Department of Energy & Climate Change

The Scope for Cost Reductions in a Mass Market for Biomass Heating Installations

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Executive summary

Scope and Purpose

This report examines the scope for cost reductions in biomass heating in a future established mass market. As there is a relationship between installation costs and running costs, as more efficient (and often more costly) schemes usually cost less to operate, this report considers both installation and fuel costs. This report focuses on how costs may change and what cost drivers are. It is not an attempt to improve evidence on current costs, which DECC is continually seeking to improve through scheme data, with much larger available samples. To avoid inconsistency, this report refers to relative costs (%) rather than absolute costs (£).

A mass market

Assuming the biomass heat market shows an annual and sustained **increase** in the current rate of growth from the 2009 – 14 period (for context, an average of 194MW were added annually between 2009 and 2014), as the number of installers and their expertise expands; we could see potential for the market growing to a point where over 800 MW of additional capacity are added **each year**. This rate of installations growth in the sector could be reasonably defined as mass market.

Areas for Installation Cost Reduction in a Mass Market

Biomass heating schemes comprise a complex set of components associated with design/project management and equipment/construction costs. Each of these is likely to be affected in different ways by the development of a mass market. We have broken down costs into seven headings and then analysed and quantified the scope for cost reductions in each component in a mass market.

Non-equipment Costs

Professional Fees for Expert Advice and Construction Oversight

Overall, by the time mass market is achieved, we consider that the costs of external expert advice associated with biomass heat installations (where incurred) will reduce somewhat due to the availability of a larger number of experts, with more accumulated experience– *and more importantly that good advice is likely to lead to many other costs falling*, in particular via a focus on whole-life costs.

Project Management, Design and Business Overheads

The standardised professionalisation and the developing skills of installers and better customer knowledge should improve the project management of installations, and so this cost and business overheads should fall appreciably in a mass market.

Equipment Costs

Biomass Boiler

Overall, by the time mass market is reached, the cost of boiler equipment should see modest reductions as a UK supply chain base matures and the technology becomes mainstream.

Flues

In a mass market, the cost of flues are not expected to reduce, and are more likely to rise with better specification over the short term before stabilising.

Boiler House

We do not anticipate any meaningful changes to the construction cost of boiler houses under mass market conditions.

Fuel Stores

In a mass market, we anticipate that the cost of fuel stores will have risen to reflect a modest increase in the role that wood chip is likely to play as a fuel source, but that the cost of mass produced pellet stores will have seen a modest reduction in cost.

Mechanical & Electrical (M&E) Works, Connections to Heating System/Buffer

In a mass market, costs should be marginally lower than they are at present as skills in the supply chain widen and develop.

The chart below shows the cost breakdown and opportunity for cost savings for the central 199kW boiler, with an overall cost reduction of 9% in a mass market. Similar overall cost savings are likely to be seen in 25kW boilers (10%) and 500kW boilers (11%). The percentage changes are based on an 'average' UK wide 2014 cost (developed for analysis of cost change only and *not intended* to be used for cost planning/budget development).

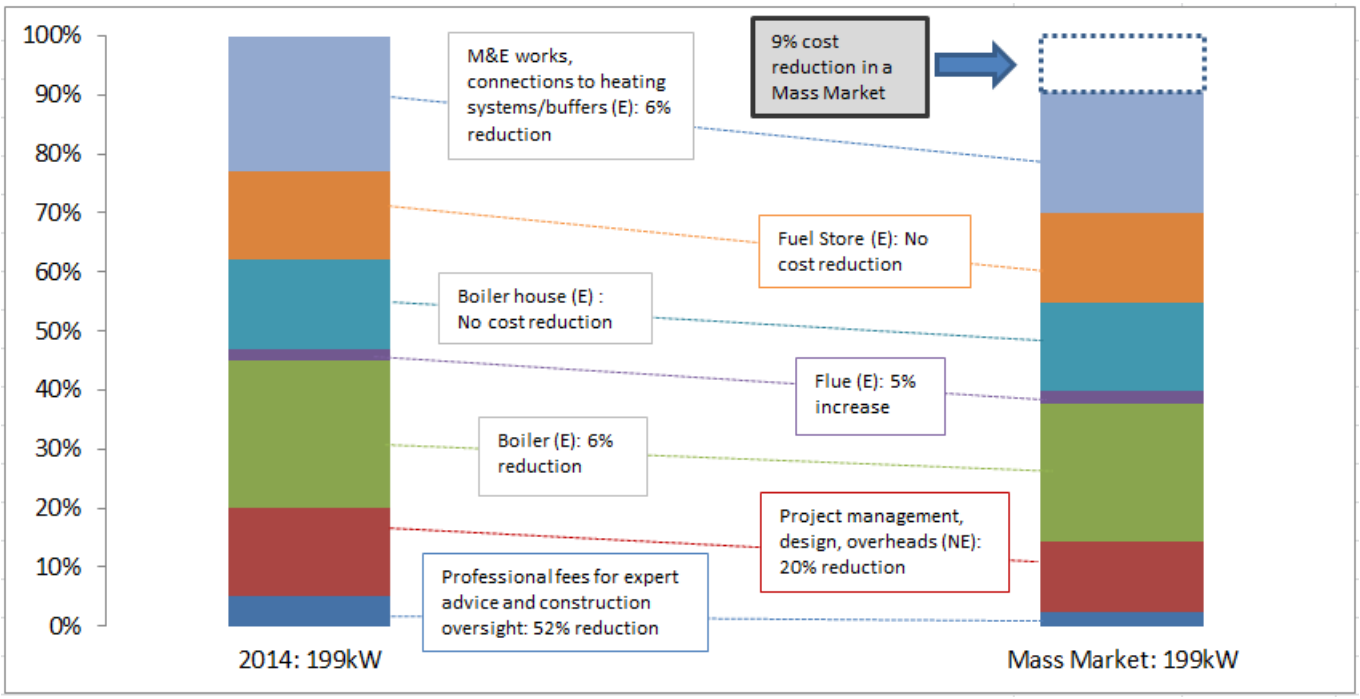

Figure 1: Cost reductions for a 199kW boiler

Conclusions on cost reductions in installation costs

Our central conclusion is that we could see a real terms reduction in installation costs of between 9% and 11% resulting from the development of mass market. Such reductions are from base line costs that assume a well-designed and properly specified 'average' UK scheme in 2014. This is an important caveat as (for example) for the average assumed cost of 2014 199kW scheme we captured current data which spread at least +/- 40%. This is probably associated with regional variations and specification/construction factors. Nevertheless, we could expect to see similar falls in the 'low' and 'high' costs and ideally, a contraction in the range as the sector develops. It is important to note that the focus of the report is on the cost reduction potential (percentage changes) and not the actual cost itself.

However we would acknowledge that these judgments are subject to significant uncertainty, and it is worth noting that under a less optimistic scenario on cost reductions, increases in chip based solutions, and greater focus on whole-life costs rather than installations costs, could mean that we only see around a 5% fall in costs rather than 9% to 11% In addition new regulations (e.g. tighter emissions regulations) could drive costs up and we cannot foresee these.

Under a more optimistic scenario, where there is widespread lower cost expert advice associated with installation, lower labour costs as a result of standardised professionalism of installers, squeezed overheads in a larger sector and possibly a UK manufacturing base for biomass equipment develops, we could envisage reductions in installation costs of between 15% and 20%.

Thus – given the scope and confines of this study we can forecast falls in scheme installation costs of between 5% at least and 20% at most, with a central forecast of 10%.

Costs of wood fuel supply in a mass market

As the market for biomass fuels grows in the UK, production and supply chain efficiencies can and should be expected to reduce the overall end price paid by consumers. We also consider that there will be a gradual move to more chip based solutions, as suppliers gain technical confidence to use chip over pellet and customers better appreciate the long term savings, which could also help reduce fuel supply costs (as chip is inherently cheaper than pellet) but may increase capital costs.

For example the report, *Biomass for Heat and Power: Opportunity and Economics (*European Climate Foundation, Sveaskog, Södra & Vattenfall), produced in 2010, estimated that fuel supply cost reductions of between 15% and 40% could be achieved with the growth of volumes and experience.

An important aspect of the wood fuel supply chain is that transport costs amount to 25% or more of the total delivered costs, thus, in a mass market with more fuel suppliers distributed nationally, it is probable that transport distances and associated costs will fall.

In the event of continued growth of the power station sector, it could likely underpin substantial penetration of imported pellets into local heat markets. This could also create downward price pressure, associated greater availability and supply.

The wider availability of specialist chippers and increased market demand may also drive modest reductions in chipping costs in a mass market.

Finally, the delivery of O&M services associated with looking after biomass heating installations – which can be 5% to 10% of delivered heat costs - is very likely to fall in a mass market, as the number, quality, spread and experience of suitable engineers will increase significantly.

For all these reasons, we can estimate costs could drop overall by as much as 25%, but in the confines of this rapid study, we would highlight the uncertainties associated with this assumption.

Conclusions on whole life costs

We have developed a simple methodology[1] to illustrate how the whole life cost of biomass might fall in a mass market. This makes the assumption that capital costs will fall by 10% and wood fuel supply by 25%. This is assuming that the counterfactual fossil fuel cost remains constant.

In a number of case studies, this would imply that the payback period for whole-life cost of biomass heat could fall by more than a quarter in a mass market. This would mean overall costs (including the lifetime fuel costs) are forecast to fall by a third in mass-market conditions looking at the UK market as a whole, when modest installation cost reductions are combined with running cost savings.

[1] Using real world data from 12 schemes in construction stage and we have not used DECC central cost estimates.

Introduction and Context

Scope and Purpose

This report has been produced by Steve Luker Associates Ltd (www.stevelukerassociatesltd.co.uk) and re:heat Ltd (www.reheat.uk.com) and examines the scope for cost reductions in biomass heating in a future established mass market. As there is a relationship between installation costs and running costs, as more efficient (and often more costly) schemes tend to cost less to operate, we have considered both installation and running costs.

Specifically the report examines the current scale of the biomass heat market and how a mass market could be defined, and then assesses the current total costs breakdown of biomass heating schemes at 25kW, 199kW and 500kW sizes, before discussing and analysing the scope for installation and operational and fuel supply cost reductions in the context of a future established mass market.

The biomass heating market in context

The UK biomass heating market, in its current form, can be traced back to the late 1990's when the first automated biomass (wood burning) boilers were imported in reasonable numbers from continental Europe. By 2008, just before the advent of the Renewable Heat Incentive (RHI), the sector provided 59% of the UK's renewable heat[2]. At that time the UK market was dominated by large industrial and commercial users in the timber processing sector (usually multi MW installations in sawmills and papermills).[3] For the purposes of this report, we estimate the installed capacity of the sector was 3,000MW by July 2009 (about 10% higher than 2008 official figures).

In July 2009 the RHI was announced and by August 2014 we know the installed capacity of RHI-accredited biomass installations amounted to 970MW. This added many smaller (mostly sub-1MW) schemes to the larger ones that dominated before 2009.

We therefore estimate that the current installed capacity of the biomass heat market is in the region of 4,000MW[4].

The main characteristic of the sector is that it involves a permanent fuel supply chain, and each individual system requires the supply of biomass fuel and the ongoing provision of specialist maintenance services. It can be estimated that the 4,000MW of capacity will be consuming about 3 million tonnes of fuel, worth £300 million pa[5] and as each new MW of capacity is added; it drives growth in the supply chain.

More expensive installations tend to have lower operating costs per kW, often require less fuel per kWh of heat produced, and usually have more efficient systems for fuel reception, handling and storage[6]. Therefore the whole-life cost of a biomass investment is directly affected by the cost, design and quality of the installation. Put simply, cheaper, less well specified schemes are likely to cost more to operate, and as a consequence deliver lower carbon savings and financial benefits to their owners.

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[2] In 2008 the market was providing 5.42TWhs of energy and installed capacity was 2,710MWs (published DECC data).

[3] We can infer this from the Wood Fuel Demand and Usage in Scotland 2010, which is the only survey of wood fuel use published and shows that 90.5% of total wood use was in the category 'Major Industry' using above 10,000odt pa. We consider this applies almost equally to England and Wales.

[4] An important caveat to this figure however, is that some of the capacity counted prior to the RHI may have been replaced by new RHI-eligible installations, or may have been decommissioned. Professional judgment is that up to 10% to 20% of the 3,000MWs could be de-commissioned now.

[5] Assuming each MW of installed capacity uses 800 green tonnes of wood fuel pa that costs £100/t to process and supply. It should be noted some of the pre 2009 (3,000MWs) still operating will be using self-sourced fuels, usually as waste-streams from processing operations, (e.g. woodchip by-products from sawmills).

[6] For example delivery turnaround time for the same volume of fuel can be as low as 10 minutes and as high as over an hour, which over a 20 year operational life with weekly/fortnightly deliveries can build in major additional operating costs.

Mass market

Assuming the biomass heat market shows an annual and sustained **increase** in the current rate of growth from the 2009 – 14 period (for context, an average of 194MW were added annually between 2009 and 2014), as the number of installers and their expertise expands; we could see potential for the market growing to a point where over 800 MW of additional capacity are added **each year**. This rate of installations in the sector could be reasonably defined as mass market, in practice with installations ranging from a few kW to several MW. Some would be simple and small, but most will require a reasonable degree of design, planning and construction, with expert engineers and construction trades and many professionals involved. These are often highly skilled jobs, and the sector represents a significant opportunity for the creation of sustainable well-paid employment opportunities. There are 468 Local Authorities in the UK, so there would likely be a number of ongoing projects in each UK council area at any given time, so the sector would have a genuine national presence at that point.

Current Baseline Cost Structure

Scope and Method

In order to ensure we have developed a robust baseline on costs, we have examined published information from the Carbon Trust. We have then compared this published information with a number of recently built (or in process of being built) schemes that we have been involved with or have obtained information on. In total we have used detailed cost data on 27 recent schemes, which we believe is a reasonable sample size to validate baseline costs (of typical and average 25kW, 199kW and a 500kW scheme). The percentage changes are based on the calculated typical and average installation cost of a 25kW, 199kW and a 500kW scheme.

Costs are shown for typical projects and exclude district heating and additional costs like demolition and removal of existing plant rooms and boilers (which can be required).

The data collected shows a range of costs in each size. This is an important point, as it highlights how bespoke biomass installations tend to be and part of the cause of the wide range of costs is simply that each installation must cater for different requirements associated with construction and differing specifications of operation. This effect appears more pronounced at the 25kW and 500kW sizes and the 199kW size shows lower comparable cost variation.

Our judgement is that at the 199kW size, there is more intense competition as a result of RHI tariff banding and some signs of a better functioning mass market can be observed. It is therefore possible to suggest that those customers (perhaps in the 25kW and 500kW sizes more often) who seek the lowest cost scheme, with no consideration of the whole-life cost (with installers seeking business) and in the absence of independent expert advice are partially responsible for the wide variations we see now – and that this might reduce in a mass market. In summary it is considered likely that some of the 'lower' costs are probably associated with less efficient schemes that are not planned with whole-life costs in mind.

Analysis of Scope for Cost Reductions in a Mass Market

Lessons from Comparable Markets

Within the timescale of this study, we have not managed to locate reliable published information about the costs of biomass heating installations in suitable comparable markets. We do, however, have some professional experience of how the markets in Europe and other parts of the world tend to work, and using that experience we comment as follows.

In immature markets we have some evidence that installation costs are considerably higher than currently experienced in the UK. The authors of this report have worked in Ireland and New Zealand, and found that costs were typically higher than the UK. A good example of this is from the World Bioenergy 2014 conference, where evidence presented by a speaker from Japan on current costs showed that a

199kW scheme could cost £475,228 (£2,388/kW[7]) in Japan, which is around 3 times higher than in the UK at present.

In general, our experience is that in the developed markets such as Austria and Sweden, the costs of installation are similar to the 'average' or 'high' costs we have found in 2014 in the UK. This is evidenced by the higher quality of those schemes and the important role of biomass in the heat market overall.

The conclusions we draw from this are that installation costs tend to be very high in the early stages of market development, but can fall as the market matures. We have not located evidence that installation costs will be *significantly* lower in mature markets, than they are at present in the UK. Perhaps one reason for this is that mature markets focus on whole-life costs, and so schemes tend to be well designed and high quality. In the scope of this study we are unable to comment on the costs of running biomass schemes in other markets.

Summary of % of Costs Breakdowns by Size of Scheme (in 2014)

Biomass heating schemes comprise a complex set of components associated with design/project management and equipment/construction costs. Each of these is likely to be affected in different ways by the development of a mass market. For that reason we have used our 'average' total cost for a well-designed 25kW, 199kW and 500kW scheme and broken it down into 7 cost headings and then applied typical % we expect each component would constitute. This has allowed us to analyse and quantify the scope for cost reductions in each component in a mass market (note: these breakdowns may have limited applicability for other uses).

Cost item: 2014 typical situation	25kW	199kW	500kW
Non-equipment costs: Professional fees for expert advice and construction oversight	0%	5%	10%
Non-equipment costs: Project management, design and business overheads	5%	15%	15%
Equipment cost: Boiler (note overhead cost inc)	35%	25%	26%
Equipment cost: Flue	7.50%	2%	1.50%
Equipment cost: Boiler house	12.50%	15%	8.50%
Equipment cost: Fuel store	20%	15%	11%
Equipment cost: M&E works, connections to heating system/ buffer	20%	23%	28%

Areas for Cost Reduction in a Mass Market

Below we offer some qualitative judgements about how costs might change (from the 2014 'average') in the context of a mass market from a UK wide perspective.

Non-equipment Costs

Professional Fees for Expert Advice and Construction Oversight

Looking at a mass-market, the technology and its correct application should be better understood by a wider range of professionals inside and outside the sector, although this is likely to involve some form of structured support and training to achieve at the scale required in the UK. Independent expert advice would improve the whole-life costs of installations, and reduce the number of poorly planned and procured schemes. Greater availability of advice will help such advice be better value.

[7] 300kW scheme = €500,000 to €800,000 (£398,000 to £637,000). So that's (on average) = £716,500/300kW = £2,388/kW = £475,278 for a 199kW.

Overall, by the time mass market is achieved, we consider that the costs of expert advice associated with biomass heat installations (where incurred) will reduce somewhat – *and more importantly that good advice is likely to lead to many other costs falling*, in particular via a focus on whole-life costs.

Project Management, Design and Business Overheads

In a mass market, where robust standards are implemented and properly policed, the costs associated with project management can be expected to both rise and fall. We anticipate a rise on schemes where there is currently little or no focus on project management, and fall on schemes where there is typically project management in place, as systems are improved and streamlined with experience, and competition increases in quality and quantity. Crucially, the long term implications of improved project management and design will be realised in the whole-life costs associated with biomass installations, as better designed and managed projects will be more efficient, robust and last longer than those which are not. As the industry matures, the costs associated with project management and design should see a modest reduction as repetition of tasks and familiarity with the 'right way' of managing and executing schemes becomes embedded into the sector. Installers with better skilled staff and higher levels of proficiency should deliver cost savings in a mass market.

Similarly, specialisation of tasks within companies will contribute to time reductions on each installation, lowering the cost to end customers. More installers will also increase competition in the marketplace, keeping margins low and encouraging installers to make efficiency and cost savings across their businesses.

A greater number of installers in the UK market will also reduce the distances it will be necessary for companies to travel in order to secure work, thereby reducing the transport and accommodation costs associated with undertaking an installation at some distance from base. Installer travelling excessive distances was a common feature of the pre-RHI market, and examples exist of biomass systems being installed in Easter Ross (Scotland) by a company based in Devon. In addition we expect to see higher utilisation of equipment and less down time when distances between installations and available engineers is reduced.

The cost of winning business in the biomass sector has historically been very high, as not only have companies had to undertake speculative design and detailed costing exercises prior to order, the high capital cost and unfamiliarity of most customers with biomass boiler equipment and its attendant supply chains means significant amounts of education and reassurance are required as part of the sales process. The need for this should reduce in a mass market and marketing budgets can lower and be better targeted to greater effect.

Installers also face costs of recruitment and challenges in obtaining skilled staff, and the cost of this may fall in a mass market.

The increased standardised professionalisation and the developing skills of installers and better customer knowledge should improve the project management of installations, and so this cost and business overheads should fall appreciably in a mass market.

Equipment Costs

Biomass Boiler

Looking at a mass market, it is considered highly unlikely that the purchase cost per kW of biomass boilers will fall appreciably, indeed as a result of customers become more informed and discerning in their purchasing decisions, cheaper, poorer quality and less-efficient equipment may (and in our view should) find less room in the marketplace.

We do not consider that the growing UK market for biomass boilers impacts on production costs in the regions which are the primary source of equipment - Scandinavia, Austria, Germany and Eastern Europe - as these manufacturing centres are already serving their own mature domestic markets, and those elsewhere in the world. The leading manufacturers, particularly of domestic and smaller commercial equipment, typically have production volumes measured in the tens of thousands of units per year.

In the meantime, we consider that there may be some scope for cost reduction in the supply chains that sit between overseas manufacturers and installers and their UK customers as the market grows and matures, although this is likely to be modest and is not guaranteed. There is certainly some consolidation yet to take place in the UK supply chain, and with some equipment manufacturers there is little or no in-country competition

Overall, by the time mass market is reached, the cost of boiler equipment should see modest reductions as a UK supply chain base matures and the technology becomes mainstream. We do not foresee large scale UK based boiler manufacturing, but modest UK based development may occur.

Flues

The manufacturing base for flues in the UK is considerable, and there are a number of well-established companies in the marketplace. Whilst the RHI has undoubtedly led to significantly increased sales of biomass-specific products (twin wall insulated and high-grade stainless chimney liners), costs do not appear to have come down as a result of the growing market. As a relatively simple product to produce, input costs are primarily energy, steel and labour, meaning there is probably little scope for cost reduction by manufacturers. Poor design of lower cost flues is also apparent, with installers specifying lower cost or unsuitable flues; that may change as the market grows.

Overall, in a mass market, the cost of flues are not expected to reduce, and are more likely to rise with better specification over the short term before stabilising.

Boiler House

This is highly variable cost that is hard to forecast in a mass market. However this is a task usually undertaken by construction companies, and consequently there are possibly few opportunities for cost reductions that are specific to the biomass sector. In some instances, 'packaged plant rooms' - prefabricated buildings which contain a boiler and often a fuel store - can offer cost savings over the construction of new buildings on some sites, however this is very site-specific, and cost savings are likely to be marginal.

We do not anticipate any meaningful changes to the cost of boiler houses under mass market conditions.

Fuel Stores

As the market matures and installer knowledge and skills grow, the number of chip installations is likely to increase because there should be higher focus on whole-life costs and since installers will be more confident of the chip supply chain in a mass market.

At present, our market experience shows that proportionally, pellet boilers make up 70-80% of the new boilers being installed under the RHI, so assuming a gradual increase in chip installations as the market matures, the costs of fuel stores when viewed across the industry is likely to rise (as they typically cost more than pellet stores). The cost of building a chip or pellet store is unlikely to change markedly from now to mass market, as chip stores are typically buildings, while pellet stores are either created in existing buildings, or are often pre-fabricated external hoppers or silos.

In a mass market, we anticipate that the cost of fuel stores will have risen to reflect a modest increase in the role that wood chip is likely to play as a fuel source, but that the cost of pellet stores will have seen a modest reduction in cost.

M&E Works, Connections to Heating System/Buffer

Whilst there is no empirical data on how the M&E works on jobs are being over or under-costed by installers, we anticipate that as the market grows and the sector matures, customers and installers will become better educated around pricing and that costs will stabilise. A larger scale market should bring down costs associated with transport and bulk purchase of items such as buffer tanks may reduce costs.

In a mass market, costs will be marginally lower than they are at present.

Conclusions: detailed % change in cost breakdowns by scheme size

The charts below offers a central judgment on how each component of cost will change in the light of the comments and analysis above. It is inevitably just a forecast and cost changes are presented in 2014 terms (not adjusted for inflation). Regional cost variations are not easy to report and are not discussed here, but we are aware of these and of course they do affect individual schemes significantly at present.

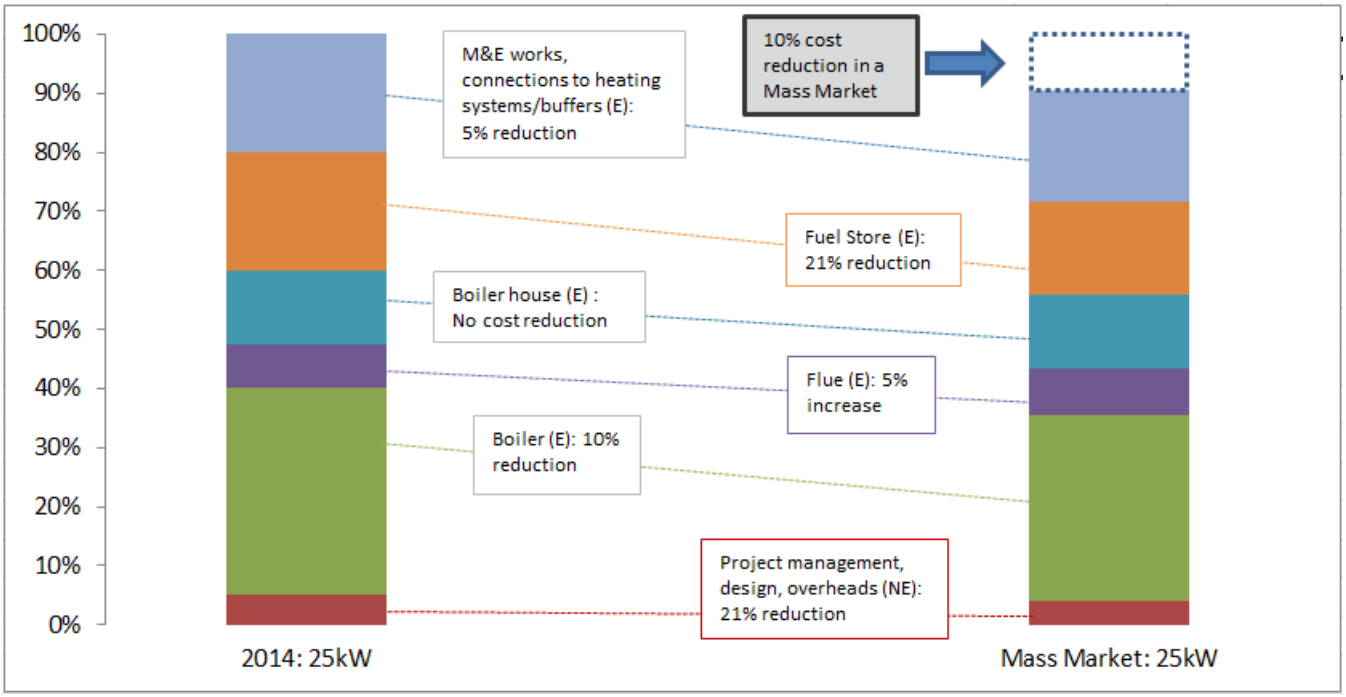

Figure 2: 25kW Cost Reduction Forecast

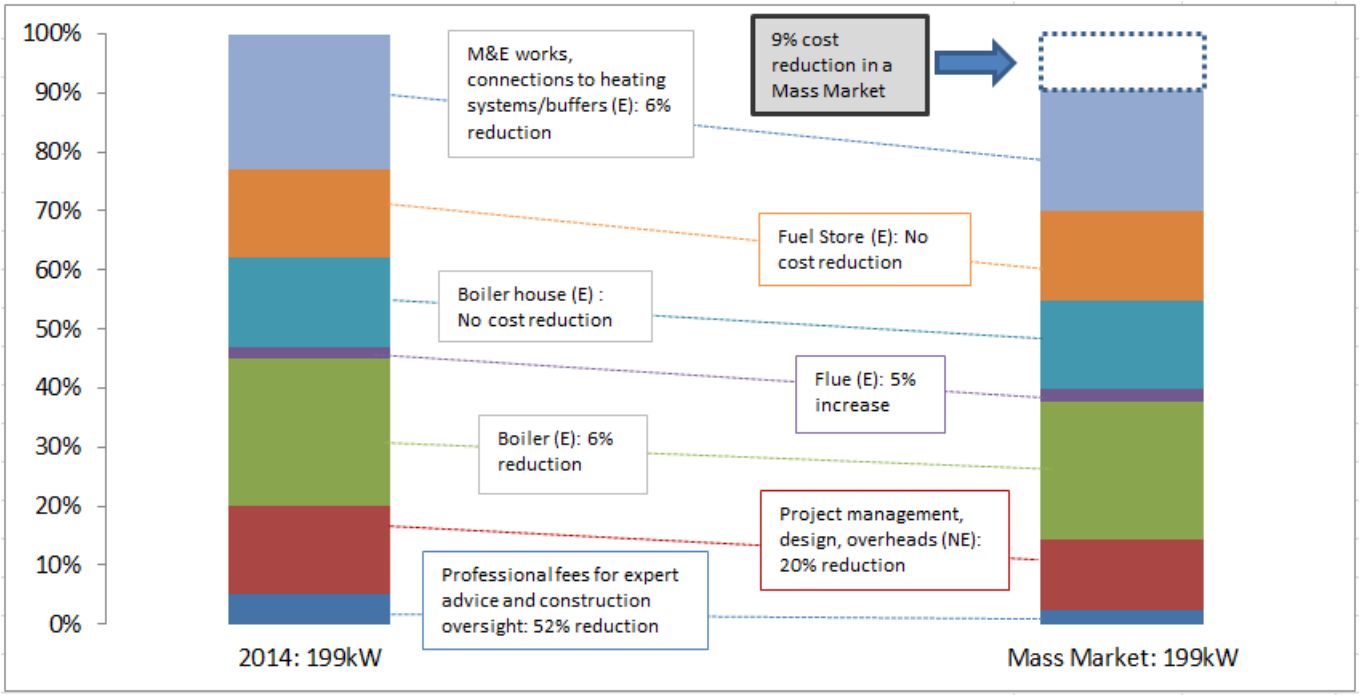

Figure 3: 199kW Cost Reduction Forecast

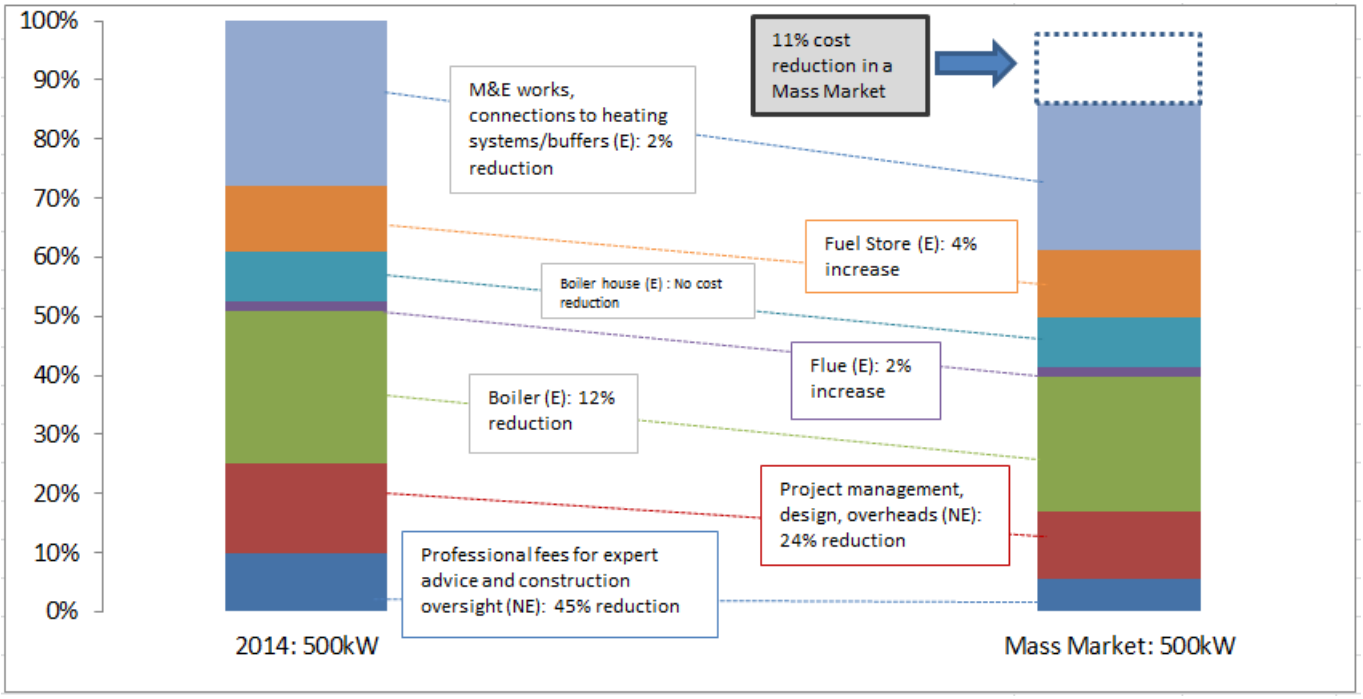

Figure 4: 500kW Cost Reduction Forecast

Our key central conclusion is that we could see a real terms reduction in installation costs of between 9% and 11% resulting from the development of mass market. Such reductions are from base line costs that assume a well-designed and properly specified 'average' UK scheme in 2014(developed for analysis of cost change only and *not intended* to be used for cost planning/budget development). We captured current data which spread at least +/- 40%. This is probably associated with regional variations and specification/construction factors. Nevertheless, we could expect to see similar falls in the 'low' and 'high' costs and ideally, a contraction in the range as the sector develops.

However we would acknowledge that these judgments are subject to significant uncertainty, and it is worth noting that under a less optimistic scenario on cost reductions, increases in chip based solutions, and greater focus on whole-life costs rather than installations costs, could mean that we only see around a 5% fall in costs rather than 9% to 11% In addition new regulations (e.g. tighter emissions regulations) could drive costs up and we cannot foresee these.

Under a more optimistic scenario, where there is widespread lower cost expert advice associated with installation, lower labour costs as a result of increased professionalism of installers, squeezed overheads and possibly a UK manufacturing base for biomass equipment begins to establish widely, we could see reductions in installation costs of between 15% and 20%.

Thus – given the scope and confines of this study we can forecast falls in scheme installation costs of between 5% at least and 20% at most, with a central forecast of 10%, looked at on a UK wide basis.

Costs of Wood Fuel Supply in a Mass Market and Overall Conclusions

This part of the report considers how the costs of wood fuel supply might fall in a mass market.

Mass Market Situation - Discussion

As the market for biomass fuels grows in the UK, production and supply chain efficiencies can and should be expected to reduce the overall end price paid by consumers. For example the report, *Biomass for Heat and Power: Opportunity and Economics (*European Climate Foundation, Sveaskog,

Södra & Vattenfall), produced in 2010, estimated that cost reductions of between 15% and 40% could be achieved with the growth of volumes and experience.

There will inevitably be legislation which impacts on costs throughout the supply chain. These could be changes which are non-specific to the sector, e.g. changes to permitted vehicle sizes on UK roads would deliver cost savings, whereas reductions in weekly working hours could have an impact on the cost of small businesses, or it could be sector specific.

We expect a reduction in the cost of wood fuel supply. This could be as a result of continued growth of the power station sector. In the event that this continues, this could likely underpin substantial penetration of imported pellets into local heat markets, which could also create downward price pressure associated greater availability and supply.

In a wider context, the ongoing shift from paper to electronic devices has had a major impact on wood fibre costs in North America in particular, which is one of the primary reasons why pellets are being sourced from Canada and the US for power stations here in the UK. That may continue.

Torrefied pellets are an emerging fuel technology (effectively 'baked', energy dense fuel), which is now at the point where torrefied fuel from a range of sources is very close to being commercially available in the UK. This could make agricultural residues, MSW, etc… available for use in a much wider range of applications, which in turn could drive down prices.

An important aspect of the wood fuel supply chain is that transport costs amount to 25% or more of the total delivered costs, thus, in a mass market with more fuel suppliers distributed nationally, it is probable that transport distances and associated costs will fall.

The wider availability of specialist chippers and increased market demand may also drive modest reductions in chipping costs in a mass market.

Finally, the delivery of O&M services associated with looking after biomass heating installations – which can be 5% to 10% of delivered heat costs – is very likely to fall in a mass market, as the number, quality and experience of suitable engineers will increase significantly.

We also consider that there will be a gradual move to more chip based solutions, as suppliers gain technical confidence to use chip over pellet and customers better appreciate the long term savings, which will also help reduce fuel supply costs (as chip is inherently cheaper than pellet).

For all these reasons, we can estimate that costs of wood fuel supply could drop overall by as much as 25%, but in the confines of this rapid study, we would highlight the uncertainties associated with this assumption[8].

Whole life costs of Biomass

Simple modelling based on 12 real world schemes currently under construction can illustrate how the whole life cost of biomass might fall in a mass market. Assumming that capital costs will fall by 10% and wood fuel supply by 25% in mass market conditions (where the counterfactual fossil fuel price remains constant). This combination of modest falls in installation costs from a situation of well-designed and properly specified schemes, combined with a substantial reduction in the overall costs of running biomass schemes has a quite significant impact on the overall costs of biomass heating.

This would imply that the payback period for whole-life cost of biomass heat could fall by more than a quarter in a mass market, and that overall costs (including the lifetime fuel costs) would

[8] Given the findings of the larger and more comprehensive European Climate Foundation study mentioned above (15% to 40% falls), this could be regarded as reasonable. Although the independence of the ECF study could be challenged.

fall by a third in mass-market conditions looking at the UK market as a whole, when these modest installation cost reductions are combined with the running cost savings described.

It should be noted our simple model ignores regional cost variations, the impact of inflation, exchange rate shifts and in particular the changes that rises in fossil fuel costs or falls in RHI income would make.