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SID 5 Research Project Final Report

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Project identification

1. Defra Project code: WR0510
2. Project title: Attitudes to use of organic resources on land
3. Contractor organisation(s): The Open University
4. Total Defra project costs (agreed fixed price): £ 203,666
5. Project: start date ..... 01 June 2007
   end date 28/02/09

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In all cases, reasons for withholding information must be fully in line with exemptions under the Environmental Information Regulations or the Freedom of Information Act 2000.

(b) If you have answered NO, please explain why the Final report should not be released into public domain

Executive Summary

7. The executive summary must not exceed 2 sides in total of A4 and should be understandable to the intelligent non-scientist. It should cover the main objectives, methods and findings of the research, together with any other significant events and options for new work.

The purpose of this project was to study attitudes and perceptions towards the spreading of organic waste-derived resources on land. Against a background of a paucity of research it brought together for the first time attitudes of stakeholders from all parts of the organic resources use cycle in an interactive, iterative research process. Processing organic wastes and turning them into reliable resources can benefit the environment and thus help meet sustainability goals. Capacity to spread treated waste to land will be determined by technology, markets and regulation as well as passive acceptance and active support of these practices. Understanding the attitudes of the public and the whole chain of stakeholders, from waste producers, to waste processors, to land managers, to food buyers and consumers can inform and establish confidence in policy making and market development.

The research objectives

- To review the current drivers and barriers and assess the robustness of the evidence
- Explore and map key issues with selected stakeholders
- Assess the extent to which attitudes are held across the UK
- Explore the views held within different stakeholder groups and key opinion formers
- Use an iterative process of stakeholder consultation and dissemination to suggest mechanisms that will facilitate change and increase confidence in returning organic waste-derived resources to land

The research built on a scoping review of the literature and then took a mixed methods approach incorporating large scale UK wide quantitative surveys and qualitative participatory workshops. The process involved the following successive and iterative stages:

1. Scoping the research through a literature review and consulting with different stakeholders to identify and explore key issues.
2. A quantitative survey of 1,106 residents (citizens/consumers and non-farming rural dwellers) and 500 farmers in the UK, carried out by Ipsos MORI, assessing their attitudes, understanding and perceptions to applying organic waste-derived resources to land.
3. Using a series of in-depth interactive workshops with individual and mixed stakeholder groups to explore the views held within and between specific stakeholders.

Scoping the issues - The literature review showed agricultural manures and slurries as the largest group of waste resources currently used on land. The organic wastes with most potential for expanding their recycling and application to land, however, are from household and commercial and industrial sources. The review also exposed the lack of research in this area. The EU landfill directive and implementation of this through subsequent regulation in the UK were identified as key drivers for diverting biodegradable waste from landfill. The main themes identified were: risks; confidence & trust; perception and acceptability; markets and competition; costs and benefits; environmental and health; alternative routes for

processing/using organic wastes; land use issues.

Quantitative survey findings - The public showed a very positive attitude overall citing more benefits than concerns and agreeing that more should be applied in future. Their main concerns were contamination, disease or health risks. The main benefits identified were that organics were good for the soil, avoid fertilisers and also good for the environment. Those who know more about organic waste recycling are also more likely to consider recycled organic resources suitable for land used to grow crops or on gardens. The survey of farmers found that those using organic waste-derived resources felt the advantages were: improvements in soil quality, waste prevention, local environment and costs. Farmers also expressed high levels of concern about potential contamination. Those farmers already using compost, however, were much more likely to consider compost suitable for all agricultural land uses, with 83% saying compost from plant waste is acceptable for growing food. Responding to compost from food waste, only 57% said compost from food waste is acceptable for all agricultural land uses. Furthermore, 80% of farmers said they lacked knowledge and understanding about the use of composts and sewage sludge and more than 90% for anaerobic digestates.

Qualitative participatory workshop findings - The issues which emerged that need to be addressed to reassure stakeholders included: regulation, standards and enforcement – creating confidence and trust; economics/costs and markets; environment, climate change, and agricultural issues; knowledge, awareness, perceptions and education; local issues – planning, local government, waste policy/waste stream issues. The most important drivers of change were identified as: effective regulation and quality standards; climate change and environmental concerns; costs, particularly increasing cost of chemical fertilisers; and soil benefits. And the strongest barriers were considered to be: lack of knowledge and the need for more research; need for better regulation and enforcement; health risks; and negative perceptions.

Discussion of project outcomes - Although some participants focussed on risks, others saw opportunities and huge potential. There were no 'in principle' objections to the application of organic waste resources on land. Climate change, environmental and soil benefits, and awareness of these issues, are important reasons in favour of organic resource use. Regulation and standards were thought to be too weak and lacking enforcement, with a need for consistency to build confidence and trust. Potential contamination and health issues were considered a risk, particularly in an expanding market and with increasing numbers of players involved. This highlights a need for strict enforcement of standards. The attitudes of the public are positive now, but stakeholders from the chain expressed concerns about negative media influence and the direction the public view might take in future.

Conclusions, key messages for policy and future work - Knowledge of attitudes and perceptions is crucial in informing policy formulation, implementation and communication alongside technical knowledge in the context of economic and political agendas. Although attitudes will not necessarily drive the policy agenda in isolation, without acknowledgement and attention policy initiatives may stall. The main research findings from the project fall into fifteen areas, as noted below:

Attitudes to policy arrangements

- Stakeholders emphasised the importance of regulation, 'standards' and enforcement in establishing confidence and trust in organic waste derived resources. There was a perception that regulation and 'standards' were too weak and lacked appropriate enforcement.
- Stakeholders emphasised the need for consistency and more joined up policy and practice across the UK and between local authorities.
- Nationally accepted quality 'standards' were considered to be necessary for all organic waste-derived resources. This included a need to reduce confusion over multiple food quality assurance schemes.
- Stakeholders expressed a concern that increasing throughput of organic waste-derived resources could affect standards of practice, enforcement of regulation and safety.

Attitudes driving behaviours

- Stakeholders felt that public opinion can have a strong impact on whether more organic waste-derived resources will be used on land.
- Currently, there is public support for an increase in the application of recycled organic materials to land. However stakeholders were concerned about the resilience of public attitudes.
- Local authorities are seen as key players in collecting and delivering source-segregated organic household waste for processing. Their perceived focus on diversion targets and lack of interest in the application of treated resources on land is a potential barrier. There was concern about adequacy of source segregation.

Attitudes and understanding

- Consumers who look out for quality marks or assurance scheme labels or who buy organic foods are more likely to know more about the recycling of organic wastes.
- There is some disagreement and often a lack of understanding amongst stakeholders of the climate change impacts of using organic resources on land.
- The project found concern amongst stakeholders about a lack of understanding and lack of knowledge. It was felt that more learning was needed about organic resources to land by all stakeholders.
- Use of terminology was clearly important for the stakeholders and warrants careful consideration, e.g.,

organic resources vs. organic waste.

- Those who are applying organic waste-derived resources to land were found to be discerning about what they apply. Farmers though displayed a lack of knowledge and awareness, particularly of composts, sewage sludge and digestates.
- The project findings show that it is the use of recycled food waste on agricultural land – part of the food chain cycle – that gives rise to most concerns. Some stakeholders were particularly concerned about the presence of meat products in food/kitchen waste and suggested that these needed to be kept separate where possible from other non-meat containing organic waste.

Attitudes affecting motivation

- Stakeholders felt it is vital to gain the support of food retailers for the use of organics waste derived resources on land used to grow food as presently they were perceived by stakeholders as a barrier to increased application.
- Prices and costs were found to be an important motivation for many stakeholders in the organic resources supply chain.

Our findings highlight a number of messages for policy makers and others about managing stakeholder attitudes around different stages of policymaking for the future system that will hopefully facilitate change and increase confidence in successful application of organic waste-resources to land. One clear implication is that policy-makers should note the critical importance of confidence and trust as established through regulation and standards and in particular through similar quality standards for all organic waste-derived resources to create a level playing field. In order to maintain trust effective implementation through joined-up policies and strict enforcement must be considered as an integral part of this.

Communication is not adequate at present throughout the resource cycle and there is a potential need for improvements in training for environmental officers, regulators and local councils. The majority of public and farmers acknowledged that applying organic waste-derived resources has a positive effect on soils and the environment, a positive perception that policy communication can build on.

There was agreement generally that there needs to be more in-depth research on public perceptions and attitudes, for example into recycling of food waste. Research is also needed into communication and particularly how to communicate effectively with different stakeholder groups.

Project Report to Defra

8. As a guide this report should be no longer than 20 sides of A4. This report is to provide Defra with details of the outputs of the research project for internal purposes; to meet the terms of the contract; and to allow Defra to publish details of the outputs to meet Environmental Information Regulation or Freedom of Information obligations. This short report to Defra does not preclude contractors from also seeking to publish a full, formal scientific report/paper in an appropriate scientific or other journal/publication. Indeed, Defra actively encourages such publications as part of the contract terms. The report to Defra should include:
   - the scientific objectives as set out in the contract;
   - the extent to which the objectives set out in the contract have been met;
   - details of methods used and the results obtained, including statistical analysis (if appropriate);
   - a discussion of the results and their reliability;
   - the main implications of the findings;
   - possible future work; and
   - any action resulting from the research (e.g. IP, Knowledge Transfer).

Contents

1 Introduction

The purpose of this project was to research and enhance understanding of attitudes and perceptions in the UK towards the spreading of organic waste-derived resources on land. A key intention of the research was to compile robust information gathered from a range of sources using selected quantitative and qualitative research methods. The project's research structure used an iterative participatory process which built on initial scoping research and progressed through stages of systematic data gathering and systemic analysis using attitude surveys and stakeholder workshops.

This research brought together for the first time stakeholders from all parts of the organic resources use cycle in an interactive, iterative research process. These stakeholders included organic waste producers and processors, users of recycled organic waste resources and those affected by the use of these products on land. The outcomes provide better understanding of what the stakeholders' main concerns are and how they perceive the key issues, drivers and barriers. They provide an evidence base for informing policy and practice, and from this, key messages for policy have been identified.

Currently a range of materials derived from processed and unprocessed organic wastes are being spread on land but in relatively small amounts apart from agricultural manures and slurries. Recycling organic wastes in these ways can benefit the environment and help meet sustainability goals. Added to the land these materials can also improve soil quality. However, there could be risks involved and these need to be identified and managed.

As a result of EU and UK legislative drivers it is likely that there will be pressure for the application of organic waste-derived resources to land to increase in the near future, as growing amounts of biodegradable material have to be diverted from landfill. Issues of sustainability, like climate change, and land availability have led to pressure to reduce the amount of biodegradable waste going to landfill to substantially lower the carbon and methane emissions associated with this current unsustainable waste disposal route. In addition agricultural and environmental research has emphasised issues of nutrient balance and soil quality. Balanced against this are issues concerning possible potential contamination and pollution from recycled organic waste materials applied to land. Understanding and mediating possible threats to the environment and human health is therefore an important aspect in progressing the issue of applying organic waste-derived resources to land.

Essential to developing policy in this area will be an understanding of the perceptions and attitudes of the whole chain of stakeholders, from waste producers, to waste processors, to land managers, to buyers and consumers. These perceptions are crucial to whether social, market and policy activities can increase and how they might work in practice. The paucity of research into attitudes to spreading waste-derived materials to land obstructs attempts to effectively communicate its benefits and to plan waste processing facilities, as investment needs reassurance of end-use markets. Against a background of media articles questioning the safety of waste spread on land, understanding the social context around the organic resources use cycle has become an urgent requirement for policy formulation.

This project had eight scientific research objectives:

1. Agree project plan and work schedule with Defra; establish an Advisory Panel and key contacts
2. Review the current drivers and barriers, assess the robustness of the evidence from relevant literature and map the key issues
3. Explore key issues with selected key stakeholders
4. Assess in a quantitative way the extent to which attitudes are held across England, Wales, Scotland and Northern Ireland
5. Explore in a qualitative, participatory way the views held within different stakeholder groups and key opinion formers
6. Use an iterative process of stakeholder consultation and dissemination to recommend mechanisms that will facilitate change and increase confidence in returning organic waste-derived resources to land
7. Produce a final report and a summary of recommendations
8. Disseminate project results to an extensive & focussed audience

These objectives were set out at the beginning of the research and were developed by the researchers with guidance from the Advisory Panel and in discussion with the Defra Research Managing Agent as the research progressed. The objectives were defined in greater detail, clarifying the boundaries of the research, its focus and what issues to explore with stakeholders. In particular, in the context of providing evidence for policy which is concerned with both regulating these practices and future options for waste management, it was felt that the focus of the project should concern those organic waste materials that offered that most potential for increased recycling to land. However this partial focus did not change the context of understanding stakeholder attitudes to current use of all organic resources used on land. As policy formulation depends on a wide range of issues, providing policy recommendations was considered outside the remit of this research and the focus of objective 6 shifted during the project from 'recommending mechanisms that will facilitate change' to providing evidence on attitudes for policy makers and suggesting messages for policy. The research aimed to provide a rich picture of stakeholder attitudes and perceptions that could be used to identify what policy measures are more likely to increase confidence in returning organic waste-derived resources to land.

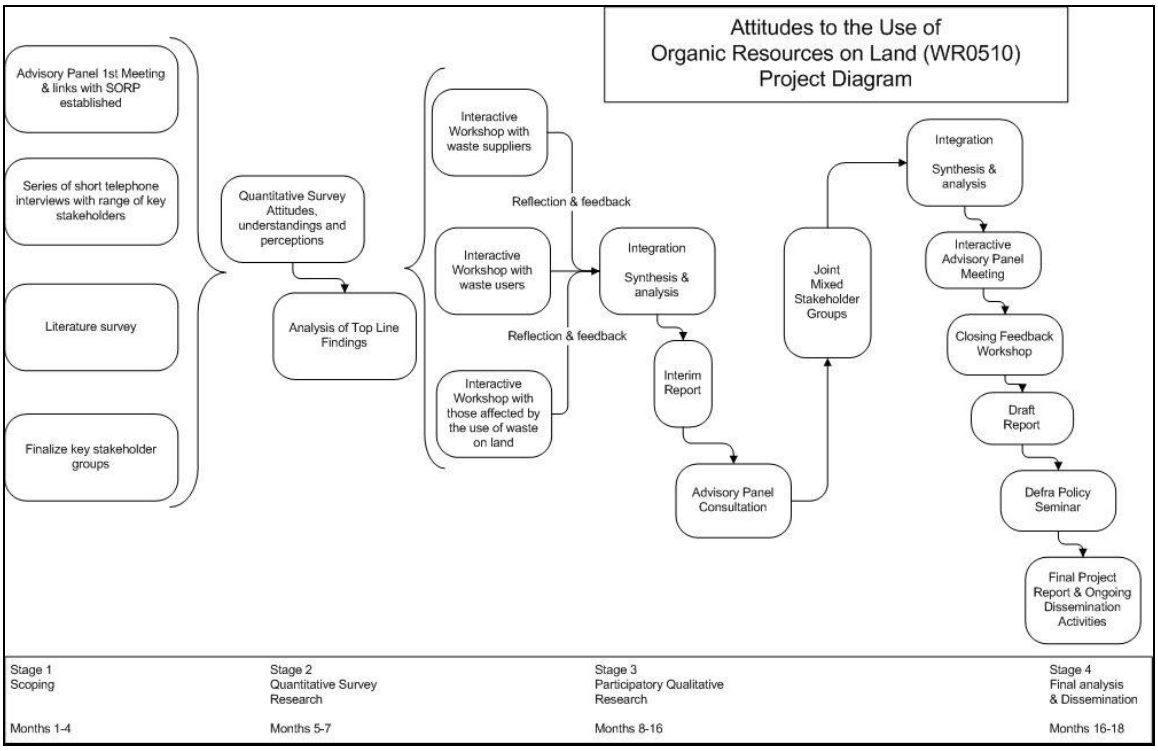

Figure 1: Project diagram

The research took a mixed methods approach that variously used quantitative and qualitative methods to uncover different aspects of the attitudes held by large samples of certain stakeholder groups or small numbers of people from a range of stakeholder groups. Carried out in four main stages, the iterative nature of the process involved feeding forward from one event to another which enabled further testing of the issues of concern to stakeholders and of the attitudes they expressed. Many of the same issues came up at different stages in the research with different groups of stakeholders. This repetition is significant as it confirms the importance of some issues and is an indication of the robustness of the overall findings. Figure 1 shows the research project plan. In the first scoping stage the significant issues of concern were identified from interviews with a selected group of key stakeholders and the available literature. The outputs from this scoping exercise were then used to inform Stage 2, large scale quantitative surveys with public and farmer groups. The third stage of participatory qualitative work involved workshops with individual stakeholder groups followed by a workshop that brought different groups together. A fourth and final stage involved a synthesis of all the information and perspectives gathered during the course of the research, interactive feedback exercises and dissemination activities.

The design of the participatory research process used in this project leads to a synthetic rather than analytic approach to defining conclusions based on the evidence which is itself grounded in the participation of stakeholders in many parts of the research process. The aim is to faithfully represent the combined views of the participants rather than force it into pre determined or researcher led frameworks. This is about researching with the participants rather than researching on the participants as they are the generators of the base evidence through the different stages of the research. The active involvement of stakeholders and the Advisory Panel, which aimed to capture current attitudes and help move thinking forward, was an important aspect of the research approach. Stakeholders involved in the research were encouraged to be active participants rather than passive consultees, to reflect and learn through the process, and to develop some ownership of the issues. This approach drew on ideas from grounded theory (Charmaz, 2006; Glaser and Strauss, 1967), soft systems (Checkland, 1999) and participatory research (Renn, 1995.), and was built on previous experience of policy workshops conducted by the OU team that facilitated the link between research and policymakers on contentious issues, such as GM crops (Oreszczyn and Carr, 2008; Lane, Oreszczyn and Carr, 2007).

This project report summarises the approach taken and outcomes of each stage as well as the overall project conclusions and key messages for policy. This summary is supported by a 'Full Project Report' and four annexes (each as separate reports) which provide details of the methods deployed and results and conclusions at each stage of the project and a fuller discussion of the findings and conclusions. Annex 1 is the Literature Review; the 'Key Issues Scoping' report forms Annex 2; the full survey results with charts, tables and the questionnaires are in Annex 3; and Annex 4 covers the methodology and mapping outputs from the interactive workshops.

2 Stage 1: Scoping the issues

The scoping research was designed to review the current drivers and barriers, assess the robustness of the evidence and map the key issues. This was carried out by a review of existing literature – both academic and 'grey' literature – and with a preliminary exploration of key issues through consultation with the project's Advisory Panel and telephone interviews with selected key stakeholders.

Literature review

The literature review (see Annex 1) first addressed the context of what, and how much organic waste-derived materials are currently used on land; as well as the quantities potentially available; the treatment processes involved; and the types of land application. It is clear from this data that untreated agricultural manure and slurries are by far the largest group of waste materials currently used on land, followed by bio-processed compost and sewage sludge. However, the organic wastes with the most potential for expanding their recycling for land application are those from municipal or household and

commercial and industrial sources. Currently there is in the region of 20 million tonnes of municipal, commercial and industrial organic wastes disposed of annually in the UK that could potentially (if segregated and processed) produce resources suitable for land application.

The literature review also explores the literature on the drivers and constraints applying to the use of organic resources on land. The EU landfill directive and subsequent regulation in the UK have been identified as the key drivers for diverting biodegradable waste from landfill. The choice of options will very much depend on costs associated with available technologies, regulatory standards and evolving organic recyclates markets, which in turn will depend – possibly for some options more than for others – on attitudes towards applying these materials to land.

The outcome of the literature review strongly reinforced an initial impression that there existed little research directly linking to attitudes on the use of organic waste resources to land. Given the general deficit of academic literature on organic waste to land, grey literature (e.g. policy documents, briefings and reports; publications from NGOs; scoping papers; and literature reviews and reports from consultant agencies and public bodies) was valuable in shedding light on the key issues and the concerns of different stakeholders. However, little of the literature available was of direct relevance. As a consequence, it was necessary to draw on a broader spectrum of related research areas which offered insights into understanding what might be the key issues of concern.

Understanding how attitudes to risk, to other environmental issues, to sustainable consumption and behaviours, as well as to how the media influences attitudes, can help frame an exploration of attitudes and perceptions in this field. The review has considered relevant literature in each of these areas to inform the project and to underpin a methodological framework for the analysis of stakeholder attitudes emerging from the quantitative survey and qualitative research.

Key issues mapping

The preliminary exploration of issues concerning the application of organic waste resources to land with stakeholders at this early stage in the project was felt to be vital to help identify and explore key issues. This was achieved through semi-structured telephone interviews with key stakeholders and by consultation with the Advisory Panel – themselves key stakeholders. Stakeholders were chosen to include all aspects of the organic resource use cycle as well as those who influence it such as Government departments, regulators, NGOs, research organisations and professional bodies.

To help with the analysis of all the information gathered from the key stakeholders on the Advisory Panel and the subsequent telephone interviews with key stakeholders, we used visual mapping techniques (Lane, 2002) to summarise the issues, attitudes and barriers. Diagrams produced through visual mapping are able to represent both the major components of a situation and the main connections between them in ways that can stimulate further analysis and comment and help identify aspects that are missing or under-represented. Different types of diagram are used to represent different things with respect to a situation or system of interest depending on who is involved in constructing them.

The results of the telephone interviews and the activities carried out at the Advisory Panel meeting were developed into a series of key issues diagrams in the form of mind maps by the team. The range and diversity of issues addressed is described in the 'Full Project Report' and also shown in the individual issue maps that are included in Annex 2. A summary map of the issues of this scoping phase of research is included in the 'Full Project Report'. Issue maps became an important device to record and summarise information and further maps were developed by the team as the project progressed and were used to inform the different stages of the research.

The scoping identified a number of themes around which key issues can be grouped. These were: risks; confidence & trust; perception & acceptability; markets & competition; costs and benefits; environmental & health; alternative routes for processing/using organic wastes; land use issues. This initial analysis of issues framing stakeholder attitudes to the use of organic resources on land was then used to develop the questions for the quantitative attitude surveys.

3 Stage 2: Quantitative attitude survey research

The quantitative research phase of this project assessed the extent to which attitudes to the use of organic waste-derived resources on land are held across England, Wales, Scotland and Northern Ireland. This was achieved through two large scale attitude surveys of farmers and the general public. These surveys were conducted through telephone interviews by Ipsos MORI. Further details of the findings from these surveys may be found in the 'Full Project Report' which discusses and interprets the results. Full tables and graphical representation of the survey data, together with the questionnaires, are in Annex 3.

It is important to emphasise that the survey deals with attitudes and perceptions rather than hard facts; in particular, where behaviour is self reported these perceptions may not accurately reflect respondents' behaviour in reality; however, they do reflect the respondents' attitudes to carrying out those behaviours.

Public attitude survey

Methodology

This telephone survey explored attitudes to the use of organic waste-derived resources on land amongst a sample of residents across the UK. In total 1,106 residents across the UK were interviewed. Data was weighted according to age, gender, social class, and area to reflect the population profile of Great Britain and Northern Ireland. The relevant areas of questioning for the survey were developed from the scoping study which linked the questions to emerging key themes.

Rather than solicit responses to a wide and somewhat confusing range of waste-derived resources within a limited number of questions, it was decided to deliberately restrict the focus of questions to the use of compost or anaerobically digested material from plant waste or waste food. These were described as 'recycled organic material' as this terminology was better understood in piloting the questionnaire with members of the public.

The public were asked a number of socio-demographic questions about their food purchasing and recycling behaviours and their knowledge of food and garden waste recycling. The key questions concerning the use of organic materials on land were about their concerns, what they felt were the benefits or disadvantages, what land uses they felt it was appropriate for and their views on whether its use should increase in future.

Survey results

From the survey results it is clear that the public showed a very positive attitude overall towards the application of organic waste-derived resources on land. In particular a large majority agreed that more recycled organic materials should be applied to land in future (83% agreed; 47% strongly and 36% tending to agree). (As explained in the 'Full Project Report' and Annex 3, all the results presented in this report have been assessed for significance and differences are only quoted when the result is significant and not assessed to be a random variation in the data).

The respondents were asked whether using recycled organic waste materials on land had a positive or negative effect on a number of specific issues. 82% said it has a positive effect on the environment; 76% of soil quality; 64% on wildlife; 63% on quality of food produced and 62% on human health. The least positive response was on the health of farm animals, but was still positive overall (58%).

In unprompted questions about what they thought were the benefits of, or what their concerns were about using more compost or other recycled organic materials on farmland, there were notably fewer concerns expressed than benefits. In response to what they thought were the key benefits almost 70% of respondents cited one or more benefit, with only 3% saying none and 28% saying they didn't know.

The main benefits cited were:

- Good for the soil
- Better than or avoid using standard fertilisers
- Good for the environment
- Avoids waste and saves landfill space

As the question wasn't prompted, the answers show a fair degree of understanding of the issues involved in using recycled organic materials such as compost amongst the public.

However this overall positive attitude to the use of recycled organic materials on land needs also to be considered in the context of the public's knowledge and understanding of organic waste recycling. Only a small minority claimed to know either a great deal (3%) or a fair amount (15%) about what happens to food and garden waste once they have been collected for recycling, with 81% saying they know nothing (39%) or just a little (42%). This self-reported lack of knowledge of the recycling process indicates a lack of connection between the activity of collecting waste materials for recycling and the use of compost on land. Where recycling materials such as paper, glass and plastics are concerned it has been shown that the public felt more motivated to recycle if they knew what happened to the materials they collected – i.e. what products they were turned into (Thomas, 2004; 2006).

When asked what would be their key concerns, if any, of using more compost or other recycled organic materials on farmland, far fewer respondents named concerns than those who cited benefits. Of the 38% who expressed concerns these were spread widely across 10 categories but focused on contamination (8%), and disease or health risks (for people 6%; and on farms 10% – spread between general health risks and specific diseases such as foot and mouth or bluetongue).

More interesting than these overall results though are the responses of some of the subsets or segments of respondents in relation to their claimed knowledge or behaviour. Firstly those who participate in organic recycling or composting behaviours are significantly more likely to know a fair amount or a great deal about what happens to the materials once collected. The same is true for people who buy organic food.

Secondly, the findings from the survey suggest that those who compost at home and those who buy organic foods are significantly more likely to strongly agree, and less likely to disagree that more recycled organic material should be applied to land in future. Also, those who recycle organics or compost at home are more likely to consider recycled organic material suitable for land used to grow crops or on gardens. Similarly, those who know a great deal or fair amount about what happens to organic waste materials once collected are more likely to consider recycled organic material suitable for land used to grow crops or on gardens and more likely to think more should be applied to land in future.

The survey results also show a very strong correlation amongst respondents who both stated that applying recycled organic materials to land would have a positive effect on the environment, soil quality, food produced, human health, farm animal health and wildlife and who agreed that more waste should be applied to land in future

However, in relation to the issue of concerns expressed about using more compost or other recycled organic products on farmland, the picture is less straightforward. A slightly higher percentage of those who knew a fair amount or a great deal about what happens to organic waste once collected had some concerns about using more recycled organic materials on land (44%) than those who knew nothing or not much (36%). This was a significant correlation although not a large difference in percentage points. Nevertheless, those who agree that more organic waste-derived resources should be applied to land in future were slightly more likely to have no concerns about increasing its use.

In relation to concerns expressed in the survey overall, very little difference emerges between those who had concerns and those who did not in relation to whether they recycled organics; composted at home; bought organic foods; or knew a lot about what happens to organic waste once collected for recycling.

Neither was there any correlation with whether the respondents live in town/city centre or suburb or a rural area; which region (Scotland, Wales, Northern Ireland, England) they live in; whether they were aware of any land near-by where waste-derived material was applied; or with gender, age, or presence of children in household. The only areas of apparent differences related to the newspapers respondents read and their social class, which themselves are strongly correlated. Around half of those respondents who read broadsheets and/or are in social class AB had concerns about applying more compost or other recycled organic products on farmland compared to only around a quarter of those who read tabloids and/or are in social class DE. However, broadsheet newspaper readers were also found to be more likely to strongly agree that more organic waste materials should be applied to land in future and slightly more likely to feel that these materials have a positive effect on the environment.

Farmers' attitude survey

Methodology

The farmers' survey interviewed 500 farmers across five regions of the UK: West of England; East of England; Scotland; Wales and Northern Ireland (100 interviews in each). The sample consisted of a mix of farming types (including large and small, arable and livestock).

The survey of farmers' attitudes was able to explore in greater detail attitudes to specific waste-derived organic materials and land applications due to the nature of the audience and their likely greater knowledge of the subject matter. Farmers were asked questions to enable results to be considered in relation to the sample profile of the farming types and sizes of the farming businesses surveyed; whether they carried out composting or AD activities; and what organic waste-derived materials they currently apply to their land. They were asked about their knowledge of products, preferred sources of information, potential future use, reasons for using these materials, what they consider suitable for different land use applications and their concerns about these materials.

The sample was stratified by farm size (in hectares) and farm type (including cattle and sheep farming, dairy, arable, general cropping, poultry and pig and mixed farms) to ensure *representation* of different farming types in the UK. This was to make sure that different groups are represented in the survey and the analysis was able to say something meaningful about these sub groups. Although the farmers interviewed represent a robust sample of UK farm types and sizes, the data in these results has not been weighted according to the actual incidence of each group in the target audience and so is *not fully representative* of the farming profile of the UK.

Survey results

Of the farmers surveyed only 28% didn't use any organic waste resources on their farm. However, of the 72% who did, 61% used only agricultural manures and slurries and only 11% used non-agricultural organic waste-derived resources (i.e. compost, anaerobic digestate etc) on their land. 2% of the farmers exclusively rely on non-agricultural waste-derived organics and 9% apply them in combination with agricultural waste. The most common non-agricultural organic material applied to land is compost from plant waste (used by 7.5% of farmers in the survey); then biosolids (5%); commercial or industrial waste (3%); AD digestate (2%); compost from food waste (1.5%) (These percentages do not add up to the total figure of 11% as some farmers use more than one type of material).

Northern Ireland has the highest proportion of farmers using organic resources (80%) and Wales the lowest (67%). However, Wales has the highest percentage of farmers using non-agricultural organic waste materials at 18% and Northern Ireland the lowest at 5%. Other regions lie between the figures. Arable/general cropping farmers are those most likely to use non-agricultural waste materials with 16% of those surveyed doing so; followed by cattle/sheep farmers at 10%; 9% of dairy and 6% of those in mixed farming.

Regarding future use, there was little expectation of changing practices with 79% saying they expected it to be about the same and 12% saying they were likely to increase their use. The main factors given by

farmers in the survey for what prevents them from using more organic waste products on their land were regulatory barriers and legal restrictions (20%) lack of supply (19%) and cost (12%). Only 2% of farmers in the survey cited soil or land conditions as a factor preventing them using more organic waste resources in future.

There was no clear differentiation between how important the farmers surveyed considered different measures for increasing use of organic resources on land. More than half felt that all the following measures to be very important: more information on specific products; lower costs; quality standards for materials; industry support; more information; better quality products; and government reassurance and assurance scheme for agricultural products.

Farmers in the survey were asked whether using more compost on farming land would have a positive or negative effect on a range of factors and overall the positives outweighing the negatives in their responses. In particular, effects on soil quality, the local environment and costs were seen as more strongly positive. More farmers considered the effects on public confidence in farming and confidence of buyers to be positive than negative, although here less than half thought the effects would be positive. The least positive effects were considered to be on health and disease on farms.

Most farmers recognised organic materials as good for the soil and preventing waste, with 77% of those who apply organic waste-derived resources on land saying that it is good for soil and 10% adding that it is better than standard fertilizers. Just under half (44%) said it prevents waste. This shows a particularly high appreciation of organic waste materials for one of the farmers' most valuable assets – the soil. In the main, the survey found little difference between the attitudes of those using non-agricultural waste-derived organics and those who only use agricultural wastes. However, those who use non-agricultural organics are slightly more likely to say it saves money, is better than standard fertilizers, and is good for the environment.

Farmers clearly discriminate between different land applications (e.g. whether the land is used for feeding or for growing crops, the sort of crops cultivated etc.). They differentiate between the organic resources that they consider suitable for a particular application. This question asked farmers what they think is suitable not what they currently apply to land. Out of all the organic waste types asked about, manures come out as the most suitable for all types of land. Slurries and compost from plant waste are seen as the next most suitable across land types, with slurries seen as more suitable for grazing land, and plant waste more suitable for forestry and horticulture. Compost from plant waste was considered suitable by the majority of farmers for all agricultural land uses and compost from food waste, although seen as less acceptable, was still said to be suitable for most types of land application by slightly less than half of farmers in the survey. Anaerobic digestates are clearly an area where there is a lack of knowledge amongst many farmers with 46% saying they didn't know what types of land use it may be acceptable to use it on.

Overall there was a lower acceptance of any type of organic waste materials applied to land from those farmers not currently using any organic wastes resources on their land. This subgroup of farmers was more likely to say these materials weren't suitable for any type of land use or that they didn't know. Those farmers who use non-agricultural organic materials considered sewage sludge more suited to use on forestry and fallow land than for food crops. This subgroup was also much more likely to consider compost fit for all agricultural land uses compared to those not using organic wastes or only using manures and slurries.

Those farmers surveyed who currently use compost are much more likely to say compost from plant waste is acceptable for growing food; 96% agreed that it was acceptable compared to 64% of farmers who don't currently use organic waste materials. However, of farmers using compost, only 67% said that compost from food waste is acceptable for land used to grow food. This though is much higher than acceptance amongst farmers not using organic waste materials where only 38% consider it acceptable.

When asked about their concerns about potential contamination in organic waste-derived materials in relation to physical contaminants (such as plastics), pathogens and other pollutants (such as heavy metals) the majority of those surveyed expressed some concerns. Although those farmers in the survey who currently use non-agricultural organic materials on their land were less likely to be concerned about each of the three contaminant issues than those not using these materials, they still expressed high level of concern.

Farmers' self-reported knowledge of organic waste materials is only high regarding manures and slurries with 82% saying they knew a lot or fair amount. However, it was relatively low for compost from plant waste and sewage sludge (only 18% and 17% respectively said they knew a lot or fair amount) and very low for compost from food waste, compost-like material and anaerobic digestates (all 6%). Considering that the majority of farmers (61%) have only first-hand experience with organic *farm waste* (i.e. manures and slurries), when responding to questions about the use of non-agricultural organic waste-derived materials the question could be raised as to how much farmers really know about these materials. Given this self-reported lack of knowledge, there was surprisingly little interest in finding out more, with 56% saying that they weren't interested in finding out more information about any organic waste materials.

4 Stage 3: Qualitative participatory workshop research

A series of in-depth workshops[1] involving interactive mapping techniques to help structure and record activities were used to explore in a participatory way, the views held by stakeholders and key opinion formers. This was done by exploring what the stakeholders participating in workshops and the surveys themselves considered to be the key issues, the drivers and barriers and potential causes and consequences of applying more organic resources to land. The resultant mapping of attitudes can only be as clear as generated by the stakeholders in their discussions. The attitudes amongst stakeholders are rich and diverse and any mapping of attitudes has to reflect that if it is not to mislead. Full details of the workshop outcomes may be found in the 'Full Project Report' and further detail of the techniques and mapping tools used, as well as the maps generated by the stakeholders in these sessions, may be found in the Annex 4.

Methodology

This qualitative research stage provided depth of views through discussions on issues relevant to those being researched. The workshops considered the range of different attitudes and perceptions held about the use of organic waste-derived resources on land. They were also designed to build on the scoping study and the findings of the quantitative surveys, in particular, contentious aspects around health, safety and environmental impacts. In the case of the farmers, the workshops augment more specifically the findings of the quantitative survey. For other stakeholder groups the workshops provided a first opportunity to gather more in-depth data to combine with the initial insights from the telephone interviews with selected stakeholders conducted at the beginning of the project. The design of the workshops was not around detailed questioning of stakeholders as this would have required considerably more time to fulfil. The project was not designed to deliver policy detail but to provide evidence on attitudes.

The individual stakeholders attending the workshops were from organisations or companies who belonged to a wide range of different stakeholder sectors or groups associated with the organic resource use cycle. Further details of the sectors and types of organisation that were represented by stakeholders participating in the workshops are given in the 'Full Project Report' and Annex 4. However, the individuals or the organisations that they belonged to were not a representative sample of their

[1] All the workshops were professionally facilitated and conducted under the Chatham House Rule (see http://www.chathamhouse.org.uk/about/chathamhouserule/).
Participants were also informed that all material provided and generated in the workshops would not be attributed to any individual stakeholder.

stakeholder sectors. It was not possible to work with sufficient numbers of stakeholders from specific groups of interests to clearly identify typical views for different groups. It would be methodologically incorrect in workshops with a wide mix of stakeholders to disaggregate the views expressed in discussions so as to attribute views to individuals as representative of the groups that they are part of. However, individual stakeholder views are framed both by their personal experience and depth of knowledge and informed by the particular group or sector that they belong and their views offer some insight into similarities and differences in emphasis in views from different perspectives. In the main, several stakeholders from each sector have been involved in the workshops to gather more than just individual views. However, in this type of qualitative research a statistically representative sample is not the aim or outcome, rather it is to explore more deeply the attitudes held across the supply chain.

In approaching the stakeholders, the team experienced a high willingness to participate by the waste management industry, organic waste contractors, compost industry, water companies, regulators from the devolved regions, professional bodies, horticulture, forestry, and (in particular) farmers and farming associations. However, some sectors have been more difficult to engage. For example NGOs, who may not have sufficient staff and resources to be able to attend workshops if the issue is not directly associated with a current campaign, and also the major supermarket chains. Involving food retailers in this project's workshops proved difficult despite considerable and on-going efforts. However, the British Retail Consortium has been represented throughout on the Advisory Panel and at workshops and one representative of a major supermarket chain gave a telephone interview. In addition several food industry businesses and representatives from food assurance schemes attended the workshops. Further, although the workshops attracted participants from England, Scotland and Wales, they did not attract participants from Northern Ireland.

The stakeholder groups approached to participate in the workshops were selected by the research team using stakeholder analysis methodology (see 'Full Project Report' and Annex 4 for further details) Two phases of workshops were held; the first phase comprised three workshops based around three categories of stakeholder groups:

1. organic waste processors – including the waste industry, composters and AD companies, local and regional authorities, regulators and the water industry
2. those who do or could use organic waste-derived resources on land – including farmers and those involved in forestry and land remediation
3. those affected by the use of these resources on land – including food processing industries, food retail and food assurance schemes, as well as NGOs representing rural and environmental interests

These workshops began by using the method of collecting individual perceptions of the key issues (around organic material on land) and clustering them collectively in open discussion. The issues maps generated (see Annex 4 for the maps) show that stakeholders perceive similar issues as relevant for the application of organic materials on land and there is little overall divergence in what each group included in the issues they highlighted. However, the emphasis is slightly different depending on the stakeholders present at the workshops. Whereas the participants of the first workshop highlighted the difficulties of negative perceptions, market uncertainty and regulation, the participants of Workshops 2 & 3 at the second event put a stronger emphasis on health risks and food safety standards.

In a following activity participants were then asked to carry out a further mapping exercise known as Force Field Analysis (Lewin, 1951; Start and Hovland, 2004). This is a method used to highlight power structures helping or hindering change. To stimulate discussion in the Force Field Analysis, preliminary findings from the scoping phase and the quantitative survey were reported to the participants. This prompted comments and started a very open discussion with and amongst the stakeholders.

It is clear from the outcomes of the force field activity (see Annex 4) that the issues that stakeholders had identified in the issues mapping exercise were again brought up, as well as new ones added, but this time as forces either driving or restraining the increased application of organic waste-derived resources

on land. This, together with the ranking of importance – or strength of the forces – helped to further clarify and add depth to understanding the stakeholders' attitudes towards these issues.

The second phase workshop brought different stakeholders together in mixed groups in order to explore the diversity of views of stakeholders and highlight areas where there may be agreement and/or disagreement. The exercise in this mixed stakeholder workshop focused on identifying the causes and consequences of three scenarios looking at potential increases in the use of organic waste-derived resources on land. The scenarios were not significantly different from each other – they considered incremental changes in the type of waste materials included such that the first looked at an increase in the use of green waste compost and sewage sludge applied to land, the second included processed household food waste and the third added commercial food waste. The groups did not focus entirely on discussing the scenario they were given but instead were concerned more generally about an increased use of organic waste-derived materials on land such that differences between the scenarios are of less importance than the overall issues raised.

The scenario exercise proved an effective tool for encouraging different stakeholders to consider together the important issues, what might cause or drive increased use of organic waste resources to land and what the consequences of increased use might be. It built on the findings of the previous workshops adding greater depth to our analysis of their attitudes. Full details of the findings from this workshop are in Annex 4.

Workshop outcomes

Overall the project has found no 'in-principle' objections from stakeholders to the application of organic waste-derived resources on land. However, this is not to say that there were no concerns about either current or potential future increases in application. Some participants were very concerned about risks particularly in relation to the food chain and their attitudes focussed often on threats – such as around health and safety issues and lack of enforcement of regulations and standards. Other participants saw opportunities and huge potential to increase current application. They tended to see few threats or at least where they did they also saw ways to overcome them. This exposed a degree of uncertainty amongst stakeholders around the consequences of increased amounts of organic waste-derived resources going to land. This uncertainty often impacted strongly on stakeholders' attitudes. In addition, most stakeholders expressed opinions about wider public views and opinions and how they might develop in the future.

Stakeholders explored key issues, drivers & barriers and causes & consequences related to applying organic waste-derived resources to land. The key issues to emerge were collected under headings that covered: regulation and standards; creating confidence and trust; economics and markets; risks and benefits – environment, climate change, and agriculture; knowledge, perceptions and communication; local issues – planning, transport and land; waste policy and waste stream issues.

The most important drivers for increased application of organic waste-resources to land were viewed as effective regulation and higher quality standards. The standards referred to here were mostly formal 'standards' to regulate organic waste-derived resources used on land, but also sometimes implied less formal aspects of the quality of the processes, materials and products associated with this resource use cycle. Climate change and environmental concerns and awareness were also perceived as increasingly important drivers, as were the driving force of increasing costs, particularly of chemical fertilizers, and of soil benefits. They also identified what were short and longer term issues. Global warming was considered a long term driver but in the short-term, economics, particularly farm economics, energy costs and landfill allowance trading scheme (LATS) targets were thought important.

The strongest barriers identified were lack of knowledge amongst all stakeholder groups, and need for more research. The need for better regulation and enforcement, as well as health risks and negative perceptions were also cited as strong barriers to increased use of these resources. To overcome potential

barriers most stakeholders emphasised the need for trust and confidence, whether in regulation, standards, enforcement or research and information.

The full results are described in the 'Full Project Report' with further detail available in Annex 4. At each stage of the workshop process the outcomes which reflected the stakeholders' attitudes and perceptions of applying more organic waste-derived resources to land were grouped around the issues discussed. From these groupings a number of overlapping themes have emerged which will be used to discuss the results in this section. The analysis and synthesis fit together the jigsaw pieces of stakeholders' attitudes and builds a more complete picture (in systems terms), as well as building the depth of understanding. It was clear from the data that there were considerable similarities in the attitudes shown at different stages of the work despite different methods being used to explore these.

These key themes and the sub-headings within each are not in any way mutually exclusive as issues overlap and connect significantly; e.g. discussion of standards and their enforcement cannot be dissociated from issues of risks to health and safety. The key themes are:

- Regulation and standards
- Health and safety issues
- Economics and markets
- Environmental and agricultural impacts
- Knowledge, understanding and communication
- Local policy and practice

An influence map of the relationships between the final themes and the system of interest – the organic resource use cycle is shown in Figure 2. The six key themes represent the sets of activities that are either perceived to be most influential on the organic resource use cycle or are most influenced by it, or both. In every case influence can flow both ways, but the perceived balance of influence varies greatly between the themes, hence the dominant arrows only are shown.

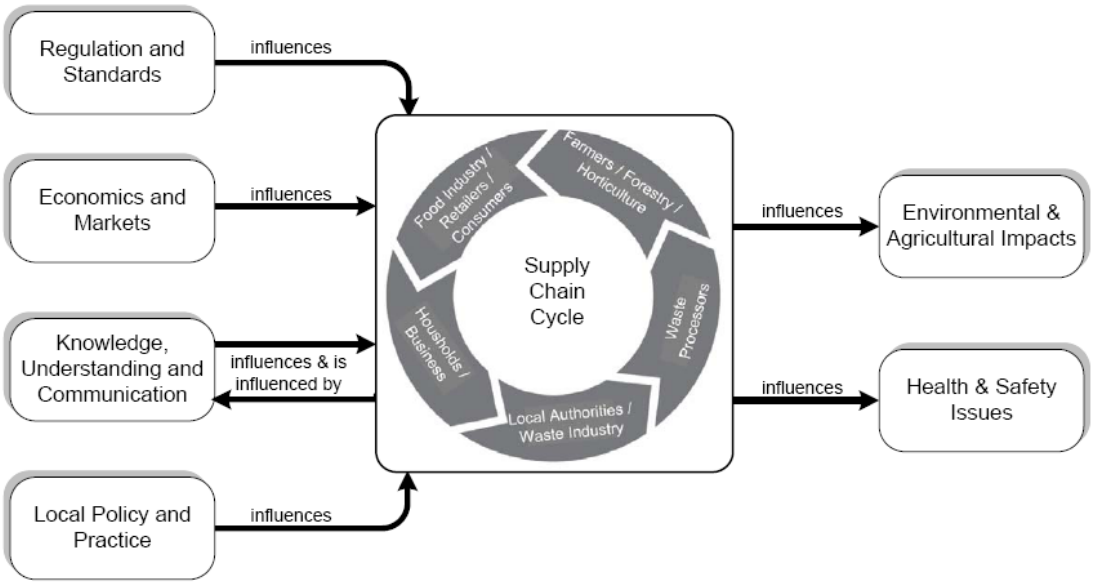

Figure 2: Influence map

I. Regulation and standards

Regulation was the most strongly rated driving force by most stakeholders and in particular linked to EU and UK recycling targets; UK soil strategy; landfill tax and LATS. Although there was some disagreement over how tight regulation and standards should be, what appropriate policy instruments might be and the adequacy of current regulations and enforcement. Some key aspects of regulation raised by stakeholders were:

- *Enforcement*: adequate enforcement of regulations was considered very important and concern was expressed that enforcement was neither currently adequate nor would be in the future if throughput of organic waste-derived resources going to land increases.
- *Consistency of approach* and the lack of joined-up policy and practice particularly between and within the different levels in the waste chain – Government, regulators and councils. This concern also applied to a perceived lack of acknowledged public or national standards for organic recyclates.
- *Confidence and trust*: confidence in standards was viewed as essential for establishing trust.

II. Health and safety issues

Health and safety were particularly associated with issues of risk and managing risk and many stakeholders expressed concerns about risks associated with health and the environment. Some key issues concerned with health and safety raised by stakeholders were:

- *Health Risks*: concern was expressed especially by those in the food sector about health risks emanating from a potentially unsafe supply chain particularly in an expanding market. There was also significant concern over the safety of meat products related to animal diseases or ground contamination. Some stakeholders were concerned that the inclusion of meat waste in processed food waste could potentially lead to contamination and health issues – both human and farm animal. Risk was something that needed managing, although not necessarily eliminating.
- *Contaminants* in organic waste-derived resources would destroy confidence in these materials unless they were well controlled.

III. Economics and markets

Economics featured strongly in many of the stakeholders' discussions. Some felt that it was the most likely thing to drive change. In this context they cited oil prices, fertiliser prices, synthetic fertiliser prices, charging for waste collections and waste disposal costs. Some key issues concerned with economics and markets raised by stakeholders were:

- *Costs*: farmers particularly considered cost an important driver, especially in relation to high fertiliser prices where it was a potential driver. Cost could also be a barrier in relation to the cost of regulatory compliance.
- *Market development*: the pull of market development was felt to be important and required resourcing for local authorities for infrastructure as well as stability of markets and acceptance from retailers.

IV. Environmental and agricultural impacts

Many of the stakeholders expressed the belief that more organic waste-derived resources going to land would be beneficial in the long term in relation to their environmental impact and effects on the soil. The main issues raised by stakeholders were:

- *Environment and climate change*: these were the next most strongly rated drivers after regulation and standards. Stakeholders mentioned in particular carbon storage issues, generating renewable energy through AD, reducing waste going to landfill, reducing CO_2 and methane emissions and reduced flooding. Negative environmental consequences were also raised by some stakeholders who were uncertain about the mitigating effects on climate change and concerned about the potential for land or soil contamination. Environmental awareness was another aspect that stakeholders felt was important in driving the issue of organic waste resources to land. Increasing awareness by the public of environmental issues whether of climate change or waste issues were felt to influence policy at national and local levels.
- *Agricultural impacts and land issues*, particularly in relation to soil benefits, were mentioned on many occasions by all types of stakeholders but especially by farmers and waste processors.

V. Knowledge, understanding and communication

Issues concerned with how much is known and how it is communicated were prevalent in many stakeholder discussions and the key aspects raised were:

- *Public understanding and communications*: all stakeholders felt that public opinion can have a strong impact on whether more organic waste-derived resources will be used on land. Stakeholders saw public environmental concern as a key driver that was also supported by business' corporate social responsibility commitments. However, they also feared a negative amplification of the risks involved in applying organic waste-derived material to land by the mass media and its consequent impact on public attitudes.
- *Understanding and perceptions* along the supply chain were considered important as well as the need for improved knowledge by all actors. Many stakeholders commented on the importance of food retailers' attitudes, in particular those of the major supermarket chains, to buying produce grown on land using organic waste-derived resources. Concern was also expressed that negative perceptions of organic waste-derived resources, such as compost being seen as a *"waste and not a resource"*, could be a barrier to increasing their use.
- *Need for research and better knowledge*: ignorance and misinformation were thought to be crucial obstacles by many stakeholders and the need for better knowledge was acknowledged. Knowledge from more research on technologies and safety, as well as drawing on experience from overseas. Also the dissemination of knowledge was cited as important and in this respect some stakeholders perceived dissemination of information by the regulatory agencies and WRAP to be inadequate.

VI. Local policy and practice

This research highlighted several issues around planning, local authorities and different organic material streams which focussed on the local dimension of waste processing and resource application. Some key local policy and practice issues raised by stakeholders were:

- *Local authorities' policy and planning*: again consistency in policies and policy implementation from local authorities was considered lacking. Difficulties with gaining planning permission and public resistance to the location of processing sites were considered barriers to increased recycling of organic waste materials.
- *Waste processing and organic resource stream issues*: food waste and animal by-products were considered as more of a problem area than sewage sludge and green waste compost. However, some stakeholders raised questions about adequacy of controls in the use of sewage sludge on land, although others strongly disagreed with this view. Source segregation of waste was considered by many stakeholders to be an important mechanism to ensure better quality products and facilitate organic waste-resources to land. They emphasised the need for waste separation at source but were also concerned about the adequacy of this at present and the consistency of approach. Also competition from other waste processing technologies - such as incineration was raised as a potential barrier.

5 Conclusions and main findings

The project outcomes have been framed in relation to the whole organic waste-derived resource use system or organic resource use cycle. Stakeholders may be associated with one or more aspect of the cycle – for instance households both buy products and generate waste and waste companies both collect waste and process it. They may also be outside the resource use cycle but influence its working – such as policy makers, regulators and interest groups, including NGOs and professional bodies (see Figure 3). Stakeholders from these groups have contributed to the research and all have commented on their own attitudes and roles as well as on others' role in facilitating the use of organic waste-derived resources on land, creating combined outputs that have been iterated on and then synthesised by the research team. Not surprisingly, policymakers in particular were considered to have a strong influence on the whole system and stakeholders generally expressed concern that Government needs to take a strong lead in this issue, hence this section focuses on re-presenting and synthesising the findings for this particular group.

Figure 3: Stakeholders in the organic resource use supply chain

The main research findings arising from all stages of the project are summarised below. These present not only the findings on attitudes and perceptions to the current application of organic waste-derived resources on land but are often framed in the context of increasing use and whether and how this might be facilitated.

Attitudes to policy arrangements

1. A key finding was the importance of regulation, standards and enforcement in establishing and maintaining confidence and trust. The project also found a perception that regulation and standards were too weak and lacked appropriate enforcement, although that perception may be due to a lack of knowledge and understanding of what regulations and standards exist and of current practice.
2. Nationally accepted standards are needed both for organic waste-derived products and in relation to quality assurance schemes for food products to encourage confidence and trust. There was also felt to be a need to reduce confusion over multiple quality assurance schemes. Again there was acknowledgement amongst some stakeholders that they lacked knowledge of what standards exist.
3. The findings emphasise the need for consistency and more joined up policy and practice across the UK and between local authorities.
4. Stakeholders perceived the consequences of increased throughput of organic waste-derived resources as potentially problematic. The consequent increase in pressure on all parts of the supply chain they felt could lead to mounting pressure to take short cuts regarding regulation and safety.

Attitudes driving behaviours

5. The project findings suggest that public opinion can have a strong impact on whether more organic waste-derived resources will be used on land.
6. The quantitative public survey indicates that, currently, there may be public support for an increase in the application of organic waste-derived resources to land. However, stakeholders were concerned about the resilience of public attitudes, particularly in relation to current lack of knowledge of organic waste recycling amongst the public and potential mass media influence. There was also a strong belief that once bad practice is experienced either directly or indirectly it can have a very negative and persistent impact on people's perceptions.
7. Local authorities are seen as key players in collecting then delivering high quality household organic waste for processing and their perceived focus on diversion targets only and lack of interest in the application of the processed resource on land was considered a potential barrier. The findings indicate that there is concern about the adequacy of source segregation at present and of the consistency of approach to waste collection.

Attitudes and understanding

8. Consumers who look out for quality marks or assurance scheme labels or who buy foods that are organically grown are more likely to know more about the recycling of organic waste-derived resources.
9. The project found some disagreement amongst stakeholders and often a lack of understanding of the climate change impacts of using organic waste-derived resources on land. Questions arose as to whether the message was getting across regarding potential benefits such as reducing CO_2 emissions and the long-term environmental benefits to the soil.
10. There was an overall feeling that more learning by all stakeholders is needed. The project found concern about a lack of understanding and lack of knowledge perceived in many sectors. The need for more research and more information and education was raised often.
11. Use of terminology was clearly important for the stakeholders and warrants careful consideration, for example, organic resources vs. organic waste.
12. Those who may be expected to apply organic waste-derived resources to land are discerning about what they apply. However, farmers also displayed a lack of knowledge and awareness of some organic waste-derived resources particularly of composts, sewage sludge and digestates.
13. The findings show that it is the use of recycled food waste on agricultural land – part of the food chain cycle – that gives rise to most uncertainty and concern. Some stakeholders were particularly concerned about the presence of meat products in food/kitchen waste and suggested that these needed to be kept separate where possible from other non-meat containing organic waste.

Attitudes affecting motivation

14. Stakeholders from most sectors repeatedly commented that in regard to closing the loop of consumption it was very important to gain the support of food retailers for the use of organics waste derived resources on land used to grow food. Many stakeholders felt that they could present a key barrier to increased application if they did not close the loop of consumption by buying food grown on land using these resources.
15. Price and costs were found to be an important motivation for stakeholders in the organic resources supply chain. Shifts in prices and costs have thus a potentially strong and direct impact on the use of organic waste-derived resources, which may quickly supplant other attitudes held by stakeholders in the chain. Cost was seen as a very important driver for some stakeholders, particularly farmers.

6 Key messages for policy

Knowledge of attitudes and perceptions is crucial in informing policy formulation, implementation and communication alongside technical knowledge and in the context of economic and political agendas. Although attitudes will not necessarily drive the policy agenda in isolation, without acknowledgement and attention policy initiatives may stall.

The in depth findings from this research were not expected to help shape particular policy options for managing the use of organic waste derived resources, whether for application to land or not. Rather they highlight a number of messages for policy makers and others about managing stakeholder attitudes around different stages of policymaking for the future system that will hopefully facilitate change and increase confidence in successful application of organic waste-resources to land. These are grouped around three aspect of the policy cycle: construction of policy; implementation of policy and agreed practices; and explanation of policies and practices; although the overlaps and relationships between them are also noted.

Construction of policy

Acknowledging whole system effects

- There is a need to take a systemic approach to this issue, as all parts of the system need to adequately connect with the others. Policy needs to assess and evaluate the consequences of actions taken in one part of the supply chain cycle, or its environment, on other parts of the supply chain. Greater reflexivity would be helpful in increasing the effectiveness and efficiency of the chain.
- There is a need for more consistency of policy and practice throughout the UK to address the lack of connectivity in some parts of the organic waste-derived resources to land use cycle.

Acknowledging attitudes to regulatory matters

- Implications for policy emerge from stakeholders' attitudes to the importance of confidence and trust being established through regulation, standards and enforcement. These indicate the need to strengthen enforcement.
- Some farmers and organic waste processors already believe they are being over regulated.

Developing evidence based policy

- To ensure confidence and trust is established, there is a need to review the implementation of current regulation/standards/permits etc. to provide a careful assessment of *policy in practice*.
- Policy needs a firm evidence base and the findings suggest that more research is needed as described in more detail in the next section.

Implementation of policy and agreed practices

Addressing whole system effects

- Acceptability will be built upon trust and confidence throughout the supply chain cycle, it therefore needs to be tackled by all and is not just something one or two parts should be expected or required to do. It is also an activity that probably needs constant and consistent attention.
- Joined-up thinking is needed across the supply chain and between national government, regulators, local authorities, retailers and others. All stakeholders need to be kept aware of the attitudes and perceptions of all others in the supply chain cycle and not just their immediate contacts so as to facilitate this connectivity.
- There is a need to encourage more joined-up practice and consistency of approach in regard to source segregation, as well as promoting better practice in order to deliver high quality materials to the processors.
- It was suggested that there may be a need to either directly or indirectly subsidise or support the organic waste-derived resource market should these resources prove more expensive than inorganic fertilisers.

Ensuring consistency and transparency

- Consistent implementation and enforcement – and effective enforcement – is needed throughout the country; such consistency is essential to discourage bad practice.
- Quality standards need to be high (*"Gold standard"*), and need enforcement to establish trust, build confidence and enable organic waste material to be marketed as a product rather than potentially viewed as a hazardous waste.
- There is a perceived need to develop or enhance nationally accepted standards both for organic waste-derived products and in relation to quality assurance schemes for food products to encourage confidence and trust.

Engaging key actors

- Overall, attitudes appear very positive within the organic resources use cycle, but a functioning 'market' for organic waste-derived resources requires robust end market (consumer) acceptance. Food retailers can play a key role in supporting this although they in turn react to their perception of consumer attitudes. Therefore engaging with supermarkets on the issue of organic waste resources to land is essential for effective policy making.
- Local authority lack of interest in the use of organic waste-derived resources on land suggests that local authorities need to be encouraged to see the bigger picture as they play a key role in the supply chain cycle. Taking a more systemic view of organic waste management also applies to issues of competition from other waste processing technologies such as incineration.
- Engaging with the public in this debate to both communicate information and gain greater understand of attitudes is essential. Concerns expressed by some stakeholders about potential adverse public reaction to recycling food/kitchen waste containing meat suggest a need to keep these products separate where possible from other non-meat containing organic waste.

Communication of policies and practices

Addressing lack of awareness

- The findings suggest that communication is not adequate at present throughout the organic waste-derived resource cycle.
- Standards may already exist (as some stakeholders pointed out) but lack of awareness of these predominated amongst stakeholders. This indicates a need for better communication of existing safeguards and standards as well as for new ones.
- An associated issue, concerning standards, is the need for technical issues to be resolved in a transparent way and communicated to the supply chain. There is no point in having standards if people are unaware of them.
- Related to this point is consideration of the potential need for improvements in training for environmental officers, regulators and local councils. Also, that training was needed for farming advisors in the use of organic waste-derived resources, particularly those who know about classic fertilisers and may not know much about these resources.
- Farmers' lack of knowledge and awareness of organic waste-derived resources other than agricultural manures and slurries needs addressing if any implementation strategy encourages farmers to increase their applications of different types of organic waste-resources to land.

Building upon positive attitudes

- The perception of the majority of public and farmers surveyed that applying organic waste-derived resources has a positive effect on the environment and soils is a positive perception that policy messages can be built on.
- Public environmental awareness about climate change and sustainability also presents an opportunity to use this existing and well rooted perception to gain support for the use of organic-waste resources on land. However, attention to public education and transparent communication are needed to build confidence and resilience.
- The connection between consumers' attitudes to food purchasing and recycling knowledge might provide a useful link for developing discussions with the food and retail industries in general, and food quality assurance schemes in particular, about how to communicate issues around the use of organic waste-derived resources on land to the public.

7 Future research priorities

The research project identified from stakeholder concerns a number of areas of future research priority. The need for more research was raised by stakeholders on numerous occasions during the workshops, which covered a range of issues both technical and attitudinal.

Resilience and variability of public attitudes

Further work is needed in engaging the public in this debate and to clarify the importance, to the public, of issues such as transparency in reporting and accounting for activities in the supply chain (e.g. labelling); traceability through assurance schemes (e.g. where food comes from); whether there are potential concerns about the use of food waste in agriculture; and if so whether these are dominated by the presence of meat/animal by-products. There was agreement generally that there needs to be more in-depth research on the publics' perceptions. One aspect of this focused on how the public would react to more knowledge about the issues of applying organic waste resources to land. Will raising its profile stimulate more negative perceptions and how might that be handled? Another aspect was greater understanding of public attitudes in relation to recycling food waste. This would include understanding the importance to the public of knowing where food comes from (its traceability or accountability); whether issues of recycling meat waste are of concern; what would reassure the public if they have concerns; and how aware people are of the alternative options for treatment if these organic wastes are not recycled to land. This work should involve in-depth public dialogue to gain a better understanding and to explore the resilience of public attitudes and how they translate into behavioural intention. Some focused scenario planning on responding to 'incidents' may also be useful. Ongoing monitoring of attitudes could also be carried out via Defra's 'survey of public attitudes and behaviours toward the environment' to supplement these activities.

Potential benefits of increasing organic resources to land

Organic waste-derived resources potential contribution to climate change was unclear and stakeholders felt more research was needed on this aspect. This does not necessarily imply the need for research but rather synopses of research findings for public communication (and for other stakeholders in the cycle) to disseminate knowledge. Similar desk-top research is needed into the financial as well as environmental life cycle impacts of organic resources compared to artificial fertilisers

Improving scientific and technical knowledge

More research on and understanding of the potential for contamination, disease and health risks is needed to provide reassurance and raise confidence. More specifically this included research on the hazards of sewage sludge and ways to prevent household chemical contamination. The particular 'risk signature' of organic recyclates application could be studied in more detail to understand the potential for mis-information. More research is also needed regarding technical issues concerned with processing technology or effects of use such as on soils. This should include long-term research on the effects of these resources; into new innovations; and on product safety.

Comparative studies

The need to collect evidence from other countries and learn from their experience was expressed. This might include studies to transfer both knowledge and best practice. Most importantly, this should result in clear dissemination of the findings in accessible ways. Research is needed into effective communication of similar examples to this issue and particularly how to communicate with different stakeholders.

Understanding attitudes of specific stakeholder groups in relation to policy initiatives

Outside the scope of this project, but of importance to developing policy initiatives in this area, is a need for further research on the issues of concern to specific stakeholder groups. Potentially involving in-depth interviews, this should explore why issues identified in this research are important to different stakeholders, why they hold particular attitudes and perceptions as well as their concerns relating to specific policy developments and would assist both policy formulation and communication. This is particularly so in relation to attitudes held by food retailers and for the interface between food assurance schemes and farmers.

References to published material

9. This section should be used to record links (hypertext links where possible) or references to other published material generated by, or relating to this project.

Other research reports generated by this project (to be published on http://randd.defra.gov.uk/):

Attitudes to the Use of Organic Waste Resources to Land: Full Project Report

Annex 1: Literature Review

Annex 2: Initial Mapping of Key Issues from Scoping Study

Annex 3: Public and Farmers Attitude Surveys Top-line Findings

Annex 4: Stakeholder Workshops: methodology and maps

Published material generated by the project:

Thomas C, Schiller F, Yoxon M and Oreszczyn S (2008) Research on Attitudes For Policy Development in Organic Resource Management *Waste 2008 Waste and Resource Management – A shared responsibility Conference*, Stratford-upon-Avon, UK, 16-17 Sept 2008

Thomas C, Schiller F, Yoxon M and Oreszczyn S (2008) Attitudes to the Use of Organic Waste Resources on Land *CIWM 2008* Annual Conference of the Chartered Institution of Wastes Management, Paignton, UK, June 10-12 2008

Thomas C, Lane A, Oreszczyn S, Schiller F and Yoxon M (2009) Recycling Organic Waste Resources to Land – Communicating the issues *ISWA World Congress: turning waste into ideas*, International Solid Waste Association, Lisbon, Portugal, 12-15 Oct 2009

References in summary project report:

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Thomas, C (2004) *Public Attitudes and Behaviour in Western Riverside* Report for Waste Watch from The Open University's Integrated Waste Systems Research Group and MORI Social Research Institute, http://technology.open.ac.uk/iws/