

Common Vision for the Renewable Heating & Cooling sector in Europe

Executive Summary

Renewable energy constitutes a basic pillar in the strategy supported by EU to reinforce the sustainable development of our economies and citizens' welfare. At present time, almost 50% of the total energy consumed in Europe is used for the generation of heat for either domestic or industrial purposes. The vast majority of this energy is produced through the combustion of fossil fuels such as oil, gas and coal – with a damaging environmental impact arising primarily from the associated greenhouse gas emissions and also from the resource extraction process. Cooling is, with few exceptions, achieved by processes driven by electricity, which is still also predominantly produced from fossil fuels. The social, environmental and economic costs of climate change are such that we must move swiftly towards a sustainable economy based on renewable energy sources.

Since 2008, the European Technology Platform on Renewable Heating & Cooling (known, for short, as the RHC-Platform) brings together the major EU stakeholders from all renewable energy sources concerned and related cross-cutting technologies to agree a joint strategy for increasing the use of renewable energy sources for heating and cooling, to define short- to long-term research and technological development objectives and to lay down targets to reach by certain dates.

The European Commission relies on the RHC-Platform to provide the right impulse to ensure the deployment of future cost effective technologies in the renewable heating and cooling sector and considers it an essential forum that gathers the main EU stakeholders in this field.

The report “Common Vision for the Renewable Heating and Cooling Sector in Europe” is the first official publication of the RHC-Platform. Launched in May 2011, the study identifies major technological and non-technological challenges to the uptake of the RH&C systems and assesses the potential of renewable energy sources to contribute to the European and national energy needs and targets.

Heating accounts for a significant proportion of Europe’s energy demand. To achieve the Common Vision targets, efficiency gains are required in both residential heating and industrial processes, better use of thermal energy being crucial for meeting the 2020 renewable energy targets and Europe’s 2050 target of a 80-95% reduction in GHG emissions. Also, cooling demand is expected to rise significantly in the next years in spite of greater use of energy-saving measures like insulation.

The theoretical and technical potential of renewable energy sources could exceed Europe’s total heating and cooling consumption. Nevertheless, discovering how, economically, to realise such potential is a challenge. The optimal combination of renewable energy technologies to meet the thermal energy needs of a given user depends strongly on local conditions such as population density, intensity of use, quantity and quality of available energy infrastructure and resource availability.

The majority of energy use takes place in urban areas, characterised by higher population density, where district heating and cooling networks represent a critical infrastructure to ensure large scale integration of renewable energy sources.



In 2020 over 25% of heat consumed in the European Union could be generated with renewable energy technologies. The large majority of renewable heating and cooling will still be produced from biomass sources, although solar thermal is expected to have the highest average growth rate among the renewable energy technologies for heating and cooling in the decade 2010 – 2020. Increasingly competitive geothermal, aerothermal and hydrothermal heat pumps will gain market shares as efficiencies rise. The first Enhanced Geothermal Systems (EGS) drillings will be realised, producing heat at temperature suitable for direct use. Improved thermally driven cooling systems (eg from solar or heat pump technologies) will make it possible to cover around 5% of cooling demand from the service and residential sectors by 2020.

Furthermore, by 2030 renewable heating and cooling technologies could supply over half of the heat used in Europe. Improved compact and seasonal thermal energy storage systems will be crucial to meeting the heating and cooling requirements in buildings. In most of Europe, biomass will be used for small-scale heating as well as industrial processes; 2nd and 3rd generation biofuels will also play an important role. Solar thermal will satisfy approx. 15% of the overall European low temperature heat demand and it will be increasingly able to meet the heat demand of medium and higher temperature industrial processes. Geothermal heat pumps and geothermal direct use will be firmly established, especially in agricultural applications and for pre-heating industrial processes requiring heat over 250°C. A smart energy exchange network will enable heat at different temperatures from multiple low-carbon energy sources to be shared efficiently between different customers.

By 2050 biomass could contribute 231 Mtoe, while geothermal could account for 150 Mtoe and solar thermal for 133 Mtoe. Aerothermal and hydrothermal technologies are expected to provide about 75 Mtoe of heat. Integrated in large- and small-scale hybrid systems and coupled with heat pumps and advanced energy stores, renewable energy sources would not only be able to satisfy 100% of the European heating demand, but also be cost-competitive with any alternative fossil fuels. Whether these targets are met or not depends on economic growth, the evolution of heat demand and the relative price of alternative fuels, all of which are hard to predict over a 40- year time horizon. Major technical challenges must be overcome to make renewable energy technologies fully cost competitive.

However enormous is the challenge ahead of us, it is not only technological. Tomorrow's energy systems are defined by the policy and legal framework we adopt today, which must provide the right conditions to attract large scale public and private investments. Public support will increase as the full potential of social benefits such as green jobs is realised. Successful deployment of renewable energy technologies also has to take into account the needs of end-users and of others affected by the technology.

Measures on both the supply and the demand side should be taken to address these challenges. In fact, the large scale deployment of RH&C technologies also requires a change in consumer behavior. The cross-cutting dialogue nurtured within the European Technology Platform on Renewable Heating and Cooling can potentially provide the kind of integrated solutions that are sought by civil society. Energy consumers are looking increasingly not only for answers to specific technical problems, but for a systemic approach and answers to large scale issues.

The stakeholders of the RHC-Platform are convinced that the use of renewables in heating and cooling is a necessary and integral component of the "third industrial revolution". It is now the responsibility of citizens, policy makers and legislators to ensure that renewable energy sources become a major part of our energy mix.



Key Figures

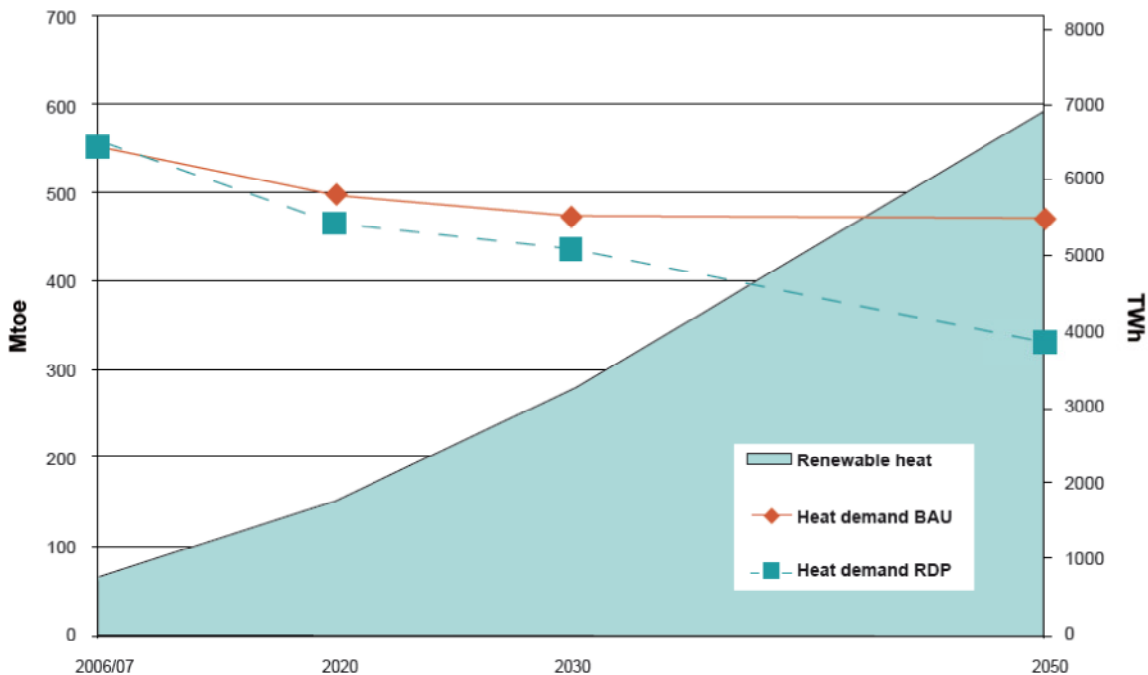


Figure 8 - Heating supply from renewable energy sources in EU

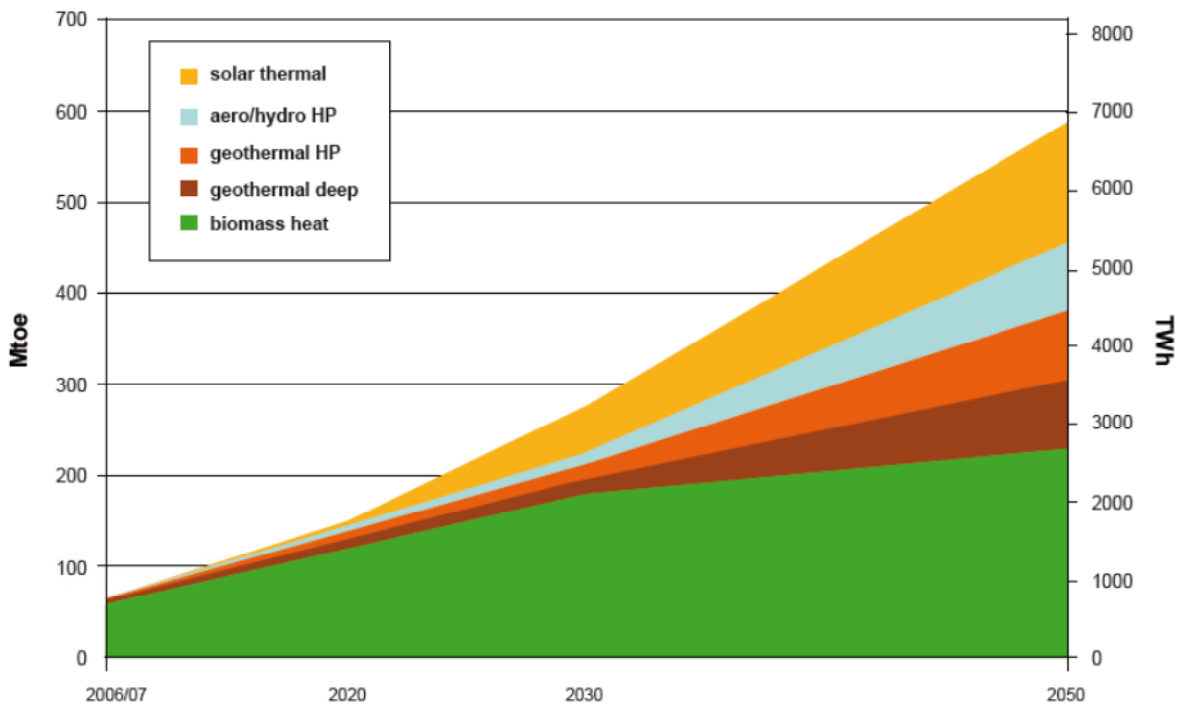


Figure 9 - Heating potential by renewable energy source in EU