

EUA-EPUE Response to SET-Plan Consultation on the “Additional target for the SET-Plan Action 5 on energy efficiency in buildings – Heat Pumps”

BACKGROUND

This response provides the perspective of the European Platform of Universities in Energy Research & Education (EUA-EPUE) to the consultative process on the “Additional target for the SET-Plan Action 5 on energy efficiency in buildings – Heat Pumps”

EUA-EPUE responds to the consultation from the perspective of the universities’ role in society in close collaboration with high level academic experts in this field. Universities constitute a significant part of the research capacity in Europe. At the same time, they educate the highly skilled work force of our societies. We consider therefore that the SET Plan priorities have to integrate innovation and research with education.

Note:

In the remainder of the document, the original text (*in italics*) contains side comments.

Additional target for the SET Plan Action 5 on energy efficiency in buildings – Heat Pumps

Introduction

Heat pumps combine high energy efficiency with the capability of utilising aerothermal, geothermal or hydrothermal heat at useful temperature levels.

Furthermore, the Renewable Energy Directive specifies that the heat extracted from the environment by a heat pump (ambient heat) is considered renewable as long as a minimum Seasonal Performance Factor (SPF) for the unit is met.¹

Heat pumps present a versatile energy technology that can provide both heating and cooling in a great variety of building contexts and applications. Combined with smart technologies and storage, heat pumps can also play a key role in providing flexibility for the electricity system while also helping to manage the variability of heating and cooling demand. The heat pump family of technologies can also be run on various fuels, such as electricity and natural gas. Heat pumps can be easily combined with other technologies and adapted to local conditions and infrastructures. Heat pumps are therefore not only a key element of the decarbonised buildings of the future, but also an effective instrument for a smooth and cost-effective energy transition. While heat pumps have the potential to become one of the mainstream technologies for heating, in many Member States, their market uptake and full adoption by consumers are still hindered by higher investment and installation costs, with a market price that is often two or three times more than competing common heating products. In addition, the installation and the coupling with other technologies (e.g. shallow geothermal systems for ground source heat pumps) is frequently complex in dense urban environments. This makes the less energy efficient and fossil-based technologies often more attractive to consumers and impedes harnessing of the renewable and energy efficiency potential offered by heat pumps.

The coupling of solar PV generated electricity with heat pump presents structural elements of advantage for heating and cooling production in a building (rate of innovation plus thermodynamics) which favour this solution against conventional systems offering a 100% renewable option for heating and cooling production. These elements translate in price considerations.²

Objectives

The objective is to develop the next generation of cost efficient heat pumps for new and renovated buildings. The aim is to accelerate their market uptake, improve their characteristics according to the market need and drastically reduce their cost to make them fully competitive with conventional heating solutions. Increasing the demand for heat pumps and speeding up mass production requires:

- *Standardized systems (having smart hydraulic layouts and standardized connector pipes) easy to be coupled with other systems harnessing renewable energy, in particular with geothermal sources.*
- *Increased integration level to reduce the number of connectors to the building (inclusion of pumps, three way valves, pressure vessels), increase the use of standardized, pre-fabricated components.*
- *Develop high capacity heat pump for simultaneous production of cold and hot water for heating/cooling the building*
- *Standardized controls including energy monitoring and energy management with self-learning capacities and demand-response enabling elements; allowing integration of on-site renewable energy and switching to extra heating sources.*
- *Remote monitoring for failure detection and preventive maintenance.*
- *Further improve the performance of heat pumps using "natural" instead of synthetic refrigerants*
- *Compact design with a minimum footprint.*
- *Modular design to include hot water storage tank in an inexpensive and simplified installation.*
- *Simplified design and installation by the installer.*

¹ Directive 2009/28/EC of 23 April 2009 and its Annex VII
² F Baumgartner, EUPVSEC 2015

Commented [A1]: General comment on the “Introduction”:

In order to better define the main objectives related to the usage of heat pump technologies, EUA-EPUE proposes to firstly describe the positive aspects related to the adoption of such technologies.

Secondly, problematic aspects such as the current limited usage of heat pumps could be reported.

Commented [A2]: EUA-EPUE advises to provide specific examples concerning the type of “other technologies” and their purpose.

Commented [A3]: Please consider factual aspects such as the local climate and weather conditions.

Commented [A4]: EUA-EPUE recommends to define the payback time period. Short-term versus long-term perspective should also be included in the definition.

Commented [A5]: Please clarify if “installation” refers to the heat pump or other technologies.

Commented [A6]: Please elaborate further the concept of “rate of innovation plus thermodynamics”.

Commented [A7]: EUA-EPUE suggests to further emphasise the cooling side considering that heat pumps are more generally associated to heating.

Commented [A8]: EUA-EPUE recommends to add some considerations concerning the general tendency to move from fossil fuels to electricity as privileged energy vector (e.g. growing electric and hybrid vehicles market), and the growing production of electricity from intermittent renewable sources (wind and PV).

Commented [A9]: Please consider that nowadays heat pumps for individual housing are already competitive in some countries such as Sweden.

EUA-EPUE advises to:

- 1) Include in the introduction specific information concerning the market conditions of not yet competitive countries;
- 2) Clarify the size of heat pumps (e.g. small-scale or large-scale).

Commented [A10]: Please note that this type of heat pump technology is not frequently utilised.

EUA-EPUE encourages to further describe the technology and include some specific examples.

- *User-friendly interface and non-disturbing operation (low noise level)*

Target:

By 2025, reduce by 40% the equipment and installation costs of the next generation heat pumps for new and renovated buildings compared to 2015 market prices.

By 2025, development of prefabricated, fully integrated cost-effective hybrid systems for simultaneous production of cold and hot water for heating/cooling the building

Monitoring strategy:

Monitoring will be done by analysing results of R&I actions and market survey.

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