

Resilient Building Toolkit Adaptation Measures Factsheet

Name and description of measure: Biomass & wood fuelled heating

Biomass is a form of stored solar energy and is available in a number of different forms. These include wood, straw, energy crops, sewage sludge, waste organic materials and animal litter.

Although burning biomass releases carbon dioxide to the atmosphere, this is offset by the carbon dioxide absorbed in the original growth of the biomass, or captured in the growth of new biomass to replace the materials used. As a result, using biomass for heating results in very low net 'lifecycle' carbon emissions relative to conventional sources of heating, such as gas, heating oil or electricity.

The heating system itself consists of biomass boiler plant, ancillary equipment (such as control systems flues and pipe work), and infrastructure to receive and store fuel and transfer it to the main boiler unit. Fuel can be stored in various ways, such as dedicated storage facilities (either above or below ground), integrated facilities within existing buildings, or in removable storage containers.

Cost of measure (high, medium or low):

Biomass heating system = high cost measure although costs off-set by the Renewable Heat Incentive (RHI).

Biomass plants can vary from small, manually fed systems with few controls, to fully automatic systems with advanced controls and remote monitoring. The types of plant available range from moving grate, plane grate, stoker burner and batch-fired systems with the choice of system dependent upon fuel grade and type and the degree of automation required, with costs varying accordingly.

Pros and Cons:

Pros

- Significant carbon savings.
- Reduced exposure to climate-change related legislation.
- Reduced fuel cost volatility.
- Resources diverted from landfill.

Cons

Excessively high moisture content of the fuel source can lead to incomplete combustion, releasing black smoke and tars that can coat internal heat exchanger surfaces and cause damage to fuel delivery systems. Lighter coloured renders may need regular re-painting in urban locations.

Physical size, maintenance requirements and access for fuel delivery trucks all require consideration. For these reasons, the installation of biomass plant in dense urban environments can pose logistical challenges.

Handling and storage of fuel can also present safety issues. For example, wood chips with high moisture content may degrade and decompose in storage, losing calorific value. In certain conditions, there can be mould growth that – in common with wood dust – if inhaled can cause respiratory problems. When wood pellets are blown into a store upon delivery, a proportion of 'break up' can happen, leading to a suspension of dust in the air that can pose an explosion risk. Furthermore, in the case of pellets, it has recently been reported that stored fuel can release carbon monoxide (CO), making a robust safety procedure essential when working on or inspecting enclosed fuel storage areas – including provision for ventilation and supervision.

Effectiveness of measure (high, medium or low):

High as equally suited to new build and retrofit schemes, with correct hydraulic design, commercial biomass boilers can be integrated into existing systems, and are best employed as part of a bivalent system (sharing the maximum load with a gas or oil boiler).

Pellet/chip size, moisture content, calorific value and fuel constituents all have a major bearing on boiler operation.

Photo(s):



Product review sites:

Carbon Trust: http://www.carbontrust.com/media/31667/ctg012_biomass_heating.pdf,
<http://www.carbontrust.com/media/88611/ctg073-biomass-contracting-guide.pdf>,
<http://www.carbontrust.com/media/88607/ctg074-biomass-fuel-procurement-guide.pdf>,
<http://www.carbontrust.com/resources/guides/renewable-energy-technologies/biomass-heating-user-guide>

Links to case studies;

[Sewstern sawmill](#) (pdf), [Fonthill primary school](#) (pdf), [BSW sawmill](#) (pdf), [Lochaber Leisure Centre](#) (pdf), [National Botanic Garden of Wales](#) (pdf), [Oncoland](#) (pdf), [Plockton school](#) (pdf)