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Enhancing Biowaste Management in the UK: The Role of Commercial and Community Composting

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EXECUTIVE SUMMARY

The management of household biowaste in the UK has undergone significant changes during the last decade. Legislation and policy have promoted the rapid development of a diverse composting sector. The sector can be divided into three categories: home composting; community composting; and commercial composting. This paper explores the growth in, and nature of, the commercial and community composting sectors and argues that both sectors have different but important contributions to make towards enhancing sustainable biowaste management in the UK¹.

The commercial composting sector is characterised by increasingly larger-scale, centralised and mechanised sites producing certified quality composts. Growth in the sector to-date has relied predominantly on composting household garden waste in open-air sites using mechanically turned windrow processes, and around 75% of compost is now produced at sites certified or working towards Quality Protocol standards (Slater et al, 2005; Smith et al, 2008; AFOR, 2009). Over the last decade the quantity of material composted by the commercial sector has grown significantly, at a rate of 24% per annum, increasing from 833thousand (k) tonnes in 1999 to 3.6 million tonnes (Mt) in 2006/07. Commercial composting now makes a significant contribution to biowaste management and to achieving European and national targets. Of the 8.3Mt of household waste collected for recycling and composting by local authorities in England in 2007/08, composting accounted for over one-third (Defra, 2008a). Thus the contribution towards sustainable biowaste management from commercial composting can be summarised as composting on a large scale and the production of quality products.

The community composting sector operates very-small scale decentralised sites with the majority of groups involved in a number of activities often related to local sustainability such as conservation, community gardens, local food production, city farms, re-use and recycling. In addition, some groups provide training and work placement opportunities for vulnerable adults and most groups are supported by volunteer activity. Community composting groups often have wider social and environmental objectives that composting helps to achieve. Most established groups operate in areas unsuitable for conventional biowaste collections, such as areas of highly dispersed or high density populations. Although the community sector has also undergone rapid development over the last decade, increasing from 1.5k tonnes of material composted in 1999 to 21.5k tonnes in 2006, capacity remains $\leq 1\%$ of that provided by the commercial sector. Thus the community composting sector contributes to sustainable biowaste management by operating in difficult collection environments, and to local sustainability through wider environmental initiatives and by providing opportunities for social cohesion and building stronger communities.

¹ Home composting has not been included in this analysis as the UK has not agreed a standard for estimating quantities of material composted at home and as yet home composting does not qualify towards the recycling and composting targets.

The future development of the commercial and community sectors is likely to differ to that observed to date, with an increased focus on collecting and composting household food residues and better integration with commercial biowaste composting. This requires major developments in composting infrastructure including in-vessel and anaerobic digestion plants and has major implications for the collection of food waste. If the strengths of the commercial and community sectors can be harnessed complementarily they could contribute to local sustainability by providing sustainable biowaste management systems as well as wider environmental and social objectives. Whether or not these benefits will be realised will depend on the future development of the sectors and the extent to which development is supported by national and local policies.

INTRODUCTION

This paper considers the different roles of the commercial and community composting sectors in contributing to sustainable biowaste management in the UK. Legislation and policy have driven the rapid development of a diverse composting sector. The next section sets out this policy context. This is followed with an analysis of the growth in, and characteristics of, the commercial composting sector and then the community composting sector. It is contended that both sectors have different strengths in contributing to sustainable biowaste management. For commercial composting this is based around large-scale composting and quality products, for the community sector this is based around services in difficult collection environments, local sustainability, promoting social cohesion and building stronger communities. The extent to which the benefits from the commercial and composting sectors will be realised in the future will depend on whether the sectors can develop synergistically and the extent to which this is encouraged by national and local policies.

POLICY CONTEXT

The EU Directive on the Landfill of Waste (99/31 EC) (Article 5) set targets for the progressive reduction of biowaste allowed to landfill. To meet these targets it is estimated that the UK will need to divert 17 million tonnes of biowaste from landfill in the year 2020 (Slater et al, 2005). The implementation mechanism for the EU Landfill Directive in the UK is the Landfill Allowance Trading Scheme (LATS) which restricts the amount of paper, food and garden waste that authorities can landfill. Surplus allowances can be traded between authorities and all authorities face punitive fines for every tonne landfilled above the total amount of allowances they hold. Each of the devolved nations in the UK also has a Waste Strategy that sets recycling and composting targets, for example England is committed to recycling and composting at least 50% of household waste by 2020 (Defra, 2007). Latest figures show that recycling and composting of household waste increased from 10% in 1999 to 34% in 2007/08, which suggests a good progression towards the 50% recycling and composting target by 2020 but still with a considerable way to go (Defra, 2008a). In addition, the Household Waste Recycling Act (2003) requires local authorities to provide collection facilities for at least two types of recyclable material by 2010 for all households, including high density housing, such as high-rise properties, and dispersed communities.

The UK Government sees an increasing role for the Third Sector, alongside the Private and Public Sectors, in developing and delivering public services. The Waste Strategy for England (Defra, 2007) commits to making greater use of Third Sector² expertise and to the sector winning a greater share of local authority contracts. The community waste sector, which includes community composting, is part of the Third Sector and is considered to make an important contribution to waste objectives (Williams et al, 2006). In addition, the Government's Third Sector Strategies (CLG, 2007; Defra 2008b) set out a vision for working with the Third Sector to mobilise individuals and

² In the UK the Third Sector refers to Charities, Co-operatives, Community and Voluntary groups, Social Enterprises and Community Interest Companies.

communities to adopt greener lifestyles to link environmental, social and economic outcomes, to develop community led solutions and promote wellbeing.

COMMERCIAL COMPOSTING IN THE UK

The commercial composting sector in the UK has developed significantly over the last decade and now plays an important role in sustainable biowaste management. However, while throughput has increased strongly it could be argued that the potential for future growth based on trends observed to-date is limited.

The first national survey of the sector reported 833k tonnes of material composted in 1999 (Slater et al, 2001); in 2006/07 this had increased to 3.6 million tonnes (Mt) (Smith et al, 2008). This growth is illustrated in Figure 1.

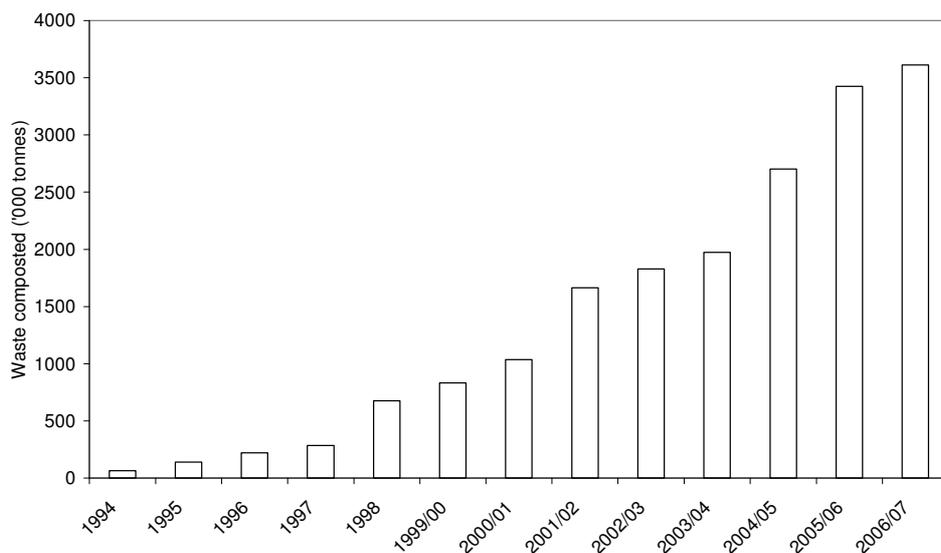


Figure 1 Growth in UK composting based on quantity of input source segregated waste material (from Smith et al, 2008)

Much of this growth has come from composting household biowaste and in 2006/07 household biowaste accounted for 87% of the 3.6 Mt composted. Commercial composting of household biowaste now makes a significant contribution to meeting UK waste targets and in managing biowaste in more environmentally sustainable ways compared to previous reliance on landfill. In 2007/08 34% (8.7 Mt) of household waste was collected for recycling or composting by local authorities, with composting accounting for over one-third of this (3.2 Mt) (Defra, 2008a).

The growth in the commercial composting sector is reported from a regular national survey of compost producers co-ordinated by the UK's Association for Organics Recycling (AFOR) (e.g. see Slater et al, 2001; Davies et al, 2003; Slater et al, 2005; Smith et al, 2008). Findings from the survey show an average growth rate for waste composted of around 24% per annum since 1999/00. Evidence for the robustness of this growth rate can be demonstrated by analysing Defra statistics of local authority returns for organic waste collected for composting from householders, which gives an average growth rate of 26% per annum.

The commercial sector is characterised by the majority of sites operating open-air mechanically turned windrows predominantly composting garden waste from households. The proportion of sites using this composting process has remained constant as the sector has developed, accounting for 81% of all sites in 2001/02 and 2006/07. The growth in material composted by the sector has been accompanied with a growth in the number of medium and larger-scale sites. Table 1 shows the number of sites composting in excess of 10,000 tonnes per annum has increased from 55 (25% of

all sites) in 2001/02 to 120 (54% of all sites) in 2006/07. However, the linear growth in the quantity of material composted (Figure 1) has not been accompanied with linear growth in the total number of operational composting sites. Table 1 shows the number of sites has remained broadly constant (increasing from 218 in 2001/02 to 222 in 2006/07) which suggests that growth in the industry over the last few years has been largely supported by expansion of existing sites rather than new entrants.

Table 1 Number of sites processing source segregated waste in the UK by waste input size band (adapted from Smith et al, 2008 and Slater et al 2005)

Source segregated waste input to site (tonnes)	2001/02		2006/07	
	Number of sites	% of total sites	Number of sites	% of total sites
≤ 5,000	132	61	51	23
> 5,000 to ≤10,000	31	14	36	16
>10,000 to ≤50,000	55	25	114	51
> 50,000 to 100,000			6	3
Unspecified			15	7
Total	218	100	222	100

Virtually all household biowaste composted at commercial sites is garden waste either collected from the kerbside or from bring-site facilities. Smith et al (2008) show that around 90% of household biowaste composted is from garden waste only sources, 10% from combined garden and kitchen waste collections and <1% from kitchen waste only collections. This raises the issue of how much garden waste is currently captured and how much is available to enable further growth. As an example, Table 2 contains estimates for garden waste arisings for England suggesting that the quantity of garden waste captured for composting has increased from 16% of the estimated total available in 2001/02 to 63% in 2007/08. At the time of writing figures for 2008/09 were not published. Assuming growth continues at a similar pace, projected capture rates can be estimated at around 80% in 2008/09, rising to near 100% in 2009/10. As it is unrealistic to assume a 100% capture rate, it is likely that the sector is already at or near the limit of garden waste available. The clear message here is that sources other than household garden waste will be needed to support future expansion of the composting industry and increased focus on collecting and composting household food residues is required.

Table 2 Household and garden waste arisings and garden waste collected for composting in England (from Defra 2008)³

	England						
	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08
Total household waste (Mt)	25.5	25.8	25.4	25.7	25.4	25.8	25.3
Total garden waste (Mt)*	5.1	5.2	5.1	5.1	5.1	5.1	5.0
Household biowaste (household garden) waste collected for composting (Mt)**	0.8	0.9	1.2	1.4	1.9	2.4	3.2
Capture rate for garden waste (% of garden waste collected for composting)	16%	18%	23%	26%	38%	47%	63%

* based on garden waste comprising 20% by weight of household waste (Strategy Unit, 2002)

³ The total household waste figures do not include waste composted at home. The UK has no standard for estimating home composting quantities and as yet home composting is not included in recycling/composting targets. Distribution of home composting bins by local authorities is estimated at nearly 2 million since 2004 (WRAP 2009). Therefore there may be less garden waste available for collection than estimated in Table 2 if quantities composted at home have also increased significantly.

**for the purposes of this estimate household biowaste collected for composting is assumed to be garden waste. Defra figures do not differentiate between garden and kitchen waste but AFOR figures show that kitchen waste is a fraction of total biowaste collected (Smith et al, 2008)

Unlike the community composting sector which comprises groups involved in a diverse range of activities where composting is often not their primary activity, the commercial composting sector is dominated by businesses whose main activity is composting or waste management. Collectively, dedicated compost producers and waste management companies account for 84% of the total material composted in 2006/07 (50% for dedicated composters, 34% for waste companies). Around 1 in 5 site operators defined their principal business activity as agriculture, suggesting diversification for farmers, and on the whole they operate small-scale sites accounting for 10% of material composted (Smith et al, 2008).

The last few years has seen continued professionalization of the commercial composting sector with a significant increase in the quantity of composts with a quality certification. The Quality Protocol was introduced in 2007 incorporating the PAS100 quality standard and around 75% of source segregated material is now composted at sites certified or working towards the Quality Protocol standard (or PAS 100 'only') (AFOR, 2009). The sector is growing in terms of economic importance with an estimated annual turnover in the region of £100m and 1,200 full time equivalent staff (Smith et al, 2008).

Composting provides a mechanism for closing the biowaste loop by producing composts that can be put to beneficial use to improve soil structure and quality. Soil conditioner accounts for around three-quarters of all compost products and the fastest growing market is agriculture, most commonly soil conditioners used for arable / cereal crops (Smith et al, 2008).

COMMUNITY COMPOSTING IN THE UK

When considering the role of composting for managing biowaste in the UK attention is usually focused on commercial composting and the contribution from the community composting sector tends to be overlooked, not least because the activity and impact of this sector has not been well understood. This section draws on primary research findings that address this issue and profiles the activities, role and impacts of the community composting sector (Slater, 2007; Slater et al, 2008).

There are over 100 groups active in community composting in the UK. These groups carry out at least one of the following composting related activities and many are involved in more than one:

- collect/receive and process material;
- run education campaigns;
- promote home composting;
- facilitate others to develop/promote community composting.

Overall 80% of organisations are involved in collecting and composting material and 20% are involved in forms of community composting activity other than collecting and composting, such as education and promotion of composting in their community. In addition, many organisations are also involved in other waste and/or non-waste activities.

Many community groups may carry out composting alongside other recycling activities and/or alongside non-waste activities such as running community gardens, city farms, local food production, day and residential services for adults with special needs, training and work integration schemes. Around one-third of groups are involved in community composting only, around one-third are involved in composting and non-waste activities, and the remainder are involved in composting, recycling and other activities. For the majority (60%), of groups composting is not their principal

activity, rather it complements other social and environmental activities and objectives. Most community composting groups prioritise social *and* environmental aims.

It is estimated that there were approximately 170 operational community composting sites in 2006 collectively processing around 21.5k tonnes per annum. The majority of sites operate at a very-small scale with over half processing less than 50tpa. Larger-scale sites (≥ 500 tpa) are more likely to be run by organisations dedicated to composting whereas small-scale sites are more likely to be run by organisations involved in a range of activities. As with the commercial composting sector, the development of the community composting sector has relied predominantly on composting garden waste. Around 80% of sites compost garden waste exclusively, mainly from households but also from community gardens, allotments and parks. It is important to note that the sector also contributes to biowaste diverted from landfill not captured by these figures, such as through educational and promotional activity, e.g. master composter schemes, and through biowaste collected by the community sector and composted at a commercially run site.

Although community composting data has not been collated and published on a regular basis, estimates of the growth in the sector is possible using a study of composting activity in the late 1990s which included the community sector (Slater et al, 2001). Since 1999 it is estimated that the number of groups running community sites has increased 10 fold, and the quantity of biowaste composted at community sites has increased by approximately 45% per annum since 1999, from 1.5kt in 1999 to 21.5kt in 2006. Although this growth is significant, the total amount composted by the community sector remains less than 1% of that composted by the commercial sector. Hence, if sustainable biowaste management is considered in terms of processing large quantities, the community sector as a whole offers a fraction of the capacity provided by the commercial sector. Therefore, in terms of contributing to the tonnage driven targets of LATS and national recycling/composting targets the role of the community composting sector is limited. However, the following section shows how the community sector is establishing an important role in areas unsuitable for conventional collections, and how the sector can deliver benefits that contribute to social sustainability.

Collection environments

Most local authorities now provide biowaste collections for composting and effort has focused largely on conventional kerbside collections in large conurbations, and in some instances this has been in competition with, or at the expense of, community led activities. There are good examples where established community composting sites provide an important and significant local service, often in areas where demographics and access means conventional kerbside provision is unsuitable or inadequate, such as rural areas with dispersed populations, or high density inner-city/urban areas.

Rural based schemes account for 57% of the community composting sector and urban based groups account for 43%. The South-west of England has the greatest concentration of rural schemes and London has the largest proportion of urban schemes. Not surprisingly a greater proportion of rural schemes are more longstanding than urban ones (25% of rural schemes have been running for more than 10 years compared to 13% of urban schemes).

Typically rural schemes run larger composting sites than urban schemes and these sites tend to be unstaffed whereas urban sites tend to be staffed. Most rural and urban schemes rely on bring systems where householders bring their garden waste to the site for composting. Virtually all rural based schemes compost garden waste only. Typically urban schemes also compost predominately garden waste and a significant proportion also compost their own kitchen waste, mainly from on-site catering operations. Around one-quarter of urban groups compost household waste only. A small-number of these are inner-city London based schemes pioneering door-to-door collection of kitchen waste from high and low rise dwellings and estate based composting. There are currently

seven Animal By-Product Regulation approved sites for composting food waste operated by the community sector in England, five of which are based in London (Animal Health Agency, 2008). Pilots have shown such schemes to be technically viable but costly and some groups are trialling commercial food waste collections to assist with financial viability.

Without community composting services in areas where conventional kerbside collection is unsuitable it is highly likely that biowaste would be landfilled. In addition, some schemes appear to be pioneering novel collection methods and nearby composting systems for household food waste, an increasingly important waste stream in terms of LATS and national targets.

Individual and Community Benefits

In addition to providing biowaste services in areas where conventional provision is unsuitable, community composting and related activities can also deliver individual and community benefits that contribute to social sustainability. This section draws on findings from a series of five participatory workshops with community groups and their stakeholders that identified important benefits from different stakeholders' perspectives. These individual and community benefits are summarised in Table 3 below:

Table 3 Summary of individual and community benefits from community composting

	Benefit	What it means
Individual	Improving health and well-being	People are physically and mentally healthier and feel better about themselves
	Feelings of safety and belonging	People feel safer have a sense of belonging
	Engaging in meaningful activity	People take part in meaningful activity through involvement with the project and may move towards other meaningful activity (e.g. employment, or volunteering, independent living)
	Engaging in pro-social / pro-environmental behaviour	People practice positive environmental and pro-social behaviour
Community	Social benefits for the community	Community cohesion, communities are more active and engaged
	Environmental benefits for the community	The quality of the environment is improved (air quality, tidy streets, green space, reduced transport, CO ₂ and CH ₄ emissions)
	Economic benefits for the community	People are better off financially. There are more opportunities to spend and keep money within the local economy.

The community composting sector offers significant opportunities for volunteering. In 2006 over 1,000 volunteers were involved with the sector. In addition trainee opportunities or placements were provided for over 200 workers and the sector employed 178 paid staff. The individual benefits outlined in Table 3 were most prominent for individuals directly involved with the schemes, predominately volunteers, placements and staff, but also, to a lesser extent, households that used the schemes.

Health and wellbeing benefits, such as personal development, confidence and self-esteem, together with benefits from meaningful activity and learning new skills were particularly emphasised for projects working with vulnerable individuals and/or volunteers. Learning new skills generic to work environments were important for vulnerable individuals and new skills related specifically to composting and wider areas of sustainability were important to volunteers. There was also considered to be some wellbeing for householders participating in schemes, especially for isolated individuals, albeit to a lesser degree than for those working directly with the projects.

An increased sense of belonging was considered an important benefit for workers and householders with an assertion that this can lead to people feeling safer within their communities. For one group operating in a deprived inner-city a 'feeling of safety' for residents was identified as a direct outcome from the regular presence of collection operatives. Engaging in meaningful work activity was important, particularly for clients and placements, but also for volunteers looking to get

involved with their communities and develop social interaction and for directors, trustees and staff in terms of their belief, enthusiasm and commitment to a role that serves and benefits the community. According to workshop participants involvement in a community composting scheme can have a catalyst effect for other pro-social and environmental behaviours.

These benefits for the individual will interlink and influence each other. So for example, individuals engaged in meaningful activity and developing new skills are also likely to develop a sense of belonging which will positively impact on their feelings of wellbeing. It is also important to recognise that these benefits are likely to have longer-term impact over and above involvement with, and possibly duration of, the project.

The balance between the importance of individual change and community change appeared layered and varied between groups. For groups that target vulnerable groups and/or rely on volunteer support, benefits for individuals directly involved in the project was a core focus, with benefits for participating householders and the wider community being an important second layer. In contrast, for groups where projects have developed out of local community action and evolved to provide several services for the local community individual and community benefits were of more equal importance.

The social change identified by stakeholders at the community level came through a number of routes, including; sense of belonging, opportunities for socialising and providing a 'social hub', developing trust and understanding - both of services and of different people in the community. In areas with established schemes working in partnership with local authorities the authorities highlighted the important ability of schemes to engage more effectively than the authorities with their local community. Empowerment was also considered important - either for individuals working in the project or in the sense of helping householders to 'do their bit'. Extending this to the wider community some schemes include residents in their management and decision making processes. Social change benefits are fostered through a combination of the ripple effect of individual change and the wider role the groups play in their communities.

DISCUSSION AND CONCLUSION

On one level the commercial and community composting sectors represent opposing ends of the composting spectrum. Large-scale, centralised and mechanised sites producing certified quality composts are increasingly characteristic of the commercial sector with operators solely involved in composting or waste management. In contrast the community sector operates very-small scale decentralised sites often with little certified quality control and the majority of groups have wider social and environmental objectives that composting helps them to achieve. However, despite their different characteristics it is proposed that each sector can play an important role in contributing to sustainability. In essence, the commercial composting sector's role is based around large-scale composting and producing quality products; the community composting sector's role is based around niche services, social benefits and promoting more sustainable living through a variety of activities at the local level.

Commercial composting makes a significant contribution to managing biowaste more sustainably compared with the UK's previous reliance on landfill, accounting for over one-third of the 8.7Mt of household waste collected for recycling and composting in 2007/08 (Defra, 2008b). The sector produces quality products with over 75% of composts produced at sites certified (or working towards) the Quality Protocol standard. These products are beneficially used on land, particularly agriculture, to enhance soil structure and quality.

Whilst there are examples of some larger community groups providing an important local biowaste service, and decentralised sites may be more environmentally favourable in terms of fewer waste miles compared to commercial sites, the small-scale of community composting means the sector as a whole makes a limited contribution in terms of diverting large quantities of biowaste from landfill. However, the community sector has other strengths that are important in promoting sustainability. Firstly, some groups have a proven ability to operate in niche collection areas that are unsuitable for conventional kerbside collections, particularly in highly dispersed or high density populations. Secondly, many groups have evolved out of grassroots community action and are embedded in such a way that they can engage more effectively with their local community compared to local authorities and commercial organisations. This is an important contribution as engagement and education is an essential element in helping to encourage individuals and communities to act more sustainably. Thirdly, the sector provides opportunities for a large number of volunteers and training and inclusion opportunities for vulnerable individuals. Benefits such as improving health and wellbeing, safety and belonging, and providing meaningful work activities and training are common for individuals directly involved with community composting schemes. In addition, many community groups are involved in other services and schemes, such as conservation, community gardens, local food production, community cafes, city farms, recycling and re-use and transition town initiatives. As well as providing environmental benefits, these strengths of the community composting sector contribute to promoting social cohesion and building stronger communities, which are important elements for social sustainability.

Therefore, if the strengths of the commercial and community sectors can be harnessed complementarily they could contribute to local sustainability by providing sustainable biowaste management systems as well as wider environmental and social benefits. Local authority support is critical for successful community schemes (Slater et al, 2008) however, in some areas this has been constrained by large-scale integrated contracts between local authorities and commercial waste service providers that marginalise opportunities for small enterprises including the community composting sector (Aiken and Slater, 2007).

The extent to which the benefits from commercial and community composting will be realised in the future will depend on how the sectors develop and whether they are encouraged by national and local policies. This paper has shown how the sectors have grown rapidly over the last decade such that composting of household garden waste appears to be nearing the limit of material available. The clear message here is that future growth will need increased focus on collecting and composting household food residues together with better integration with commercial biowaste composting. This requires large structural changes to composting infrastructure including the development of in-vessel or anaerobic digestion (AD) sites and has major implications in terms of collection methods. Although established in Europe and in the waste water sector in the UK, AD has not been widely used in the UK for solid biowaste treatment. To help develop this Defra have recently launched a £10 million Anaerobic Digestion Demonstration Programme (Defra, 2009). The scale and capital investment required for AD suggests that whilst this may be a viable option for development by the commercial sector, it is unlikely to be widely adopted by the community sector. Hence, if the community composting sector is to continue to develop in the longer-term it will need to adapt, diversify and capitalise on new opportunities.

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