



## **Link btw higher degree of electricity in district heating and need for energy savings in buildings**

### **Energy savings as a tool to facilitate electrification**

Energy savings are important to facilitate a higher degree of electrification of the building sector i.e. buildings that are going to be converted from using fossil fuels such as heating oil and natural gas or biomass pellet boilers to using heat pumps. A lower energy demand in the buildings is needed in order to improve both the cost efficiency and the energy efficiency of the change in technology and “fuel”.

### **Changes induced by an electrified district heating system and the link to EE**

Substantial energy savings are of great important in buildings that are currently heated with heat form large district heating systems (this is also the case for those district heating systems which are fueled by biomass or in the process of being converted to do so – se point below).

District heating systems in large cities have historically been fueled by the “waste heat” from power production in co-generation plants fueled by coal/gas. In this situation, a high temperature demand (fx caused by inefficient buildings) in the district heating system was not a big problem although it was obviously not very efficient. However, if we look into a future where the district heating is to be delivered by electrically driven heat pumps or geothermal heat (that might be the only possible alternative to biomass due to the lack of space for etc. solar heating) the temperature level of the heat delivered from the system has to be reduced. In order to gain a high efficiency from the heat pumps the temperature needed for the output from the heat pumps has to be as low as possible. Huge efficiency gains can be obtained using heat pumps if temperature needs are reduced from e.g. 80 degrees Celsius to 60 degrees Celsius or even lower.

### **Systemic implications of low-temperature district heating**

A lower temperature in district heating brings about two changes to the system. Firstly, the reduction in the temperature (which facilitates the efficiency of the heat pumps) actually reduces the energy carrying capacity of the district heating system i.e. less energy is transmitted in a unit of water. Secondly, a lower temperature in the district heating system means that the buildings need to be capable of being heated at a lower temperature. Consequently, to harvest those benefits of electricity in the existing large district heating systems it is of paramount importance to ensure that the need for heat is reduced and that the heat provided fulfill the same “function” at a lower temperature i.e. that the end-user has the same level of indoor heating and comfort in their buildings. This require a higher degree of energy efficiency in the connected buildings.

Hence it will actually hamper the possibility to include a higher degree of electrification in the district heating sector if the focus of energy savings is only targeting direct fossil fuels savings, as it will notably neglect the need to improve efficiency to facilitate an electrical driven heat pump system.



### **Lifetime of buildings and link to biomass based energy supply**

The long lifetime of buildings and the slow renovation rates, means that energy savings are important in buildings already at this point, because they are going to be used (and be a part of the energy system) many years ahead.

This is *also* the case for buildings, which energy supply is based on biomass (regardless of in individual boilers or in the district heating systems). The general transition of the energy system cannot rely on biomass. It is not a credible long term solution since sustainable biomass is already a scarce resource, which should be used, where no other renewable fuels are obvious e.g. in shipping, aviation and long haul trucks.

It could however, reasonably be argued that energy savings should not be focused on buildings that are foreseen to be demolished in the span of 5 – 10 years from now (this primarily, if it is due to the trend of people are leaving the countryside to live in cities).

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