CIWEM Chartered Institution of Water and Environmental Management

Policy Position Statement

Composting

Purpose

The purpose of this Policy Position Statement is to review the contribution and role of composting in the management of organic waste and to consider the operational, policy and environmental issues relating to this practice. This PPS addresses stabilised compost derived from source separated organic wastes. Partially or fully stabilised materials produced, for example, as an output from Mechanical Biological Treatment (MBT) plants are discussed in a separate PPS.

CIWEM calls for:

1. A clear regulatory footing for controls on composting treatment and product quality (as is the case for organic material containing food waste).
2. Regulation of composting that is exempt from environmental permitting to operate to the same standard as other centralised composting operations.
3. The UK Government to make a case to the European Commission for derogation of composted material from the prescribed nitrogen (N) limits of the Nitrate Directive. This would resolve the apparent conflict between improving soil organic matter and restricting N additions to soil from composts, so that the full benefit of composted materials on soil quality can be realised.
4. Further research to develop alternative products from composted biomaterials to promote peat substitution in the horticulture industry.
5. Local authorities to innovate further in tackling segregation of food waste in the context of those living in flats, high-rise apartments and dwellings where home composting is not possible.
6. Greater consideration of composting as a treatment option for organic waste. Recent focus has been on anaerobic digestion as the preferred option. However, composting still has an important role to play for specific organic waste streams and as part of an integrated organic waste treatment solution.

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Context

Composting is a well-established natural method for treating, sanitising and stabilising organic materials such as green waste, fruits, vegetables, cardboard and wood found in municipal solid waste (MSW) streams or similar waste from commercial and industrial, agricultural and horticultural sources. In addition, the composting process is used in conjunction with the anaerobic digestion (AD) process to stabilise digestate prior to subsequent use. Composting is undertaken on both a small and large scale, ranging from home composting bins to centralised sites that compost thousands of tonnes every year. Composting plays a key role in helping local authorities and businesses to achieve targets to increase recovery rates and divert waste from landfill.

Composting is generally defined as the controlled biological decomposition of organic material under conditions that are predominantly aerobic and that allow the development of "thermophilic" temperatures through biologically produced heat. The composting process produces a final product that is sanitised, stabilised, high in humic substances and can be applied to land. Applying compost to land is beneficial as it adds valuable organic matter, which improves soil structure, as well as adding valuable macro- and micro-nutrients and micro-organisms back to the soil to improve its health.

At a European level, the Landfill Directive requires the UK to divert biodegradable MSW away from direct landfilling into alternative forms of treatment with targets of 50% diversion (relative to 1995 levels) by 2013, rising to 65% diversion by 2020 in place. This equates to up to 33 million tonnes of biodegradable waste being diverted from landfill. In order to improve the UK's performance in the management of MSW, the Governments of England, Wales, Scotland and Northern Ireland have imposed a system of recycling and recovery targets on their individual local authorities (table 1). The aim is to achieve a zero waste society and set challenging new targets in order to achieve the aims of this philosophy.

National MSW reuse, recycling and composting targets		
England	Revised Waste Strategy published 2011, recycling targets for household waste	50% by 2020
Northern Ireland	Recycling and composting of household waste	40% by 2015 45% by 2020
Scotland	Recycling/composting & preparing for re-use waste from the household	50% by 2013 60% by 2020 70% by 2025
Wales	Minimum level of preparing for reuse & recycling/composting for MSW	52% by 2013 58% by 2016 64% by 2020 70% by 2025
	The Welsh Assembly Government are also considering targets for the composting of source separated food waste	12% by 2013 14% by 2016 16% by 2020

Table 1. Targets set by the individual Governments in the UK

Compost can be regarded as a recycled product once it has reached End of Waste status (currently PAS100 standard), and therefore can count towards the achievement of the overall recycling targets. In association with European legislation such as the Animal By-Products Regulation (ABPR) (EC) No. 1069/2009i, legal requirements and quality control are playing an increasingly significant role in determining the materials to be composted and the methods that can be used. Table 2 sets out the type and scale of composting and the predominant feedstock.

Type / Scale of composting	Predominant feedstock
Home (small)	Vegetable or food waste (only small quantities of meat, dairy, fats or oils), grass cuttings, paper and card (exempt from ABPR)
Vermiculture (worms) (small but with modular equipment can be extended to community scale)	Vegetable or food waste (only small quantities of meat, dairy, fats or oils), bedding materials, and vermicast Is ABPR compliant
Community (medium)	Similar make up to home composting but may include slightly higher green waste content
In-vessel composting (IVC) (large)	Capable of being ABPR compliant
Enclosed (large)	Capable of being ABPR compliant
Open windrow (large)	Generally for source segregated green waste

Table 2. Type and scale of composting and the predominant feedstock

In 2008/09 85% of good quality compost was obtained from source separated organic waste, of which more than 51% came from kerbside collected wasteii. Increasingly challenging recycling and landfill diversion targets will require ever-larger quantities of organic waste to be treated, turning an increasingly significant amount of waste into a source of compost. Home composting offers a complementary alternative to household waste recycling centre/civic amenity collection sites and centralised treatment for garden waste. Recent estimates indicate that participating households may divert on average of 150kg organic waste per year from landfilliii, however it will need to meet End of Waste criteria (currently PAS100) to count as having been recycled to contribute to Landfill Directive targets for recycling.

There are other options for treating food waste that should be noted including co-digestion and food waste disposers (FWDs) (see CIWEM Policy Position Statements on both of these topicsiv). Co-digestion of sewage sludge with green waste or woody wastes makes the sludge safe for application to agricultural land and also produces biogas, whilst FWDs can allow for improved environmental outcomes by collecting food waste from hard to reach properties such as flats.

Key Issues

Composting technologies

Many technologies and systems are commercially available for centralised composting of wastes. Open-air windrows provide a lower cost option than other more technologically developed methods for dealing with green waste. Typical costs of composting in windrows is £24 per tonne of feedstock compared to £45 per tonne by in-vessel systemsv. Open air windrow sites have caused problems such as an increase in bioaerosols that have been linked with potential impacts on human health. Guidance has been produced to help reduce these impactsvi.

In 2008/09, 74% of the source segregated green waste composted in the UK was by open-air mechanically turned windrowvii. However, this figure is likely to decrease as more treatment takes place in enclosed facilities. In-vessel composting takes place in a sealed container or building where the environment can be carefully controlled and optimised for stabilisation and sanitisation of the product and allows gas scrubbing to control odour emissions.

Quality control

The UK has seen the introduction of BSI PAS 100 standard for composts, the commercially derived Apex standard and the Compost Quality Protocol CQP (for England, Wales and Northern Ireland) (Scotland have yet to adopt this protocol). Compost producers can apply for PAS 100 or PAS 100 and CQP jointly. PAS 100 is subject to certification; however, tests on compost do not have to be carried out by certified laboratories. In 2009 71% of the compost was produced at sites fully certified to PAS100viii and this proportion is increasing year on year. Compost must reach PAS 100 standard to be classified as recycling by meeting End of Waste criteria under the revised Waste Framework Directive. Whilst producing high quality compost that meets the PAS 100 standard must be encouraged it should not be to the exclusion of small scale and home composting where uncertified compost can still be recovered.

Declining organic matter in soils – compost as the answer?

The proportion of agricultural soils in England and Wales containing less than 3.6% organic matter has increased from 31% in 1979-81 to 41% in 1995. Declining organic matter in soils is identified in the Draft Soil Protection Strategy for Englandix as a key issue for the sustainable management of soil and has important implications for the physical condition of agricultural soils.

Waste-derived composts, as well as other manures and organic materials, can provide a good source of organic matter for soil improvement. Composts provide effective replacements for mineral phosphate and potassium fertilisers for crop production, but are generally poor sources of N as the organic N in the product is not readily released. However, this makes composts ideal substrates for building soil organic matter because the risk of nitrate leaching into groundwater is low. The Code of Good Agricultural Practice for the Protection of Waterx for England and Wales sets an application limit of 250 kg N/ha/year from organic wastes and

compost (which usually contains 1-2% N) but the matching of nutrient applications to crop needs is also required. In Nitrate Vulnerable Zones, which represent significant areas of intensively managed agricultural land in England where soil organic matter is in decline, the Nitrates Directive (91/676/EEC) sets a limit of 170 kg/ha/year as total N with the intention of protecting groundwater from nitrate contamination. Unfortunately, these limits restrict the potential benefits to be gained from applying high rates of composts to soil to raise organic matter values. No specific limits on N inputs are stipulated in the Scottish Code of Practice for the Prevention of Environmental Pollution from Agricultural Activityxi, but the matching of nutrient applications to crop needs is again required; CIWEM considers this more pragmatic approach preferable.

A substitute for peatxii

A further advantage of waste-derived composts is as a peat substitution, thereby reducing the destruction of unique peatland habitats. Total horticultural peat consumption in the UK is estimated at just under 3 million m3 per year, the majority of which is used in growing media formulationxiii. Mindful of the environmental measures introduced by peat producers in the UK and the industry's role as a source of employment, composted biomaterials are accepted as effective alternatives to peat for general soil conditioning purposes and this is likely to be the main outlet for composted wastes in the domestic and commercial landscaping markets. Indeed, significant progress has been made in exploiting alternatives to peat for use as soil conditioners in the last decade. In 2009, figures showed that the market was 57.5% peat free. Further to which the Government has recently issued a consultation document "on reducing the horticultural use of peat in England"xiv. This document sets targets to phase out the use of peat in the public sector by 2015 and in the horticultural bagged growing media sector by 2020. This will lead to an increased demand for high quality compost with the market demanding very low contamination levels.

Land reclamation, brownfield development and urban situations

Compost is an ideal material for soil building in reclamation and brownfield development situations. Self-sustaining soils need to have adequate organic matter to provide a reserve of nutrients, water retention and biological diversity. The microbial activity that organic matter stimulates has the potential to help remediate hydrocarbon contaminated soils. Composted materials are also valuable for soil improvement, mulching in urban areas and for absorbing water as part of sustainable drainage systems.

Discussion

7. The environmental, operational and regulatory pressures influencing composting are dynamic and finely balanced. Composting is a key way to reduce the amount of organic waste sent to landfill. However, this is balanced by the need to protect the natural environment from pollution when compost is applied to land. In order to achieve this, EU legislative trends are moving in the direction of increased regulation, and cleaner composts derived from source separated waste streams.

8. CIWEM recognises that whilst composting undertaken under exemption from the Environmental Permitting Regime is useful in helping to recycle organic material, these operations need to operate to the same standard as other centralised composting operations and will not contribute to recycling as they will still be classified as waste.

9. CIWEM recognises that standards are necessary to provide quality assurance for composted materials and supports the efforts of both Government and the commercial sector to develop and implement these.

10. Home composting has the potential to divert significant amounts of biodegradable household waste from landfill disposal and avoids the need for collection and transport of organic waste to centralised facilities. Many local authorities in the UK have distributed home compost bins to the public. A continued commitment to promoting home composting is important to expand waste diversion in this way. There has been some decline as local authorities have not been in a position to support and educate their residents and as the diversion does not meet recycling targets under the Landfill Directive. In areas where home composting is not an appropriate solution, food waste disposersxv can play a useful role in processing food waste safely and diverting it from the solid waste stream.

11. UK agriculture requires significant inputs of biomaterials to correct the declining organic matter in soil used for food production. Composts provide an ideal substrate for this purpose as they contain significant amounts of organic matter. Their low N availabilities also have the advantage of minimal risk of nitrate leaching to groundwater. Large rates of addition are necessary to increase soil organic matter reserves, but there is a conflict apparent between the need to raise soil organic matter and the current restrictions on N additions via organic manures. CIWEM recommends that these conflicts be resolved so that the full agronomic benefit of these materials on soil quality can be realised.

12. Composting and AD technologies provide solutions for the treatment of source segregated organic waste, they both have advantages and disadvantages depending on the location, cost, collection system and availability of users for end products, CIWEM considers that technology choice should be based on a case-by-case evaluation and that both technologies should cooperate to reach high recycling/composting targets.

13. Modern composting facilities have the capability to minimise emissions to air and reduce any negative impacts to the environment or heath. Together with the use of compost as an adequate alternative solution to peat and fertilisers means that composting is able to reduce the overall environmental impacts of the recovery or disposal of organic waste.

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Note: CIWEM Policy Position Statements (PPS) represents the Institution's views on issues at a particular point in time. It is accepted that situations change as research provides new evidence. It should be understood, therefore, that CIWEM PPS's are under constant review and that previously held views may alter and lead to revised PPS's. PPSs are produced as a consensus report and do not represent the view of individual members of CIWEM.

References

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ii Parfitt J. 2009. Home composting diversion: district level analysis. WRAP, Banbury.

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iv CIWEM PPS on Food Waste Disposers. 2011. Available from: http://www.ciwem.org/policy-and-international/policy-position-statements/food-waste-disposers.aspx
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v WRAP. 2010. Comparing the cost of alternative waste treatment options. WRAP, Banbury.

vi Environment Agency. 2011. Composting in open windrows SR2008No16. Available from: http://www.environment-agency.gov.uk/business/topics/permitting/35436.aspx

vii Stone I., Jane Gilbert E. and Pocock R., Dangerfield S., Proud R., Chen C. 2010. Survey of the UK organics recycling industry 2008/09. The Association for Organics Recycling, Wellingborough.

viii Ibid

ix Department for Environment, Food and Rural Affairs. 2009. Safeguarding our Soils, A strategy for England. DEFRA, London.

x Department for Environment, Food and Rural Affairs. 2009. Protecting our Water, Soil and Air: A Code of Good Agricultural Practice for farmers, growers and land managers. DEFRA, London.

xi The Scottish Executive. 2005. Prevention of Environmental Pollution from Agricultural Activity: A Code of Good Practice. Scottish Executive, Edinburgh.

xii See also CIWEM's Policy Position Statement on the Use of Peat http://www.ciwem.org/policy-and-international/policy-position-statements/the-use-of-peat.aspx

xiii Department for Environment, Food and Rural Affairs. 2010. Consultation on reducing the horticultural use of peat in England. DEFRA, London.

xiv Ibid

xv CIWEM PPS on Food Waste Disposers. 2011. Available from: http://www.ciwem.org/policy-and-international/policy-position-statements/food-waste-disposers.aspx