IEA Heat Pump Programme

Annex 30

Retrofit Heat Pumps –
Energy-efficient and environmentally sound heating and cooling systems

The Annex presents 20 practical applications of HPs in existing buildings, analysing the present generation of HPs and possible improvement of components and systems for retrofit application, as well as research& development (R & D) projects directly related to the objectives of the annex, subdivided in systems, components and refrigerants from selected European countries.

The Annex shows that the potential contribution to the EU energy strategy with retrofit heat pumps is impressive. Heat pumps are contributing to all three targets of European Commission's 20-20-20 policy, in particular with the existing building stock.

Barriers and challenges for the retrofit market

The primary focus of this annex was the support of retrofit heat pumps (HPs) for the reduction of primary energy consumption and the greenhouse gas emissions in the domestic building stock.

The market for new building is dominated by HPs with low temperature distribution systems, whereas economic competitive and energy-efficient HPs for the retrofit of heating systems in existing buildings are still in the development stage. The following technological barriers was identified for R&D activities as heat pump solutions for renovation are not yet readily available or economically competitive with conventional systems:

- Coping with the high design temperature of conventional heating systems in existing residential buildings with distribution temperatures up to 70°C – 90°C.
- Creating heat sources at acceptable costs, preferably ground coupled

A main challenge for Annex 30 was the limited availability of HP technology fit for retrofitting the different situations in existing buildings.

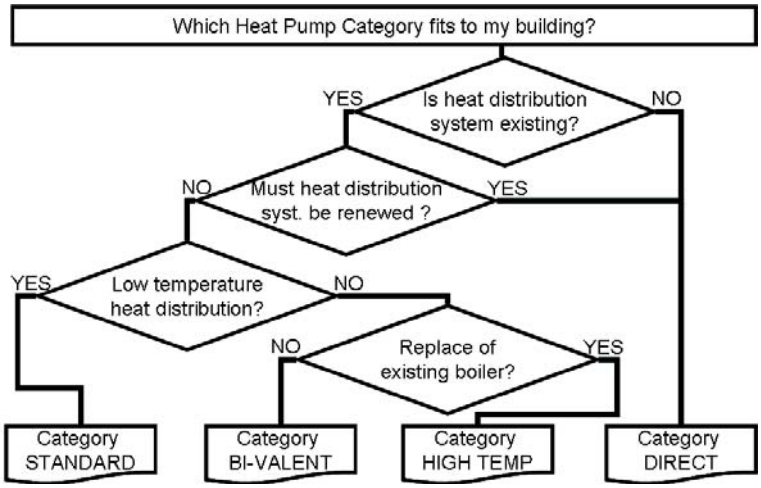
To reach the goals solutions was found and experience gained on...

... the application of available HPs in standard buildings that have been improved, resulting in a reduced heat demand.

... the development and market introduction of new high temperature HPs for application in existing buildings.

... the use of reversible air-to-air HPs in buildings without centralized heat distribution systems.

Which heat pump category fits to my building?



A selection chart was developed to distinguish between different types, in which case a type of heat pump can be used and which assumptions a building should fulfil.

Heat pumps contribute to EU 20-20-20 targets

With the exception of Sweden, until 2006 the heat pump market in Europe has been mainly concentrated on new buildings and in particular one- and two-family houses.

However, the existing European building stock shows largest potential to contribute to Europe's challenge in reduction of fossil energy consumption and greenhouse gas emissions.

The results of the annex shows that HPs are able to use this potential and since 2007/2008 the heat pump market is increasingly influenced by the retrofit of the building stock in particular in Germany, Switzerland and France.

In many cases HPs already can be used as a preferable retrofit choice. The use of HPs is leading to drastically improved efficiency in heat generation, reduction in use of fossil energy and, at the same time, to enable people to use geothermal, hydrothermal and aerothermal renewable energy.

Therefore, the potential contribution to the EU energy strategy is impressive (see Table1). It means that heat pumps are contributing to all three targets of European Commission's 20-20-20 policy in particular with the existing building stock.

Table 1: Contribution potential of HPs to EU 20-20-20 energy goals

	EU Target	Change requiered to reach target	Potential contribution by heat pumps	as a share of the EU target
Primary energy consumption	reduction by 20%	5.385 TWh (20%)	902 TWh	20.6%
Renewable energy production	contribution of 20% by RES	3.508 TWh	774 TWh	22%
Greenhouse-gas-emmissions	reduction by 20%	1.073 Mto (20%)	230 Mto	21.5%

Source: EHPA European Heat Pump Action Plan 1.1.2008

Further information

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Participating countries: **France, Germany, the Netherlands and Sweden**

Publications: Final report of Annex 30 and Executive Summary of Annex 30, available at www.heatpumpcentre.org