

**WASTE WORKING GROUP****C/O Earthwatch – Friends of the Earth Ireland & VOICE,****7 Upr., Camden St., Dublin 2.****Ph: 01 - 4785140****To: The North-East Regional Authority****Re: Submission on the Draft Waste Management Plan for the North-East Region, 2000.****Date : 12<sup>th</sup> May 2000.****Author: Anne-Marie Cunningham**

**The Waste Working Group is a coalition of environmental NGOs including VOICE (of Irish Concern for the Environment) and Earthwatch – Friends of the Earth Ireland.**

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**Notes**

Within the body of this submission,

- The Draft North-East Regional Waste Management Plan is referred to as “the Plan”,
- The North-East Regional Authority is referred to as “the authority”.
- “recovery” means material recovery unless otherwise specified and “disposal” refers to both incineration/thermal treatment and landfill, for reasons discussed later.

## **Executive Summary**

It is the contention of the Waste Working Group that the function of this plan is to lay the groundwork for the development of a truly sustainable waste management/ resource conservation and recovery system in the North-East region in line with Ireland's commitments to sustainable development. In order to achieve sustainable development waste management cannot be decoupled from resource conservation and recovery. The focus of the North-East Waste Management Plan must shift from methods based on 'getting rid of rubbish' to processes that will prevent wastage and conserve natural resources. To achieve this the plan must be firmly focused on the upper part of the EU waste hierarchy, which states that prevention and minimisation of waste should be followed by reuse, repair and recycling.

However all three scenarios proposed by this plan are focused on the least sustainable options as outlined by the EU waste hierarchy. The source reduction options - prevention and minimisation - are ignored in all three and the targets set for recycling and composting are low compared with what has been achieved internationally within the same, and shorter, time periods. The scenario favoured by the authority proposes to recycle 35.9% and incinerate 48.5% of municipal and industrial waste generated in the year 2014 and landfill the remaining 15.5% plus the residues from the various treatment processes. This illustrates that the plan concentrates 64% of effort on how to dispose of waste and 100% on reactive measures to deal with waste once it has been generated

In relation to source reduction the plan focuses mainly on educational initiatives. Whilst education is an important part of any plan, no measures have been taken to stabilise and in the longer term reduce, the amount of waste generated within the North-East region in line with the targets set out in Ireland's strategy for sustainable development. It is recommended that the authority sets such a target and develops a plan of action in relation to source reduction.

In relation to material recovery,

- the plan does not detail the delivery mechanisms by which the targets set for recycling will be achieved. For example, the plan does not provide any information about current or proposed recycling industries in the region or the current market for recycled products. It also does not sufficiently address market development for recycled products.
- the targets set by the authority are quite low compared when compared with what has been achieved internationally.

On analysis of the three 'alternate' scenarios proposed, it is clear that the only significant difference between them is incineration. The evident bias towards incineration is a serious concern of the Waste

Working Group. The threats that incinerators pose to human and environmental health have been well documented. In addition incinerators are in direct contravention to a waste plan based on the principles of sustainable development. Incinerators serve as 'black holes' for vast amounts of potentially recoverable resources and recreate the 'out-of-sight, out-of-mind' approach evident with landfill. If the authority chooses to introduce incineration to the region, they are deferring the waste problem rather than attempting to solve it. Also as incinerators require a steady amount of waste for efficient operation, it is the concern of the Waste Working Group that such a measure will negatively impact on development of recycling and other material recovery initiatives within the region.

It is the contention of the Waste Working Group that,

- it is not necessary to introduce incineration to satisfy national policy requirements,
- incineration is the most unviable option in economic terms,
- energy can be recovered in greater quantities by means which are more conducive to sustainable development.

International experience has shown that it is more than possible to meet and indeed surpass the target for diversion from landfill set out by the National policy by positive ways that are conducive to sustainable development. It is recommended that as a prerequisite to action, the authority considers the numerous positive systems in place internationally which prove that it is more than possible to meet and indeed surpass the targets set out by National Policy and in shorter time periods. Subsequent to this it is recommended that the authority develops a new scenario, one which combines waste reduction at source with reuse, repair, recycling together with financial incentives. Only when such a strategy has been researched and developed will the authority be equipped to make an informed decision on the way forward for the North-East region.

## **1. Introduction**

Environmentally sound management of wastes is among the environmental issues of major concern in maintaining the quality of the Earth's environment and especially in achieving environmentally sound and sustainable development<sup>1</sup>. It is therefore the belief of the Waste Working Group, that the primary function

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<sup>1</sup> Earth Summit (1992), UN Conference on Environment and Development, Rio.

of this waste management plan is to lay the groundwork for a truly sustainable waste management/ resource conservation and recovery system in the North-East region. It is the concern of the Waste Working Group that the North-East Regional Authority is not doing this and therefore deferring the waste problem of the region rather than attempting to solve it. Therefore the necessity of developing a waste plan based on the principles of sustainable development is discussed.

## **2. Waste Management in the context of Sustainable Development.**

*This section highlights the importance of considering the effects that a particular waste management plan will have on the development of sustainable societies and why waste 'management' must become synonymous with resource conservation.*

Sustainable development is most commonly described as development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Sustainable development thus aims to improve the quality of human life while living within our ecological means.

For sustainable development waste generation and its associated problems cannot be decoupled from resource depletion. This is clarified by consideration of our current system of resource use, which follows a predominately linear pattern.

i.e. Resources → product → disposal

Resources are extracted, used to manufacture a product that is bought by a consumer and subsequently thrown away. On the right hand side of this equation the rapidly increasing amounts of waste generated have reached critical levels. In fact, industrial development and its associated waste products has accelerated at a rate far surpassing the adaptive capacity of natural systems and if wastes continue to be produced at current or increased volumes, then any 'management' system will eventually become overwhelmed.

On the other side of the equation, the rapid depletion of the Earth's natural resources is endangering the supply for future generations. Global calculations show that humans are consuming over one third more than nature can reproduce. Of course, for industrialised countries this rate is even higher.

## ***Inequitable Use of Global Resources***

The following extract from the 'UK House of Commons Environment, Transport and Regional Affairs Committee Report on Sustainable Waste Management' illustrates the urgency to address our current resource consumption patterns.

**'At present 20% of the world's population use 80% of the world's resources: the other 80% - the population of the developing world – uses only 20% of these resources. Such inequity cannot continue. Traditionally it has been believed that as the less developed world developed, it would use more and more resources and that the world's supply of resources would expand to accommodate that; any shortage of raw materials would either stimulate the search for new supplies or encourage the use of alternatives. Now, we are having to face the fact that such a level of resource use would push the world way beyond what is sustainable; so that either the developing world has to be held back or the developed world has to find ways to sustain current standards of living while using far fewer resources; maybe as little as 10% of the resources we use now. Such a revolution in resource use, and possible reuse is the real driving force behind today's needs for the developed world to take waste minimisation and sustainable development seriously.'**<sup>2</sup>

There is clearly an imbalance between our current development patterns and the natural capacity of the Earth's systems to adapt to the over consumption of resources and to absorb waste at its current rate of production. The following points further illustrate this,

- Researchers in the Netherlands found that the country would have to be 14 times larger to supply all the resources, water and energy used by Dutch consumers and absorb all the waste produced by Dutch citizens.<sup>3</sup>
- Research has also shown that if all the world were to live as a North American or Canadian, 2 more planet Earths would be needed to sustain everyone, 3 more still if population should double and 12 Earths altogether if worldwide standards of living should double over the next 40 years.<sup>4</sup>

<sup>2</sup> Material Recovery (1999), Friends of the Earth Europe.

<sup>3</sup> Thorpe, B. (1999), Citizen's Guide to Clean Production, Clean Production Network, USA.

<sup>4</sup> Thorpe, B. (1999), Citizen's Guide to Clean Production, Clean Production Network, USA.

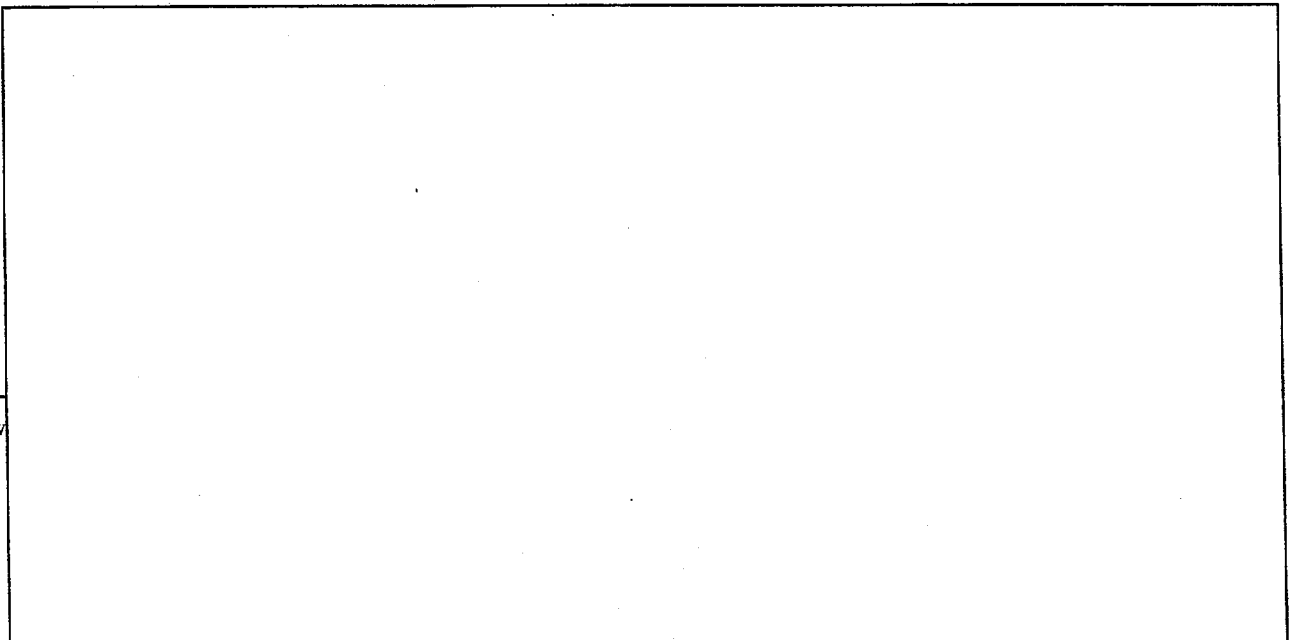
- Studies conducted in the US show that for every 100 pounds of product manufactured, at least 3,200 pounds of waste is created. Only 6% of the materials we extract each year from the Earth becomes durable goods; the other 94% is converted into waste within a few months of being extracted.<sup>5</sup>

When considering waste management in the context of sustainable development, it becomes obvious that a change in attitudes towards waste is necessary. A shift from waste “management” i.e. what are we going to do with our rubbish to resource conservation i.e. how are we going to prevent wastage and conserve natural resources is essential.

The focus has for too long been on what will be done with waste once it is produced i.e. end of pipe solutions. However, it is widely recognised that for sustainable development, the *closing of the material loop* must be achieved, i.e. turning our present linear use of resources into a cyclical one.

To ‘close the material loop’ there needs to be an incremental reduction in the amount of virgin resources feeding into the production chain coupled with a continuous decrease in waste produced. This is shown diagrammatically in Figure 1 below.

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<sup>5</sup> Haw

**Figure 1: 'Closing the Material Loop'- The sustainable approach to 'waste management' / resource conservation and recovery.**

The internationally recognised waste management hierarchy, which lists waste management options in order of preference, aims to promote sustainable waste systems. According to this hierarchy prevention and minimisation of waste are the most favourable option. Waste that cannot be prevented or minimised should be reused, repaired, recycled or composted. Energy recovery and landfill are the least favourable options.

The aim therefore is to generate waste plans that are firmly focused on the upper and middle parts of this hierarchy. This would further the development of cyclical production and consumption patterns and thus the advancement of closed loop processes. Unlike options such as landfill or incineration, recycling and reuse result in material being returned to production processes, where the material can be made into the same or similar product from which the material arose or it can be fashioned into something entirely different. This means that for the economy as a whole there is a reduced need for primary extraction, hence resources are saved and there is a reduction in the environmental effects from the production, processing and transport of the raw material, which also results in considerable economic savings. Recovery of energy from waste may appear to have a similar effect, yet on closer examination it becomes evident that this is not the case. Recovering energy from waste by incineration or any other means of thermal treatment can only recover the energy contained within the actual material and of course this can only be recovered once. The energy used up in the extraction of resources, transport etc. cannot be recovered. Conversely this energy can be saved by methods such as reuse and recycling. Although recycling cannot occur indefinitely (for example, due to shortening of fibers in newsprint recycling), recycling can usually take place more than once. There is, therefore, an element of circularity in the recycling process that is absent in the case of incineration and landfill. Also it has been pointed out that sustainable development requires a reduction in raw **material** usage. Incineration effectively results in these materials 'going up in smoke'. It is for these reasons that both landfill and incineration are referred to as linear waste management options. It is also for



these reasons that within the body of this submission “recovery” is used to denote material recovery mechanisms and does not refer to energy recovery unless otherwise stated.

### ***Incineration – Waste to Energy or a Waste of Energy?***

Far more energy is actually saved by recycling materials than burning them due to the fact that significantly more energy is required to produce virgin materials than to recycle. It has been estimated that for every tonne of ‘product’ we buy, ten tonnes of resources have been used in the manufacturing process. **Reuse and recycling have a far better energy recovery record, with savings of up to 70-90% despite energy lost in transport and cleaning compared to an expected efficiency of 25% recovery from incineration<sup>6</sup>**

This fact is reiterated by the a recent report by the European Commission, which asserts that in general recycling is preferable to incineration in energy terms.<sup>7</sup>

- Recycling aluminum cans in the United States in 1996 saved enough energy to power a city the size of Philadelphia for one year.<sup>8</sup>
- Germany has 53 incinerators burning 14 million tonnes of waste per annum. The burning of this massive amount of waste produces 0.5% of German energy requirements. The incineration of every single atom of waste produced in Germany would provide 1.5% of all German energy requirements.<sup>9</sup>

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## **3. Analysis of the Waste Policy for the Region**

*The scenario favoured by the authority,*

<sup>6</sup> Earthwatch submission to MCKK consultant group (1997) Local Authority Waste Management Policy suggestions.

<sup>7</sup> Review of Waste Management Strategy, European Commission, COM (96) 399, 30 July 1996.

<sup>8</sup> The Worldwatch Institute <http://www.worldwatch.org/alerts/981217.html>

<sup>9</sup> Der Grune Punkt, (1998) Edition 3: Waste Incineration Processes in Germany.

- is focused on the least favourable options according to the EU Waste Hierarchy - incineration, recycling and landfill - and therefore cannot provide a plan conducive to sustainable development.
- concentrates 64% of effort on end-of-pipe linear waste management options and 100% of effort on reactive measures to deal with waste after it has been produced,
- proposes to introduce a technology which will have a detrimental effect on environmental quality

According to Section 8.1 of the plan, the waste policy is focused on reducing dependence on landfill. The scenario chosen by the authority focuses on incineration, recycling and landfill as the mechanisms to achieve this. Indeed all three scenarios are focused on two or all of these options and none includes targets for prevention and minimisation, the two most favourable options according to the EU Waste Hierarchy. Also the targets set for recycling are low compared to what has been achieved internationally as will be illustrated throughout this submission.

The largest categories of non-agricultural waste arising in the region are shown in Table 1 below.

Waste Category	% of Non-Agricultural Waste Arisings
Household	20.3
Commercial	13.5
Industrial	26.2
Construction and Demolition	33.8
<b>Total</b>	<b>93.8</b>

**Table 1. Various categories of waste shown as a percentage of the total non-agricultural waste arising in the Region.**

**Construction and demolition** waste is the single largest category of waste arising in the region. While it is recognised that the plan proposes to recycle a very high percentage of this waste stream, 79.8% (Table 2 of the Executive Summary), it should be noted that the Government's target for recycling of this waste stream is 85%<sup>10</sup> to be reached over the time period of this plan.

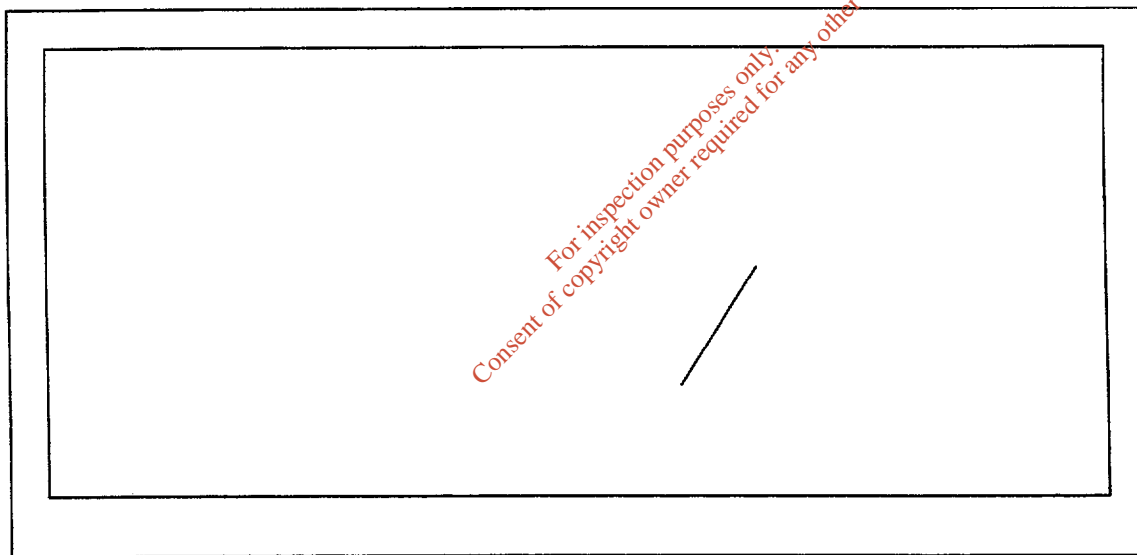
The remainder of this submission will focus on the remaining largest non-agricultural waste streams, municipal and industrial waste. Table 2 below shows the targets set by the authority in relation to these waste streams, to be reached over a fifteen year period.

<sup>10</sup> Waste Management: Changing our Ways, (1998), Department of the Environment and Local Government.

Waste Category	Recycling (tonnes)	Recycling (%)	Thermal/ Incineration (tonnes)	Incineration (%)	Landfill (tonnes)	Landfill (%)	Total
Municipal	119,075	38.9	174,714	57.1	12,112	4.0	305,902
Industrial	37,162	28.8	37,163	28.5	55,744	42.7	130,519
Total	156,687	35.9	211,877	48.5	67,856	15.5	436,421

**Table 2. The recycling and disposal methods proposed by the authority for waste generated in the North East region in 2014.**

On analysis of the waste management policy for the North-East region it is clear that the plan is firmly focused on the lower end of the waste management hierarchy. Figure 2 below shows that the waste management methods that the authority proposes to employ for municipal and industrial waste generated in the region in the year 2014.



**Figure 2. Targets set by the North East Regional Authority for the recycling, incineration and landfill of municipal and industrial waste generated in 2014.**

*\*This figure relates to waste immediately directed to landfill and does not account for residues from any treatment process such as incineration.*

Thus, in the year 2014, the authority plans to direct 35.9% of the municipal and industrial waste stream towards recycling, 48.5 % to incineration and 15.5% to landfill. However this is the primary route which waste generated will take. Consideration must also be given to 'secondary' waste that is generated by treatment processes such as incineration. This information is given in Table 10.2 of the plan, which indicates that 119,314 tonnes of waste will be landfilled in 2014.

**However the Waste Working Group questions the tonnage given for residue from the incineration process to be landfilled.**

According to Table 10.2 of the plan, the residue from the thermal treatment process will be 8,475 tonnes in 2014. However it is unclear how this figure was calculated. According to information given in Section 8.3.5 of the plan, burning waste reduces its mass to 30% of the original. The input to the incinerator for municipal and industrial waste alone in 2014 is 211,877. Using the above information, it can be calculated that the incineration process will produce 63,563 tonnes of residual material that will go to landfill.

### **3.1 Incineration - the wrong solution for the North East Region**

**The Waste Working Group is firmly opposed to the introduction of incineration to the region for the reasons outlined below.**

1. It has been illustrated above that **incineration does not eradicate the need for landfill**. In fact a symbiotic relationship exists between both waste disposal methods.

**2. Incineration will effectively increase the amount of potentially hazardous waste generated in the region.**

Section 8.3.5 of the plan, states that the end products of the incineration process are “a sterile inorganic residue” and section 7.1 states that the process will “render residues relatively inert”. However whilst the process may render residues inert biologically but not chemically. In fact the bottom ash produced by the incineration process contains toxins which have been converted from a state less liable to leach - unburnt waste - into a form which is more liable to leach.<sup>11</sup> According to recent EEA report, a common factor for all incineration plants is that the residues are highly contaminated and in most cases classifies as hazardous waste. Unless treated further the pollutants are also very soluble and the waste is therefore difficult to store in landfills.<sup>12</sup>

Also the remedial technology that may be fitted to the incinerator to capture some of the toxic emissions from the smoke concentrates these toxics in the ash. Ironically, this means that the better the air pollution control, the more toxic the ash.

**3. Incineration is an end-of- pipe waste management option akin to landfill.**

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<sup>11</sup> The Landfill Campaign Guide, (1997), Friends of the Earth, Appendix 2.

<sup>12</sup> Environment in the EU at the Turn of the Century, (1999) EEA.

An explanation of why incineration is a linear waste management option and how the energy recovery option can mask this is provided in Section 2 of this submission.

**4. Incineration has a negative impact on source reduction and material recovery schemes and is in direct contravention to resource conservation.**

Thermal treatment plants require a steady supply of waste for efficient operation. Operators typically require contracts with local authorities to supply them with a minimum amount of waste to burn over protracted periods, such as 25-30 years. Such contracts obviously remove the motivation to prevent or reduce waste and restrict the choice of future options. Therefore incineration is in direct contravention to a plan based on prevention, minimisation and reduction as the onus is on the local authority to ensure enough waste is produced rather than reduced.

There is no guarantee that wastes that cannot be reduced, reused or recycled will not go to an incinerator. According to the EPA's handbook on waste prevention,<sup>13</sup> potentially more than two thirds of municipal waste can be reused or recycled and according to a waste composition study in the UK, over 40% of waste is recyclable and 30 – 40% can be composted. The UK study also illustrated that the quantities that may be incinerated are so small that they in effect rule out incineration as an economically viable option. It also notes that in the longer term, we should be designing away the last 20%, i.e. making all waste 100% recyclable or compostable.<sup>14</sup>

However in the year 2014, 57.1% of municipal waste will be incinerated.

**Clearly waste that is recoverable will be going to incineration in 2014.**

**5. Incineration is detrimental to environmental and human health.**

**According to the UNED Conference on Environment and Development, 1992, appropriate solid waste disposal technologies should be developed on the basis of health risk assessment.<sup>15</sup>** However the plan contains no assessment of the environmental or health impacts of any of the suggested scenarios.

The plan states that a separate report on the feasibility of thermal treatment for the region has been completed and this considers the environmental aspects of this technology. However it is imperative that

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<sup>13</sup> Waste Prevention, Solving the Growing Waste Problem, EPA, Ireland.

<sup>14</sup> Re-Inventing Waste: Towards a London Waste Strategy (1998), *cited in* Material Evidence.

<sup>15</sup> Earth Summit (1992), UN Conference on Environment and Development, Rio.

for informed decision making, a comprehensive environmental analysis for the various scenarios be provided within the plan.

A number of negative environmental effects associated with incineration are given below.

- According to the Swedish Environmental Protection Agency, during waste incineration, pollutants are released both into the air and water from wet scrubbers as well as via the slag and flue gas cleaning residues formed during incineration. These pollutants include particulates, hydrogen chloride, PAHs, dioxins and other organo chlorines plus mercury and other metals.<sup>16</sup>
- Incinerators act as synthesizers. Therefore other toxic substances, originally not present within the waste stream, will be produced as a result of the combustion process. At temperatures ranging from 400 to 1600°C, complex organic molecules break down into basic atoms. However as the combustion gas cools on its way up the chimney and out the stack, some atoms recombine to form new and often more hazardous compounds. These chemical recombinations or 'products of incomplete combustion' (PICs) can be even more toxic than the original combusted waste. Dioxins and furans are the most hazardous of these types of substances. Dioxin is the collective name for numerous toxic chlorinated compounds that are undesirable by-products of the combustion process and chlorine industry.
- Dioxins are persistent organic pollutants and bioaccumulate in the food chain. The Irish Doctors Environmental Association (IDEA) issued the following statement in November 1999,  
*" the Irish Doctor's Environmental Association strongly opposes the plans for a waste incinerator in Kilcock as it does for other proposed sites throughout the country. Our concerns relate to the adverse health effects from toxic substances in the emissions, which being mainly fat soluble, accumulate in body tissues and are concentrated up the food chain, eventually being absorbed by humans through consumption of, for example, cow's milk, meat, fish, eggs and subsequently passed to the foetus in a higher concentration. Possible ill-effects include altered immune responses and disordered endocrine effects such as decreased fertility, lowered IQ and cancer".*
- The US EPA considers dioxin a carcinogen for which there is no safe level of exposure.<sup>17</sup>

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<sup>16</sup> Swedish EPA, Report 4603, Summary Action Plan Waste

<sup>17</sup> US EPA (1994), Health assessment document for 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) and related compounds. Office of Health and Environmental Assessment, Office of Research and Development, Washington D.C.

- The Dutch National Institute of Public Health and Environmental Protection estimates that waste incinerators can be held responsible for over 80% of all dioxin emissions into the air in the Netherlands.<sup>18</sup>
- Many toxic substances emitted from municipal waste incinerators, including certain dioxins and furans, cadmium, lead and mercury, are known to disrupt the endocrine system (the body's hormonal system). The effects of endocrine disruptors on wildlife have been shown to include thyroid dysfunction in birds and fish, decreased fertility in birds, fish, shellfish and mammals, metabolic abnormalities in birds, fish and mammals, behavioural abnormalities in birds, fish and mammals, demasculinisation and feminisation of male fish, defeminisation and masculinisation of female birds and fish and compromised immune systems in birds and mammals.<sup>19</sup>
- A recent report for the European Commission suggested that for every tonne of municipal waste burnt between GBP£21 and GBP £126 worth of environmental and health damage is caused<sup>20</sup>
- Another health problem associated with incineration is the particularly fine particulates that they produce. A major study found that there is a much stronger statistical link between fine particulates and mortality rates from lung cancer and cardiopulmonary diseases than any of the other major forms of pollution measured (eg. Carbon Monoxide and Sulphur Dioxide).<sup>21</sup> The total health damages due to chronic effects of primary and secondary particulates alone, from a single 400,000 tonne/year incinerator, is estimated to cost up to 48,000,000 ECU/year.<sup>22</sup>
- The later two examples highlight the '**hidden costs**' associated with thermal treatment and the real costs of this technology should be incorporated into the economic assessment of the chosen scenario.

It is recommended that the authority seriously considers the adverse effects of incineration and invokes the Precautionary Principle in this regard.

<sup>18</sup> National Institute of Public Health and Environmental Protection,(1994) Emissions of Dioxins in the Netherlands.

<sup>19</sup> Colborn, T. & Clement, C.,(1992) Chemically induced Alterations in Sexual and Functional Development: The Wildlife /Human Connection, Advances in Modern Environmental Toxicology, Vol. XXXI.

<sup>20</sup> ETSU, (1996), Economic evaluation of the draft incineration Directive, European Commission.

<sup>21</sup> The New England Journal of Medicine, (1993), An Association between Air Pollution and Mortality in Six US Cities.

<sup>22</sup> Source: Department of Foetal & Infant Toxicology, University of Liverpool.

### ***The Precautionary Principle***

According to the Wingspread Statement on the Precautionary Principle,<sup>23</sup> "when an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically. In this context the proponent of an activity, rather than the public should bear the burden of proof. The process of applying the precautionary principle must be open, informed and democratic and must include potentially affected parties. It must also involve an examination of the full range of alternatives, including no action."

The principle of precautionary action has 4 parts, 3 of which are,

1. people have a duty to take anticipatory action to prevent harm,
2. the burden of proof of harmlessness of a new technology, process, activity or chemical lies with the proponents, not with the general public,
3. Before using a new technology, process or chemical, or starting a new activity, people have an obligation to examine "a full range of alternatives" including the alternative of doing nothing.

- Another negative environmental impact of incineration is its global warming implications. A recent report issued by the USEPA showed that reduction at source and recycling make a major contribution to lowering greenhouse gas emissions and burning waste in an average waste-to-energy plant causes higher greenhouse gas emissions than disposal to landfill.<sup>24</sup>

Although thermal treatment plant are often referred to as "state of the art" facilities, operating to high standards, it has been shown that levels of emissions achieved under laboratory conditions or even in a commercial incinerator being inspected by prior arrangement by a regulatory authority are likely to be far lower than those routinely emitted during normal operations. This was demonstrated in the US in 1990 when a joint task force of the EPA and the Occupational Safety and Health Administration conducted 62 unannounced inspections at 29 waste incinerators. No less than 69% of the inspections resulted in citations for violations.<sup>25</sup>

Also, no matter how "state-of-the-art" or "safe" an incineration plant may be, it still has no place in a sustainable waste management system as it effectively serves as a 'black hole' for a vast amount of resources and is not conducive to closing the material loop. Vast amounts of time and money are focused on trying to perfect the destruction of discarded resources, thus deferring the real solution which is how to

<sup>23</sup> Rachel's Environment & Health weekly (1998), # 586.

<sup>24</sup> USEPA, (1997), "Greenhouse gas emissions from municipal waste management", URL: [www.epa.gov/epaoswer/non-hw/muncpl/ghg.htm](http://www.epa.gov/epaoswer/non-hw/muncpl/ghg.htm)

<sup>25</sup> Wates, J., 1994), The Non-Governmental Organization and The Management of Hazardous Waste In Ireland, Earthwatch, European Environmental Bureau.



recover them. Also the Government's policy document recommends the development of recovery facilities that are environmentally beneficial and it has been shown that incineration has detrimental environmental consequences. It is therefore recommended that the authority rejects the proposed scenario and develops a new scenario that is beneficial in terms of environmental protection and is conducive to sustainable development.

## 4. Alternative Scenarios

*It is recommended that the authority consider a scenario that is not suggested in the plan - one which combines source reduction, reuse, repair, recycling and composting together with financial and economic incentives. The development of such a scenario is essential for informed decision making.*

The three alternative scenarios proposed by the authority are outlined in Section 8.2.

However all three scenarios are focussed on the lower end of the waste hierarchy and therefore cannot provide the basis for a plan which would be conducive for sustainable development. It is therefore recommended that the authority develops a new scenario, one which combines waste reduction at source with reuse, repair, recycling together with financial incentives. Only when such a strategy has been researched and developed will the authority be equipped to make an informed decision on the way forward for the North-East region.

For example, the official waste policy of Canberra Australia is to create a waste free society by 2010. This policy of turning all waste into resources – or **zero waste** – has also been embraced by New Zealand. Here, twenty two district and city councils have joined a national pilot project originally designed for ten, committing to reduce waste to zero by 2015.

At a conference launching this project Warren Snow, from the Zero Waste New Zealand Trust, stated that, “councils can see that reducing waste to zero is no longer a theoretical exercise. Most of the processes already exist and we have more than enough case studies of community based recycling and waste reduction projects achieving dramatic results”<sup>26</sup> Canberra has already reached a 60% diversion rate from landfill without the use of incineration.

### 4.1 Source Reduction

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<sup>26</sup> Zero Waste New Zealand Trust, (1999) *Zero Waste Movement Hits Top Gear*, Media Release, 13 December.

*The authority has not set targets for waste reduction at source and has not comprehensively developed a plan of action in this regard.*

Prevention and minimisation are both source reduction options. The prevention of waste is the single most important initiative towards achieving sustainable waste management. Taking a preventative approach involves acting at source. For example, prevention requires changes in processes and products - designing non-toxic products from materials that can be safely recycled or composted - in order to avoid the generation of waste that is disposed. It also therefore benefits natural resource conservation. It encourages the exploration of safer alternatives and the development of clean and sustainable products and technologies.

Waste prevention also benefits the producers of products as it represents a viable opportunity to achieve savings in terms of the costs of raw materials, energy, disposal and recovery.

However none of the three scenarios proposed by the authority include the option of waste reduction at source. The waste prevention and minimisation policy of the authority is focussed on awareness raising in the various sectors. Whilst it is recognised that education will play a critical role in the effective implementation of the plan, stronger actions need to be taken to curb the rapidly increasing growth of waste in the region.

**According to a recent UN Conference on Environment and Development<sup>27</sup>, a preventative waste management approach focused on changes in lifestyles and production and consumption patterns offers the best chance for reversing current trends.**

**According to Ireland's strategy for sustainable development<sup>28</sup> a goal is to stabilise municipal waste arisings generally at 350kg/year per capita, and in the longer term, to 2010, to reduce these wastes by 20%.**

Also the Irish Government's policy statement "Changing our Ways", states that **"a major general objective is to stabilise, and in the longer term reverse, the growth in waste generation"**.

The total estimated municipal waste arisings in the region at present, is 174,395 tonnes (Table 3.1 of the plan). As the population of the region is 306,155 (Section 1.1 of the plan), the estimated municipal waste arisings is 0.57 tonnes/ year per capita which is equal to 570 kg/year per capita.

Table 2 of the plan summary shows a marked increase in municipal waste generation to 305,902 tonnes by the year 2014. As the population of the region is expected to increase to 330,633 over the plan period, the

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<sup>27</sup> Earth Summit,(1992), UN Conference on Environment and Development, Rio.

<sup>28</sup> Sustainable Development, (1997) A Strategy for Ireland, Department of the Environment.

municipal waste arisings can be predicted to increase to a level of **925 kg/year** per capita. This is **264%** more than the target set by the strategy for sustainable development.

It is therefore recommended that the authorities set a **target for waste prevention and minimisation** in line with that in the sustainable development strategy for Ireland.

According to the World Resources Institute, John Stutz of the Tellus Institute outlined a three-part structure for Setting waste prevention targets: - choose the material stream, the method of measuring prevention from the stream and the goal and time when it will be achieved. Stutz is working with both the OECD and US EPA to develop methods to quantify waste prevention and source reduction. As a measure of waste prevention for OECD, he proposed the use of a percentage of the waste available for prevention.

Using this measure, targets could be set as a percent of progress for a particular year.<sup>29</sup>

Examples of prevention targets set by other bodies include:

- The Netherlands has minimum targets of 10% for prevention,<sup>30</sup>
- Cork Corporation had set a target to reduce household waste from half a tonne per person per annum, to a third of a tonne per annum over the coming years.<sup>31</sup>

In relation to **industrial and commercial** sectors the authority can act by,

- Making waste prevention and minimisation an integral part of the industrial licensing process for activities within their functional area. These licenses could include targets for waste prevention and minimisation.

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<sup>29</sup> World Resources Institute (URL: [www.wri.org](http://www.wri.org))

<sup>30</sup> World Resources Institute (URL: [www.wri.org](http://www.wri.org))

<sup>31</sup> Cork Proposed Waste Management Plan, (1999) , Fehily Timoney & Co.

- Ensuring that all producers of waste are aware of their obligations under the 1996 Waste Management Act, which states that anyone who “carries on an activity of an agricultural, commercial or industrial nature (including the manufacture of any product)” must “take all reasonable steps as, are necessary for the purposes of prevention or minimisation (including, where appropriate, steps as respects the design of any product aforesaid)” (Section 28(2)). Contravention of this is an offence under subsection 6.

It is important to remember that producers are usually in the best position, technically and economically, to influence the rest of the product chain in reducing life-cycle environmental impacts and to ultimately close the material loop.

- In relation to construction and demolition waste, Kilkenny Council is considering the inclusion of a condition in planning permissions for all major development proposals requiring the developer to submit a construction waste management report prior to commencement of activity.<sup>32</sup> It is recommended that the Council investigates this and also considers its application to other activities.

In relation to **domestic waste**, one of the many effective approaches approach taken internationally is the one used by the metropolitan area of Melbourne, Australia.<sup>33</sup>

A domestic waste hierarchy was outlined, as follows:

- **Consumption reduction**
- **Product re-use; and**
- **Material recycling**

For this strategy, priority was placed on exhausting waste prevention and reuse opportunities ahead of recycling programs.

An overall waste reduction goal for a 65% reduction in domestic waste going to disposal, over a ten year period, was set. This included a 10% waste prevention target.

They plan to achieve this by urging the public to:

- Reduce consumption of luxury and throw away items,

<sup>32</sup> County Kilkenny Proposed Waste Management Plan, (1999), Fehily Timony & Company.

<sup>33</sup>EcoRecycle, (1997), Waste Minimisation Strategy for Melbourne, (URL: [www.ecorecycle.vic.gov.au](http://www.ecorecycle.vic.gov.au))

- Choose unpackaged and minimally packaged products; and
- Choose low toxicity products (such as cleaning agents).

The First Annual Waste Reduction plan for London<sup>34</sup> emphasises the need to move away from a sole reliance on increasing recycling and composting as the solution to waste problems. The idea behind the plan is that by both reducing the amount of waste generated in the first place and recycling and composting as much as possible of what is produced, the tide can be turned and dramatic cuts in amounts requiring disposal can be achieved. This document sets out an overall strategy for waste reduction at source and lists immediate actions that will start to make a difference.

**It is recommended that the authority investigates such waste reduction plans with a view to developing one for the North-East region.**

The authority has also committed itself to education and awareness-raising in communities within the region. An example of how education programs can be enhanced by the involvement of the community itself is the New South Wales Earth Works program in Australia.<sup>15</sup>

This program is typically run by a Council for its local community. Members of the community are trained in waste reduction, home composting and communication skills. Each Earth Worker then takes their knowledge and skills and shares them with the wider community.

The advantages of Earth Works include:

- allowing messages of waste reduction to be taken to a wide range of people in a wide range of communities,
- providing for peer education on one to one communication, which can be a highly effective means of influencing people's attitudes and behaviours,
- considerable flexibility to adapt to the specific needs and circumstances of different communities.

Earth Works is a highly cost effective method of community education for waste reduction and home composting as much of the ground work is done by volunteers.

## 4.2 Material Recovery

<sup>34</sup> Towards a Waste Reduction Plan for London (1999), M.E.L. Research Limited.

*The targets set by the authority for recycling of municipal and industrial waste are low when compared with what has been achieved internationally. Also the authority has not detailed the delivery mechanisms by which the recycling targets will be achieved. The importance of reuse and repair as essential elements of a sustainable waste plan is highlighted.*

There are numerous examples of reduction, reuse and recycling strategies implemented internationally, that have far exceeded the recovery and diversion targets set by the authority and in shorter time periods.

Examples of these include,

- The municipality of Dilbeek, in Belgium reduced its quantity of household waste by more than 60% within six months in 1996. The average amount of household waste generated fell from 495 kg/capita in 1995 to 304 kg/capita in 1996. With such an impressive reduction, the municipality saved about 2 million EURO in 1996 and 1997.<sup>35</sup>
- The Quinte area in eastern Ontario (population 95,000), diverted an average of 68% of household waste from disposal over a seven year period starting in 1989. This was achieved by the implementation of a comprehensive system that combined recycling, home composting, reduction, reuse and financial incentives. Over this period the total cost of waste management and recycling - including disposal - dropped by 39%.<sup>36</sup>
- The town of Bellusco, Italy (population 6,000) has achieved 73% diversion from landfill by use of drop-off facilities and a kerbside collection of paper and green waste.<sup>37</sup>
- Nova Scotia, Canada (population 950,000) had over 100 landfills in the province until 1995 when new laws pertaining to the landfilling of waste were introduced. The province has gone from a recovery rate of approximately 8% to 51% in the five year period without building incinerators and 600 jobs were created in the process.<sup>38</sup>
- Examples of successful recovery programmes in the UK include, Daventry (population 80,000) which went from less than 10% recovery rate to 46% in 26 months and 11 Essex districts that have set a 60%

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<sup>35</sup> Waste Prevention and Minimisation, (1997), Institute for Applied Ecology, Darmstadt.

<sup>36</sup> Recycling Works, (1998), Friends of the Earth and the Community Recycling Network.

<sup>37</sup> Connett, P., Alternatives to incinerating trash, St Lawrence University, New York.

<sup>38</sup> URL: [www.gov.ns.ca/envi/wasteman](http://www.gov.ns.ca/envi/wasteman)

recovery rate by 2007. These have also been highlighted as examples of how learning from international experience has speeded up the recovery process considerably.<sup>39</sup>

- A combination of a comprehensive recycling and composting scheme, coupled with charges for each sack or bin of refuse have helped Sidney Township, Ontario to *reduce the amount of household waste going to disposal by 69% over a seven year period between 1989 and 1986*. All refuse presented for collection must have an attached tag, the price of which covers the cost of refuse collection and tipping. A waste management by-law is in place which identifies material not allowed in the refuse, including household hazardous waste, recyclable material and garden waste. There is no charge for the use of the recycling bin, household hazardous waste depot or garden waste drop-off depot. The municipality collects untagged sacks or bins separately and the generator of the refuse is identified in 70% of cases. The generator is contacted and requested to come to the municipal office to reclaim their refuse. The by-law allows for fines up to \$25,000 but this has never had to be pursued. It was also found that as long as opportunities for recycling and composting are widely available, the public will accept User Pay.<sup>40</sup>
- Guelph, Ontario (population 100,000) has reached a 58% diversion rate (67% diversion of wet waste and 51% of dry waste) of household waste using a wet/dry collection system.<sup>41</sup>

Also the proposed scenario does not include a provision for **home composting**. International experience has shown that home composting has proven to play a valuable role in successful waste management systems, particularly for regions with a large rural population which is the case in the North-east Region.

For example the municipality of S. Giustina in Colle, Italy achieved a reduction in organic waste presented for collection of 71% of the original municipal organic waste by *home composting alone*.<sup>42</sup>

The plan contains no strategy for material recovery by means of **reuse and repair**.

If the authority ignores these viable options, it is disregarding an important part of a sustainable waste management system and a method to divert substantial amounts of waste away from landfill.

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<sup>39</sup> Source: Ecologika, London.

<sup>40</sup> Recycling Works, (1998) Friends of the Earth and the Community Recycling Network.

<sup>41</sup> Connett, P., Alternatives to Incinerating Trash, St Lawrence University, New York.

<sup>42</sup> Waste Prevention and Minimisation, (1999) Oko – Institut e.V., Darmstadt.

## **Reuse – a key element of a sustainable waste plan**

Reuse includes those waste reduction practices in which household products and packaging are reused again as products or packaging. It is distinguished from materials recycling, in which a product is broken down to its materials and these materials are recycled. The simpler processing involved in product re-use places it above material recycling in the hierarchy.

The following examples illustrate the effectiveness of reuse and repair.

- The "Genbrugsfabrikken" (Recycling Factory) in Risskov, Denmark started as a small scale repair centre for bicycles, furniture etc. It now provides a free collection of all household items from households in the Aarhus city region.<sup>43</sup>
- A USA electricity unit in Connecticut collected old refrigerators from households, free, as a means of reducing electricity use. As a result of removing 13,600 refrigerators from its 1.2 million customer area in eight months,<sup>44</sup>
  - an estimated 14 million kW-h was saved (enough to power 2300 homes);
  - 1200 tons of scrap metal was recovered for recycling;
  - 23,150 cubic yards of landfill area was saved; and
  - 45 full and part-time jobs, with a payroll of US\$500 000, were created.

This case study, which saved both electricity and waste, demonstrates the opportunities for partnership approaches.

- The Digital Computer Centre has a Resource Recovery Centre in Contocook, New Hampshire, USA. The centre receives all returned trade in digital equipment. The equipment is either refurbished, spare parts are recovered or materials are recovered and recycled. The facility processes over 14,000 tonnes of computer equipment each year of which only 1% is landfilled.<sup>45</sup>

<sup>43</sup> Ecorecycle, (1997) Waste Minimisation Strategy for Melbourne, (URL: [www.ecorecycle.vic.gov.au](http://www.ecorecycle.vic.gov.au))

<sup>44</sup> Raniello, B., (1991) Recycling White Goods: A Win/Win Situation, Resource Recycling, August.

<sup>45</sup> Ecorecycle, (1997) Waste Minimisation Strategy for Melbourne, (URL: [www.ecorecycle.vic.gov.au](http://www.ecorecycle.vic.gov.au)).



These last two examples should be useful to the authority in light of the pending Waste from Electrical and Electronic Equipment (WEEE) Directive.

Although the scenario proposed by the authority plans to recycle 35.9% of municipal and industrial waste in the year 2014, the plan does not adequately detail how this target will be delivered.

For example, the plan states that the difficulties associated with finding markets for collected materials has hampered recycling both nationally and in the region to date and that the Department of the Environment and Local Government is hoping to address this problem (Section 5.3.2). It is also proposed that the local authorities within the region will change their purchasing policies to favour recycled products and will encourage similar behavior in other public offices.

While the importance of tackling this issue at a national level is recognised, the authority is also required to address this issue under the Waste Management Planning Regulations.

Further action that the authority can take in this regard include,

- encouraging manufacturers in the region to adopt a minimum content policy for the use of recycled material (could be included in licenses),
- promoting "Buy Recycled" initiatives in the region,
- providing a forum for information exchange and technical assistance,
- providing information on recycling contractors in the region, thereby promoting local industry
- promoting establishment of new material recovery facilities in the region, and
- involving themselves in negotiating contracts which will provide stability for these new local businesses and also guaranteeing a supply from each local authority themselves. In relation to paper the authority can encourage local and regional newspapers to use a minimum recycled paper content in their newspapers, thereby developing an environmentally responsible image for the paper and guaranteeing a market for recycled paper.

The authority could also consider the experiences of the state of California, USA and Canberra, Australia.

- California has strict landfill diversion targets and to help local governments meet these targets California designated certain areas as Recycling Market Development Zones (RMDZs). The purpose of these was to offer special incentives to manufacturers who use recycled feedstocks in order to expand the markets for recovered materials. An annual award scheme - the Waste Prevention, Recycling and Market Development and Grant Program - is available to non-profit and not-for-profit entities in San

Francisco County. There are over 18,000 people employed in waste reduction and recycling related industries throughout the state.<sup>46</sup>

- The city of Canberra, Australia has a target to reach *zero waste* by the year 2010. According to their policy statement<sup>47</sup>, the development of Resource Recovery Estates dedicated to separating, reprocessing and value adding materials, will help solve many disposal problems and provide employment opportunities. Also a Resource Exchange Network will be established to match the unwanted outputs from one process with the needs for resources in other activities. This Network will promote markets for recovered products, provide a central database of all available materials and indicate their potential reuses.

## ● 5. Conclusions and Recommendations

It is recommended that the authority reject the scenario proposed by the plan on the basis that it,

- Concentrates 64% of effort on end-of-pipe linear waste management options and 100% of effort on reactive measures to deal with waste after it has been produced, and therefore cannot provide a plan conducive to sustainable development,
- Proposes to introduce a technology which will have a detrimental effect on environmental quality,
- Has not provided a full range of alternative options.

To correct the situation it is recommended that the authority,

- Researches the many excellent strategies that are in place internationally, a number of which are outlined in this submission, with a view to their transferability to the North-East region.
- Dedicates time and resources to the development of a waste reduction plan for the region, and
- develops a new scenario, one which combines waste reduction at source with reuse, repair, recycling and composting together with financial incentives.

The plan should also include comprehensive delivery mechanisms for targets set and a real and democratic public consultation exercise should be fully conducted before a decision is made on the way forward for the North-East region.

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<sup>46</sup> Recycling Works, (1998) Friends of the Earth and the Community Recycling Network.

<sup>47</sup> Canberra Zero Waste Policy, (URL: [www.act.gov.au/nowaste/wastestrategy/](http://www.act.gov.au/nowaste/wastestrategy/))

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# Don't burn it or bury it

## Alternatives to Landfill and Incineration



### Briefing Sheet

#### INTRODUCTION

The fact that we live in a wasteful society is generally accepted. In the UK we produce 414 million tonnes of waste each year [1] and it has been estimated that for every tonne of products we buy, ten tonnes of resources have been used to manufacture them [2]. Unfortunately the UK's approach to this inefficient use of resources has historically been to ignore it and simply throw waste in holes in the ground (landfill sites) or burn it (incinerators). Even today about 70 per cent of our waste still goes to landfill sites and about 20 per cent is incinerated [3].

This briefing explains why Friends of the Earth believes that we need to reduce waste, explains how industry can reduce its waste, how household waste can be reduced, and recommends a solution for dealing with the residual waste.

#### WHY REDUCE WASTE

Friends of the Earth opposes both landfill and incineration because they waste valuable resources. As John Prescott, Deputy Prime Minister, said in his forward to the Government's consultation on Sustainable Development, "Scarce and valuable natural resources must be conserved" [4]. Friends of the Earth agrees with the Deputy Prime Minister for the following reasons:

- . The environmental constraints within which we operate are becoming increasingly obvious. For example,
  - i. It is now accepted that we need to reduce the amount of greenhouse gases we release if we are to avert potentially catastrophic climate change. As organic waste breaks down in landfill sites large quantities of methane - a potent greenhouse gas - is produced. Some landfill sites have equipment to try to capture the gas but they are unlikely to be able to capture much more than half of the gas generated [5].
  - ii. The amount of wood and paper we consume is already having a hugely damaging impact on the world's forests - for example, hundreds of species in Scandinavia alone are endangered due to the spread of plantations for paper production - yet it is predicted that wood and paper consumption will increase globally by 60 per cent by 2010 [6]. Incinerating or landfilling paper is clearly not the way forwards.
- . As developing countries industrialise and populations grow we need to share what resources we do have amongst more and more people. This concept is, in simple terms, defined as "Who within our environmental space. We will need to achieve real reductions in resource use - around 80 per cent - to live within our environmental space and not consume resources we ought to be leaving future generations. see *Tomorrow's World, Britain's Share in a Sustainable Future* for more detail and explanation (see further reading).
- . Landfill sites and incinerators are polluting and unpopular. Landfill sites can pollute underground water, local rivers and streams as well as release methane. Incinerators release toxic air pollution like dioxins, particulates and heavy metals and also produce toxic ashes which must be disposed of in special landfill sites.

As we move towards the next millennium and an increasingly competitive world market, those companies that produce goods more efficiently and waste less resources will be the ones that succeed. Wasteful companies will lose out, close down and their employees will lose their jobs. Friends of the Earth want UK companies to succeed not fail. Friends of the Earth also wants more jobs created through using resources more efficiently, through, for example increased recycling of materials [7].

For these reasons we must move away from throwing away or burning valuable resources and using persistent and toxic substances. This briefing suggests that this is possible through more closely adhering to the waste hierarchy - waste minimisation, reuse, and recycling, followed by composting (including anaerobic digestion).

## REDUCING AND REUSING INDUSTRIAL WASTE

There have been a number of projects in the UK that have revealed the scope for waste reduction and cost savings in industry. Three such projects are briefly described here:

- . Aire & Calder Project - within two and a half years this waste minimisation initiative, which involved 11 large manufacturing companies in the Aire & Calder river catchment in West Yorkshire, had identified 671 opportunities for savings with an annual cost saving of £3.3 million. Ten per cent of the measures taken to reduce waste were cost neutral and a further 60 per cent had a pay-back of less than one year [8].
- . Project Catalyst - 14 companies within the Mersey Basin (ranging from the fine chemical sector to the Royal Mail) made £2.3 million of savings within a year by reducing gaseous, solid and liquid wastes. Thirty per cent of these savings were cost free and 30 per cent had pay back periods of one year or less [9].
- . The Leicestershire Waste Minimisation Initiative - working with 10 companies within the small and medium sized sector, the Initiative identified potential savings of £13 million (4.5 per cent of total turnover) [10]

There is also potential for reductions in waste through reuse and recycling within industry, for example;

- i. Express Foods in Cumbria have invested £100,000 in in-process recycling and achieved pay-back within a year and annual savings of £175,000 [11].
- ii. A landfill tax in Denmark has increased aggregate recycling from 12 per cent to 82 per cent [12].

In addition to this there is potential for identifying one company's waste as another company's material feedstock (a ground-breaking publication - the Waste Book - developed by the Environment Agency Anglian Region and Luton Friends of the Earth has done this).

However, unfortunately many firms are still reluctant to implement a waste minimisation programme. A report by Biffa Waste Services suggested that 44 per cent of companies do not even track waste costs and over half have no plans for waste minimisation [13]. Some industrialists do realise the potential for waste reduction (for example Claude Fussler of Dow Chemicals has said that industry and science can deliver up to a tenfold increase in efficiency in the use of resources [14]) but most appear not to. For these reasons, and others, Friends of the Earth is campaigning for the landfill tax - a tax on waste disposed of to landfill - to be increased and extended to cover incineration. Higher costs of waste disposal will force industry to spend more effort in reducing waste.

But Friends of the Earth believe that to fully achieve the economic and environmental benefits of cleaner production and waste minimisation we must also;

- iii. Provide people with the Right to Know about resource use, pollution and waste disposal from manufacturing facilities.

In the USA the Toxic Release Inventory - which details releases of hundreds of toxic chemicals - has led President Bill Clinton to say

...since the Community Right to Know Act has been on the books reported reductions in toxic emissions are about

43 per cent for the whole country. Now that's a law worth passing. No new bureaucracy; just power to the people through basic knowledge. This has kept millions of pounds of chemicals out of our lives. It has helped us to stay healthy and live longer...it also helped to spur innovation to help businesses work smarter and cleaner and become more profitable, not less profitable."

In the UK there is no over-arching right of access to information on industrial emissions although Michael Meacher, Minister for the Environment, has promised to introduce comprehensive pollution inventories. We look to him to deliver on this promise soon.

iv. Introduce innovation forcing legislation (legislation that sets the tough standards needed regardless of the capabilities of current technologies to meet them) to force companies to clean-up their act. Unfortunately the last Government was increasingly interested in using the voluntary approach drive forward standards rather than use regulations. Friends of the Earth's research into this approach has revealed that it fails to lead to innovation (essential if we are to develop clean technologies) and provides little motivation for companies to act [15]. Friends of the Earth believes tough mandatory targets are the most effective method for forcing change, as Labour say in their policy document *In Trust for Tomorrow, Regulatory standards should be designed to be "technology forcing"* - in other words, to make it necessary for industry to develop ever-cleaner processes and technologies. [16].

v. Introduce legislation to force producers to take responsibility for the waste and products they create from cradle to grave. For example making manufacturers of electrical goods deal with the cost of collecting and recycling/disposing of them when they are at the end of their life would motivate manufacturers to design for durability, repair, and easy re-use and recycling.

### Waste reduction and reuse by households

Whilst the waste that is produced by households only accounts for 5 per cent of total waste arisings, our consumption of goods and products drive much of the waste produced in gathering and processing the resources to make them. Therefore by changing consumer habits a significant contribution to reducing waste can be made. Friends of the Earth suggests that wherever possible consumers should consider the following three steps when shopping:

- i. Don't buy it if you don't need it. The advertising industry makes millions of pounds telling us what we need and when we need it. The reality may be very different. By not buying so many products not only is resource consumption reduced but money may be released for spending on other potentially more enjoyable activities - going to the football, having a meal out, visiting a friend.
- ii. Use a service rather than buying a product. Hiring or borrowing tools makes more sense in terms of resource usage than every house having a stack of tools that are rarely used, and it could also save money. Also, for some people the idea of using cotton nappies and a nappy washing service rather than disposable nappies may be attractive and may save money as well as reduce paper consumption and waste.
- iii. Try to buy products that are built to last, made of recycled materials, don't use toxic materials, are manufactured for reuse (either the whole product or components) and can be returned to the manufacturer or retailer at the end of their life This isn't as easy as it seems and that is why Friends of the Earth is campaigning to give manufacturers 'cradle to grave' responsibility for their products (see earlier).

There is currently no target set by the Government for waste reduction, although whilst in opposition Labour promised in their policy document *In Trust for Tomorrow* to set one [16].

### RECYCLING WASTE

Recycling resources clearly reduces the need for virgin resources as well as reducing the waste and habitat damage associated with gathering them. Recycling materials also saves energy when compared to the energy used in using raw materials (table 1). Whilst we do recycle some resources - 16 per cent of steel packaging as opposed to 67 per cent in Germany, 27 per cent glass packaging as opposed to 85 per cent in Switzerland [17] - we need to do far better if we are to live within our environmental constraints,



reduce pollution and be competitive. It has been estimated that around 80 per cent of waste is currently recyclable [18].

**Table 1 Energy saved by recycling**

Waste stream materials	Energy conserved by substituting secondary for virgin raw materials (tonnes of oil/tonne)
Newspaper	0.53
Corrugated cardboard	0.54
Office paper	0.84
Other recyclable paper	0.50
PET plastic	2.05
HDPE plastic	1.77
Other containers	1.50
Film/packaging	1.80
Other rigid	1.64

source: Sound Resources Management Group Inc; *Recycling versus incineration: An energy conservation analysis*; 1992; Canada

There is more scope for recycling household waste. At present only 5 per cent of household waste is recycled. This compares very badly with other countries such as Switzerland (recycles 42 per cent), Finland (30 per cent) and the Netherlands (28 per cent) [20]. In some areas in Canada recycling rates in excess of 70 per cent are being achieved [20]. In the UK there are only a few local authorities that recycle anything like this amount, for example;

- i. Castle Morpeth are recycling and composting over 80 per cent of waste and aiming at 80 per cent by 2005.
- ii. Bath recycle 25 per cent of domestic waste through a separate door to door collection
- iii. Leicester are planning to recycle 40 per cent (including composting) by the year 2000 through a separate door to door collection.
- iv. The London Borough of Sutton are aiming to recycle 80 per cent by 2006.

## COMPOSTING AND ANAEROBIC DIGESTION

### Anaerobic digestion

Anaerobic digestion is a way of treating organic waste (food waste, etc - about 35 per cent of household waste) to produce a soil conditioner and methane for energy production (see box). A number of local authorities are now looking towards anaerobic digestion as a method for processing the organic fraction of waste and producing a useable product. Anaerobic digestion has successfully been used as a method of dealing with wastes such as sewage sludge for over a hundred years [21]. Only more recently has the process been adapted to deal with household wastes. Sixty plants worldwide are now in operation and 70 are planned or under construction. Examples of where anaerobic digestion is working for household waste include; Salzburg in Austria, Arhus in Denmark, and Tilburg in the Netherlands.

The need to prevent the dumping of organic wastes in landfill has been given an impetus by the European Commission. The EC has proposed a new landfill directive which will prohibit most organic rich wastes being disposed of to landfill - a requirement which would, in effect, preclude the dumping of untreated household waste.

Anaerobic Digestion looks a favourable option for dealing with household waste as long as contamination of the organic fraction can be minimised or eliminated. Friends of the Earth argues that the organic waste must be separated at the household prior to collection and digestion. Without separation at the household the compost produced (following anaerobic digestion) is likely to be too contaminated to provide a useful

compost (table 2). This is also the view held by the Government [22] and supported by a report commissioned by the European Commission [23]. It is likely that a new EC Directive on composting will require separate collection of organic wastes at the household level.

### Composting

Composting is a well established and simple method for processing organic waste. It requires aerobic conditions (presence of oxygen) and temperatures of 55-60 degrees centigrade which will lead to the breakdown of organic materials into a usable compost. A number of local authorities encourage composting at a household level through education and/or the provision of free or cheap composting bins or wormeries. For example Cambridge County Council provided local community groups with compost bins at a third of retail price and the groups sold them on to householders at half price. A survey by The Composting Association revealed that there are now 47 local authority composting sites in the UK. However, there is a potential for much greater levels of composting in the UK, at present less than 10kg per household is composted in the UK compared to 180 kg in the Netherlands [24].

Composting is an energy consuming process (around 30-35 kWh per tonne input) that is already commercially available.

## DEALING WITH THE RESIDUES

Even if recycling rates as high as 50-80 per cent are achieved, a significant amount of waste remains to be dealt with. Friends of the Earth argues that these residuals need to be treated using the best practicable environmental option (BPEO). The options available include incineration, pyrolysis and landfill.

### Incineration

As mentioned earlier, Friends of the Earth is opposed to incineration. The reality is that for economic reasons incinerators need to be so large-scale (200,000 tonnes a year and more) that they would have to attract residual unrecyclable waste from a huge area, generating large amounts of transport. There are also very real concerns with pollution generated by incinerators (see further reading).

### Pyrolysis and gasification

A number of local authorities are showing interest in these technologies as potentially less polluting alternatives to incineration. In gasification plants the waste is heated in a low-oxygen atmosphere to generate a low heat content gas for burning in an engine or turbine. In pyrolysis, the waste is heated to high temperatures in the absence of oxygen and produces a secondary fuel product. At present there are no large scale plants in operation in the UK for waste pyrolysis or gasification, however Germany currently has plants operating [19]. In resource management terms these processes suffer from the same failings as conventional incineration systems, however they may have advantages because of reduced atmospheric releases.

### Landfill

Landfill can cause significant environmental impacts and is generally seen as the option of the last resort. But the reality is that landfill will have an important role to play for some time yet. Friends of the Earth believes that landfill should only be used for truly un-recyclable and compostable wastes, and any waste to landfill should be pre-treated to reduce any potential harm it may cause (see further reading).

It is important to recognise that society should be designing products and materials so that they can be recycled at the end of their life. If this occurs then the amount of waste finally needing to be disposed of should be reduced significantly.

## CURRENT COSTS

The primary reason why landfill has been the predominant route for wastes in the UK is costs. Landfill in the UK is cheap compared to other European countries. But the price of landfill has recently risen due to

tighter monitoring requirements and the introduction of a landfill tax in October 1996. Landfill costs are set to rise further and in some areas may soon be more expensive than kerbside recycling.

Incineration, which is being promoted as an alternative to landfill, is at present more expensive than landfill and costs are set to rise further. A new European Directive will increase the emission standards from incinerators, with the extra costs involved likely to translate as an extra £8 per tonne of waste [25]. This extra cost, together with a strong possibility of an incineration tax [26], could make incineration prohibitively expensive in the near future.

However at present the rise in costs of landfill is not high enough to stimulate reuse and recycling in most areas and instead is only likely to increase waste incineration (until the cost of incineration rises).

Therefore Friends of the Earth are calling for the landfill tax to be increased and extended across to incineration as soon as possible so that waste is moved up the hierarchy, leading to more efficient use of resources and less pollution. Because of the potential financial impacts on local authorities, we are also calling for funds to be made available to local authorities from the waste tax receipts so that the necessary recycling infrastructure can be introduced without council tax payers being hit too hard.

## FUTURE COSTS

A research report commissioned by the European Commission suggested that kerbside recycling will be the cheapest waste management option in all member states soon after 2001 [27]. In addition to this, the report also attempted to analyse the environmental costs and benefits of different waste management options, with the result that recycling was seen to be by far the best way of dealing with wastes.

Further to this a Canadian report [20] states that there are real financial benefits from increasing recycling, for example:

- i. research in the USA by the California Waste Management Board estimates that meeting the state's 50 per cent recycling target will add \$2 billion to California's economy and create over 45,000 new jobs by the year 2000.
- ii. research by the Tellus Institute for Resource and Environmental Strategies shows that a 3Rs (reduce, reuse, recycle) programme in the Greater Toronto Area which would achieve an 81 per cent diversion rate would also create 2,124 new jobs, \$104 million each year in additional earnings, \$499 million in increased output, and \$311 million savings each year in avoided environmental impact.

## CONCLUSIONS

The need to conserve resources and reduce pollution (to live within our environmental constraints), to create and conserve jobs and conserve landfill space for un-recyclable wastes suggests that landfill and incineration should be seen as yesterday's technologies for the vast majority of waste produced (indeed, because of the size incinerators need to be to be economic, there is in reality no role for incineration in sustainable waste management). Waste minimisation, reuse and recycling is the way forwards and to achieve this the Government will have to introduce new policies and legislation such as those outlined in this briefing. Only by doing this will we live within our environmental space and be a resource efficient economy that survives in an increasingly competitive global market.

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 Up in smoke, why Friends of the Earth opposes incineration, 6pp, 1998.  
 The Landfill Campaign Guide, 112pp, 1997.  
 The Incineration Campaign Guide, 136pp, 1997.

### The Anaerobic Digestion process

1. Non-organic materials are removed from the waste. Friends of the Earth believes that this separation should be carried out at source - through households separating different wastes into separate bins - rather than at a Materials Reclamation Facility (MRF) - essentially a warehouse where mixed household waste is separated into different wastes - because the organic fraction obtained from MRF will be more contaminated than source separated materials. This particularly affects the heavy metal and plastics content of the end-product (see table 3). In many countries, compost derived from MRF separated wastes do not meet the standards required for use applications, such as a soil conditioner. An amount of contaminated waste will need to be disposed of at this stage depending on the sorting process (about 10 per cent for source separated and more for MRF sorted).

2. The waste is then pre-treated. Usually involving sorting, chopping and mixing.

3. The waste is then transferred into the anaerobic digestion vessel. There are a number of different systems used at this stage, some involve dry digestion and some involve mixing with water (or other liquid wastes). A special bacterial mix is introduced. The waste is heated, usually to about 30-35 degrees centigrade (called the mesophilic range) and is broken down by the bacteria in the absence of oxygen (hence anaerobic). As the waste is broken down a gas is produced (mostly methane and carbon dioxide) The methane can be used to generate the energy the process needs and any excess energy (usually about 100-150 KWhr per tonne waste input) may be sold to the national electricity grid.

4. After digestion the waste (which has reduced in volume by about 80 per cent) is removed, screened and composted to produce a soil enhancer which may be sold for forestry and other uses. The potential market for good quality compost is huge, some 30 times greater than the amounts that could be produced in the UK from municipal wastes [17]. Some waste after screening will need to be disposed of.

Sources: source: IEA Bioenergy; Biogas from municipal solid waste, 1996, ETSU, and Biomass Recycling

Ltd, UK.

**Table 2 Typical composition of compost from municipal solid waste**

Elements (concentration in mg/kg dry material)	Dutch standards (clean compost)	Dutch standards (very clean compost)	composition of source separated organic fraction of municipal solid waste (see box)	composition of material reclamation facility separated organic fraction of municipal solid waste (see box)
Lead	100	65	70-125	600
Copper	60	25	25-40	350
Nickel	20	10	10-25	60
Zinc	200	75	140-200	800
Chromium	50	50	15-30	90
Cadmium	1	0.7	0.4-0.6	5
Mercury	0.3	0.2	0.1-0.4	3
Arsenic	15	5	4-6	12

source: IEA Bioenergy; Biogas from municipal solid waste, 1996, ETSU

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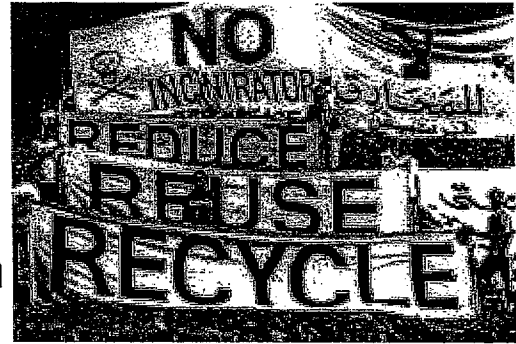
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## Alternatives to Incineration

Municipal and hospital waste incinerators, are considered to be the largest dioxin sources in industrial countries. PVC plastic is probably the single most significant source of chlorine in these incinerators - the element necessary for dioxin generation. Incinerators that burn hazardous waste from industry are also point sources of dioxin.

Strategies to prevent the generation of these incinerable waste streams currently exist: by toxic use reduction planning within industries; by waste reduction and alternative forms of sterilization in hospitals; and by efficient reduction, recycling and compost actions at community level for household waste.

"State of the Art" incinerators and cement kilns that burn hazardous waste can never solve our toxic waste problems. We need a Clean Production approach that substitutes safe materials and processes to stop the generation of hazardous waste in the first place.

[Alternatives to Household Waste Incineration](#)

[Alternatives to Medical Waste Incineration](#)

[Alternatives to Hazardous Waste Incineration](#)

[Benefits of toxic use reduction in the US](#)

### Alternatives to Municipal Waste Incineration

Municipal and biomedical waste incinerators, are considered to be the largest dioxin sources in industrial countries, according to the US Environmental Protection Agency. Although it only accounts for approximately 0.5% of municipal waste by weight PVC provides more than 50% of available chlorine - the element essential to dioxin formation. According to the majority of studies on incineration, when all other factors are held constant, there is a direct correlation between input of PVC and output of PCDD/PCDF [dioxin]. For this reason the Danish government policy is to avoid the presence of PVC in incinerators.

*"Cleaner production is as much about attitudes, approaches and management as it is about technology. This is why it is called cleaner production and not cleaner technology."  
Cleaner Production in the Mediterranean Region, 1995*

Even if all the PVC and chlorinated wastes were taken out of the waste stream, incineration would still be a poor solution due to high costs, loss of jobs in the recycling industry, lost profits from secondary resale and on-going contamination from heavy metal, hydrocarbon and other air emissions,

Cost effective and eco-efficient waste management alternatives to incineration exist. Glass, metals and paper can be easily recycled and reused. Organic waste fractions can be composted at household or community level. Some plastics such as polyethylene and polypropylene can be efficiently recycled if collection and recycling systems are based within the region.

Recycling is also profitable. A ban on incinerators, legislated in 1992 in the province of Ontario, Canada, stimulated both job creation and the price of secondary materials. Within two years the recycling industry had benefitted from price increases of 163% for aluminum cans, 25% for PET bottles, 350% for cardboard, 210% for fine paper, 500% for HDPE, and 350% for newspapers.

A highly successful recycling programme has been running in Curitiba, Brazil since 1989. Ten thousand families participate in the "Garbage That is Not Garbage" programme receiving two kilos of food for every four kilos of recyclable garbage collected and delivered to the mobile units. The programme was initially implemented to foster the separation of organic from inorganic garbage at source as part of the city's environmental programme. Even the admittance to the municipal open air shows requires bringing in a bag for recycling rubbish. Approximately 60 tonnes of paper are recycled every day equivalent to 1,200 trees. The goals for the future are to transform Curitiba into a centre of excellence in the areas of urban planning and transportation and demonstrate the success of good city planning in developing countries.

A study to show the feasibility of a recycling/composting plan in the island of Mallorca in the Mediterranean was prepared by Greenpeace Spain in 1995. The annual waste production of waste is 329,000 tonnes - the majority of which is:

compostable material	37.4%
paper	22.2%
plastics	11.5%
glass	10.6%
textiles	7.2%
metals	5.1%
other	6.1%

An analysis of recycling potential including composting found that 72.8% of waste reclamation was possible. The financial costs of incineration (even with energy recovery) were calculated to be 6,000 pesetas/tonne compared to 2,325 pesetas/tonne if materials were recycled. Implementation could achieve a 60% beneficial use within five years and solve the country's escalating waste problem.

A study was done by the Center for the Biology of Natural Systems in New York, USA in 1996 to examine the costs and benefits of eliminating dioxin sources from all combustion processes in the Great Lakes region of North America. The study found that replacing all municipal waste incinerators in the region with intensive recycling programmes would result in approximately \$530 million annual savings.

The consequences of closing all the 52 Great Lakes garbage incinerators and creating programs of intensive recycling capable of diverting the same tonnage of waste that is currently burned involves an increase in collection costs and an increased education cost to the municipalities. But this is balanced against the net income from processing and marketing collected recyclables, the savings from avoiding disposal costs and paying off the debt for the incinerator.

The study estimated that 6,100 jobs would be created from additional collection and processing jobs after deducting job losses at incineration closures. Further job increases of 21,000 are predicted if the additional recycled materials are used by current and new manufacturing firms within the region.

A previous 1991 study by the Worldwatch Institute calculated the number of jobs per 1 million tonnes of waste processed in New York City.

Type of waste disposal	Number of jobs
Landfill	40-60
Incinerators	100-290
Mixed waste composting	200-300
Recycling	400-590

Recycling is not the answer to waste reduction however. We need to reduce our use of packaging and products and advocate reuseable, returnable packaging and better product design for durability and repairability.

### Alternatives to Medical Waste Incineration

In medical waste incinerators, the dominant chlorine donor is PVC plastic, which enters these facilities as packaging and in many disposal medical products. An estimated 9.4 percent of all infectious waste is PVC, and virtually all available chlorine fed to medical waste incinerators comes from PVC.

In reality there are dioxin-free means of disposing of 99.7% of the medical waste stream.

Because medical waste incinerators are major point sources of dioxins some countries have brought in more stringent regulations. This has resulted in many hospitals closing their own on-site incinerator and shipping waste to a commercial incinerator with more pollution control devices. However, this is increasingly seen as an inadequate solution. Increasingly hospitals in Austria, Germany and Denmark are reducing the amount and nature of wastes by switching to reusables which can be sterilized. Substitution of PVC products go hand in hand with programmes to prevent waste and separate for recycling.

Reasons for phasing out PVC in these hospitals: municipal incineration plants either did not accept wastes in which the chlorine content exceeded the determined percentage, or would do so only at a considerably increased price; incineration plants had to be closed due to more stringent emission regulations and repeated complaints from the community.

Other reasons exist to substitute PVC products within hospitals. Medical objections against the use of PVC are mainly based on the migration of the plasticiser DEHP. It is soluble in fat-containing fluids such as blood and may cause diseases of the liver, skin and cardiovascular system. Animal experiments have shown a significant increase in liver tumours, when DEHP is added to the food of mice and rats. For this reason DEHP was classified as "carcinogenic in animal experiments" and for lack of adequate epidemiological studies in human beings as "possible human carcinogen". Recent evidence points to its hormone disrupting potential.

Currently there are often increased costs for PVC alternatives (often 20-30% more expensive). However these costs must be balanced against the cost of ongoing incineration fees and dioxin emissions.

#### Non-PVC Hospital Products

PVC Use	Alternatives
Examination gloves:	PE and/or PE copolymers are recommended. Latex is of higher quality and proven barrier to viruses.
Overshoes:	clogs with leather tops in operating rooms; multiple-use rubber shoes, shoes made of cloth or overshoes made of PE for single use e.g. visitors in intensive care rooms.



Aprons:	cloth alternatives used in low contamination areas PE coated in operating rooms.
Mattress covers:	alternative plastic and rubber use only where necessary. washable microfibre - e.g. "Kortex" or "Geritex" more comfortable to patient.
Wound plasters and dressings:	textile materials recommended.
Bedpans:	Stainless steel
Syringes:	PE and PP, sometimes ABS and natural rubber, Glass syringes for blood extraction
Infusion equipment, bottles, and/or bags with suspension devices, tubings, tubing clamps, stop cocks:	Non-PVC infusion equipment, eg. glass for certain uses, PP, PE, PE/PA, EVA PCCE and PSU as well as multi use suspension devices for all common infusion receptacles.
Tubing:	EVA and EVA copolymers, PCCE or PE, In other fields of application, e.g. for respiration, silicon or rubber tubings
Stop cocks:	PE, PC and PSU, often in combination of several plastics. Silicon adapters with connecting parts of PE and PP
Gastric probes:	Silicon and PP
Catheters silicon and latex drainage bottles, collecting bags:	glass, PE, PE/PP
Scalpels: (disposable with PVC handles)	Metal handles with interchangeable, sharpened blades
Breathing masks	rubber, silicon, latex
Special Case Blood Bags	supplier with prototype in USA
Packaging	Mostly PVC free now. PP Blister packs

In general, eighty five percent of the total medical waste stream in hospitals consists of the same mixture of discarded paper, plastic, glass, metal and food waste that is found in ordinary household waste. The remaining 15% is defined as infectious and these wastes must be sterilized before disposal. A small percentage of this waste or 0.3% of the total medical waste stream, can only be incinerated, in part for cultural or aesthetic reasons, but also because it is difficult to sterilize in any other way. Thus there are dioxin-free means of disposing of 99.7% of the medical waste stream. Non hazardous waste can be recycled within a household waste recycling plan.

**Alternative Disinfection**

For disposing of infectious waste there are several alternative dioxin-free methods that are cost comparative

**Three of these are:**

- Autoclaving**
- Microwave Disinfection**
- Superheated Steam Sterilisation**

**Autoclaving**

An estimated 45% of infectious medical equipment from Western hospitals is already reused through autoclaving. This is basically steam sterilisation which encourages the reuse or recycling of medical equipment. Autoclavers are commercially available in varying sizes from desk-top to industrial units.

The process involves heating bags of medical waste at between 120 and 1650C for 30 to 90 minutes in chambers into which pressurised steam is introduced. The steam penetration ensures destruction of bacteria and pathogenic microorganisms. Waste is reduced by an estimated 75% of its volume and can either be landfilled directly or compacted further. The autoclaved infectious waste adds to the landfill burden, but the amount is usually less than 0.2% of the municipal solid waste stream. According to a recent survey of hospitals that have installed autoclaves, they are easier to operate than incinerators.

**Cost Benefits of Autoclaving**

A 1996 study by the Center for the Biology of Natural Systems in New York examined the annual operating costs of hospital incinerators in the Great Lakes Region of North America and found that autoclaving was more profitable.

Total Estimated Costs of Alternative Infectious and Pathological Medical Waste Disposal Methods, for All (609) Hospitals in the Great Lakes Region

DISPOSAL METHOD (Millions of 1994 dollars)	ANNUAL OPERATING COST
Existing incinerators (uncontrolled)	9.8
Existing incinerators with mandatory upgrading	55.5
Autoclaves plus small pathological waste incinerator	23.0
Ship to commercial facility	28.0

Autoclaving is the most profitable investment unless there are no regulations at all on incineration emissions. Further assessment was made of the costs to hospitals of converting to autoclaves including paying off the debt on the original purchase of an incinerator. In this scenario conversion costs (2.9 million dollars) are still cheaper than the annual operating cost of incineration with mandatory emission upgrading (3.4 million dollars per year).

**Microwave Disinfection**

Microwaving is economically competitive, versatile and studies in Europe have shown virtually no emissions since the internal heating system is closed. Consequently there is no need for pollution control devices. Microwave disinfection relies on treating hospital waste with moist heat and conventional microwaves at temperatures of 940C. The equipment can be installed on or off site in stationary or mobile units. The remaining residues which have been reduced by 80% in volume can be landfilled

**Superheated Steam Sterilisation**

This technology comprises a heated shredder and sterilisation unit. In the shredder, organic liquids are vaporised and solids reduced to gas by super-heated steam at temperatures between 500 and 700C. Medical equipment is melted into a sterile mass in under an hour. Remaining residues are cooled and dropped into a collection bin or ground in a heated shredder. The process has been shown to reduce medical waste by 50 to 80% of its original volume.

**Alternatives to Hazardous Waste Incineration**

It is estimated by European researchers that 70% of all current waste and emissions from industrial processes can be PREVENTED AT SOURCE by the use of technically sound and economically profitable procedures.

No country should contemplate a commercial hazardous waste incinerator without a national programme of cleaner production. Policy measures to achieve this have been well documented by UNEP, USEPA, UNIDO and others and cleaner production initiatives have achieved significant results particularly within small and medium scale industries.

Once an incinerator is built, ongoing toxic waste generation is legitimized and there is little incentive to investigate process changes within industry even if cleaner production methods are more profitable. For this reason, mandatory toxic use reduction plans should be prepared by each facility currently generating toxic waste.

### **BENEFITS OF TOXIC USE REDUCTION: Massachusetts, USA**

The state of Massachusetts in the United States has achieved significant reduction of hazardous waste through mandatory company planning. This legislation and training programme has become a model for pollution prevention activities around the world.

The Toxic Use Reduction Act (TURA) was passed in 1989. The goal of the legislation is to develop toxics use reduction as its primary tool for industrial pollution control while enhancing the competitive position of Massachusetts enterprises. The first goal is to reduce toxic waste generation by 50% through toxics use reduction over a ten year period (1987-1997).

Under TURA firms that use any of a list of approximately 800 chemicals in quantities that annually cross a minimum threshold must:

annually report publically on the amount of chemical used and released; pay an annual fee; prepare a plan (updated every two years) on how to reduce or eliminate the use of those chemicals that is certified by a licensed Toxics Use Reduction Planner.

In 1995, 603 firms participated. Over 87% of the participating firms implemented TUR programs. Twenty of the firms eliminated 1.29 million pounds of byproduct (wastes) and on average companies saved \$35,000 per year.

Between 1990 and 1993 all firms cut their toxic byproduct (waste) by 14.5% and plan to generate 23% less waste in 1998. Total volume of listed toxic chemicals in the state dropped by 6% within these three years. Of the 29 firms applying for awards in toxics use reduction, together they had eliminated the use of 2,870 tons of toxic chemicals, reduced 750 tons of hazardous wastes and saved \$44 million per year.

### **Benefits of Toxic Use Reduction: New Jersey, USA**

Similar to Massachusetts, the state of New Jersey in the USA has a toxic use reduction goal of 50% within five years. New Jersey mandates pollution prevention planning based on full materials tracking throughout each industry covered by the state regulation. The total net savings to companies as a result of pollution prevention techniques amounts to \$105 million dollars per year.

For every dollar spent on the entire process, including Government costs, company costs for compliance and capital costs, the companies' achieved net savings of \$5 to \$8.

Although all companies had achieved reductions, one-quarter of those who sent in plan summaries had reduction goals of zero for all chemicals reported. The most common pollution prevention methods determined were

raw material substitution  
substituting different coating materials

changing to aqueous cleaners

Chlorinated solvents were among the top three chemicals targetted for toxic use elimination by companies.

#### Alternatives to Other Combustion Sources of Dioxin

##### Cement Kilns

Increasingly cement kilns are burning hazardous waste as fuel thereby generating dioxins in air emissions and ash. Cement products are now contaminated with heavy metals and dioxins.

A phase out of incinerable waste streams is possible via toxics use reduction legislation. The economic costs of converting these cement kilns back to fuel has been done by the Center for the Biology of Natural Systems in 1996. The study found that the added expected income from burning hazardous waste in cement kilns is likely to be less than the model estimates due to a declining market share. This would enable kilns to resume former fuel burning of coal, coke, oil or natural gas, as currently practiced by three quarters of the kilns in the region. However instead of receiving a tip fee (which in 1993 amounted to \$68 million), the 9 cement kilns in the region would then pay for the normal fuel (about \$9 million per year) amounting to an increase of approximately \$77 million. At the same time, the transition results in a payroll saving since additional employees that handle the hazardous material are no longer needed. Furthermore the kiln could avoid the operational costs of installing control devices and more importantly would not generate dioxin contaminated emissions and wastes.

Source documents for the information in this section, include:

DIOXINS IN THE MEDITERRANEAN. Greenpeace, October 1996.

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## **WASTE WORKING GROUP**

### **Comparative Report of Three International Sustainable Waste Management Programmes, Including Feasibility in the Irish Situation.**

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**The Waste Working Group is a coalition of environmental NGOs including VOICE (of Irish Concern for the Environment) and Earthwatch – Friends of the Earth Ireland, and concerned individuals.**

**Author: Anne-Marie Cunningham MSc., BSc.**

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# 1 Introduction

This report details three case studies, which are compared and analysed using various parameters. The case studies are examples of how high waste reduction levels may be achieved in both residential and commercial sectors by ecologically sustainable means.

**Section 1** - details the programmes in place in Daventry in the UK, and the Quinte region and province of Nova Scotia in Canada. The Daventry region has achieved a 53% diversion rate of household waste from landfill through recycling and composting. Nova Scotia, increased its total solid waste diversion rate from 7% to 51% over a seven year period. Over a period of seven years, Quinte, Ontario diverted 68% of residential waste through a wide range of reduction initiatives.

**Section 2** - examines the approaches taken by each region in relation to pertinent components of their respective strategies. It also looks at the keys to success in each case.

**Section 3** - examines some of the themes that are unique to one programme or common to all, and looks at their feasibility in the Irish situation.

## 2 Case Studies

### 2.1 Case Study 1 - Daventry District Council's Green Waste Trial and Expanded Programme.

*Daventry District Council's recycling and composting scheme is acknowledged as being one of the best UK local authority household waste diversion programmes. It is to be used as a model for other councils across the UK. Over the twelve month period from August 1998 to August 1999, the diversion from disposal rate in the trial area increased from 12% to an average of 51%. The programme was subsequently expanded, and between April and June 2000 Daventry reached a 53% diversion rate.*

#### 2.1.1 Background

In response to the UK's Government's 1991 target, which required 25% of household waste to be recycled by the year 2000, Daventry Council introduced its Red and Blue Box Scheme for collecting a range of dry recyclables. The staged development of Daventry's programme incorporated the establishment of a Materials Recycling Facility (MRF) in the town of Daventry. Dry recyclables were transferred to the MRF for sorting

and densification before onward sale to contracted materials reprocessors. This saved in excess of 30,000 miles per annum travel by recycling collection vehicles which had previously had to make the round trip to a regional MRF in Milton Keynes to discharge their contents. Materials marketing arrangements still exist with Milton Keynes MRF and its operator, Shanks Waste Solutions.

The Red and Blue Box scheme had developed over time to recycle 9.4% of household waste by 1997/98. Supported by increasing consumer education and waste minimisation programmes, the diversion level increased to 12.4% in 1998/99. Sixty nine percent of all registered properties participated on a voluntary or "opt-in" basis. In order to boost diversion rates to meet the national target, the Council developed the Green Waste Trial.

### **2.1.2 Aim**

The aim of the Green Waste Trial was to evaluate the viability of a kerbside organic waste collection service for the whole of the Daventry District. This was established in an attempt to boost diversion rates in order to meet the UK target of recycling of 25% of household waste by 2000.

### **2.1.3 Demographics**

Daventry District Council is one of seven Local Authorities in the County of Northamptonshire. The area includes the town of Daventry but is largely rural, with approximately 28,000 households.

The trial area covered approximately 5,400 households, including eleven villages, in the rural part of the district. While it is a rural area, a mixture of all housing types is represented: farms and cottages, large and small properties, council housing and a small number of flats.

### **2.1.4 Methodology**

#### **Project Partners**

Daventry Council was responsible for the collection of the materials. Daventree Council also provided part funding for the project. By doing this, they were able to secure the additional funding, through the Landfill Tax Credit scheme, from Hales Waste Control Limited. Hales Waste also developed a section at their landfill site to compost the collected organic material. Waste Watch, which is a UK charity promoting waste reduction, re-use and recycling, provided the communication and education element of the trial.



## The Programme

The Council selected approximately 5,400 households in the rural area of the district to participate in the kerbside, twin bin, organic waste trial. The waste management system provided householders with:-

- a weekly collection of dry recyclables in a twin box scheme (red and blue box). Textiles were to be bagged and placed with the boxes;
- a biweekly collection of organic kitchen and garden materials (240 litre brown wheeled bin); and
- an alternate fortnightly collection of residual wastes (grey bin).

Waste Watch also provided householders with a kitchen pre-sort bin to facilitate sorting their kitchen organics. This also acted as a visual reminder to save these materials.

Red Box	Blue Box	Bags
Newspapers	Food cans	Clothes
Magazines	Drink cans	Shoes
Catalogues	Aerosol cans	Handbags and belts
Envelopes	Plastic bottles	Curtains
Junk mail	Glass bottles and jars	Sheets and pillow cases
Office and computer paper		Duvet covers
Telephone directories		Blankets

**Table 1.1 - Materials Collected in the Recycling Scheme.**

The Council adhered to their policy of collecting the refuse and green materials on alternate weeks throughout the trial. Householders were requested to try the scheme before any alterations were made. Exceptions were made in the following cases:-

- If a household did not want to participate either because they composted at home or because they adamantly refused to recycle, the Council then withdrew the brown organic bin on request. However, the household still only received a fortnightly refuse collection from one grey refuse bin.
- A household could have a larger grey refuse bin if there were five or more in the family.
- A smaller household could have a larger grey refuse bin following a visit from Waste Watch to assess whether all requested materials were being recycled, and that there was an exceptional reason for adding additional waste.

Organic material was delivered directly to Hales Waste for composting and use as a landscaping material. The composted material was used at the landfill site for restoration purposes.

### **2.1.5 Results**

- In 1998, 98% of registered properties in the trial were participating in the Brown Bin scheme.
- Participation in the Box Recycling Scheme rose from 69% to 81% with measurable increases in material tonnages.
- It was deduced that almost 70% of material in the average household bin was potentially recyclable, through the dry and organic collection service.
- Total recycling/waste diversion within the trial area averaged 51% and the highest rate achieved over the year was 60%.
- The increase was not only due to organic recycling as the recycling rate for dry recyclables also increased by 35%.
- Contamination by non-organic waste in the brown bin was reduced from 4% to 1% due to the continuing communication project.
- Organic waste in the grey refuse bin decreased from 33% to 21%, between the start and end of the trial.

### **2.1.6 Project Expansion**

Subsequent collection rounds for the 23,000 remaining households were added to the programme between April and September 1999, with equally successful results. An overall recycling rate of 25% was achieved during the month of May 1999. By June 2000, Dayentry was diverting 53% of household waste from landfill to materials recycling and composting. These figures excluded any calculations for home composting, which is actively promoted by the Council, and also excluded the tonnage of materials and green waste taken in by two County Council operated civic amenity sites. Participation increased from 65% to approximately 90%, due mainly to the reduced frequency of collection of residual waste.

## **2.2 Case Study 2 - Nova Scotia, Canada**

*At present, Nova Scotia is leading Canada in diverting solid waste from landfill and incineration. Between the years 1995 to 2000, the province increased its solid waste diversion rate from 7% to 51%.*

### **2.2.1 Background**

In the early 1970s Nova Scotia had more than 100 dumps operating in the province. Many of these employed open burning as a means of disposal. In 1989, the Canadian Council of Resource and Environment Ministers set a nationwide goal for waste reduction of 50% by weight per person from 1988 levels, to be achieved by the year 2000. When the Nova Scotia Environment Act became law in 1995, the province formally adopted

the Canadian target of 50% diversion of solid waste from disposal by the year 2000. The Act also committed the Department of the Environment to develop a comprehensive strategy for the management of solid waste resources. This resulted in the 1995 Solid Waste Resource Management Strategy. The Strategy was developed following extensive consultation with those involved in all aspects of the solid waste system. Municipalities, industry representatives and members of the public all participated.

**The Solid Waste-Resource Management Strategy for Nova Scotia is premised upon:-**

- environmental protection and ecological value;
- wise and efficient use of renewable and non-renewable resources; and
- economic opportunities.

### **2.2.2 Aim**

The main goals of the Solid Waste-Resource strategy included:-

- diversion of 50% of solid waste from disposal by the year 2000;
- an increase in disposal standards;
- regional co-operation; and
- maximisation of economic opportunities through waste management.

### **2.2.3 Demographics**

Nova Scotia is a province situated on the East Coast of Canada, and has a population of approximately 950,000. It has a large rural factor. Halifax, the capital city has a population of 359,000. The second largest municipality, Cape Breton Regional Municipality, has a population of around 120,000. The rest of the population resides in rural towns, villages and country areas. Nova Scotia's primary industries are entrenched in natural resources - fishing, farming, mining and tourism.

### **2.2.4 Methodology**

Studies commissioned in 1994 by the Nova Scotia Department of the Environment indicated that great savings could be made if municipalities planned and developed waste management systems on a regional basis. Seven solid waste regions were established in the province. Each submitted a Solid Waste-Resource Management Plan to the Minister of the Environment. **All plans demonstrated a potential to achieve and exceed the goals identified in the strategy, and indicated that composting could divert over one third of waste from disposal. The plans also demonstrated how the municipalities could approach reduction, recycling, education and awareness, and disposal.** 1989 was chosen as the base line from which to measure diversion rates; in this year, 22,000 tonnes of waste was generated in the province.

## Ban on Open Burning

In 1996, twenty open burning sites still existed. In the same year, open burning was banned and all existing sites were shut down.

## Disposal Bans

Materials that could be recycled or composted were banned from disposal. These materials included:-

- compostable organic materials, including leaf and yard waste and food waste;
- leaf and yard waste;
- beverage containers;
- most HDPE and some LDPE plastics;
- steel/tin food containers;
- glass food containers;
- newsprint;
- corrugated cardboard;
- used tyres;
- waste paint;
- car batteries; and
- antifreeze;

## Resource Recovery Fund Board

The Resource Recovery Fund Board (RRFB) was established under an act of the Nova Scotia Legislature to administer a substantial portion of the Solid Waste-Resource Management Strategy. The RRFB was established by the government, but is run by a Board of Directors. The government maintains two seats on the board, however the majority of seats are held by industry and local authority representatives. Although a not-for-profit organisation, it is intended to be a commercially viable company that provides responsible management of the Strategy.

The RRFB has five main mandates.

1. To fund municipal or regional diversion programmes.
2. Develop and operate a Deposit/Refund System for beverage containers.
3. Develop and implement industry stewardship programmes.
4. Develop education and awareness of reduction, reuse, recycling and composting.
5. Promote the development of value-added manufacturing in the Province.

Since 1996 the RRFB has:-

- established a network of over 90 Enviro-Depots and 5 Regional Processing Facilities;
- administered the Deposit/Refund system for beverage containers;
- instituted the Used Tyre Management Programme to recycle used tyres;
- given approximately \$20 million\* to municipalities, over a four year period, through diversion credits and approved funding programmes to assist municipalities in offsetting their costs of meeting the goals and objectives established through the Solid Waste-Resource Management Strategy. A further \$2.9 million has been granted to business to promote value-added products made from materials diverted from disposal, and \$1.7 million has been invested in a provincial education programme; and
- created approximately 450 jobs.

## Industry Stewardship

Stewardship agreements are being negotiated on an on-going basis with industries whose products and packaging generate solid waste. To date, the following four stewardship agreements have been implemented.

### 1. Deposit -Refund system

Nova Scotians return over 160 million beverage containers annually and community charitable groups often benefit from donated returns. The Enviro-Depots also accept residential corrugated cardboard, newsprint and car batteries. The return rate on beverage containers sold in Nova Scotia is over 80%. Deposits applied to refillable containers are completely refundable. However, deposits on non-refillable containers are not completely refundable and the rate of refund for various containers is shown in Table X.

Non-Alcoholic	Alcoholic	
	≤ 500 ml	>500 ml
10c deposit	10c deposit	20c return
5c return	5c return	10c return

**Table 2.1: Deposits and Refunds Applied to Non-Refillable Beverage Containers.**

Source: *Nova Scotia: Too Good to Waste, A Summary of the Nova Scotia Solid Waste-Resource Management Strategy*, Nova Scotia Department of the Environment.

### 2. Milk Packaging Stewardship Agreement

Nova Scotia milk producers provide funding and 'in kind' advertisement to municipalities to recycle milk cartons.

\* Canadian Dollars

### **3. Tyre Return System**

Tyres sold within the province are diverted from disposal and reprocessed in Nova Scotia. An environmental fee of \$3 for all new passenger tyres and \$9 for all new truck tyres is applied to manage the system.

### **4. Used Oil Return**

Retailers who sell motor oil must either accept used oil or provide a collection depot within 5km of their business.

## **Municipal Recycling and Composting**

Kerbside recycling is provided to 98% of households. Most municipalities use kerbside collection to collect those materials banned from disposal (though some programmes expand beyond these materials).

The Department of the Environment banned compostable organic material from landfills in November 1998. 30-50% of Nova Scotian 'waste' is organic material. All regions are participating in the home composting programme. Compostable material is also collected from 75% of households and is composted at centralised composting facilities. Collected materials include:-

- all food waste including meat, fish, bones and dairy products;
- leaf and yard waste; and
- non-recyclable paper products (e.g. soiled paper towels, napkins etc.)

**Combined with the Enviro-Depot and kerbside programmes, kerbside composting has the potential to divert over 75% of household waste in Nova Scotia.**

Businesses are also source separating their organics. Most contract with haulers to take their organic materials to centralised composting facilities while some have on-site composting facilities.

### **2.2.5 Results**

- On September 26<sup>th</sup> 2000 Nova Scotia announced that they were the first Canadian province to reach the federal goal of 50% diversion from landfill. Just five years before, their diversion rate was only 7%.
- All open burning has ceased.
- Almost 100% of residents have kerbside recycling.
- 100% of businesses also have access to recycling programmes.
- 75% of residents have kerbside collection for organic materials.
- All regions are participating in the home composting programme.
- The Enviro-Depot network has resulted in more than 678 million beverage containers being recycled.
- As a result of the Used Tyre Management Programme, 2.3 million tyres have been recycled.

## **Job Creation**

Over 3000 jobs have been created as a result of the Strategy. The following list illustrates examples of different sectors where job development occurred.

- The Enviro-Depot network. More than 500 jobs were created in transportation, processing, and marketing of beverage containers and other materials.
- A new tyre recycling plant is currently under construction, which will crumb tyres for the manufacturing of various products.
- The Paint Recycling Company in the Halifax Regional Municipality processes leftover paint.
- Amherst Glass Works manufactures glass figurines and plaques from discarded glass.
- Composting facilities that process over 100,000 tonnes per year.
- A new plastics facility grinds PET plastic for sale to markets in Canada and the USA, where it is used to manufacture items such as carpet and clothing.
- CFK in Hantsport manufactures paper products from old newspaper.
- USG in Port Hawkesbury adds newsprint to its manufacturing process to produce Fiberock, a wallboard.
- Thermo-cell in Debert, manufactures cellulose out of old newspapers.

### **2.3. Case Study Three - Quinte, Ontario, Canada**

*A comprehensive system combining prevention, reuse, recycling, composting and financial incentives enabled Quinte to achieve a 68% reduction in household waste generation, over a seven-year period. At the same time the total cost of the waste management and recycling programme, including disposal, fell by 39%.*

#### **2.3.1 Aim**

The goal of the programme was to strongly develop waste diversion options such as recycling and composting, and then to introduce regulatory measures in the form of landfill bans and variable charging (otherwise known as 'User Pay') schemes.

#### **2.3.2 Population**

The region has 95,000 residents. This includes the towns of Belleville, Trenton and Sidney, population 37,000, 16,500 and 17,500 respectively, and the surrounding rural areas.

### **2.3.3 Methodology**

A programme called 'Blue Box 2000' was developed and implemented. This system is a multifaceted waste diversion programme based on the principle of separating material at source and includes the following key components:-

- an expanded recycling programme (20 different materials collected in 7 compartment top-loading vehicles) serving all households including flats and rural areas;
- a home composting programme that includes distributing and installing over 25,000 free composters;
- initiatives to stimulate reduction and reuse activities (for example, a reuse guide and a save a sack campaign); and
- extensive on-going promotion and education programmes (including, poster cards, newsletters and calendars).

The 3 largest municipalities in the area have implemented User Pay refuse programmes to provide residents with additional motivation to divert and reduce waste.

#### **Maximising Recycling**

The goal of maximising the amount of material recycled was achieved in three main ways as shown below.

- Expanding the number of materials collected, from the initial newspapers and pamphlets, cans and glass to include virtually all paper and cardboard products, all plastic containers, plastic sacks and textiles;
- Regular promotion and education programmes to ensure that residents were regularly reminded as to what to put in the box. Tools included periodic newsletters to all householders, flyers to highlight new materials and to remind people what goes in the box and how to present it for collection, problem cards, frequent newspaper adverts, calendars, setting out collection schedules and extensive work through schools; and
- Introducing regulatory measures after the programme was well established.

#### **Maximising Composting**

Waste composition studies show that 46% of the waste stream was made up of compostable material. Home composting was identified as the most cost effective method of waste reduction since it removes material from the collection and processing system altogether. A decision was made from the start, to try to maximise home composting prior to considering the need for collection and central composting of food waste. There is a seasonal collection of leaves that are centrally composted in open windrows.



The challenges identified with home composting were:-

1. how to get the compost units to as many residents as possible; and
  2. how to get residents to use the units.
- Composters were distributed free of charge to 25,000 residents both door-to-door (urban) and at depots (rural).
  - The municipalities remained actively involved after the units were distributed by providing support through a compost hotline, several trained 'Compost Doctors', who made house calls to sort out problems and to encourage maximum use of the composter, and ongoing promotion and education campaigns.
  - A survey of approximately 200 households found a 95% satisfaction rating with composting.
  - The average organics in the refuse were reduced by 70% in areas with User Pay schemes.
  - Kitchen organics were reduced by 46%, while garden waste was reduced by 93%.

### Maximising other diversion activities

A number of other activities were promoted as part of the Blue Box 2000 programme, including:

- a **3Rs centre** where potentially reusable material can be dropped off or picked up;
- a **reuse directory** for each municipality, listing outlets for reuse (buy or sell);
- a **Clean and Green** programme promoting alternatives to cleaners and garden products;
- a **Save-a-Sack** programme to encourage shoppers to reuse their own carrier bags;
- reducing **junk mail** with co-operation from local flyer delivery firms; and
- supporting other programmes such as **community jumble sales, grass-recycling campaigns** (leave grass clippings on the lawn) and **waste reduction guides** for different sectors such as schools and businesses.

### Regulatory measures

After the programme was well established regulatory measures were introduced to provide an incentive to stimulate residents to separate all their recyclable and compostable material.

Regulatory measures included:-

- banning recyclable material from disposal;
- sack and bin limits; and
- User Pay programmes.

The User Pay programmes resulted in a significant increase in all diversion activities. The public responded well once the programme was introduced, giving it an 85% approval rating. Also, initial concerns over fly-tipping and double taxation did not materialise.

### 2.3.4 Results

The Blue Box programme has been subjected to detailed studies of waste composition, refuse and recycling bin set outs, public attitudes and other relevant factors. It was demonstrated that:-

- with good promotion and effective programmes residents typically recycled 50-60% of what is possible;
- introducing basic regulatory measures, such as sack limits and banning materials from landfill increased this to 75%; and
- when residents paid for each sack of refuse that they disposed of, an average of 85% of available material was recycled - rising as high as 97% for newspaper and PET soft drink containers.

The following summarises the data for Belleville, Trenton and Sidney.

- Residential waste going to landfill fell from 26,297 tonnes in 1989 (before diversion programmes were implemented), to 16,845 tonnes in 1993 (with diversion programmes in place but before User Pay), to 8,285 tonnes in 1996 (with User Pay) - a **68% diversion**. This equates to a reduction from over 1 tonne per household per year, to 350kg per household per year.
- The average refuse sack or bin set out was reduced to 0.7 bins/sacks per household per week.
- Recycling accounted for 29% diversion from the original waste stream.
- Organic diversion accounted for 33%.
- Waste reduction at source accounted for 6%.

## 3. Comparison of Programmes

The following section examines the approaches taken by each region in relation to pertinent components of their strategy. It also looks at the keys to success in each case.

### 3.1 National Targets

All regions had to work towards compliance with set targets, which are shown in Table 3.1.

Region	Quinte, Ontario, Canada	Nova Scotia, Canada	Daventry, UK.
<b>National or Federal Target</b>	Canadian federal goal of 50% diversion from landfill by the year 2000.	Canadian federal goal of 50% diversion from landfill by the year 2000.	National UK target to recycle 25% of household waste by the year 2000.

Table 3.1: National and Federal Targets for the Respective regions

### 3.2 National Initiatives

Initiatives taken at a national level that assisted certain regions in achieving their targets are shown below.

- **The UK Landfill Tax Credit scheme** provided part funding for the Daventry programme. Under the Landfill Tax Credit scheme, which was introduced in October 1996, landfill operators can redirect, as part of a voluntary donation, a proportion of their tax to fund environmental projects. The scheme encourages partnerships between the landfill operators, their local communities, and the voluntary and public sectors. The scheme allows registered landfill site operators to contribute up to 20% of their landfill tax liability for the year to environmental organisations. They can then claim a tax credit worth 90% of that contribution. The aim of the scheme is to encourage more sustainable waste management practices, including recycling, and to deliver lasting environmental and community benefits.
- The establishment of a **Resource Recovery Fund Board (RRFB) in Nova Scotia**, which was directed under an act of Nova Scotia legislature to administer a substantial part of the Strategy. The responsibilities of the RRFB included distributing funding; developing a deposit-refund scheme and establishing stewardship agreements with industry.

### 3.3 Public Consultation and Participation

#### **Daventry**

During the trial period, 98% of registered properties were participating in the brown bin scheme and the rate of participation in the box recycling scheme was 81%. Public participation in the programme was boosted by the involvement of Waste Watch. The main role of Waste Watch was to deliver a communication and education programme to the trial area, to ensure maximum participation and to minimise the level of contamination of materials, and to maintain this throughout the trial period.

In relation to organic waste, collection crews monitored the contents of the brown organic bins. Contaminated bins were rejected and stickers attached. (Stickers were also attached to grey bins with additional waste). These householders were then reported to Waste Watch who targeted them for further assistance.

A public survey indicated that:-

- 98% of residents thought that recycling kitchen and garden waste was a good idea;
- 90% thought the scheme was manageable;
- 89% of trial householders found the level of information provided throughout the trial adequate;

- 88% found the additional contact with Waste Watch useful; and
- 93% of respondents reported that they were contributing to a cleaner, greener environment by increasing the proportion of waste recycled in their household.

Householders reported that it was easier to recycle their kitchen organic waste using the kitchen pre-sort bins provided by Waste Watch, and therefore recycled more. They also found operational information, for example lists of targeted materials and collection dates, helpful.

### ***Nova Scotia***

Public participation from the start of the planning process was highlighted as a key to the programme's success. The solid waste-resource management strategy was developed after a period of extensive consultation with all sectors of the community. Residents were asked for their opinion on how to solve the waste crisis. The answer was clear: reduction, reuse, recycling and composting. The consultation process was open and transparent. Two sets of consultants were hired; one to deal with the consultation process, the other to develop the waste-resource plans.

In Halifax, the regional capital, a Community Stakeholder Committee was established to guide the development of the long-term waste resource plan as well as managing the siting of a new landfill. Public participation in the programme itself was bolstered by the community acting as advocates for the programme.

To maximise participation in the program itself, the RRFB conducted a province-wide education programme and each municipality was required to promote the local programme.

### ***Quinte***

This programme demonstrated that convenient and effective programmes are fundamental to boosting participation rates, as is a comprehensive on-going promotion and education strategy. This case study also illustrated the effect of variable charging in boosting participation rates in the diversion programme itself.

### 3.4 Costs and Savings

#### ***Daventry (Expanded programme)***

The ongoing operating costs of the service are just under £1 million\* (1999/2000 budget), equivalent to less than £40 per household, which provides for alternate weekly collections of organic materials and waste, weekly collection of dry recyclables and operation of the Daventry Materials Recycling Facility. Additional capital expenditure of less than £500,000 on brown bins and the mini-MRF equipment has facilitated 53% recycling and composting at an overall cost to council tax payers of £6.50 per year over basic refuse collection.

#### ***Nova Scotia***

Over four years, the Resource Recovery Fund Board gave approximately \$20 million† to municipalities, through diversion credits and approved funding programmes, to assist them in offsetting their costs of meeting the goals and objectives established through the Solid Waste-Resource Management Strategy. A further \$2.9 million has been granted to business to promote value-added products from materials diverted from disposal. A further \$1.7 million has been invested in a provincial education program.

#### ***Quinte***

In 1989, annual refuse collection and disposal costs to the municipalities averaged at \$154‡ per household. By 1996, with full diversion programmes in place, this was reduced by 39% to \$94 per household. This cost included all waste activities such as refuse collection and disposal, recycling collection and processing, composting collection and central processing, household hazardous waste programme, bulky goods collection, promotion and education, and administration.

These savings occurred as a result of the following factors:-

- A 68% reduction in the amount of material presented for collection. Fewer collection vehicles were therefore needed, reducing collection costs.
- Significant savings in tipping fees for disposal.

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\* UK Sterling

† Canadian Dollars

‡ Canadian Dollars

- The incremental cost of collecting and processing a wide variety of recyclables was partially offset by the increase in income from material sales,
- Due to the widespread use of home composters, the municipality handled significantly fewer tonnes of organic materials.

The actual cost to the municipalities for the whole waste management system (including refuse) after factoring in the net income from recyclable materials and sale of refuse tags was \$42 per household.

### 3.5 Keys to success

The following points illustrate some of the most important initiatives taken in each region.

#### **Daventry**

The **communication programme**, conducted by Waste Watch, significantly boosted participation rates by:-

- providing **high levels of communication** to householders using clear and simple messages;
- providing opportunities for **feedback** from householders;
- **evaluating the effectiveness** of communication methods used;
- providing **extra help and advice** to assist householders, including practical home visits and practical waste reduction advice; and
- **communicating with collection crews**, in order to help staff understand the importance of the recycling collection and also to help them change their work methods.

Various media were used to inform the public about the trial and waste analyses, and questionnaires assessed the effectiveness of the communication methods. The telephone helpline, letters, home visits, newsletters, and the provision of kitchen pre-sort bins were popular with customers. Research, testing and trials of the system and the on-going consumer education campaign were key to the programme's success.

An important step taken by the Council was to **halve the amount of residual waste that could be presented for disposal**. This was achieved by changing the weekly collection service to a fortnightly service. The communication programme was effective in overcoming local fears about this change to their collection service.

Other factors which ensured the success of the programme included:-

- **reliable and consistent collections** to increase participation and acceptance; and
- the **convenience** of the programme for the householder;

## **Nova Scotia**

Key contributors to this programmes success included:-

- **involving the public from the outset;**
- **an open and transparent process;**
- giving some **ownership** to the community;
- **flexibility** in gaining compliance from residents;
- operating on a **level playing field** - all municipalities were governed by the same regulations;
- phased **landfill bans** and ensuring compliance by the use of landfill audits;
- learning from the **experiences of other communities;**
- obtaining **political support** and establishing a programme to educate politicians; and
- finding political advocates.

## **Quinte**

The key contributors to the success of the programme and the lessons learned by the Quinte region are listed below.

- Residents were prepared to go to great lengths to divert waste once the programmes were **convenient and effective.**
- **Diversion is cheaper than disposal.** Although some individual diversion components may cost more, when treated as a system, the diversion based approach proved cheaper than a disposal based approach.
- **Promotion and education** were key to the programme's success. This required a comprehensive on-going strategy that targeted a range of audiences and media.
- **Diversion-based systems created jobs.** It was estimated that between 80 and 90 new jobs were created by direct and indirect waste diversion activity in Quinte.
- Distributing **composters free of charge** made sense. Composting proved to be one of the cheapest and most popular waste diversion schemes, but it had to be made very accessible to residents.
- Introducing the **User Pay** charging system stimulated all diversion/reduction activities.
- Once User Pay is implemented, the public supported it when it was seen that little or no illegal fly tipping, significant waste diversion, and reduced system costs occurred.
- The more diversion tools provided, the more successful User Pay will be.

## 4 Discussion

The following section examines some of the themes both common and individual to each programme and looks at their feasibility in the Irish situation.

### 4.1 Regulatory measures

All three programmes had some form of regulatory measures in place. Daventry placed limits on the amount of refuse that could be presented for disposal by residents, making exceptions only in certain instances. Quinte introduced their regulatory measures on a phased basis. They started with landfill bans and sack and bin limits, and progressed to a User Pay system. Nova Scotia, which also banned a wide range of recyclable and potentially recyclable material from landfill, placed emphasis on the need for all municipalities to operate on an 'even playing field'. Nova Scotian landfill bans were introduced on a phased basis, to allow time for alternatives to develop.

All of the above regulatory measures are available to Irish authorities and landfill bans are already in place in some counties. Ireland's main policy document in relation to waste management, *Changing our Ways* emphasises variable charging mechanisms as a method to recover costs. However, diversion programmes require seed funding. Quinte introduced its User Pay system after a comprehensive diversion programme was established. It was introduced for two main reasons. Firstly, to recover some of the costs of the programme and secondly, to incentivise waste reduction.

### 4.2 Convenience

All programmes highlight the importance of customer convenience. The population of the three regions reside in both rural and urban areas, yet all provide a kerbside collection system for a high percentage of the population. Nova Scotia and Daventry also provide a separate kerbside collection for organics. Kerbside systems were augmented by drop-off centres.

Recently produced local and regional waste management plans for Ireland indicate kerbside collection systems will be introduced in all major cities and towns and rural networks of bring facilities will be expanded. It is essential that these be designed with customer convenience in mind.

### 4.3 Education and Community Involvement.

All three case studies cited education as a key to the success of their programmes. The development of a comprehensive on-going education programme by Irish authorities is feasible, provided funding is made available. The Nova Scotian example highlighted the need for community involvement in the planning process from the outset and the need for authorities to be open and transparent in all dealings with the community.



#### **4.4 Providing Support**

Both the Quinte and Daventry case studies emphasise the necessity of providing support for the community as they engage in waste reduction efforts. In the case of Daventry, Waste Watch provided the support. In Quinte the support was provided by the municipalities themselves. Both options are available to Irish authorities.

#### **4.5 Industrial and Commercial Sectors.**

Both the Quinte and Daventry case studies focused on residential waste. The Nova Scotian strategy focused on all solid waste. To date voluntary stewardship agreements have been established with industry in relation to beverage containers, milk packaging, tyres and used oil. All commercial enterprises have access to recycling programmes and are source separating their organics.

Ireland has the potential to develop its own voluntary agreements with the industrial sector, or to legislate for such initiatives. Irish local authorities, under the 1996 Waste Management Act, can require source separation of materials presented for collection.

#### **4.6 Organics Diversion**

In each case, the largest component of the municipal solid waste stream was the organic fraction. Placing emphasis on the organic stream helped achieve high diversion rates. This is comparable to Ireland, where in 1998, the biodegradable content of municipal waste landfilled was 59.5% (or 27% excluding paper).

#### **4.7 Developing Partnerships**

The Daventry Green Waste Trial was conducted in partnership with a private company (Hales Waste) and an environmental Non Governmental Organisation (Waste Watch). The success of the trial shows the benefits of engaging in partnership approaches, and such options are open to Irish authorities.

#### **4.8 Potential for Improvement**

As a result of the Daventry trial programme, it was deduced that approximately 70% of material in the average household bin was potentially recyclable through the dry and organic collection service. In Nova Scotia, it was estimated that a combination of Enviro Depots, kerbside recycling and kerbside composting, has the potential to divert over 75% of household waste.

## 5 Concluding Comments

In Ireland, at present, the primary waste management mechanism for solid waste is disposal to landfill. The three case studies detailed started their waste diversion programmes from a very similar situation that Ireland is now in, i.e. low diversion of solid waste from landfill. Encouraging for communities in Ireland, all three achieved high waste reduction levels in relatively short periods of time. The Quinte and Daventry cases both focus on residential waste, and have achieved diversion rates of 68% and 53% respectively. The Nova Scotia region focused on residential, commercial and industrial solid waste and has achieved a 50% diversion rate over five years. Common themes such as a strong education programme and the use of regulatory measures ran through each. However, each programme also contained components specific to it, and was tailored to the particular community that it targeted. Whilst Irish authorities can learn from the experiences of international systems, they also need to tailor their own programs to the Irish situation as a whole as well as to individual communities.

This body of research suggests that Ireland needs determined action at all levels. Central government could be involved in initiatives to attract and develop recycling industries, whilst ensuring funds are diverted to recyclers and to local authorities for infrastructural requirements. They can also initiate agreements with industry for waste reduction, as well as developing plans for market development of recyclables. Central government can also be involved in nationwide education programmes.

At local government level, Irish local authorities can ensure that they maximise the convenience of their collection programmes, and that clear lines of communications and opportunities for feedback from the community are established. Regulatory measures can also be introduced to incentivise waste reduction. Providing appropriate resources are in place, local authorities can also provide support mechanisms for communities in their functional areas, or as in the case of Daventry, they can work in partnership with other organisations to provide this service.

This report indicates that sustainable waste management can be achieved whilst providing both environmental economic and social benefits. All of the keys to success highlighted by each region could be implemented in the Irish situation. This indicates that Ireland has the potential develop high diversion from landfill rates by use of sustainable waste reduction methods.

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Further information on these waste programmes can be obtained from:

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