ORGANIC MATTER RECYCLING REPORT

The following report was submitted to Sheffield Council's Recycling Officer, Stuart Hodgkin, in 1991. Much of it is still relevant and Sheffield still has no means of recycling the organic fraction of its waste.

1. PRESENT SITUATION.

The estimated weight of putrescible organic matter waste processed annually in Sheffield is approximately **40,000** Metric Tonnes [25% of the total wastestream, 160,000 tonnes].
Much of this material is currently burnt at the Council's Bernard Road incinerator at a cost of £6 / M.T. Organic matter is unsuitable for combustion being made up of over **90%** water, which must be evaporated before the remaining dry fraction burns.

The Environmental Protection Act 1990, provides local authorities with the statutory power to enforce source separation of any recyclable resource, where a means for its recovery exists.
The E.C. target for recycling is to recover **25%** of total waste by 1996. Although 68% of households in Sheffield make some effort to recycle, present estimates show that only **16%** of total waste is recovered citywide.

It is reckoned that on average organic matter takes up about **30%** of domestic binspace.
Many individuals already compost their own waste organic matter on a garden scale. Sheffield Community Recycling Action Project has recently produced a leaflet explaining the composting process, to encourage more people to use this valuable resource. Heeley City Farm has run courses and field trials, successfully growing organic vegetables on brickdust subsoil using compost derived from domestic collection. The Ecology Company's Compost Collective currently produces **20** tonnes of compost per year on 12 allotment sites, recycling vegetable waste from greengrocers in S10.

Although Sheffield's economic history is predominantly industrial rather than agricultural, there has been a strong and continuous horticultural tradition in the area, in private gardens and the 3,000 allotment plots, on 66 sites covering 350 acres. Sheffield is uniquely well-provided for in the area of greenspace since the city itself covers an area of 3,600 hectares. However, organic matter must usually be obtained from rural supplies or imported from outside the region. Last year, the compost budget for municipal parks alone was **£75,000**. By diverting putrescible organic refuse away from the inefficient incinerator and converting it into compost, the city could save and benefit from the nutrients it contains. This form of recycling would make Sheffield a literally greener city.

Several cities around the world have already begun to recognise the value of their organic waste resources and acknowledge the ecological importance of re-using this resource. Composting is most suitable for urban areas where population is dense and local opportunities to recycle organic matter are limited Some schemes are operated as high-technology, capital-intensive, centralised operations, using industrial-scale waste digesters such as the *Dano* processors [e.g.Munich].
Others are run using low or intermediate technology, as local community amenities [e.g.Byker Tyneside], or as schemes to encourage and facilitate home-composting [e.g. Adur West Sussex].

2. RESOURCE INPUTS.

A wide range of industrial, institutional, retail and domestic waste materials can be recovered by composting processes. Some inputs are readily compostable, such as spoilt produce from shops and wholesale markets, spent hops from breweries and fruit and vegetable wastes and peelings from homes, hospitals, schools and other food processors.

Some inputs are valued as fertilisers, such as abattoir products, manures, pet and poultry litter, wool shoddy from old carpets and mattresses, hair clippings from barbers and urine [piss].
Many other materials can be added to compost, either to improve its texture, such as rotted sawdust or shredded cardboard, or to add minerals, such as coffee grounds, gypsum plaster and basic slag from kiln linings. A variety of contaminants, such as metal and plastic packaging, glass, chemical residues and colour inks must be removed from the inputs by separation before processing and also by screening the finished product.

Citywide collection of available inputs could be achieved by a variety of complimentary methods, ranging from large-scale high volumes, delivered to a centralised composting site, to local collection rounds and domestic composting units. Information on inputs and sources would need to be databased and mapped to enable efficient collection to take place.

3. PROCESSING.

Compost can be processed either in heaps or in long rows. The process is improved by aeration, moisture control, insulation, microbial inoculation and by introducing specialist compost worms [Eisenia Foetida] to refine the material into a mature finished product. Initial decomposition by micro-organisms generates heat [up to 65 ^{o}C], water vapour and carbon dioxide, and persists for 2-4 weeks. During this stage, the volume of the material is reduced by about a third, facilitating storage.
This material is then matured into stable, homogenous, humus-rich ripe compost by the action of macro-organisms, a process which can take up to six months. The essential chemical action of the process is the bonding of nitrogen onto carbon, which can be achieved most efficiently if these elements are combined in a suitable ratio, ideally 35 parts carbon to 1 part nitrogen. In mature compost this ratio is reduced to 10:1, at which level, nitrogen is safely and readily available.

The logistics of a composting operation are decided by the volume and frequency of inputs.
This supply is subject to seasonal and other cyclical variations. Mature compost can be obtained in as little as six months, using an area of 1 sq. metre to process each metric tonne of inputs/output.
A site used for composting would have to be managed to ensure efficient reception, processing, storage and despatch of materials. It would also have to meet environmental and health and safety requirements. In addition, attention should be paid to site ecology to ensure that the sight, sound and smell of the process are not offensive to public opinion. The end-product should be monitored and tested regularly for its pathogen and heavy metals content.

Any large-scale composting scheme would benefit from the technical involvement and support of a wide range of disciplines. Locally, expertise, facilities and information are available from Cleansing Services, Sheffield University and Hallam (Polytechnic). Nationally there exists a large network of organisations and initiatives in this field.

4. COSTS.

The start-up costs of a composting enterprise using low / intermediate technology would be very small relative to the impact it could make on the total volume of wastes recovered.

Capital expenditure would be required for site-preparation, machinery and transport, although existing facilities and plant could be adapted at minimal cost. The site would need a road and drop-off point suitable for large lorries delivering fresh garbage. Chopping and mixing machinery appropriate to the scale of the operation would be essential for the initial preparation of materials for composting. Building and turning small volume heaps can be achieved efficiently by personpower using basic tools, though other machines such as front-loading earthmovers and conveyor belts would greatly increase the rate of processing larger volumes. Suitable transport would be required for the collection of raw materials and for the delivery of finished compost. Safety and monitoring equipment would also be necessary.

Operating costs would largely be expenditure on wages. These would vary in proportion to the volume of organic matter available for processing. Other running costs would be minimal expenditures such as additives to improve the quality of the final product, such as seaweed meal or rock dusts, fuel costs and

administration resources etc. Some costs could be minimised by using other recycled materials such as timber or pallets.

5. FUNDING.

A wide variety of funding opportunities would be available to a municipal-scale composting scheme. Environmental concern groups such as Friends of the Earth and Greenpeace are keen to support new ecological recycling projects. The City Council is committed to "encourage and develop domestic, industrial and commercial recycling initiatives and develop mini recycling centres throughout Sheffield; and encourage industry and business to adopt better management of waste through recycling." [Draft Unitary Development Plan 1991. SCC Planning Department]. These aims could all be achieved by supporting and co-operating in composting projects. The council has mechanical resources and logistical expertise which could be made available to such projects on favourable terms to the mutual benefit of both parties. Big business is aware of the potential economic benefits of recovering waste and retailing compost products. Several large concerns are currently offering help with finance and research and are keen to be involved in such projects.

In addition to these established sources of support, a composting scheme could use other creative methods of fundraising. For instance, donors of organic waste could be issued with shares entitling them to a proportion of the end-product. This form of credit would act as an incentive to the separation and collection of material. If the scheme was financially successful, these credits could even be redeemed for cash.

6. OUTPUTS.

The returns in profit from composting will be delayed by two factors. Firstly, the processing cycle from raw material to saleable product should take 6-12 months to complete. Secondly, the buying public may take some time to accept and demand the new product. However, a large market already exists for compatible products. Trends such as organic gardening and the substitution of peat as a growing medium could put recycled organic compost at a premium.

The financial return from output can be estimated by comparing the retail prices of similar products. Stable manure costs 50p for 25 Kg [=£20 per Metric Tonne]. Peat costs approximately £4 for 50 L [=£80 per MT]. Growbags cost £1 for 20 Kg [=£50 per MT]. Fine potting compost costs £1 for 5 Kg [=£200 per MT]. Wormcasts cost £2 for 5Kg [=£400 per MT]. Different grades and mixtures of compost could be manufactured to supply these various markets.

In addition to the core products, there are also several by-products of the process which could also be generated, such as uses for the heat output and related products such as liquid feeds derived from leachate.

The potential value of these secondary outputs can be understood by reference to one specific product. A large demand exists for compost worms to use as bait for fishing. These can be sold for as much as £2 per kilo, a staggering **£2000 per metric tonne**. Since these potential returns may take years to be realised, it must be understood that any compost processing business could only reach break-even point and profitability in the medium to long term.

A composting enterprise would perform two services of benefit to the community; waste disposal and provision of compost products. Several other benefits could be derived, such as the use compost to help regenerate derelict allotment sites. Compost could be made available at a subsidised price to enable more disadvantaged people to grow their own fresh fruit and vegetables. It would be especially useful for elderly and infirm gardeners who may be less capable of making their own. A composting scheme could also provide opportunities for practical research in the field of biotechnology. A successful operation would have prestige value for Sheffield as an innovative example of resource recycling and improving urban ecology.

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