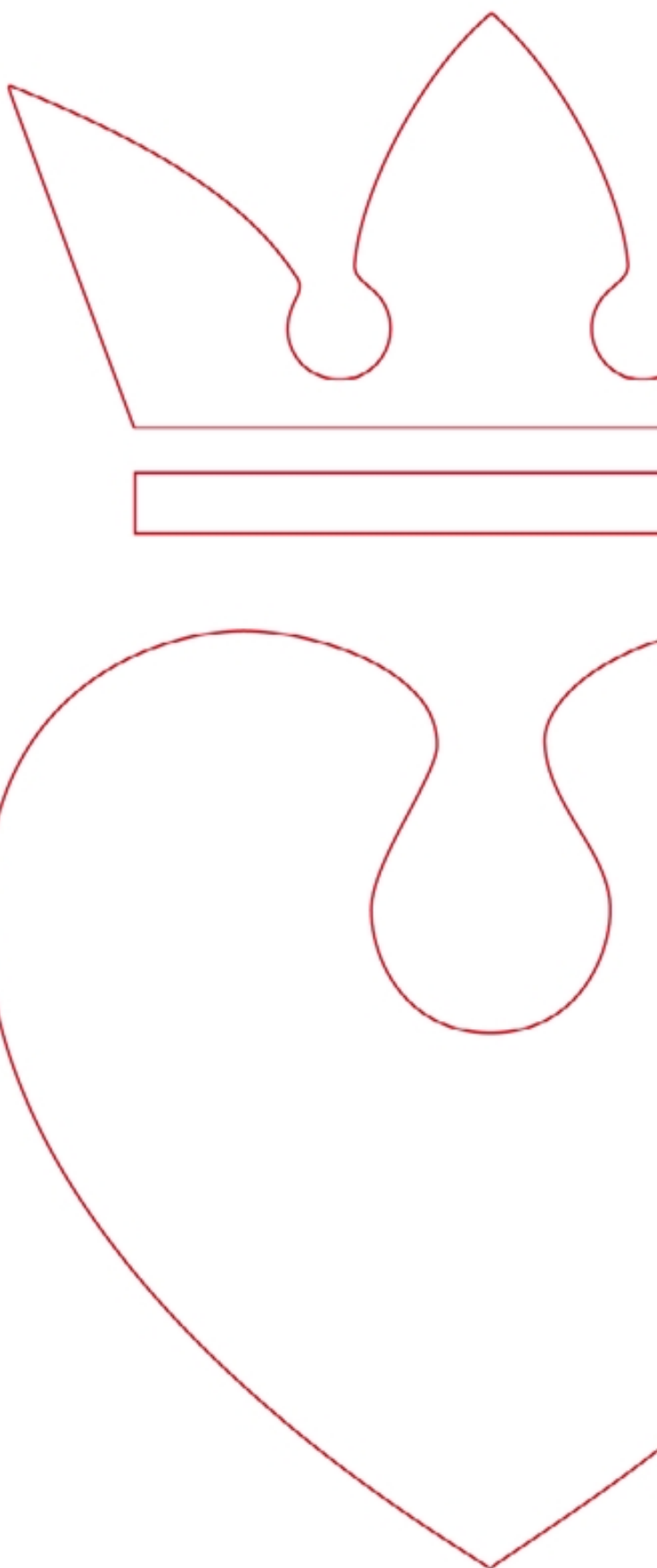
The note explains the financial arguments of energy savings, and the economic benefits of implementing BAT technologies in the fields of energy technologies, in the municipallety of Hillerød. Often the financial arguments may be the idea behind the implementation of the technologies.

The note also describes how energy savings can be funded if the citizen's don't want to pay themselves, as well as how the citizens may receive grants when they implement energy-saving technologies. Energy savings has from 2006 been traded after a commodity, in the same way as CO2 quotas, and is also discussed in the note.

Finally, the note sets out the economy and profitability of the initiatives contained in energy action plan 2008 for the municipality of Hillerød.

Further information can be found, on the Municipality Homepage www.hillerod.dk or by contacting energihandlingsplanen@hillerod.dk.

Enjoy the reading



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Economic initiatives for energy saving

When children get their first money, they learn, that they shall only buy things that give them value. They also learn to assess, whether the things they wants to buy gives a value, that is as large as the value they would get if they bought a subsidized product.

This value differentiation is often difficult, For example, the value obtained from an normal electric bulb, compared to the value obtained from an low energy electric bulb. Both provide light, and because the design of the lamps often covers the light bulb, the aesthetic parameters are not given much weight.

The difference in values is often linked to the rational thinking, and therefore, the costs often determines whether people buy´s ex. a normal bulb to 10.00 kroner or a low energy bulb to 30.00 kroner.

An economist, however, would argue that the rational argument based on the cost, not only consists of the fixt costs but also, the cost for installing the bulb and the power consumption when the bulb is lit, should be recognized throughout the total bulb Life. The result of the economical analysis discussed in the next section.

The economic distinction can be much more complex than the example with the electric light bulbs, and when people are seeking information on the Internet or from private consultants, they often gets contradictory answers about the cheapest product. The distinction can often be confusing when the calculations include the life-cycle analysis of the products

which concludes the costs, on the basis of an overall environmental impact.

That is why many citizens choose to buy technology which they are familiar with, and by doing that, they know that their value needs are met.

Companies, on the other hand, often choose products on the basis of advices from economists, and therefore many companies are faster to implement the new energy technologies, than the normal citizens. These technologies can be implantation of solar panels instead of district heating, or low energy housing instead of buildings which just meets the highest energy performance level.

Products that uses less energy, is often more expensive than normal products, produced on traditional technologies. But if lifetime costs and operating costs are taken into account, the results often show, that the product which uses less energy, is the cheapest.

The Municipality of Hillerød has used these considerations in many of the general energy focus areas, to implement more energy-saving technology, as outlined in the Energy Action Plan.

The action plan also outlines some areas, aimed at the citizens. These areas are economically advantageous for the majority, which means that if the citizens finance the technology in a bank, the annually costs will be cheaper from day one, because the annuity is lower than the cost, that alternatively is paid on electricity, water or heating.

Profitability of energy savings

An investment in environmental technologies that uses less energy than conventional products is often profitable if the lifetime costs inclusive usage, is included in the financial calculation product.

When the profitability is examined, the process can be described as shown below. An idea of replacing a product with a new, which can save energy (and money), is the first bullet in the process. The next bullet is to investigate the current product needs and to verify, that the new product will contribute to the expected effect. If the current product ex.

is specially designed or specially adapted to a specific need, this must be noticed.

When there exists a new product and the existing product specifications are well known, the next steps are a profitability study and planning of the replacement of the product.

During the profitability study, it shall be clarified how much cheaper it is with the new technology and calculate if the surplus is enough to pay the replacement of the product. After the replacement, it is a good idea to evaluate that the new product meets the expectations. People may contact the supplier if the product doesn't reach the expectations.



In practice, the process can be as the following example of an electric bulb. You see an advertisement with a low energy electric light bulb using 11W/h. The bulb can possibly be fitted into your lamp instead of the conventional bulb using 40W/h. For advertising, the low energy light bulb has a lifetime of 15.000 hours, and the conventional bulbs have a lifetime of 1.500 hours. One of your existing conventional bulbs has a bracket which is similar to the energy-saving light bulb, and the existing bulb is old, so it will have to be changed soon. The existing conventional bulb is lit daily from 17 -22 in the six winter months, equivalent to approximately 900 per hour. year.

Replacement cost "energy saving bulb":

- Low energy bulb 30,00 kr.
- Conventional bulb 10,00 kr.
- Implementation 00,00 kr.
- Grants: -, 00 kr.
- Costs for disposal of the old incandescent bulb: 00,00 kr.
- Electricity per kWh 1,75 kr.

The profitability study shows that the costs of the conventional bulb is 1.150,00 kr. where energy saving light bulb, in the same period, will cost 318.75 kr. On an annual basis, that means that it costs 49.75 kroner/year more to use conventional bulbs compared of the costs to the low energy bulb.

The saving of 49.75 kroner is pr. bulb and the savings of a household can be considerably larger.

Although both products meet the ecstastically needs and the conventional bulb only costs 1/3 of the energy saving light bulb, the total savings is more than 1½ times the purchased costs on the expensive technology.

From an economic point of view, it is economically profitable to invest in

energy-saving light bulb especially if the alternative is conventional pears.

The profitability of energy-saving technologies is often determined by the direct payback time, which is defined as the time the product shall be used / be in operation, before the energy saving, reflects the extra costs to buy the technology.

Company's often operates with a direct payback time of less than 5 years, if the investment shall be characterized as good.

Private persons often operate with a direct payback that is less than 20 years, if the technology shall be profitable. It is required that the repayment period not may be longer than the product's lifetime.

The direct payback time for the light bulb example is: $(30.00 \text{ kroner} - 10.00 \text{ kroner}) / (0.040 \text{ kW} - 0.011 \text{ kW}) * 900 \text{ hours} * 1.75 \text{ kroner} = 0.44 \text{ years} \sim 5 \text{ months}$

Since the direct payback is clearly less than 5 years, the investment in good for both private and companies.

Funding for energy saving

Energy saving technologies can be expensive to buy, if people don't have the money on their bank account. But many banks, however, look favorably on providing preferential loans to energy technologies. For example, expanded lending frame for people who build low-energy buildings compared to conventional buildings, but more citizens have told that they should argue for the economic benefits of low energy housing before they got extended their payback time.

Total funding

Some companies have specialized in implementation of energy-saving activities for "free". The concept is known as EPC (Energy Performance Contracting) which is an contract between a company and a PCE company, to get a continuously fixed payment, equivalent to the normal cost for energy. The EPC-company must then pay the companies energy bill and replace ex. light bulbs, and pay the replacement costs themselves. They earn money because the building uses less energy than normal after their installation of energy saving technologies. After an agreed period of years, the contract stop and the company get a lower energy bill. The EPS companies also called ESCO companies, is manly addressing companies, because their potential for energy savings are significantly higher than in private homes.

The ordinary citizen, can also obtain low-energy light bulbs and electricity saving rails, for free, from many energy companies.

For more information's place contact your local energy company.

It is generally very difficult to get an advantageous agreement on a total

financing of energy-saving activities. Therefore many companies chooses agreements on subsidies for energy-saving activities, rather than get 100% financing.

Subsidy and grands

There exist more possibilities for obtaining grants, as a part financing for energy-saving activities. The possibilities are differentiated for different audiences and also offered by various organizations.

Local citizens have the opportunity to obtain grants to build low-energy buildings, install solar panels, etc. in the new Ullerødby - Hillerød. The grants is provided by the EU and forwarded to the citizens by the municipality. Furthermore, there is an opportunity to get grants for general energy-saving activities from most energy companies. The grants can either be free guidance from a consultant, on where to realize the largest energy savings, or the grants can be given as financial grants to specific projects.

Nationally there is grants for major projects, as well as for companies that wants to implement demonstration projects, which can introduce new energy saving technologies. For example, several times a year, there are calls for applications for PSO grant.

The European Union gives grants to energy saving projects, and both private and public companies, can receive grants, and they can forward them to the public. The municipality of Hillerød has resaved subsidies through the EU frame programs, for the preparation of a plan for energy actions, and for the energy installations as the 3000 m² solar collectors in Ullerødbyen.

There is more informations about these projects on the municipality webpage.

Trade in energy saving

Until 2006, the energy companies in Denmark should have employed an energy consultant, where their customers could receive energy guidance's.

In 2006 this provision was changed. The energy companies must now give documentation that shows that their guiding activities have led to energy savings by the customers. Companies can choose whether they want to realize savings in their own supply area or whether they will do it somewhere else in the country. Companies do also have the option to buy energy savings from private or companies that can show documentation of, that they have reduced their energy demand.

Energy saving activities are regulated by "law on energy saving activities" and the saving documentation shall be reported to the Danish Energy Agency, twice a year.

Several companies and trade associations have specializing in

acquiring energy from private and then sell it to the energy companies. The costs of energy savings varies between 0.20 and 0.60 kr./kWh, in the autumn of 2008.

In the example with the bulbs, the change of the conventional 40W bulb with a 11W low energy bulb results in a saving of 29W every hour the bulb is lit. On an annual basis, this accumulated a saving of approximately. 26,100 wh or 26 kWh, which has a market price between 5.25 and 15.75 kroner.

In this context, the documentation is a document which describes, that "you" has changed a 40W conventional bulb with a 11 W low energy saving bulb. It is therefore not something which affects the person who has changed the bulb or the installation.

Financial conditions behind the activities of the Energy Action Plan

The note describes the costs and the financing of the energy actions that is outlined in the Energy Action Plan 2008. The cost of the energy actions is defined as the extra cost involved with the action, compared to a situation where the technology not is implemented. The costs, is compared to the energy saving pr. year, and the direct payback time is calculated, as described above.

For calculating the payback time, the following energy costs are used:

- Heat: 400 kr./MWh
- Electricity sold to the grid: 0.60 kr./KWh
- Electricity used in the buildings: 2.00 kr./KWh

The tax-funded area in the municipality will not pay any extra cost that not already has been granted, by approving the energy actions. The cost of the major new facilities in the utility will be approved in each case, in separate settings, and the contents of the Energy Action Plan 2008 outlines the activities that is planned in the utility, and points out a good investment for the rest of the municipality.

Utility

The district heating operations is financed by Hillerød Varme a/s as a part of the expansion and renovation of their technical parts. In new city areas the costs are mainly paid by the developer.

Lowtemperature district heating.

- Blend loops incl. pumps and management (experience price) per loop: 150,000 kr.
Payback time: 10.5 years.

Optimal pipe dimensioning

- Extra electricity to pumps 5.000 kr./year
- Savings through narrower pipes (2 km of pipes per year) 80,000 kr./ year
Payback time: 5 years.

Maximum insulation of the heating pipes

- Extra costs by more insulation (v. 2 km per tube. Years) 80,000 kr./ year
Payback time: 11 years

Direct piping by the costumers

- Savings per customer that install direct piping: 1000 kr. / year
No payback

Renovation of the old district heating pipes.

- Extra costs to more insulation (v. 1 per km. Years): 100,000 kr.
Payback time: 5 years

Actions in the electricity grid, is financed by Hillerød Energy a/s, as a part of their general development and maintenance of the grid. The cost of cableing of the existing air cables and dynamic computer simulations is part of the general operation and maintenance of the grid. It is therefore not associated with external costs.

Low loss transformers (per transformer)

- Extra costs per transformer: 44,000 kr.
- Payback time (Idling): 22 years
- Payback time (v. 60% load): 4.5 years

Energy production

Solar collectors in the city area Ullerød, are paid by Hillerød Varme a/s, and are a part of the expansion of production capacity. Local solar panels on private buildings, is financed by those who will benefit from the installations. Either the citizens or the municipality.

Solar collector in Ullerødbyen

- The costs to solar panels inc. construction and management: 4,000,000 kr.
- Payback time: 6.25 years

A new large solar collector in the eastern city

- The costs to solar panels inc. construction and management: 8,000,000 kr.
- Payback time: 12.50 years

Local solar collectors

- The costs of the solar panels incl. construction and management. 2,400,000 kr.
- Payback time: (provided by the citizen) 20 years

Photo Voltaic at the municipal buildings is linked to the Sorcerer project and financed partly by the EU. Photo Voltaic on private homes is financed by the citizens themselves. For example, as the houses that is being construction in Ullerødbyen.

Photo Voltaic on municipal buildings

- The costs of photo voltaic panels incl. construction and handling. 1. 600,000 kr.
- Payback time: 20 years

Photo Voltaic on private buildings

- The costs of photo voltaic panels incl. construction and management. 960,000 USD
- Payback time: 37.5 years

Heat pumps are financed by the people who install them. Heat pumps are used primarily in low-energy houses that not are connected to the district heating net. There is therefore no extra cost for the establishment of pump equipment, compared with oil and district heating. For example more houses that is being build with heat pumps in Ullerødbyen - Hillerød.

Biofuels facilities are fully affiliated heating centrals, and all costs are held from Hillerød Varme a/s.

Full exploitation of Krakasvej Heat Central

- Extra revenue in relation to the purchase of heat from Vattenfall: 13,750,000 kr.

Powerplant for the gasification of wood

- Costs of the plant: 10,000,000 kr.
Payback time (fuel included): 4.5 years

Construction and buildings

The cost of the municipal buildings, are held by the general construction operations. Energy labeling of the municipal buildings with pinout of profitable energy actions will be made by the municipality. The pinouted actions with a payback in less than 5 years, shall to be realized, due to the national law.

- Costs for the projects (guessed): between 7 - 20,000,000 kr.
Payback time: maximum of 5 years

Energy saving demonstration projects

- Costs for the projects (Average): 1,200,000 kr. per year
Payback time (based on 2007): 5.7 years

Energy management in municipal buildings

- Costs for energy management follows the current operations management
Payback time: from 1 to 3 years
- Special mainstreaming of energy saving by buildings includes a behavior change in the municipal project management system, so promoters and control groups are helped to think of how energy is saved in all the renovation and construction projects. There will be afternoon presentations to colleagues working on construction and renovation projects, as a part of the Sorcerer project.

Transport and Roads

LED lighting is used for all the repairs and maintenance of traffic facilities. Recovery time is not good in itself because the material costs are low. But when the total operating costs are recognized in other words hourly for assemblers and their cars when changing bulbs, etc.

Payback time: maximum 5 years.

Water

- The use of rainwater for sanitation etc. can reduce average household water consumption by 30%.
- Energy management of sewage pumps provide experience significant savings.
Payback time: maximum 5 years.