

Efficient heating systems – why it is worth investing and what are the benefits?

November 10, 2020

Energies 2050 & University of Minho

High energy bills again this year, perhaps rising costs, high energy consumption ... Do you think of one of these points first when talking about the start of the new heating season, instead of thinking how warm and comfortable it will be at home while enjoying the winter? This might mean that you have an inefficient heating system at home, and you should think about changing it.

At European level, 60% of the installed heating technology stock consists of old and inefficient heating systems, and if your system is over 15 years old, it is potentially very inefficient. Knowing that space heating and hot water needs represent nearly 80% of the energy demand of European households, you will surely incur these same high costs because of inefficient heating. The good news is that there are great efficient heating solutions on the market, and for all kinds of budget!



Efficient heating solutions on the market

Many efficient heating systems are available on the market, adapted to all needs and budgets. Here are the most efficient heating technologies on the market:

- **Heat pumps**

A heat pump is a well-known technology that can provide heating, cooling and hot water. Using a heat exchanger, it can extract energy from air (aerothermal), ground (geothermal) or water (hydrothermal) and use it to provide heat for space heating and hot water. This conversion is done via a compressor, which needs electricity to run but the global balance is fair and positive for the environment. The efficiency is above 100% and it is the most efficient technology currently on the market. There are diverse models and types of heat pumps that can be easily adapted to the needs and spaces of every house. Combined storage tanks are often installed to stock heat for hot water and space heating.

- **Solar thermals**

Solar thermal technology converts sunlight into heat, which is then used to produce hot water, heat or even to cool buildings. The solar thermal collectors are usually installed on the house's roof, though they can be also integrated into other building elements (e.g., balconies, façades) or on other shadow-free areas. Most solar thermal systems work in combination with an energy storage unit and a back-up heater, for example a condensing boiler or a heat pump, which operates when the heat demand is too high for the solar system to meet alone. These packages also present an energy label with an energy class above A on a G to A+++ scale. On average, in a single-family house, 50 to 90% of the heat required for space heating and or domestic hot water can be generated with solar thermal energy.

- **Biomass boilers**

Biomass is any material of organic origin. It can be used in heating, and wood is the form that is most widely used for that purpose. Biomass boilers are the latest and most efficient technology to produce heat in the most ancient way: firing wood. Each year, 40% of the wood sustainably produced in Europe is used for heating in European buildings, both residential and commercial. Therefore, central heating biomass boilers can provide high thermal comfort while reducing greenhouse gas emissions. Moreover, the overall sustainability of biomass heating is further increased in areas where wood is locally available, which shortens transport routes and helps the local economy. Modern heating systems use biomass in the form of pellets, wood chips or split logs. They can also be easily combined with solar thermal systems and reach even higher efficiency levels.

- **Condensing boilers**

Modern condensing appliances are designed to use virtually the entire energy content of the fuel to transform it into heat. In contrast to previous generations of these appliances, condensing boilers reuse the heat energy of water vapour produced in the combustion

process which ‘condenses’ back into liquid form and is ultimately reused to pre-heat the cold water entering the boiler. This makes condensing technology highly convenient, resource- and cost-efficient for heat generation.

Condensing boilers are often the first choice both for new installations and for refurbishment of existing central heating systems across Europe. For more than twenty years, condensing technology has been constantly advancing: increased comfort and energy efficiency, reduced emissions and noise levels, improved design, and reduced size to fit any building setting. Moreover, this highly efficient technology can also be easily teamed with renewable energy sources such as solar thermal systems.

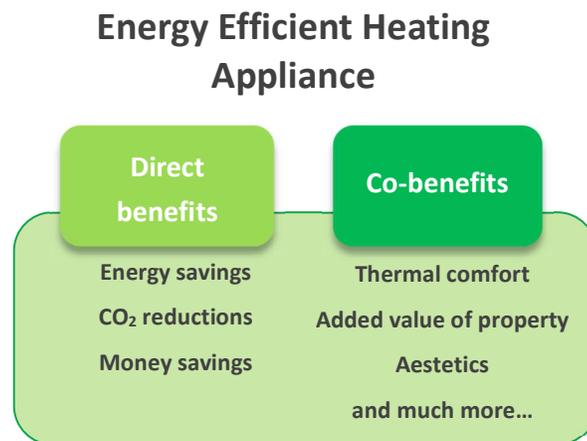
- **Hybrid systems**

A hybrid is an appliance or a system of appliances which combines at least 2 different energy sources and whose operation is managed by a common control. The most common solution is a hybrid system that joins a heat pump and a condensing boiler.

Hybrids are versatile: they combine some of the best features of various heating technologies to provide high thermal comfort in various building types, meeting both space heating and hot water needs. This makes hybrids particularly suitable to substitute old and inefficient heaters in existing buildings.

Efficient heating benefits are more than cost savings!

Saving energy and money are the best-known benefits of changing your heating system to a more energy efficient alternative. However, the effects are far greater than just these two. These effects are known as co-benefits and not considering them may lead to underestimating the real value of improving your heating system.

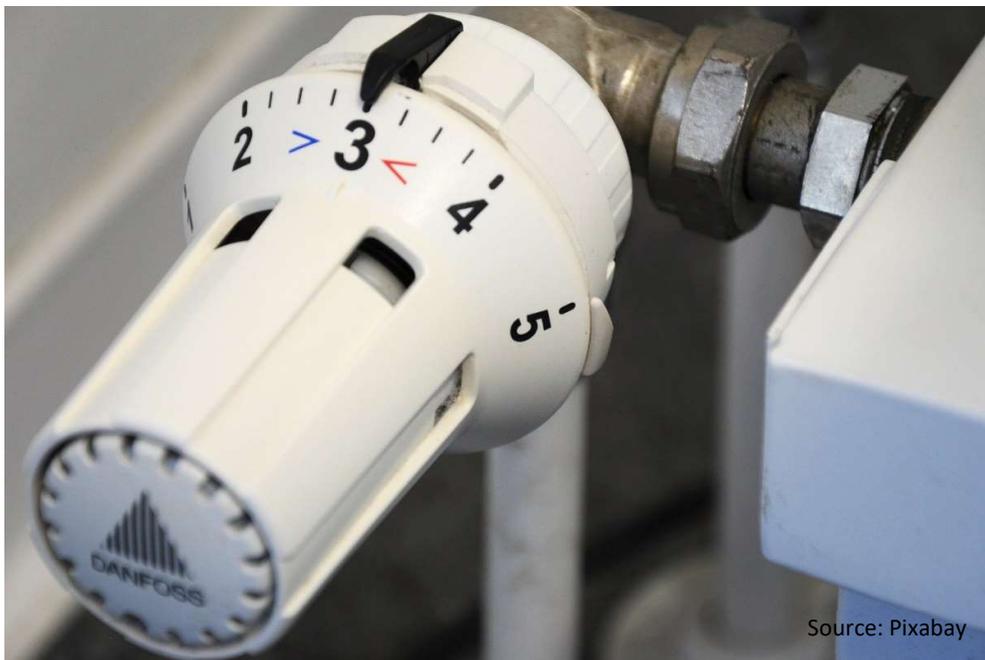


- **Some co-benefits are more relevant than others**

There are many co-benefits associated with the replacement of an old and inefficient heating system with a newer and more efficient solution. Some heating systems may be preferred for their practicality - we can then cite the ease of use and maintenance and the reduced installation and storage required area as the associated co-benefits. Consumers seeking to

gain more economic benefits are willing to invest in a heating solution that provides as co-benefits independence from energy prices and/or increases the market value of the building. Consumers who value the visual impact on the exterior and/or interior of the building can also choose from the wide variety of heating appliances that have improved aesthetics and can easily be integrated or concealed in the building. Nevertheless, the most relevant co-benefits associated with efficient heating solutions identified by consumers are thermal comfort, air quality and reduced environmental impact.

Thus, co-benefits represent bonuses in which consumers are willing to invest. A consumer survey conducted in Europe by a European funded project, HARP, concluded that the reduction of environmental impact and independence from energy prices are the most valued co-benefits in terms of monetary value. In opposition, aesthetics seems to be the co-benefit consumers are less likely to invest more money in.



- **Different countries, different co-benefits**

The consumer survey addressed consumers' relevance and willingness to invest in these additional benefits in five European countries - France, Germany, Italy, Portugal and Spain. The study shows that the co-benefits identified as most relevant differ with countries. For example, in France, the most relevant co-benefit is the increase in the added value of the building, while in Spain it is a thermal comfort. Check the co-benefits by country in figure below!

Specific country findings

FRANCE

Reduction of environmental impact and the increase in the added value of the building are the most relevant co-benefit identified by the consumers and the one they are willing to invest more money.

GERMANY

Reduction of environmental impact and thermal comfort were the most relevant co-benefits identified by the consumers. **Reduction of environmental impact** is the one they are willing to invest more money.

ITALY

Thermal comfort and reduction of environmental impact are the most relevant co-benefits identified by the consumers. Most of them are willing to invest significantly on **reduction of environmental impacts and thermal comfort.**

PORTUGAL

Thermal comfort, air quality and reduction of environmental impact are the most relevant co-benefits identified by the consumers. They are willing to invest more significantly on **reduction of environmental impact, thermal comfort, and increased value of the property.**

SPAIN

Reduction of environmental impact, independence from energy prices and thermal comfort are the most relevant co-benefits identified by the consumers. They are willing to invest more significantly on **reduction of environmental impact and independence from energy prices.**

Do you see yourself in your country's results? What do you value the most when evaluating the replacement of your current heating solution?

Need more information?

This article is one of many consumer materials on efficient heating solutions produced by the HARP project. To get more information about the HARP and to access informative consumer materials, namely an infographic on efficient heating co-benefits, we invite you to visit <https://heating-retrofit.eu/> [*The link is to be customized with a national webpage*] and to follow us on twitter **@HARPproject**.



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 847049.

The sole responsibility for this content lies with the authors. It does not necessarily reflect the opinion of the European Union. Neither the EASME nor the European Commission are responsible for any use that may be made of the information contained therein.