
Biomass Heat Accelerator

Overview and summary of output



Overview of the Biomass Heat Accelerator

The Biomass Heat Accelerator (BHA) was set up to catalyse the growth of the medium and large scale commercial/industrial heating market for biomass by demonstrating best practice and addressing supply chain risk.

Introduction

The Carbon Trust's Biomass Sector Review identified the significant contribution that solid fuel biomass heating could make to the UK's low carbon heating targets.

The review identified biomass replacing oil-fired heating systems in the 200kW to 2MW range as the most commercially attractive segment and therefore the most likely application to contribute significantly to renewable heat targets.

This document summarises some of the key insights from the BHA and gives an overview of the reports, guides and tools provided by the programme.

The BHA ran from 2006 to 2011 in a set of five interlinked workstreams and brought together biomass experts to establish and communicate best practice in system design. A wide range of [tools and guides](#) have been produced to share this knowledge – these are listed at the end of this report.

Biomass heating systems have higher capital costs than fossil fuel boilers with the same capacity, but potentially lower operating costs. In suitable circumstances the overall lifetime cost for a biomass system can be considerably lower than for fossil fuel, particularly when connection to the gas grid is not an option. Projects supported by the BHA through to implementation had estimated payback periods in the range of 2-11 years and annual savings from £34k to over £500k. This wide range reflects the range of boiler sizes and complexity of sites involved.

Analysis of project findings has provided interesting insights into:

- The current status of the UK market for biomass heating installations.
- The industries and geographical locations most likely to implement biomass heating.
- Biomass system costs.

Figure 1 BHA Activities

Workstream 1: Data gathering and benchmarking	Investigating existing biomass installations: costs, common operational and engineering issues.
Workstream 2: Installers' cost-base reduction interventions	Engaging with the supply chain and installers to increase capacity and reduce cost.
Workstream 3: Refining of market potential and demonstration of best practice	Finding most promising sites, following through development process on a number of sites, analysing costs.
Workstream 4: Fuel supply-chain activities	Preparation of a suite of guides and tools to assist in fuel procurement.
Workstream 5: Knowledge transfer	Sharing best practice. Producing a set of guides, case studies, tools and templates.

The UK biomass market

The biomass heating industry is relatively immature in the UK when compared to countries such as Sweden and Austria which have long-established, successful markets.

This is largely due to the strength of forest products industries in these countries, contrasting with the reliance of the UK on coal in the past and natural gas at present. It is also related to the longer heating season in other countries, which favour higher capital investment in heating systems which leads to lower running costs.

In 2006 we found a relatively small number of companies in the UK installing biomass systems above 100kWth capacity and that most were focused on boiler sales and support rather than wider product development or systems improvement. The [installer engagement workstream](#) identified the need to strengthen basic business processes (e.g. quote management and contract drafting) in smaller companies which have few internal resources to deal with the challenges of a fluctuating market. Since this work began in 2006, a number of the companies involved have received investment from larger organisations, which is an indication of how the market is maturing.

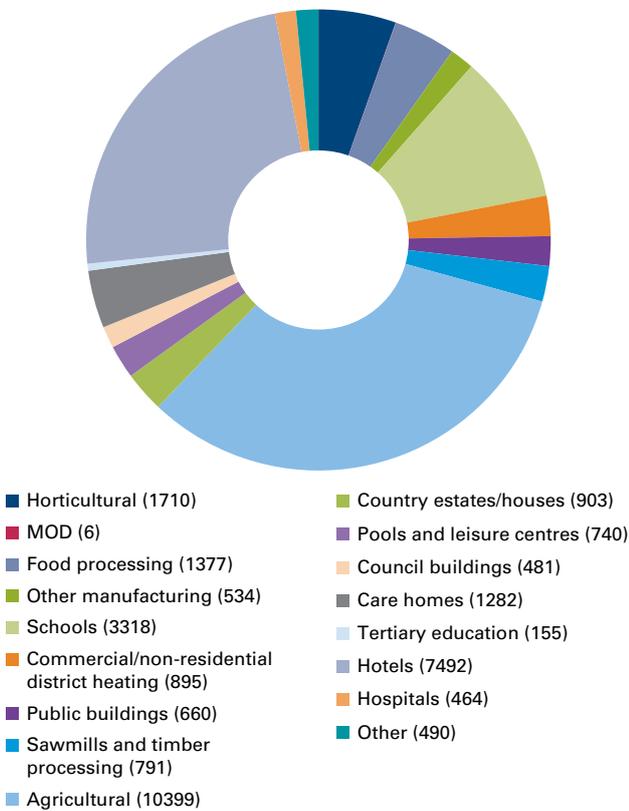
The number of biomass installation companies has grown significantly over the past few years as initiatives such as RHI have had an impact on market demand. The relatively swift growth in the pool of suppliers has meant that there are newer entrants in the market who are less experienced than the more established players.

Many large construction projects which incorporate biomass boilers (for example building a new school or housing development) do not involve biomass specialists but treat the boiler like a standard gas one, incorporating the biomass boiler into a standard heating system with little appreciation of the best system configurations to optimise the use of the biomass system. The lack of knowledge among general contractors about correct system sizing and effective integration with fossil fuel back-up systems has led to installations which do not achieve the expected cost and carbon savings. A key aim of the BHA has been to establish and communicate best practice in system design with tools and publications such as the [Biomass decision support tool](#) and the [End user guide](#).

The majority of biomass equipment has been imported from the European market. Companies with manufacturing facilities for fossil fuel boilers and equipment in the UK, concerned about maintaining their reputation for reliable equipment, are more likely to import boilers from established suppliers on the continent than to set up production in the UK.

Confidence that a reliable fuel supply of the right quality is available is an important factor in deciding to install biomass heat. The UK biomass fuel supply market has expanded in response to the increasing numbers of biomass installations and there is potential for it to expand further. Fuel standards and quality assurance schemes have become increasingly established as the market has developed.

Figure 2 Breakdown of identified potential off-grid biomass sites by key sectors



Sites most likely to implement biomass heating

We found that the sites most likely to implement biomass heat were those where several of the following factors existed:

1. Biomass was to replace a large amount of high cost fossil fuel.
2. The heat demand profile suited biomass boilers (ideally a reasonably steady demand over a substantial part of the year).
3. There was good availability of a relatively low cost biomass fuel supply.
4. There was a strong client desire to reduce carbon, either because of their general approach to sustainability or as a result of the Carbon Reduction Commitment programme, which has the effect of encouraging low carbon energy supply.

Industry sectors which may have sites particularly suitable for biomass heating include sawmills, food processing, country estates, leisure centres and hotels. The public sector featured strongly in those projects supported by the BHA, in particular schools and higher education.

Sites in Scotland featured heavily among those tracked by the BHA, as would be expected from the large indigenous woodland, high level of forestry arisings and many areas with no connection to the natural gas grid.

A GIS mapping exercise was carried out to identify sites off the gas grid in key sectors likely to have high heat demands. Figures 2-3 show output from this exercise.

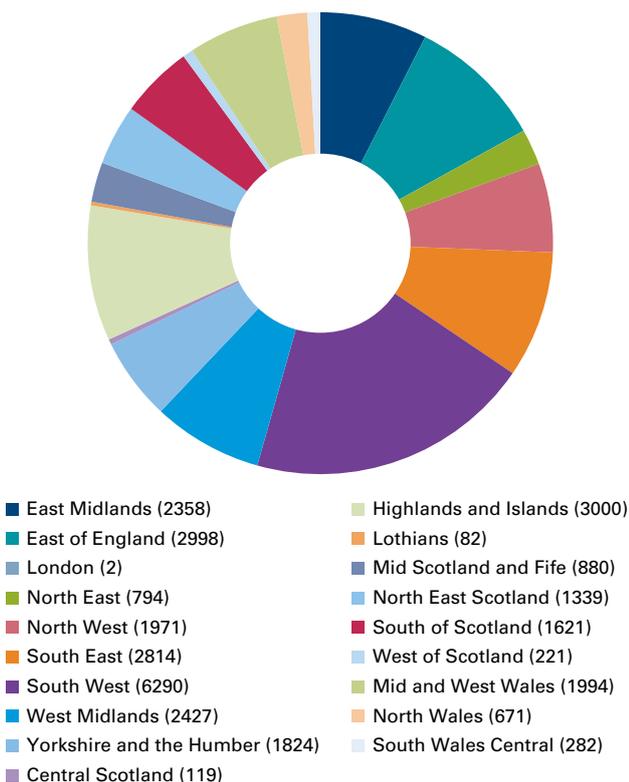
Biomass system costs

Projects supported by the BHA through to implementation in 2010/11 had estimated payback periods in the range of 2-11 years and annual savings from £34k to over £500k.

A wide variation in costs is seen between different sites with similar heat loads. Many elements of the cost of a biomass system, such as the buildings required and the connections to existing systems, are site specific and vary significantly. There was also a wide range of quoted prices for specific equipment which is a sign of a market which is not fully mature.

The Renewable Heat Incentive has played an important role in making the business case for biomass heating systems as it brings down the payback time significantly. The financial decisions about feasibility studies and installations carried out under Workstream 3 (in 2010/11) were heavily influenced by the progress of the Renewable Heat Incentive.

Figure 3 Breakdown of identified potential off-grid biomass sites by region



The banding originally proposed, with a steep drop in support/kW for systems above 500kW, heavily favoured boilers below this capacity and all but one of the woodchip projects that progressed during Workstream 3 were below 500kW. Some projects proposed what would otherwise be considered undersized boilers to capitalize upon this support and so improve the business case.

Feedback from installers involved in the BHA in 2006/7 was that price was not a major driver in the market (for end users due to high fossil fuel prices and grants and incentives, and for installers due to high levels of demand) and there was little appetite or need on the part of installers to reduce sales prices. One company commented that the market was relatively price inelastic and the company's strategy is to concentrate on maintaining a reputation for reliability rather than looking for cost reduction opportunities.

Project data from the BHA suggest that the industry observed an overall increase in average prices between 2008 and 2010/11. There are many reasons for this, including the busy market and limited number of experienced designers and installers, the impact of the RHI in improving the business case without the need for cost reduction and variations in the euro exchange rate affecting costs for imported equipment. The wide spread in quotes for equipment suggests that there is considerable scope for cost reduction as the market matures and competitive pressures increase.

Further details on cost and other findings from Workstream 3 are available in the [Insights into biomass heat installations report](#).

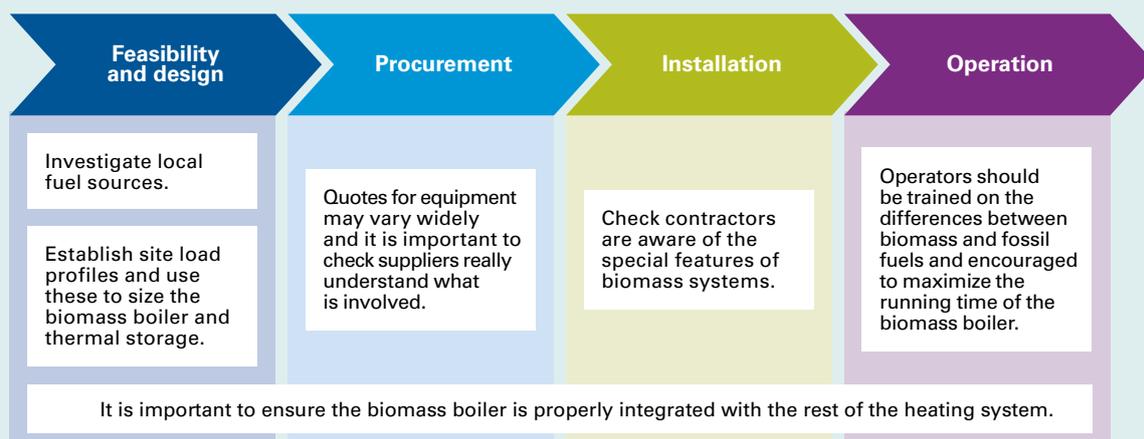
Key considerations for successful biomass systems

[Biomass heating: a practical guide for potential users](#) gives detailed guidance on all stages of biomass system procurement and installation.

The [report on Workstream 3](#) highlighted key points for the successful development of biomass projects:

- Establish site load profiles and use these to size the biomass boiler to give optimum system cost and performance, with thermal storage to smooth peaks and troughs in demand. Gas systems are often oversized without significant cost penalty, but the higher capital cost of a biomass boiler means that it is crucial to size it correctly to achieve the best cost benefit case.
- Investigate local fuel sources at an early stage in the project. Ensure that feasibility assessments include the space required for fuel storage and delivery.
- Biomass systems generally require more space than fossil fuel systems of the same rating. Imaginative reuse of space within existing buildings may be necessary.
- Follow good procurement practice in tendering for equipment and assessing the experience of contractors. Quotes for equipment may vary widely and it is important to check suppliers really understand what is involved. Check that contractors are aware of the special features of biomass systems and have a track record of successful biomass installations.
- It is important to ensure the biomass boiler is properly integrated with the rest of the heating system so that it is controlled effectively and integrated hydraulically. Commissioning should include demonstration that the whole system operates as intended, with responsibility clearly allocated for overall system.
- Operators should be trained on the special features of biomass and encouraged to ensure that the biomass system is run in preference to the fossil fuel back up.

Figure 4 Points to note for biomass heating projects



BHA reports, guides and tools

Previous reports

- [Biomass heating practical guide and summary: detailed guidance for those considering installing a biomass heat system](#)
- [Biomass sector review \(2005 review of the biomass sector\)](#)

Supplementary reports

- [Workstream 2 work with individual installers](#)
- [Workstream 3 insights into biomass heat installations](#)

Guides

- End user guide
- Contracting guide
- Fuel procurement guide
- Guidance by sector
- Template request for proposal
- Template contracts

Tools

- [Fuel supply map based on national fuel supplier database](#)
- [Economic evaluation tool for initial evaluation of biomass costs](#)
- [Decision support tool: to determine sizing and control strategy for detailed design](#)

Case studies

Industry guides supported by the BHA

- CIBSE Application Manual (to be published late 2012)
 - [Combustion Engineering Association Health and Safety manual](#)
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We help to cut carbon emissions now by:

- providing specialist advice and finance to help organisations cut carbon
- setting standards for carbon reduction.

We reduce potential future carbon emissions by:

- opening markets for low carbon technologies
- leading industry collaborations to commercialise technologies
- investing in early-stage low carbon companies.

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