

All aspects on energy, part one

Mikael Ahlborn, 2011-01-17

Renewable energy

What are the sources of renewable energy

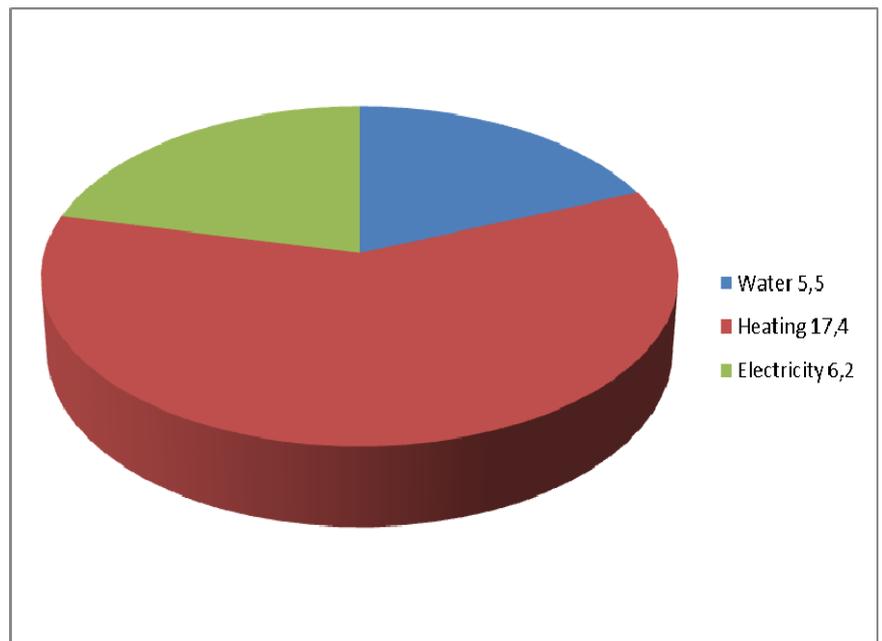
Renewable energy comes from sources that are constantly renewed at a rapid pace. Examples of renewable energy are hydroelectric, wind, solar and bio energy. Bio energy is energy produced from biomass such as plants and plant parts of various kinds. Since biomass is continuously formed, bio energy is a renewable energy source. Sweden has excellent conditions for the production and use of renewable energy. Many of our rivers are already used for the production of hydropower, and much of the country's area consists of forest that can be processed into bio fuels.

Over 40 percent of all energy consumed in Sweden comes from renewable energy sources. It is mostly bio energy and hydropower and in the future even wind power will account for a greater proportion. Sweden's use of renewable energy is by far the highest in comparison with other European Union countries.

Within the European Union there is active work in the field of energy. It has developed common goals for renewable energy: by 2020, 20 percent of European Union energy consumption should come from renewable sources and the share of bio fuels should be at least ten percent. In addition, the European Union should reach a goal of 20 percent energy efficiency by 2020. For Sweden, these goals are that we should increase the share of renewable energy from 39 percent today to 49 percent by 2020.

As a real estate owner it is of course impossible, to a greater extent, to affect the production of energy, whether for heating or electricity. However, what we can do is to look at our own buildings. We can avoid consuming more energy than necessary and we can look ahead at our choices of technical solutions in existing, and new buildings. The cost of electricity, water and heating is the single largest cost for a real estate owner. To be able to meet the demands for reduced energy consumption, energy saving measures must be carried out.

Picture 1, shows the energy costs for Akelius Helsingborg.



Heating, water and electricity consumption for Akelius Helsingborg per year. (Mkr)

Heating

The most common way of producing heat in Sweden is by district heating, as the name implies, district heating comes from somewhere within the district. Instead of every building having its own boiler, district heating is supplied by a central plant which can use advanced methods to run on many different fuels, so benefiting both households and the environment. It is said that the district heating plant is at the heart of a district, spreading warmth right the way around it.

District heating arrives at the property in the form of water heated at a central heating plant. This heat is spread among households in the area by transporting the hot water under high pressure through a system of well insulated pipes. This water is at between 70 and 120 degrees, depending on the weather and time of year, and is fed to a district heating centre in each property. There are heat exchangers here that utilize the hot water to heat the radiators in the building and also the hot water in the taps. This is not the same water that flows through the various systems – the cooled district heating water is returned to the district heating plant so as to be reheated in a closed circuit.

Energy saving measure

Measures to save energy

There are many ways of saving energy in properties, such as installing new windows, insulation of attics and walls. There are also ways of reducing the energy demand in technical systems. Here are some explanations of possible energy project.

Weather forecast controlled heating

Weather forecast controlled heating systems makes it possible to control the heating of buildings with very detailed and local weather forecasts, on average it is possible to reduce the energy consumption by 10 percent, with same or improved comfort for the tenants.

With forecast regulate, the heating of buildings is not only dependent on the outdoor temperature, it is controlled by an equivalent temperature taking into account all weather parameters and calculating the buildings energy balance. Traditionally heating has been regulated only dependent on the outdoor temperature and not taking into account the thermal mass of building, wind losses or solar contribution. This means that by making use of internal heat sources and sun radiation this reduces the need for heat supplied by heating systems.



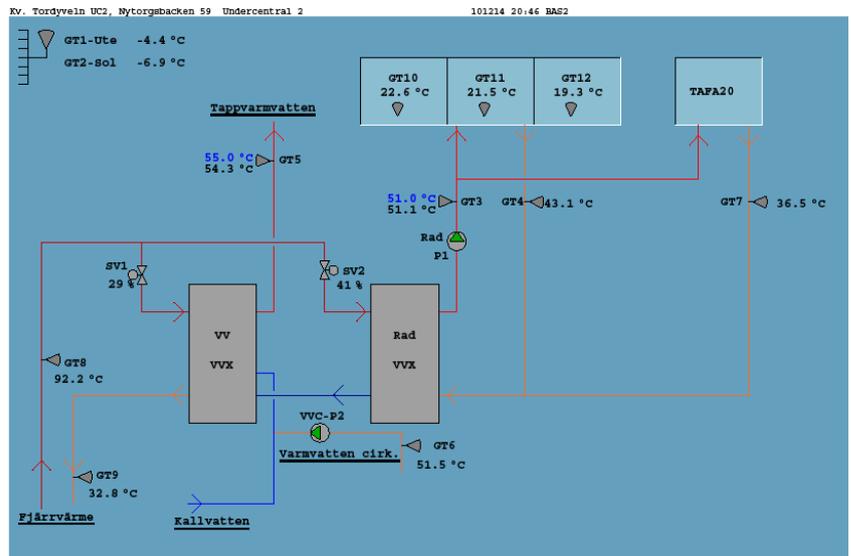
Real estate Automation

Energy efficiency in both new and existing buildings has become one of the most important issues for the construction and property sector. With automatic control, regulation and measurement can optimize the operation of energy systems including ventilation and cooling. The goal is to minimize energy consumption while the indoor climate is right.

Real estate automation means a system, usually in the form of a computer or microprocessor, which ensures that the property has the desired energy in the form of hot water, ventilation and central heating.

Today's systems for buildings are often linked to the internet so that the reading of consumption data is possible. It is not uncommon for consumption data to be presented in charts on Web pages. It is equally plain that you can ask for different set points, after logging in with passwords to your web pages.

A major contributing factor to the increased functionality of building automation systems is open source software such as Linux, FreeBSD and other similar stable and reliable operating system.



Water saving-measures

Water saving measures is a natural part of energy efficiency, which results in a low cost per apartment in relation to savings on water and energy bills. One example of an energy saving measure is to install saving aerators for showers and taps that by mixing in air increases water velocity, this also reduce the amount of water when flushing the toilet.

Water-saving measures significantly affect the energy bill. Approximately 35 percent of all water used in the apartments is hot water.

Individual metering

Individual metering of electricity, hot and cold-water means that you only pay for the electricity and water you yourself use. If you save energy and are careful with your electricity and water consumption in your apartment, you can save money compared with the traditional debiting system. Each tenant is then debited for their individual consumption on their rent slip.

This is financially profitable for the tenants living in the building. They do not have to pay high fixed costs for a standing charge – this is paid by the real estate owner – and they have the ability to affect their costs by only paying for the electricity and water they consume.

Another important aspect of individual metering is it increases people's motivation to save energy; it is not unusual to see hot water consumption reduced by 20-30 percent. In the bigger picture, it is ultimately the environment that stands to gain the most since the cumulative reduction in environmental impact will be considerable.

Ventilation

The measure that will save the most energy in the ventilation system is to recover the heat in the air leaving the house, such a system both supplies and extracts air with a heat-exchanger. There are basically two types of air heat-exchangers; rotating and cross flow. When using a rotating heat exchanger, the recovery ratio can be as high as 80 percent.

Electricity consumption in the exhaust system can be reduced if the old fan is replaced with a new one with higher efficiency and with a modern command and control equipment. Pressure-controlled exhaust fans save heating energy by the sensing when the house is being over ventilated, and the fan speed is reduced. With modern technology, air flow is varied according to seasonal variation - less in winter and more during the summer.

Summary

The measures mentioned above are of course only some examples of how to reduce energy consumption in properties. We know that the cost of energy will increase; therefore it is important to define the need for measures for each individual property, and take necessary action as soon as possible.

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Group Work

Measures to reduce energy

As the city manager of Helsingborg, you have just made a visit to a real estate called Property X. Back in the office, you start to think about what kind of energy project that it is possible to perform in this property.

Property X is a building with 15 apartments and a total area of 1005 square meters. The building was constructed in 1935, in the middle of the 1970's district heating was installed.

All installations such as laundry, general lightning, showers and taps are old. The property has natural ventilation, which means the air is extracted from the rooms through air vents, and via ventilations duct in the chimney.

Key ratios

Property X

	Apart ments	Sqm	water kr/sqm	Heating kr/sqm	Electricity kr/sqm	Heating kr/kwh	Electricity kr/kwh	Water kr/m3
Property X	15	1005	37	145	66	0,90	1,34	11,50

Questions

- 1 What kind of energy saving measures do you think the property is in need of?
- 2 How much do you think these measures will reduce the energy?
- 3 Will these measures be a good investment?

Use the information above to give some good examples to reduce the energy.