

Thermal energy storage: reducing emissions of biomass and CHP

THEMAL ENERGY STORAGE REDUCES THE EMISSION OF RESIDENTIAL BIOMASS AND COGENERATION OF HEAT AND POWER SYSTEMS

Biomass and CHP

With 96% of the production, biomass is by far the largest source of renewable heating in Europe. However, nearly all of this is central production; only a fraction of this is produced by residential biomass burners.

Nevertheless, because every modern central heating coupled biomass burner is equipped with a storage unit, biomass is the most important renewable storage market besides solar thermal.

Most biomass energy facilities are operated as combined heat and power (CHP) systems. For

residential use, however, CHP is just being introduced to the market.

Both biomass burners and residential CHP units do not absolutely require storage to function. However, storage does provide some clear advantages.

For both biomass burners and micro-CHP units, the storage reduces the number of times the system needs to be started and stopped, thus reducing the exhaust emissions and improving the user comfort, particularly for manually loaded systems.

“... storage provides some clear advantages...”

Why storage?

Reduced emissions

Thermal storage acts as a short-term buffer between the biomass or CHP burner, reducing the number of start-stop cycles of the machine. Since the majority of the emissions are produced during starts and stops of the burner, storage can strongly reduce the emissions of a biomass or CHP installation.

Peak shaving

Because a thermal storage can be used to shave load peaks, smaller and cheaper installations can be used. The system becomes more reliable and economically more attractive.

Larger market

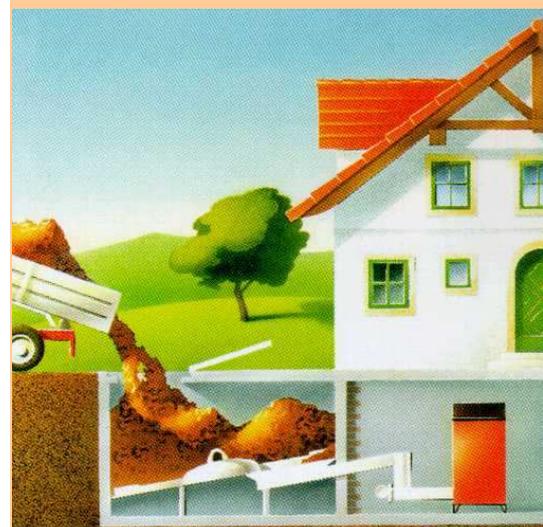
Particularly for residential CHP, the volume required for the installation limits the application in small houses, particularly in residential renovation. With the reduced size of a compact thermal storage, these markets are more easily accessible.

Thermal storage technology

Thermal energy can be stored using different technologies. With sensible heat storage, heat is stored by increasing the temperature of a medium. Common examples include hot water boilers, solar combi systems, ground heat exchangers, and aquifer storage.

Up to three times more energy can be stored with latent heat storage, where heat is stored in a phase change, e.g. by melting paraffin or organic salts. Because latent heat storage is very effective over a small temperature range, it is an excellent material to stabilise an indoor climate, for example.

Thermochemical storage has the highest energy density. By storing heat in a chemical reaction, reversibly changing the storage material structure, up to 10 times more energy can be stored compared to a hot water tank of the same volume. In addition, thermochemical storage has virtually no heat losses, making it very suitable for seasonal storage.



SOURCE: ENERGYTECH.AT

Did you know..?

...biomass is by far the largest source of renewable heating in Europe?

...thermal storage can strongly reduce the emissions of residential biomass and CHP systems?

...up to ten times more energy can be stored in a given volume using advanced storage materials?



Find out more

For more information on thermal energy storage, visit the PREHEAT website at www.preheat.org.

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“... storage can reduce the emissions of biomass and CHP systems”

SOURCE: UNIVERSITY OF GEORGIA

The residential biomass and CHP market

The worldwide turnover of residential solid fuel biomass burners is estimated at around 800 million euro in 2006, with an annual growth of 7%. Europe is by far the largest market with a turnover of 500 million euro. Within Europe, the largest market by far is Poland, followed by Germany and the Czech Republic.

The European Commission aims to double the production of heat from biomass in 2010 (with respect to 1995), requiring a substantial increase in the sales of biomass installations.

However, predicting the market growth for residential biomass is quite difficult, given that the increasing use of biomass-

related crop production is causing some public debate. Some therefore regard this heating option as an uncertain source of renewable heating.

The residential biomass market is dominated by a huge number of small actors. For example, Austria has 37 manufacturers for pellet burners alone. In the last few years, conventional heating manufacturers have started selling biomass technology as well.

Residential CHP has just been introduced to the European market in 2008, the leading countries being the Netherlands and the UK. Introduction is expected soon in Germany, France and Belgium.

This publication was created within PREHEAT, a European project within the Intelligent Energy-Europe framework. PREHEAT has increased the visibility of heat storage and the attention for development and implementation of improved heat storage technologies. On the long term, PREHEAT has aimed to initiate a coherent European promotion program with a collective approach by the industry, R&D institutions and other market actors.

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