European Commission

Success stories on composting and separate collection

Directorate-General for the Environment

More information on composting and the text of this publication can be downloaded from the following address:
http://europa.eu.int/comm/environment/waste/compost/index.htm

Any comment about this publication should be sent to the following address:

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Preface

It is my pleasure to preface this collection of success stories in the field of biodegradable waste management published by the Directorate-General for the Environment.

These stories are addressed to people who are responsible for waste management in local authorities, who are members of an environmental NGO or who are simply interested in improving the way in which waste is managed in our society.

Every year more and more waste is generated in the European Union. The volume of waste generated constitutes one of the parameters for measuring the degree of sustainability of our way of life. More has to be done to minimise the quantity of waste produced and to maximise the quantity of waste recycled. This booklet is about how local authorities can be at the forefront of waste management and help all of us contribute to a better environment.

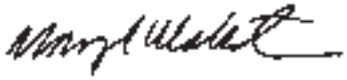
When we eat, mow the lawn or prune trees, we produce waste. But this waste is a special type of waste. It can easily be transformed into a useful product that can enhance the quality of our soils, especially the soils that an intensive agricultural system is making less fertile. This product is compost.

Compost is the odourless, stable and humus-like material rich in organic matter as well as proteins and carbohydrates, which originates from the composting process of organic wastes. The 'magic' of transforming a putrescible, pungent and wet waste into an organic material smelling of soil and freshly turned earth is performed by nature. Bacteria, fungi and worms are all involved. Human technology is only mimicking and speeding up what nature is doing every day under our very own eyes.

The success stories in this booklet will show you that it is not necessary to make big investments and have a sophisticated industrial plant for producing compost — you can do it in your garden!

I would like to underline that to produce good quality compost you need to collect the biodegradable waste separately from other wastes. We all have to make our contribution, if we want to improve the status of our environment. Consumers will have to make an effort to actually separate the waste. Local authorities will have the task of organising an effective collection system so as to minimise costs. Economic operators will have to improve the way in which they handle biodegradable waste. Finally, national governments and the Commission will have to find ways of ensuring that the compost produced will improve the quality of our soils.

I hope that — with the goodwill of all those concerned — this booklet may be useful in generating ideas, suggesting new pathways, and shedding light on separate collection and composting of biodegradable waste in the Community at the turn of the 21st century!



(Margot Wallström)
Environment Commissioner

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1. Introduction

1.1. Aims and objectives

This report has been produced as part of a project undertaken for the European Commission, Directorate-General for the Environment, on success stories on composting and separate collection. This project has involved identifying a number of successful centralised and home composting schemes in the six Member States of Spain (E), France (F), Ireland (IRL), Italy (I), Portugal (P) and the United Kingdom (UK). For each scheme a case study has been completed, highlighting in particular the reasons for the scheme's success.

The objectives of the report are to provide information to local authorities across Member States that will assist in introducing successful and cost-effective home composting and biodegradable waste-separation schemes in their localities.

This report describes the range of initiatives found throughout the Member States considered in this manual, reported in the form of case studies. The key successful factors from specific case studies, and for all schemes, are summarised in the manual in order to provide key parameters for other local authorities planning similar initiatives.

The dissemination of information from successful separation and home composting schemes will assist other local authorities charged with meeting diversion targets from landfill. This project aims to provide reassurance that schemes are practicable and affordable, and encourage the uptake of proven approaches to the diversion of biodegradable wastes.

1.2. Background

1.2.1. The waste hierarchy

The Community waste strategy ([1]) sets out a hierarchical preference for waste-management options of 'minimisation, reuse, material recycling, energy recovery and safe disposal', based on the performance of these options against the overall goal of sustainability ([2]).

In order to progress towards more sustainable integrated waste-management practices, it is necessary to move waste 'up the hierarchy' from the current situation where a substantial proportion of wastes in some European countries is landfilled.

1.2.2. The landfill directive

The Landfill Directive 1999/31/EC aims to ensure high standards for the disposal of waste in the European Union and to stimulate waste prevention via composting and biogasification of biodegradable waste as well as recycling. The directive includes provisions to reduce the landfilling of biodegradable waste in order to avoid the environmental damage caused by releases of breakdown products (landfill gas, including methane, and leachate).

Article 5(1) of the directive includes targets for the diversion of biodegradable wastes from landfill, requiring the promotion of waste sorting, material recycling and energy recovery. Several Member States have already introduced limits for the biodegradable waste that is permitted to go to landfill.

For those Member States which have not introduced such guidelines, achieving the targets in the directive will present a challenge to local authorities and the waste-management industry. Alternative waste-management routes must be developed for biodegradable wastes which realise environmental benefits in a cost-effective manner. The most practicable of these is composting, both centralised and by the householder.

([1]) Set out in the communication from the Commission on the review of the Communitiy strategy for waste management (COM(96) 399 final, 30.7.1996).
([2]) Council resolution on waste policy (OJ C 76, 11.3.1997, p. 1).

1.3. Separate collection and the benefits of composting

The successful diversion of biodegradable wastes from landfill relies on the separation of these wastes at source. Whilst the biodegradable fraction can be extracted from mixed wastes, this is laborious and produces a contaminated product. Separation at source offers the opportunity of a high-quality clean feedstock for composting and the prospect of an uncontaminated product. A 'clean' waste collected via separate collection is more likely to meet compost standards and be suitable for sale or use, bringing associated environmental benefits. Use of the compost end product offsets the requirement for other soil conditioners, such as peat, in agricultural and garden uses.

Separation of biodegradable wastes at source also allows for the promotion of home composting, or composting within small, local communities. This management route for biodegradable wastes has two major advantages: the environmental impacts of waste transport and handling are avoided; and there is generally a use for the compost product by the householder, closing the recycling loop and realising environmental benefits from the offset use of other products (in contrast to the problems sometimes experienced in finding a 'market' for composts produced centrally). Additionally, separating their own waste stream will raise the awareness of householders regarding waste generation and help develop a sense of responsibility for their waste.

More generally, composting as a technology is adaptable and suitable for treating wastes in a variety of socioeconomic and geographical locations. Despite the range of treatment technologies from simple home composting schemes to high-tech centralised systems, both the technology and the associated collection systems can be implemented relatively simply and inexpensively. Public acceptability for composting schemes is also high in comparison with other technologies such as incineration or landfilling of wastes.

Furthermore, the compostable fraction of waste is often one of the most polluting of the waste stream, and implementing such a scheme diverts waste from the traditional disposal routes such as incineration and landfill. As one of the largest fractions of household waste, diverting organic waste from landfill can also significantly contribute to meeting local recycling targets.

2. Key factors of composting case study schemes

2.1. Introduction

This section will discuss the key factors identified from the case studies as crucial to the success of composting schemes. Factors will be discussed in relation to centralised, home, and community composting schemes, across all the Member States.

2.2. Waste types targeted by composting schemes

All schemes target the biodegradable waste fractions of household waste which can include kitchen waste, such as vegetable and fruit peelings, and garden waste, such as grass and plant clippings. Some schemes also allow card and newspaper to be collected within the biodegradable fractions of waste. Many schemes target compostable waste together with other recyclables, such as paper and glass, in an integrated waste strategy. The Wyecycle scheme in the UK involves the separate collection (in different containers and in different collection rounds) of biodegradable waste and dry recyclables. The scheme organisers believe that if they only collected biodegradable waste in isolation householders would be less willing to participate in the scheme.

2.3. Waste-collection arrangements

Waste is either treated in home, community or centralised composting schemes. In home composting schemes it is essential that the householder understands the functioning of the composter and which materials they can dispose of in it. For example, in Arun in the UK, householders were sold 300 L composters and given instructions on how to use them correctly by the scheme organisers and a network of volunteers established with the scheme.

Considering both community and centralised schemes, an organised separate collection system seems to be more effective and therefore all of the case studies examined involved separate collection and none involved the collection of mixed waste which is then sorted for the organic fraction. Separate collection appears to be crucial for the efficient collection of a clean organic feedstock, and also results in a higher quality end product.

Householders are typically provided with containers or bags for the collection of compostable waste free of charge. To charge for these containers is seen as a disincentive to householders to participate in the scheme. However, in a few schemes, such as that in Padua, Italy, householders have to purchase additional bags for compostable waste. Despite this, the Padua case study emphasises the provision of a well-designed collection system, convenient for the householder, and suitable for use, as a crucial success factor.

The frequency of collection can vary from once every one or two weeks to everyday. If a region is implementing a composting scheme concurrent to a reduction in the frequency of 'other' waste collection, it is important to ensure that organic waste collection is frequent enough to prevent waste accumulating to levels which are unacceptable to the householder. This is of particular importance in warmer climates, as biodegradable waste may begin to decompose and cause odour and environmental nuisances, prior to collection if the collection frequency is not high enough.

2.4. Use of end products and quality standards

When operating centralised composting schemes, it is imperative to ensure that an end market exists for the product. Sale of the end product can provide revenue to assist in funding of the scheme. Further, use of the end product is fundamental to realising the full environmental benefit of composting, and so it is important to ensure that this is achieved.

Obtaining a recognised standard for the quality of the compost end product, whilst not always necessary, increases consumer confidence and assists with its use in a variety of applications. To ensure a consistent product of sufficient quality, it is important to have a high-quality, uncontaminated feedstock which is monitored and maintained throughout the year. Separate collection of biodegradable wastes is imperative to ensure the delivery of clean, uncontaminated organic waste feedstock.

In Italy, the compost produced in the composting case studies all comply with an Italian law on fertilisers. This enables the compost to be used in experimental agricultural applications, to be sold to householders or given away for free trials. In Bapaume, France, the organisers of the composting scheme plan to apply for a compost label to enable it to be used by local farmers. These farmers in turn supply produce to local food production companies with their own quality charters.

2.5. Financial details

2.5.1. Capital and operational costs

Whilst capital and operational costs associated with the set-up and running of a composting scheme cannot be avoided, opportunities to minimise costs should be pursued wherever possible. For example, many compost schemes share collection vehicles (and also the associated costs) with schemes to collect dry recyclables. The Monza composting scheme collection in Italy uses the original mixed waste-collection vehicles purchased prior to the development of the composting scheme. The vehicles are shared between the waste collections and have not had to be adapted.

2.5.2. Revenue and cost savings

Many of the composting schemes considered in this report have realised substantial cost savings through implementation of their respective schemes. For example, in the Niort scheme in France, the unit cost of composting is half that of landfilling waste and, in addition, a State tax is not paid on waste that is composted. Cost avoidance is one of the most important benefits to composting.

2.5.3. Financial assistance provided to schemes

The majority of schemes have received some form of financial assistance, often partial funding by local or national government. The Cork scheme in Ireland, obtained funding from the Irish Structural Funds programme and the Barcelona scheme in Spain obtained European Commission funding.

2.6. Publicity and information

In all of the case studies, the most important overriding factor for a successful scheme is good publicity and information, ensuring that stakeholders and scheme participants are involved in the scheme at an early stage, maximising acceptance and participation rates. Most schemes succeed by using a variety of different methods to convey their message to householders.

For example, the Montejurra scheme in Spain had a very intensive publicity campaign involving direct mailing to householders, presentations in villages, campaigns in schools and retirement homes, and advertisements in newspapers and on television and radio.

Composting schemes tend to be popular with the local population, creating jobs and a ‘feel-good’ factor. Publicity campaigns promoting the scheme can emphasise these key points.

2.7. Administration of the scheme

For a scheme to be successful, it is important that it is well organised. Administration of the scheme will typically involve the local municipality or government, which has insight into local circumstances and waste arisings. Detailed planning and design, incorporating local market conditions and specifications, are important when developing a collection scheme and treatment facility. The scheme operators will also need to plan in advance to obtain the necessary planning and licence consents they may require from the relevant authority in their Member State.

2.8. Summary

As highlighted by the case studies presented in this manual, key success factors for separate collection composting schemes have been found to be:

- setting clear, achievable objectives for the scheme;
- establishing the right mix of waste types to target;
- ensuring the scheme infrastructure is organised so as to be effective and also convenient to householders;
- establishing a market for an end product which is clean due to the separate collection of biodegradable waste;
- sound financial management and planning;
- organising a wide-ranging publicity and information campaign for the scheme, ensuring that the local public are as widely involved in the scheme as possible, particularly in the early stages of scheme development.

2.9. Further information

For further information, a list of Internet websites is provided below:

European sites

http://europa.eu.int (home page of the European Union)
http://europa.eu.int/comm/environment/waste/index_en.htm (waste page of the Environment DG)
http://europa.eu.int/comm/environment/waste/compost/index.htm (compost page of the Environment DG)

Austrian sites

http://www.bmu.gv.at/ (Federal Ministry of the Environment, Youth and Family)
http://www.ubavie.gv.at/ (Federal Environment Agency)
http://www.adis.at/nua/ (Environmental Protection Bureau of Lower Austria)

Belgian sites

http://www.ovam.be/ ('The ABC for composting', a manual on home composting)
http://www.ibgebim.be/ (environmental administration for the Brussels Region)
http://www.mrw.wallonie.be/dgrne/education/compost/ (Walloon Ministry of the Environment)
http://www2.cipal.be/Rumst/compost.htm (composting page of the municipality of Rumst)
http://www.aalst.be/milieu.htm#composteren (the site from the city of Aalst with a page on composting)
http://www.merelbeke.be/bestuur/bes3101.htm#tuin (the site from the municipality of Merelbeke with a page on composting)
http://bewoner.dma.be/TROEP/cp_index.htm (a site aiming at promoting home composting)
http://www.ccjuprelle.be/environnement/compostage.htm (the municipality of Juprelle)
http://users.skynet.be/berzelius (private composting website)
http://www.brecht.be/afgft.htm (the site from the municipality of Brecht with a page on composting)

Danish sites

http://www.mem.dk/ (Ministry of the Environment and Energy)
http://www.mst.dk/ (Environment Agency)
http://www.arf.dk/ (Association of County Councils)

Dutch sites

http://www.minvrom.nl/minvrom/ — Ministerie van Volkshuisvesting, Ruimtelijke Ordening en Milieubeheer (VROM) (Ministry of Housing, Regional Planning and the Environment)
http://www.milieuloket.nl/ (guide to making your own compost)
http://www.rivm.nl/ — Rijksinstituut voor Volksgezondheid en Milieu (RIVM) (State Institute of Public Health and the Environment)
http://www.milieucentraal.nl (a Dutch Government site, with information on environmental topics, such as composting)
http://www.noordwijk.nl/milieu/compost.htm (municipality of Noordwijk website on home composting)

Finnish sites

http://www.vyh.fi/ym/ym.html (Ministry of the Environment)
http://www.vyh.fi/syke/syke.html (SYKE) (Finnish Environment Centre)
http://www.kuntaliitto.fi/ (Association of Finnish Municipalities)

French sites

http://www.environnement.gouv.fr/ — Ministère de l'Aménagement du Territoire et de l'Environnement (Ministry of Regional Planning and the Environment)
http://www.ademe.fr/ — Agence de l'Environnement et de la Maîtrise de l'Énergie (ADEME) (Agency of the Environment and the Control of Energy)
http://www.cs3i.fr/ecoleurope/ ('European pupils' website for the environment'; in English, French and German)
http://www.sdv.fr/pages/alainh/publ05.htm (information on composting)
http://www.geocities.com/RainForest/5020/gcompostext.htm (Groupe d'Action pour le Respect et la Défense de l'Environnement)
http://www.explorado.org/francais/fiches/act1.htm (information for schoolchildren on composting)
http://www.perigord.com/homepage/voskuyl/compost.htm (private home page on waste management)

German sites:

http://www.bmu.de/index1.htm — Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit (BMU) (Federal Ministry of the Environment, Nature Protection and Reactor Security)
http://www.umweltbundesamt.de/ (Federal Office for the Environment)
http://www.uvm.baden-wuerttemberg.de/uvm/ — Ministerium für Umwelt und Verkehr (UVM) (Ministry of the Environment and Transport)
http://www.lfu.baden-wuerttemberg.de/lfu/ — Landesanstalt für Umweltschutz (LfU) (State Institute for Environmental Protection)
http://www.bayern.de/stmlu/ — Bayerisches Staatsministerium für Landesentwicklung und Umweltfragen (StMLU) (Bavarian State Ministry of Regional Development and Environmental Affairs)
http://www.bayern.de/lfu/ — Bayerisches Landesamt für Umweltschutz (LfU) (Bavarian State Office for Environmental Protection)
http://www.brandenburg.de/land/melf/ — Ministerium für Landwirtschaft, Umweltschutz und Raumordnung (MLUR) (Ministry of Agriculture, Environmental Protection and Regional Planning)
http://www.hamburg.de/Behoerden/Umweltbehoerde/ — Umweltbehörde (Department of the Environment)
http://www.mulf.hessen.de/ — Hessisches Ministerium für Umwelt, Landwirtschaft und Forsten (HMULF) (Hessian Ministry of the Environment, Agriculture and Forestry)
http://www.hlug.de/ (Hessian State Institute for the Environment)
http://www.mv-regierung.de/um/ — Umweltministerium (Ministry of the Environment)
http://www.nloe.de/ — Niedersächsisches Landesamt für Ökologie (Lower Saxonian State Office for Ecology)
http://www.murl.nrw.de/ — Ministerium für Umwelt, Raumordnung und Landwirtschaft (MURL) (Ministry of the Environment, Regional Planning and Agriculture)
http://www.lua.nrw.de/ — Landesumweltamt (LUA) (State Office for the Environment)
http://www.muf.rlp.de/ — Ministerium für Umwelt und Forsten (MUF) (Ministry of the Environment and Forestry)
http://www.mu.sachsen-anhalt.de/ — Ministerium für Raumordnung und Umwelt (MU) (Ministry of Regional Planning and the Environment)
http://www.thueringen.de/tmlnu/ — Thüringer Ministerium für Landwirtschaft, Naturschutz und Umwelt (TMLNU) (Thuringian Ministry of Agriculture, Nature Protection and the Environment)
http://www.tlu.uni-jena.de/ — Thüringer Landesanstalt für Umwelt (TLU) (Thuringian State Institute for Environment)

http://www.staedtetag.de/ — Deutscher Städtetag (German Council of Cities)
http://www.bionet.net (Europe-wide site dealing with all aspects of biological waste management)
http://www.waste.uni-essen.de/ — Institute of Waste Management (University of Essen) (a major European composting site)

Greek sites

http://www.minenv.gr (Ministry of the Environment, Physical Planning and Public Works)
http://www.minagr.gr (Ministry of Agriculture)
http://www.ntua.gr (National Technical University of Athens)
http://www.duth.gr (University of Thrace)
http://www.auth.gr (Aristotle University of Thessaloniki)
http://www.aegean.gr (University of the Aegean)
http://www.aua.gr (Agricultural University of Athens)
http://www.uth.gr (University of Thessaly)
http://www.uch.gr (University of Crete)
http://www.upatras.gr (University of Patras)
http://www.teikal.gr (Technological Education Institute of Kalamata)
http://www.teilar.gr (Technological Education Institute of Larissa)
http://www.teithe.gr (Technological Education Institute of Thessaloniki)
http:www.cres.gr (Centre for Renewable Energy Sources)
http:www.tee.gr (Technical Chamber of Greece)
http:www.gsrt.gr (General Secretariat of Research and Technology)
http:www.cleanupgreece.org.gr (Cleanup Greece)

Irish sites

http://www.environ.ie/ — Department of the Environment and Local Government/An Roinn Comhshaoil agus Rialtais Áitiúil
http://www.epa.ie/ Environmental Protection Agency (EPA)/An Ghníomhaireacht um Chaomhnú Comhshaoil

Italian sites

http://www.minambiente.it/home1.htm — Ministero dell'Ambiente (Ministry of the Environment)
http://www.mnet.it/upi/ — Unione delle Province d'Italia (Union of the Provinces of Italy)
http://www.compost.it/ (site from the Consorzio Italiano Compostatori)
http://www.monzaflora.it/gruppocomposta/default.htm (address of Scuola Agraria Monza, public working group on composting)
http://provincia.asti.it/edu/agricoltura/agr1ca.htm (public working group on composting)
http://www.bdp.it/~tnir0006/ambiente/compost.htm (site of the Province of Trentino, with information on composting)
http://rmac.arch.uniroma3.it/corsocaad/bosio/finale/progetto/compost.htm (information from the School for Architecture in Rome)
http://www.pavonerisorse.to.it/archivio/compost.htm (a site of an NGO, Legambiente Piemonte, with information on composting)
http://www.comune.fonte.tv.it (the site of the municipality of Fonte, with information on composting)
http://www.ismaa.it/html/ita/compost/compost.html (research programme, from the Istituto Agrario S.Michele all'Adige)

Luxembourg sites

http://www.mev.etat.lu/ — Ministère de l'Environnement (Ministry of the Environment)
http://www.aev.etat.lu/dechet/compost.htm (Waste Division, Ministry of the Environment, with information on composting)

Portuguese sites

http://www.dga.min-amb.pt/arvore.html — Direcção Geral do Ambiente (DGA) (General Directorate of the Environment)
http://www.ipamb.pt/ — Instituto de Promoção Ambiental (IPAMB) (Institute of Environmental Promotion)
http://www.aream.pt/ — Agência Regional da Energia e Ambiente (AREAM) (Regional Agency of Energy and the Environment)
http://www.anmp.pt/ — Associação Nacional de Municípios Portugueses (ANMP) (National Association of Portuguese Municipalities)

http://www.esb.ucp.pt/compostagem/index.html — Centro de Demonstração de Compostagem, a joint effort from the Escola Superior de Biotecnologia da Universidade Católica Portuguesa and the Associação Nacional de Conservação da Natureza)
http://www.bsi.com.br/unilivre/centro/expresiduosorga.htm (website from the Centro de Referência em Gestão Ambiental para Assentamentos Humanos, with comprehensive information)

Spanish sites

http://www.mma.es/ — Ministerio de Medio Ambiente (Ministry of the Environment)
http://www.cma.junta-andalucia.es/ — Consejería de Medio Ambiente (Department of the Environment of Andalucia)
http://www.gencat.es/mediamb/ — Departament de Medi Ambient (Department of the Environment of Catalonia)
http://www.gva.es/coma/ — Conselleria de Medi Ambient (Department of Environment of Valencia)
http://www.fegamp.es/ — Federación Galega de Municipios y Provincias (FEGAMP) (Galician Federation of Municipalities and Provinces)
http://www.fvmp.es/ — Federación Valenciana de Municipios y Provincias (FVMP) (Valencian Federation of Municipalities and Provinces)
http://www.diba.es/mediambient/comp.htm#act (the site of the city of Barcelona, with information on composting)
http://www.drac.com/pers/chueca/compost.htm (information on composting in the City of Terrassa)

Swedish sites

http://miljo.regeringen.se/ — Miljödepartementet (M) (Ministry of the Environment)
http://www.lf.se/ — Landstingsförbundet (Association of County Councils)
http://www.svekom.se/ — Svenska Kommunförbundet (Swedish Association of Local Authorities)
http://www.tjorn.se/gov/kompost/htm
http://www.skelleftea.se/kommun/miljo/kompost.htm
http://www.varmdo.se/teknserv/renhalln/kompost1.htm
http://www.umea.se
http://www.molndal.se/kommunik/kompost.htm
http://www.tanum.se/miljo/information/kompostering.htm
http://www.gotland.se/EKOKOM/GODAEX/huggaren.htm
http://www.geocities.com/RainForest/Vines/7035/kompost.html
http://www.kvarntorp-kretsloppspark.se/komp.htm
http://www.nsr.se/research/index.htm
http://www.pedc.se/gk/avfall/503.html

United Kingdom sites

http://www.detr.gov.uk/ — Department of the Environment, Transport and the Regions (DETR) (Department of the Environment)
http://www.environment-agency.gov.uk/ — Environment Agency (UK Environment Agency)
http://www.doeni.gov.uk/ — Department of the Environment (DOE) (Department of the Environment in Northern Ireland)
http://www.lga.gov.uk/ — Local Government Association (LGA)
http://www.compost-uk.org.uk/standard.html#top (UK Composting Association)
http://www.chiron-s.demon.co.uk/ccn/ (Community Composting Network)
http://www.wdbc.gov.uk/wdbc/html/envir/hcompost.html (West-Devon home composting scheme)
http://www.hambleton.gov.uk/council/homecompost.html ('Guide to home composting of a local community', Hambleton)

Canadian sites

http://www.ns.ec.gc.ca ('Environment Canada' is a government site which contains information on topics such as composting, e.g. the environmental assessment considerations of composting facilities)
http://www.compost.org/ (the Composting Council of Canada/Le Conseil canadien du compostage)
http://atlenv.bed.ns.ec.gc.ca/assessment/comp_f.html (a site from the Canadian Government: 'Elements to be considered when assessing the environmental impact of a composting plant')
http://www.gov.nb.ca/environm/comucate/compost/magic.htm (the site of the New Brunswick Department of Environment. It contains a manual on composting: Backyard magic: the composting handbook)
http://www.gvrd.bc.ca/waste/bro/swcomp1.html (site on composting from the greater Vancouver regional district)
http://www.on.ec.gc.ca/glimr/classroom/chapter-7/compost-e.html (Government site on composting in the classroom)

http://www.digitalseed.com/composter/ (answers to commonly asked questions on composting)
http://www.composter.com/ (linking composting and sustainable communities)

US sites

http://dnr.metrokc.gov/swd/ResRecy/compost.htm ('King County, Washington', a web page on organics and composting)
http://www.tnrcc.state.tx.us/exec/oppr/compost/backyard.html (Texas Natural Resources Conservation Commission)
http://www.lcswma.org/compost.htm (Lancaster County Solid Waste Management Authority, Lancaster, Pensylvania)
http://www.history.rochester.edu/class/compost/compost.html
http://extension-horticulture.tamu.edu/extension/compostfacility/ab (a project on composting from the Texas A & M University)
http://csanr.wsu.edu/compost/ (the 'Compost connection' home page, Sponsored by Washington State University's Center for Sustaining Agriculture and Natural Resources)
http://www.klammeraffe.org/~fritsch/uni-sb/fsinfo/Papers/env/compost/compost.html (Columbia home composting scheme)
http://www.mailbase.ac.uk/lists-a-e/composting/ (a discussion forum and information resource for those working in all aspects of compost engineering, management, science, technology and marketing)
http://www.ci.chi.il.us/WorksMart/Environment/SolidWaste/Composting/CompostingGuide.html ('A city dweller's guide to good composting' (Chicago))
http://www.sfrecycle.org/v2/compost/precomp.htm ('San Francisco recycling program: composting)
http://www.edf.org/pubs/Reports/compost.html (a guide for communities)
http://www.oldgrowth.org/compost/ ('The compost resource page')
http://www.greenbuilder.com/sourcebook/compostsystem.html (sustainable composting)
http://www.epa.gov/epaoswer/non-hw/compost/index.htm ('EPA Office of Solid Waste' web page on composting)
http://www.compostingcouncil.org/ (US Composting Council)
http://www.gov.nb.ca/environm/comucate/compost/magic. (composting handbook)
http://www.vegweb.com/composting/ (composting guide)
http://www.edf.org/heap/ (composting in schools)
http://www.cfe.cornell.edu/compost/Composting_Homepage.html (Cornell Univeristy site)
http://net.indra.com/~topsoil/Compost_Menu.html ('Rot Web', one of the most complete websites on composting)
http://go4green.sask.com/home/garden/compost5.html ('Go for green' website, a guide to composting)
http://www.recyclenow.org/r_composting.html (home composting programme)
http://www.ehmiworld.org/research/composting/guidetoc.asp ('Guide to effective methods for increasing home composting awareness and participation rates')
http://www.metro.dst.or.us/metro/rem/garden/compworks.html (home composting works in the region of Oregon, US)
http://www.ag.ohio-state.edu/~ohioline/hyg-fact/1000/1189.html (factsheet on home composting from Ohio University)
http://www.jgpress.com/Links/BCLinks/OtherResources.html (BiocCycle)

3. Glossary of terms used in composting

- ***Aerated static pile:*** compostable materials are placed in large piles which are aerated by drawing air through the pile or forcing air out through the pile. The pile is not turned
- ***Centralised scheme:*** biodegradable waste is collected from households and taken to a central facility for composting
- ***Compostable waste:*** the biodegradable fraction of waste. All biodegradable wastes of biological origin are in principle compostable. These include food scraps from households, restaurants and canteens, green waste from gardens and parks, soiled paper and cardboard. Although compostable, waste paper and cardboard should in general be used for making new paper and cardboard
- ***Composting:*** the aerobic decomposition of biodegradable wastes under controlled conditions and their reconstitution into humus by the action of micro- and macro-organisms, involving the bonding of nitrogen onto carbon molecules, fixing proteins and carbohydrates in forms readily available to plants
- ***Compost:*** the odourless, stable and humus-like material rich in organic matter as well as proteins and carbohydrates issued from the composting process of biodegradable wastes
- ***Community composting scheme:*** biodegradable waste is collected from householders and processed centrally in a centralised scheme. However, community composting schemes are typically smaller than centralised schemes, and situated within the local community. The end product is used by the householders participating in the scheme, thereby closing the loop of waste generation and use
- ***Home composting scheme:*** biodegradable waste generated by householders is used to produce compost for use by the individual. Although this may involve the purchase of a composter, this is not essential as many householders may compost using composters made at home
- ***In-vessel composting:*** biodegradable material is composted inside a drum, silo, container or other structure. The composting process conditions are closely monitored and controlled and the material is aerated and mechanically turned or agitated
- ***Non-putrescible biodegradable material:*** woody, drier materials, which will compost but take longer to do so than putrescible materials and require the presence of oxygen
- ***Putrescible material:*** soft, wet biodegradable materials such as food scraps and vegetable peelings, which will degrade aerobically or anaerobically
- ***Screening:*** sorting of waste to remove contaminants using equipment such as a trommel or screen
- ***Separate collection:*** the collection of wastes by material type from householders, for example the biodegradable fraction, and dry recyclables such as paper, glass and steel
- ***Trommel:*** equipment used to screen waste. Waste is forced into trommel and separated into different size fractions and contaminants such as plastic films removed
- ***Windrows:*** regularly turned elongated piles of waste in the process of being composted. Windrow composting usually relies on natural processes for air supply to the waste, although it may be artificially aerated. Windrows are turned to increase the porosity of the pile, and increase the homogeneity of the waste

4. Case studies

The table on the next page summarises the key characteristics from each of the case studies presented in the manual.

4.1. Spain

Baix Camp area
Area Metropolitana de Barcelona
Montejurra

4.2. France

Bapaume
Gironde
Niort

4.3. Ireland

Cork
Kerry
Limerick

4.4. Italy

Cupello
Monza
Padova

4.5. Portugal

Amtres
Lipor

4.6. United Kingdom

Arun
Castle Morpeth
Wyecycle

Key characteristics of the composting schemes featured in the manual

Member State	Name of the scheme	Scheme type	Organisation administering the scheme	Number of households and/or population covered by the scheme	Quantity of biodegradable waste collected by the scheme (t/year)	Quantity of compost produced (t/year)
Spain	Baix Camp	Separate collection + centralised composting	Consell Comarcal del Baix Camp	25 000 inhabitants, 8 000 households	4 000	360
	Barcelona	Separate collection + centralised composting	Area Metropolitana de Barcelona	137 000 inhabitants, 55 000 households	10 700	1 900
	Montejurra	Separate collection + centralised composting	Commonwealth of Montejurra	52 000 inhabitants, 23 000 households	10 000	2 000
France	Gironde	Separate collection + centralised composting	Private company	20 000 households	36 000	24 000
	Niort	Separate collection + centralised composting	Commune of Niort	12 000 households	Approximately 8 500	4 511
	SIVOM de Bapaume	Separate collection + centralised composting	Association of communes	23 600 inhabitants	6 000	2 500
Ireland	Cork	Green waste shredder scheme	Cork County Council	280 000 inhabitants	1 000	
	Kerry	Separate collection + centralised composting	Kerry County Council	5 600 inhabitants, 1 766 households	500	
	Limerick	Separate collection + centralised composting	Limerick Corporation	2 800 households	950	450
Italy	Cupello	Separate collection + centralised composting	Municipality of Cupello	4 200 inhabitants	315	
	Monza	Separate collection + centralised composting	Local council	119 060 inhabitants	10 000	
	Padova	Separate collection + centralised composting	Consortium formed by 26 municipalities	205 000 inhabitants	16 500	
Portugal	Amtres	Separate collection + centralised composting	Amtres municipal association	150 000 households	250 000 (1)	15 000
	Lipor	Separate collection + centralised composting	Lipor municipal association	50 000 inhabitants	30 000 (1)	29 000
UK	Arun	Home composting	Arun District Council	140 000 inhabitants	Not known	Not known
	Castle Morpeth	Separate collection + centralised composting	Castle Morpeth Borough Council	20 400 households	5 000	3 000
	Wyecycle	Separate collection + centralised composting	Wyecycle	1 000 households	250	70

(1) Includes both separately collected biodegradable waste and mixed waste which is then mechanically separated.

EC composting success stories

Baix Camp separate collection and composting scheme

Generalitat de Catalunya
Departament de Medi Ambient
Junta de Residus

BAIX CAMP
Consell Comarcal

Above: Logo of the Baix Camp scheme

Summary

- The Baix Camp separate collection and composting scheme is run by the Consell Comarcal del Baix Camp (Baix Camp Area Council). The Catalonian Government, through the Environmental Department, acts as policy-maker and supervisory body of the scheme.
- The area currently covered by the scheme is 695 km^2. It currently includes approximately 25 000 people in 8 000 households.
- The scheme consists of kerbside separate collection from households and large producers of biodegradable kitchen and garden waste, transport to the central composting plant and composting by open aerated piles.
- In the two and a half years of operation of the scheme, approximately 7 000 tonnes of kitchen and 3 000 tonnes of garden waste have been collected, and 900 tonnes of compost produced at the plant.
- The scheme is successful because of good publicity campaigns and the political will within the local council.

Site description and location

The scheme is located in the Baix Camp area of the province of Tarragona, in the southern part of Catalonia (Comunidad Autonoma de Catalunya), in north-eastern Spain. The Baix Camp area is part of a Catalonian administrative division, and provides some centralised services to the municipalities in the area. It includes 28 municipalities, approximately 145 000 inhabitants and 50 000 households.

The area is a mixed rural, non-metropolitan area, with most of the towns and villages being fairly small. Two of the towns, Cambrils and Hospitalet, have a very high seasonal population, with approximately 130 000 tourists visiting in peak season. The local population consists of a mix of elderly rural residents, devoted mainly to agriculture and services, an urban population in Reus, working mainly in industry and services, and a predominantly tourism-oriented population in the coastal area.

The climate is typically Mediterranean, with approximately 500 mm annual rainfall and a mean temperature of 15 °C. Most of the rainfall takes place in the mild winters and the summers are warm and dry.

Scheme description

The scheme consists of a house-to-house kerbside separate collection of the biodegradable fraction of household wastes, and a kerbside collection of biodegradable wastes from producers of large quantities of waste (hotels, schools, markets, industry, etc.). The biodegradable fraction is transported by lorry to the central composting plant, located near Botarell village, in the geographical centre of the area. The scheme started in June 1997, and is now expanding its coverage. Currently, biodegradable wastes are separately collected from 10 rural municipalities and part of the larger towns. The composting plant also receives biodegradable and garden waste from other producers and industries in the area, and from municipalities outside the area.

Right: Leaflet explaining the Baix Camp composting scheme

Aims of the scheme

The aims of the scheme are driven by the Catalonian policy on waste management, which favours recovery of clean fractions of household wastes, in order to improve recovery, reuse and recycling, and divert waste from traditional landfill or incineration. The regulations implementing this policy make separate collection of the biodegradable fraction of household wastes obligatory for municipalities of more than 5 000 inhabitants, the current objective being recovery of 50 % of the biodegradable fraction generated in Catalonia. The Baix Camp scheme is one of the first schemes to be implemented under this policy.

Scheme technical details

Separate collection is made at the household, using 1.5 l bags made of compostable plastic and bins collecting the biodegradable fraction. These are deposited in dedicated kerbside containers. The biodegradable fraction containers, which include the kerbside containers from big producers, are collected by six compactor lorries, making between three and six trips per day, and an additional three to six lorry trips per day are made to collect garden waste. The distance from the collection areas to the composting plant ranges from 2 to 40 km.

The quantities of biodegradable waste received at the plant have been increasing with time, as more municipalities have been undertaking separate collection. In the two and a half years of operation, a total of approximately 10 000 tonnes of biodegradable fraction have been collected, including approximately 3 000 tonnes of garden waste, although this varies seasonally. Maximum and minimum quantities of waste collected in a month are still variable, as the scheme is evolving.

The percentage of participation also varies depending on the collection area considered. Currently, it is 40 % in the 10 rural municipalities. The percentage of non-biodegradable waste (contamination) in the containers is approximately 5 %.

In the central composting plant, which has an annual design capacity of 30 000 tonnes of biodegradable kitchen waste and 5 000 tonnes of garden waste, the biodegradable fraction is pre-treated, by mixing it with garden waste, and left to ferment for two to three weeks. It then undergoes separation through an 80 mm diameter trommel. The rejected waste is sent to landfill and the biodegradable fraction is composted in a covered pile for 12–14 weeks turned with a mechanical mixer. The mature compost is then refined with a 25 mm trommel and a densimetric table. Finally, the compost is separated by trommel into sized fractions. The plant has leachate collection and treatment and bio-filters for the parts of the plant which are housed in buildings.

In the two and a half years of plant operation approximately 900 tonnes of compost have been produced at the plant. Compost is produced to different sizes, depending on demand. There are no specific standards for the quality of the compost, other than the legal definition of compost for agricultural purposes and the size requested by different clients.

The current market for the compost is private gardens and individual farmers, mainly for fruit and olive orchards. It has also been sold for public works, like landfill closure and road revegetation. The current price charged for the compost is ESP 2 000 (approximately EUR 12) per tonne. Initially, compost was distributed free to market the product. The compost is seen as too expensive for farmers (there is excess of manure available in the area) and fairly cheap for private gardeners. Therefore efforts are being made to market the product amongst retailers. Currently all compost produced is sold.

The scheme started with an intense publicity campaign, with door-to-door information (leaflets etc.) given to households and large-scale producers, bins and compostable bags were given away, a bus road show organised and radio and press campaigns undertaken. However, the scheme management did not consider the radio and press campaigns very useful. The scheme undertakes similar continuous publicity efforts in areas to which separate collection will be extended, together with other initiatives such as taking schools to the plant, training volunteers, and setting up a workshop/school centre.

Future plans for the scheme

The scheme is evolving rapidly, especially in terms of the community served by separate collection. Short-term plans include full coverage of Cambrils and Reus, significantly increasing the number of households included in the scheme. In the meantime, the excess biodegradable fraction collected in other areas of Catalonia will be sent to the Botarell plant, helping it reach full capacity. Depending on the general household waste-management planning of the Catalonian Government, the scheme could be enlarged to several neighbouring areas, as the plant is far from capacity.

Financial details

Details of costs	
Set-up costs	ESP 990 million total EUR 6 million total
Operating costs	ESP 7 500/tonne EUR 45/tonne
Publicity costs	ESP 38 million total EUR 228 000 total
Avoided disposal costs	ESP 1 200/tonne EUR 7.2/tonne
Revenue	ESP 180/tonne EUR 1.1/tonne

Above: The central composting plant

Capital costs

- **Composting plant:** ESP 837 million (EUR 5 million) of which approximately:
  - — ESP 600 million (EUR 3.6 million) for construction;
  - — ESP 237 million (EUR 1.4 million) for machinery.
- **Land purchase:** ESP 70 million (EUR 420 000).
- **Access road:** ESP 60 million (EUR 360 000).
- **Collection and transport equipment** (one lorry and containers)**:** ESP 23 million (EUR 138 000). The other scheme lorries were provided by the bigger municipalities involved.
- **Kick-off and 1998 publicity campaign:** ESP 38 million (EUR 228 000).

Capital investment was from the Government of Catalonia (approximately 70 %), and the Baix Camp Council (approximately 25 %). Relatively minor assistance in capital investment through provision of a collection vehicle came from Tarragona Provincial Government.

Running costs

The annual cost of running the plant is ESP 30 million (EUR 180 000), divided into 50 % operational costs, 30 % staff costs and 20 % assorted costs such as insurance and treatment of rejects. Staff at the plant include one skilled and two unskilled workers. Running costs for the collection of the biodegradable fraction can differ depending on the concepts included, as they are part of a more complex waste-collection scheme, including collection of non-biodegradable waste fractions, and the geographical area. For the 10 rural municipalities, collection costs are approximately ESP 14 million (EUR 84 000) a year, with two unskilled workers. To this a pro rata of shared staff equivalent to ESP 4 million (EUR 25 000) must be added, and a similar figure for the publicity campaigns. This gives a total figure of approximately ESP 22 million (EUR 134 000).

Running costs are covered from two sources. One is the flat rate which each municipality charges households, of which approximately ESP 3 300 (EUR 20) is for the treatment of the compostable biodegradable fraction. The other source is the charges for wastes coming from municipalities outside the Baix Camp area, of ESP 3 300 per tonne of biodegradable fraction.

Revenue obtained from composting sales is developing as production increases. In the two and a half years of operation, a total of ESP 1.8 million (EUR 10 850) revenue has been obtained. Cost savings achieved through use of compost, offsetting the use of alternative products, are considered marginal, as there is competition from excess manure in the area.

The cost of disposal avoided is relatively low (ESP 1 200/EUR 7.2) per tonne of waste, as incineration costs in the area are also low, partly due to energy recovery.

Reasons for scheme success

According to the scheme's management, the scheme is successful for a combination of reasons. On the one hand, the Catalonian regulatory framework makes separate collection compulsory for municipalities above 5 000 inhabitants. Also, there has been political will on the part of the Baix Camp Area Council to implement the scheme and coordinate with the municipalities. Additionally, public opinion was favourable before the publicity campaigns. The campaigns have also helped in the success of the scheme, as have the staff involved, who have great enthusiasm.

The scheme had some initial difficulties including technical constraints in the management of putrescible wastes, but this was solved by adding garden waste, thus reducing moisture, and by fermenting waste in the first stage of pre-treatment rather than manually separating it. Other constraints, such as the lack of critical mass of biodegradable fraction for the efficient running of the plant, have been overcome by taking waste from outside the Baix Camp area and from industry. In 1999, the plant was reaching its critical capacity, and the situation is expected to improve further as more municipalities are being included in the scheme.

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EC composting success stories

Barcelona composting scheme

Área metropolitana de Barcelona
Entitat del medi ambient

Above: Scheme logo

Summary

- The Barcelona southern metropolitan area separate collection and composting scheme is run by the Area Metropolitana de Barcelona, Entitat del Medi Ambient (Barcelona Metropolitan Area Environmental Authority), a supra-municipal administration created by law, and provider of centralised services to 33 municipalities in the Barcelona city and surrounding area.
- The area currently covered by the scheme is 113 km^2. The scheme currently includes approximately 137 000 people in 55 000 households over four municipalities.
- The scheme consists of household kerbside separate collection of the biodegradable fraction of household wastes and treatment at a centralised composting plant by composting tunnels.
- Approximately 10 700 tonnes of biodegradable waste a year are composted by the scheme.
- The scheme has been successful due in part to the enthusiasm amongst the metropolitan area staff and the experience of the operating company in composting.

Site description and location

The scheme is located in the Barcelona metropolitan area, an area covering 33 municipalities, approximately three million inhabitants and 585 km^2. The Barcelona metropolitan area is a metropolitan authority, created in law in 1987, supervising and providing centralised services to the municipalities involved. In particular, waste management is jointly managed by the Metropolitan Area Environmental Entity and the municipalities themselves. The scheme described here, which is part of the whole metropolitan area waste-management programme, covers mainly the southern portion of the metropolitan area. This area includes the municipalities of Castelldefels, Viladecans, Gavá and Begues, a total of 137 000 inhabitants in approximately 55 000 households, and covering an area of approximately 113 km^2.

The area's socioeconomic structure is varied, depending on the municipality. Castelldefels is a coastal service municipality, with a fair amount of holiday and weekend households. Gavá and Viladecans have a mix of industry, service industry and tourism, and Begues is mainly a rural municipality.

The population of the area consists of a mix of rural residents and a diversified urban population. The climate is typically Mediterranean, with approximately 500 mm annual rainfall and a mean temperature of 15 °C.

Scheme description

The scheme consists of household kerbside separate collection of the biodegradable fraction of household wastes, and kerbside collection of garden waste and biodegradable wastes from large producers (currently the 40 Barcelona food markets). The non-biodegradable fractions undergo a different cycle and are either collected and recycled or sent to incinerator or landfill.

The biodegradable fraction is transported by lorry to the central composting plant, located in Castelldefels town. The composting plant started operation in 1992, composting mainly sewage sludge, garden and wood waste. Separate collection of the biodegradable fraction started on a small scale in 1997, when the metropolitan area waste-management programme was approved. The composting plant then started receiving the biodegradable fraction and reduced the amount of sewage sludge composted. In 1998, the composting plant was expanded, and both the scheme and the composting plant itself are in an evolving phase in terms of population covered and plant capacity.

Above: Maturing piles at the composting plant

Aims of the scheme

The aims of the scheme are specified and are part of the Barcelona metropolitan area municipal waste-management programme, approved in July 1997. This programme is consistent with, and in some details even goes further than, the Catalonian policy on waste management, which follows EU waste-management policy.

The Catalonian regulations make separate collection of the biodegradable fraction of household wastes obligatory for municipalities of more than 5 000 inhabitants, the current objective being recovery of 50 % of the biodegradable fraction generated in Catalonia.

The Castelldefels composting plant is the second plant processing the biodegradable fraction of waste in the Barcelona area, although it was originally built to compost sewage sludge and wood waste.

Scheme technical details

Separate collection is made at the household level, using 10 l bins made of plastic and bags of biodegradable plastic or paper. These are deposited in dedicated kerbside containers and collected by the municipalities. The other fractions (paper, glass, packaging, other non-biodegradable wastes) are also collected by the municipalities, but subject to a completely different circuit than the biodegradable fraction. The biodegradable fraction containers, which include the kerbside containers from the Barcelona city food markets, are collected by compactor lorries. The lorries make different numbers of trips depending on the type of collection round. Waste from the food markets is collected daily, except Sundays, and waste from the municipalities is collected between three and four times a week. Additionally, a variable number of lorry trips are made to collect garden and wood waste. The distances from the central composting plant to the different collection areas varies from 1–20 km.

The containers are then transported to the central composting plant in Castelldefels. The quantities of biodegradable waste received at the plant are currently changing, as more municipalities undertake separate collection and quantities of sewage sludge decrease. Currently, 3 500 tonnes of biodegradable waste, 2 400 tonnes of sewage sludge and 4 800 tonnes of wood waste are composted at the plant. In the very near future, the quantity of biodegradable waste composted will increase substantially, to reach a maximum target of 16 000 tonnes.

The quantity of waste collected in a month varies as the scheme evolves. The participation rate varies depending on the collection area considered. The entire metropolitan area has a rate of approximately 6 %, but in the southern area this figure is 22 %; however, these figures are not very representative, as they are rapidly increasing.

In the central composting plant, the biodegradable fraction is pre-treated by tearing the bags and mixing the waste with garden waste using an agricultural mixer. In a parallel line, sewage sludge is mixed with wood waste. Both mixes are then introduced in composting tunnels. There are currently three tunnels in the plant, and three more are planned to be built in the short term, with a total volume of 280 m^3 and a usable volume of 210 m^3. The tunnels take two to three days to be filled, and the mix spends between 10 and 14 days composting. The conditions in the tunnels are controlled centrally, in terms of air flow, temperature, oxygen, carbon dioxide, etc., by means of probes into the composting mix from above, and air aspirators and ventilators. The tunnels are equipped with bio-filters made of compost or vegetal recirculated material. The equipment in the tunnels and central control system are designed by the company operating the composting plant.

The mix is then matured in piles in the open, and mixed with a dedicated mixer once a week for two months. The mature compost is then refined by a vibratory table with nets of two different mesh diameters, 5 and 15 mm. This produces compost of two different sizes and characteristics. The non-biodegradable reject, mainly plastic from the bags, is separated by ventilation, and sent to landfill. The plant has leachate collection, which is recirculated to the composting tunnels. Other plant equipment includes a general purpose lorry, four excavators and a wood chopper.

Currently, slightly less than 10 % by weight of the biodegradable waste fraction is converted into compost. Compost production is approximately 1 990 tonnes a year, and this will increase in the very short term.

There are no specific standards for the quality of the compost, other than the legal definition of compost for agricultural purposes. Both the metropolitan area and the Catalonian Waste Authority control certain characteristics of the compost. Additionally, the company operating the plant has its own laboratories which are used to test the compost frequently in order to ensure compliance with clients' requirements. At the plant, several final products are prepared, mixing the compost with sand and earth for different end uses.

The current markets for this compost are private gardens, commercial plant nurseries and retailers. The current price of the compost is between ESP 4 000 and 6 000 (approximately EUR 24–36) per tonne, depending upon the quantity ordered. The sale of the compost is part of the plant company revenue, and at the moment there are no problems in selling the product.

Publicity for the scheme is a joint effort and the responsibility of the metropolitan area and the municipalities involved. In principle, municipalities take the initiative, supported by the metropolitan area authority. The experience in the metropolitan area suggests that the efforts and quality of these campaigns have a very direct effect on the participation rate of the population. At the start of the scheme, several initiatives took place within each municipality, such as the delivery of information (leaflets) to households, providing bins and compostable bags to big producers, and organising meetings as well as radio and written press campaigns. However, the scheme management does not consider the radio and press campaigns to be particularly useful. At present, in areas where separate collection is already taking place, there are no further plans for publicity events.

Future plans for the scheme

The scheme is rapidly expanding, in terms of population covered by separate collection and the area of scheme coverage. Immediate plans include increasing the capacity of the composting plant to 16 000 tonnes of biodegradable fraction a year, which is possible by building three new composting tunnels.

This planned expansion will ensure that the plant can cope with the increasing participation rate from those municipalities already included in the scheme and the inclusion of another municipality in approximately a year's time. This will bring the total population covered by the scheme to approximately 220 000 inhabitants.

Financial details

Details of costs	
Set-up costs	ESP 900 million total EUR 5.4 million total
Operating costs	ESP 18 000/tonne EUR 108/tonne
Publicity costs	ESP 60 million total EUR 361 000 total
Avoided disposal costs	marginal
Revenue	ESP 935/tonne EUR 5.6/tonne

Current capital costs

- **Composting plant:** ESP 530 million (EUR 3.2 million), approximately half in construction and half in machinery.
- **Short-term planned expansion** is budgeted at ESP 370 million (EUR 2.2 million).
- **Collection equipment** is provided by the municipalities involved.

Capital investment made or planned to make the total of ESP 900 million (EUR 5.4 million) is distributed as follows: 22 % European Commission via the ERDF, 56 % government sources (metropolitan area, Catalonian Government, Barcelona Provincial Government) and the rest from commercial financing by the company owning the composting plant.

Other costs

The metropolitan area invested ESP 60 million (EUR 360 000) in publicity campaigns in 1998, with extra quantities provided by each municipality. This figure is likely to be higher at the end of 1999.

Running costs

The operation of the composting plant is the responsibility of a private company. The treatment cost is ESP 18 000 (EUR 108) per tonne of waste. Plant operational costs are approximately 40 % staff costs, 12 % energy and water, 35 % external maintenance, 10 % internal maintenance and 3 % assorted. The company running the plant shares staff with other plants, but at the Castelldefels plant the equivalent staffing levels are: one manager, one administrative staff member, one commercial and laboratory operator and five more operators divided into two shifts. Collection costs are covered by the municipalities.

Running costs are covered by two sources. One is the rate each municipality charges households to cover the collection (ESP 7 000–8 000/ EUR 42–48) and treatment of wastes (ESP 3 000/EUR 18). The other sources of money are the charges per weight of wood received at the plant (ESP 3 000/EUR 18 per tonne) and the revenue from compost sales.

Currently, the revenue from composting sales is approximately ESP 10 million (EUR 60 000) per year. Equivalent final products for the gardening industry, such as peat, are approximately double the price.

The cost of avoided disposal of the biodegradable waste is still marginal, given the current low cost of alternatives (incineration and landfilling). Both alternatives are to have a much lower importance once the metropolitan area waste-management programme is fully developed.

Reasons for scheme success

According to the scheme's management, the scheme is successful for a combination of reasons. On the one hand, there is the support of a planning instrument, the metropolitan area waste-management programme, which sets objectives and means to accomplish various objectives. Also there has been the will from the metropolitan area staff to coordinate with the municipalities and the Catalonian Government. Other reasons are the experience of the operating company in composting, with proprietary technology which operates efficiently. On the collection side, the population covered is participating in the project with interest, probably due to the effectiveness of the publicity campaigns.

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EC composting success stories

Montejurra separate collection and composting scheme

MANCOMUNIDAD DE MONTEJURRA

JURRAMENDIKO MANKOMUNITATEA

Above: Logo of the Commonwealth of Montejurra

Summary

- The Commonwealth of Montejurra separate collection and composting scheme is run by the Commonwealth of Montejurra, the provider of centralised water and waste services to several municipalities in Navarre, northern Spain.
- The area covered by the scheme is 2 000 km^2, including 52 000 people in approximately 23 000 households and 120 municipalities.
- The scheme consists of a household and kerbside separate collection of biodegradable fractions of household wastes, composting at a central plant.
- It produces approximately 2 000 tonnes of compost from 10 000 tonnes of biodegradable waste per year.
- The cost of the scheme is approximately ESP 270 million (EUR 1.6 million) a year.
- The scheme is successful due to the enthusiastic involvement of the local population and the widespread information campaign.

Site description and location

The scheme is located within the administrative boundaries of the Merindad de Tierra Estella, within the region of Navarre (Comunidad Foral de Navarra), in northern Spain. The Commonwealth of Montejurra is an administrative union of the municipalities comprising the Merindad de Tierra Estella providing centralised services.

Montejurra includes 120 municipalities, approximately 52 000 inhabitants and 23 000 households. The area is predominantly rural, but with a high percentage of weekend or holiday households (25 %). Estella, capital of the area, is also the most populated urban area, and there are other smaller towns, but in general the population is fairly dispersed in small villages in an area of 2 000 km^2, with an average density of 26 inhabitants per km^2.

The area's population consists of a high percentage of elderly residents, and is devoted mainly to agriculture, agricultural transformation industries and services.

The climate ranges from sub-atlantic in the north of the area, with approximately 1 200 mm annual rainfall and a temperature range of 5–25 °C, to dry Mediterranean in the south of the area, where annual rainfall drops to 400 mm and temperatures become more extreme, ranging from 0 to 35 °C. The central composting plant is located in the south of the area, in the municipality of Carcar, on an isolated plot of land.

Scheme description

The scheme consists of a:

- household/kerbside separate collection of biodegradable and non-biodegradable fractions in two different containers;
- kerbside collection of paper and glass;
- household collection of bulky wastes (furniture etc.), rags and clothes.

The non-biodegradable and biodegradable fraction containers are collected by truck and transported to the central composting plant, where the biodegradable fraction is composted and sold. Plastic, metal and paper/cardboard fractions are also separated and sold, and the rest of the waste is landfilled. This scheme pioneered separate collection and integral domestic waste management in Spain, and was conceived in 1986. In 1989, separate collection began, and by 1998 all municipalities were included within the scheme. The composting plant started operation in 1993.

Above: Household collection container

Given the pioneering nature of the scheme in Spain, from the very beginning there has been very intense information, publicity and awareness-raising activities taking place. These have included:

- **direct mailing** with brochures and leaflets;
- **scheme explanations in all villages**, with 100 % participation in small villages and 80 % participation in Estella, the area capital;
- distribution of **household biodegradable fraction bins and bags**;
- **sectoral information campaigns** in schools and retirement residences;
- **publicity campaigns** on the radio and in newspapers;
- **television spots** on local networks;
- even the help of the **local clergy**, promoting the scheme during church services.

The participation rate is currently 70 %, and it is considered difficult to improve upon this. However, realistic improvements are desirable and feasible in collection logistics.

Aims of the scheme

The aim of the scheme is to engage the community in managing the area's domestic waste in a sustainable fashion, **diverting waste from the traditional landfill disposal route**. In this sense, the scheme has foreseen, and been a useful example for, later EU and Spanish national policies in household waste management.

Scheme technical details

Biodegradable waste is collected separately from households, using dedicated bags and bins made of recycled plastic. These are deposited in dedicated green kerbside containers. The non-biodegradable fraction (tins, plastic, other packaging) is deposited in brown kerbside containers. These are collected by one or two compartment compactor trucks, with specific routes, and depending on the size of the village, from once a week to six times a week. The distances from the central composting plant to the different villages vary from 3 to 60 km. There are approximately 14 lorry trips per day and the scheme has a total fleet of seven trucks. Containers are then transported to the central separation and composting plant. Approximately 10 000 tonnes of biodegradable waste are collected yearly, which is around 55 % of the total waste collected. Glass and paper are deposited in dedicated street side containers, and do not go to the central composting plant.

In the central separation and composting plant the containers undergo different processes. The biodegradable fraction is shredded and placed in composting piles. These are in the open, on concrete, and undergo aerobic composting for 25 days, being turned with an excavator. Later, the non-compostable or larger than 70 mm fraction is separated by gravity (approximately 15 % by mass). The compost is then further aerated for approximately eight weeks, and sorted using a 12 mm sieve and a densimetric separation unit. About 20 % by mass is separated in this phase.

The non-biodegradable fraction container is subject to trommeling/manual/magnetic separation. Around 30 % of the content of these containers is biodegradable, which after being separated in the trommel, also goes to the open composting area, and joins the separately collected biodegradable waste in the composting cycle.

The plant is currently treating 10 000 tonnes of biodegradable waste per year. It could theoretically separate and treat more biodegradable waste, but the limiting factor is waste generated in the area. Domestic waste is generated at a uniform rate all year. Seasonality is seen mostly in the biodegradable waste generated by the food processing industry (vegetable waste), mainly in late summer to early autumn.

Approximately 2 000 tonnes of compost are produced yearly from the original biodegradable fraction (18 % of which is sewage sludge).

There are no marketing constraints for the compost, and it is readily sold to farmers, mainly for preparing the soil before planting and for vineyards. Potential

Above: House-to-house collection vehicle

demand is considered higher than production. Production is constant and demand seasonal, but there are no storage constraints. The price of compost ranges from ESP 1 750 (approximately EUR 11) and ESP 2 500 (approximately EUR 15) per tonne.

Future plans for the scheme

Future plans for the scheme include increasing the total amount of compost produced. This may be done by increasing the amount of sewage sludge composted by the scheme. There are also plans to improve collection logistics, which seem to limit the participation in the scheme and to improve health and safety conditions at the central composting plant. Expansion is limited by the geographical/administrative territory of the Commonwealth.

Financial details

Details of costs	
Set-up costs	ESP 666 million total EUR 4 million total
Operating costs	ESP 37 000/tonne EUR 222/tonne
Publicity costs	not known
Avoided disposal costs	marginal
Revenue	ESP 200/tonne EUR 1.2/tonne

Capital costs

- **Plant construction:** ESP 400 million (EUR 2.5 million).
- **Land purchase:** ESP 50 million (EUR 310 000).
- **Collection and transport equipment** (7 lorries and containers)**:** ESP 216 million (EUR 1.3 million).

Running costs

- Total **running cost** of the scheme per year: ESP 270 million (EUR 1.6 million), of which approximately ESP 175 million (EUR 1 million) per year are collection costs and ESP 95 million (EUR 572 000) are treatment costs.
- **Staff costs** are approximately ESP 100 million (EUR 600 000) per year for collection and ESP 45 million (EUR 270 000) per year for treatment.

The scheme has a full-time staff of four skilled people (manager and staff responsible for collection and maintenance), and 28 unskilled workers (10 drivers and 18 workers). The Commonwealth also provides, through central services, administration support of three staff per year.

Capital investment was made by the Government of Navarra and the Commonwealth of Montejurra, in the proportions of 90/10 % of infrastructure cost and 70/30 % of the cost of vehicles and containers.

Running costs are covered mainly by the flat rate the Commonwealth charges each household, which is ESP 7 800 (EUR 47) per household per year, revenues from sales of recycled fractions of waste, and landfill charges.

Revenue obtained from composting sales is approximately ESP 2 million (approximately EUR 12 500) a year. Cost of disposal avoided is arbitrary, due to the current absence of alternatives.

Reasons for scheme success

According to the scheme's management, it has been successful mainly because it has proved that such a scheme could be operational and fulfil its objectives, creating a positive feedback between the scheme operator and the population. It also benefited from the pioneer effect, as it has been visited and used as an example by many interested parties from Spain and abroad.

More specifically, the intense and widespread information and awareness-raising campaign has led not only to acceptance, but also to the active participation of the community in the scheme. It has been a bottom-up exercise, more than an imposed scheme. Additionally, the generation which traditionally recycled still exists in the rural area.

Contact details

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EC composting success stories

SIVOM de la région de Bapaume centralised composting scheme

Above: SIVOM logo

Summary

- The SIVOM composting scheme is organised by an association of municipalities in the Bapaume region.
- The SIVOM ([1]) composting scheme of Bapaume covers 92 % of the 23 600 inhabitants of the region.
- It is a centralised composting scheme where biodegradable kitchen and garden waste is collected separately and composted centrally.
- In all, 2 500 tonnes of compost are produced each year from 6 000 tonnes of biodegradable wastes.
- The scheme is successful because householders are well informed of the process and segregate waste efficiently, leading to a high-quality end product.

Site description and location

The region of Bapaume is located in the *département* of Pas-de-Calais, south of the city of Arras, approximately 200 km from the Atlantic coast. It is a rural area, fairly prosperous and characterised by farms and individual houses. The SIVOM includes 56 towns, of which the largest, Bapaume, includes 3 500 inhabitants. The average daily temperature is about 12 to 22 °C and average rainfall 900 mm.

Scheme description

The scheme began by undertaking selective collection of compostable wastes for a trial period, for 3 000 inhabitants. Each household was allocated a 120 l 'green' recycling bin to dispose of kitchen (including meat and fish) and garden waste, paper, cardboard and nappies (very small quantities). Following satisfactory composting trials on the collected waste, the SIVOM decided to expand the collection scheme to all of the 11 000 households in the region. Fifty per cent of household waste is now collected in green recycling bins. Recycling bins have been distributed free of charge and the cost (FRF 265/EUR 40.4 per unit) has been incorporated into the annual waste tax paid by each household.

The SIVOM has four vehicles for the collection of waste. Three vehicles collect the green recycling bins and general waste bins, with another vehicle in reserve. There are seven weekly collection rounds for the green bins, totalling 66 000 km of trips per year.

The composting facility was opened in 1998. Prior to this, a private company was in charge of treating the compostable waste. During its first year of operation, the facility has produced about 2 500 tonnes of compost from 5 600 tonnes of waste (5 000 tonnes of kitchen wastes and 600 of garden wastes). The compost is sold to an agricultural cooperative, the cooperative A1, at FRF 40 (EUR 6.1) per tonne. The cooperative then sells the compost to the local farmers at FRF 60 (EUR 9.15) per tonne. This price includes the service provided to the local farmers by the cooperative such as advising on manuring quantity and frequency of application. The compost is mainly used for potatoes and beetroot farming.

Awareness-raising leaflets have been sent to each household as the bins and waste-collection centres ([2]) were put into place, from the end of 1998 to the beginning of 1999. A representative of the SIVOM has distributed practical guidelines for sorting to each house. An open day has also been organised at the composting facility, and more than 2 000 people have visited the site. Furthermore, the SIVOM

Above: 'Raw' green waste arriving at the centre

([1]) 'Syndicate with various purposes': an association of municipalities which cooperate on a range of issues including municipal waste management.
([2]) Centres open for the public to bring certain wastes for composting and recycling.

Above: Waste being turned in windrows

publishes an annual information letter 'Déchet'tri' for the promotion of the composting collection scheme.

Aims of the scheme

The composting scheme aims to reduce the amount of waste sent to landfill. The region of Bapaume is particularly suitable for the development of a composting scheme as it is an arable rather than a livestock area. Therefore, due to the lack of manure, there is a market to sell the compost produced.

Scheme technical details

The wastes are delivered to the composting centre of Bapaume. The composting facility occupies 3 000 m^2 under roof on a 3.5 hectare site. The optimal capacity of the facility is 7 000 tonnes per year. In the facility, paper and cardboard are composted in addition to kitchen and garden wastes. The collection of paper and cardboard compensates for the seasonal variation in garden wastes which peak in spring and summer. The composting operation can be divided into five main stages.

- **Delivery:** compostable wastes from the green recycling bins (6 000 tonnes per year) and garden wastes from waste-collection centres (1 000 tonnes per year) are delivered.
- **Crushing:** the wastes are crushed and stored in a buffer cell of 12 tonnes capacity before being transported to the composting unit.
- **Composting:** the wastes are put in windrows, firstly for a week in a vessel 37 m long and 4 m wide. On the vessel bottom, an air canal supplied by a ventilator diffuses air according to the windrow temperature in order to accelerate the composting process. A rotating wheel moves along the vessel walls, and turns and waters the material before transferring it to the following vessel. Waste spends one week in each of the four vessels.
- **Sorting:** the metallic wastes are removed using a magnetic separator, then the wastes pass through a rotating 20 mm meshed screen in order to eliminate undesirable and coarse elements.
- **Maturing:** this operation lasts for two to three months. The compost continues to mature until its biological activity has stabilised.

The SIVOM of Bapaume has also tried earthworm composting, but the process was abandoned mainly due to the fragile health of earthworms which needed permanent supervision.

The final compost product is subject to monthly analysis carried out by a private laboratory approved by the Agriculture Chamber. The agronomic quality and concentration of heavy metals are analysed.

Future plans for the scheme

The SIVOM plans to get a label for the compost, as the final product quality is especially important to the farmers who purchase the compost for canning factories. The canning factories who buy the farmers' produce have adopted quality charters with which farmers must comply.

The SIVOM will develop further information on the scheme. In particular,

Above: Central composting facility

it will undertake different activities in order to raise awareness amongst school pupils. School pupils will receive a documented description of the system of selective collection, and recycling and composting concepts will be presented through various learning activities.

The composting facility may also be expanded as the waste collected from householders already participating in the scheme increases, and as neighbouring towns join the scheme.

Financial details

Details of costs	
Set-up costs	FRF 21.8 million total EUR 3.3 million total
Operating costs	FRF 240–270/tonne EUR 37–41/tonne
Publicity costs	FRF 120 000 total EUR 18 300 total
Avoided disposal costs	FRF 200/tonne EUR 30.5/tonne
Revenue	FRF 40–60/tonne EUR 6–9/tonne

Total costs to date are as follows:

- **Composting centre:** FRF 20 million (EUR 3 million), including FRF 6.7 million (EUR 1 million) financed by ADEME (Agency for Environment and Energy Conservation) and FRF 13.3 million (EUR 2 million) by the SIVOM.
- **Four waste-collection centres:** FRF 1.8 million (EUR 274 000) of which FRF 400 000 (EUR 61 000) is financed by ADEME and the Regional Council and FRF 1 400 000 (EUR 213 500) by the SIVOM.

Although the scheme has calculated the cost of collection of green waste as identical to ordinary waste, the cost of treatment is significantly higher for traditional waste disposal routes compared with composting — FRF 120 (EUR 19) as opposed to FRF 40 (EUR 6.25) per person per year. These figures correspond to a cost of about FRF 470 (EUR 72) per tonne for waste disposal when composting of one tonne of biodegradable waste costs approximately FRF 200–230 (EUR 30–35), including FRF 50 (EUR 8) for writing off investment costs. Revenues from composting are FRF 7 (approximately EUR 1) per year for each inhabitant. It includes the revenue from the sale of compost and the financial contribution of 'Eco-Emballages' which is calculated according to the quantities of composted paper and cardboard. Furthermore, the development of the selective collection and the composting scheme generated employment — 19 people are employed by the SIVOM for household waste management.

Reasons for scheme success

The SIVOM considers that communication is an essential condition for the success of the selective collection and composting scheme. The quality of the final product depends on the quality of the sorted material. Only householders who are well informed and convinced of the need for separate collection will meet the required purity targets. Therefore, the emphasis has been put on communication with householders, not only to explain how selective collection works, but also to show the advantages of the composting scheme on the basis of its actual results. In order to persuade the interested parties, the SIVOM approach has been very progressive. It was of prime importance to demonstrate that it was possible to maintain the quality of the waste sorting and the final composting product over time.

Above: Final composting product

Contact details

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EC composting success stories

Gironde composting scheme

Summary

- The composting centre and scheme in the Gironde are run by a private company.
- The centralised scheme covers 20 000 households in the area.
- Biodegradable kitchen and garden waste are collected separately and composted centrally. Householders can also take garden waste to waste-collection centres.
- The composting unit has a total capacity of 40 000 tonnes per year and produces between 2 000 and 3 000 tonnes of compost per month.
- The scheme is successful due in part to the quality of compost produced.

Site description and location

The composting site is located in the *département* of Gironde, in the Landes Regional Natural Park. The Sud Basin district is a coastal region which includes the municipalities in the south of Gironde and north of the Landes. The district has between 50 000 and 150 000 inhabitants, depending on the season, as the population increases significantly during the tourist period. The composting scheme includes the four communes of Arcachon, La-Teste-de-Buche, Gujan-Mestras and Le Teich.

The economic activity of the district is mainly oriented towards tourism. The scheme covers 20 000 households, of which about 15 000 benefit from direct collection (70 % of those in the district).

Scheme description

The Sud Basin waste recycling centre opened in 1997. The management of the centre has been granted to a private company. The centre includes a waste reception and control area, a composting unit, a special storage area for inert wastes and a transfer station for wastes which are not treated directly on the site. In September 1998, a sorting centre for recyclable wastes from separate collection (packaging wastes, cardboard, plastics and wood) was also launched. Wastes are sorted before being sent to the relevant reprocessing facilities.

Householders can voluntarily deliver their garden and green wastes (vegetable and fruit peelings only) to 6 m^3 containers which are put in public areas, although both waste types are also collected directly from individual households on a weekly basis. The district has distributed new kerbside containers with two compartments to allow the collection of dry recyclable wastes and residual mixed household wastes separately. The compostable wastes are collected in the old bins which were used for household wastes before the introduction of the separate collection scheme.

The district has introduced a number of information and communication activities. Once a year, at the beginning of July, a brochure on the district waste-management facilities and a general document on recyclables are distributed directly to each household. An issue of the *District Information Journal* has also focused on separate collection. To support this matter, four district employees, so-called 'sorting ambassadors', liaise directly with the public. Visits to the recycling centre are organised each year, on 5 June, as part of an 'environment day'. During this event, about 2 000 people visit the centre and are offered a free pack of compost. Finally, these actions have been

Above: Aerial view of composting site

Above: Waste arriving at the centre

complemented by meetings in schools, which aim at raising awareness amongst pupils.

Aims of the scheme

Both the Environment Charter signed in 1994 by the Sud Basin district and the Department Plan for waste management focus on the necessity of promoting waste recycling. The district intends to reach a recycling rate greater than 35 % by the year 2000. It operates recycling schemes for garden and kitchen wastes, wood and other materials. The main objective is to divert the maximum volume of wastes from incineration and landfill disposal.

Scheme technical details

Biodegradable wastes are delivered to the recycling centre. The centre covers 20 hectares and the composting area itself covers 14 000 m^2. The centre is fully fenced and under surveillance, and includes a collection system for run-off water. The centre uses the following pieces of equipment:

- two loading machines;
- a windrow-turning machine;
- a sifting machine;
- a tractor;
- a crusher.

The biodegradable wastes which are composted on site include garden wastes from municipal services and industry, as well as household garden and kitchen wastes. The unit has a total capacity of 40 000 tonnes per year. The monthly quantities vary between 2 000 tonnes (including 400 tonnes to households) and 3 000 tonnes (including 1 300 tonnes to households). Approximately 15 to 30 trucks a day enter and leave the site.

The composting operation is performed in the open air and includes the following stages:

- reception and piling of biodegradable wastes from green bins and collection centres;
- crushing and windrow setting;
- watering and successive turning over for two to three weeks (ventilation and humidifying phases);
- sifting, two diameters of mesh are used, 10 and 20 mm in order to eliminate contaminants and oversize particles;
- maturing which lasts for five to six months.

The final product is subject to regular analysis every four to five months by an independent certified laboratory. It is sold to parks, to communities, to households, and to small market gardening and wine-growing companies. The price varies from FRF 70 to 280 (EUR 11 to 43) according to the compost size and the quantities bought. The compost is mainly sold outside the district so as to avoid direct competition with local producers.

Future plans for the scheme

The district plans to extend the separate collection scheme to all householders as a first stage.

At the end of the programme, it will also be extended to blocks of flats and to the city centre.

In parallel, the seasonal tourist population will also be involved in the composting

Above: Final product

scheme in 2000–01, as the necessary equipment still needs to be installed in campsites along the coastline.

The district wishes to increase the proportion of kitchen wastes collected, which is very limited at present and is composed mainly of fruit and vegetable peelings. A specific communication campaign will be organised to promote composting. The objective is to increase the amount of compostable waste collected by 2 000 to 2 500 tonnes per year. To check on the quality of the compost produced from kitchen wastes, it is planned to produce a compost from kitchen wastes only, and conduct a comprehensive analysis on this.

Financial details

Details of costs	
Set-up costs	FRF 1.5 million total EUR 175 000 total
Operating costs	FRF 128/tonne EUR 20/tonne
Publicity costs	not known
Avoided disposal costs	FRF 200/tonne EUR 30.5/tonne
Revenue	FRF 70–280/tonne EUR 10–43/tonne

The total investment is FRF 9.1 million (EUR 1.4 million) allocated as follows:

- **composting area:** FRF 4.5 million (EUR 700 000);
- **buildings/facilities:** FRF 1.5 million (EUR 200 000);
- **crusher:** FRF 1.3 million (EUR 180 000);

Above: Turning of windrows

- **turning over machine:** FRF 300 000 (EUR 50 000);
- **sifting machine:** FRF 500 000 (EUR 80 000);
- **loading machine:** FRF 1 million (EUR 150 000).

The Agency for Environment and Energy (ADEME) has supported the composting scheme with a grant of FRF 2 million (EUR 300 000).

The overall cost of treating compostable waste is FRF 160 (EUR 24) per tonne at the centre, compared with FRF 320 (EUR 49) per tonne when landfilling or incinerating waste. The local incineration plant closed at the end of 1999, and so the cost of incineration will rise due to increased transport costs.

Green wastes received from local communities outside the district and parks are invoiced at FRF 160 (EUR 24) per tonne when they are delivered to the recycling centre. This allows for the production cost to be reduced accordingly.

Four people are employed specifically by the composting scheme.

Reasons for scheme success

The main reasons for the composting scheme's success is the operator's technical expertise and the quality of the compost produced by the scheme. The district has chosen to transfer management of the recycling centre to a private professional operator by 'delegation of public service'.

The scheme did not encounter any problem to find outlets for the compost product. As the compost is produced mainly from 'green wastes', it is easier to sell it to farmers than is the case with compost from urban wastes.

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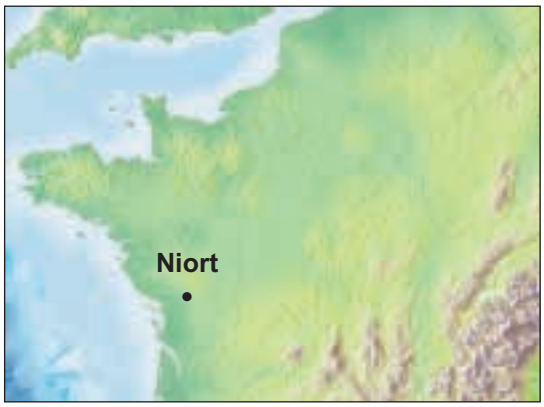
EC composting success stories

Niort Operation colVert scheme



Above: Niort scheme logo

Summary

- Niort Operation colVert scheme is run by the commune of Niort.
- The scheme includes 12 000 households which represent about 50 % of the total population in the region.
- The scheme is a centralised composting scheme, which provides householders with a free compost container for separate kitchen and garden waste prior to collection. Householders also take garden waste to waste-collection centres.
- In 1998, the scheme produced 4 500 tonnes of compost, 2 500 tonnes of which have been distributed to the inhabitants.
- The scheme is successful because the local population realises the volume of the scheme, due in part to a sound information campaign.

Site description and location

The city of Niort, the prefecture of the *département* of Deux-Sèvres, is located 60 km off the Atlantic coast, in the region Poitou-Charentes. Rainfall ranges from 14 to 22 mm per month. Niort has 55 787 inhabitants of whom 65 % live in private housing estates and 35 % in flats and the city centre.

Scheme description

The composting scheme has been developed in two phases. From 1992 to 1994, during the first test phase, 1 500 volunteer households received a specific container (120 or 240 l) and a kitchen bin (10 l) to collect kitchen (including meat and fish) and garden wastes. Waste-collection centres and mini-waste-collection centres ([1]) were also provided with containers for biodegradable wastes. A specific collection was organised and a 3 000 m^3 hard-standing composting facility was built. From the end of 1994 to 1997, the collection scheme was extended to the whole city under the name of 'Operation colVert'.

Operation colVert is aimed at households with a garden. Kitchen bins and 120 or 240 l containers have been distributed free of charge. However, they cost the scheme itself respectively about FRF 18 (EUR 2.7, 10 l), FRF 210 (EUR 31.5, 120 l) and FRF 290 (EUR 43.5, 240 l). In all, 12 000 voluntary households, which represent about 50 % of the community, have been provided with containers and kitchen bins, in three successive phases in 1994, 1996 and 1999.

In 1997, 8 400 tonnes were treated in the composting centre, of which 4 200 tonnes were collected from households. In 1998, 4 500 tonnes were collected from households of which 2 500 tonnes were from direct household waste collection, 1 000 tonnes from waste-collection centres and 1 000 tonnes of garden wastes. Three different grades of compost were produced (10/20/40 mm), and the compost was available for the inhabitants in the waste-collection centres. In 1998, the inhabitants of Niort produced 2 500 tonnes of compost. The city of Niort took 643 tonnes and 226 tonnes were delivered to other users, mainly other communes.

The wastes covered by the scheme include kitchen wastes, packaging cardboard from households and garden wastes disposed of in the containers, garden wastes delivered directly to the waste-collection centres and garden wastes from city services and industry.

The Niort commune has conducted a very active information and communication campaign under the Operation colVert name. The communication project has been carried out in-house and has involved several departments. The information has been disseminated through the media at the national, regional and local levels.

([1]) Small collection centres where yard waste and recyclables can be deposited.

A press conference organised at the beginning of the operation has been followed by regular follow-up press communications and the preparation of a press dossier as well as a special report in the regional press. The municipal administration of Niort has developed different communication tools directed at potential scheme contributors, and, in particular, a public notice campaign, public meetings in the city districts, material distributed door-to-door (leaflets, a letter from the mayor, etc.), stickers, and, a half-yearly newsletter. The commune has also established a specific reception at the City Hall and organised guided tours of the composting site. Free phone numbers are available to the public for all questions related to wastes. Furthermore, people can call to get information on the available compost stocks and distribution days or to ask questions about composter maintenance. Communication messages have also been directed at the municipal staff, the agents in charge of the distribution and collection of containers, the elected authorities and schools.

Aims of the scheme

The main objective of the scheme is to divert waste from landfill disposal and incineration. Composting is considered as having a great potential for this, and the investment and operating costs are lower than for incineration. The composting process is also seen as having lower environmental impacts than incineration and landfill. Composting also solves the problem of the disposal of garden wastes from public areas. The use of compost leads to an improvement of the local clayey and chalky soils.

Scheme technical details

The collection of biodegradable waste from the households is carried out on a weekly basis. The inhabitants have received several bins, differentiated by their colour, for the separation of biodegradable waste and plastic, glass and paper. Refuse vehicles are used to collect kitchen and garden wastes only. Each lorry covers a sector with 1 100 to 1 200 bins.

The city of Niort uses the 'Vegeterre' process, a treatment line on a closed and guarded site. The site covers 14 hectares and includes a composting area of 10 000 m^2. The total capacity of the composting facility is 10 000 tonnes per year, and it is located 5–6 km from the city centre. Given that the volume and composition of the biodegradable wastes vary throughout the year, in particular because of the season changes (for example, dead leaves in autumn), different groups of wastes are isolated and mixed in appropriate proportions in order to standardise the quality of the final product.

The site includes five main operations:

- **reception** and **storage** of biodegradable wastes;
- **crushing, watering, windrow setting;**
- **turn over, watering;**
- putting into **maturation**;
- **maturing, sifting, storage** of the final product and **recycling** of oversize wastes.

A system has been set up to collect run-off. Water from a settling tank is delivered to a water treatment plant. The sifted oversize wastes are sorted out into two categories: unwanted wastes which are sent to the waste disposal site and biodegradable wastes which go back into the composting process. The composting process lasts five to six months and the maturation process one month.

Above: Collection scheme vehicle

Future plans for the scheme

The mayor of Niort plans to increase the treatment capacity of the composting station. The hard-standing area will be doubled so as to compost 15 000 tonnes of waste per year. The crusher (grinder) and the sifter will be replaced. The mayor also intends to try and obtain a quality label for the final product.

Financial details

Details of costs	
Set-up costs	not known
Operating costs	FRF 200/tonne EUR 30.5/tonne
Publicity costs	FRF 313 500 total EUR 47 800 total
Avoided disposal costs	FRF 260/tonne EUR 40/tonne
Revenue	compost not sold

Total cost to date:

- **Composting site construction:** FRF 1 million (EUR 150 000).
- **Purchase of the equipment:** FRF 1.8 million not including VAT (EUR 282 000).
- **Information and communication:** FRF 580 000 from 1994 to 1996 (EUR 88 450).

The regional fund for energy conservation and wastes (FRMED) funded by ADEME and the Poitou-Charentes region has financed the purchase of containers up to 25 % (FRF 743 000/EUR 113 000) and communication costs up to 18.2 % (FRF 105 000/EUR 16 000). The fund for modernisation and management of wastes (FMGD), which is run by ADEME at the national level, has contributed 33.4 % of the costs of the composting site construction (1.2 million/EUR 190 000).

The composting scheme leads to substantial cost savings:

- the cost of composting is FRF 200 (EUR 30.5) per tonne compared with landfilling which costs FRF 400 (EUR 60) per tonne;
- the State tax of FRF 60 (EUR 9) is not paid on wastes that are composted.

The establishment of a composting scheme has also led to the creation of seven new job positions.

Reasons for scheme success

The selective collection of biodegradable wastes at households is well respected as a worthwhile service by the population. The fact that the system is voluntary means good quality biodegradable wastes are produced. Finally, the scheme is a success due to the innovative and dynamic methods of communication employed for promoting it.

Above: Householder emptying kitchen waste into collection bins

Contact details

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EC composting success stories

Cork green waste shredder scheme

Above: Cork 20/20 waste-management strategy logo

Summary

- The green waste shredder scheme is run by Cork County Council.
- It has been in operation since mid-1998 and provides a green waste composting service to the 280 000 population of County Cork.
- The scheme is operated primarily at the county council's landfill sites and civic amenity sites. People can bring their green waste to the designated areas for recycling on specified days.
- Approximately 1 000 tonnes of waste are collected and treated by the shredder per year.
- The scheme has been successful because of its good public perception.

Site description and location

The scheme is located within the administrative boundaries of Cork County Council. The county itself is located in the south-western region of Ireland. Typical temperatures for the area average approximately 12 °C, and the rainfall total for the region is approximately 1 185 mm per year. The scheme has been made available to all of County Cork's population at various times throughout the year. The scheme is primarily centred in a rural/suburban area, targeting a cross-section of socioeconomic groups.

Scheme description

The green waste shredder scheme commenced operation in mid-1998 and involves the shredding and central composting of green waste. It is operated primarily at the county council's landfill sites and civic amenity sites where any green waste otherwise destined for landfill is composted.

There is a population of approximately 280 000 people in the county and, at various times, the shredder is potentially made available to all of them. For example, after Christmas, the shredder is taken to all parts of the county on designated days published in the local newspapers. People can bring their green waste to the designated areas for recycling on these special days. Landfills are dotted around the county, and so it is possible for the whole population to have access, if required, by bringing green waste to the landfill for recycling.

The scheme aims to reduce the volume of waste going to landfill by collecting, shredding and finally reusing green waste. It involves the use of a shredding machine which can shred trees with trunks up to 200 mm in diameter. This equipment is towed from one location to another by a council refuse-collection freighter. As well as transporting the shredding machine, the freighter also stores the material ready for composting. The end product of the scheme is used by the local authority at various locations around the county as a mulch at roundabouts and tree/shrub plantations. Although not currently sold to third parties, the product could ultimately be marketed as a mulch and a substitute for peat.

In order to publicise the scheme, the county council issued leaflets to the general public as well as a 20/20 vision waste-management newsletter outlining general information on the scheme itself.

Above: 20/20 Vision waste-management newsletter

The scheme, which has encountered no technical obstacles to date, is regarded by Cork County Council as a great success. This has been largely attributed to the level of cooperation from the participating population.

Aims of the scheme

The ultimate aim of the scheme is to reduce the amount of waste going to landfill in Cork. Currently, there are three main landfills from which the scheme operates in the county. There is concern within the local authority regarding the remaining capacity of these main landfills. While other suitable landfill sites are being investigated, overall levels of waste being assigned to landfill need to be drastically reduced. The recently produced Irish national waste-management policy document has set out a target of a minimum 65 % reduction in the amount of biodegradable waste going to landfill over the next 15 years.

Composting is recommended as an alternative to landfilling biodegradable material. Diverting green waste away from landfill in the composting process clearly contributes towards fulfilling government targets of waste reduction, while also producing a mulch product and a substitute for peat.

Scheme technical details

The scheme involves the use of a shredding machine and freighter. The model of shredder used has a silent engine pack and turntable. The shredder is towed from site to site by the refuse freighter. The freighter itself was converted from an old disused refuse-collection vehicle into a vehicle suitable for the project requirements.

The scheme is run as a 'bring to collection' system and central locations have been established. Presently, approximately 1 000 tonnes of waste per annum are collected which is ultimately diverted from landfill. The minimum quantity of waste collected in a month is approximately 80 tonnes, the maximum 500 tonnes per month, depending upon the season. The specific method of composting is by windrow. At the Ballincollig Nurseries owned by Cork County Council, the end product of composting is applied to nursery plants.

Future plans for the scheme

Future plans for the scheme involve the purchase of additional shredders throughout the county in order to make the scheme more available to the participating population. At present, Cork County Council can use all the mulch, and more, that is generated. Sale of compost in the future will depend on national regulations in the area of peat conservation which would be likely to drive up demand for this material.

Currently, there is a new civic amenity site planned for another location in the county where the shredder will also be used in addition to the existing sites. Indeed, it is planned to construct numerous other civic amenity sites to replace the landfills as they close.

Financial details

Details of costs	
Set-up costs	IEP 32 700 total EUR 41 529 total
Operating costs	IEP 17/tonne EUR 21/tonne
Publicity costs	IEP 9 000 total EUR 11 430 total
Avoided disposal costs	IEP 10/tonne EUR 12.7/tonne
Revenue	product not sold

- **Shredder:** IEP 25 700 (EUR 32 600);
- **Freighter revamp:** IEP 7 000 (EUR 8 890);
- **Publicity costs (leaflet/newsletters):** IEP 9 000 (EUR 11 430);
- **Running costs per year:** IEP 8 000 (EUR 10 160).

Two semi-skilled workers operate the machinery four days a week for three hours at approximately IEP 7 (EUR 8.9) per hour, totalling IEP 168 (EUR 213) a week. As yet, no revenue is generated from the scheme.

The cost savings achieved through the scheme have amounted to approximately IEP 10 000 (EUR 12 700). Financial assistance provided to the scheme was in the form of a grant from the operational programme for environmental services under the Irish Structural Funds programme 1994–99. The balance was provided by the council's own funds.

Reasons for scheme success

The scheme is successful for two main reasons. Firstly, it is perceived favourably by the public, and secondly the equipment employed by the scheme is 'clean' and simple to use.

Contact details

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EC composting success stories

Tralee composting scheme

Above: Composting scheme logo

Summary

- The Tralee central composting scheme is run by Kerry County Council.
- Biodegradable kitchen and garden wastes, and newspapers are collected separately and composted centrally.
- In all, 1 766 households (a population of approximately 5 600) are covered by the scheme in Tralee town.
- The centralised scheme collects at present approximately 500 tonnes of biodegradable waste a year.
- The scheme has been successful because of a good quality information campaign and the assignment of adequate resources by the county council.

Site description and location

The scheme is based in the town of Tralee, County Kerry. Tralee is located in the northern half of the county, in the south-western region of Ireland. The scheme is currently being run by Kerry County Council on a pilot basis, with a view to introducing it throughout the county in the long term. The scheme incorporates householders in three areas of the town: Manor, Oakpark and Caherslee.

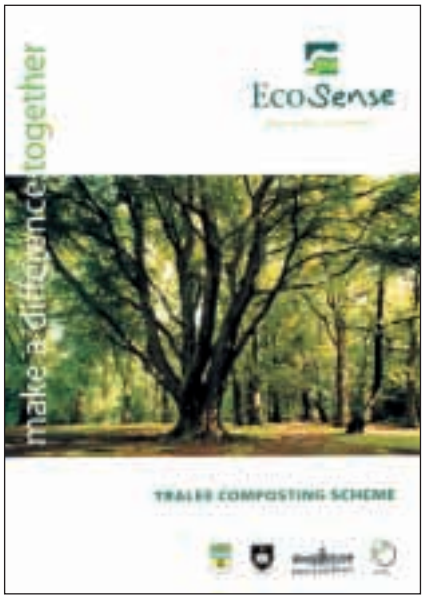
The area enjoys a moderate climate with an average temperature of approximately 12 °C. Average rainfall for the area is 1 500 mm per year. The pilot scheme has been aimed mainly at privately owned dwellings located in residential areas of medium density.

Scheme description

The central composting scheme was launched by Kerry County Council in March 1999. The first compost bin collection was on 12 April 1999. The scheme involves the collection of biodegradable waste from 1 766 households (approximately 5 600 population) in the Manor, Oakpark and Caherslee areas in Tralee town.

As part of the scheme, selected households were given a brown wheel bin for their biodegradable waste only, in addition to the standard wheel bin for household waste. Participants were also given a small kitchen caddy, an information pack, stickers for their bin showing what can and cannot go into the bin, and a calendar showing the composting bin-collection weeks. Participants were provided with a free phone number to allow them free and easy access to the environment section of Kerry County Council.

The brown wheel bins provided to householders are designed to minimise odours from the food waste. The bins have a false bottom and ventilation holes at the top and bottom, allowing air to move freely through the contents of the bin. The materials accepted in the brown wheel bin are food (no meat), newspaper and garden wastes. A more comprehensive list is presented to participants in an 'Ecosense' composting scheme brochure, supplied to each participating household.



Above: Tralee composting scheme leaflet

Initially, only small amounts of garden waste were allowed into the compost bin and newspapers were not allowed. Consultants had advised that an excess of these materials in the compost heap might interfere with the composting process. However, during an inspection of the project in the second week of biodegradable waste collection, it was decided that newspapers and garden waste were acceptable based on the high quality of biodegradable waste coming in. The brown wheel bins are collected every second week and the biodegradable waste is brought to the composting platform at the North Kerry landfill, which is located about 10 km from the town.

The scheme was extensively publicised and involved an official launch, leaflets, newsletters, information pack, door-to-door visits, surveys, radio and newspaper advertisements and television coverage.

Aims of the scheme

Currently, 97 % of all waste collected in Kerry goes to landfill. The Irish Government has recently produced its national waste-management policy document which sets out a target of a minimum 65 % reduction in the amount of biodegradable waste going to landfill over the next 15 years. Composting is recommended as an alternative to landfilling biodegradable material. In County Kerry, biodegradable waste accounts for 30 % of all household waste. Diverting this waste away from landfill in the composting process contributes towards fulfilling government targets of waste reduction, while at the same time producing a natural soil amendment in the garden as an alternative to expensive artificial fertiliser.

Additionally, diverting the biodegradable material from landfill also makes economic sense. Because the North Kerry landfill is a highly engineered landfill designed to minimise the impact of the waste on the environment, the cost of landfilling has increased from IEP 5 per tonne (EUR 6.35) for the old method of landfilling to IEP 42 per tonne (EUR 57) in 1999. Every tonne of material diverted from the landfill prolongs the life of the landfill, reducing costs in the long run.

Scheme technical details

A roto-press refuse truck is used to collect the biodegradable waste from the households. Before each collection run, a load of wood chips is added to the truck. This type of collection vehicle is ideally suited to biodegradable waste collection as it mixes the wood chips and biodegradable waste together thoroughly while in transit. The wood chips are necessary for composting to provide a texture to the waste that aids free movement of air and moisture through the material.

On arrival at the composting platform at the North Kerry landfill, the biodegradable waste is shredded by what is known as an 'Allu bucket' and stacked for composting. The biodegradable waste is then covered with 'Toptext' which is like a Gore-Tex material, allowing air into the compost heap and vapour out, but keeping the rain from the biodegradable material. An excess of rain water upsets the composting process.

Every two weeks each composting pile is mixed and moved up the composting platform. After 10 weeks, the compost is sieved and then added to the first maturing pile. After 38 weeks, the compost is ready for use. When the compost is mature, it is available to the public free of charge, and it is also planned to be used for council landscaping activities. The local authority is considering levying a charge for the compost in the future.

Above: ***Raw materials after mixing with wood chips***

Future plans for the scheme

Despite the fact that this central composting scheme was launched only in March 1999, the project has been regarded as very much a success. The plan to expand the project throughout the town of Tralee will go ahead in 2000, with ultimate plans to make it county-wide as soon as possible.

The end product of the composting will be used for general horticultural use, Kerry County Council landscaping projects, Tralee Urban District Council landscaping and parks department, farmers reclaiming land and general usage by residents in the scheme area.

Financial details

Details of costs	
Set-up costs	IEP 151 766 total EUR 193 000 total
Operating costs	IEP 165/tonne EUR 209/tonne
Publicity costs	IEP 25 161 total EUR 32 000 total
Avoided disposal costs	IEP 14.4/tonne EUR 18.3/tonne
Revenue	product not sold

Start-up

- **Capital expenditure:** IEP 134 054 (EUR 170 000);
- **Route surveys:** IEP 3 816 (EUR 4 800);
- **Waste categorisation survey:** IEP 1 250 (EUR 1 588);
- **Distribution of bins:** IEP 4 100 (EUR 5 200);
- **Initial publicity and education campaign:** IEP 14 000 (EUR 18 000);
- **Consultancy:** IEP 6 000 (EUR 7 620);
- **Project supervision:** IEP 2 600 (EUR 3 300);
- **Total:** **IEP 166 000 (EUR 211 000).**

Running costs

- **Collection (equipment personnel and supervision):** IEP 40 268 (EUR 51 000);

- **Composting operation (equipment personnel, and supervision):** IEP 40 200 (EUR 51 000);
- **Ongoing publicity campaign:** IEP 11 100 (EUR 14 000);
- **Consultancy fees:** IEP 2 000 (EUR 2 540);
- **Total: IEP 93 000 (EUR 119 000).**

Capital expenditure, which amounted to IEP 134 000 (EUR 170 000) included the construction of the composting area and ancillary works (IEP 43 400/EUR 55 000), the purchase of 2 000 wheel bins (IEP 58 175/EUR 74 000) and the purchase of composting machinery (IEP 32 300/EUR 41 000).

The capacity of the Tralee scheme is 1 000 tonnes per annum with present equipment and infrastructure. The total tonnage of raw material presently collected is estimated at 500 tonnes per annum. This gives an operating cost per tonne of IEP 187 (EUR 237) at present, including IEP 80/EUR 101 collection costs, IEP 80/EUR 101 processing costs and IEP 27/EUR 35 miscellaneous costs. A gate fee of IEP 32/EUR 41 per tonne is charged, leaving a shortfall of IEP 155/EUR 197 per tonne. A trial will be undertaken soon to reduce the collection service to an alternative weekly service. The extra cost of IEP 80/EUR 101 per tonne for the extra collection will thus be removed. In the future, the financial shortfall will be further reduced by increasing the gate fee, charging for the product, increasing the tonnage of raw material and/or increasing the charge to the households.

Above: Instructions to householders regarding waste which can be composted

Financial assistance provided to the scheme was in the form of a grant from the operational programme for environmental services under the Irish Structural Funds programme 1994–99.

Reasons for scheme success

The scheme is successfully persuading householders to segregate their biodegradable waste from the rest of their household waste. The scheme coordinator believes the main reasons for the success of the project to date are:

- the effort applied to the education of participants through the publicity campaign which has resulted in a growing awareness within the community regarding the waste-generation problem in the area;
- the resultant level of public participation;
- the quality of the biodegradable material collected to date means further enthusiasm amongst participants, the obvious benefit to the council itself and subsequent savings;
- the assignment of adequate resources by Kerry County Council.

Contact details

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EC composting success stories

Limerick composting scheme

Summary

- The Limerick composting scheme is run by the Limerick Corporation.
- 2 800 households are involved in the centralised scheme.
- Biodegradable kitchen and garden wastes are collected separately and composted centrally.
- The scheme collects approximately 950 tonnes of green waste a year and produces 450 tonnes of compost from kitchen and garden waste.
- The scheme is successful because of the quality of the compost end product and the rapid resolution of any problems with the scheme.

Site description and location

Limerick County is located in the south-west region of Ireland. The composting scheme is located within Limerick City, the administrative area of Limerick Corporation. As a pilot initiative, the scheme involved the four refuse-collection routes in the north side of the city. The areas were chosen as they have few commercial outlets and have a broad spectrum of housing types and social classes. Thus they were seen to be representative of the domestic waste situation of the city as a whole.

Limerick County experiences average temperatures of approximately 5 °C in January and approximately 16 °C in July. The average rainfall for the region is approximately 1 000 mm per year.

Scheme description

The project was divided into two phases: Phase 1, where a pilot area was instituted in a representative area of the city, and Phase 2 where the project was extended to the rest of the city. Tenders were advertised in the *Official Journal of the European Communities* in August 1996 and were selected in October 1996. Between February 1997 and January 1998, the composting equipment for the project was purchased and delivered. In total, 2 800 green bins were distributed to households in the pilot area and implementation of the composting project formally commenced in January 1999.

There are approximately 2 800 participants involved in the scheme. Information on the scheme was conveyed to the public in the form of press releases, radio announcements and leaflet distributions.

The first official green bin collection day was 5 February 1999 and it has continued since without interruptions. Each house was provided with a 140 l green wheel bin. The green bins are collected every second Friday while the regular black refuse bins are collected on alternate Fridays. Four collection vehicles are used to collect the biodegradable waste (kitchen — including meat and fish, and garden waste) from the participating households.

On arrival at the compost site, the material is loaded into a shredding machine. Once

Above: ***Green composting wheelie bin***

shredded, the material is placed in windrows on a concrete slab at the transfer station located at Longpavement, 4 km from the city centre. Windrows are formed using the shredder. The material collected has been of varying quality. Some householders are very conscious of the need to segregate their waste while others are less so. Where problems of contamination have arisen, contaminating material is removed before loading into the shredder, or removed from the shredder when it rejects the items.

To address the problem of waste sticking to the bottom of the green wheel bins, the Corporation provided householders with biodegradable plastic bags to prevent this from happening, which has proved to be successful in dealing with the problem. Separately, a number of 'bio-bins' have also been supplied to some customers. These are wheel bins with artificial bottoms and aeration holes in the sides both at a low and high level. Additionally, more normal size 240 l green bins have been ordered. These will be distributed to those participants that require a larger bin. In all, 150 have already been given out. The scheme participation rate to date has been approximately 90 %.

Aims of the scheme

The ultimate aim of Limerick's composting scheme corresponds to that of other similar initiatives in Ireland. Primarily, the aim is to reduce the amount of waste going to landfill in line with the recently produced Irish national waste-management policy document, which has set out a target of a minimum 65 % reduction in the amount of biodegradable waste going to landfill over the next 15 years.

Above: Composting platform

Above: Shredding waste

Composting is recommended as an alternative to landfilling biodegradable material. Diverting this waste away from landfill in the composting process clearly contributes towards fulfilling government targets of waste reduction. Studies on the project have shown that this process can reduce the amount of waste going to landfill by 30 % which will ultimately help in cost reductions, as well as help Limerick meet national targets.

Currently, Limerick Corporation is using Limerick County Council's landfill for which gate costs are currently IEP 40 (EUR 50.8) per tonne. Therefore, by reducing the volume of waste going to landfill, this composting scheme will also have substantial cost savings benefits for Limerick Corporation.

Scheme technical details

Four refuse-collection trucks are used to collect the biodegradable waste from the participating households. The waste accepted by the scheme includes kitchen and garden waste. For the purposes of the scheme, the trucks used for collection were modified to collect leachate from the green waste in on-board tanks. This prevents liquid being deposited on the streets whenever the compression plate operates.

The waste material is transported in these trucks to a transfer station 4 km from the city centre. Here, the waste is loaded into the shredder and reduced to a form suitable for composting. The loader itself is equipped with a grab on the front bucket to ease handling of tree cuttings and is also equipped with a telescopic extension to ensure that the material is placed into the shredder with few problems. Compost windrows are formed by simply moving the shredder slowly in 1 to 2 m movements along the concrete pad.

As the material composts, the windrows give off steam. They are turned, by a windrow turner, as the process requires that the centre of the windrows does not exceed 60 ºC. It also ensures that the material on the outer edges of the windrow is mixed and so composts at the same rate as the rest of the windrow.

After approximately three months, the material is sieved to remove the plastic and other contaminants. After screening, the compost is deposited to Limerick Corporation's Parks Department depot where it is left to mature for a further 8–10 weeks. Larger pieces of biodegradable material are rejected but are included as seed material in new windrows. Limerick Corporation's Parks Department plans to use the compost for the planting of trees during October.

Future plans for the scheme

Depending on the success of the project, the corporation plans to expand the scheme progressively to the rest of the city after its initial 12-month pilot period. Analysis of progress to date has shown certain areas of the city are more prone to participation than others. Therefore, in the future, when extending the scheme across the city, Limerick Corporation is looking into reorganising the refuse-collection truck routes to collect waste from housing areas that make the concerted effort to segregate green waste.

Financial details

Details of costs	
Set-up costs	IEP 603 000 total EUR 766 000 total
Operating costs	IEP 12.5/tonne EUR 16/tonne
Publicity costs	IEP 6 000 total EUR 7 620 total
Avoided disposal costs	not known yet
Revenue	product not sold

Capital costs

- **Shredder:**
  IEP 116 000 (EUR 148 000);
- **Windrow turner:**
  IEP 186 000 (EUR 237 000);
- **Screen:**
  IEP 103 000 (EUR 131 000);
- **Extra fine screen:**
  IEP 6 830 (EUR 8 600);
- **Bins 240 l:**
  IEP 12 400 (EUR 16 000);
- **Bins 140 l:**
  IEP 52 600 (EUR 67 000);
- **Microchips:**
  IEP 52 200 (EUR 66 300);
- **Leachate tanks:**
  IEP 12 400 (EUR 16 000);
- **Weighing equipment:**
  IEP 44 100 (EUR 56 000);
- **Computer equipment:**
  IEP 17 100 (EUR 22 000);
- **Total:**
  IEP 603 400 (EUR 766 000).

Operating costs

- **Machine storage:**
  IEP 700 (EUR 900);
- **Overheads:**
  IEP 1 200 (EUR 1 500);
- **Staff wages:**
  IEP 10 000 (EUR 12 700);
- **Publicity costs:**
  IEP 6 000 (EUR 7 620).

Financial assistance provided to the scheme was in the form of a 75 % grant from the operational programme for environmental services under the Irish Structural Funds programme 1994–99.

Reasons for scheme success

The scheme's success so far is attributed to the following reasons.

To date, a good quality compost has been produced. It has been analysed by Bord na Mona (the Irish peat fuel suppliers) and can be used as a growing media. Currently Bord na Mona are carrying out a growing trial on the compost.
The quality of the green waste being collected has improved greatly since February. Participants are now making an effort to source-separate their waste.
Any problems that have occurred have been taken on board and dealt with. Such solutions have included the provision of biodegradable bags to prevent green waste adhering to the sides of bins and the provision of 240 l green bins to participants with bigger gardens.

Above: Loader and shredder

Contact details

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EC composting success stories

Cupello composting scheme

Summary

- The Cupello composting scheme is managed by the local municipality.
- The scheme covers an area of 48 km^2 and a population of 4 200.
- The scheme is a separate door-to-door collection scheme involving kitchen waste.
- In the first months of the project, the amount of food waste collected was about 75 kg/year/inhabitant compared to overall municipal solid waste production of 350 kg/year/inhabitant.
- The scheme has been successful because of the quality of the new collection services.

Site description and location

Cupello is a village located in the Abruzzo region of southern Italy. Average temperatures in the area vary from – 5 °C in winter to 35 °C in summer, rainfall averages 600 mm a year. The municipality population is approximately 4 200 inhabitants and covers an area of 48 km^2.

Scheme description

Cupello is included in the pilot project 'Separate collection and biodegradable waste composting', implemented by the province of Chieti, using European Community funds. The purposes of the programme include:

- **establishing pilot projects** for the integrated management of urban waste, including biodegradable waste separation;
- **promoting and developing home composting** of garden and kitchen waste (including meat and fish) in areas of low and high population;
- **setting up a public service separate collection information point**, as a technical and operational support for municipalities willing to promote or develop separate waste-collection schemes.

Cupello is primarily involved as a pilot project, partly chosen as it contains the composting plant of the consortium.

The separate collection of biodegradable waste in Cupello began in autumn 1998 when the pre-existing collection scheme was completely revised. Prior to the scheme, separate collection attained a level of 1 %. New services are now organised as follows:

Above: Organic waste-collection lorry

- **door-to-door collection of biodegradable waste three times a week**, with a bulk lorry provided by the province;
- **door-to-door collection of paper and plastic once a mont**h with the same vehicle;
- **collection of dry non-recyclable waste twice a week** in road bins used prior to the project.

A temporary municipal collection eco-centre has also been installed in the industrial area of the village.

Garden waste is not collected together with food waste but a 'bring system' is in place. This aims to reduce collection costs and the total amount of waste to be collected, and to promote home composting of garden waste. The door-to-door collection of food waste only enables the use of bulk lorries instead of expensive compactors, due to the much higher bulk density of food waste without garden waste.

The biodegradable fraction is delivered for composting at a cost of EUR 28 per tonne. The attained separate collection level is 35 %, with a 25 % biodegradable waste separation (approximately 75 kg/year/inhabitant).

Aims of the scheme

The scheme's aim was to introduce an integrated collection scheme with no additional cost, and satisfy the waste-collection targets set by Decree 22/97 (targets are set at 15, 25, 35 % recycling rate by 1999, 2001, and 2003).

The separation of the biodegradable fraction, which is composed of highly putrescible waste, together with the collection of dry and recyclable fractions — paper, glass, plastic bottles — allows the reorganisation and integration of collection rounds. The total number of rounds has been kept constant, due to a reduction in the collection frequency for all other waste.

Source-separated biodegradable waste has the advantage of being a contaminant-free feedstock for production of high-quality compost. As a Mediterranean country with a dry, warm climate, Italy has large needs for biodegradable amendments to be used in agriculture and plant cultivation.

Scheme technical details

Biodegradable waste collection takes place three times a week (other waste is collected twice a week). Bulk lorries are used, with a capacity of 3 m^3 each. The lorries are managed by two operators (one is the driver). The operator empties the household buckets or bins, which are placed along the roads in front of the buildings on collection days, directly into the bulk lorries. Wheeled carts are hung on the lorries and emptied automatically. Compacting is not required, due to the high bulk density of food waste. The bulk lorries then carry the waste directly to the composting plant, which is located about 10 km from the area covered by the scheme.

The composting plant is owned by a public consortium of municipalities. The plant receives waste from many towns all over the province of Chieti, and processes kitchen and garden waste. It is basically a mixed municipal solid waste treatment plant and the composting process works downstream from a separation line for mixed waste. The composting process is being progressively upgraded towards producing high-quality compost.

At present, the source separated biodegradable fraction from Cupello is treated in a dedicated line (separated from the non-separated waste); biodegradable waste is mixed with screened garden trimmings and tipped on a covered and aerated platform. The composting process takes 90–100 days.

With the implementation of the pilot project of separate collection of biodegradable waste (now involving 20 000 inhabitants and soon increasing to at least 40 000 inhabitants), it is likely that the composting plant will be dedicated to the composting of biodegradable waste separated at source. The plant throughput is now approximately 40 000 tonnes/year.

Standards for the final compost product are covered by Italian Law 784/84 on fertilisers. The quality compost produced is called Civeta and is currently produced in small quantities, although these are expected to rise. The consortium managing the plant has drawn up an agreement with the local consortium for irrigation aimed at carrying out experiments on compost use in agriculture.

Future plans for the scheme

Within the province of Chieti, there is no problem with disposal of waste due to the number of available plants and landfills, which are even used to dispose of waste from other provinces in Abruzzo. Therefore, traditionally downstream waste separation has been undertaken instead

Above: Collected kitchen waste

of separate collection, perceived as being more complicated. However, the result of the pilot project has satisfied the six municipalities involved of the benefits of source separation. A public survey has shown that the public have appreciated the new developments introduced with the pilot project. The rate of biodegradable waste interception (including garden waste) is between 60 and 80 kg/year/inhabitant in the municipalities where the door-to-door collection system is in place and between 40 and 60 kg/year/inhabitant in the municipalities where 240 l bins have been placed along the streets. Other municipalities appear to be interested in the results of the pilot collections, and it is likely that they will enter into partnerships to manage larger door-to-door separate collection rounds.

The future of the pilot project in the short term will include extension of the pilot collection rounds to at least 40 000 inhabitants (10 % of the population of the province), with the technical/operational support and the equipment of the province already supplied to the municipalities. In the medium term, the scheme coverage is likely to be extended to other municipalities.

Home composting has also been successful, and has been recognised as a useful tool for waste management.

Financial details

Details of costs	
Set-up costs	no additional costs
Operating costs	ITL 736 000/tonne EUR 380/tonne
Publicity costs	ITL 8 million total EUR 4 000 total
Avoided disposal costs	ITL 130 000/tonne EUR 65/tonne
Revenue	compost not yet sold

The new waste-management system has been able to cope with a new, complex waste-collection scheme, without additional costs for the public. In the municipalities where the door-to-door collection scheme is in place, and collection frequencies have been reorganised, the cost of services is now steady at 80–85 % of the costs of the former system, not including benefits from the avoided landfill disposal.

In Cupello, the cost of waste collection was EUR 31/year/inhabitant with the former collection system, and after implementation of the new scheme collection costs are down to EUR 26/year/inhabitant. These savings are due to the use of non-compacting bulk lorries, the use of small/medium-sized waste containers (maximum 240 l), a downsizing of the collection team from three to two operators, the reorganisation of the collection frequencies, and a reduction in the frequency of the 'other' waste collection. Further economic advantage is gained through the savings which have been made through the reduction of the quantities of waste requiring disposal. This aspect will be more relevant in the near future, since the Abruzzo region, with the new regional law on landfill disposal, will add an eco-tax of EUR 0.25/kg whenever a municipality does not attain the targets stated by Decree 22/97.

In addition to the cost of EUR 26/year/inhabitant for the new services are the following costs:

- EUR 1/year/inhabitant for the information campaign;
- EUR 2.5/year/inhabitant for the biodegradable bags for the biodegradable waste collection.

Reasons for scheme success

The reasons for success are:

- the quality of new separate collection services, which are recognised as being a real service for the citizens;
- the striking difference between the new services and the former ones, even as far as public image is concerned;
- the economic advantage of the new services.

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EC composting success stories

Monza composting scheme

Summary

- The Monza composting scheme is managed by the local council through external contractors.
- The scheme covers an area of 35 094 km^2 and a population of 119 060 inhabitants.
- The scheme is a door-to-door collection scheme for biodegradable waste, while garden waste is collected through 'bring systems' at municipal recycling centres.
- The forecast collection, on a yearly base, is approximately 57 kg/inhabitant for food waste and 27 kg/inhabitant for garden waste.
- The scheme is successful due mainly to the information campaign carried out at the beginning of the scheme.

Site description and location

The scheme is located in the municipality of Monza, near Milan, in northern Italy. Average temperatures in the area range from 10 °C in winter to 24 °C in summer; rainfall ranges from 60 to 120 mm/month. The town of Monza has 119 060 inhabitants and spreads over an area of 35 094 km^2. It is surrounded by other urban areas and major highways. The main green area in the surroundings is Monza Park (approximately 8.5 km^2), the biggest fenced park in Europe.

Scheme description

The municipality started a separate collection scheme for compostable waste in 1998. The scheme is a typical Italian scheme whereby the municipality contracts collection activities to reduce costs, and waste is delivered to more than one composting plant, to reduce the risk in case of any failure or plant closure. Plants are chosen according to the cheapest tipping fee and transport costs. The Milan area has a lack of composting capacity, due to spatial constraints and public acceptability in a highly populated area.

The total amount of waste collected in Monza was approximately 430 kg/inhabitant in 1998. The scheme applies to the various types of source separated materials; household and commercial food waste (28.3 kg/inhabitant, July to December 1998), garden waste such as leaves, grass clippings, brush and tree prunings (13.7 kg/inhabitant, July to December 1998), glass, paper, plastic and mixed waste, kitchen waste, including meat and fish, as well as vegetable and fruit peelings. Moreover, an eco-centre has been built for the delivery and temporary storage of bulky materials (wood, garden waste, etc.).

Biodegradables are set out for collection separately from other recyclables and mixed waste. The composting scheme for biodegradable wastes consists of a door-to-door collection scheme involving all of the population. Each household receives a 10 l bucket for the collection of biodegradable matter and 100 biodegradable bags per household per year. The buckets are placed on the roadside on collection days, and emptied manually. High-rise buildings, canteens and fruit shops have been provided with a 240 l trolley bin for temporary storage of separated wastes. The bin is placed by the roadside on collection days and is emptied mechanically.

Garden waste is delivered directly by the producer to the eco-centre. Food and

Above: Monza road collection bins

garden wastes are delivered to different composting plants and charged with different tipping fees (much lower for garden waste compared with food waste; about EUR 20/tonne versus EUR 60/tonne).

The main reason for a 'bring system' for garden waste is to reduce collection costs and the total amount of waste requiring collection. Door-to-door collection of food waste only enables the use of bulk lorries instead of expensive compactors, due to the much higher bulk density of food waste with garden waste excluded. Further, a bring system requiring the householder to deliver garden waste promotes home composting.

The total biodegradable wastes collected during the last year (July 1998 to July 1999) was 7 000 tonnes of kitchen waste and 3 500 tonnes of garden waste.

Home composting is also encouraged by the municipality but so far no financial aids for home composters have been introduced. Nevertheless, backyard composting is fairly popular, being traditional and stimulated by public information campaigns.

Aims of the scheme

The collection scheme's aim is to assist the municipality in achieving the targets set out by the Ronchi Decree on waste recovery and recycling (Decree 22/1997). Targets are set at 15 %, 25 %, and 35 % recycling by 1999, 2001, and 2003. In Lombardy, the region where Monza is located, source separation of garden waste has been compulsory since 1994. The composting process is considered as an environmentally sound and beneficial means of recycling biodegradable materials. Furthermore, it diverts specific materials, such as high-moisture biodegradable waste, from landfill.

Source separated biodegradable wastes have the advantage of being a contaminant-free feedstock for producing a high-quality compost. As a Mediterranean country, with a dry, warm climate, Italy has a large requirement for compost to be used in agriculture and horticulture.

Scheme technical details

Biodegradable waste collection takes place twice a week; each collection route takes some four hours to cover all the area included within the collection system. In all, 25 bulk lorries are in use, with a capacity of 3 m^3 each, and a single operator. The operator empties the household buckets or bins, which are placed along the roads in front of the buildings, directly into the bulk lorries. In the case of the trolley bins, they are attached to the lorries and emptied automatically. No compaction is needed, due to high-bulk density of food waste.

In order to reduce the costs of long-distance transport, waste is transferred from the bulk lorries into five compaction vehicles, parked in different areas of the town. Finally, these compaction vehicles carry the waste to the composting plants.

The composting scheme delivers waste to many different composting plants, according to their availability and tipping fee. The composting plant which is mainly used at present is the SE.SA. s.p.a. plant (situated in the district of Padua), which is located 250 km from the area covered by the scheme.

Besides food waste, the plant processes garden waste and sewage sludge. A new composting process is being tested for three months. Prior to that, windrows were cured in an enclosed building with exhaust air treatment; now there is a bio-container system. The advantage is that the whole process is much faster and odours are reduced. The plant throughput is now 60 000 tonnes/year.

The main plant operations are as follows.

- **Tipping and primary screening of biodegradable waste and tipping and shredding of garden waste**. Both waste types are then mixed with sludge.
- **Bio-container composting** (14 days). There are six bio-containers that are monitored by a remote control system. They provide adequate aeration and moisture; air is blown into the cells to maintain an adequate oxygen level and to control the temperature. Some sprinklers provide the moisture as required.
- **Further curing** (20 days) which follows after the material has been taken out of the bio-containers.
- **Outdoor screening** (15 mm size screens) and open air product storage. The product is not yet put on the market or bagged for commercial purposes.

Exhaust gases are captured and undergo odour abatement through a two-phase system consisting of a scrubber and bio-filters. Process parameters are continuously monitored and include temperature, pH, and oxygen. The facility's design includes a paved floor and outdoor paved areas which are equipped with drains. Leachate from the first screening is led to a collection tank and then sent by tanker to an anaerobic digester. Rain water and water from the scrubber system are collected and used in the sprinkler system. Non-compostable materials and residues are landfilled at a nearby site, managed by SE.SA. s.p.a. itself.

Standards for finished compost are stated by the Italian Law 784/84 on amendments. So far, SE.SA. management has decided not to sell the compost, in order to obtain the support of farmers and to allow them

Above: Tipping of garden waste at the composting plant

to experience the product. It is distributed free, mainly to residents and large-scale fruit and vegetable farmers in the nearby villages, as agreed with local authorities. Agronomy experts, contracted by professional users, perform quality controls on the product. The product is given away free to encourage householders to collect more garden waste and achieve the right mix of food and garden waste. This strategy is to make them aware of the quality of the product they can receive back.

Future plans for the scheme

The whole population of Monza is involved in the collection scheme and therefore no further expansion is expected. In the future, the municipality might decide to build its own composting plant, after gaining public approval, or contribute to the siting, building and running of a facility along with other municipalities in the vicinity.

As far as the SE.SA. composting plant is concerned, it faces a growing demand for composting from new clients. A new extension to the plant will allow it to satisfy part of this demand. Furthermore, when it gets enough experience with the new process, the quality of its product will improve. The demand of local consumers is growing fast and at present there is no need to widen the market.

Financial details

Details of costs	
Set-up costs	no additional costs
Operating costs*	ITL 12 200/tonne EUR 6.3/tonne
Publicity costs	ITL 5.8 million total EUR 3 000 total
Avoided disposal costs	not known
Revenue	product not sold

(*) Operating costs do not include collection or staff costs as the same equipment and staff are used for the scheme that were used for municipal solid waste collection, and so additional costs are not borne by the scheme.

The collection scheme has not involved any additional costs for the municipality due to the fact that the service relies upon the same equipment and facilities of the previous mixed municipal solid waste-collection scheme. These are owned by the contractor in charge of the service. Moreover, some major factors have enabled significant optimisation, for instance the use of bulk lorries instead of compactors for food waste and the reduction of collection frequencies of mixed waste to once a week, compared with previous frequencies of collection up to three times/week.

The municipality provided households with buckets and the initial bag supply (100 a year for households). The total expense for buckets and bags was EUR 60 000 in 1998 and EUR 40 000 in 1999, when only bags were distributed (distribution cost). Trolley bins are rented; the cost is approximately EUR 2 200 per month. Costs for publicity have been paid by the municipality; the publicity campaign in 1998 cost EUR 3 000.

As far as the SE.SA. composting plant is concerned, final investment was approximately EUR 3.5 million.
No information is available about the operational costs of the new bio-cells, since they are still in the testing phase.

Reasons for scheme success

The collection scheme is succeeding in making householders separate their biodegradable waste and garden waste. Biodegradable waste is diverted from mixed waste and it is 98 % pure. A sound information campaign was carried out at the beginning of the scheme, including a description of separate collection procedures and a time schedule for collection. An information point is available for householders to ask for further details on separate collection and waste management.

Some minor problems were reported at the start-up of the scheme; these were mainly complaints by some householders that the volume of the bags and buckets was too small for big families, and that not enough bags were distributed. Experience gained has allowed these problems to be solved and collection activities optimised.

From the municipality's point of view, the scheme's rationale was growing fees for the disposal of mixed municipal solid waste. The scheme led to a significant reduction in overall waste-management costs. The community is proud of having met important recycling targets. Awareness of playing an important role in a sustainable environmental management is very high amongst the public.

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EC composting success stories

Bacino Padova composting scheme

Summary

- The scheme covers the 'Bacino Padova 1' district, which contains 26 municipalities. Municipalities have formed a consortium (public utility company) which deals with waste and wastewater management.
- The district has about 205 000 inhabitants and covers an area of 57 714 km^2.
- The scheme is a door-to-door collection scheme for biodegradable waste. Garden waste is composted with sewage sludge in a district plant, and food waste is taken to an extra-district composting plant. Householders also home compost their garden waste.
- In all, 7 571 tonnes of food waste and 8 876 tonnes of garden waste were separately collected in 1998.
- The scheme is successful because of the convenience of waste collection for householders.

Site description and location

The composting scheme is located in the province of Padua, in north-eastern Italy. The district of 'Bacino Padova 1', with 26 municipalities, is covered by the scheme. These municipalities manage together a number of services (sewage system, water treatment, waste collection) by means of a consortium (Consorzio Tergola), which is a public utility company financed by the municipalities, and through revenue obtained from its service functions.

The typical climate in the area is hot (25 °C to 30 °C) and wet in summer, and cold in winter (0 °C to 10 °C). Rainfall ranges from 52 to 100 mm/month. The district has about 205 000 inhabitants and covers an area of 57 714 km^2. It is mainly a rural area where the majority of residential buildings have their own garden.

Scheme description

Since 1996, a door-to-door collection scheme has been in place in the district, with a recycling rate of 50.8 % in 1998. The following waste streams are separately collected:

- biodegradable waste (food and garden waste);
- paper and board;
- glass;
- plastic;
- other (mixed waste).

The total amount of waste produced in 1998 was 64 000 tonnes (approximately 320 kg/inhabitant); in 1998, 7 571 tonnes of food waste (meat and fish, as well as vegetable and fruit peelings), and 8 876 tonnes of garden waste were separately collected.

Each household received a 6.5–10 l bucket and biodegradable bags of the same volume for food waste. Further biodegradable bags have to be purchased in main markets. Multi-occupant buildings, canteens and fruit shops have been provided with a trolley bin (120/240/360 l, according to user request) where food waste is stored until the next collection round.

Garden waste has to be collected separately and preferably taken directly by

Above: Cover of magazine prepared by consortium

the producer to an eco-centre. In the district there are 14 eco-centres, which are equipped collection areas, where there are large containers for storage of waste prior to disposal or recycling. Households who ask for door-to-door collection of garden waste have to pay an additional tax. In all, 35 % of householders home compost their garden waste and are allowed to ask for a reduction of waste tax. Householders can purchase heap systems, mesh-wire bins, and plastic bins from the municipality, which sells the composters at the manufacturing cost.

Aims of the scheme

The scheme's aim is to assist the municipality in achieving the targets set by the Ronchi Decree (Decree 22/1997) on waste recovery and recycling. The composting process is considered an environmentally sound and beneficial means of recycling biodegradable materials. The request for quality compost in the district area is high, due to private gardens and farms.

Scheme technical details

House-to-house biodegradable waste collection takes place twice a week, although in summer, food waste may be collected three times a week. Buckets are placed on roadsides on collection days, which are emptied directly into the bulk lorries, and then into compaction vehicles for long distance transport. The scheme vehicles are owned by the contractor employed to collect the waste. The estimated total amount of waste recovered through composting in 1998 was approximately 110 kg/inhabitant. Home composting accounted for an estimated 30 kg/inhabitant a year; the rest was food and garden waste.

The district has its own composting plant for garden waste and sewage sludge. The plant and the water treatment facility are managed directly by the Consorzio Tergola and are located in Vigonza, near Padua. The plant has been recently renewed and treats about 30 000 tonnes a year. The composting process lasts about three months and involves the following.

- **Pre-treatment:** open air shredding of waste, mixing with sludge and transport to the composting hall.
- **Fast thermophilic decomposition:** piles are placed over an aerated floor where pipes connected to a blower supply the air needed for composting. Piles are turned and mixed every 3–4 days, for one month, to homogenise the compost and promote rapid oxygen transfer.
- **Curing in outdoor windrows:** to guarantee the necessary oxygen, windrows are turned every 8–10 days. The area is paved and leachate is collected.
- **Screening:** two sizes of screen are in use, the finer for compost to be used for pot cultivation (< 10 mm), the other for agricultural users. Coarse rejects are sent to landfill.
- **Storage** of the final product under a roofed area.

In order to reduce the visual impact, the border of the composting site has been provided with a vegetation curtain.

Food waste is not taken to this composting plant, but relies on many different composting plants, according to their availability and tipping fees. At present, the composting plant which is mainly used is the SE.SA. s.p.a. plant, which is located about 50 km from the district area.

Standards for finished compost are controlled by Italian Law 784/84 on amendments. The garden waste composting plant produces:

- high nutrient compost, which is sold to homeowners and farmers; the average selling price is about EUR 7.5/m^3;
- a compost lower in fertilising value, to be used for topsoil and soil amendment, fruit and vegetable farming, land reclamation, etc., which has so far been given away free.

The benefits of compost use have been extensively publicised with letters and flyers sent to all households in the district.

Future plans for the scheme

Since all householders can potentially be involved in the scheme, no further expansion is expected. However, in the future, some new composting plants will be built in the district area.

An objective for the future is to enhance the rate of separate collection in all the municipalities involved. This will be attained by raising public awareness and increasing the flexibility of the collection techniques. The Consorzio is keen to encourage constant communication with the householders. Householders now receive a bimonthly publication called *Pollution*, which contains information about the performance of separate collection of waste and new projects concerning the environment. The publication contains a list of useful telephone numbers and the public can send letters and receive written answers.

Above: Final storage of compost at the plant

Financial details

Details of costs	
Set-up costs	ITL 4 259 million total EUR 2.2 million total
Operating costs	ITL 770 000/tonne EUR 400/tonne
Publicity costs	ITL 145.2 million total EUR 75 000 total
Avoided disposal costs	ITL 48 265/tonne EUR 25/tonne
Revenue	ITL 36 000/tonne EUR 18.75/tonne

The house-to-house collection scheme has involved no additional costs for the municipalities, as the service relies upon the same equipment and facilities of the mixed waste-collection scheme. This equipment is owned by the contractors in charge of the service. The municipalities received some public financing from the Regione Veneto (mainly for construction of eco-centres) and the Provincia di Padova.

Costs for publicity are paid by municipalities. The total expenditure for publicity campaigns was EUR 75 000 in 1998 (about EUR 0.7/inhabitant). The home composters cost approximately EUR 45 and are paid for by the householder. Consorzio Tergola assessed the cost per inhabitant of the two different waste-management schemes; the one in place before 1996 and the separate collection scheme. At current prices, the cost of collection and disposal for mixed waste is about EUR 40/inhabitant/year, against EUR 38/inhabitant/year for door-to-door separate collection. Even if the separate collection activity was slightly more expensive, the disposal costs are now much lower, due to the high and rising costs of landfill disposal (today at about EUR 70–80/tonne).

The composting plant final cost, including recent renewal, is EUR 2.2 million, 50 % of which has been self-financed and the rest has been financed by Regione Veneto and the EU (within the framework of Objective 5b of the Structural Funds). The gate fee for garden waste is EUR 16/tonne for members of the Consorzio, and EUR 22.5/tonne for the others. Fees have been set so as to cover all the operational costs of the plant. The Consorzio Tergola plans to raise the gate fee but guarantee the return of the compost for free in a closed loop.

Reasons for scheme success

The scheme is successful in making householders separate their food waste and garden waste. Biodegradable waste is diverted from mixed waste and its purity is on average 98 %. In 1998, the separate collection scheme achieved a rate of collection of about 51 % of total waste produced. According to the scheme manager, this high performance is mainly due to the convenience of the door-to-door collection system and to the use of convenient receptacles for the proper management of biodegradable fermentable waste materials (bins and transparent biodegradable bags).

Problems faced by the composting plant include residents in nearby areas who were afraid of nuisance and health risks. To reassure the public, open door events to the plants have been organised. Additionally, farmers were not confident about the compost quality at the start; however, they have been given free compost as encouragement.

Above: Illustration showing the life cycle of compost

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EC composting success stories

Oeiras municipality separate collecion scheme and Amtres

AMTRES
CASCAIS-OEIRAS-SINTRA

Above: Scheme logo

Summary

- The Oeiras municipality separate collection scheme is run by the municipality (Câmara Municipal de Oeiras) through the Environment and Equipment Division. A private solid waste treatment company runs the composting scheme located in Trajouce. Its main shareholder is Amtres, a municipal association composed of Cascais, Oeiras, Sintra and Mafra municipalities.
- The area covered by the scheme is 46 km^2, inhabited by approximately 150 000 people.
- The door-to-door separate collection scheme for biodegradable and non-biodegradable waste has been operating since 1994, and in 1995 was extended to the whole of Oeiras municipality. There is also a small home composting scheme promoted and supported by the Oeiras municipality.
- Approximately 15 000 tonnes of compost are produced a year by the scheme.
- The scheme is successful because of the enthusiastic involvement of the local population and the production of good quality compost which is successfully sold.

Site description and location

The composting scheme is located in Trajouce within Oeiras municipality in the western metropolitan area of Lisbon. The scheme serves four municipalities — Cascais, Oeiras, Sintra and Mafra (since 1999). These municipalities created a municipal association Amtres — Municipal Association for the Treatment of Solid Waste — to manage their waste treatment services (composting, landfill, waste separation and recycling). Amtres owns the waste treatment facilities and equipment but the management of solid waste treatment is undertaken by a private company, of which Amtres is a major shareholder.

The typical climate in the area is hot (26 °C average maximum temperature) and dry in summer, and cold (7 °C average minimum temperature) and wet in winter. The annual rainfall is 737 mm with 81 % of the rainfall occurring between October and March. The four municipalities represent about 760 000 inhabitants. The area is mainly urban, with the majority of residential buildings being flats with few houses having their own garden.

Scheme description

The municipality of Oeiras is the only municipality within Amtres that operates a separate door-to-door collection scheme of biodegradable waste. A pilot scheme was launched in June 1994 and operated for one year in the Queijas area with approximately 8 500 inhabitants. The pilot scheme was extended to the whole municipality in July 1995, with a few changes. The scheme involves approximately 150 000 inhabitants.

The following waste streams are collected separately:

- garden and wood waste;
- food waste (including meat and fish);
- paper and cardboard;
- packaging and plastic;
- glass;
- batteries.

Residential houses have 30 l black non-biodegradable plastic bags to collect biodegradable and mixed waste (not collected by separate collection rounds). Further bags have to be purchased in local shops, and 15 bags cost PTE 180 (EUR 0.9). The money raised through the

Above: End product

sale is discounted on the shop's waste tax. There are about 100 selling points located throughout Oeiras municipality. Brown trolley bins made of recycled plastic (50 l) are currently replacing the black plastic bags, and each household is being supplied with one trolley bin.

Collective buildings have been provided with green trolley bins made of recycled plastic (120/240/360 l, according to the user's request) where food is stored until the next collection round. The trolley bins are placed inside the building if there is a common area or on the roadside.

Garden and wood waste has to be collected separately and households request collection by calling the municipal services. Alternatively, green waste can be taken directly by the producer to an eco-centre (equipped collection areas with large containers for the storage of waste prior to disposal or recycling).

The implementation of the scheme was accompanied by a door-to-door awareness campaign during the pilot phase where the benefits of the scheme were promoted. At the moment, information is conveyed through *Reciclar*, a municipal newsletter bulletin, presentations given to schools, school contests, games and special events. Four or five municipal workers are responsible for managing the scheme and for its marketing.

Aims of the scheme

The door-to-door collection scheme's aims are to promote separate collection and divert waste from the traditional landfill disposal route. The composting scheme aims to promoting high recycling rates of biodegradable matter, diverting waste from landfill and minimising environmental impacts. The composting process is considered a source of revenue, and an environmentally sound and beneficial means of recycling biodegradable materials.

Scheme technical details

In Oeiras municipality, house-to-house biodegradable waste collection takes place three days a week, four at peak periods. Trolleys bins and black plastic bags are placed on the roadsides on collection days, and are emptied directly into different types of municipal lorries (mainly compactors). The collection starts at 11 p.m. Lorries make a variable number of trips depending on the type of collection round. The biodegradable fraction is deposited at Trajouce composting plant.

In Sintra, Cascais and Mafra municipalities, where there are currently no door-to-door separate collection schemes, the collection routes with the greatest amount of biodegradable matter are selected. The waste from these collection routes is sent by lorry to the composting plant and every day 200 vehicles arrive at the plant.

The composting plant occupies an area of 10 ha with a 10 ha adjacent landfill and is owned by Amtres. The composting plant, eco-centre, landfill and waste-separation station are managed by the private company and are located about 2 km from Trajouce, Oeiras.

The plant has been recently renewed and treats about 250 000 tonnes of waste per year from both separate collection and mixed collection circuits, 50 % of which is rejected and send to a landfill.

After mechanical separation, the composting process now lasts about two to three months and involves the following.

- **Fast thermophilic decomposition and maturation:** piles are placed over an aerated floor where pipes supply the air needed for composting. Piles are turned and mixed for two and a half months to homogenise the compost and promote rapid oxygen transfer. The air is extracted through ventilators with the capacity to extract 90 000 m^3/hour. The air is washed, circulates through a bio-filter and part of it is reintroduced into the composting process. The bio-filter is made up of a chemical mix known as 'cocomix' and coconut shell, which minimises odours.
- **Refining:** the waste is passed over a vibratory table with a net of 6 mm mesh diameter, which homogenises the compost. The non-biodegradable reject, mainly plastics and metallic, is sent to a landfill located 5 km from the composting plant.
- **Storage and packaging:** the compost is stored under a roofed area where it is packed and sold in bulk or as pellets.

The plant produces 15 000 tonnes of compost a year, and since the start of the scheme in 1991, 600 000 tonnes of biodegradable matter have been diverted from the landfill. The plant works eight hours a day, six days a week.

There are no specific standards for the quality of the compost, other than the legal definition of compost for agricultural purposes by the Direcção-Geral do Ambiente. The company operating the compost plant has its own laboratories which are used to test the compost regularly in order to ensure compliance with the requirements of the Direcção-Geral do Ambiente.

The compost is sold at PTE 4 000 (EUR 20) per tonne in bulk or PTE 10 000 (EUR 50) per tonne in bags/pellets for agricultural applications (mainly vineyard and horticultural). The sale of the compost is part of the plant company revenue and at the moment there are no problems in selling the product.

Publicity for the scheme is organised jointly by the municipalities and Amtres. Oeiras municipality has four technical staff

Above: End product

involved in publicising the scheme and Amtres has one dedicated salesperson. The experience within the Oeiras municipality area suggests that door-to-door promotion is the most effective method of publicity. However, it is also the most expensive method and is used in conjunction with delivery of information (leaflets), the *Reciclar* news bulletin, organised meetings and press campaigns.

There is also a small household composting scheme which has been promoted and supported by the Oeiras municipality since 1992. It aims to encourage waste reduction and reuse and promote environmental awareness. The main targets of the scheme are households with private gardens and schools. The scheme is currently in its third phase of implementation. Households with gardens and schools are currently being targeted. A door-to-door promotional campaign has been carried out and interested schools have been visited. To date there are now 250 households and two schools participating in the scheme. The amount of compost produced is very small and producers use all the compost produced. Oeiras municipality provides the equipment and technical support free of charge.

Future plans for the scheme

The scheme is rapidly expanding with an increase in the quantity of biodegradable waste separately collected. Once separate collection from the Mafra municipality is included within the scheme, the quantity of compost produced is expected to double.

Financial details

Details of costs	
Set-up costs	PTE 11.5 million total EUR 57 500 total
Operating costs	PTE 3 500/tonne EUR 17.5/tonne
Publicity costs	not known
Avoided disposal costs	PTE 2 000/tonne EUR 10/tonne
Revenue	PTE 4–10 000/tonne EUR 20–50/tonne

- Composting plant: PTE 10 million (EUR 50 000) at 1999 prices with 50 % financial assistance from the European Commission ERDF programme.
- Construction of closed hall and new aeration system: PTE 1.5 million (EUR 7 500) funded in 85 % by the European Commission Cohesion Fund.
- Operation costs are PTE 3 500 per tonne (EUR 17.5) and the avoided cost from sending the waste to landfill is approximately PTE 2 000 per tonne (EUR 10). The composting scheme approximately halves the quantity of waste sent to landfill every year.
- Compost sales generate revenue of PTE 100 million per year (EUR 500 000).
- Staff costs involve 50 persons: 4 technicians, 5 administrative staff, and 41 operators and assistants.
- Amtres spends PTE 300 000 (EUR 1 500) promoting the integrated waste treatment management scheme which includes the composting plant.

Reasons for scheme success

The main reasons for the scheme's success are:

- Amtres has an overall waste-management strategy, which sets objectives and the means to accomplish them;
- Amtres is supported by strong commitment from the participating municipalities;
- the compost is good quality, all is sold and initial odour emission problems have been resolved successfully;
- the population involved in the separate collection scheme are participating in the project with interest.

Contact details

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EC composting success stories

LIPOR composting scheme

Above: Scheme logo

Summary

- The scheme covers eight municipalities in the Porto metropolitan area which have formed a municipal association for the treatment of waste in Porto (LIPOR).
- The area covered by the composting scheme is 637 km^2, with approximately one million people.
- A door-to-door collection scheme for biodegradable and non-biodegradable waste has been operating since 1995 in four municipalities. The scheme consists of treatment at a centralised composting plant and is part of an integrated system of solid waste management.
- Approximately 30 000 tonnes of biodegradable waste are composted a year by the scheme.
- The scheme is successful because of the enthusiastic involvement of the local population.

Site description and location

The composting scheme is located in Ermesinde, Valongo, in the Porto metropolitan area, in the north-west of Portugal. The scheme covers an area of 637 km^2, eight municipalities and approximately one million people. Espinho, Gondomar, Maia, Porto, Valongo, Matosinhos, Vila do Conde and Póvoa de Varzim municipalities are associated together in LIPOR, which is a public entity company financed by the municipalities through revenue obtained from its service functions. LIPOR is an organisation with an integrated and coherent system of management and is responsible for the management, treatment and best use of the solid waste produced in the area.

The area's socioeconomic structure comprises industry, commerce, services and coastal holiday resorts. The population in the area comprises a diversified urban population with a population density ranging from 1 102 to 6 482 inhabitants per km^2. Households are divided between communal buildings and residential houses.

The climate is typically Atlantic with an annual rainfall of 1 140 mm, 73 % of which occurs between October and March. Temperatures in the area range from 4 °C to 14 °C from the end of November to the end of February, and 14 °C to 24 °C between March and October.

Scheme description

The biodegradable fraction is collected by the municipal waste-collection services, with different arrangements for each of the participating municipalities. The non-biodegradable fractions undergo a different cycle and are either collected and recycled or sent to landfill.

The first phase of the door-to-door separate collection scheme covers six pilot areas in four municipalities, Gondomar, Maia, Matosinhos and Valongo, with a total of 50 000 inhabitants. Separate collection is made at the household level where waste is divided into three fractions: biodegradable and mixed, cardboard and paper packaging, and plastic, metal and glass packaging.

The three waste fractions are deposited in colour-coded containers that can be plastic bags and/or bins; green is used for biodegradable waste. The capacity and location of the containers vary according to the type of building and are distributed as follows.

- Semi-detached, detached houses and buildings with less than two floors: these receive one 90 l green plastic container. The containers are kept inside the house and are placed on the kerbside only on collection days.
- Buildings with more than two floors: the biodegradable and mixed fractions are placed in plastic bags. Eco-points, which are groups of bins for separate collection with the same colour-code, are placed inside the building or on the

kerbside. The household deposits the contents of the basket and plastic bag into each of the separate containers. The containers have a capacity of 90 l. There are 680 eco-points in the LIPOR region.

- Waste can also be separated by the householders using 70 l green plastic bags. The bags are placed on the kerbside on collection days and after use are returned to the manufacturing company.

The biodegradable fraction is collected during the night, three times a week on alternate days by three lorries with the capacity to transport 12 tonnes of waste. Each pilot zone has at least one vehicle for the collection of biodegradable waste. The participating rate in the pilot areas is greater than 90 %. However, the total participation rate is 5 %, since 95 % of the areas do not have separate waste-collection schemes. Additionally, there is a separate circuit for garden and wood collection which is requested by telephone and a circuit route is set up according to the number of requests in each area.

Four municipalities (Maia, Matosinhos, Porto and Vila do Conde) established a separate collection circuit for food markets, restaurants and businesses. The biodegradable fraction collection is made using dedicated brown plastic bins with a capacity between 240 l and 800 l and 10 m^3 open metal boxes. The bins are kept inside the premises and collection takes place throughout the day three times a week, on alternate days. Each participating municipality has two lorries dedicated to the collection circuit which can transport 12 tonnes of waste. The participating rate is greater than 90 % in the selected areas.

In areas where separate door-to-door collection is not available, the biodegradable fraction is mixed with the other types of waste and is deposited in plastic bags and large plastic bins on the kerbside. The circuits with the greatest amount of biodegradable matter are selected for the composting scheme and are collected by normal vehicles. There are 26 vehicles dedicated to undifferentiated waste collection. Additionally, biodegradable and garden waste can be taken voluntarily by the producer to an eco-centre. There is one eco-centre for every 25 000 inhabitants.

Aims of the scheme

The scheme aims to encourage waste separation and the treatment of waste in a sustainable way, diverting waste from the traditional landfill disposal route.

Scheme technical details

The biodegradable fraction is transported by lorry to the central composting plant, located in Ermesinde, Valongo. There is a total of 42 vehicles arriving every day at the plant, delivering 500–600 tonnes of biodegradable waste a week from three sources:

- door-to-door separate collection (15 %);
- markets, fairs, restaurants and businesses (15 %);
- undifferentiated collection routes with high biodegradable matter content (70 %).

The quantities of biodegradable waste received at the plant are currently changing as more areas undertake separate collection and the quantity of mixed waste decreases.

The composition of the waste collected is:

- 37 % biodegradable matter;
- 20–22 % paper;
- 12–14 % plastic;
- 4–5 % glass;
- 2–3 % metals.

From the total quantity of waste arriving at the site, 42 % (210–252 tonnes a week) enters the composting process and the remainder goes to landfill.

The composting process lasts about five to six months and involves two mechanical separation phases, open air maturation and indoor maturation, as follows.

- **Pre-treatment:** open air tearing of bags and mixing of waste using two cranes.
- **First phase mechanical separation:** waste is transported by two conveyor belts into a rotating drum where waste homogenisation is completed. This is followed by deposition of the homogenised waste on a vibratory belt where recyclable materials such as paper, card, plastic, glass and metals are collected.
- **Second phase mechanical separation:** waste enters a 'hammer mill' where it is shredded and sieved. The non-biodegradable reject, mainly plastic, is separated, compacted and sent to landfill.
- **Open air maturation:** the concentrated biodegradable mix is matured in piles in the open, and mixed regularly with a dedicated mix for two to four months. The mature compost is then refined

Above: Fertor compost end product

Above: Fertor compost end product

using a density sieve and the more dense materials, generally the non-biodegradable fraction, are sent to landfill.

- Indoor maturation and storage: the waste is then moved to an indoor area where it is sieved and some of it is transformed into pellets. The final bulk or pellet product is left to cool in the indoor area for about 1.5 to 2 months, until fermentation ceases. It is then packed in 50 kg bags or sold in bulk.

The final compost has a commercial name (Fertor) and 29 000 tonnes per year are produced by the scheme. The compost is sold at PTE 5 000 per tonne (EUR 25) for agricultural applications, such as vineyards and orchards.

Future plans for the scheme

It is planned to build a new composting plant and waste treatment centre in the next two years.

Financial details

Details of costs	
Set-up costs	PTE 160 million total (cost when plant was constructed in 1965) EUR 5.4 million total
Operating costs	PTE 1 705/tonne EUR 8.5/tonne
Publicity costs	not known
Avoided disposal costs	PTE 750/tonnes EUR 3.75/tonne
Revenue	PTE 5 000/tonne EUR 25/tonne

The total operating costs in 1998 were PTE 145 million (EUR 4.9 million), including costs for publicity in newspapers, outdoor activities and participation in fairs to promote the compost.

Staff costs involve 25 persons working in three shifts, two engineers, two secretaries, two sellers and one commercial coordinator.

Reasons for scheme success

The composting scheme is succeeding in persuading, with the help of municipalities, householders to start separating their biodegradable waste. This ultimately reduces the amount of waste that goes to landfill or incineration.

The scheme has tackled several obstacles, including finding an outlet for the compost end product, which is now sold successfully.

The treatment alternative enables the LIPOR organisation to save PTE 22.5 million a year (EUR 830 000), as landfill costs are PTE 750 per tonne (EUR 3.75).

Contact details

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EC composting success stories

Arun District Council home composting scheme

Above: Arun District Council logo

Summary

- The Arun District Council home composting scheme is run by Arun District Council working in conjunction with composter manufacturers.
- The scheme covers an area of 23 000 hectares within the district council boundaries, and a population of 140 000 (62 000 households).
- The scheme is a home composting scheme, involving sale of composters to householders for home use.
- In the first year of the project, 3 600 composters were sold.
- The scheme is successful due to good publicity and the willingness of the local population to participate in the scheme.

Site description and location

The scheme is located within the administrative boundaries of Arun District Council (ADC), in the county of West Sussex, in south-east England. The climate is fairly wet and daily average temperatures in the area range from approximately 10 °C to 25 °C.

The area includes the coastal towns of Littlehampton (the headquarters of ADC) and Bognor Regis. The rest of the district is rural, and contains approximately 26 villages. The rural areas tend to be prosperous, although parts of Littlehampton and Bognor Regis are less affluent. Housing is mainly semi-detached or detached with gardens, and there are few multi-occupancy apartments in the area. The district's population consists of a high percentage of elderly residents, with available leisure time and an interest in gardening, who are keen to participate in the scheme.

The home composting scheme established by ADC involves the sale of home composters at advantageous rates in a scheme brokered by the district. The project was devised by the council in discussion with the manufacturers of the composters used by the scheme.

Scheme description

To date, the scheme has involved two one-day events for the sale of composters. These were held in the towns of Littlehampton and Bognor Regis. At these sales, householders were able to purchase a composter. Each event was extensively publicised, including radio and newspaper advertisements, letters to residents' associations, parish councils', allotment associations and flyers to all householders in the district.

During the first sale, in March 1998, 2 800 composters were sold and householders were sent a newsletter and questionnaire for completion. From this questionnaire, a network of 50 householder volunteers was established. The aims of the network are:

Right: Home composter

- to provide advice to future buyers of home composters, with queries received from householders by the ADC coordinator answered by the appropriate network member;
- to help existing composter owners with queries;
- to provide a forum for discussions at regular network meetings, of which there have been three so far.

At the second sale, 800 composters were sold. Members of the network were present and brought samples of the compost product produced from their home composters.

Aims of the scheme

The scheme's aim is to assist the local authority in achieving the targets set by the UK Government regarding the percentage of household waste to be recycled or composted by local authorities. This is currently 25 % of household waste to be composted or recycled by 2005, as detailed in the national waste strategy 'A way with waste'.

The scheme also aims to encourage the treatment of waste in a sustainable, cost-effective fashion, diverting waste from the traditional landfill disposal route. Home composting is seen as meeting these criteria. It is also arguably higher up the waste hierarchy than centralised composting, as transportation is minimised and waste is treated in a closed loop.

Scheme technical details

Each householder in the Arun District Council area can purchase a 300 l composter through the council's sales events or a credit card hotline. Each composter is constructed from recycled high-density polypropylene plastic, is 1.5 m high and is circular in design. This particular type of composter was chosen following discussions between the council and manufacturers, and the composter is deemed to be of the optimum size for householder use. The manufacturers supplied staff and educational materials for the composter sales event.

Householders are advised to put garden and kitchen waste (including meat and fish) into their composters, and to use the end product of composting within their gardens. Since the product is not sold, the council has not had to address the issues of finding a market for the compost or monitoring its quality in relation to any standard.

Within the district, over 3 600 composters have been sold so far. A preliminary questionnaire completed by householders purchasing the first 2 800 composters indicated that 96.5 % of householders were using their composter, and that 73 % were pleased with their purchase. The district had high rates of composting prior to the implementation of the scheme, due to its rural nature (30 % of households composting garden or kitchen waste). Unfortunately, Arun District Council does not have figures on the decrease in municipal solid waste following the adoption of the system.

Future plans for the scheme

The scheme is still relatively new. Future plans include expanding the network of householders and using them to spread the message of home composting throughout the community. It is planned to use the network to begin visits to local events with a professional display, encouraging other householders to purchase a composter.

Arun District Council is particularly keen to involve the younger generation and the scheme's coordinator regularly visits schools to educate children as to the benefits of composting and recycling.

Above: Sale of home composters to the public

Financial details

Details of costs	
Set-up costs	GBP 14 000 total EUR 21 000 total
Operating costs	GBP 4 000 total EUR 6 000 total
Publicity costs	GBP 2 900 total EUR 4 350 total
Avoided disposal costs	not known
Revenue	not known

Total cost to date:
GBP 20 900 (EUR 31 350)
Cost per composter in use:
householder
GBP 20 (EUR 30)
Council subsidy
GBP 5 (EUR 7.5)
Total price of composter:
GBP 25 (EUR 37.5)
Running costs per year
(staff time/publicity/newsletter):
GBP 6 900 (EUR 10 350)

The scheme has involved minor expenditure by the council, due to the fact that the scheme has not involved the purchase of equipment or facilities.

Each composter costs GBP 49.95 (EUR 75) if purchased directly by a householder from the manufacturer. However, the composters are supplied to Arun District Council for GBP 25 (EUR 37.50), a special rate agreed due to the number of composters sold. Arun District council then subsidises each composter by GBP 5 (EUR 7.5), meaning that the cost to the householder is GBP 20 (EUR 30). The council believes that if composters are sold to householders too cheaply they are less likely to be used. During the second sales event, the subsidy on each composter was paid for by a partnership fund set up with the county council's waste contractors.

Other costs include the production of the composting newsletter and questionnaire sent to each householder purchasing a composter in the first sale. These costs, including analysis of the questionnaire results, were approximately GBP 2 300 (EUR 3 450).

Staff costs involve a full-time member of staff for two days a week to run the network and scheme, although the time commitment immediately prior to the network sales was higher.

The manufacturer has paid for some of the publicity costs of the scheme, including all of the first sale publicity which included radio and newspaper advertising. The council spent GBP 600 (EUR 900) publicising the second sale of composters.

Reasons for scheme success

The scheme is succeeding in persuading householders to start composting their kitchen and garden waste. The scheme coordinator believes that the main reasons it has succeeded so far are as follows.

- The scheme has tapped into a growing awareness within the community regarding the problems of waste generation. It follows on from initiatives to involve the public through invitations to contribute to consultations on the county waste strategy.
- Householders currently have to pay for the collection of garden waste by refuse collectors. Disposal of green waste is thus a problem for householders for which composting offers an alternative.

The scheme has addressed several obstacles such as encouraging members to continue to use their composters through the establishment of a network. The council has also found publicity for the scheme to be crucial as to whether or not the scheme succeeds. Arun District Council has worked hard to ensure that all members of the community are targeted by the scheme's publicity.

Contact details

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EC composting success stories

Castle Morpeth's composting scheme

Castle Morpeth Borough Council

Above: Borough Council logo

Summary

- Castle Morpeth's composting scheme is administered through Castle Morpeth Borough Council's Environmental and Planning Department.
- The scheme covers 25 % of the borough's population, including 5 000 of the 20 400 households, and services an area of 3 000 hectares.
- Biodegradable kitchen and garden waste is collected separately and composted centrally.
- The scheme produces 3 000 tonnes of compost a year from 5 000 tonnes of collected biodegradable waste, resulting in an income of GBP 76 600 (EUR 115 000) per year.
- The scheme has been successful due to its simplicity, with no additional effort required by the householder to collect biodegradable waste.

Site description and location

The scheme is located within the borough of Castle Morpeth, north of Newcastle in the north-east of England. The scheme is operated within the towns of Morpeth and Ponteland which are both affluent, densely populated urban areas.

The general climate within this part of England is generally cold and wet, with an average annual rainfall of 620 mm.

Scheme description

The scheme, which began in March 1993, aims to decrease the biodegradable fraction of household waste going to landfill to a minimal level within the borough.

The scheme was first piloted on a housing estate with 468 houses and was publicised using a leaflet explaining the aims of the pilot, and stating that if after the pilot the residents in the area did not want a permanent scheme then it would be withdrawn. Morpeth Borough Council also held an exhibition at a local school which around 80 residents attended.

Following the success of the pilot, the scheme was expanded to other householders using a leaflet for promotion. It is now generally found that the scheme is self-publicising and nearby householders are actually requesting that they be involved in the scheme.

In the early days of the scheme, a shredder was borrowed from another authority and a small tractor (used for turning the compost) was borrowed from the county council. The initial outlay for the scheme consisted solely of the purchase of the site itself.

Aims of the scheme

The largest problem that initially arose with the scheme was convincing the public that the compost was a viable product, and to start with much of the end product was given away. This problem has been overcome and all of the compost produced is now sold.

Above: Bags of Morganic — Compost end product

Above: Screening shed used for screening and bagging the compost

Scheme technical details

The scheme aims to assist Castle Morpeth in meeting the government's recycling targets. Biodegradable waste was chosen to be targeted as it is a large proportion of the waste stream, and has the highest pollution potential if landfilled.

The scheme operates a twin bin system, two bins being provided to each householder, a green and a grey bin. Both bins are 240 l wheel bins; the green one is used for the collection of biodegradable kitchen and garden waste, and the grey one is for any other types of waste. Bins are collected in alternate weeks. Recycling points are provided for householders for the collection of other recyclables such as metals, paper, glass and plastics. These are distributed so that there is one recycling point per 500 households.

As well as the large green wheel bin, householders are also provided with a 1.5 l plastic lidded bin which is designed to be placed within a kitchen cupboard for the collection of biodegradable kitchen waste. This bin, once full, can then be emptied into the larger wheel bin.

The biodegradable waste is collected from the householders using a standard refuse vehicle, which is also used for the collection of the contents of the grey wheel bins. Since only one bin is collected per week, no extra vehicles or labour are required for the collection of separated biodegradable waste. The biodegradable waste is then taken to the central composting site where it is tipped, and larger contaminants, such as plastic bags, are removed.

The waste is then shredded using the on-site shredder, stored and then turned on a regular basis, in covered windows. After seven weeks, it is ready to be screened and bagged. The site uses a telescopic shovel for turning the biodegradable waste. This is a small vehicle with a hydraulically operated telescopic bucket. The shredder currently in use was bought in 1996. The telescopic shovel is leased on an annual basis.

The participation rate of the scheme is nearly 100 % with only a 1 % contamination rate.

Currently, the capacity of the composting plant is 5 000 tonnes per year, although the council is currently in the process of moving the site and the new site will have a capacity of 15 000 tonnes a year. The scheme is currently running at capacity and so no additional householders can join the scheme. However, following the move, the scheme will be expanded to other householders to increase the tonnage of biodegradable waste collected. The new site will operate a covered clamp system for composting.

The minimum quantity of biodegradable waste that was collected during any one month during the 1997/98 financial year was 124 tonnes and the maximum was 375 tonnes.

The present plant is located about 10 km north of Morpeth and the proposed new plant premises lie about 10 km east of Morpeth. It may be that biodegradable material from other authorities such as Blythe and Newcastle will be taken by Castle Morpeth in the future.

There are no extra lorry journeys created by the scheme and in fact the composting plant lies closer to the population than the landfill site. Therefore, there has been no increase in the distance waste has to travel for treatment. There is currently no bio-filter in existence although there are plans to build one at the new site.

The scheme is being run at capacity and takes in 5 000 tonnes of biodegradable kitchen and garden waste per year which in return produces 3 000 tonnes of end product.

There is currently no UK standard for compost although Morpeth Borough Council has provided comparative figures of levels of substances, such as heavy metals, under those allowed in the EU eco-label standard.

Trials are run by Newcastle University to investigate how successful the compost is at growing various types of shrubs and plants, and investigations are then made into the heavy metal content of these plants.

Currently, all of the product collected from the scheme's participants is sold and, in addition, extra compost is taken from neighbouring authorities and also sold.

The compost is sold in 50 l bags, 80 l bags or in bulk. Morpeth Borough Council sells the compost directly to householders, to garden centres or to other people such as landscape gardeners, etc. One particular growth market that has been identified is that of using the compost, by mixing it with sand, for golf course top treatment.

The compost is sold by Morpeth Borough Council for GBP 1.99 (EUR 2.99) for a 50 l bag, GBP 2.99 (EUR 4.49) for an 80 l bag and for GBP 50 (EUR 75) for 1.5 tonnes. These prices are also given to the garden centres as a recommended retail price.

An initial problem of selling the compost was that of reluctance of customers to trust the quality of the product. However, it is generally felt that this obstacle has now been overcome and repeat customers have now been found, along with written endorsements of the product.

Future plans for the scheme

It is planned that the composting site will change location to its new premises early in 2000 and following this the scheme will be expanded to other householders to increase the tonnage of biodegradable waste collected. The new site will operate a covered clamp system for composting.

Financial details

Details of costs	
Set-up costs	GBP 150 000 total EUR 225 000 total
Operating costs	GBP 13.7/tonne EUR 20.5/tonne
Publicity costs	GBP 2 000 total EUR 3 000 total
Avoided disposal costs	GBP 10.3/tonne EUR 15.4/tonne
Revenue	GBP 10.1/tonne EUR 15.2/tonne

Capital costs

- The cost of the current composting site, which consisted of a concrete hard standing and nine redundant poultry sheds, was GBP 50 000 (EUR 75 000). Since the purchase of this land, only one screening shed has been erected.
- The shredder cost GBP 25 000 (EUR 37 500).
- The green bins were provided by the manufacturer free of charge for the first year and then cost GBP 15 (EUR 22.5) each (therefore the total cost is 5 000 x GBP 15 = GBP 75 000 (EUR 112 500)). The purchase of these has been undertaken using an operating lease.

Operational costs

- The site itself is run by one semi-skilled worker and costs GBP 12 340 p.a. (EUR 18 510).
- Supervision of the site costs around GBP 2 500 p.a. (EUR 3 750).
- Commission for selling the compost costs GBP 1 300 p.a. (EUR 1 950).
- Administration and publicity costs GBP 2 000 p.a. (EUR 3 000).

Vehicle running costs

- Fuel to run the screener costs GBP 12 000 p.a. (EUR 18 000).
- Diesel used for the delivery of the end product costs GBP 4 800 p.a. (EUR 7 200).
- Gas oil to run the shredding operation costs GBP 2 000 p.a. (EUR 3 000) and the road fund licence costs GBP 1 300 p.a. (EUR 1 950).
- Transport insurance is approximately GBP 460 p.a. (EUR 690).
- Maintenance of the shredder, screener and vehicles costs GBP 18 000 p.a. (EUR 27 000).

Other costs

- The trials run by Newcastle University cost GBP 2 500 (EUR 3 570).
- The other analytical costs are GBP 1 200 p.a. (EUR 1 800).
- GBP 10 000 (EUR 15 000) is spent purchasing bags.

Reasons for scheme success

The scheme's administrator, Malcolm Dixon, believes that the success of the scheme is due to its simplicity, with no additional effort being requires to participate. He also believes that the end product now has a good name and participants are able to take pride in the scheme.

Contact details

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EC composting success stories

Wyecycle community composting scheme

Above: Scheme logo

Summary

- The Wyecycle community composting scheme was the first kerbside biodegradable waste-collection scheme in the UK and is run by a not-for-profit community business — Wyecycle.
- The scheme covers the two parish areas of Wye and Brook and a total of 1 000 households.
- Biodegradable kitchen and garden waste are collected separately and composted at a community site.
- The scheme receives approximately 50 tonnes of kitchen waste and 150 to 200 tonnes of garden waste per year and produces around 70 tonnes of compost end product per year. The sale of this end product results in an annual scheme revenue of GBP 2 000 (EUR 3 000).

Site description and location

The scheme is located in the south-east of England near Ashford, within the county of Kent. The scheme operates throughout the two parishes of Wye and Brook. The areas covered by the scheme are predominantly rural, and the majority of residents are considered to be upper-middle class. There is also an agricultural element present within the area.

The climate is quite dry in comparison with other areas in the UK, and the average temperature slightly higher.

Scheme description

The scheme began as part of a research project in May 1990 with students from Wye College. A composting site was initially shared with the College, but in 1995 funding from the College ceased and the scheme relocated to its current site.

Aims of the scheme

The scheme aims to promote the recycling of biodegradable waste, in conjunction with other recyclable wastes, in a sustainable community setting.

Scheme technical details

The scheme in operation in Wye was the first community compost scheme to be established in the UK, and covers 950 households. Collections from Brook began in January 1999, and the number of householders covered in this area is 70.

The scheme is operated by Wyecycle, a community business which is separate from the local council. Ashford Borough

Above: Resident with green kitchen waste bin and brown garden waste sacks

Council's only involvement in the scheme is for the payment of the recycling credits.

Householders are given a 10 l bin for use within the kitchen for indoor waste, including vegetable, meat and fish waste. This is then emptied by the householder into an 80 l green wheel bin. The waste entering this bin consists of both kitchen biodegradable waste and, in the case of Brook, cardboard.

Garden waste, which is collected separately, is collected in second-hand potato paper sacks, which are supplied by Wyecycle free of charge. These paper sacks are obtained free by Wyecycle from a local potato chip manufacturer.

The green wheel bins for kitchen waste are collected weekly. A grey 120 l bin is collected fortnightly for mixed waste by the local council. In addition to the collection of kitchen and garden waste, Wyecycle collect glass, paper, metal and textiles on a weekly basis in a black recycling box. The collection of recyclables is believed to be vital for the success of the kitchen and garden waste scheme. Without a comprehensive collection scheme, i.e. recyclable wastes as well as kitchen and garden waste, it is believed that residents would be less likely to participate.

The green bins, although the same size as the grey bins, have a false floor and hence a smaller capacity. The bins were purchased in this way so that a paper bag could be used as a liner within the bins. This has since been found not to be required, due to the bins not getting very dirty. Future bins will be purchased without a false floor and will hence have a 120 l capacity.

Vehicles used for the scheme include a tractor and trailer which are used for the collection of the garden waste, and a van, which is used for the collection of the kitchen and recyclable wastes.

All three waste streams (kitchen waste, garden waste and recyclable wastes) are collected on the same day of the week, although they are all collected separately.

The majority of residents participate in the scheme as the grey bin of mixed waste is collected only fortnightly and this provides an incentive to segregate compostable and recyclable wastes. Using a figure of one tonne per year as the average quantity of waste produced per household, Wyecycle claims to have reduced the amount of waste being sent for landfill by 78 % as the average quantity of waste now being sent for landfill per household is 220 kg.

Of the green waste collected, approximately a quarter by weight is kitchen waste and three quarters is garden waste.

The scheme is currently running at a capacity of around 250 tonnes per year. The quantities of kitchen waste arising are fairly consistent all year round, and so any variations in the quantities collected are due to a varying quantity of garden waste. The minimum quantity of waste collected during the last 12 months was in February when only two tonnes of garden waste were collected (plus the four to five tonnes of kitchen waste). The maximum quantity of waste collected during the last 12 months was in September, when 20 to 25 tonnes of garden waste were collected (plus the kitchen waste).

The method of composting the garden waste is that of a static pile/aerated windrow system. The waste is heaped in a pile and left for one month. This is then turned and moved to the next heap space and left again for another month, and water is added if the heap has got too dry. This is done a total of nine times, after which it is ready to be sieved, bagged and sold. There is no shredding involved and any large pieces are simply put back into the system and go around again.

The kitchen waste is placed in a second-hand shipping container, before being added to the garden waste composting system. Here it undergoes partial composting and digestion within a fairly anaerobic environment. After three weeks the waste is transferred to another shipping container where it is left a further three more weeks before being added to the garden waste. This process reduces the risk of nuisance from fly and vermin.

The plant is located 1.6 km from Wye and 0.8 km from Brook.

The collection of kitchen waste is undertaken by one visit to each of the villages. The number of trips carried out by the tractor for the collection of garden waste is dependent on the quantities of garden waste to be collected. The trailer on the rear of the tractor holds approximately one tonne of waste, and hence if there are five tonnes to collect then five trips are made.

The end product of the process is marketed as a soil conditioner and mulch, and not as a high-grade product intended for growing seeds in.

Research into its composition, along with growing trials, has been undertaken by students at Wye College.

The compost is sold back to the residents within the two small parishes of Wye and Brook. It is either bagged up and retailed from a local hardware store, which takes the orders for Wyecycle which then delivers the compost, or the compost is sold in bulk from the site.

Compost is bagged within old fertiliser bags and is then sold as a 30 kg product. It costs GBP 3 (EUR 4.5) per bag or GBP 10 (EUR 15) for four bags. It can be bought in bulk for GBP 10 (EUR 15) per cubic metre.

In general, it is the householders and landscape gardeners that buy the compost and Wyecycle has not experienced any difficulties in selling the product.

The scheme is publicised using leaflets to householders which inform the residents of the scheme, and act as a memory jogger for what can and cannot be put into the various containers.

Future plans for the scheme

The scheme is currently running at full capacity, and so does not plan to expand in the near future. The scheme is run as a demonstration for the local authority, acting as a model for the local authority to follow.

In the future it is planned that cardboard will be collected from residents within the Wye area, as well as Brook.

Financial details

Details of costs	
Set-up costs	GBP 12 000 total EUR 18 000 total
Operating costs	GBP 59/tonne EUR 89/tonne
Publicity costs	GBP 150 total EUR 225 total
Avoided disposal costs	GBP 35/tonne EUR 52.5/tonne
Revenue	GBP 4.8/tonne EUR 7.2/tonne

The site is rented from the management company and costs GBP 1 000 (EUR 1 500) a year.

The tractor that is used for the garden waste collections cost GBP 8 000 (EUR 12 000) second-hand and the second-hand shipping containers cost GBP 1 000 (EUR 1 500) each. Three are used for composting purposes. The van, also purchased second hand, cost GBP 2 000 (EUR 3 000) and is expected to last for two to three years.

Due to Wyecycle offering a comprehensive collection service, it is difficult to determine the exact costs of collection, although it is estimated that the recycling credits of GBP 35 (EUR 52.5) per tonne paid to the scheme covers all of the biodegradable waste-collection costs.

Processing costs are not covered by the recycling credit scheme, and further grants are used for this side of the operation. Money has also been obtained via the landfill tax credit scheme and for the composting side of operations this is in the region of GBP 15 000 (EUR 22 500) to GBP 20 000 (EUR 30 000). Other grants have been obtained in the past from various private businesses.

There are four full-time staff based at the recycling plant and it is estimated that the collection and processing of biodegradable composting alone takes an equivalent of one full-time person. Staff spend the rest of their time dealing with recyclable wastes.

Revenue from compost sales is in the region of GBP 2 400 (EUR 3 600) which comprises GBP 400 (EUR 600) from bulk sales and GBP 2 000 (EUR 3 000) from retail/bagged sales.

Reasons for scheme success

Mr Boden believed that the success of the scheme was partly due to the fact that a comprehensive recycling collection scheme was in operation in conjunction with the collection of compostable materials. In addition, he believed that high participation rates were maintained by allowing residents to buy back the compost. This also assists with educating participants with regard to contamination levels.

A large technical problem with the scheme that has been overcome is the fact that it was the first scheme in the country to collect kitchen and garden waste from the kerbside and therefore there were no other schemes to learn from.

A financial problem that has still to be overcome is to get local authorities to realise the worth of the scheme and that further resources are required if the scheme is to expand.

Above: Undercover screening area (screening undertaken using old bed mattresses

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