Highlights of
Heat Roadmap Europe (Pre-study 1)

Heat Roadmap Europe (Pre-study 1) investigates the role of district heating in the EU27 energy system by mapping local conditions across Europe, identifying the potential for district heating expansion, and subsequently simulating the potential resource in an hourly model of the EU27 energy system. In 2010, approximately 12% of the space heating demand in Europe is met by district heating. This pre-study presents the findings concerning a considerable outlined expansion of the district heating sector within the current EU27 until 2050, using GIS systems (geographical information systems) and energy system analyses tools.

The chosen methodology in this pre-study contains a combination of hour-by-hour energy modelling of the EU27 energy system and mapping of local conditions, which is essential for district heating. We are currently continuing this work in a second pre-study.

The current energy policy context is that the latest energy communication from the European Commission (*Energy Roadmap 2050*) contains only a very modest positive view about the future possibilities with district heating systems and additional industrial heat use from industrial CHP plants.

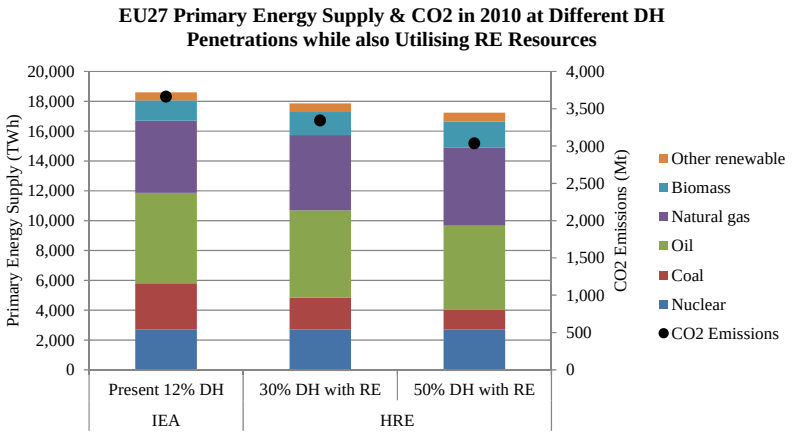

Figure 1: Primary energy supply and CO2 emissions for the entire EU27 energy system in 2010 at present and if district heating and CHP were expanded to 30% or 50%.

This rather conservative analyses shows, that in total, the expansion of district heating could decrease the European primary energy consumption by 7%, decrease fossil fuels by 13% and ***lower CO_2 emissions by 17% supplying exactly the same energy services*** (figure 1). The potential for fuel savings is most likely higher than calculated in this pre-study, since there are additional alternatives which could also be implemented. For example, there is also a substantial amount of electric heating in the EU27 energy system which can be converted.

More district heating in Europe will reduce the energy system costs considerably since local heat recycling and renewable energy use will replace expensive energy imports. Calculations indicate that the overall annual ***cost reduction in the heating sector will be approximately €14 billion by 2050*** compared to *Energy Roadmap 2050*, if more district heating is implemented. This corresponds to a relative cost decrease of 11%. At the current energy import prices, the direct socio-economic payback for the district heating pipelines put into the ground is estimated to be two to three years . The reduced energy import will also increase the future security of supply and give more positive balances of foreign exchange.

More district heating would generate local labour intensive investments replacing expensive energy imports of fossil fuels to Europe. This pre-study only includes a first rough estimate of job creation of around 8-9 million man-years, ***equal to approximately 220,000 new jobs on average over the 38 year period*** from 2013 to 2050 due to investments in heat recycling, renewable energy supply, and extended and new heat grids.

With a high proportion of variable renewable electricity supply, this important part of the energy system needs several partners that can provide balancing power. These partners can be district heating systems that can provide balancing power in both directions. Electric boilers and large heat pumps together with thermal storages can absorb surplus electricity generation from intermittent renewable energy, while combined heat and power plants can actively support the electricity supply system during times of power deficits.

It should be emphasized that 220,000 jobs is a rough estimate of the minimum number of work places being created and the 220,000 jobs arise from purely the additional investments. The real number will be higher due to the following:

- Multiplier effects of the jobs created are not included.
- Additional jobs are not included to account for the fact that when the energy costs of Europe decrease, European industry will become more competitive.
- Additional jobs from industrial innovation due to the investments in new energy technologies are not included.

The importance of communicating the local possibilities for district heating to urban and regional planners should be emphasised. Also the methodology applied here is very important, since it combines hourly energy modelling with the mapping of local conditions on a high geographical resolution. The high resolution also recognises future possibilities for local activities managed by local organisations.

This is very important in future renewable energy systems. The low geographical resolution typically used for EU energy systems analysis tends to exclude specific local possibilities in current scenarios. Hereby, they favour generic possibilities available everywhere such as electric and gas alternatives associated to major international energy companies. You can say that these traditional energy models only capture half of the truth searched. Traditional energy models tend also to work with low time resolution in their analyses. We will emphasize that a high time resolution is required in order to capture the daily variations in the energy system in order to verify the true variability in energy demand and supply.

Based on this pre-study it is our humble appeal that the scenarios created in the EU Energy Roadmap 2050 report are more transparent in the future.

Reference:
Connolly, D, Mathiesen, BV, Østergaard, PA, Möller, B, Nielsen, S, Lund, H, Trier, D, Persson, U, Nilsson, D & Werner, S 2012, Heat Roadmap Europe 2050: First pre-study for EU27.

Link to study here.