RISKS INHERENT WITH BIG TECHNOLOGY SOLUTIONS IN ORGANICS MANAGEMENT

March 2003

Prepared by:
Ron Alexander
Enviros, 16 Crucifix Lane, London, SE1 3JW
Tel: 0207940 5422, Fax 0207940 5414
E-mail: alexassoc@earthlink.net

REMADE Scotland
Caledonian Shanks Centre for Waste Management
3rd Floor
Drummond House
1 Hill St
Glasgow
G2 6RN
Tel: 0141 582 0450
Fax: 0141 404 0451

http://www.remade.org.uk

RISKS INHERENT WITH BIG TECHNOLOGY SOLUTIONS IN ORGANICS MANAGEMENT

Commercial scale composting in the U.K. has grown significantly over the past several years, and will continue to grow into the foreseeable future. As the industry has grown, both landfill operators and waste managers have begun to study the science of composting, and as such, now see it as both a recycling and manufacturing process. Today, the composting process is well understood as a manufacturing process, and clever composters can manipulate the process in order to manufacture products which best meet the requirements of their specific end users. However, even as success in the worldwide composting industry has grown significantly, so to have failures.

For the U.K., organics have become a priority material to recycle because they are easy to target within the waste stream and can make a large impact, quickly in meeting overall recycling targets. Also, some infrastructural requirements for the collection and management of organics already exists. However, different barriers and opportunities exist in organics management, as compared to more traditional recyclables. The greatest difference between organic materials and traditional recyclables is that they are putrescible in nature. Of course, significant drivers exist which will enhance the collection and management of organic materials. These drivers include the E.U. Landfill Directive (EC/1999/31) and The National Waste Plan 2003 (the National Waste Strategy: Scotland).

For Scotland, the E.U. Landfill Directive targets for organics require 290,000 tonnes of organics to be managed by 2020. Organic feedstocks that will be targeted in the short-term include primarily garden waste, and later, kitchen waste, as well as non-recyclable wood, paper and card. It is likely that much of these organics will be collected in source-separated fashion, but mixed solid waste composting is also an option that certain local authorities may consider.

A variety of composting methods may be used in organics management, based on the specific feedstock to be composted. Where outdoor windrow system are less complicated and engineered, and may be appropriate for feedstocks such as garden waste, in-vessel systems (which are typically patented) are often used for highly putrescible feedstocks, and those which are more difficult to manage (e.g., kitchen waste, biosolids, MSW). As *"big technology options"* become more financially viable for use in the U.K., the opportunity for great successes, as well as great failures exists. Failures are likely because these "black box" technologies are often seen as panaceas by non-technical individuals involved in the decision-making process. Therefore, in order to assist the U.K. in developing a healthy composting industry, and assist it in avoiding industry failures, a study was completed within the United State's composting industry in order to evaluate why specific composting (and other waste management) facilities

failed. In this brief study, 21 North American facilities were identified, with the focus on biosolids and MSW composting facilities; while one digester and MRF (materials recycling facility) were also evaluated. Of the 21 facilities, 7 are still in operation and 12 of the "failed facilities" alone represent a $423 - 500 million dollar loss.

The U.K. composting industry has specific challenges and issues that are unique to it, and they must be addressed in order for it to grow to the extent necessary. To its benefit, the organics management industry has strong political drivers forcing its positive movement, and therefore creating great interest, as well as investment in the industry. However, based on U.K. regulation and E.U. legislation, a great deal of work must be done to expand the industry in a limited amount of time. Unfortunately, this circumstance creates an atmosphere where significant mistakes can occur. The U.K. must also deal with other inherent issues such as space restrictions, uncertainty in future regulation and legislation, underdeveloped compost markets, consultancy and operational inexperience and a complicated waste management infrastructure.

As a means to assist the industry in avoiding common errors in composting facility development, we have outlines common mistakes found to cause facility failures.

COMMON MISTAKES

- **Facility Design** – Many mistakes have been made in the overall design of composting facilities, with a major cause being a lack of overall experience and an understanding of the composting process, as well as the logistics related to the management of organic materials. These mistakes have been caused by consultancy companies, as well as their clients (local authorities and private companies) through trying to meet unrealistic economic parameters, usurping the formal review process, and at times, by getting too involved in the overall design without possessing proper and related experience. Facility design must take into consideration the biological nature of the process, odour management and product quality issues.

- **Technology Selection/Equipment** – Mistakes have been made by consultants, their clients, as well as politicians, becoming enamoured with a specific composting technology, thereby not staying open-minded towards other technologies. At times, the systems have simply not worked, while in other cases, the systems were just not appropriate for the specific location or feedstock. It is key to obtain assistance from companies that possess experience in the composting process and equipment selection, as well as the varieties of technologies and equipment available, before a preferred technology is chosen and a tender is designed around it.

- **Odour/Odour Control Systems** – Probably the greatest cause of facility "shutdowns" in the United States and probably the world - is odours. Whereas, odours are always generated during the commercial composting process, the volume of the odorous air stream, as well as the types of odorous compounds, can greatly affect the severity of

the potential odour problem "off-site". Often odour systems are under designed, unable to handle the quantity of air necessary for proper odour control, they are ineffective on the specific odorous compounds, or are not included in the original facility design at all. The science of odour control and odour monitoring is very complex, but the reaction of the general public is not. Odour generation and management must be considered in the design phase of facility development, but often, proper operation of the facility is key to reducing odour generation and movement off-site.

- **Sitting** – Sitting of the composting facility often goes hand in hand with odour issues. Sitting a facility too close to neighbours is a classic mistake of the composting industry. Even "in-vessel" systems are affected by siting issues related to odour generation. The logistics of a composting operation, which relate back to traffic or vehicles entering and leaving the facility, should never be disregarded. Truck traffic has caused problems with neighbours of composting facilities and has caused stress on the road infrastructure.

- **Product Quality/Marketing** – Producing a compost product that meets the quality requirements of the end user dramatically affects its marketability. However, aside from product quality issues, history has also shown that a lack of market development activity and underestimating the requirements necessary to develop a successful marketing program have also caused marketing failures. One way to avoid such failures, is to determine the realistic quality of product you expect to produce, then complete market research to determine if markets exist for it. Market research should be a significant part of your facility design and evaluation process. Understanding the needs of the market, as well as the investment necessary to develop a revenue generating marketing program, is often overlooked. Poor marketing leads to large piles of compost being built throughout the composting facility. This occurrence may lead to odour generation, logistical problems at the composting site, public relations difficulties, etc.

- **Misunderstanding Waste Characteristics and Properly Controlling Facility Inputs** – Large-scale composting facilities, especially MSW composting facilities, should never be developed without completing a proper waste characterization. Using national or regional characterization figures, which did not represent actual waste characteristics, has caused great difficulty to several composting facilities. This is because misunderstanding the waste characteristics can greatly affect the operational costs and input capacity of a facility. Biosolids composting facilities have been developed with the understanding that the local authorities garden waste would be used as the bulking agent, only to find out that the majority of the garden waste was grass and not 'woody' (carbon rich). Therefore the facility had to purchase woodchips for use as a bulking agent, which significantly increased their operational costs. MSW composting facilities have been designed with a belief that food based materials and packaging would be the primary inputs, only to find that great volumes of non-recyclable paper and card were a majority of their feedstock. Other facilities have been designed and built assuming that the proper volume of feedstocks was available, and could be contracted for, to make the facility financially viable - only for

that to be proven incorrect. Also, assumptions should never be made when it comes to the ability to control of the flow of waste materials entering the composting facility. Proper volumes must be guaranteed and 'contracted for' before the facility is developed.

- **Politics** – Several composting facilities have been doomed from the start because of poor political decisions in the design of the composting facility. Examples exist where local politicians have been invited on junkets to evaluate composting facilities without involving proper technical representation assisting them. Poor systems choices have also been made because powerful members of the selection committee have been enamored by specific composting systems, even though those systems were not the best for their particular situation. Politics dealing with local residents and regulatory bodies have also caused the operation of many facilities to be altered, as well as snuffed out completely. The lesson is that technical decisions need to be made by technical individuals who have practical experience.

- **Financial** – Failures have also occurred because composting facilities were undercapitalized from their beginning and were unable to properly operate without compromising the long-term integrity of the program. Undercapitalized facilities have been forced to "ramp up" too quickly, trying to manage larger volumes of incoming waste than they were able to during the 'start-up' phase (so they could receive additional gate fees), causing odour problems, forcing improper performance testing of equipment, and the production of poor quality compost. In other cases, little money was set aside for contingencies, or upgrades to the system, causing the facility to "limp along" until revenue could be generated to make repairs, or upgrade the system. Also, in-depth evaluations of cost to build and operate the facility have been improperly completed during the design of some facilities, leading to a higher cost per ton to manage the materials than expected (or promised by the technology provider).

We have seen the successes and we have seen the failures, and what we have learned is that most of the failures can be avoided. One of the best ways to avoid failures in the development of large-scale composting facilities is to simply understand the realities of composting. Some of these realities are:

1. Composting is an excellent waste management option, but it is not a panacea (it is simply not perfect option for every organics management application)

2. Composting is both an engineering and biological process

3. No composting facility is odour free

4. Even successful composting facilities have problems from time to time

5. Most composting facilities create "reject" material (product that has to be landfilled). MSW composting facilities often have a 35% to 45% reject rate

6. Operational challenges increase exponentially with facility size

7. Developing markets for compost products takes time and investment (no composting facility should be developed without an understanding of where the compost will be used)

8. If it sounds too good, it usually is!

So to improve your chances of success, learn from past successes and failures. We must allow past experiences in compost facility design and operation to shape the design and operation of future facilities. Keys to shaping your facility are:

- Understanding the composting process,
- Seek out experienced assistance to help you in the facility development process,
- Select the proper composting technology and consultancy assistance,
- Understanding your markets,
- Allow for proper planning and technical review process,
- Start the planning/design process 'early' (don't let a short timeframe cause bad decision making),
- Never be a 'guinea pig' - don't be the first one to develop a composting facility based on a new or and unproven technology.

Also, remember that bigger and/or higher technology solutions are not always best choice.

LESSONS FOR PROJECTS IN THE CONCEPTION STAGE

1. Begin with realistic expectations for project outcomes
2. Research, in detail, and visit any related projects and facilities
3. Perform conservative assessments of technical and financial feasibility
4. Perform extensive field-testing; including pilot-scale composting and waste analysis.

LESSONS LEARNED DURING THE DESIGN AND PROCUREMENT STAGES

1. Base your design on the 'known' principles of composting
2. Vendors must demonstrate positive past performance and a detailed understanding of their system
3. Be cautious of those with little practical, or successful experience
4. Odour must be well managed
5. Careful siting and community relations is key
6. Understand your waste stream and determine the product you plan to produce
7. Regardless of the procurement method, make sure to develop a capable project management team
8. Budget for cost overruns, as well as delays in development and revenue generation
9. Hire a facility operator or project manager and obtain their input before final design is completed
10. Be patient, use design review and procurement processes that have worked in the past.

LESSONS FOR OPERATIONS AND MARKETING

1. Establish operations and monitoring protocols consistent with the principles of proper composting
2. Communicate with the community, customers and end users
3. Train your facility staff
4. Anticipate challenges of various types
5. Build an ongoing employee training, plant optimization and safety programs
6. Commit resources towards marketing
7. Product quality must match the requirements of end users and desired uses
8. Complete market research during project planning, and develop a marketing plan that is based on facility requirements and market regional conditions.

ACKNOWLEDGEMENT:

REMADE Scotland would like to thank the Clean Merseyside Centre for permission to reproduce this document under the REMADE Scotland brand. Further information about the Clean Merseyside Centre is available from:

Clean Merseyside Centre
Unit 36B
The Colonnades
Albert Dock
Liverpool
L3 4AA
Tel: 0151 708 9533
Fax: 0151 707 2431

http://www.clean-merseyside.com/