

# The Competitiveness of District Heating

## - consequences of energy savings in the domestic sector

Urban Persson and Professor Sven Werner from Halmstad University show that the competitiveness of district heating only decreases moderately with 20% energy savings in the domestic sector but considerably with 50% energy savings.

### Theoretical study on 83 cities

The main research question in the PhD project of Urban Persson is: "To what extent can Europe's 5 000 district heating (DH) systems contribute to sustainable development?" This main question is broken down into several sub questions were one is "How does energy efficiency measures in buildings change the prerequisites for DH expansion?" This sub question has now been answered by a theoretical study of in total 1703 city districts and 83 cities in Belgium, Germany, France and Netherlands.

### Focus on the distribution cost

Perssons and Werners starting point for this project was that in order to be competitive, the total cost of district heating must be lower than the cost of a local heating alternative, see Figure 1. In case of increased energy savings in the domestic sector, the specific heat production cost is almost constant while the distribution capital cost (Cd) is affected. Consequently, the focus in the project has been on the Cd.

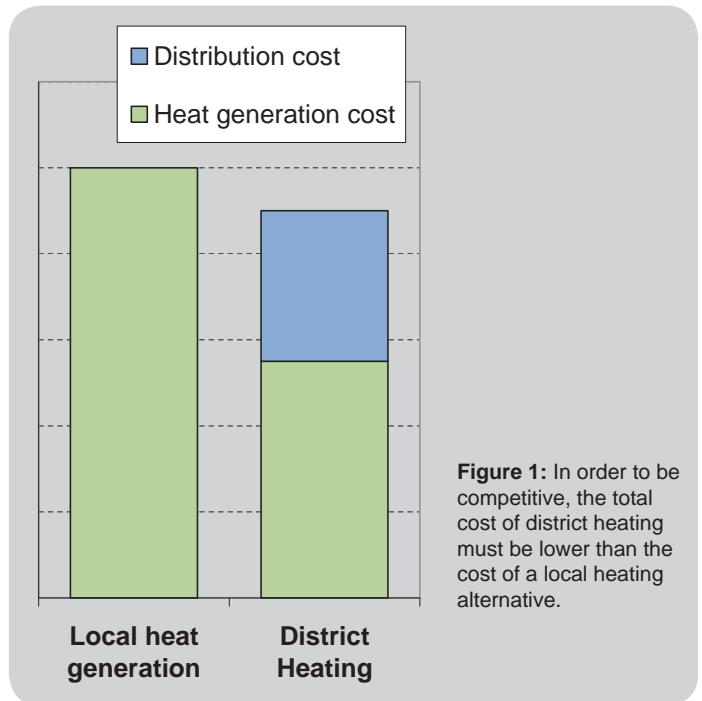
### Reformulating the linear density

The Cd can be formulated as a function were the linear density (heat load/piping length) is the decisive parameter. However, the linear density cannot be found in official data for urban areas. Hence, the linear density was reformulated to be based on properties which can be found in data bases for urban areas. With this approach, the potential for district heating can be evaluated also for areas where there is currently nodistrict heating network.

### Distribution cost modell

Based on the reformulation of the distribution capital cost (Cd), an Excel-based model was created (DCM – Distribution Cost Model). Gathered data for urban areas in the four included countries was processed in the modell to give the theoretical district heating market share as a function of the Cd.

Figure 2: District heating market share as a funtion of distributed capital cost in all included urban areas.



### The market share of DH decreases with energy savings

The DCM model can present results for individual city areas as well as taken together to represent cities, countries or all 83 city areas included. The latter is presented in Figure 2. As can be seen, the marginal Cd does not increase liniary with the potential market share of district heating, but increases dramatically up to about 60-80 % market share. As also can be seen, the Cd is sensitive for reduced heat loads and the competitiveness of district heating decreases if system heat loads are reduced. Assuming that a feasible Cd is 2,0 EUR/GJ, the potential market share of district heating would be 60 % without any energy savings. The market share decreases to 40 % and 10 % with energy savings of 20 and 50 %, respectively.

