Market Report on Irish

Compost Production and Use

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Market Report on Irish Compost Production and Use

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EXECUTIVE SUMMARY

This report presents information about the Irish compost production and use sectors.

There are approximately 45 composting facilities operational in Republic of Ireland in May 2012, and approximately 16 composting facilities that are not currently operational. The operational facilities have an estimated 377,700 tonnes of operational capacity. 28 composting facilities surveyed by EPA processed 269,000 tonnes of residuals in 2010, producing an estimated 134,600 (50%) tonnes of compost. During 2010, 43,139 tonnes household organic residuals was collected by local authorities and 20,698 tonnes by the private sector, with a further 63,837 tonnes collected at civic amenity centres and bring centres. Gate fees for both food and green residuals achieved at composting facilities are reported to have been on a downward trend since 2006. Intertrade Ireland (2011) estimated employment in the composting industry on the Island of Ireland in 2009 at 363 people directly employed and a further 2,573 indirectly employed, and a processing capacity of 508,560 tonnes.

There are five non-industrial-process anaerobic digestion facilities processing manures and off-farm feedstocks operational in Republic of Ireland in May 2012. The operational facilities have an estimated 35,000 tonnes of total operational capacity. Three mushroom compost production facilities are listed.

Irish organic resource management facilities are listed on an interactive map at www.rx3.ie/Irish-Composting-Facilities-Map.

Fifteen composting facilities operators in Ireland were surveyed during late 2010 for information about compost markets, compost sales routes and perceived industry barriers. The facilities reported market shares as follows; landscaping, 24%; agriculture, 29%, amateur gardening 18%; horticulture 21%; landfill capping 7%; grounds maintenance 1%. Over two thirds of compost produced was sold, with 12% distributed at a loss, 5% distributed free and 16% used onsite. Barriers identified by the composting production sector can be grouped as being related to poor awareness (about contamination by householders, about compost properties by potential users, especially farmers and the public) and to regulatory issues relating to planning and the Animal By-products Regulation.

The report presents data about five Irish sectors that use compost products - agriculture and organic farming, horticulture, retail, landscaping and forestry and brownfield and contaminated land. Information for the market sounding was collected by using telephone interviews. Stakeholders were identified using trade organisation membership and government lists and companies own advertising through published literature, internet searches. The survey of a range of sectors: retail, landscaping & forestry, horticulture, agriculture and organic farming, and the brownfield and contaminated land sector was conducted as a series of interviews at appropriate industry events or telephone interviews.

The report presents data about each sector, identifying use of compost in the sector, level of awareness of compost and other recycled organics, barriers to compost usage, and quantifies actual and potential compost use in each sector.

Current and potential markets for compost are identified, including specialist sectors like horticultural clusters which could consume specialist compost products. Mean European compost sales prices are also identified, which may signal relative or potential Irish prices.

The report indicates that total compost consumption, currently 190,000 tonnes, could be increased to over 500,000 tonnes by production increases and consequent appropriate market development.

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ABBREVIATIONS USED

AFOR - Association for Organics Recycling
BMW - Biodegradable municipal waste
CSO - Central Statistics Office
ECN - the European Compost Network
GAP - Good Agricultural Practice
MSW - Municipal Solid Waste
NWR - the EPA National Waste Report
REFIT - 'Renewable Energy Feed in Tariff', the primary means through which electricity from renewable sources is supported in Ireland.
SMC - Spent Mushroom Compost

1 INTRODUCTION

1.1 Background

Following the adoption of the 1996 Waste Management Act and the publication of "*Changing our Ways*"[1] in 1998, waste management infrastructure in Ireland has developed significantly.

Ireland, which was a landfill nation with little or no focus on recycling or recovery, now has strong collection and sorting systems in place. Ireland recycled 166,684 tonnes in 1998 and 1,084,070 tonnes of municipal waste in 2010. Thus, 12 years has seen a significant improvement in our recycling rates.

One of the challenges currently facing the Irish system is the lack of internal markets for recyclables. This was identified in the 2002 Government policy statement "*Delivering Change*".[2] This statement identified Irelands' lack of stable and economically attractive markets and outlets for recyclable materials as one of the main barriers to an improved and sustainable recycling performance. This observation led the Department of Environment, Heritage, and Local Government (DOEHLG) to establish the Market Development Group (MDG) in July 2004.

The MDG published the *Market Development Programme for Waste Resources: 2007-2011* that laid out a 5 year plan to facilitate the market development of recyclables. The Programme implementation was officially started in October 2008 and is now implemented under the name "rx3".

1.2 Requirements of the market development programme

Project C002 of the Market Development Programme requires delivery of a project described as follows.

Long Term Objective *A market sounding exercise: to identify and engage with stakeholders; to advertise the objectives and aims of the MDG Programme within the industry; and to gather baseline information in relation to awareness, technical knowledge, attitudes and barriers etc. to compost usage in individual sectors in Ireland. This will supplement the surveys conducted within the ERTDI report "Assessment and Evaluation of Outlets of Compost Produced from Municipal Waste", 2002* ["Assessment and Evaluation of Outlets of Compost Produced from Municipal Waste"] *which served to identify composting infrastructure and some users of compost and other organic amendments.*

Stage 1: Survey of the Landscaping and Forestry Sector
All stakeholders within this sector such as compost producers, users (landscape architects, landscape contractors, garden designers etc.) retailers and industry bodies will be identified (using the MDG database and other relevant means) and surveyed.

Stage 2: Survey of the Horticulture Sector
All stakeholders within this sector such as compost producers, users (commercial growers, nurseries, growing media manufacturing companies etc.) retailers, industry and regulatory bodies will be identified and surveyed.

Stage 3: Survey of the Agricultural and Organic Farming Sector
All stakeholders within this sector such as compost producers, users (IFA, Irish Tillage and Land Use Society (ITLUS), IOGFA), retailers, industry and regulatory bodies (Teagasc, DOA, etc.) will be identified (using the MDG database and other relevant means) and surveyed.

[1] Department of the Environment, Community & Local Government, 1998. Changing our Ways
[2] Department of the Environment, Community & Local Government, 2002. Delivering Change

Stage 4: Survey of Brownfield and Contaminated Land Sector
All stakeholders within this sector such as compost producers, users, remediation companies, consultants, retailers, industry and regulatory bodies will be identified (using the MDG database and other relevant means).

For each of these 4 stages, the purpose is to:

- *Gain understanding of level of awareness amongst stakeholders in relation to compost usage*
- *Determine the actual usage and outlets for compost in this sector*
- *Gain an understanding of the barriers to compost usage*
- *Estimate quantities of compost that could be used in this sector if barriers are overcome*
- *Add new stakeholder contacts and company information to the MDG Database*

Deliverable *Report detailing:*
- *Stakeholders attitudes and knowledge towards compost usage;*
- *Identification of projects/areas that are suitable for future growing trials;*
- *Estimates of potential market size and value of compost products.*

1.3 Objective

The objective of this study is to generate data about the current state of the market for organic residuals derived materials and the potential for growth; to identify and engage with stakeholders; to advertise the objectives and aims of the rx3 Programme within the industry; and to gather baseline information in relation to awareness, technical knowledge, attitudes and barriers etc. about compost usage in individual sectors in Ireland. This will update the surveys conducted within the report “Assessment and Evaluation of Outlets of Compost Produced from Municipal Waste”, 2002, which served to identify composting infrastructure and some users of compost and other organic amendments.

Additions to the outline project identified in the Market Development Programme are necessary. The retail sector has a direct influence on compost market penetration. For that reason, a survey of the retail sector was also conducted.

2 COMPOST PRODUCTION SECTOR

The primary objective of this report is to generate data about the state of the market for organic residuals derived materials and the potential for growth. However, to provide a complete picture, an additional review of the compost production sector was required.

This chapter presents data about the compost production sector in Ireland, primarily using published data, but also using data gathered about the sector from direct contacts with compost producers.

2.1 Methodology

The data collection included primary data collection using telephone surveys to complete questionnaires in Appendix B. Fifteen large composting facilities responded.

The questions for composting facility operators were structured into sections as follows:

- Section A - Contact details
- Section B - Composting site operations
- Section C - Products, markets and use
- Section D - Other comments

The authors completed these elements with known data where available. Secondary data collection consisted of reviewing publicly available information. The information reviewed included: facility waste licences, EPA National Waste Report Series[3], EPA National Waste Report Factsheet, Facility AERs, industry data and company websites.

Where published data was not available, respondents completed those sections relevant to them via telephone interview. The questionnaire is quantitative, with questions requiring either figures or responses to categorised answers (tick boxes). There are few open ended questions, where clarification or opinions was sought and respondents may add general comments.

Data collected about composting facilities was compiled as follows;

- Name and county for each composting facility
- Facility waste licence status and facility animal by-products status
- Number of facilities in animal by-products regulatory approvals process
- Main types of materials processed
- Tonnages licensed or processing capacity reported or estimated
- Type of composting technology used
- Product types produced and estimated proportions of each (based on interviews)
- Quality system used (quality assurance scheme or quality standard)
- Published product sale prices

[3] www.epa.ie/downloads/pubs/waste/stats/

2.2 About the production sector

2.2.1 Composting facilities

In October 2012, c. 45 composting facilities, estimated capacity of 386,100 tonnes, operate in the Republic of Ireland. A further 5 facilities are believed to be not operating. 7 composting facilities are reported in Northern Ireland.

Table 1 lists Island of Ireland composting facilities that are or have been licensed and have operated in recent years. Capacity is an estimate of developed capacity, based on published data, otherwise, for facilities operating under waste permit, an estimate of 10,000 tpa is used. Some facilities in Table 1 are not operational.

Table 1: Details of composting facilities on Island of Ireland[4]

Facility name	Type	Capacity (est.)	Green	Brown bin	Sludge	Other
Acorn (Ballybeg), Tipperary (ABP)	IVC	45,000				
Athchursail Arann Teoranta (ABP)	IVC	500				
Barna Waste – Carrowbrowne, Galway	IVC	20,000				
Bord na Móna Plc, Drehid, Kildare (ABP)	IVC	25,000				
Bord na Móna Plc, Kilberry, Kildare	Windrow	50,000				
Celtic Worm Company, Cork	Vermi+					
Clare County Council, Inagh	IVC	2,000				
Coolmore Stud, Tipperary	Windrow	10,000				
Cork County Council, Bandon	Windrow	900				
Cork City Council, Kinsale Road	Windrow	2,500				
Crammonds, Wicklow	Windrow	1,000				
Cremin Farm Compost, Limerick	IVC	10,000				
CTO Environmental Solutions, Cork	Windrow	6,000				
De Brun Iasc, Kerry (ABP)	IVC	15,000				
Dundalk Town Council landfill , Louth	Windrow					
Enrich, Kilcock, Meath	Windrow	10,000				
Enrich, Kilcock, Meath (ABP)	IVC	10,000				
Envirogrind Ltd. , Donegal (ABP)	IVC	10,000				
Galway City Council, Carrowbrowne (ABP)	IVC	9,500				
Galway County Council, Ballinasloe	IVC	1,000				
Green King Composting Ltd, Wicklow	IVC	20,000				
Johnstown Recycling Ltd., Westmeath (ABP)	IVC	2,500				
Kerry County Council, N. Kerry Landfill	IVC	10,000				
Kildangan Stud farm, Kildare	Windrow	1,000				
Limerick County Council, Mungret	Windrow	5,000				
M&T Plant Hire, Wexford	IVC	10,000				
Mayo County Council (Ballina)	Windrow	1,000				
Marine Harvest, Donegal	IVC	900				
McGill (Castletownroche)	IVC	10,000				
McGill (Coom, Glenville) (ABP)	IVC	20,800				
McGill Molaisin (Cappoquin)	IVC	12,000				
Milltown Composting Systems Ltd. (ABP)	IVC	10,000				
O'Toole Composting Ltd. , Carlow (ABP)	IVC	15,000				
OD Recycling Ltd., Tipperary	IVC	10,000				

[4] See www.rx3.ie/Irish-Composting-Facilities-Map for further detail. Brown bin indicates source segregated and separately collected domestic catering waste (approved by DAFF to process ABP). Sludge denotes municipal or industrial sludge stream. Other denotes feedstocks that may include fish, manure, mixed waste stream etc. or is in a validation process to accept animal by-products.

Facility name	Type	Capacity (est.)	Green	Brown bin	Sludge	Other
Organic Gold Marketing Ltd, Meath	IVC					
Ormonde Organics, Waterford	IVC	10,000				
Panda (Nurendale Ltd), Meath	IVC	18,000				
Pat Cleary Compost & Shredding	Windrow	5,000				
Paul and Bronwyn Mooney, Kildare	Windrow	2,000				
Silliot Hill (food residuals) , Kildare	IVC	5,200				
Silliot Hill (sludge) , Kildare	IVC	11,000				
Sligo County Council, Ballisodare	Windrow	2,000				
Terralift Ireland Ltd. , Monaghan	IVC	5,000				
Thornton's Kilmainhamwod, Meath (ABP)	IVC	20,800				
V&W Recycling, Louth	Windrow	1,000				
Waddock, Carlow (ABP)	IVC	7,000				
Waterford City Council	IVC	10,000				
Waterford County Council, Dungarvan	IVC	1,000				
Waterford County Council, Lismore	IVC	500				
Waterford County Council, Tramore	IVC	1,000				
Coleraine Borough Council, Letterloan	Windrow	1,000				
Greenacre Composting, Antrim	IVC					
Magherafelt District Council	IVC	8,000				
Natural World Products, Belfast	IVC	60,000				
Natural World Products, Keady, Armagh	IVC	80,000				
Organic Waste Recycling, Newtownards						
Simpro Ireland Energy, Tyrone	Windrow	8,120				

Built composting capacity provision has grown in Republic of Ireland since 2000, figure 1.

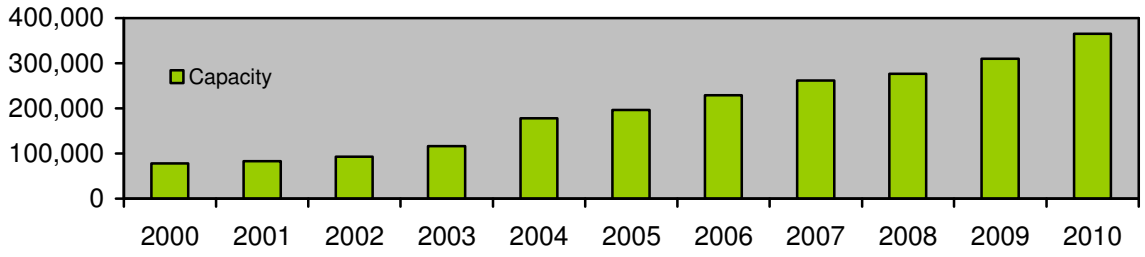


Figure 1: Built capacity of operational ROI composting facilities 2000-2010[5]

2.2.2 Mushroom compost production facilities

Republic of Ireland mushroom compost production facilities had a reported total licensed and permitted capacity of 111,850 tonnes in 2011. Three facilities operated in Northern Ireland.

Table 2: Mushroom compost production facilities in Ireland in 2012

Facility name	License	Capacity (tonnes)	Primary feedstock
Kabeyun Ltd-Monaghan Mushrooms	W0121-01	15,600	Manure
Carbury Compost Ltd.	W0124-01	56,500	Manure
Custom compost	W0123-01	39,750	Litter, Manure, Gypsum
Tandragee Compost, Tandragee, Armagh			
Cabragh Mushroom Composts, Armagh			
Reen Compost, Armagh			

[5] Throughput calculated using EPA National Waste Report data, and rx3 estimates.

2.2.3 Anaerobic digestion facilities

A number of anaerobic digestion facilities process currently organic materials or are in development in October 2012. Table 3 lists anaerobic digestion facilities on the Island of Ireland. Anaerobic digestion facilities, exclusively processing industrial residuals generated onsite or sewage (e.g. Ringsend or Tullamore WWTPs) do not operate as merchant facilities for municipal residuals or commercial residuals so are not listed.

Table 3: Anaerobic digestion facilities on Island of Ireland[6]

Facility name	Capacity (tonnes)	Primary feedstock
Adamstown, Wexford	5,000	Manure, biosolids, biowaste
Beofs, Kilkenny	10,000	Manure
Methanogen, Waterford	10,000	Manure
McDonnell, Limerick	10,000	Dairy and poultry manure
Roughty Valley Co-operative, Co. Kerry		Manure
Agri-Food and Biosciences Institute (AFBI)	5,000	Dairy cow slurry, (energy crops)
Ballyrashane Creamery, Coleraine BT52 2NE		Dairy waste, crops, slurry
Bethlehem Abbey, not operational		Manure & silage
BH Energy, Dundonald, BT16 1TS	12,000	Cow slurry, silage
Coleraine Biogas Facility		Poultry & cattle manure
Creagh Concrete, Ardboe, Co. Antrim		Grass silage, slurry
Foyle Food Group AD, (in planning and PPC)	15,000	Paunch, treatment plant sludge
Green Farm Energy, Co. Tyrone BT79		Farm-derived feedstock
Greenville Energy, Co. Tyrone. BT78	24,500	Grass silage, slurry
J&P Best, Newry, BT35 6TA		
JMW Farms Ltd. Tynan, Co. Armagh.		Slurry, energy crops
Lyttle's Biogas, Armagh BT66 7SH		Poultry and cattle manure
McGuckian's Cloughmills, Ballymena BT42		Onsite pig slurry solids
Toomebridge Biogas Facility		Manure & silage

Further anaerobic digestion development is expected in Republic of Ireland in response to improved REFIT[7] rebates implemented during 2012 by the Department of Energy. There is a surge in interest in anaerobic digestion in Northern Ireland, as a result of the ROCs rebate system. The ROCs system, at current prices currently offers nearly double the REFIT rebate.

[6] See www.rx3.ie/Irish-Composting-Facilities-Map for further detail and references. An estimate of 10,000 TPA is used for facilities operating under local authority waste permit, unless actual tonnage is published elsewhere.

[7] REFIT stands for 'Renewable Energy Feed in Tariff' and is the primary means through which electricity from renewable sources is supported in the Republic of Ireland.

2.2.4 Additional biological treatment facilities proposed

In November 2011, approximately 487,700 tonnes of additional treatment capacity for brown bin and mixed waste materials was reported to be at some point in planning and/or development, in Republic of Ireland. The proposals were approximately half each in composting and anaerobic digestion. Commercial decisions will dictate the actual implementation or otherwise of these proposals.

Table 4: Proposed additional biological treatment facilities on Island of Ireland[8]

Expected	Facility	Tonnage	Type	Feedstock
2013	CTO Env. Solution, Middleton, Cork	14,000	IVC	G, BB
2012/13	Thorntons, Kilmainhamwood, Meath	19,200	IVC	G, BB, MBT
2013	Panda, Slane, Co. Meath	20,000	AD	G, BB, MBT
2012	Bord Na Mona, Drehid Co. Kildare	25,000	IVC	G, BB
2013	Greenport Environmental, Foynes.	50,000	AD	G, BB, MBT
2013	Organic Gold, Co. Meath	25,000	IVC	G, BB
2014	CTO Greenclean, Milltown, Cashel	14,500	IVC	G, BB, MBT
2014	Clean Ireland Recycling, Co. Clare	15,000	IVC	G, BB, MBT
2015	Stream Bioenergy, Dublin	90,000	AD	BB, MBT
2015	Joe Barry, Summerhill	20,000	AD	BB, MBT
2015	Bord Na Mona, Drehid Co. Kildare	90,000	IVC	MBT
2015	Greenstar, Ballycoolin, Dublin	50,000	IVC	G, BB, MBT
2016	Greenstar, Sarsfield Court, Cork	45,000	AD	BB, MBT
2016	Greenstar, Deepwater Quay, Sligo	10,000	IVC	G, BB, MBT

[8] Emerging Waste Recovery Infrastructure, the Irish Waste Management Association, Nov 2011. See also www.rx3.ie/Irish-Composting-Facilities-Map for further detail, if available.
G=green waste, BB=brown bin MBT=Mixed waste. Expected = expected online dates reported at November 2011.

2.2.5 Map of Irish organic residuals management facilities

Figure 2 shows composting, anaerobic digestion and mushroom compost production facilities on the Island of Ireland.

An interactive version of this map, with further detail and references is available at www.rx3.ie/Irish-Composting-Facilities-Map.

Figure 2: Map of organic resource management facilities on the Island of Ireland

2.2.6 Quantifying materials treated, volumes and types

The 28 facilities surveyed for EPA NWR 2010, recycled 269,200 tonnes organic residuals (defined by EWC code), while the 30 facilities surveyed for EPA NWR 2009, recycled 301,793 tonnes organic residuals. Breakdown by material is shown in Table 5.

Table 5: Residuals composted at selected facilities, 2009 and 2010

Type	EWC	EWC description of waste production source	2009	2010
Industrial, Agricultural	02 01	Agriculture, horticulture, aquaculture, forestry, and fishing	65,729	52,196
	02 02	Preparation & processing of meat, fish & foods of animal origin	6,037	7,031
	02 03	Fruit, vegetables, cereal etc. Preparation and processing	5,282	1,502
	02 05	Dairy products industry	9,851	12,600
	02 06	Baking and confectionery industry	482	232
	02 07	Production of alcoholic and non-alcoholic beverages …	26,124	23,680
	03 01	Wood processing and the production of panels and furniture	65	943
	03 03	Pulp, paper and cardboard production and processing	1,932	1,896
	04 02	Textile industry	52	149
	07 01	MFSU basic organic chemicals	1,107	852
	07 05	MFSU of pharmaceuticals	3,916	3,582
	07 06	MFSU of fats, grease, soap, detergent, disinfectant & cosmetic	616	520
	10 01	Fly ash from peat and untreated wood	25	
C&D	17 08	Gypsum-based construction material	4,815	140
Sludges	19 05	Aerobic treatment of solid wastes	382	
	19 08	Waste water treatment plants not otherwise specified	53,814	56,853
	19 09	Preparation of water for human consumption or for industrial use	2,900	322
	19 12	Mechanical treatment of waste	34,144	1,647
Municipal	15 01	Packaging (& separately collected municipal packaging wastes)	1,882	11
	20 01	Municipal wastes (separately collected fractions) except 15 01	48,373	73,695
	20 02	Garden and parks wastes (including cemetery waste)	32,508	30,238
	20 03	Other municipal wastes	1,758	1,112
		TOTAL	**301,793**	**269,200**

In 2010 43,139 tonnes household organic residuals was collected by local authorities, 20,698 tonnes by private sector, and 63,837 tonnes at civic amenity centres and bring centres.

BMW (biodegradable municipal waste) recovery reported by EPA National Waste Reports indicate a 4-fold increase since 2001 - see figure 3. Non-BMW streams, reported by EPA and estimated by rx3, also show significant increases.

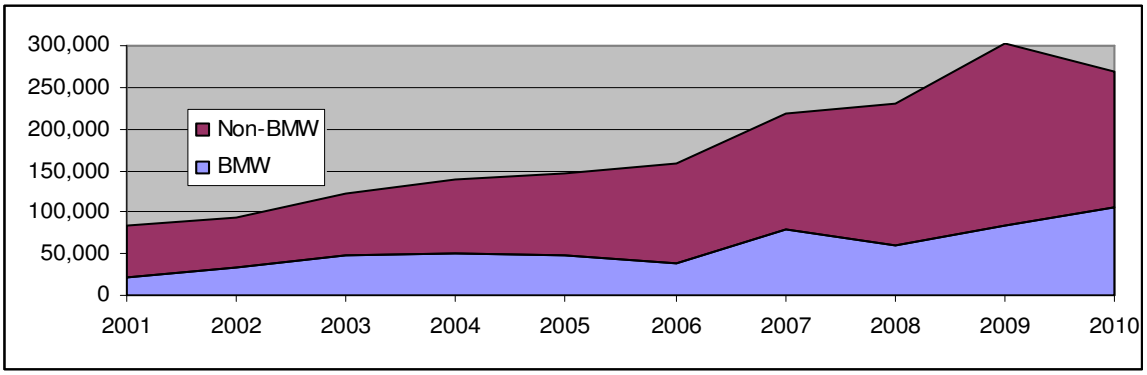


Figure 3: BMW recovered (EPA National Waste Report series) and non-BMW (est.)

2.2.7 Organic materials available to collect or treat in Ireland

Estimates of organic materials available in tonnes per annum are shown in Table 6.

Table 6: Organic materials available in Ireland as estimated by different bodies

Materials "type"	Intertrade Ireland (2011)[9]	Cré (2010)[10]
Industrial	597,816	
Commercial	331,691	
Municipal	654,000	Food 358,267 Green 284,494
Totals	**1,583,507**	**518,369 to 642,761**

2.2.8 Gate fees charged for composting

Figure 4 depicts the average gate fee reported by organic resource management facilities 2005 - 2010. Gate fees vary depending on the facility location and the quantity and quality of material offered, delivery mechanism etc., so the prices reproduced here are estimated national averages. Published data is not yet available for anaerobic digestion gate fees. The landfill levy each year to 2012 is also depicted.

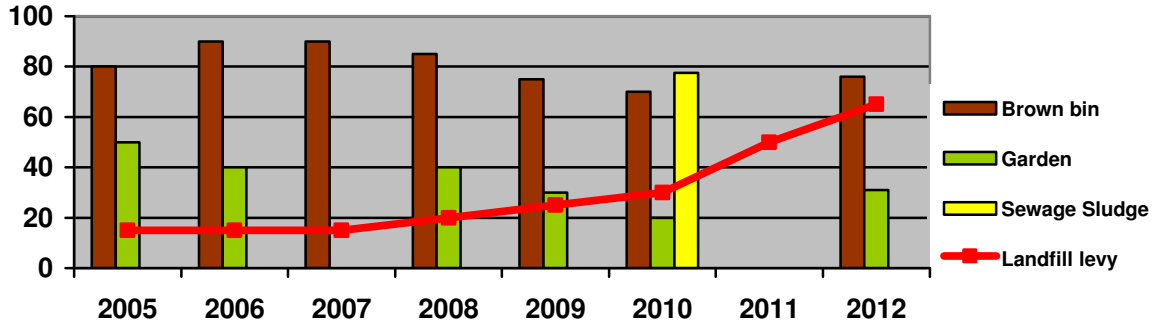


Figure 4: reported organic resource management facility gate fees and landfill levy in Ireland [11]

Gate fees to 2010 were falling, possibly due to market competition for residuals from landfill. Increasing landfill levy rates will divert organic resources from landfills, and may lead to increased gate fees and/or expanded treatment capacity.

2.2.9 Employment in the Irish composting industry

CSO 2009 statistics indicate that employment in the "Materials recovery (NACE 3830)" sector employed 1,815 people, with turnover of €397 million. The "Waste collection (NACE 3810)" and "Waste treatment and disposal (NACE 3820)" sectors employed 1,340 and 2,006 and turned over €397 million and €346 million respectively. No breakdown of these categories is provided, so employment in organic resource management is unclear.

Intertrade Ireland (2011) estimated employment in the composting industry on the Island of Ireland in 2009 at 363 people directly employed and a further 2,573 indirectly employed on an Island of Ireland processing capacity at 508,560 tonnes.

Intertrade Ireland (2011) data suggests that one direct job is created per 1,401 tonnes of composting capacity provided. The report extrapolates the potential employment in the

[9] Intertrade Ireland, 2011: Market Report on Composting and Anaerobic Digestion *(All Island Study)
[10] Cré, 2010, Collectable Source Separated Household Food Garden Waste in Ireland
[11] Inter Trade Ireland, 2005, 2006, 2009 - Market Report Composting and Anaerobic Digestion Sector; Forfás Waste Benchmarking Analysis, 2007 and Policy Priorities 2008; RPS survey, 2010, 2012.

sector on the island of Ireland with projected infrastructure development and suggests that over 1,000 people could be directly employed in the sector.

The Intertrade Ireland job creation estimates reflect the current Irish mix of smaller local and centralised facilities. Job creation rates reflect the size/type of facility developed. One job is created for every 800 tonnes of organic residuals processed in the Austrian composting and anaerobic digestion industry[12], while US data[13] reports one job created per 2,500 tonnes processed, and WRAP[14] reports one job created per 4,338 tonnes of organic residuals recycled in 2010.

Significant employment creation is likely in the composting and anaerobic digestion sector with the capacity expansions projected in response to national Landfill Directive targets.

2.2.10 Animal by-products regulation

The Animal By-products Regulation (EC) No. 1069/2009 and the Animal By-products Implementing Regulation (EU) No. 142/2011lays down health rules concerning animal by-products not intended for human consumption. The purpose of the legislation is to safeguard human and animal health by controlling the use and disposal of animal by-products.

The legislation pertaining to compost plants aims to ensure that all products of animal origin treated by composting meet the required treatment standards to ensure pathogen reduction and that recontamination is prevented, so treated material may be safely applied to land. This regulation is therefore a key requirement for compost production sector facilities treating animal by-products.

The Department of Agriculture, Food and Fisheries has approved twelve composting facilities and four anaerobic digestion facilities to process animal by-products by. An estimated 181,000 tonnes of animal by-products composting and anaerobic digestion treatment capacity is approved to operate. These facilities are listed in Table 7.

Table 7: Composting / anaerobic digestion facilities approved to process animal by-products

Name	Technology	Product types[15]	Approval
Athchursail Arann, Galway	Composting	CATW, OTHER C3	COMP - 19
Ballybeg (Acorn), Tipperary	Composting	CATW, OTHER C3	COMP - 45
Bord na Móna, Drehid, Kildare	Composting	CATW	COMP - 63
De Brún Iasc Teo, Dingle, Kerry	Composting	FISH WASTE	COMP - 57
Enrich Environmental, Kilcock, Meath	Composting	CATW	COMP - 58
Envirogrind Ltd, Pettigo, Donegal	Composting	CATW, OTHER C3	COMP - 07
Galway City Council, Galway	Composting	CATW	COMP - 35
Johnstown Recycling, Westmeath.	Composting	CATW	COMP - 36
Kilmainhamwood Compost, Meath	Composting	CATW, OTHER C3	COMP - 06
McGill Environmental, Glenville, Cork	Composting	CATW, OTHER C3	COMP - 31
Milltown, Fethard, Tipperary	Composting	CATW	COMP - 15
O'Toole Composting, Fenagh, Carlow	Composting	CATW	COMP - 24
Waddock, Killamaster, Carlow	Composting	CATW	COMP - 16
Ballyshannon, Berridge, Wexford	AD		BIOGP- 64
BEOFFS, Ballytobin, Callan, Kilkenny	AD	C2 & C3, MANU & MIMC	COMP - 08
Roughty Valley Co-operative, Kerry	AD		COMP - 77
McDonnell Farms, Limerick	AD		COMP - 55

[12] Intertrade Ireland, 2009, Market Report on Composting and Anaerobic Digestion
[13] FoE Europe, 2010, More jobs, less waste
[14] WRAP survey of the UK organics recycling industry in 2010. 1,255 jobs, processing 5.45MT
[15] Product types per Department of Agriculture, Food and the Marine. CATW = catering waste, OTHER C3 = other category 3 animal by-products, MANU = manure, MIMC = milk/colostrums

Approval for a composting or anaerobic digestion facility to treat animal by products is a staged process. A number of facilities were at stage 1 or conditional approval of the approvals process in May 2012. The numbers at each stage are presented in Table 8.

Table 8: Numbers of facilities seeking approval to process animal by-products (May 2012)

Technology	1st Stage	Conditional approval/validation	Approved	Total
Composting	6	5	12	23
Biogas	6	10	3	19

2.2.11 Quality standards in the composting sector

In Ireland, centralised composting and anaerobic digestion facilities apply product quality standards from the facility waste licence. This standard defines thresholds of certain parameters including potentially toxic elements, physical contaminants, pathogens and stability. The standards applied are frequently derived from the European Commission Working Document on Biological Treatment of Biowaste 2nd Draft.

Some facilities produce compost conforming to specific industry product specifications.

The EPA[16] identified three classes of barrier to use of composts - heavy metals, pathogens, and phytotoxicity (salts, organic acids, pesticide contamination). This report noted that compost standards in the form of legal standards (e.g. heavy metals, pathogens, etc.) and market-driven standards or specifications can help overcome product-related barriers to compost use.

The lack of a national compost product standard was recognised as a barrier to compost market development. Therefore in 2009, at request of rx3, NSAI started the development of a National Compost Quality Standard. Irish Standard 441 (IS441) "*Quality requirements for compost manufactured from separately collected biodegradable materials*" was published in mid-2011.

See www.rx3.ie/National-compost-quality-standard for details.

[16] EPA, 2002, Assessment and Evaluation of Outlets of Compost Produced from Municipal Waste Report

2.2.12 Quality assurance in the composting sector

A quality assurance scheme is a market-oriented step that goes beyond the adoption of National Compost Quality Standards. Market driven quality schemes can impact positively on collection and treatment of organic residuals and on quality of the end-product itself. This, and a quality mark/logo/label, instils confidence in consumers as to the quality and contents of compost products.

Ireland has not had a national compost quality assurance scheme, nor is a pan-European quality assurance scheme operational, nor are any Republic of Ireland composting facilities certified to PAS 100[17]. Some facilities report producing high-quality compost products according to quality assurance scheme specifications, without being accredited to them. The WRAP survey of the organics recycling industry 2012 (Table 10) indicates that the certification to a compost quality assurance scheme (PAS100 +/- CQP) leads to a premium in selling price.

The lack of a compost quality assurance scheme was recognised as a barrier to compost market development. The composting industry has indicated that it requires a compost quality assurance scheme to aid market development.

In response to these issues rx3 appointed contractors Certification Europe to develop a compost quality assurance scheme. This project has developed scheme documentation which has been followed by a trialling period of 12 months to mid-2012. From mid-2012 there has been a pilot operation phase of 12 months, when composting facilities will be certified. The compost quality assurance scheme logo, figure 5, will be widely marketed.

Figure 5: Quality assurance scheme logo

Twenty composting facilities have participated in the scheme to date, representing over 67% (245,500 tonnes) of the total operational capacity of Irish composting facilities.

In October 2012 the first four composting facilities were certified to the scheme. These facilities are;

- Bord na Móna, Kilberry, County Kildare
- Cremin Farm Compost, Kilmallock, County Limerick
- Enrich, Kilcock, County Meath
- Limerick County Council, Mungret, County Limerick

[17] PAS 100 is the British Standards Institution's Publicly Available Specification for composted material.

Minister for the Environment, Community and Local Government, Phil Hogan, T.D. presented certificates to representatives of the first composting facilities certified to the Irish compost quality assurance scheme, figure 6.

Figure 6: Certificate presentation to the first composting facilities certified to the Irish compost quality assurance scheme

Facilities certified to the compost quality assurance scheme are mapped on the rx3 website at www.rx3.ie/Development-launch-national-compost-quality-assurance-scheme

Figure 7: Location of composting facilities certified to compost quality assurance scheme

See www.cqas.ie for further details of the scheme and updates on certifications.

2.3 rx3 survey of compost producers

2.3.1 Main markets identified

rx3 surveyed selected fifteen Irish composting facility operators during November 2010.

These facilities surveyed represented 50% of the main, active, large composting facilities. The survey asked operators about the main markets for compost sold from the facility. Facility operators were asked what the main markets, on the basis of tonnage, were for the compost produced by their facilities. Responses are depicted in Figure 8.

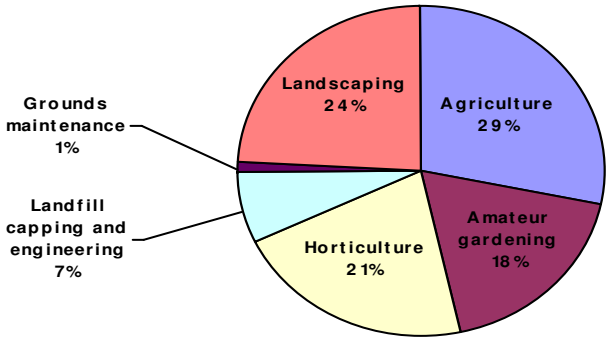


Figure 8: Distribution of compost reported, of total produced

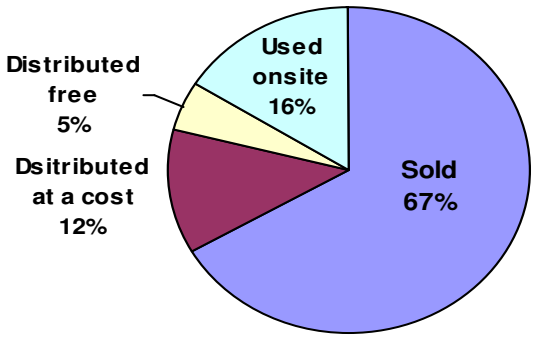
The survey response indicated that the most common applications for compost produced were in the agricultural, landscaping, horticulture (including peat dilution) and amateur gardening sectors

Respondents asked about future markets for organics products, suggested that the agriculture sector offers the most significant growth potential.

These reported market shares are similar to those reported for 2006 by Intertrade Ireland.
A small number of companies are or have been involved in export of compost products, primarily producing either peat dilution product or low-volume, high-value niche products.
A number of facilities produce product specially designed for use in sports grounds and golf courses and other high-value niche markets. Some of this material has, in recent years, found export markets in Dubai, Greece, UK and Germany.

2.3.2 Compost sales routes

The rx3 market survey of composting facilities asked operators if charges were applied to compost distributed from their facility. Figure 9 outlines the response reported, estimating the % of compost sold, compost used on site, distributed free and distributed at a cost.



The majority of facilities reported selling the compost produced. Some facilities reported distributing compost produced free of charge to householders that use the green residuals facilities and kerbside collection services. This encourages feedstock delivery by the public and an understanding of the circular nature of the process.

Figure 9: Reported compost value by survey response

Lack of storage space for finished compost, and the dynamics of seasonal pressure on treatment and storage space can lead to compost distribution at reduced prices or without

charge or even at a cost to the composting facilities due to transactions occurring at less optimum times.

Some facilities offer agricultural markets a combined compost delivery and land spreading service as part of their compost distribution arrangement.

Organic residuals and manufactured composts are bulky, so transport and distribution costs limit the distances over which it is economically feasible to move both feedstock and final products. Compost products have a relatively low value compared with other recovered materials and margins for businesses operating in the industry are tight. As a result, treatment facilities tend to be located close to feedstock supplies, the end-markets tend to be local, and the products and end users vary by region. Products targeted at sectors such as horticulture, landscaping and sports turf do offer higher values, which is reflected in increased regional and national distribution of these products. The presence of horticultural clusters suggests a market for composting facilities to target.

2.3.3 Barriers to compost market development

Composting facility operators were asked about the barriers to compost market development identified by compost producers. The main barriers identified by compost producers are as follows:

Awareness issues

- Contamination of brown bins, especially the domestic brown bin making it difficult to produce clean quality compost.
- The main market for compost produced in Ireland is in the agricultural industry. Further awareness of the advantages of using an organic material over a chemical fertiliser needs to be developed within this sector.
- Farmers need reassurance that organic materials can perform like chemical fertilisers. This requires development and marketing of a quality assurance scheme.
- Public perception of organic resource materials is important. A number of sites operate systems where residuals producers drop off green residuals and collect compost. This creates a closed circle increasing awareness of the benefits of recovering organic material. This helps improve public perceptions, of food residuals, garden residuals and sludges as a valuable resource.

Rx3 is addressing awareness issues through measures including its crop trials, which demonstrate the scientifically verified[18] benefits of compost and digestate use. These crop trials are being conducted in order to raise awareness and help markets to develop.

Regulatory issues

- Respondents noted difficulties in complying with the Animal By-products Regulation approval process, noting that the process was time-intensive and expensive. The process was described as "*over-regulated*".
- Regulatory processes can be lengthy, inconsistent and expensive to navigate.
- At the time of the survey, respondents felt that the landfill levy needed to be further increased to divert biowaste from landfill. This has happened and the levy has increased significantly since (see Figure 4).

[18] AAPFCO Soil Amendment / Compost Uniform Product Claims http://compostingcouncil.org/admin/wp-content/uploads/2010/09/Soil-Amendment-and-Compost-Product-Claims.pdf

3 COMPOST USE SECTORS

3.1 Background - compost markets identified in other studies

3.1.1 European and UK markets for compost

Looking at the makeup of other markets may help understand where markets for compost might develop in Ireland. The European Compost Network (ECN)[19] described size type and value of European compost markets as shown in figure 10.

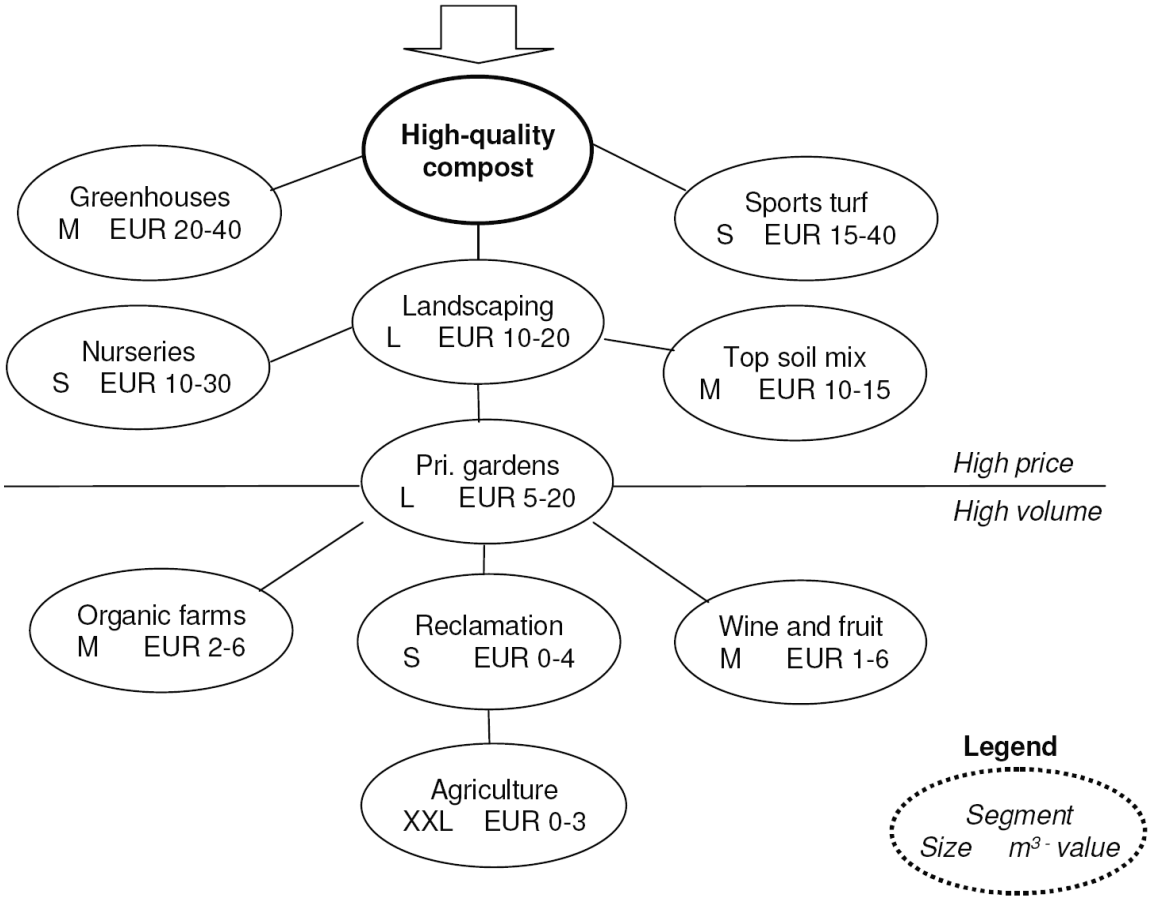


Figure 10: Values and size of markets for compost in Europe

Note: Market volume is indicated as relative size (small (S) to extra-extra-large (XXL)) of the market segment. Prices are known ranges for compost products within the market segment (EUR/m³).

Data about compost markets within the EU, including Irish compost markets, contained in an ECN report (2006) is presented in Appendix C.

Regional differences across Europe mean that conclusions must be carefully considered, as elements might not apply to Ireland.

In 2008/09, 2.8 million tonnes of compost were commercially produced in the UK. Of this, 35% was sold to end users, 20% was sold to retailers, 23% was used on the site of production and 20% was distributed free of charge. These proportions have remained constant from previous years despite recent rapid growth in compost production.

[19] ECN, 2008, European Compost Production and Use in EU.

Table 9 identifies the main market shares of compost products from source segregated feedstock manufactured in the UK, 2010.

Table 9: Market share of compost products manufactured in the UK, 2010[20]

Sector	Market share (%)
Agriculture	67
Landscaping	10
Landfill restoration / daily cover	8
Horticulture, professional	5
Horticulture, amateur	5
Other	4.1
Sports turf	0.5
Energy recovery fuel	0.4

There is wide regional variation in markets used by composting facilities in the UK. Nearly 50% of the 100,000 tonnes of compost used in regeneration projects in 2005/06 were used in London.[21] Horticulture accounts for 30% or more of the end markets in Wales and the North West but very little in other areas. Compost used in agriculture ranges from less than 10% in Wales to almost 80% in Northern Ireland. This variation reflects not only the regional prevalence of agriculture but also the availability of animal manure alternatives. Similar regional variation may be expected in Ireland.

The report "Assessment and Evaluation of Outlets of Compost Produced from Municipal Waste" published by the EPA in 2002 estimated the potential annual sizes of outlets for MSW-derived compost shown in Table 10.

Table 10: Potential annual outlet estimates for BMW-derived compost (2002)

Sector	Estimated potential outlets (t)	Rationale
Agriculture Conventional	250,000	• MSW-derived compost best used on crop land • Based on an estimated 400,500 ha of crop land and assuming 12,500 ha (~3%) of crop land available annually and 20 t/ha (wet weight) MSW-derived compost applied as is
Agriculture Organic	64,000	• Presently 32,000 ha in production • Assumes 10% of land in organic production available annually and applied with 20 t/ha MSW-derived compost (as is)
Horticulture	55,000	• 20% of existing horticultural peat and bark compost usage • No allowance made for usage on road verges
Forestry	40,000	• Assuming 10% of land in forestry production available annually and applied with 20 t/ha MSW-derived compost (as is)
Bogland restoration	20,000	• At least 50,000 ha bogland requiring restoration
Export	18,750	• Assuming 5% of annual 375,000 tpa horticultural peat exported
Contaminated land remediation	No estimate	• Need to refine estimate of hectarage requiring remediation • Need to refine targets (i.e. timing) for land remediation
Total	**447,750**	

Compost destination markets in Ireland were most recently reported for 2006 by the ECN and by Intertrade Ireland, shown in Table 11. Reasons for discrepancies in 2006 reporting are unclear, but may be related to numbers of facilities surveyed.

[20] A survey of the UK organics recycling industry in 2010, WRAP, 2012
[21] WRAP (2008) Market Situation Report, Realising the value of organic waste

Table 11: Reported markets for compost produced in Ireland - 2006[22]

Compost uses	Product	2005 (EPA)	2006 (ECN)	2006 (ITI)
Agricultural land	Soil conditioner	55%	37,185 (37%)	26,328 (33%)
Landscaping			6,030 (6%)	12,765 (16%)
Horticulture			3,015 (3%)	11,170 (14%)
Other uses	N/a		-	3,989 (5%)
Peat dilution	Growing Media		16,080 (16%)	16,754 (21%)
Landfill cover[23]	Soil conditioner	45%	38,190 (38%)	8,776 (11%)
Total		**100%**	**100,500 (100%)**	**79,783 (100%)**

The agriculture, horticulture, landscaping, landfill cover and land reclamation markets account for 74% of the compost market. Growing media production, primarily listed as peat dilution above, accounts for 21% of production. Other uses account for 5% of the compost market.

Data about compost markets within the EU, including Irish compost markets, contained in an ECN report (2006) is presented in Appendix C.

3.1.2 Prices for compost

Prices reported during the rx3 market survey for bulk compost sold from composting facilities, are in the €10-40 per m^3 range for compost from the facility, bulk un-bagged, and increasing for bagged materials.

Table 12: Irish prices reported for compost sold onsite

Products on sale	Grade	€ per tonne, fresh	€ per m3 fresh
Ex-works bulk un-bagged	General	€5 - 20	€10-40
Blends - 5 to 20 litres bags	Blends	€90	€180

Facilities selling compost directly are competing with compost retailed from shops and merchants. For comparison purposes, Irish retail prices for compost blends and some other materials published on Woodies website on 15 August 2011 were gathered and are presented in Appendix D. Retail prices range from €70 to €450/ m^3. Also presented are UK prices published by Which Consumer magazine in 2010. See section 3.5 for further details about the retail sector.

Calculations of the fertiliser value of compost (as opposed to sales price) are presented in Appendix A. These calculations generate actual values for compost sold to the agricultural market, though prices actually achieved may not always match. These show fertiliser value of green/food derived compost as approximately €10/tonne.

3.1.3 About Irish compost product

The 28 composting facilities surveyed by EPA NWR 2010, composted 269,200 tonnes organic residuals in 2009. If these facilities produced 50%[24] compost by weight of input

[22] 2005 data from EPA NWR factsheet; 2006 ECN data, ORBIT Final Report, "Compost production and use in the EU", 29 February 2008; 2006 ITI data from Intertrade Ireland report 2011, from 36 facilities surveyed, Island of Ireland data.;

[23] EPA National Waste Report (NWR) 2008 reports that 102,092 tonnes of woodchip & stabilised organics was used for recovery at landfill facilities. Tonnage of woodchip alone is not available.

[24] Per figure 3 of WRAP "Survey of the UK organics recycling industry in 2010"

material, this suggests that 134,600 tonnes compost was produced by those facilities in that year.

Compost products sold in Ireland are typically categorised by product type and sometimes by recycled content. These products compete with organic horticultural products such as peat, manures, and soils. This categorisation is important to understand the market.

Products are described in this document according to categories as shown in Table 13.

Table 13: Organic products categorisation

Product	Definition
Soil conditioner	A composted organic product, including vermicast, manure and mushroom compost suitable for adding to soils. This term also includes 'soil amendment', 'soil additive', 'soil improver' and similar terms. Soil conditioner typically has not >15% by mass of particles with a maximum size > 16 mm.
Fine Mulch	An organic product suitable for use on soil surfaces. Fine mulch has >20% but <70% by mass of its particles with a maximum size >16 mm.
Mulch	An organic product that is suitable for placing on soil surfaces. Mulch typically has at least 70% by mass of its particles with a maximum size >16 mm. Often 25- 40 mm grades are used as mulches.
Growing media	A growing medium suitable for the establishment and development of a wide range of plants in containers. This term also includes 'potting mix'.
Soil blend	General-purpose soil derived from blending two or more of: sand, natural soil material or organic materials and often having a bulk density > 0.7 kg/L and an organic matter content of between 3-15% by mass.
Top dress	A mix that is suitable for surface application to lawn.

Furthermore, organic horticultural products may contain 100% recycled, some or no recycled material, as shown in Figure 11.

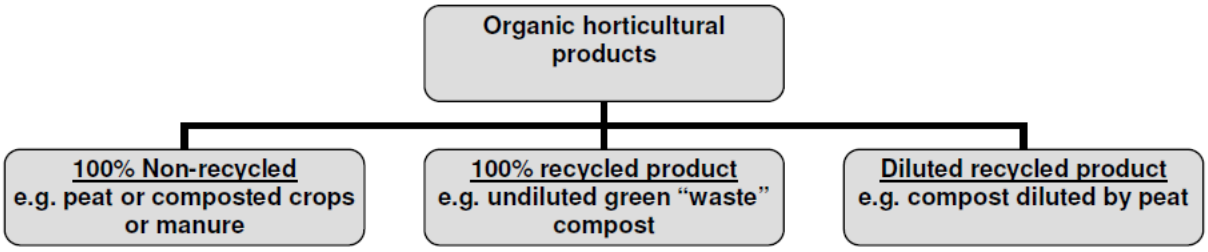


Figure 11: Classification of Organic Horticultural Products

3.2 Methodology

Information for the market sounding was collected by using telephone interviews. Stakeholders were identified using trade organisation membership and government lists and companies own advertising through published literature, internet searches.

The survey of five sectors: retail, landscaping & forestry, horticulture, agriculture and organic farming, and the brownfield and contaminated land sector was conducted as a series of one-to-one interviews at appropriate industry events or telephone interviews.

Of the 54 organisations contacted, responses were received from 45 organisations. The number of respondents for each sector is as follows:

- In the agriculture sector, twelve contacts were made with traditional and organic farming sectors and with an organic farming representative organisation. .
- In the retail sector the seven companies contacted included two of the large multiples, one large Irish retailer and a number of smaller retailers operating in the Irish market.

- In the horticulture sector the eight contacts included fruit and vegetable commercial producers and the horticulture section of a Governmental organisation.
- In the landscape sector the eight contacts were active commercial landscapers.
- In the forestry sector the three contacts were active commercial forestry organisations.
- In the nursery sector the five contacts were active commercial nursery organisations.
- Two representative organisations with an interest in the compost use sector were contacted.
- The contaminated land sector was documented using presentations and onsite discussions about Galmoy and Lisheen mines during the CIWM conference and site visit on November 3rd, 2010 Thurles, Tipperary "Mine Waste and Restoration of Mine Tailings".

An indicative list of questions is presented in Appendix B. The questionnaire for compost users was structured into four sections seeking: Contact details; Activities and products; Knowledge of sector; Products used volumes and types, prices paid, barriers.

Respondents completed those sections relevant to them via telephone interview. The questionnaire was largely quantitative, with most questions requiring either figures or responses to categorised answers (tick boxes). There were a few open ended questions, where clarification or opinions was sought and respondents may add general comments.

Many of those interviewed in all sectors were unable to provide precise quantitative data, such as prices paid for compost, volumes used, rates of application etc. Therefore, published data is used to supplement information, where available.

3.3 Agriculture and organic farming sector

3.3.1 About the agriculture and organic farming sector

Of Irelands land area, 64% (about 4.18 million hectares) is used for agriculture. Approximately 80% (3.36 million ha) of agricultural area is devoted to grass (silage, hay and pasture), 11% (0.46 million ha) is in rough grazing and the remainder circa 9% (0.38 million ha) is allocated to crop production.[25]

Fertiliser inputs to the agricultural industry cost approximately a third of a billion euro annually, spreading over 500 kilograms per hectare of arable land.[26]

The agricultural market is important due to its size and the security of outlets that it provides even though this market has paid low gate fees in Ireland. This sector is an intensive user of mineral fertilisers – some of which could be displaced by composts. The agricultural market requires sanitized and standardised quality compost, typically for use on cereal or combinable crops.

Applicants for the single payment scheme (SPS), the disadvantaged area scheme (DAS) and REPS 4 are obliged to comply with the provisions of "*Good Agricultural and Environmental Condition*", one of which is the maintenance of organic matter levels in the soil. Where the soil organic matter level falls below 3.4%, on land which has been cultivated for more than six years, growers may be obliged to undertake remedial action. This represents a potential market for compost in tillage land, as compost is high in organic matter, albeit volumes will be restricted by nutrient content.

Food Harvest 2020 is an Irish Government report which sets the scene for the agri-food, drinks fisheries and forestry sector until 2020. It indicates that Ireland can grow its food and beverages annual export value by one-third to €12 billion, can increase farm and fishery primary production value by €1.5 billion and processing added value by €3 billion. The ending of milk quotas in 2015 represents an opportunity to grow milk output by 50%. This growth must be sustainable, and organic fertilisers can support sustainable growth.

The Irish organic farming sector is an expanding market that could use compost but is limited to using composts that are certified organic, none of which are currently produced in Ireland.

In the UK, previously only suitably treated green residuals had been permitted as sources of nutrients and soil improvers under organic regulations. In 2011 DEFRA clarified that its interpretation of the EU organic regulation, was that composted or fermented source-separated household residuals are permissible feedstocks to composts that are certified organic provided the compost is subsequently certified to the relevant Publicly Available Standard PAS 100 or PAS 110 respectively, while also meeting additional organic farming requirements.[27]

3.3.2 Determining the actual usage of compost in this sector

The rx3 market survey of fourteen composting facilities in Ireland during November 2010 asked operators about the main markets and tonnages of compost sold from their facility. The aggregated response indicates the agricultural market consumed 29% of the fourteen respondent's tonnage.

[25] www.teagasc.ie/agrifood
[26] www.cso.ie/px/pxeirestat/Statire/SelectVarVal/Define.asp?maintable=ASEA2&PLanguage=0 1990-2003 data; data.worldbank.org/indicator/AG.CON.FERT.ZS
[27] www.organicgrowersalliance.co.uk/node/549

The 28 composting facilities surveyed by EPA NWR 2010 composted 269,200 tonnes organic residuals in 2009, producing an estimated 134,600 (50%) tonnes of compost. A 29% market share for the agricultural sector approximates to 39,034 tonnes of compost.

By comparison, the mean agricultural market share in Europe, in 2008 was 48%, with larger market shares in southern Europe. The share in the UK was 48% in 2007/2008, and 60% in 2008/2009.[28] Intertrade Ireland (2011) and ECN[29] reported respectively that the agricultural market represented 33% and 37% of total Irish compost markets in 2006.

3.3.3 Level of awareness of compost and other recycled organics

There was a good level of understanding of compost and other organic fertilisers and soil amendments in the organic farming sector. Survey respondents understood the advantages of using organic material over a chemical fertiliser, but were equally aware of the requirement for assurances on the quality and certification of products produced before they could even be considered, whatever the claimed benefits.

Among the conventional farming sector, farmers with a ready supply of animal manure did not indicate a requirement to purchase compost as '*with the manure, everything is going well, don't see the need for compost'*, although farmers did note that they would be interested to accept compost free of charge. Farmers without a ready supply of animal manure expressed more interest in compost.

Farmers also queried how nitrogen and phosphorus from compost applications can be aligned with the requirements of the "Nitrates" legislation. These queries are answered in detail in the rx3 crop trial reports www.rx3.ie/Crop-trials-using-compost-and-digestate.

Respondents recognised the importance and supported the idea of creating an Irish supply of certified organic compost.

Some respondents were aware of local composting facilities offering compost for sale. One respondent indicated awareness of the industry compost quality standard and of the rx3 crop trials.
Some respondents commented that they would like to learn about trials with compost, and were informed of the ongoing rx3 crop trial.

3.3.4 Barriers to compost usage

The primary barriers identified during discussions with the agricultural sector include.

Quality

- Quality assurance schemes e.g. supermarket or brewery schemes or Bord Bia schemes for beef, grain, horticulture, dictate which materials may be used on assured produce. Crops that are consumed raw, e.g. salad vegetables, are sometimes considered by purchasers to be at risk of contamination from pathogens in compost and manures. Reference recent salad food scares in USA and Germany, where compost and digestate were investigated and eliminated, as a possible source of pathogens.
- The lack of a quality assurance scheme for compost affects composts penetration into the agricultural market.

[28] European data; Table 34 of "Compost production and use in the EU" ORBIT e.V. / ECN 2008: UK data; UK data, AFOR Survey of the UK organics recycling industry2008/09.
[29] 2006 ECN data, ORBIT Final Report, "Compost production and use in the EU", 29 February 2008; 2006 ITI data from Intertrade Ireland report 2011, from 36 facilities surveyed, Island of Ireland data.;

- Respondents cited fears about “waste-derived” or “pathogen-bearing” compost. Farmers wanted to see and hear from Irish case studies of compost use, in order to learn how effective the material is, how to use it, and other characteristics of interest. E.g. transportation and application of compost differs in cost and technique from artificial NPK and the practicalities require consideration.
- The lack of certified organic Irish compost is a barrier to penetration of compost into the Irish organic farming market. Certified organic compost meeting the European standard is currently imported. DEFRA announced a change in April 2011 in interpretation of the EC Regulations which define the organic farming system, to allow use of compost derived from food residuals that is not certified organic. Recent Irish certification of composting facilities to the compost quality assurance scheme may facilitate change.

Competition

- Manures and sludges (municipal and industrial), are supplied and spread to lands along with a nutrient management plan, and with associated soil testing free of charge or even with a gate fee. These materials may have established links to landholders (pig producers buy grain from and send manure back to grain growers) or be familiar and trusted (spent mushroom compost and sludges). Peat is also widely available for producers seeking soil amendment. Marketing of compost requires emphasis of its strong unique selling points to compete locally with these materials.

Cost

- Cost of compost (relative to NPK compounds and manures) was cited to be a primary criterion for any fertiliser considered. In order to consider compost, farmers require it to be price competitive with artificial fertilisers. Further benefits like improved soil biota or carbon sequestration are viewed as “extra benefits”. The rx3 crop trials clearly demonstrate that cost savings are delivered in certain situations, depending on compost purchase, transport and application costs.
- Volatility of NPK prices restrains extensive use of compost, as farmers and contractors will not purchase compost spreading equipment based on potentially brief spikes in NPK prices. Sustained high prices for NPK would overcome this issue.

Guidance and Implementation

- Normal crop production management requires certainty over additives applied as will be ensured by a compost quality standard and proposed compost quality assurance scheme. Clear guidance on contents, effects of application, nutrient release rates, application methods etc are needed. This certainty is perceived to be not yet available from composting producers.
- Agricultural advisers and contractors were cited as key decision makers and facilitators respectively, and lack of information targeted at this sector is a barrier to its involvement. .
- Farmers fear additional regulatory burden and potential for impact upon the Single farm Payment due to compost use e.g. through Animal By-products Regulation or Good Agricultural Practice requirements.
- A combined agricultural compost sales and spreading service is a business model that works well in other countries. Farmers indicated interest in using such a service.

3.3.5 Quantification of compost use potential in conventional agriculture sector

For the purposes of this section, the agricultural sector is considered to comprise grass and cereal crop growers. Other growers are considered to be in horticulture sector.

Three primary agricultural sub-sectors for compost use are identified, conventional arable crop land, conventional agricultural grass land and organic farming land.

Conventional arable land can use over 15 tonnes of compost per hectare, depending upon soil quality, nutrient content and crop type. Assumption made that 4% of crop land is available annually.

Conventional grassland can use 15 tonnes compost per hectare. The rx3 trials applied 12.5 tonnes of compost per hectare. Assumption made that 0.1% of crop land is available annually. Trials supported by rx3 to examine the benefits of and potential from compost and digestate use on spring barley and winter wheat and grass are ongoing during 2012. These trials help validate compost use figures.

The CSO reports hectarage of land in agricultural use. Compost demand in the sector is estimated in Table 14. The authors made assumptions about how much of this land would use compost. These assumptions used the EPA 2002[30] data, and also accounted for potentially wider compost use with increased fertiliser prices and for decreased application rates per hectare permissible under the Good Agricultural Practice ("Nitrates") Regulations and using compost application rates demonstrated during rx3 crop trials. Thus, the 10 tonnes/hectare application rates are lower than application rates used in the 2002 study.

Table 14: Estimate of demand for compost in the agriculture sector, 2012

Crop	Total land area 2009	% land available est.	Tonnes per hectare est.	Tonnes potential
Total wheat	83,000	4%	10	33,200
Total oats	20,100	4%	10	8,040
Total barley	185,900	4%	10	74,360
Other cereals	4,300	4%	10	1,720
Pasture	2,092,400	0.10%	10	20,924
Hay	220,300	0.10%	10	2,203
Grass silage	1,033,900	0.10%	10	10,339
Arable silage	25,400	0.50%	10	1,270
Maize silage	20,900	0.50%	10	1,045
Total	**3,686,200**	**17%**		**153,101**

These assumptions suggest that the conventional agricultural sector has potential to use over 153,000 tonnes of compost per annum.

3.3.6 Quantification of compost use potential in organic agriculture sector

Organic production accounted for 52,821[31] hectares in Ireland in 2010. Assuming this land (crops and pasture) took 10 tonnes of compost per hectare and that 10% of crop land is available annually. Thus, the organic sector has potential to use 52,821 tonnes annually.

The horticultural sector of certified organic land is likely to be a more intensive user of compost that shown here.

[30] EPA, 2002, Assessment and Evaluation of Outlets of Compost Produced From MSW
[31] Department of Agriculture, Food and Fisheries
www.agriculture.gov.ie/publications/2011/annualreviewandoutlookforagriculturefisheriesandfood20102011/environment/organicfarming/

Organic Farming Action Plan 2008 - 2012 targets conversion of 5% of land (215,000 hectares) to organic farmland by 2012. 10% of 215,000 hectares at 10t/ha has potential to use 215,000 tonnes compost per annum based on above estimates.

The organic farming sector represents a potential growth sector, given that certified organic composts are imported currently.

3.3.7 rx3 supported crop trials

Crop demonstration trials have been a feature of compost marketing in countries that have successfully introduced widespread source segregation, separate collection and composting of organic residuals. Information from these international trials is widely published. Similar projects are required in Ireland to demonstrate the widely verified benefits[32] of compost use to farmers. Therefore, in 2010, rx3 appointed Methanogen Ltd to deliver a demonstration project showing market potential and to quantify technical, environmental, and financial aspects of the approach, to produce results aiding adoption of best practice on Irish commercial farms. The long term objective is to increase agricultural use of compost. The project trials took place during the 2010, 2011 and 2012 summer growth seasons.

Five farms, each growing either spring barley, winter wheat or grass silage, trialled and demonstrated use of quality compost and digestate against use of slurry and inorganic fertiliser in a commercial farming environment.

Figure 12: Crop trials were conducted using commercial equipment

The project is in its third season. Second year results demonstrate a range of beneficial effects and practical learning's. These include:

- Separated digestate liquor and inorganic fertilisers showed similar nitrogen release rates.
- Soil organic matter (SOM) may increase over time, with use of organic fertilisers.
- Compost application timing is important to ensure adequate incorporation.
- Compost is well suited to grass/clover, with steady N-release; yields may increase.

[32] "AAPFCO Soil Amendment / Compost Uniform Product Claims" http://compostingcouncil.org/admin/wp-content/uploads/2010/09/Soil-Amendment-and-Compost-Product-Claims.pdf

- The high N availability in digestate appears to not diminish clover performance as does the N provided by inorganic fertiliser
- Organic fertilisers can be more financially attractive than inorganic fertilisers.

Importantly, the farmers are very satisfied with the results to date.

Figure 13: Surveying crop trial plots in Tipperary

The 2010 and 2011 trial seasons results, including a financial evaluation of the impact of using organic fertilisers, were published in September 2012. The final report, including three seasons' results, will be published mid-2013.

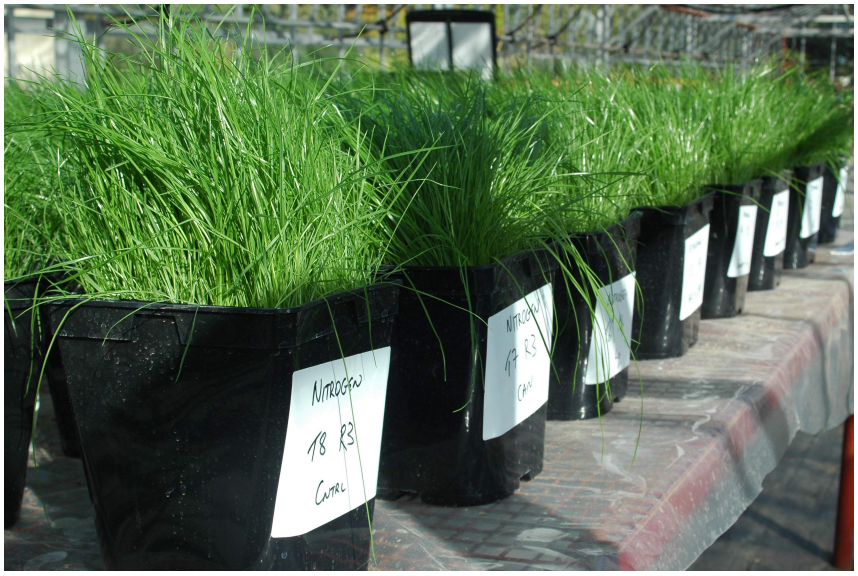


Figure 14: Pot-plant growth trials using grass

A detailed chemical characterisation of the compost and digestate is being conducted. Incubation trials are studying nitrogen and phosphorus (N and P) availability of compost and digestate when mixed with soil. Pot-plant growth trials using grass are ongoing to determine relative availability of organic N and P relative to inorganic N and P. In all cases, a comparison of results will be made to another characterisation which is underway of 25 compost and digestate materials from another project and with results reported in international literature. These results were published in September 2012.

An extensive information dissemination exercise has been conducted throughout the project, and over 400 interested parties have attended open days. A financial evaluation of effects is being developed. Most importantly, the farmers are very satisfied with the results to date.

Figure 15: information dissemination is a key element of the rx3 programme

Full 24-month results from the project are expected to be published during 2012.

3.4 Horticulture sector

3.4.1 About the horticulture sector[33]

The total Irish household purchase in shops of horticultural products, including home produced and imported produce, is valued at €1.2 billion per annum.

The horticultural industry in Ireland produced output was valued at c. €366 million at farm gate values in 2010, of which the food and amenity sectors make up 80% and 20% respectively.

Irish food is primarily sold to the domestic retail market or the food service (i.e. catering) sector.

The key amenity horticultural crops include nursery stock production, protected flowers, ornamentals and Christmas trees. Amenity horticultural produce is primarily sold to the domestic retail market. This includes for example plant/flower sales (value €235 million per annum) through garden centres, DIY shops, lifestyle centres and supermarkets. The gardening & landscape market is an important element of the amenity horticulture sector.

The two main export products are mushrooms to the UK (value €100 million per annum) and amenity horticultural products (value €10 million per annum including nursery stock, cut foliage & Christmas trees).

Association for Organics Recycling (AfOR) reports that the primary horticultural crops using compost in the UK were; vegetables / fruit / salad crops, oilseed rape, beet, peas, potatoes, vegetables, orchard fruit, soft fruit, and glasshouse protected crops. All of these crops are widely grown in Ireland. The production of crops in Ireland for the larger markets is described below.

Potato sector - In 2010, 11,200 hectares of potatoes were grown. Some 540 potato growers grew five hectares or more with approximately 200 of these growers accounting for more than 75% of total production. Potato production in 2010 was more than 450,000 tonnes. Production is primarily targeted at the domestic market.

Field vegetables - The total production area for field vegetables reported was 4,590 ha, with 212 commercial field vegetable growers.

Protected crops - The 120 protected crop growers, largely located in north Dublin, Louth and Wexford) grow mainly tomatoes, peppers, cucumbers and some flower crops. While areas and values of output overall have decreased over the years, there has been some significant investment by individual businesses in this sector in recent years.

Fruit - Over 70 growers produce soft fruit, mainly strawberries, raspberries and blackcurrants. The 196 hectares of strawberries comprise 50% of the total value of the protected edible crop sector output. Approximately 40 apple growers use 579 ha of production area. The top ten growers in terms of orchard size account for 64% of the total production area. Dublin, Tipperary, Waterford and Kilkenny are principal apple production counties.

Amenity crops - Hardy nursery stock production is the key segment of this sector making up 60% of its value. There are more than 100 nursery stock producers located mainly in Kildare,

[33] www.bordbia.ie/industryinfo/hort/pages/marketforhorticulturalproducts.aspx and www.glasireland.ie/industry_info.aspx reporting on "Food Harvest 2020 - Report of the Horticulture Action Group" - June 2011

Tipperary, Kilkenny and the east of the country. Christmas tree output is valued at €9 million and foliage at €3 million euro. Due to the slow-down in economic activity and in particular in the landscaping market, many growers in the amenity nursery sector have re-aligned production systems to supply alternative markets (including the export market).

3.4.2 Determining the actual usage of compost in this sector

The rx3 market survey of fourteen composting facilities in Ireland during November 2010 asked operators about the main markets for compost sold from their facility. The aggregated response indicates that the horticultural market consumed 21% of respondent's product.

By comparison, the mean horticultural market share in Europe, in 2008 was 11.3%. The share in the UK (professional and amateur combined) was 14% and 13% in 2007/2008 and 2008/2009 respectively.[34]

Intertrade Ireland reported that the horticultural market represented 14% and use in peat dilution represented 21% of total Irish compost market in 2006.

ECN[35] reported that the horticultural market represented 3% and "blends" represented 16% of total Irish compost markets in 2006.

The 28 composting facilities surveyed by EPA NWR 2010 composted 269,200 tonnes organic residuals in 2010, producing an estimated 134,600 (50%) tonnes of compost.

A 21% market share for the horticultural sector in 2010 approximates to 21,536 tonnes of compost.

The reported usage of horticulture sector interviewed during the market sounding varied from 40 m^3 per annum up to 1700m^3 per annum.

Horticulture operators report composting some of their own residuals in small piles of chipped green residuals that compost down, relatively unmanaged, into product that they can re-use on sites. This use is not recorded centrally. Therefore the actual rate of use of compost in these sectors may be underreported.

3.4.3 Level of awareness of compost and other recycled organics

The level of awareness, technical knowledge and attitudes to compost in the sector was gauged during the market sounding exercise.

There was a good level of understanding of compost and other organic fertilisers and soil amendments in the horticulture sector. Respondents understood the advantages of using organic material over a chemical fertiliser.

Respondents were interested in talking to compost suppliers, even where they had not yet been using compost. One respondent, a strawberry grower, indicated willingness to trial compost products to evaluate benefits.

There was interest in finding out about other organic by products such as digestate and would like to see trials showing benefits to convince them to use compost.

[34] European data; Table 34 of "Compost production and use in the EU" ORBIT e.V. / ECN 2008: UK data; UK data, AFOR Survey of the UK organics recycling industry2008/09.
[35] 2006 ECN data, ORBIT Final Report, "Compost production and use in the EU", 29 February 2008; 2006 ITI data from Intertrade Ireland report 2011, from 36 facilities surveyed, Island of Ireland data.;

The horticulture sector reported a demand for a variety of products from composting facilities including fine compost, coarse compost, potting mixes, mulch and bark products. Some respondents reported low demand e.g. large amounts of organic material are returned to soils growing brassica crops when crop residues in the field are ploughed back in.

Some respondents were aware of local composting operations offering compost for sale.

One grower reported producing own compost and reported interest in expanding this aspect of his business.

Overall, taking the reservations discussed into account, respondents were generally open to considering further compost use, depending upon further information on quality, quantity and costs being made available.

3.4.4 Barriers to compost usage

The primary barriers identified by the horticultural sector include;

Quality and awareness

- Quality assurance schemes e.g. supermarket or brewery schemes or Bord Bia schemes for beef, grain, horticulture. These schemes dictate which materials may be used on assured produce, and the lack of a quality assurance scheme affects the penetration of compost into the market. Crops that are consumed raw or where the harvested part of the crop is grown close to the soil are of concern. Recent disease outbreaks in USA and Europe with spinach and bean sprouts respectively, demonstrate the importance of having certainty over pathogen elimination.
- In addition to consumer driven quality concerns, the horticulture sector applies much importance on quality and consistency of cropping. Variable quality or low-quality inputs could be disastrous if crop failure resulted, with multiples of the value of the compost at stake.
- Respondents felt that quality assurance could not be delivered by composting facility operators, in the same way as peat producers could. Apart from obvious risks to crops, this could also jeopardise a horticulture grower's compliance with Bord Bia quality assurance scheme.
- Some compost products on the market in the past have not been fit-for-purpose. One grower reported having trialled compost with containing weed seed and high sodium content. The same grower noted awareness of the clopyralid issue in the USA and noted that a mistake over a large crop could be very costly to a grower.
- Respondent's reported that seedlings and young plants require characteristic properties (low electrical conductivity and nutrients) that compost products have not yet been demonstrated to posses.
- Benefits of compost application are seen over a number of years. Therefore, compost use is more likely where growers own or have a long tenure rather than short leases.
- Respondents in the horticultural sector reported high levels of awareness of compost and its marketing. This suggests that awareness of compost product and its properties is not a barrier in at least part of this sector.
- The Good Agricultural Practice for Protection of Waters Regulation's (the "Nitrates regulations") limits nutrient application rates by crop types, limiting applications of nutrient-rich compost to low rates.

Competition

- Manures and municipal / industrial sludges are locally available at low to no cost. These materials may be known and trusted (SMC and sludges). Peat is also widely available for producers seeking soil amendment. Marketing of compost requires emphasising its strong unique selling points to compete locally with these materials.
- Organic growers need certified organic compost, which is not yet produced in Ireland.

3.4.5 Potential

Intensive horticulture in Ireland is frequently located on light soil types, e.g. in North Dublin. This soil type can benefit from compost application, so may be a possible market for compost. Intertrade Ireland[36] identified horticulture clusters in Ireland, in Table 15.

Table 15: Horticulture Clusters on Island of Ireland

Sector	Cluster	Sector	Cluster
Potatoes	Dublin / Meath / Louth Cork, Wexford, Donegal (seed)	Amenity	Waterford / Kilkenny, Kildare, Tipperary, Cork / Kerry,
Field vegetables	Dublin / Meath Cork, Wexford	Protected crops	Dublin / Meath / Louth Cork, Wexford
Apples	Armagh / Louth / Monaghan Tipperary / Waterford / Kilkenny	Fruit (not apples)	Dublin / Meath / Louth Cork, Wexford
Mushrooms	Monaghan / Cavan / Armagh		

The distribution of these clusters matches the approximate distribution of composting facilities on the east and south coasts. This suggests that composting facilities close to horticulture clusters could target that horticulture cluster with specialised product development measures. Trials in these sectors by appropriate composting facility operators would help evaluate interest in the sector.

Growers of fruits indicated that compost may be useful as mulch, e.g. on strawberry crops. Other specialist horticulture sectors such as the turfgrass production sector are smaller users but, given high value of product, offer potentially high value for compost used.

The area in horticultural use in June 2009 reported by the CSO was 4,189,900 hectares total areas farmed and 402,100 hectares total crops, fruit and horticulture. Making assumptions about how much of this land would use compost (based on the EPA 2002 study “Assessment and Evaluation of Outlets of Compost Produced From MSW”) and using compost application rates cited in the literature (and compliant with GAP), an estimate of compost demand in the sector is estimated, shown in Table 16.

Table 16: Potential compost use in horticulture sector

Crop/Sector	Total ha land area 2009	Est. % land available	Tonnes per ha est.	Tonnes potential
Potatoes	12,900	4%	20	10,320
Beans and peas	3,600	4%	10	1,440
Oilseed rape	6,500	4%	30	7,800
Turnips	1,500	4%	10	600
Total beet	8,300	4%	10	3,320
Vegetables for sale	4,200	10%	30	12,600
Fruit	1,600	10%	30	4,800
Nurseries, horticulture	1,500	10%	30	4,500
Other crops	19,800	10%	10	19,800
Total	**59,900**			**65,180**

These assumptions suggest that the horticultural sector has potential to use over 65,000 tonnes of compost per annum. However, growers renting land, e.g. as many potato growers do, may be focussed on short-term gains and be less inclined to improve soils than land owners, who may have longer-term goals.

[36] Intertrade Ireland, 2004, A Review of the All-Island Horticulture Industry

3.5 Retail sector

3.5.1 About the retail sector

Compost is sold in the retail sector through large multiple outlets and independent retailers, primarily DIY/hardware retailers and garden/specialist centres. Compost is sold bagged as a soil enhancer and as a growing medium, primarily to the amateur/hobby gardening sector.

This market requires advertisement and public relation measures. Smaller quantities (mostly bagged) create high packaging and distribution costs, but also higher returns.

The top two DIY multiples are owned by Grafton Group which operates Woodies DIY (33 outlets) and Atlantic DIY (8 outlets) and builder's merchants (62 outlets) for a combined turnover exceeding €500 million. Other multiples operators in the sector include B&Q and Wickes. A large number of independent retailers, large and small, sell compost. The number of independent outlets has not been quantified in this report.

Retailers sell to primarily amateur/hobby gardeners. The compost is sold as "multi-purpose compost" and specialist composts for plants and containers, "grow-bags" for growing vegetables and, to a lesser extent, soil improvers.

Irish retail prices for compost blends and some other materials published on Woodies website on 15 August 2011 were gathered and are presented in Appendix D. Retail prices range from €70 to €450/ m^3. By comparison, also presented are UK prices published by Which Consumer magazine, 2010.

Intertrade Ireland 2011 reports that "*The retail market [in Northern Ireland] for composting products is highly differentiated into dozens of niche products (e.g. seed/ potting compost, container/basket compost etc), but bagged retail composts range in price from around £50 per tonne for multipurpose compost to over £1,000 per tonne for speciality blends (although the market for and yield of these products is small).*" The large pricing ranges observed may be partially explained by bag sizes as typically, larger bags provide cheaper compost per unit of weight.

Peat plays a large role in this sector, and issues around peat have been addressed in detail in this section of the report. The Irish retail sector has not yet agreed an approach to the peat use reduction issue as has happened in the UK with the Growing Media Initiative.

3.5.2 Determining the actual usage of compost in this sector

The rx3 market survey of fourteen composting facilities in Ireland during November 2010 asked operators about the main markets for compost sold from their facility. The aggregated response indicates that the amateur gardening market consumed 18% of respondent's product.

The retail markets for compost are not always reported separately and sometimes reported as part of the hobby/amateur gardening or the blending or peat dilution markets, and are considered together in for parts of this report.

Intertrade Ireland and ECN[37] reported respectively that the peat dilution and blends market represented 21% and 16% of total Irish compost markets in 2006.

[37] 2006 ECN data, ORBIT Final Report, "Compost production and use in the EU", 29 February 2008; 2006 ITI data from Intertrade Ireland report 2011, from 36 facilities surveyed, Island of Ireland data.;

By comparison, the mean *amateur horticulture market* share in Europe, in 2008 was 11%. The share in the UK was 9% in both 2007/2008, and 2008/2009.[38]

The 28 composting facilities surveyed by EPA NWR 2010 composted 269,200 tonnes organic residuals in 2010, producing an estimated 134,600 (50%) tonnes of compost. An 18% market share for the retail sector in 2010 approximates 24,228 tonnes of compost.

3.5.3 Level of awareness of compost and other recycled organics

Retailers reported a good degree of awareness of compost products, and associated alternatives, notably peat. However, retailers also reported customer's awareness as driving their decision making processes, and indicated that this awareness must be driven at a national scale.

The retail sector reports a demand from customers for a variety of products from composting facilities including fine compost, coarse compost, potting mixes, mulch and bark products.

3.5.4 Barriers to compost usage

The primary barriers identified by the retail sector identified include:

Quality

- Retailers expressed concerns about contaminants and items such as glass, sharps and stones in compost. Quality and consistency issues, purchasers require certainty over products applied. This certainty is perceived not to be available from composting facility operators.
- Retailers indicated that buyers using product for professional uses (primarily landscapers) previously found that recycled compost products have been of inferior quality despite being less expensive. This loss of confidence with the quality of recycled products may impact on their customer's willingness to try products in future.
- Retailers reported generally low awareness among their customers of the qualities and environmental benefits of compost or of the environmental impact of using peat. Retailers indicated that an awareness campaign is required in Ireland addressing awareness of the harmful effects of peat extraction, and the alternative solutions. Some respondents indicated that the environmental impact of using peat would affect the buying habits of the general public, but that awareness needed to be raised to facilitate this happening.
- The dominance of, customer familiarity with and physical characteristics of peat work to the detriment of compost products in the market, and some customers express a preference for high peat content products. Respondents noted that this contrasts with the UK market where there has been a shift to the peat reduction with an increase in the use of more sustainable products, led by the larger UK retailers.
- Some retailers indicated that they had previously stocked recycled compost products but that they have stopped stocking these due to lack of demand.
- Unclear and inconsistent labelling of content and properties of compost product was reported to be a barrier to its use.
- One retailer reported *"a preference among Irish retail buyers for multipurpose compost, as opposed to specialist mixes"*. This preference would inhibit the final values available to compost producers, as specialist mixes garner higher prices.
- There are technical barriers to inclusion of high percentages of compost in growing media, such as the high nutrient (salt) content of compost which can cause seedling root damage.

[38] European data; Table 34 of "Compost production and use in the EU" ORBIT e.V. / ECN 2008: UK data; UK 2007/2008 and 2008/09 data, AFOR Surveys of the UK organics recycling industry.

- Growing media can be made and bagged up to six months before the peak spring sales period. The shelf-life of less stable composts products may be reduced due to biological activity.

3.5.5 Peat dilution, growing media and export horticulture markets

Peat has long been used as a horticultural ingredient and the horticultural industry relies heavily on peat sourced from bogs. However, peat bogs are increasingly recognised as valuable habitats for wildlife and important stores of carbon. Environmentalists, government and horticultural businesses now recognise the environmental consequences of using peat in horticulture, and the industry is turning increasingly to sustainable raw materials. This change is mandated in the UK, and as a significant supplier of peat to the UK market, Ireland is affected by these changes.

A proportion of the "compost" produced in Ireland for the growing media sector is diluted peat, so the peat dilution and growing media sectors require consideration. Much of this material is sold through the UK retail sector.

This is a technically demanding sector with complex supply chains blending and bagging peat and compost products in automated plant and selling through to retailers, and direct to end-users.

The island of Ireland is a major producer and exporter of peat-based growing media and soil improvers, producing 2.5 million m^3 annually. Bord Na Mona alone sold over 1.7 million m^3 horticultural peat products (value €49.2 million) in 2009/10. Peat producers exported 90% or 633,699 tonnes of peat from Ireland in 2010, much of it horticultural use in the UK (10,000 m^3 soil improvers and 1,612,000 m^3 growing media to the UK in 2007[39]), but also to the Benelux countries, France and Italy.[40]

Bord na Móna used over 100,000 m^3 of composted materials as peat diluents/replacements on the Kilberry site in 2009 for the UK retail market[41].

Alternatives to peat, including recycled products made from compost and digestate, have been evaluated and incorporated into growing media in recent years and this market may represent a significant growth sector. Peat-free and peat-diluted growing media are used in significant volumes in professional and hobby markets in European countries, including France, Germany and Denmark, Italy, the UK and the Netherlands.[42]

There is increasing demand from UK markets for alternatives to peat due to UK government policy. The UK government introduced a target for 40% of growing media and soil improvers to be non-peat by 2005 in the Mineral Planning Guidance Note 13. The target was raised to 90% peat replacement by 2010 in the UK Biodiversity Action Plan in 1999. However, the UK industry missed the 90% peat reduction target by 2010 significantly. Further UK Government action is in consideration. The "Act on CO_2" campaign is a plan to work with industry to achieve a complete phase out of peat from the amateur gardener market by 2020. The development of WRAP Guidelines for the Specification of Composted Green Materials Used as a Growing Medium Component (Growing Media Specification) influenced development in this sector.

The UK targets and demand from other European countries suggest that there is significant potential in Ireland to replace existing peat-based export growing media markets with peat-free and peat-diluted growing media and soil improvers. As a significant exporter of growing

[39] Monitoring of Peat and Alternative Products for Growing Media and Soil Improvers in the UK 2007; Compost and growing media manufacturing September 2007
[40] www.ipcc.ie/2020peatextraction.html
[41] Bord na Móna, 2010, Organic Waste to Horticultural Resource
[42] Peatlands International 1-2008

media and horticultural products to UK, the Irish peat dilution sector is actively working to comply with the Growing Media Initiative. Supply of suitable compost is a limiting factor and peat diluters have indicated willingness to source quality composted Green residuals from compost producers within the industry.

Bord na Móna used over 100,000 m^3 of composted materials as peat diluents/replacements on the Kilberry site in 2009 for the UK retail market.

New and innovative products continue to be launched, and technological improvements over the last decade are reflected in the excellent quality of many products now on the market. The consumer group "Which? Gardening" recognised this in awarding "Best Buy" awards to three peat-free container composts for the first time in March 2010, including Irish products.

3.5.6 Potential for compost use in the peat dilution export market

Ireland is a major exporter of peat-based growing media and soil improvers, producing 2.5 million m3 annually. Bord Na Mona sold 1.7 million m3 horticultural peat products in 2009/10, 68% of the market. Peat producers exported 633,699 tonnes of horticultural peat from Ireland in 2010, much for use in the UK (10,000 m3 soil improvers and 1,612,000 m^3 growing media to the UK in 2007).[43][44]

Peat dilution with materials including compost supports the market for blends exported to the UK. Bord na Móna, with 68% of the total peat export market, used over 100,000 m3 of composted materials as peat diluents/replacements on the Kilberry site in 2009 for the UK retail market. This indicates that the peat dilution export market is currently a significant consumer of Irish composts, at least 147,000m^3 if Bord na Móna has 68% of the export market. This market may have potential for further expansion, although technical issues may cap the proportion of compost in peat blends. A 50% expansion of Irish compost into this market is estimated, thus, 147,000 tonnes * 150% * 0.5 bulk density = 110,250 tonnes.

3.5.7 Quantification of compost use potential in the Irish retail sector

The volumes of compost sold for horticultural uses through the retail sector (including 100% compost, peat/compost blends and 100% peat) are not published, nor were they available from retailers. Comparisons with the UK market help to derive crude estimates.

The UK used 6.6 million m^3 of peat and alternatives used in growing products (soil improvers and growing media) in 2007. Of this, 69% is bought by amateur gardeners from retail outlets.[45] The proportion of peat diluents in these products overall was 54%, of which compost formed 30%, the balance being wood fibre coir etc. [46]

Thus, a crude, aspirational (due to lack of peat dilution targets) estimate of the potential retail sector market size in Republic of Ireland (population 4.4 million) is 26,561 tonnes of peat diluents/replacements at 54% dilution, as shown in Table 17.

Table 17: Potential use of peat diluted compost in Ireland, based on UK usage rates

UK use	69% bought from retail	Dilution rate (54%)	Diluent was 30% compost	Compost / person in UK	Potential use in Ireland
Cubic meters					**Tonnes / m^3**
6,600,000	4,554,000	2,459,160	737,748	0.012	53,123 m^3 = 26,561 tonnes

[43] Monitoring of Peat and Alternative Products for Growing Media and Soil Improvers in the UK 2007; Compost and growing media manufacturing September 2007
[44] www.ipcc.ie/2020peatextraction.html
[45] DEFRA 2010, Consultation on reducing the horticultural use of peat in England
[46] DEFRA 2005, Monitoring peat and alternative products for growing media & soil improvers in UK

3.6 Landscaping & forestry sector

3.6.1 About the forestry sector

Ireland has 789,000 hectares (12%) of its land area used for forestry, about evenly split between public, primarily Coillte (397,804 ha) and private (347,651 ha) sector forestry. The species composition of the national estate is 25% broadleaf and 75% conifer species.[47]

The likely uses of compost in forestry applications are at planting and nursery stages, as soil improver, in growing media or as mulch or where rapid growth is required. Therefore, the forestry sectors of most interest are nurseries and biomass growers.

In 1996, the Government published 'Growing for the Future', an ambitious strategy for the development of the forestry sector in Ireland to 2035. The strategic plan concluded that the national forest estate would need to increase to 1.2 million hectares (17% of total land area) by 2030. It aimed to achieve this by increasing forestation levels to 25,000 hectares per annum to year 2000 and 20,000 hectares per annum thereafter from 2001 to 2030. However, the rate of forestation has declined in recent years, just 8,314 additional hectares were planted in 2010. Just 54% of the envisioned target (155,000 hectares) has been planted.

3.6.2 About the landscaping sector

The landscaping sector in Ireland is a service provider to landowners. The CSO reports that there are 2,312 active enterprises and 4,483 persons engaged in the sector.

The landscaping sector requires high quality product e.g. for potting soil mixes or growing media. The demand is for a range of special products and mixtures in the specialised applications. This requires product development work by the composting facilities. So packaged solutions are required, not only compost. Compost in this market is in strong competition with bark and peat based products and their well organised industries. However, prices paid are relatively high, and the market for these products is growing.

3.6.3 Determining the actual usage of compost in this sector

The rx3 market survey of fourteen composting facilities in Ireland during November 2010 asked operators about the main markets for compost sold from their facility. The aggregated response indicates that the landscaping market consumed 24% of respondent's product. The reported compost use by landscapers interviewed during the market sounding varied from 2 m^3 up to 4000 m^3 per annum.

No use of purchased MSW-derived compost was reported by the forestry sector, although use of spent mushroom compost and self-generated compost was reported. Landscapers and forestry operators reported some composting of own residuals in small piles of chipped Green residuals that compost down, relatively unmanaged, into product that they can re-use on sites. This use is not recorded centrally. Therefore the actual rate of use of compost in these sectors may be underreported.

The 28 composting facilities surveyed by EPA NWR 2010 composted 269,200 tonnes organic residuals in 2010, producing an estimated 134,600 (50%) tonnes of compost. A 24% market share for the landscaping market approximates to 32,304 tonnes of compost.

WRAP, 2008[48] reports that the UK landscaping sector estimated that their use of compost in this market would grow by 5% per year. The 2007/08 total UK output of green residuals

[47] http://ec.europa.eu/ireland/press_office/media_centre/june2011_en.htm#23

compost into the landscaping industry is estimated at 354,000 tonnes or 5.7kg/person.[49] These estimates equate to 25,477 tonnes compost in Ireland. This suggests that Irish use of compost in the landscape sector approximates the UK rate.

By comparison, the mean landscaping market share in Europe, in 2008 was 12.4%. The share in the UK was 12% and 13% in 2007/2008 and 2008/2009 respectively.[50] Intertrade Ireland and ECN[51] reported respectively that the landscaping market represented 16% and 6% of total Irish compost markets in 2006.

The forestry sector was not described as an outlet that is in use in any of the Irish or European surveys conducted, including the rx3 survey. The UK reports that forestry accounted for <1% of compost use.

3.6.4 Level of awareness of compost and other recycled organics

The level of awareness of the sector was gauged during the market sounding exercise.

There was a good level of understanding of compost and other organic fertilisers and soil amendments in the landscaping and forestry sectors. Respondents understood the advantages of using organic material over a chemical fertiliser, but need reassurance on the quality of products produced. Landscapers reported use of a wide variety of organic products including multipurpose compost, peat moss, topsoil, ericaceous compost , bark , and manures, both compost and non-compost depending on availability and situation.

The forestry sector indicated use of agricultural manures in nurseries, with some spent mushroom compost and some self made green residuals derived compost. No respondent indicated use of purchased compost.

3.6.5 Barriers to compost usage

The primary barriers identified by the landscaping sector identified include;

Quality

- One respondent noted; *'Cost, Quality and availability of product are primary issues'*
- Respondents in both the landscaping and forestry sectors indicated some awareness of compost product and its marketing, e.g. by asking about weed seeds and heavy metal content of recycled compost. This suggests that awareness of the product and its properties is not a problem in all areas of this sector.
- Respondents reported a need for certified high quality products to use as a potting material, for soil improvement and mulches. Respondents felt that quality assurance had not been delivered by composting facility operators to date, in the same way as peat producers could. Variable quality or low-quality product could prove disastrous if planting failure occurred, with multiples of the value of the compost at stake. The compost quality assurance scheme will address this deficit.
- Some respondents indicated they wished to grow in a sustainable manner and would be interested in all sustainable products; also indicated willingness to pay a premium for sustainable products but not at the expense of an inferior product quality.
- Landscapers surveyed felt that the visual impact of any mulch used was extremely important, and expressed concern about contamination content of composts.

[48] WRAP, 2008, Compost Market Assessment Report - Volume 2
[49] AFOR Survey of the UK organics recycling industry 2008/09.
[50] European data; Table 34 of "Compost production and use in the EU" ORBIT e.V. / ECN 2008: UK data; UK data, AFOR Survey of the UK organics recycling industry 2008/09.
[51] 2006 ECN data, ORBIT Final Report, "Compost production and use in the EU", 29 February 2008; 2006 ITI data from Intertrade Ireland report 2011, from 36 facilities surveyed, Island of Ireland data.;

Business model/Logistics

- Landscapers reported a need for sites to drop green residuals to and indicated that they would buy compost as they dropped material off if it were available. This service would facilitate their use of the material, but is not available.
- Respondents reported that self-made compost appears not to be a barrier to compost purchase due to the time required to weed seed and storage problems.
- One respondent noted that *"There is a lack of verifiable information on compost quality and technical advantages".*
- One respondent noted that *"Recycled Grade Bark provided from Civic Amenity Centres in the past has had too many fines in it. This has put Landscapers off recycled products. Now even though the recycled products are less expensive there is a feeling that the products are inferior"*
- One respondent noted that the "*Main obstacles to the greater use of compost are odour and staining of fresh surfaces*."
- One respondent noted that *'I would consider a product if it was better than what I already use…. I would pay extra for a better product'.* This suggests that price is not a significant barrier in all aspects of the horticulture sector.
- Specification of compost within terms of landscape contracts is required if compost products are to be consistently used. If the specification is not explicit, then competing materials might be used, depending on costs. Applying green procurement guidelines will promote this objective. To open this market to regular compost use, product must be of consistent quality and available in sufficient quantity, often at short notice.

3.6.6 Quantification of compost use potential in the forestry sector

Forestry can use compost as a soil improver, as a growing medium or as mulch. Composts could also be used within the biomass sector of the forestry industry. Trees grown for biomass must grow rapidly and would therefore benefit from the high levels of organic matter and nutrients present in composted MSW. Current reported compost use is primarily in the nursery stages of forestry.

Ireland has 789,000 hectares (12%) of its land area used for forestry. The desired forestry plantation rate is 20,000 ha/year for the next 30+ years. If 10% of this 20,000 ha/year is available annually for compost application then approximately 2,000 ha/year will be available. Assuming an application rate of approximately 20 t/ha, this sector could potentially utilise 40,000 t of MSW-derived compost annually.

3.6.7 Quantification of compost use potential in the landscape sector

Compost application is often specified in depth in landscaping application where 1 mm depth = 10 tonnes/hectare. Thus, for example, reinstatement of shrub/herbaceous areas requires 2.5mm = 25 tonnes/hectare.[52]

The landscaping sector has a demand for a variety of products from composting facilities including fine compost, coarse compost, potting mixes, mulch and bark products. This makes it a useful revenue earner to combine with sectors that require large volumes of a single grade of material such as the agricultural sector.

WRAP[53] reports that the UK landscaping sector estimated that their use of compost in this market would grow by 5% per year. A 5% increase on the 25,843 estimate suggests potential use of 27,135 tonnes.

[52] WRAP (2003), Compost specification for the landscape industry.
[53] WRAP (2008), Compost market assessment report - volume 2

3.7 Brownfield and contaminated land sector

3.7.1 About the brownfield and contaminated land sector

The brownfield and contaminated land sector has developed in recent years in Ireland, with much work conducted on mines restoration and landfill cover/capping. There are also a large number of smaller sites with activities likely to require land restoration in future. Bog restoration is a sector that requires consideration as peat extraction finishes and land requires restoration.

Contaminated land
EPA (2002)[54] estimated that there were 395-429 historic and 1580-1942 operational contaminated sites in Ireland. The number of historic and current industrial activities that may pose a risk to soil and groundwater are shown in Table 18.

Table 18: Industrial activities pose a risk to soil and groundwater

Industrial Activities	Estimated Number of Activities	Status
Landfill sites - Closed (EPA Licensed) (2009)	68	Closed
Landfill sites - On-site, open (2009 data)	48	Current
Existing Landfill sites, un- or partially lined	0	Current
Old Gasworks Sites	50-80	Closed
Non-Hazardous and Hazardous Waste Disposal Sites Closed Subject to S.I. 524 of 2008, (2009 data)	327	Closed
Closed Mining Sites (38 with tailing ponds)	128	Closed
Old Fertiliser Plants (Manufacturing and Blending)	4-6	Closed
Closed Tanneries	10-12	Closed
Mining sites in operation	4	Current
Chemical Industry	150-160	Current
Petroleum Import Terminals, (Not including on-site industrial storage facilities)	22	Current
Petrol Station underground storage (30-35% constructed before 1979 Regulations.)	900-1200	Current
Tanneries	3	Current
Timber Treatment Yards	150	Current
Dockyards	14-16	Current
Military Sites	1	Current
Railway Depots	80-100	Current
Scrap Yards and Dismantlers	180-200	Current
Airports with Maintenance Facilities	2	Current

Mine tailings - Ireland has a number of mining sites that have large tailings ponds where mining waste is stored, pending rehabilitation. Tailings ponds facilities in Ireland include Lisheen (78 hectares), Tara (170 hectares), Galmoy (33.5 hectares), and Aughinish Alumina Red Mud Pond (35 hectares). An estimate of 10,000 tonnes is applied.

Bogland - Ireland has large areas of cutaway bogland that has been drained and stripped of peat. This land requires appropriate restoration and is mandated by IPPC licence, in some instances. The end-use selected may require soil amendment or soil manufacture, and thus could prove a potential market for compost in certain instances. An estimate of 10,000 tonnes is applied.

[54] EPA, 2002, Assessment & Evaluation of Outlets of Compost Produced from Municipal Waste Report

Landfills - Landfills use significant amounts of soil-like materials as daily cover, intermediate cover, temporary capping and final capping. Final capping, restoring land to a final function, offers potential for compost use as a soil additive to enhance soil properties which benefit plant growth in the top soil layer.

3.7.2 Determining actual usage of compost in the brownfield sector

Landfill operators must demonstrate that all waste delivered to the landfill has been adequately pre-treated. Biodegradable waste must be stabilised to achieve the reduction of the decomposition properties so that offensive odours are minimised and that the stability standard specified by the waste licence is achieved. Thus, mixed MSW may be processed into compost like output, termed stabilised biowaste. This stabilised biowaste, while still a waste, may have use as cover material on landfills. Compost product is used on landfill as final cover material or as a capping material on mine tailings ponds.

The rx3 market survey of fourteen composting facilities in Ireland during November 2010 asked operators about the main markets for compost sold from their facility. The aggregated response indicates that the landfill cover market consumed 7% of respondent's product.

By comparison, the mean land restoration and landfill cover market share in Europe, in 2008 was 26.4%. The combined (land restoration + landfill cover) share in the UK was (14%+6%) = 20% in 2007/2008 and (3%+6%) = 9% in 2008/2009.[55] The fluctuation in the land restoration market may be due to the large project based nature of the demand.

Intertrade Ireland and ECN[56] reported respectively that the land restoration and landfill cover market represented 11% and 38% of total Irish compost markets in 2006.

The 28 composting facilities surveyed by EPA NWR 2010 composted 269,200 tonnes organic residuals in 2010, producing an estimated 134,600 (50%) tonnes of compost. A 7% land market share for the restoration and landfill cover sector approximates to 9,422 tonnes of compost.

3.7.3 Level of awareness of compost and other recycled organics

Irish mining companies have investigated use of soil forming/soil improving materials to grow vegetation on tailings ponds. These materials are needed as it is difficult to grow grass on bare tailings due to nutrients deficiencies and lack of organic matter. Environmental stability must be achieved to encourage growth. This is done by the addition of organic material, including composts, which can support good and stable vegetative growth. This use of soil forming/soil improving materials presents a possible opportunity to the composting sector.

Galmoy and Lisheen mines have used manufactured soils on tailing ponds.

Galmoy mine has tailings cells with a combined surface area of 33 hectares. Phase 1 (9 hectares) was rehabilitated starting 2007 using a manufactured soil. The facility reports having used 127,000 tonnes of organic substrate (65,000 tonnes brewer's grains, 2,600 tonnes limed sewage cake, 60,000 tonnes compost) mixed with 120,000 tonnes glacial till. The rehabilitated section now supports good vegetative cover of grasses with white clover that can be used as animal feed. Following closure of Galmoy mine, the remaining area of tailings cells will be rehabilitated. Use of organic substrate at the same rates as Phase 1 on 24 hectares would entail use of significant use of organic substrates.

[55] European data; Table 34 of "Compost production and use in the EU" ORBIT e.V. / ECN 2008: UK data; UK data, AFOR Survey of the UK organics recycling industry2008/09.
[56] 2006 ECN data, ORBIT Final Report, "Compost production and use in the EU", 29 February 2008; 2006 ITI data from Intertrade Ireland report 2011, from 36 facilities surveyed, Island of Ireland data.;

Lisheen mine (scheduled for closure in 2013) has 78 hectares under tailings. Part of this area has been restored using a growth medium manufactured using a blend of peat and glacial till at 400mm depth (4,000 m^3/ha) to form growth medium for plants. The land has been returned to pasture grazing uses on a trial basis. Significant further areas of tailings must yet be restored. Use of organic substrate on the large areas involved would entail use of significant use of organic substrates.

3.7.4 Barriers to compost usage in the brownfield sector

The primary barriers identified by the land restoration and landfill cover sector include;

- Specification of the product by designers is required if compost products are to be consistently used. If the specification is not explicit, then competing materials might be used, depending on costs. To open this market to regular compost use, product must be consistent quality and available in sufficient quantity, often at short notice. The supply chain to remediation sites may involve organisations such as engineers and soil blenders.
- Ability to deliver very large volumes of product in a very short period of time will require appropriate compost storage measures, at producer or user premises.

3.7.5 Quantification of compost use potential in the brownfield sector

Landfills
Minimum requirements for final capping of landfills for non-hazardous waste include > 1m top layer of soil as a cover. WRAP[57] cites use of compost applied with topsoil for soil improvement in quarry restoration at rates of over 300 tonnes per hectare.

EPA data[58] indicates that there were 82 hectares temporary capped and 24 hectares uncapped, or 106 hectares total at MSW landfills open in 2008. Closure of 106 hectares (1.06 million m^2) will require 1 million m^3 of soils at 1m depth. These soils typically include 150mm to 300mm topsoil depending on proposed final use. Compost could form a proportion (20-40%) of the topsoil depending upon soil conditions and quality, plant tolerances, and manufacturer's recommendations. Capping would be used over the estimated 5 years that the final capping is put in place. This equates to approximately 10,000 tonnes per annum.

Thus, potential compost use (using 2008 capping requirements) in landfill final capping can be estimated in the range.

Estimate	Area	Cap depth	Compost in soil	1 year in 5	Annual use
	m2	M	%	%	m3 / year
Low	1,060,000	0.15	20	20	6,360
High	1,060,000	0.3	40	20	25,440

Bogland
EPA, 2002 [59] assumed that if 50,000 ha of bogland were restored over 10 years, and that 20% was available annually for compost application, at a rate of 20 tonnes/ha, then this sector could utilise 20,000 t of MSW-derived compost annually. The assumption spent bogland that would not have sufficient peat onsite to manufacture soil requires verification.

[57] WRAP, 2010, Good practice guide to use of PAS 100 compost in landscape & regeneration, table 3.
[58] Environmental Protection Agency 2010 Focus on Landfilling in Ireland
[59] EPA, 2002, Assessment and Evaluation of Outlets of Compost Produced from Municipal Waste Report

Mine tailings and other brownfield

Compost application in brownfield application is often at very high rates. WRAP estimates the compost potential of a series of uses associated with regeneration and remediation of brownfield sites as shown in Table 19.

Table 19: Compost use potential for regeneration and remediation of brownfield sites[60] [61]

Use	End use Opportunities	Green area	Application rate	Compost use
Woodland	In situ soil improvement / mulch	100%	250 t/ha	250 t/ha
Golf course	Top dressing / landscaping	100%	125 t/ha	125 t/ha
Parks/POS	In situ soil improvement / landscaping	100%	250 t/ha	250 t/ha
Mixed Development	Topsoil manufacture / in situ soil improvement / landscaping	20%	250 t/ha	50 t/ha
Urban housing	Landscaping	25%	250 t/ha	62.5 t/ha
Rural housing	Landscaping	40%	250 t/ha	100 t/ha
Urban shop/ sports complex	Landscaping	55	250 t/ha	12.5 t/ha
Large colliery regeneration	topsoil manufacture / In situ soil improvement / landscaping / bioremediation	100%	500 t/ha	500 t/ha
Habitat establishment / amenity land	Soil formation	100%	50 - 100 t/ha	50 - 100 t/ha

While an estimate of compost use per unit of land is given, the area of contaminated land must be determined before an estimate of the magnitude of this potential outlet can be assessed. Nevertheless, with numbers of contaminated land sites numbering in thousands, and with high rates of use per hectare, this sector poses a large potential market. A potential use estimate of 10,000 tonnes per annum is taken.

[60] WRAP, 2006, Uses of compost in regeneration and remediation of brownfield sites in the UK
[61] SNIFFER (2010), Code of Practice for the use of sludge, compost and other organic materials for land reclamation.

3.8 Summary of market potential for compost

Current compost use accounts for 189,287 tonnes and the market potential identified is over 500,000 tonnes. Revenue earned from compost sales is not published, and is difficult to estimate. However it is likely to be in low single digit millions.

ECN data giving mean European market prices suggest that current Irish compost production is worth over €14 million with a potential market valued at over €22 million. This market value estimate is heavily weighted by the centralised "export for peat dilution" sector, which accounts for a significant proportion of the calculated value. There are a number of different sectors, with quality requirements being a common demand by the higher value markets. Data on potential compost markets is summarised in Table 20.

Table 20: Actual and potential compost market sizes, issues and estimated unit values

Outlet details	Actual use[62]	Mean EU price €/t	UK[63], Average	Current value @ mean EU price	Potential use	Potential value Mean EU price
Bogland	0	€1		€0	20,000	€20,000
Forestry	0	€1		€0	40,000	€40,000
Brownfield	1,000	€1	€2	€1,000	10,000	€10,000
Landfill	8,422	€1	€2	€8,422	10,000	€10,000
Conventional Agr.	39,034	€6	€1	€238,107	153,101	€933,916
Landscaping	32,304	€10	€12	€323,040	27,135	€271,350
Organic Agr.	0	€15		€0	52,821	€792,315
Horticulture	21,536	€15	€11	€323,040	65,180	€977,700
Peat blend, export	73,500	€145		€10,657,500	110,250	€15,986,250
Retail bagged	24,228	€145		€3,513,060	26,561	€3,851,345
Sports turf			€22			
Amateur Horti.			€16			
Fuel, Energy			€11			
Totals	**200,024**			**€15,064,169**	**515,048**	**€22,892,876**

* High prices because sold in small bags (5 to 20 litres) - See Appendix D for Irish prices

Figure 16 depicts actual and potential market sizes, against ECN price estimates.

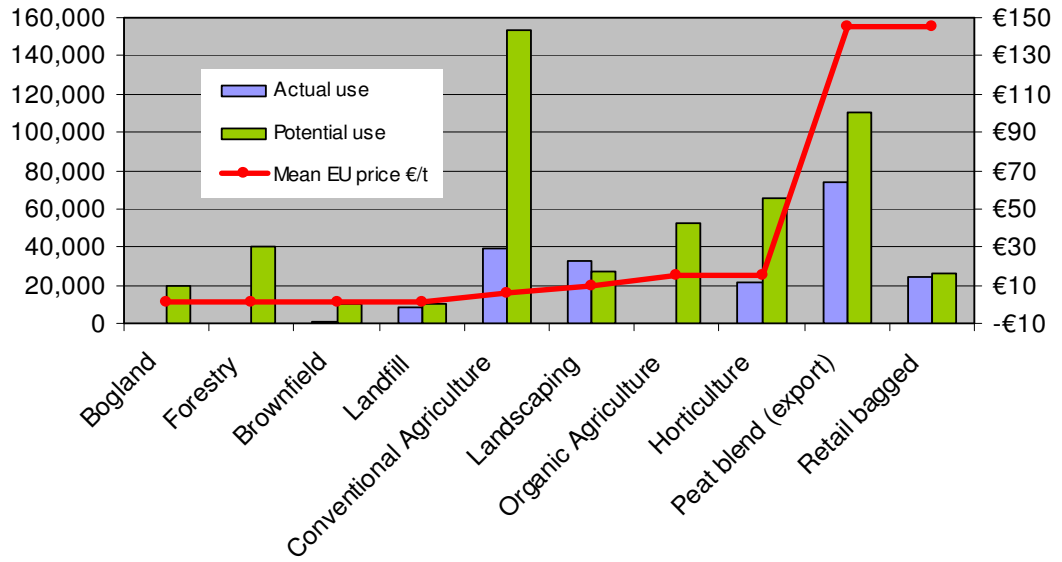


Figure 16: Actual & potential compost market size, and mean EU price, €/t

[62] Estimated by responses to rx3 survey, and calculated.
[63] WRAP survey of the UK organics recycling industry in 2010. 1 pound sterling = 1.23 Euros

The value and volume data are presented graphically in Figure 17 below.

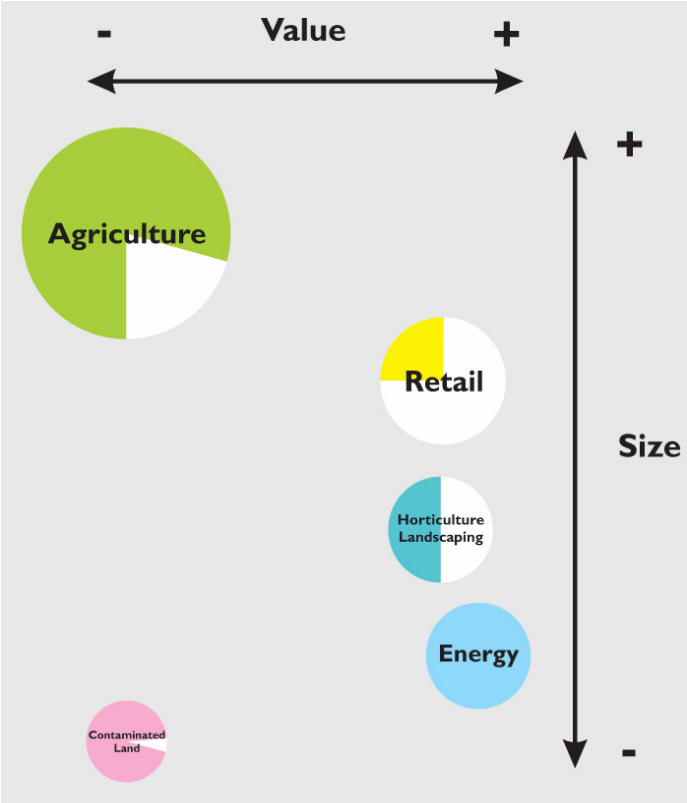


Figure 17: Graphical depiction of market size, and values

The price paid for compost doesn't reflect the real value and the production costs, contrary to many other products. In the Irish compost industry, most revenue is earned at the gate (gate fee) or at the weigh bridge (tonnes of residuals accepted). Few Irish companies, with notable exceptions, have developed their local market so well that compost sales contribute significantly to the companies' economical success. So in most cases additional effort and competence in market and product development and marketing will be required to enter into the revenue oriented high price markets.

The trends in compost prices are unclear. Some data sources suggest that prices are rising, while others suggest falling prices. Thus, supply of compost from source segregated residuals has increased significantly in recent years, possibly putting downward pressure on prices. But, demand for composts is also growing. It is not clear which effect is dominating.

This report suggests that potential for sales of compost products exists in;

- Horticultural clusters show that local markets potentially exist for composting facilities.
- Irish certified organic compost which could displace German/UK imports.
- rx3 crop trials show that compost can displace artificial fertiliser for lower costs. Improved arable and grass crop yields were also shown.
- Quality focussed markets that require quality assurance can be addressed using the national compost quality assurance scheme 441.
- Lack of high quality compost product for specialist users, e.g. in sports turf sector.
- Specialist compost brokers/sales companies that can undertake logistics of compost sales from specialised compost producers not wishing to diversify into this area.
- Higher value peat dilution and retail sales outlets.

APPENDIX A

Appendix A - Sample Calculation of Financial Value of Compost

Compost and digestate contain the key nutrients N, P and K, which have a direct financial value compared with inorganic fertilisers. The prices of chemical-based fertilisers increased to historically high levels in 2007/2008 and have only slightly moderated since. This increase has been driven by the increase in the prices of natural gas/oil and strong world demand for fertilisers. Thus, use of compost as an alternative source of nitrogen and phosphorus may offer cost savings to farmers. The value of fertiliser content of compost is calculated here using NPK market prices based on the typical nutrient contents of composts and digestate.

Table A-1: Calculation of fertiliser value of composts and digestate[64]

	Nitrogen (N)	Phosphorus (P_2O_5)	Potash (K_2O)	Total
Market price of fertilisers	**€1.06/Kg**	**€1.00/Kg**	**€0.70/Kg**	**-**
Green compost				
Fertiliser equivalent (kg/tonne compost)	0	3	5.5	-
Financial value of nutrients in compost (€/tonne compost)	0	2.99	3.86	**6.84**
Green/Food compost				
Fertiliser equivalent (kg/tonne compost)	0.55	3.8	8	-
Financial value of nutrients in compost (€/tonne compost)	0.58	3.79	5.61	**9.98**
Digestate				
Fertiliser equivalent (kg/tonne digestate)	5.92	0.5	1.8	
Financial value of nutrients in digestate (€/tonne digestate)	6.26	0.5	1.26	**8.02**

Thus, one tonne of typical green/food residuals compost was worth €9.98 in fertiliser at the selected artificial NPK prices. Further to the fertiliser value, other properties such as organic matter content can offer improvements to soil quality in the medium and long term including improved soil tilth, effects on diseases and increased macro-organism presence - providing further financial value but are not quantified here.

This calculation may be converted into actual savings using calculations and assumptions for the individual case involved, such as purchase price, transport and application costs. Calculations of this type were conducted during the rx3 crop trials project and are presented in the project report – see www.rx3.ie/Crop-trials-using-compost-and-digestate.

The proportion of each nutrient immediately available for crop uptake differs between materials and facilities. Around 90% of the nitrogen in digestate and 10% in green/food compost may be immediately available to crops. The market price of fertilisers also varies over time. Therefore, calculations should be made on a case by case basis. However, calculated values are a useful marketing tool to demonstrate direct financial value. This value is offset by the costs compost purchase, transport and spreading, (~ €1.23-€3.7 per tonne[65]).

[64] Wrap Compost Calculator, using currency exchange: 1 pound sterling = 1.23 Euros www.wrap.org.uk/content/compost-calculator

[65] Intertrade Ireland 2011, using currency exchange: 1 pound sterling = 1.23 Euros

APPENDIX B

Appendix B - QUESTIONNAIRES

Table B-1: Typical list of questions asked of composting users

Section A :	**Contact Details**
Contact name, job title	
Organisation name and address	
Telephone and email address	
Section B: Activities and products. Does your company or facility use compost site?	
If Yes • What types & how much? Where is the compost sourced?	
If No • Do you use other organic amendments such as peat, mulch, bark, peat/compost mixes, shredded wood, manures, sludges, shredded green residuals etc? • What proportion of this could they replace with compost? What do they pay for the organic amendments? In which sectors of their business is there potential for compost use	
• How much compost could your company / facility use at upper range? Ie displacing all artificial nutrients, if possible. • What are the main obstacles to the greater use of compost in the sector? • Do you see a value in compost? • Are you aware of the rx3 project using compost on arable crops?	
Section C: Knowledge of Sector	
• Are you aware of rx3 and the work that it does?	
Section D :	**Organic Amendment Horticulture Activity**

Which of these products do you use? And List prices paid per m^3 or other units?

- Multi-purpose compost
- Peat moss
- Alternative amendments
- Top soil
- Peat free compost
- Bark
- Cocoa shell
- Manure, Composted
- Manure, non-composted
- Ericaceous compost
- SMC
- Other (specify)

Where do you source these products? Please specify which product from which source? Specify source by name (if willing to do so)?

- Self generated
- Domestic retailer (Woodies etc)
- Composting facility
- Farmer (manures)
- Civic Recycling Facility (e.g. drop off and pick up)
- Forestry sector (e.g. bark, shredded wood, mulch, etc)
- Construction sources
- Peat producing / blending facility
- Other (specify)

What barriers are there to the development of markets for compost from waste materials? Responses *might* include some or all of the following;

- Lack of awareness of compost qualities and environmental benefits among customers
- Preference for _____ product
- Unclear labelling on packaging
- Cost
- Other, please describe

Quantities of compost that could be used in this sector

We wish to estimate quantities of compost that could be used in your sector if barriers are overcome. Do you think that your use of organic amendments, compared to the rest of your sector is?

High Typical Low Other, please describe

Table B-2: Typical list of questions asked of compost producers

Section a: organisation details	
A1 Organisation name and address	
Name, job title	
Organisation name and address	
Telephone, email address	
A2 - What is the primary role of your organisation?	
○ Commercial compost producer ○ Equipment / plant supplier / hire company ○ Waste management company / landfill operator ○ Agricultural ○ Horticultural ○ Community group / not for profit ○ Other *(please specify)* ..... How many composting sites operated?	
Section B: Composting site details	
B1 - Composting site operator and site name and address	
Name of organisation operating composting site..... Composting site name and address.....	
B2 - Feedstock source and compost use	
Is your composting feedstock: produced on-site or brought in from external source or both Is your compost product: used on-site or distributed off site or both	
Composting site operations quantity and type of organic material	
• Throughput - total quantity of source segregated residuals composted or digested in 2009/10 (excluding MBT and mixed wastes composting)..... Tonnes • Please list all those applicable, and specify the quantity composted in 2009/10 A) tonnes municipal household residuals *(i.e. Household residuals collected by local authority or on their behalf)* B) municipal non-household residuals *(i.e. Non-household residuals collected by local authority or on their behalf)* C) non-municipal residuals	
Section C: Compost product	
I. Which, and how much, of the following did you produce in 2009/10? (please tick all applicable and give the quantity in tonnes/ m^3/litres and % sold/free/used onsite) • Mulch (surface applied large particles to suppress weeds, retain moisture, prevent erosion) • Soil conditioner (incorporated into soil to improve, structure, nutrient and biological properties) • Growing media constituent (not soils, used alone or in specific mixtures for plants) • Turf (top) dressing (fine composts to improve establishment and growth of turf) • Ingredient in manufactured soil • Other type of product (please specify, e.g. Landfill cover, biofuel, organic fertiliser)	
Section D: markets, outlets and end-uses	
I. Detail the total quantity manufactured for each outlet in 2009/10. State the principal product type	

Market sector	Quantity manufactured tonnes / m^3 / litres	Principal product (estimate %)
Horticulture *(professional growers using intensive systems, e.g. flowers, nursery stock, fruit & veg)*		
Amateur gardening *(e.g. retail outlets/civic amenity)*		
Agriculture *(e.g. Arable farmers, livestock farmers)*		
Landscaping		
Grounds maintenance *(e.g. grounds, roads)*		
Sports pitches		
Land restoration *(e.g. Brown field, mining areas)*		
Landfill restoration		
Landfill - daily cover		
Other e.g. Efw, forestry, bioremediation *(specify)*		

APPENDIX C

Appendix C - Percentage Outlets Share of European Compost Market

Table C-1: Compost market shares by sector in European composting countries (%)[66]

EU Market shares 2003-2006	AT	BE/Fl	DE	ES *	FI	FR **	HU	IT	NL bw	NL * gw	UK	IE	Mean EU%
Sector	**2003**	**2005**	**2005**	**2006**	**2005**	**2005**	**2005**	**2003**	**2005**	**2005**	**2005**	**2006**	
Agriculture	40	1	53.4	88	20	71	55	51	74.8	44.4	30	**37**	48
Horticulture & green house production	10	1	3.9	8	-	25	15	-	-	15.5	13	**3**	11.3
Landscaping	15	22	15.9	4	20	-	10	6	3.6	12.3	14	**6**	12.4
Blends	15	6	13.6	-	10	-	-		15	5.1	2	**16**	10.3
Soil mixing companies	2	21	-	-	-	-	-	-	-	9.4	-	**-**	10.6
Wholesalers	-	9	-	-	-	-	-	-	-	5.2	-	**-**	9.7
Hobby gardening	15	20	11.9	-	-	4	5	27	1.1	2.3	25	**-**	11
Land restoration and landfill cover	2	1	-	-	50	-	15	2	-	-	16	**38**	26.4
Export	1	7	-	-	-	-	-	-	5.5	5	-	**-**	4.6
Others	-	2	1.3	-	-	-	-	-	-	0.8	-	**-**	1.4

* Garden material derived compost
** Mainly mixed waste compost

[66] European Commission Final Report, 2008, "Compost production and use in the EU"

APPENDIX D

Appendix D - Retail Compost Prices

Prices on www.buy4now.ie/woodiesdiy **15.8.2011**

Table D-1: Retail compost type product prices

Product	Description	€/ m3	€/t*
Erin Irish Moss Peat 175 Litre	Peat	50	100
Erin Excel Tomato Planter	Unclear	60	120
Erin Excel Vegetable Planter	Unclear	60	120
Growise Fruit and Vegetable Planter	Unclear	60	120
Growise Potato Planter 56 Litre	Unclear	60	120
Erin 100 Litre Excel Multipurpose Compost	Compost blend	70	140
Erin Irish Moss Peat 100 Litre	Peat	70	140
Erin Multi-Purpose Compost 50 Litre	Compost blend	70	140
Hortons 60 Litre Container & Potting Compost	Compost blend	70	140
Hortons Multi-Purpose Compost 120 Litre	Compost blend	70	140
Hortons Multi-Purpose Compost 75 Litre	Compost blend	80	160
Erin Ericaceous Compost 50 Litre	Compost blend	90	180
Erin Excel Multipurpose Compost 50 Litre	Compost blend	90	180
Erin Tree, Shrub & Rose Compost 50 Litre	Compost blend	90	180
Erin Decorative Mini Chip Bark 75 Litre	Bark	100	200
Growise Grow Bag.	Unclear	100	200
Horton 60 Litre Farmyard Manure	“Manure”	100	200
Hortons 75L Decorative Mini Bark	Bark	110	220
Shamrock Potting Compost 75 Litre	Compost blend	110	220
Erin Excel Multipurpose Compost 25 Litre	Compost blend	120	240
Westland 60 Litre Multi Purpose Compost w John Innes	Compost blend	130	260
Westland Soil Conditioner 60 Litre	Unclear	130	260
Growise House Plant & Pot Plant Compost 20 Litre	Compost blend	170	340
Hortons 30L Top Soil	Soil	200	400
Westland Bulb Compost Pouch 10 Litre	Compost blend	330	660
Westland Cacti Compost Pouch 10 Litre	Compost blend	450	900
Westland Indoor Plant Compost 10 Litre	Compost blend	450	900

Table D-2: UK prices for compost and topsoil reported by WRAP and Which Consumer Magazine 24 February 2010

Product	Grade	Per m^3	Cost per tonne*
Ex-works bulk	0-40 mm	£3	£6
Ex-works bulk	0-5mm	£12	over £20 @ 500kg/ m^3
Delivered bulk	Topsoil delivered to landscaping	-	£11- £18
Delivered bulk	Topsoil delivered to sports and leisure	-	£15-£30
Bagged retail	Multipurpose compost	-	£50 per tonne
Bagged retail	Speciality compost blends	-	Up to £1,000
Bagged retail	“Seed composts” and “growing young plant composts” (2010)	€70-290	€140-580
Bagged retail	Peat-free “Seed composts” and “growing young plant composts” (Which 2010)	€116	€232

*Cost per tonne @ 500kg/m^3