The Carbon Trust
Biomass Heat Accelerator (BHA)

All-Energy May 2007

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Agenda

- Background
- Project overview
- Preliminary results
- Project status
- Next steps

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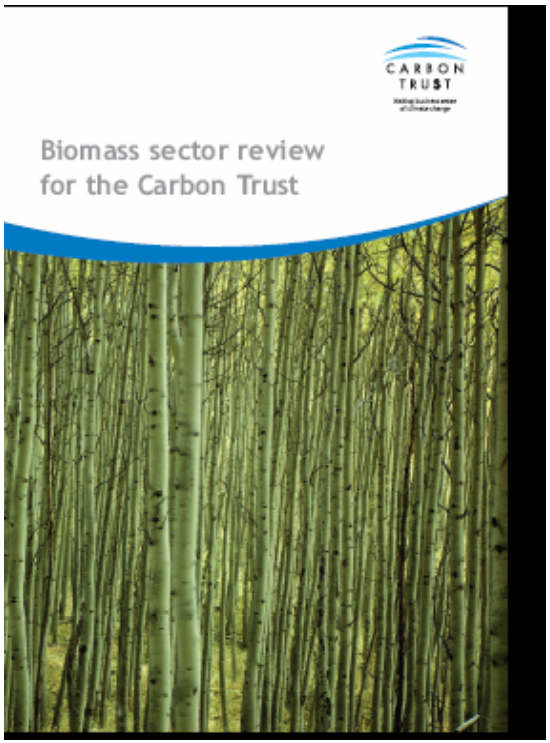
The Biomass Sector Review analysed the economics, barriers and potential activities that could accelerate the development of the biomass heating sector

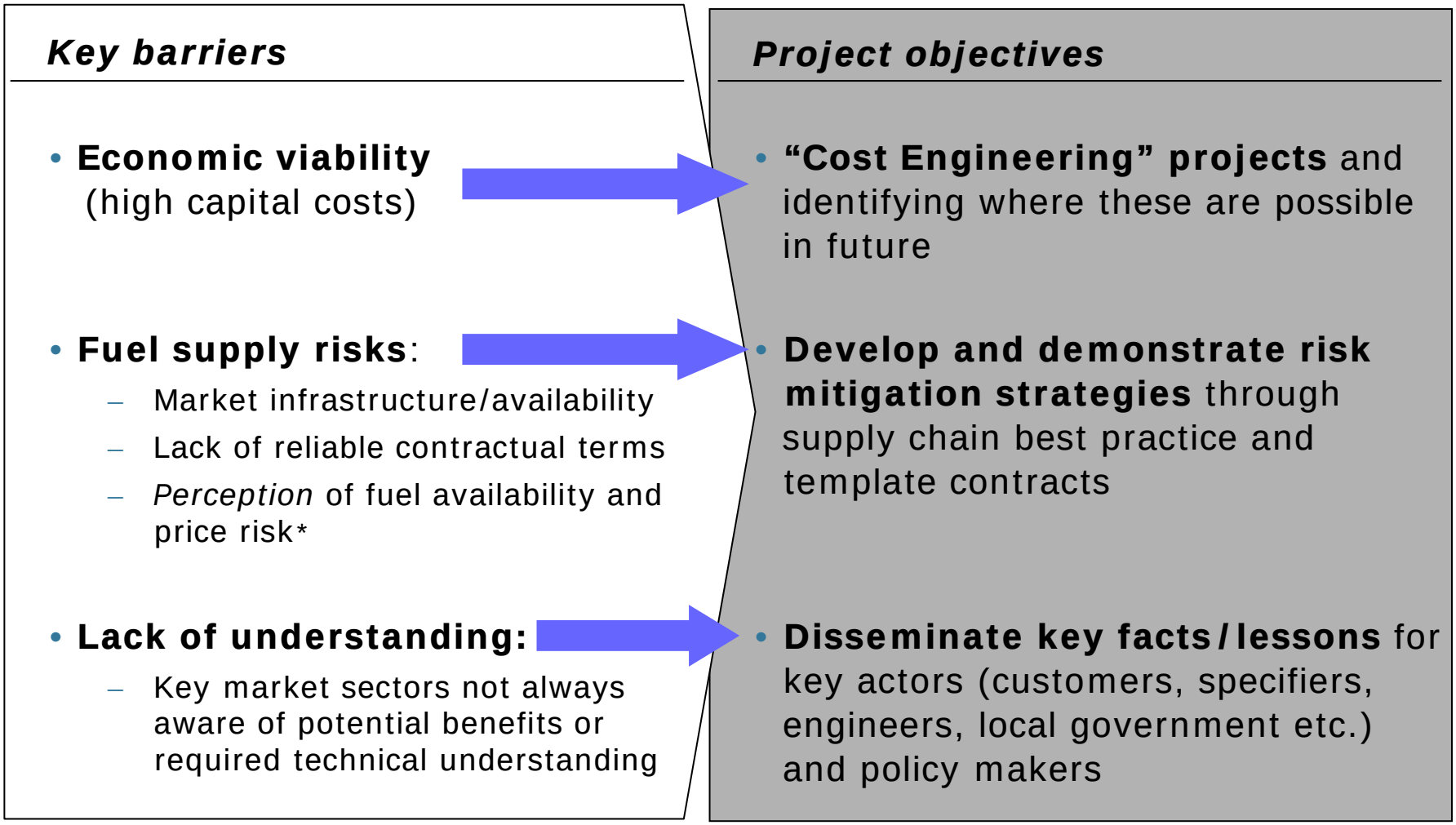
Key findings



- Biomass has potential to **save up to 5.6 Mt Carbon pa** using indigenous UK resources
- **Biomass for heating at smaller scales** (0.2-2MWth) via combustion and displacing fuel oil give the most cost-effective carbon savings and have the **most attractive** economics in the absence of public financial support
- **High costs, lack of confidence in a reliable supply chain and lack of understanding** are key barriers to sector development
- The Carbon Trust could be material to the development of the sector by conducting an acceleration project focused on heat (**Biomass Heat Accelerator - BHA**)

Source: Biomass Sector Review- Carbon Trust, PAA & B&V, October 2005

The Biomass Heat Accelerator project has three core objectives/workstreams designed to target three key barriers



* Fuel availability and price volatility may become real risks as the market expands

Activities started in April 2006. Focus to date has been on baseline data gathering and cost-engineering

- **Baseline**
  - Detailed data received from around 60 existing biomass installations to date
  - Data has been analysed to identify key trends and cost benchmarks
  - On-going data capture planned throughout the project
- **Cost Engineering (Installation/Manufacturing)**
  - 6 projects underway with a range of installation/manufacturing companies to reduce costs in a variety of different areas
  - Up to 12 other projects in preparation
  - Appropriate technical expertise selected & allocated

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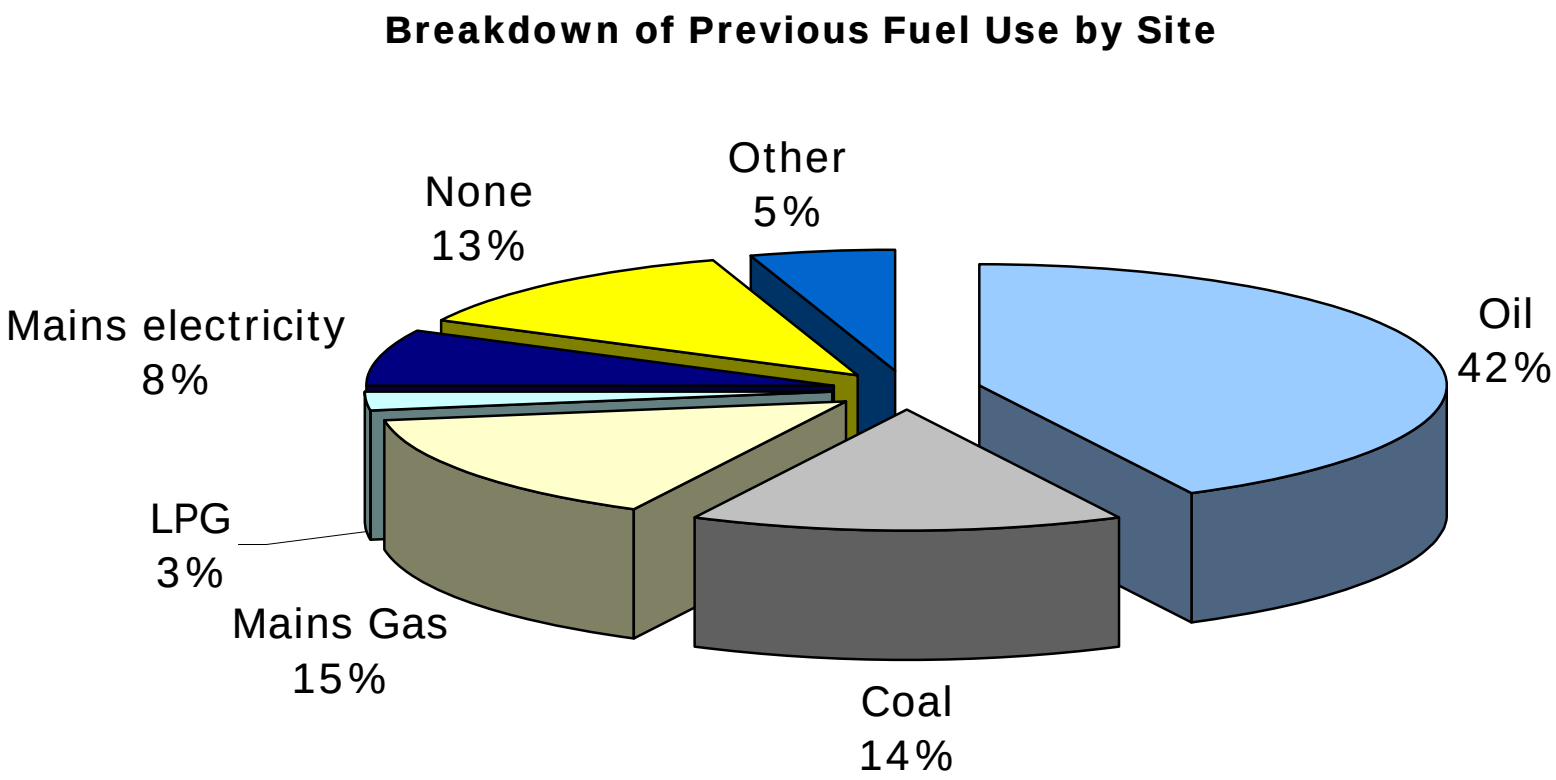
64% of the existing sites in our sample switched to biomass from oil, coal or electric heating



Note: based on available sample of data from 49 sites as of February 2007

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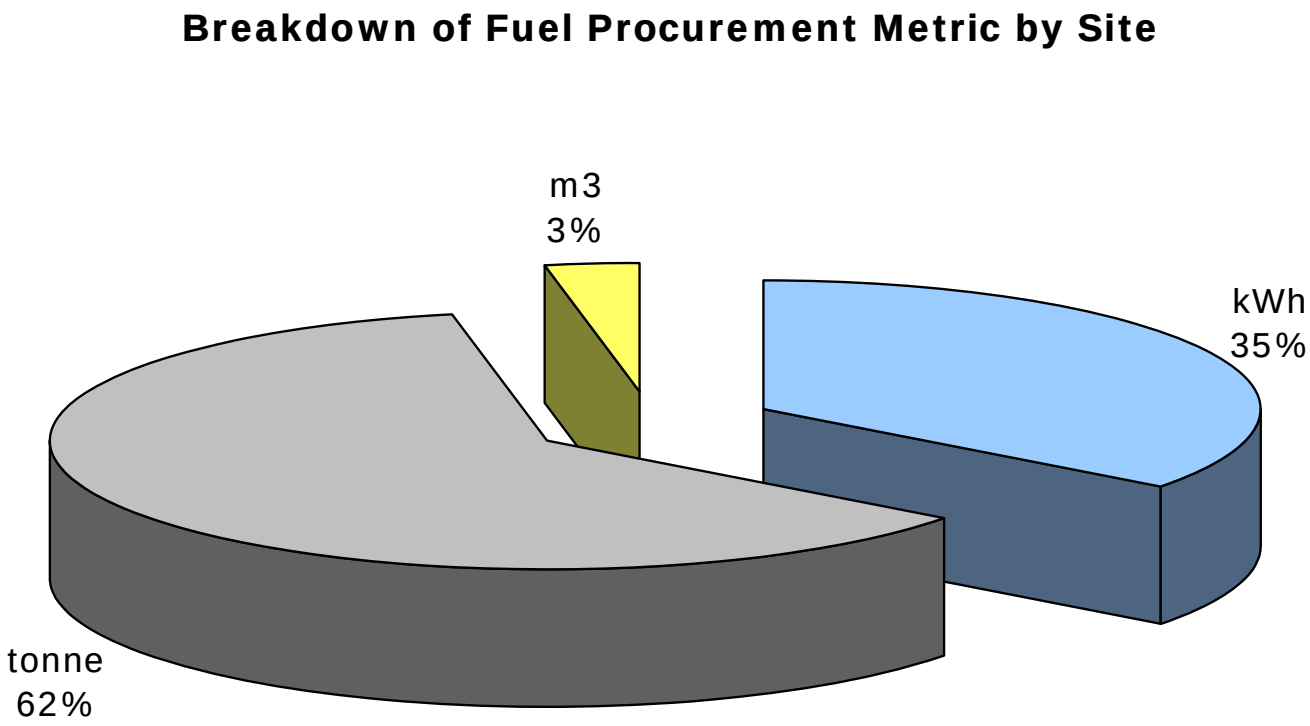
65% of the sites in our sample procure fuel based on weight/volume rather than energy content



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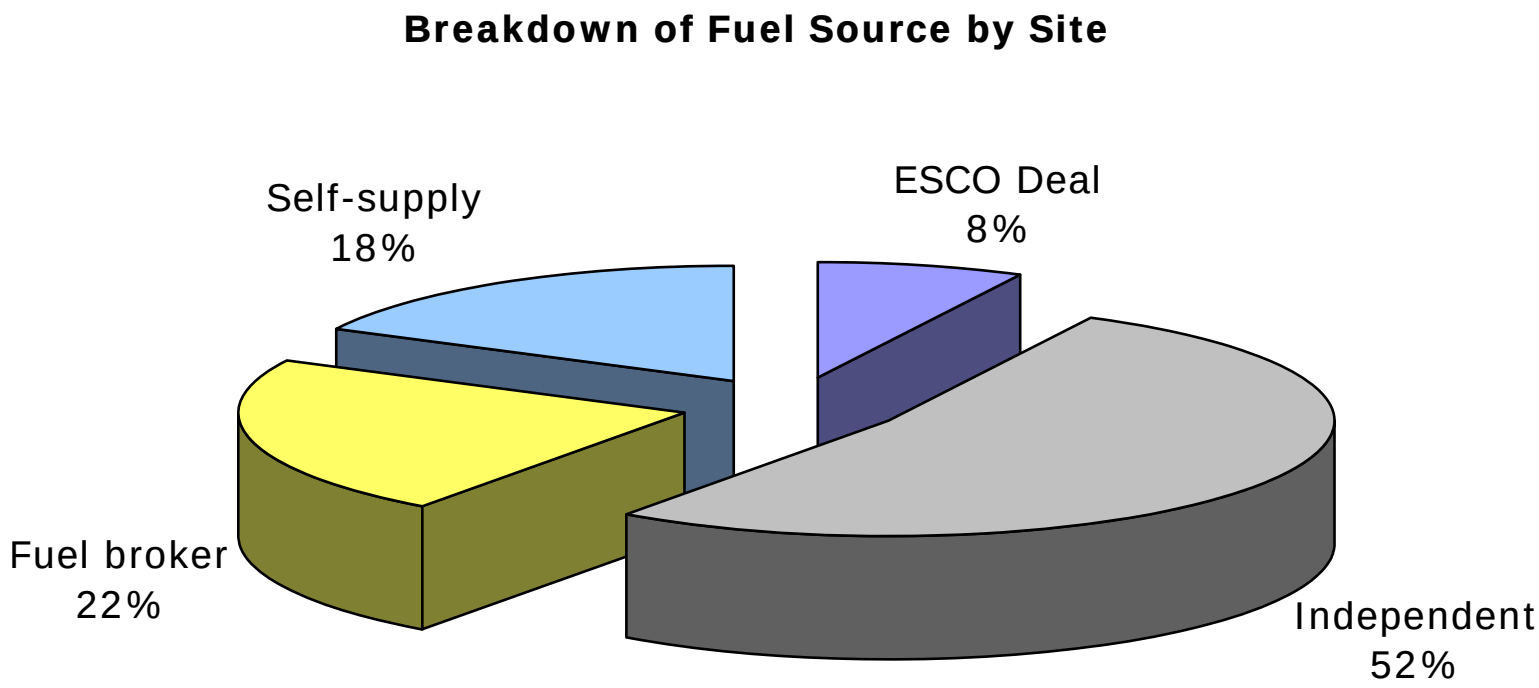
Over half of the sites in our sample source their fuel from local independent sources



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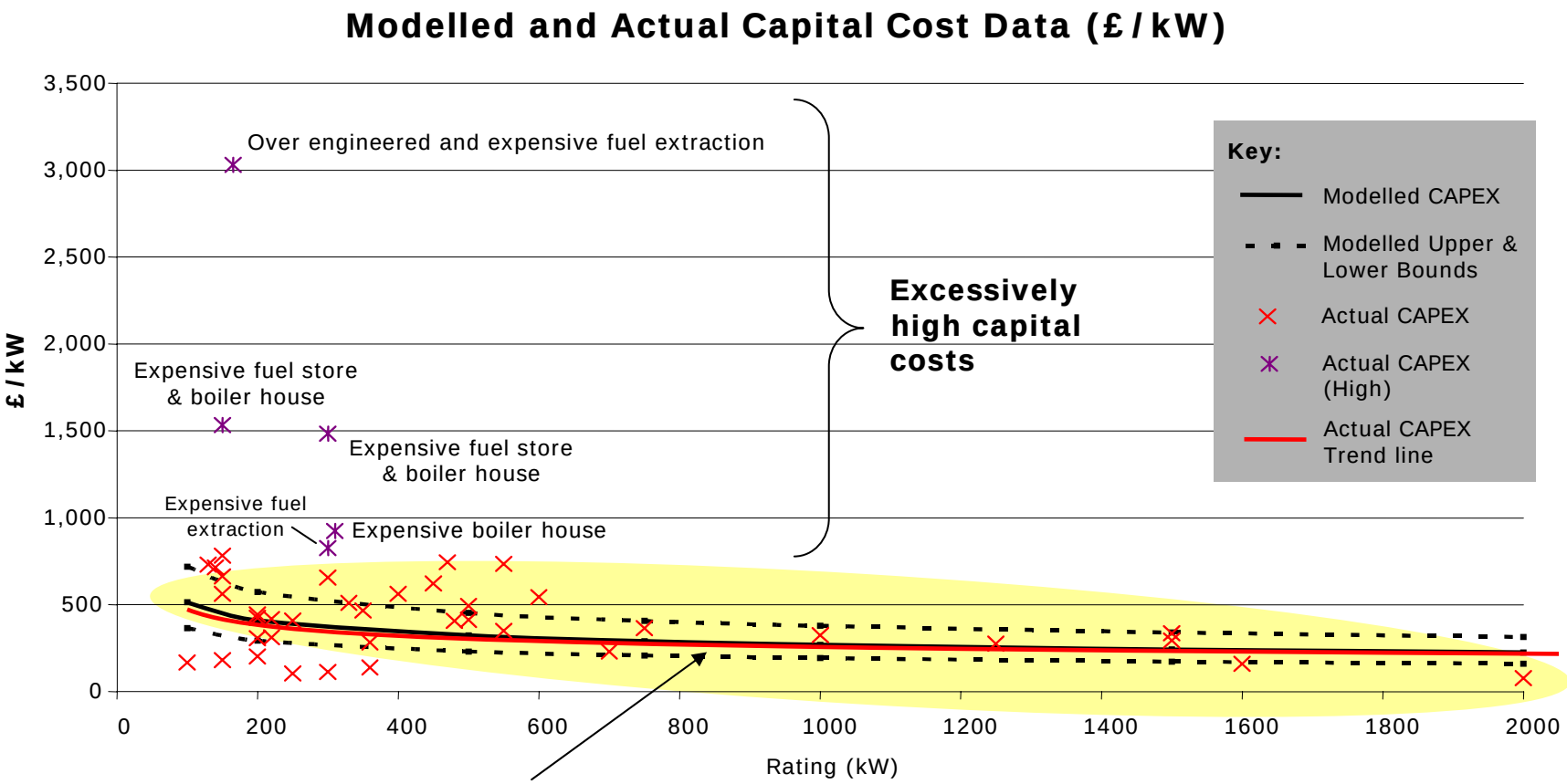
Baseline data has shown wide range of capital costs and identified common reasons for high costs



Generally good correlation between actual data and assumed CAPEX modelled

Note: Trend line excludes points having a high CAPEX (points in purple)

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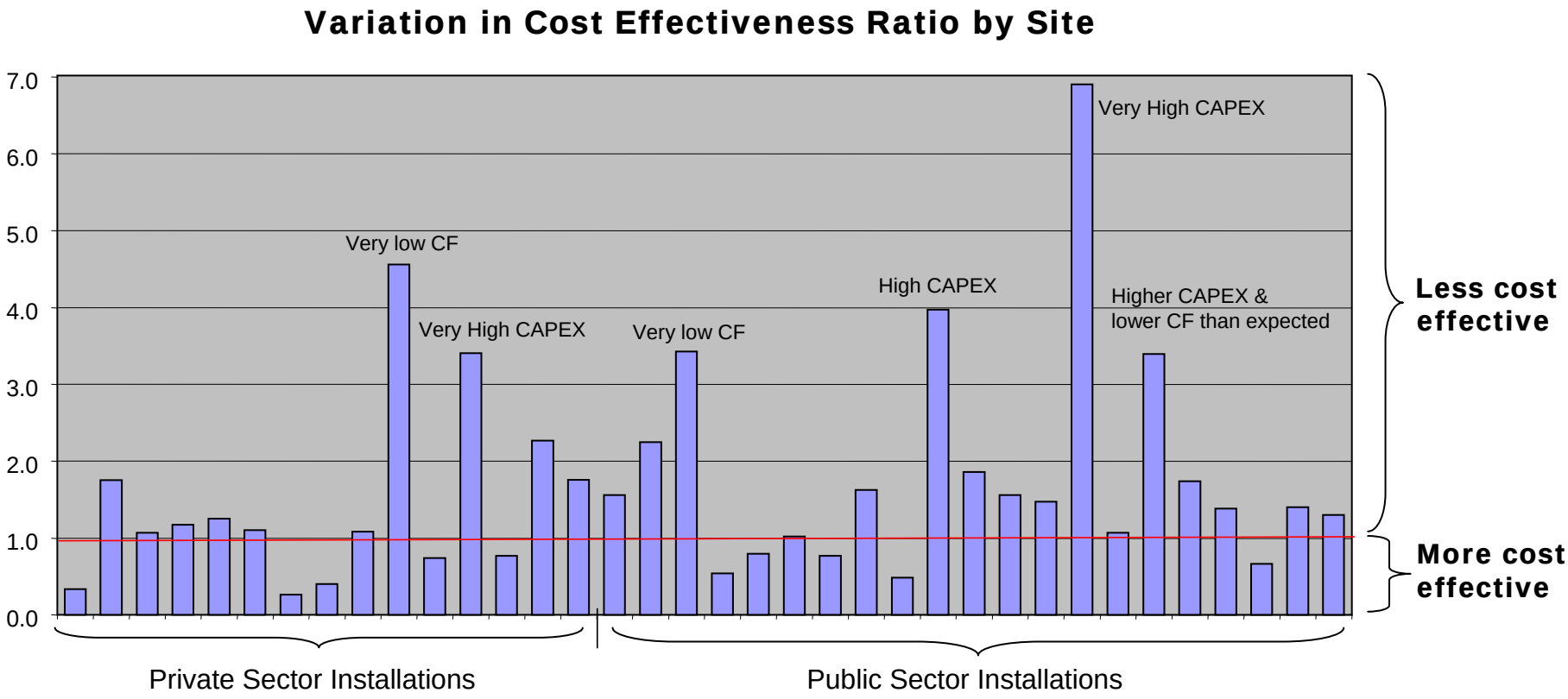
There is a significant variation in cost effectiveness. High capacity factor is vital as well as low capex.



$$\text{Capital Cost Effectiveness Ratio} = \frac{\text{Actual £ per kW / Capacity Factor}}{\text{Expected £ per kW / Capacity Factor}}$$

More cost effective sites are those with ratio <=1

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The data gathered has led to a number of initial observations

- There is a large variation in capital costs and relative cost effectiveness across sites
- Lower relative cost effectiveness is due to two key factors: high capital costs and low capacity factors
- High capital costs are often caused by over-engineering of installations (particularly fuel stores and boiler houses)
- Low capacity factors are thought to be due to incorrect design (especially over-sizing of systems), incorrect commissioning, and inadequate operational support/utilisation
- Very few sites use meters to monitor the level of heat delivered, thus making it very hard to verify actual performance
- In general the private sector sites are more cost effective in terms of use of capital and operational performance than the public sector sites
- Some of the data suggest a link between grant levels and capital costs – in some cases it appears that grants are allowing projects to go ahead that would otherwise have not been viable, or larger grants are associated with higher-than-expected total project costs

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Cost Reduction projects are focused on the key cost centres for a typical biomass heating project

Area	Rationale
Civil Engineering	Boiler houses and fuel stores often responsible for high-cost installations
System sizing	Evidence indicates that many systems have not been size-optimised. Opportunities exist to improve capacity factors of systems in future
Business processes	UK biomass heating companies are SMEs. "Lean" business processes could help reduce overhead cost per sale and free up technical capacity
Manufacturing	Opportunities exist for some UK-based manufacturers to offer lower-cost devices in comparison to continental imports
Alternative sourcing (balance of plant)	Many components of a biomass project could potentially be sourced more locally or at lower cost
Remote monitoring	Design for minimal attendance/early fault diagnosis could reduce O&M costs

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