The storage of solar heat

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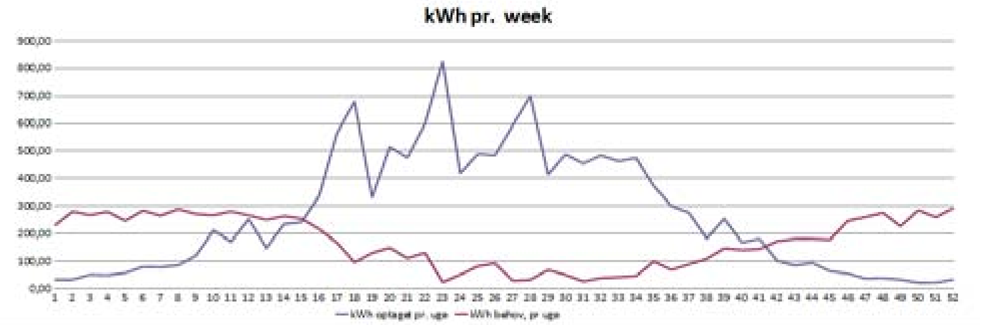
One of the main issues in incorporating weather dependent sustainable energy sources such as solar- and wind power, into the electrical grid, is the irregularity of power production. The peak hours of power consumption in society, rarely coincide with the peak hours of generation of sustainable energy. The full potential of sustainable energy sources is therefor seldom utilized.

In this concern, solar thermal collectors are quite problematic. The need for heating and hot water is largest during the least radiant parts of the day – in the morning, evening and during the night. Most residential solar thermal collectors are connected to large water tanks, in which hot water is stored. These can however, rarely cover an entire households' heating needs, and are most often only used to cover hot water needs. The problem is even more obvious when observing the difference in the heat required and heat generated for an average danish house (built in the 1990's) during an average year, using 25 m^2 of solar thermal collectors.



Our hope is to prove, that it is possible create a system, which stores large quantities of surplus heat from daytime hours - and from periods with very varying weather conditions, which is more effective than systems using water as a heat storing medium.

This is possible by utilizing phase changing materials, which can contain large amounts of latent heat energy, as mediums of heat storage. Using large tanks of for instance *lauric acid* (which is a naturally occurring lipid that melts at app. 44 °C) could potentially store approximately 2,5 times more usable thermal energy than equivalent water tanks. These tanks would be able to store some of the excess heat energy during peak hours, and provide heat energy when it is needed. In effect, a system such as this could be able to store more energy than water, thereby reducing the amount of wasted heat energy, available during peak hours, considerably.

These systems could be effective in areas with large consumptions of residential hot water, such as Scandinavia, or in areas with very varying temperatures, such as deserts, mountain regions etc, ultimately making solar thermal collectors a more viable source of residential heating, reducing the amount of fossil fuels used for heating.