

# Waste Minimisation

## Efficient Management for Cost Savings

Guide for Businesses in Northern Ireland





### Executive Summary

Becoming a resource efficient business in Northern Ireland is an attractive goal, but in practice, many companies do not know where to start. This simple and practical guide is designed to be a first stage towards your company reducing waste by working through a simple nine-step process.

Through improving the resource efficiency of your business, you will realise benefits such as: saving money, reducing your carbon footprint, preserving natural resources for future generations and becoming a green supplier.

Invest Northern Ireland is committed to supporting your business to become more efficient through the use of waste minimisation good practice techniques including state-of-the-art technologies. Invest NI offers free resource efficiency and waste minimisation audits and implementation support to eligible companies.

Please do not hesitate to contact us if we can be of further assistance to support your business on the journey to zero waste.

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## Table of Contents

<b>1.0</b>	<b>Introduction</b>	<b>05</b>
1.1	How Important is Business Waste in Northern Ireland?	05
1.2	Drivers for Waste Minimisation	06
1.3	What is Waste?	07
1.4	What is the 'true' Cost of Waste?	08
1.5	The Waste Hierarchy	09
<b>2.0</b>	<b>Nine Steps to Waste Minimisation</b>	<b>14</b>
2.1	Step 1 – Gaining Commitment and Engaging People	15
2.2	Step 2 – Quantifying Business Waste and Costs	15
2.3	Step 3 – Process Mapping	17
2.4	Step 4 - Understanding the Root-cause of Waste	21
2.5	Step 5 – Monitoring and Targeting	22
2.6	Step 6 – Waste Minimisation Action Plan	24
2.7	Step 7 – Review of Performance	25
	Step 8 – Communication	25
	Step 9 – Continual Improvement	26
<b>3.0</b>	<b>Tips for Waste Minimisation</b>	<b>28</b>
<b>4.0</b>	<b>Legislation</b>	<b>32</b>
4.1	The Duty of Care	33
4.2	Hazardous Waste	34
4.3	Waste which must be separately collected	34
4.4	Carriage of Dangerous Goods	35
4.5	Liquid Waste	35
<b>5.0</b>	<b>Signposting Data</b>	<b>37</b>
5.1	Invest NI Sustainable Development Team	37
5.2	Other Sources	37

## Appendices

Appendix A:	Waste Minimisation Efficiency Action Plan - Summary Template	41
Appendix B:	Waste Minimisation Efficiency Action Plan - Improvement Action Business Case Template	41

# 1.0 Introduction

- 1.0 Introduction ..... 05
- 1.1 How Important is Business Waste in Northern Ireland? ..... 05
- 1.2 Drivers for Waste Minimisation ..... 06
- 1.3 What is Waste? ..... 07
- 1.4 What is the 'true' Cost of Waste? ..... 08
- 1.5 The Waste Hierarchy ..... 09

**1.0 Introduction**

This Guide has been produced by Invest Northern Ireland as a practical resource for local businesses. It is designed to help you improve your business efficiency and save money through minimising and avoiding waste in your business.

It will help you to better understand the wastes that your business generates. It also provides a methodology to help you identify opportunities to reduce waste arising and the costs associated with waste generation and disposal.

The main focus of this guide is solid waste, although of course there are many forms of waste in a business. Waste is gathered in many forms, from skips and bins to bales and drums, and is generally uplifted from a business for re-use, recycling, further treatment or use as a fuel, recycling or disposal to landfill.

The best and cheapest option is to eliminate waste from your processes; however, this can be challenging. This guide helps you to manage wastes efficiently to help maximise savings and reduce environmental impact.



**1.1 How Important is Business Waste in Northern Ireland?**

From latest data available for the commercial and industrial sector in Northern Ireland, there was an estimated 1.3 million tonnes of waste arising in 2009<sup>1</sup>, with an average of 43% recycling rates, 23% disposed to landfill and the remainder either treated, re-used, composted.

Waste is inevitable in many businesses and there are almost always ways in which waste can be targeted and reduced.

Reducing waste and materials use are often part of business's continual improvement programmes, but the main driver will be cost-savings. Reducing waste and wasted materials is highly likely to save your business money.

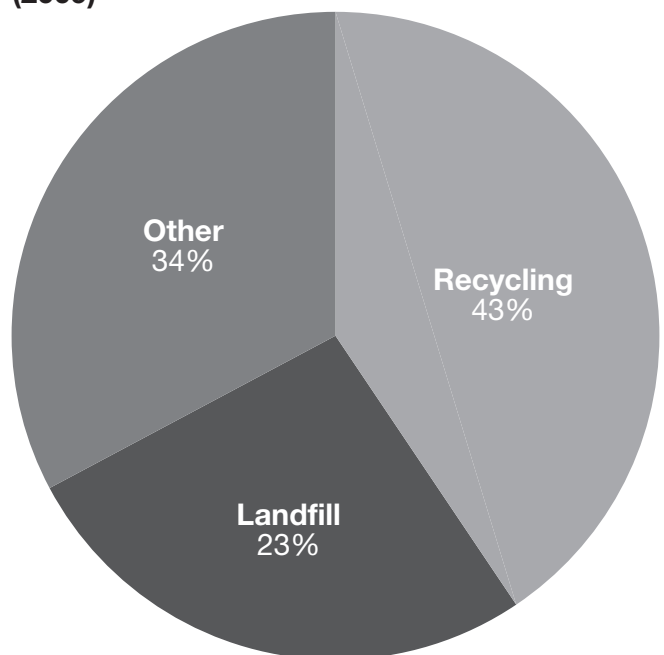
Knowing what waste is being generated in your business and where it ends up (its 'fate') is important, to be able to quantify and measure results. Landfill is often the most expensive option, and reducing your total waste overall will almost always achieve cost savings.

What are your business's waste fate ratios for landfill, recycling and re-use? Using these national averages shown in Figure 1 below, you can compare your own company performance and roughly work out whether this could be drastically improved in certain areas.

Q: Benchmark your organisation!

How does it perform in comparison to the national average ratios?

**Fig 1. Waste fate by % in Northern Ireland (2009)**



<sup>1</sup> Reference: WRAP Publication: Northern Ireland Commercial & Industrial (C&I) Waste Estimates, Nov 2011.



## 1.2

### Drivers for Waste Minimisation:

There are a number of forces driving improvement in waste management and resource efficiency that impact on businesses, including:

Cost savings:

- The need to cut overhead costs associated with waste disposal;
- Segregation of waste with inherent value from the landfill waste stream (e.g. recyclable waste such as metals, plastics, cardboard and paper) which can receive money-back on waste management fees;
- Rising raw material and energy costs, and
- Landfill tax escalator, which is driving up landfill waste costs over time (in April 2013 this increased to £72 per tonne for active waste, and may increase further).

Environmental impact:

- Environmental impact on landfill and consumption of resources, and
- Requirement to cut greenhouse gas emissions to mitigate the effects of climate change.

Legislation:

- Waste has a number of legislation issues associated with it, including duty of care, licencing and record-keeping. Non-compliance may lead to fines or other penalties as well as poor publicity.

Environmental, Health and Safety Management:

- Waste arising in businesses must be managed – correct management can save businesses time in correcting the root-cause faults such as spills, incorrect record-keeping and mixing of incompatible wastes (which may lead to an explosion or fire).
- Some waste streams, if not handled correctly, can cause health and safety issues – causing your business time and money to correct.

Identifying waste reduction opportunities and engaging staff in recycling initiatives can help you to reduce your costs as well as the amount of waste disposed of to landfill.



### 1.3

#### What is Waste?

There are many terms used for different types of waste. Businesses often think of waste as only the contents of their bins or skips, but there are also other forms of waste. Waste is not simply material that is excess to requirements – it represents the loss of valuable materials and resources. Typical wastes include the following:

Typical Forms of Waste in Northern Ireland Businesses		
<b>General (non-hazardous) waste</b>	Cardboard from packaging	Plastics
	Office paper	Food waste
	Wood, pallets	Metals
<b>Hazardous waste</b>	Oils and oil-contaminated waste	Fluorescent tubes
	Solvents, thinners and solvent-containing paints	Aerosol cans and pressurised containers
	Refrigerant gases containing ozone-depleting substances	Used chemical and oil containers
<b>Waste which has to be separately collected (not mixed with other wastes – and it may or may not have hazardous properties)</b>	Waste electrical and electronic equipment (waste IT equipment, printers, telephones, keyboards, display screens etc)	Clinical and infectious waste
	Batteries and accumulators	Edible oil (cooking oils)
<b>Other forms of waste</b>	Heat losses, leaks	Effluent and liquid residues
	Smoke/fumes/dust and air emissions	Rejects, re-work or wasted effort (time)
<b>Waste banned from landfill</b>	Liquid waste	Tyres (except bicycle tyres)
	Batteries	Hazardous wastes*

\*Unless the landfill has a specific permit to dispose of hazardous wastes.

**1.4 What is the 'true' Cost of Waste?**

The invoices received for waste management and rebate for recyclable waste (called recycle) are only one aspect of waste costs. In fact, waste costs the business money well before it even reaches the skip!

This hidden cost of waste is often termed the tip of the iceberg (Figure 2). This is because not every business has the ability to effectively measure its waste in process.

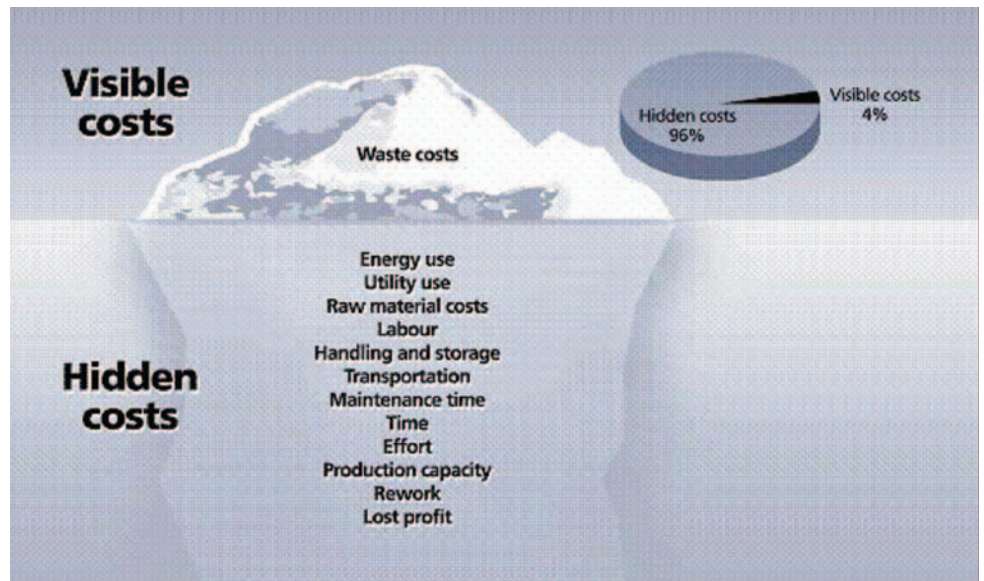


Figure 2: Visible and Hidden Costs of Waste

The business may be a manufacturer, an office, a service provider or undertaking any business activity. There will still be hidden waste in the business.

For example, any product which failed a quality check and has to be reworked will be a hidden cost to the business in the extra energy, raw materials and time used to correct the product.

Business waste eats directly into profits, so by reducing waste the business can become more profitable, meaning that even if your sales stay the same, the business will generate more profit. This is a considerable incentive in today's economic climate.

Business can often think of rebate on recycle as being of benefit to the company financially. Could this benefit be increased?

Looking at just one of the hidden costs of waste – the raw materials cost – shows that this benefit could be increased by reducing waste at source. Consider the following simple scenario:

**Hidden Costs of Waste Scenario**

- 10 tonnes of metal costs £1,000 per tonne, so a total of £10,000
- 10% loss in production = 1 tonne of scrap in turnings, off-cuts etc.
- The company receives £200/tonne for the scrap metal. Good news?

Let's now include the cost of purchasing the materials.

- The figures now show that the waste metal turnings have, including the money-back, actually cost the business £800 in materials and waste alone. [Working: The cost of the resource (£1,000) loss plus waste rebate (-£200) = £800]

Using a systematic process, waste in any business can be better understood and managed through prioritising issues and working towards cost savings and environmental improvements. Reducing waste can reap significant cost savings to the business.



**1.5 The Waste Hierarchy**

The waste hierarchy (Figure 3) identifies waste management options and ranks them in terms of sustainability. All businesses should aim to prevent or eliminate waste from the outset wherever possible, as this will almost always save money as well as environmental impact.

If waste prevention is not possible, then consider re-using, recycling or recovering other value. For example, energy can be generated using uncontaminated wood waste in a biomass boiler.

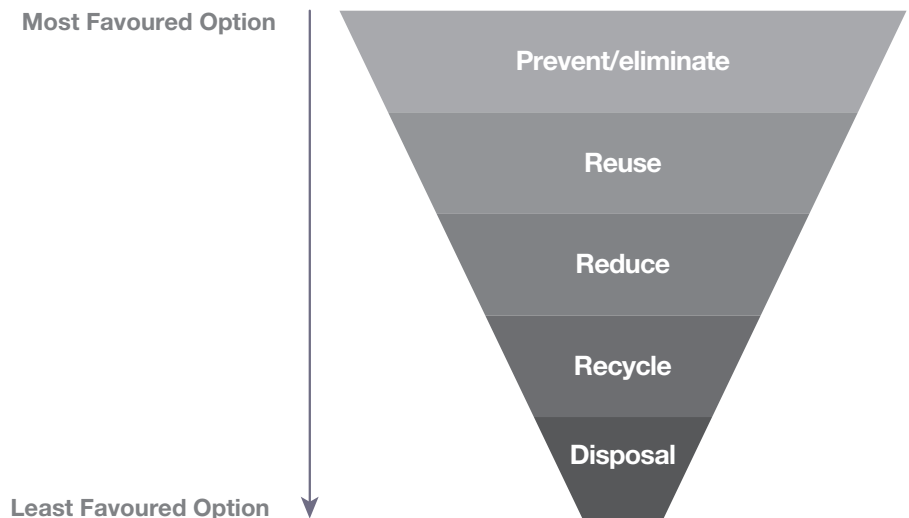
Not all wastes can be prevented, reused, recycled or used for the recovery of other values, so in these cases, responsible disposal will be required.

Waste disposal (e.g. to landfill) has one of the largest impacts on the environment and is typically the least cost-effective waste management solution. Therefore, it is more productive to aim to ‘move up’ the waste hierarchy so that you can save money, raw materials, water and energy. Your environmental performance will improve as well!

**1.5.1 Prevention**

Prevention is the most effective means of waste minimisation and has the lowest environmental impact. Preventing waste has been estimated to save up to 10 times the actual disposal cost, due to the hidden costs of waste such as lost labour time, energy costs, lost materials and so on.

Figure 3: The Waste Hierarchy



Removing or replacing materials with less hazardous materials can eliminate certain waste streams. For example, replacing cleaning solvents containing volatile organic compounds with an aqueous-based alternative will eliminate both the empty solvent containers and any contaminated cleaning wipes from the hazardous waste stream. This will have associated cost reduction benefits as well.

So, by not using a particular resource in your processes you also eliminate the associated waste. In a similar way, understanding where waste is generated in a process can help target critical control points. Taking action to make the processes leaner can reduce waste, with significant benefits:

**Case Study: Reducing waste costs by 5% in packaging manufacture.**

This Northern Ireland based manufacturer of paper and board packaging worked with Invest NI to identify and prioritise waste reductions.

An initial review was undertaken of the manufacturing process, various machines, current waste management practice, and data available.

Discussions were held with machine operators to consider reductions to what was considered to be ‘controllable waste’.

Due to the process, some wastes were considered to be low priority as they were regarded as less controllable. It was found that 10.7% of the total waste produced was corrugator warping and could largely be controlled.

It was found that greater wastes occurred when lower quality board was fed through the process, as this was then being rejected by a machine further along the process due to a quality issue.

Further investigation and root-cause analysis showed that improved reject board management can prevent this waste.

**Actions included:**

- Inspection of the board prior to processing,
- improved monitoring of the corrugator operating parameters,
- a sign-off policy on rejected board prior to the conversion processes and
- an increased sample size of corrugated board to be checked for quality parameters

**Results:** identified savings of up to £150,000.

A simple way of preventing waste and reducing costs in particular in food and drink applications is to look for zero-overfill opportunities. This means not “giving away” product for free by reducing the acceptable quantity tolerance measure on filling processes.

**Case Study: Zero overfill achieves over £16,000 savings per annum.**



A Northern Ireland company, which prepares ground coffee products, prevented waste and made savings by reducing overfill in product lines.

This was calculated to be around 6.5% overfill – basically giving away coffee product for free.

**Results:** By upgrading the process and investing in new equipment, the company was able to save just under 5 tonnes of coffee product per annum. Including processing costs, annual cost savings are calculated to be over £16,800.

**1.5.2 Reduce**

If elimination or prevention is not practicable, consider how the waste can be reduced. Often this is linked with reduction of a raw material. For example:

- Reducing the thickness of cardboard boxes used for packaging, or the number of layers of shrink-wrap used;
- Controlling the chemical dosing of a cleaning system to not over-use the material during a washing process.
- Reducing the quantity of smaller containers by purchasing in bulk. For example, bulk cleaning fluids for a contracted cleaning company, decanting the required volumes into re-usable smaller containers (e.g. spray-bottles) for use on-site. This reduces the disposal of multiple spray-bottles and also may bring a reduced cost per unit volume by purchasing in bulk.
- Using technology, procedures and training of operators to improve processes.

**Case Study: Altering Processes to Reduce Waste**



A UK-based vegetable processor used a waste minimisation programme to identify opportunities to alter process to reduce waste.

The volume and cost of disposal of peelings was one driving factor, with peeling waste running at 25%, and presenting issues of waste disposal as well as loss of raw material.

There are five common techniques for vegetable peeling – abrasive, steam, automatic knife peeling, caustic and flame peeling. Following a review of available peeling technologies it was suggested that abrasive peeling, knife peeling or a combination of both represented the most appropriate option for the company. They both had the potential to reduce peeling waste by a further 5%.

Investment in new machinery would incur a small increase in electricity costs. However, raw material savings of over 300 tonnes of vegetables each year were possible.

**Results:** Reduction in waste, increased material sales and improvements in water use and effluent processing from the investment led to cost savings of between £37,000 to £87,000, making the project commercially feasible.

**1.5.2.1 Reducing void space in skips and bins:**

Your business should consider options to reduce volumes of waste, such as a compactor or baler for solid waste, or bulk tank for waste oil. Avoid paying for void space! Making sure bins and skips are as full as possible before uplift will maximise efficiency and help reduce costs.

For example, two half full bins can be consolidated into just one full bin, or the bins could be left longer until their fill level has increased before being uplifted. So long as the waste does not start to cause nuisance issues such as odours (such as organic waste decomposing), this can be a quick way to reduce waste costs.

**Tip: Keep your waste container sizes and uplift frequencies under review – you may be able to reduce even further!**

### Avoiding “Void Space” Case Study:



A metals fabrication and engineering company with over 100 employees identified an opportunity to reduce waste costs by improving their wood waste skip management. Broken pallets and wooden packaging were segregated from other waste streams. However, the waste was simply dumped into the 20m<sup>3</sup> skip until the fill level was reached, when the waste management company was called in to exchange the skip. There was a fixed charge for this, regardless of the weight of the skip.

Analysing data on individual skip weights over a 12-month period revealed that skips varied in weight between 1.14 tonnes and 3.26 tonnes.

Providing training to the cleaners and yard-men sorted the issue.

**Results:** Avoiding void space was calculated to reduce uplifts by around a third over the year!

Uplifts reduced from 99 to 68 in a year.

This represented a saving of around £3,720.

### 1.5.3 Re-use

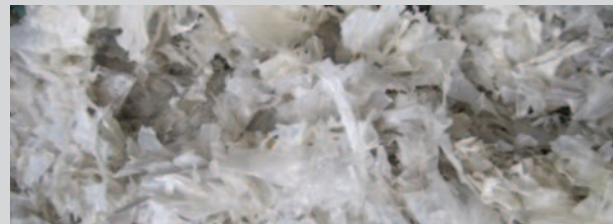
Re-use means re-using materials which would have otherwise become waste, and extending their useful life. For example cleaning or repairing parts or packaging so that they can be reused, or sending used office furniture or IT equipment for refurbishment and re-use or donate to a charity rather than disposing to landfill.

Re-use can reduce the amount of raw materials purchased and therefore save money, as current materials are being utilised for longer.

In reusing waste, we can also extract energy – for example, by re-using uncontaminated waste wood in a biomass boiler for heating, or generating bio-gas from using organic wastes to feed an anaerobic digestion (AD) plant.

The resulting gases are captured and burnt to generate electricity and heat, and the digestate can be put to useful agricultural use.

### Case Study: Waste Savings through the re-use of LDPE



A significant volume, around 2.1 tonnes, of low-density polyethylene (LDPE) was being produced by a business specialising in the manufacture of healthcare products. Instead of spending over £2,000 on the disposal of waste LDPE, the organisation identified that the installation of a granulator or shredder would provide resource and cost savings.

#### Results:

Granulating or shredding LDPE off-cuts allows the material to be diverted from landfill to be recycled:

- Reduced waste management costs (avoiding landfill tax and higher waste contractor charges).
- Re-use in process - some of the LDPE can now be reused within the process - saving on virgin raw material spend.

### 1.5.4 Recycle

Recycling means taking a waste no longer of any use in its present form, and processing this in some way to change its form for further use. Recycling consumes energy – energy to transport the recyclate and energy to change its form.

Many wastes can be recycled and a financial rebate received (or a free uplift of the waste at a minimum), but it is always more financially attractive to eliminate or prevent the waste in the first place. Hence recycling should be considered only prevention and re-use options have been exhausted. Typical recyclables include:

Paper	Textiles	Waste oil	Glass
Metals	Wood	Cardboard and packaging	
Plastics (various types including polyethylene (PE), polypropylene (PP) and shrinkwrap)			

#### 1.5.4.1 Waste Recyclate Variations in Pricing

There is potential for revenue (money-back) for certain waste streams. Typical recyclates are plastic, wood, cardboard and paper, metals and organics (such as food waste).

Recyclate has a value determined by the marketplace based on supply and demand. Where recyclate is in high demand and low quantities are available, the rebate for the recyclate will be higher. Conversely, when recyclate is in low demand and large quantities are available, the money-back potential may be very low or even non-existent.

To find out the general rebate potential of different recyclate, refer to the prices section in <http://www.letsrecycle.com>. These prices can change from month to month, and further variations may apply, for example, if the quality of the recyclate is poor, or if transport costs are high. Tips:

- To maximise return for recyclate, keep it clean and consistent – i.e. don't mix the waste and don't contaminate it! Bulking techniques such as baling can also help increase the value of recyclate.
- It is more cost-effective to avoid waste in the first place than it is to receive money back from the sale of recyclate. However, if the waste is unavoidable, then rebate for recyclable waste is a practical solution.

#### 1.5.5 Dispose

Disposal to landfill should be considered as a last resort once you have exhausted the other stages of the waste hierarchy. Disposal often represents the highest cost option and environmental impact.



# 2.0 Nine Steps to Waste Minimisation

2.0	Nine Steps to Waste Minimisation . . . . .	14
2.1	Step 1 – Gaining Commitment and Engaging People . . . . .	15
2.2	Step 2 – Quantifying Business Waste and Costs. . . . .	15
2.3	Step 3 – Process Mapping. . . . .	17
2.4	Step 4 - Understanding the Root-cause of Waste . . . . .	21
2.5	Step 5 – Monitoring and Targeting . . . . .	22
2.6	Step 6 – Waste Minimisation Action Plan . . . . .	24
2.7	Step 7 – Review of Performance . . . . .	25
	Step 8 – Communication . . . . .	25
	Step 9 – Continual Improvement . . . . .	26

**2.0****Nine Steps to Waste Minimisation**

This section helps you to work through the following nine-step process to waste minimisation. You can use the following as a checklist as you work through the steps.

<b>Step 1</b>	Gaining commitment and engaging people	<b>Y/N</b>
<b>Step 2</b>	Quantifying business waste and costs	<b>Y/N</b>
<b>Step 3</b>	Process mapping	<b>Y/N</b>
<b>Step 4</b>	Understanding the root-cause of waste	<b>Y/N</b>
<b>Step 5</b>	Monitoring and Targeting (M&T)	<b>Y/N</b>
<b>Step 6</b>	Waste minimisation Action Plan	<b>Y/N</b>
<b>Step 7</b>	Review of performance	<b>Y/N</b>
<b>Step 8</b>	Communication	<b>Y/N</b>
<b>Step 9</b>	Continually improve by returning to Step 2	<b>Y/N</b>

## 2.1

### Step 1 – Gaining Commitment and Engaging People

Once you've decided that your business could benefit from implementing waste minimisation, Step 1 is to engage all staff and senior management.

Setting up a team will not only share out the resource impacts, but will also help spread the message throughout the business. Positive engagement, motivation and enthusiasm go a long way to getting results!

Leadership and buy-in from the top management will set the framework for action and will provide a mechanism to support actions and provide feedback, which may have resource or capital expenditure impacts.

If possible, team members should be selected from all levels in the business, from the shop floor to senior management. In the manufacturing industry, experience has shown that teams are most effective if they include employees from:

- Engineering/facilities/site services functions, who are responsible for the design, installation, maintenance and operation of plant and equipment;
- Production management responsible for scheduling and line management;
- Procurement/quality/environmental managers who understand materials, sourcing and trends that relate to waste;
- Operatives who actually perform the day-to-day production tasks and who usually know most about the activities that cause waste.

Involving others in the team, such as green champions, is also recommended. Training, supporting and empowering the team to assist in specific tasks will be essential. This could be activities such as checking that material for recycling is in the correct bin, completing a monitoring activity or perhaps undertaking a detailed waste analysis of a particular process.

Commitment is needed from the whole team to make change happen within operations and business processes.

Reaching out to suppliers and contractors is also beneficial – think about contracted cleaners who uplift and segregate waste, suppliers of raw materials in packaging that could be re-used or recycled. These businesses could also help your business to reduce waste and in turn make their own cost savings – a real win-win situation.

Changing people's attitudes to waste may take time and will definitely need a factual basis as well as enthusiasm. This is why we need to quantify business waste costs and to present this information clearly and factually to the top management and the workforce.

Remember to recognise the team's efforts, and don't forget to say 'thanks' and acknowledge input and ideas, no matter where these originated from in the business. Can your business adopt a 'zero waste' culture?

## 2.2

### Step 2 - Quantifying Business Waste and Costs

Many businesses underestimate the total cost of waste to their bottom line. Typically in Northern Ireland this could be around 4–5% of turnover, but could also be as high as 10%.

Step 2 looks at identifying both the obvious and also the hidden costs of waste. Once these are addressed, the process of prioritising waste projects can follow.

### 2.2.1 Getting Started: What are the costs of waste to your business?

A good place to start is to understand your waste costs for the previous year (using financial years can be a good idea to tie in with data you will need from company accounts).

Write down, or put into a spreadsheet the following details, and add these up to see the annual cost of waste management once this leaves your site (examples are included):

Type of Waste	Quantity (Annual)	Cost (excl VAT) (Annual)	Waste Fate	Contractor
General mixed	24 tonnes	£2,400	Landfill	Company A Ltd
Plastic	12 bales @ 500kg per bale	-£750	Recycle	Company B Ltd
Cardboard	12 skips @ 1 tonne per skip	£1,200	Recycle	Company B Ltd
Paper	12 bags @ 50kg per bag	£0 (free uplift)	Recycle	Company C Ltd
Wood pallets	40 per month = 480 per annum @25kg per pallet = 12 tonnes	£1,200	Re-use	Company D Ltd
Solvent	1200 litres	£3,600	Recycle/Re-use	Company E Ltd
Oil leaks	150 litres	£500	Dispose	Company E Ltd
Sludge	600 litres	£300	Dispose	Company E Ltd
Toner Cartridges	36	Free uplift	Recycle	Charity Z
	<b>Annual Cost</b>	<b>£8,450.</b>		

Many companies have more than one waste contractor, and some will use free-of-charge services or donations – these should also be included so that all waste arisings are captured and not hidden.

Walk around the site and check that visible wastes are all captured within your spreadsheet. Add any new items picked up at this stage, and include the waste management costs. Try to estimate the quantities, if accurate quantities are not available.

Taking photographs can be an excellent reminder of the waste streams and wasteful practices seen during a site visit. These can also be used later in training slides or as a record to benchmark improvements on at a later date.

#### Example:

To estimate quantities, measure waste generated in a week and then multiply up by the production weeks in a year to estimate the total annual waste (e.g. 48 production weeks x 2 tonnes a week = 96 tonnes a year).

You could also weigh an 'average bag' of waste and multiply this by the number of bags of waste produced in a shift, for example, and then multiply up as above to estimate this for a year.

If you are estimating, make a note of this on the spreadsheet with an indication of how the result was arrived at. This is useful for traceability of results, and as measurement (see Step 5) improves over time it provides an accurate description of the benchmarks and calculations used at the start. It also helps if another member of the team takes over the project and needs to understand how the results were arrived at previously. This is a good environmental management practice.



### 2.2.2

#### Understanding where hidden costs may be

The hidden waste costs can be challenging to identify and quantify, so using a structured approach can be helpful. One technique that can be used to understand waste in more detail throughout a business is called process mapping. This is discussed in Step 3 below.

### 2.3

#### Step 3 - Process Mapping

Process mapping is a structured, consistent method of writing down and mapping the various aspects of the business, and looking at the inputs and outputs for each process.

Using this technique, the business can start to identify critical points (whether in a particular department or within a particular business process) and therefore start to prioritise areas of significant waste.

A process is a task or operation which you do to prepare a product or a service. A process requires various inputs to generate the output, and as this process occurs, a number of wastes may be generated.

These wastes may include solid waste, rejects, wasted materials and packaging, and also less obvious wastes such as wasted energy, waste of compressed air, wasted materials as air emissions (such as evaporated solvents) and personnel time. An example process map is shown in Figure 4.

Often materials will appear in several process map areas and so this exercise is useful to identify the materials and wastes in each area, to quantify these where possible, and to build up a picture of the waste throughout the business.

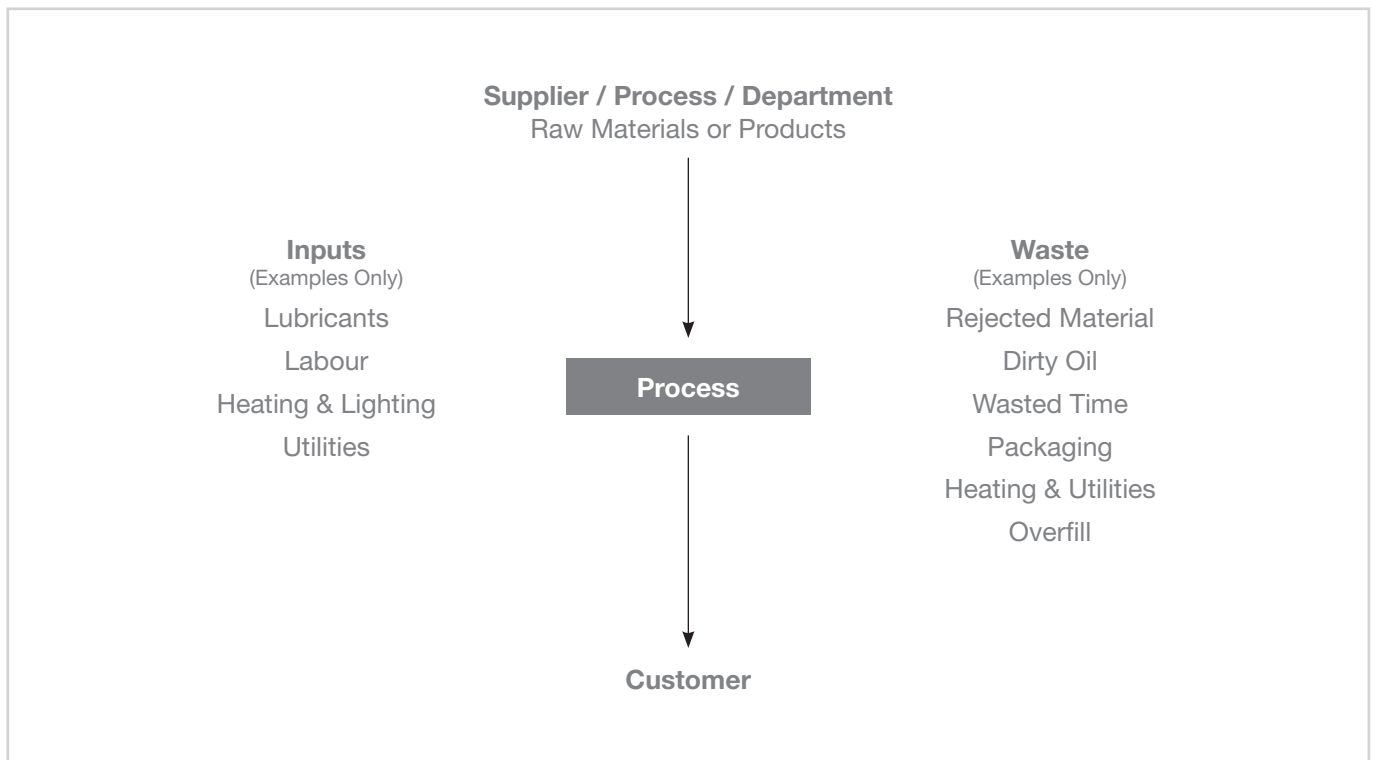


Figure 3: Generalised Site-Based Process Map

Generally speaking, businesses will have several processes linking to each other which then support the final goods or services as supplied to the customer, as seen in Figure 4.

Waste can occur at any of these process stages, and it is important to identify where the wastes are arising in order to then quantify (including attributable hidden costs). Once these costs are understood it becomes easier to target areas for reductions.

As a product advances through the business (for example, through a production process) it gains embedded 'value'. At the end of the process, a product may have had personnel time, energy, heat, chilling, compressed air, packaging and costs of transporting and storage expended on it.

If the product ends up in a skip at this point, then it is easy to see how the real costs of this waste can add up, but do remain largely hidden – and are therefore worthwhile exploring.

This technique applies to service-based industries too. The following exercise looks at how to go about this and provides some ideas.

**2.3.1 Process mapping exercise**

Using this process mapping technique, set up a list of the different process areas in your business. Processes include those from input of materials through to goods/ services at despatch. Don't forget to include support services, such as offices and facilities.

Use the process map template from Figure 4, or a similar process to build maps for each of the areas listed. This can be a desk-based exercise, but to gain better understanding and to help quantify the wastes, use a site walk-round to check the inputs and wastes. Remember to add any that you find during the walk-round which were omitted previously.

Next, using the sample sheet shown in Table 1, develop a breakdown that includes costs and quantities of materials and waste arising from each of the processes. There may be multiples of particular units, for example, packaging may have to include wooden pallets, card boxes, plastic wrap etc. Some wastes might be entire products which have failed quality inspections.

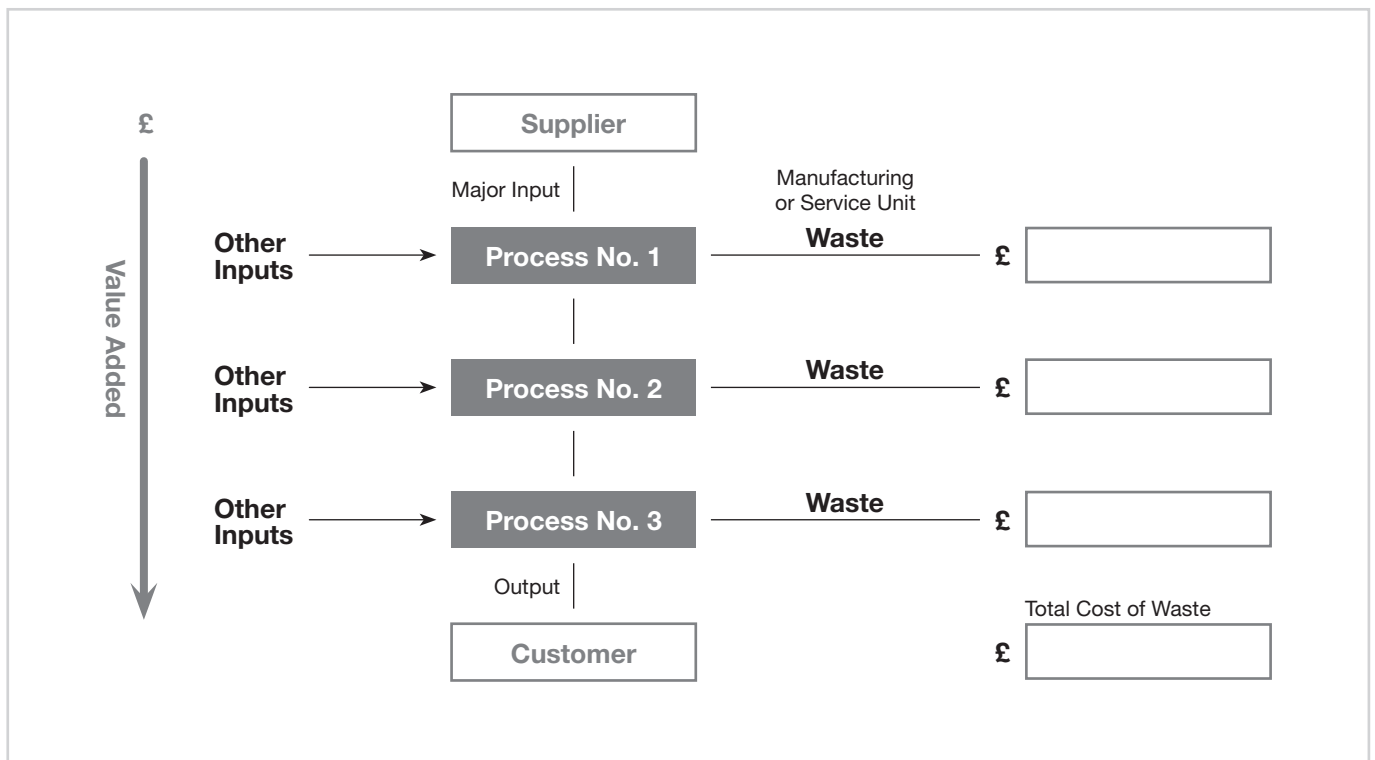


Figure 4: The Waste Tracking Model

Note that some wastes are easy to find as they are visible and obvious, e.g. in skips, bins, or drums full of waste. Others are more difficult to pinpoint such as invisible solvent emissions.

### 2.3.2 Addressing the hidden costs of waste exercise

Having identified all possible sources of waste from an operation, the next stage in minimising waste involves identifying opportunities to eliminate or reduce major waste streams.

To help with this exercise, use your own business experience and draw on the experience of operators, facilities staff and managers within your business to develop your own version of Table 1.

Focus on waste aspects that meet the following criteria:

- Materials and resources in significant quantities;
- Expensive materials;
- Expensive waste streams (such as hazardous waste);
- Wastes which are an 'easy fix'.

An example from a simple process is included in Table 1 below for illustrative purposes.

An example from a simple process is shown in Table 2 below.

Once the data has been gathered (use estimates where reasonable to do this), then any opportunities for minimisation should be prioritised. Prioritising is important as resources will be limited, and it's important to gain results to motivate both top management and the workforce to do more.

Major Sources of Waste Worksheet						
Process or Activity Name:						
		Hidden Costs of Waste				
A	B	C	D	E	F	G
Type of Waste	Estimated amount of waste produced e.g. per week/month/ year.	Estimated cost raw materials purchase costs e.g. per tonne.	Additional costs related to processing this material – if known (e.g. handling/ utilities costs per week/month/ year).	Estimated disposal cost e.g. cost per tonne for landfill/ recycling.	Total cost associated with waste (C + D + E).	Current waste reduction activities (if any).
e.g. plastic wrap	1 tonne per week	Supplied around products -indirectly purchased	1 hours' effort per tonne material @ £15/hr to handle/ recycle	£80/tonne rebate	-£65/week or -£3,250/yr (rebate assumed 50 working weeks)	Segregation for recycling
e.g. cardboard packaging	6 tonnes per month	£120/tonne = £720/month	20 hours' effort per month in correcting card packaging processing faults and waste disposal to landfill @ £15/hr = £300/month  £40/month in attributable electricity costs.	£100/ tonne for landfill cost = £600/month	£1,660/month or £19,920/yr	None.
(add additional rows according to the number of wastes)						

Table 1: Major sources of waste

**To pinpoint potential savings, it is important to identify:**

- 1) All the different types of waste produced by each of your company's activities.
- 2) The stage in the process at which they are produced.
- 3) The costs to the business of the waste – including hidden costs where possible.

**2.3.3 Hidden Costs of Waste Example Case Study 1**

Often the costs of the materials are not taken into account when looking at the cost of waste. These costs are often handled between separate departments and may not be linked up.

For example, waste management invoices may be approved by the Facilities Department whereas the office stationary and paper is ordered by the Office Manager, and packaging ordered by the Production Manager.

Having different parts of your business work together on waste minimisation programmes can help joined-up thinking to identify cost savings.

Consider getting personnel from different parts of your business to be waste champions and provide a forum for them to meet, discuss ideas and work on projects together.

True Cost of Waste Case Study:	
A technical services company with an engineering workshop reviewed its paper usage and installed double-sided copiers to reduce paper use.	
Usage was still high, so to raise awareness of the true cost of the printing they added paper, printing and toner costs and subtracted the paper recycling rebate (£50/month).	Paper costs £4,300 Printing costs £3,000 Toner costs £4,068 Paper recycling rebate: -£600
If the company had only used the paper costs and paper recycling rebate of £600, the hidden costs of waste (£7,000!) would not have been identified and the business case far harder to justify!	<b>So a total of £10,768</b>
National benchmark figures – 7 reams of paper per person per annum.	If the company were operating at benchmark levels, this would represent a saving of around £7,500. and over 3.5 tonnes of paper.

**2.3.4 Hidden Costs of Waste Example Case Study 2**

Processing information or materials into services or products takes resources, time and energy. Consider this next example from a sink manufacturing process:

**Ceramic Sink (RRP £350)**



Energy = £2.00  
 Materials = £45.00  
 Solid waste = £2.00  
 Other overheads = £50.00  
 Total: £99.00  
 Profit: £251.00

**Stainless Steel Sink (RRP £180)**



Energy = £1.00  
 Materials = £20.00  
 Solid waste = £0.50 (includes a rebate for steel scrap)  
 Other overheads = £30.00  
 Total: £51.50  
 Profit: £128.50

Hidden costs within processing include rework, quality failures which lead to waste, and wear and tear on machinery. Reducing waste in-process means tackling what is called the 'value chain', i.e. the value embedded in the product as it is processed up to the point of sale.



2.4

**Step 4: Understanding the Root-cause of Waste**

Once the significant areas of waste in the business are established, the next step is to understand what the root-cause of this waste is. Some issues will be easier than others to resolve, so for example, a training issue may be easier and cheaper to resolve as opposed to investing in new machinery.

Having further understanding of the root-cause of waste can help you to target the waste reduction programme more successfully, and to make the most effective use of the resources (personnel, time, money, etc) available to the business. A typical technique to use is shown below in the 'cause and effect' fishbone diagram (Figure 6).

**2.4.1. Root Cause Exercise**

Take each of the highlighted processes from the Process Mapping exercise earlier, and undertake an investigation considering the issues encountered.

Start by getting management commitment and then involving personnel who have experience of the area or

process – remember the maintenance team as well as representatives from operators and managers. Use a blank diagram such as within Figure 4 to generate a desk-based exercise (flip-chart or similar) identifying the root-cause of waste in each of the key waste areas. For the four 'fishbones' use the headings:

- People
- Materials
- Methods
- Machinery

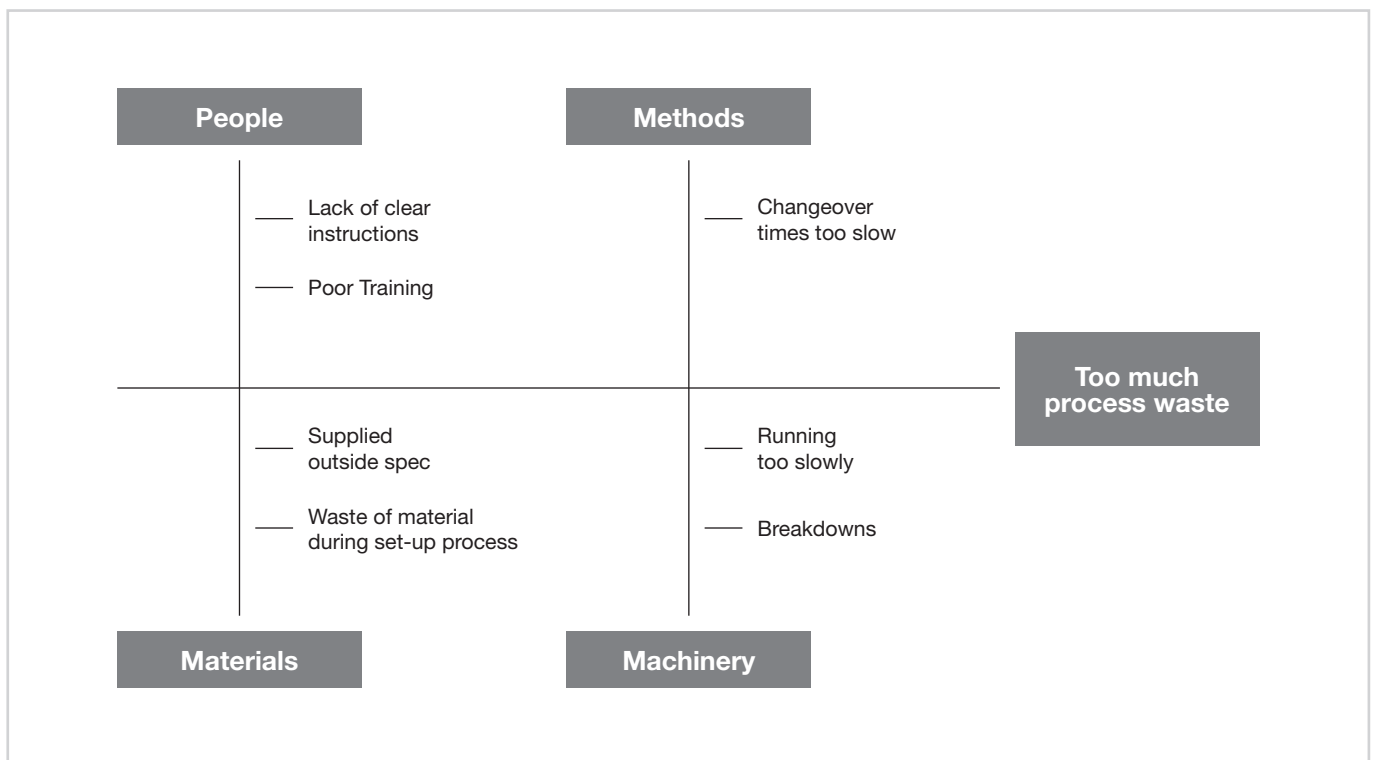


Figure 4: 'Cause and Effect' Diagram

Also consider where themes arise – the same issue appearing on many of the cause and effect diagrams. For example, it may become obvious that managers are not aware of the costs of waste to the business and behaviour change is needed to tighten up working practices.

Once the root-causes have been investigated, this will inform how to build your monitoring and targeting programme (Step 5) and Action Plan (Step 6).

Taking the information gathered so far to your top management (identifying the cost of the waste in prioritised areas, together with areas for action) will aid more informed decision-making on targeting resources and investment. Taking action is obviously important otherwise cost savings might not be achieved!

Once agreement is reached on the areas to target, the next step is to gather more detailed data on the waste arising in these areas. To do this, a monitoring and targeting system can be put in place, as discussed in Step 5.

**2.5**

**Step 5: Monitoring and Targeting**

The next step in the process is to develop reliable data on specific quantities and costs. Monitoring aspects such as solid waste, raw material and packaging losses, machinery down-time, energy losses and lost time all help to build up the picture.

Without data to support your waste minimisation activities, waste programmes are unlikely to be sustainable over time. Data will help identify where savings may be made, track cost savings, and help build the business case for any new investments. Using data from your business to feed back to the team is important to help maintain the momentum and enthusiasm.

Using the target areas highlighted in the initial Process Mapping exercise, write up a monitoring strategy, so there is an overall summary of what is being monitored, for example:

Monitoring Strategy Worksheet						
Area	What is to be monitored?	Units	How	Records	Responsibility	Timeframe
Goods In	Cardboard packaging and plastic wrapping	kg	Floor scales in warehouse	Weekly checksheet filled in on clipboard	Warehouse Manager	End of each daily shift – weekly reporting to Production Manager
Printing Press	Process waste – offcuts	kg	Weigh one full bin of offcuts to use as estimate. Tally full bins at end of each shift.	Tally sheet of production run and full bins kept at each press. Complete for each shift. (Multiply up based on one full bin to get kg)	Shift Manager	End of each daily shift – weekly reporting to Production Manager
Yard	Waste skips	tonnes	Note the fill levels of skips going off-site. Ask contractor for weight details for each skip uplifted and fill in against the security log-book.	Log-book kept at security.	Security Guard	End of each shift – weekly reporting to Production Manager
Fill in additional rows as required.						

The various log-sheets and methods of recording will need to be put in place and responsibilities agreed. A short briefing with each responsible person will be helpful, explaining why the data is to be gathered and how long each trial will be running for initially.

Start to monitor and target the areas identified through the process mapping exercise where the largest and most expensive waste streams are arising. This will provide a baseline from which to implement an action plan of improvements (Step 6).

There are a wide variety of monitoring techniques, for example:

- Weighing bags of waste and recording.
- Using waste quantities as extracted from Waste Transfer Notes (e.g. number/size of skips etc).
- Working with your waste contractor to supply accurate skip waste weights from their weighbridge.
- Clamp-meters for monitoring electricity use across a circuit.
- Remote monitoring using manufacturing PLC systems which automatically gather data.
- Stop-watch measuring down-time of lines or machinery.

The data should be recorded (including any assumptions or whether based on estimates), should be reliable and then, critically, analysis is carried out.

Monitoring does not have to involve complex IT or equipment. Simple tracker-sheets kept on a clipboard

near to the process, combined with data entry into a database such as Excel can be used to record and then analyse data effectively.

Analysis using valid comparisons is very important; for example, relating the waste arising to the production or throughput of products or services. To create a baseline for comparison consider measuring:

- Production (e.g. tonnage, units, 'widgets' etc)
- Productivity, product losses, and yield across individual processes.

This will give you comparative results. For example, if one production line is processing twice as much as a second production line, yet their waste is the same, then clearly the first production line is twice as efficient as the second line.

Remember that you may decide to monitor a number of processes as a trial only. Once investigated, you may decide to change the detail in the monitoring programme or the areas to target based on the results. Some areas may have value in being monitored almost continually.

Monitoring data must be analysed to enable you to target improvements or capture data which can be related to performance.

**Tip:**

If the resulting data can't be related to performance, then reconsider a method of collating data which will be useful, or re-direct your monitoring efforts' onto the next prioritised area of the business which **will** make a difference.

**2.5.1 Monitoring Waste in Process - Example**

The principle of ‘right first time’ applies because as soon as a product or service has to be reworked there is an impact on the bottom line from wasted time, materials and generation of waste. The time, materials and energy used to rework are being diverted from generating new products or services which bring greater return to the business.

Quality management and applying ‘lean manufacturing’ principles driven by measurement are important to understanding where to save money by reducing waste. This can apply to any business and in particular applies to manufacturing processes. This case study shows how a business targeted efforts based on measurement of a particularly wasteful process:

**Case Study: Using Lean Manufacturing in a Paint Shop to increase profit by 30%**

This UK-based in-house paint shop had measured a 17% reject level. This meant that up to five workers at any one time were needed to strip or sand parts prior to reworking.

A waste minimisation project highlighted several issues - all relating to the standard of operations and housekeeping:

- Paint quality was not controlled, with no measurement of viscosity or temperature and, therefore, no proper adjustment of spraying parameters.
- Plant was not maintained, e.g. spray guns were not serviced unless they stopped working due to a blockage, breakage or the failure of ancillary equipment.
- The person performing quality control (a quick check for ‘pass’ or ‘fail’) was too busy to tell the operators when there was a problem. The only feedback was given at the end of each shift.

The company then analysed the process requirements before generating an Action Plan:

- Setting quality standards;
- Writing operating procedures;
- Training the sprayers, and
- Setting up a corrective action system for communicating quality problems and implementing change.

As a result, the company employed an additional person to deal specifically with housekeeping, quality control, plant maintenance and staff training.

**Results:**

- Reject levels are now less than 2% and still improving.
- Production levels have remained constant, but sales have increased by 15.5%.
- Only one person is now needed to prepare rejects for processing and material costs have also fallen significantly.
- Profits are, therefore, nearly 30% higher, even after allowing for staff costs.

**2.6**

**Waste Minimisation Action Plan**

Having gone through Steps 1–5 you will be much more informed about the waste arising in your business, both overall and in detail. Total waste, including hidden costs, will be further quantified, and this now provides an opportunity to develop an action plan.

Remember that action needs to be taken in order to achieve improvement in business processes.

Based on the results of Steps 1–5, the opportunities for reducing waste should be listed and costed. No-cost actions should be implemented as soon as possible.

**Tip:**  
Don't forget to record the no-cost actions even if implemented immediately – these still count towards overall progress on your waste minimisation action plan!

Develop a summary list of actions, including an outline of the expected results and potential owners of these actions. A template for this is available in Appendix A - Waste Minimisation Efficiency Action Plan – Summary Template.

The highest priority opportunities can then be implemented in order and the benefits realised. Prioritising action to eliminate or reduce waste is not always easy. While it may seem obvious to tackle the largest waste stream first, the business should consider its aims.

Bear in mind that in line with the waste hierarchy, actions which achieve prevention, reduction, and re-use should be considered before recycling and disposal.

Get input from the waste team on the priority actions. This type of structured approach to waste minimisation is best carried out by the teams, as this spreads the workload and helps to keep a balanced view. Use the team's input to check that the waste minimisation action plan is realistic and achievable.

**Tip:**

- Business priorities will be based on the highest cost of wasted material, not necessarily the largest quantity of waste.
- Think strategically about the visible actions you can take quickly to get organised and demonstrate improvement. Examples include low-cost or no-cost actions like labelling of bins, communications via toolbox talks and posters - before making business cases for capital investment.
- Actions are likely to directly relate to the environmental performance of the business – ensure the waste minimisation action plan is captured as evidence towards any on-site environmental management system to standards such as ISO 14001 or BS 8555.

A business case for individual actions (some of which may require investment) should include the following information to enable senior management to make a reasoned commercial decision on whether to implement the improvement action:

- Improvement action title.
- Implementation cost.
- Estimated annual waste, raw materials and time savings (cost and environmental).
- Payback period or net present value.
- Description of improvement action.
- Rationale for making the change.
- Identification of project risks.

- Next steps including supplier details (as appropriate).
- Signposting guidance.

The above information is outlined in a Waste Minimisation Efficiency Action Plan – Improvement Action Business Case Template which is available in Appendix B.

## 2.7

### Steps 7-9: Review of Performance, Communication and Improvement

The last three steps capture the review of the waste programme performance, communication of this and helping ensure that waste minimisation becomes part of regular business processes through the continual improvement cycle.

#### 2.7.1 Step 7 - Review of performance

A waste minimisation action plan should be prioritised according to your business's current needs, and should be updated over time. This makes the action plan a dynamic tool.

Generally speaking, a business is more likely to want to prioritise low-cost and no-cost actions. Use the monitoring data to demonstrate that changes made through implementing the action plan are making a difference. Quantified data which relates to cost savings can then be used to influence whether the business will invest in higher-cost process improvements to gain further savings in the medium to long term.

Reviewing performance means comparing the baseline against the new figures available. Using the monitoring data, you can review and evaluate the actual benefits achieved. Note down results, but also any comments on challenges or barriers as well as the successes.

Ensure top management and the waste team are aware of the results from the performance review. A performance review is typically done on an annual basis, or more frequently at the start of a waste minimisation process.

#### 2.7.2 Step 8 - Communication

Communicate success to staff, senior management and your supply chain to maintain their engagement. Results may be presented as quantified savings in terms of cost or environmental savings (such as tonnes of carbon saved, equivalent trees saved etc) according to the audience. Cost savings help the business to be sustainable and reducing overheads means the business can be more competitive in the marketplace.

Noticeboards and toolbox talk briefings can be used on an operational basis. Include waste minimisation in staff inductions to inform new employees about reducing waste in the business and to ask for their ideas.



Communicating the reasons why waste has arisen and how this has been changed is a very powerful tool to helping embed behaviour change for a more efficient, less wasteful business. Complete the communication loop by providing feedback on the results the team has achieved. Consider bringing any case study or improvement programmes forward to support an application for a Green Award!

### **2.7.3 Step 9 - Continual Improvement**

Successes really help to provide a boost to the momentum of waste minimisation programmes. Once successes are communicated though, this is not the end of the story. Don't forget to maintain the improvement by keeping track of process improvements through monitoring.

To maintain improvement, consider the following tips:

- Ensuring planned preventive maintenance is completed.
- Ensure that reactive maintenance occurs within a reasonable time-frame.
- Training may have to be completed for current employees.
- Training and awareness on key issues should be part of induction.
- Written procedures may have to be updated and adapted over time.
- Monitoring (either from time-to-time or continually) should demonstrate that the gains have been maintained.

To promote the culture of waste minimisation in the business, do make sure there is a mechanism for all employees (and those working on your site such as contractors) to feedback of ideas about reducing waste.

The final step is to continually improve by returning to Step 2 in this guide to revisit the waste minimisation process to prioritise new actions now that initial improvements have been made. Remember that your wastes have probably decreased – so do organise with your waste management contractor to reduce waste uplifts to reduce costs further!

# 3.0 Tips for Waste Minimisation

3.0	Tips for Waste Minimisation. . . . .	28
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### 3. Tips for Waste Minimisation

This section gives tips that businesses can implement to save money in some common areas.

Area	Waste Minimisation Tips
Product design	<ul style="list-style-type: none"> <li>• Design-for-life means taking into account waste minimisation as part of product design.</li> <li>• Consider reducing materials used in the product.</li> <li>• Eliminate hazardous materials by specifying substitute materials which are non-hazardous.</li> <li>• Reduce waste generated during the products' lifespan.</li> <li>• Increase the ability for the product to be re-used/recycled rather than landfilled at its end of life.</li> </ul>
Process design to optimize material use	<ul style="list-style-type: none"> <li>• Assess your current processes and determine if these can be altered to prevent difficult or hazardous wastes from being produced.</li> <li>• Can any hazardous materials be substituted with non-hazardous materials? (e.g. aqueous-based cleaners in place of solvent based cleaners?)</li> <li>• Chemical baths used in-process can reveal opportunities to reduce – for example, reducing the concentration of chemicals can significantly reduce cost of materials and reduce the hazard of the liquid waste.</li> <li>• Use baffles, drip racks and drain boards to allow drips from parts being brought from one tank to another, to allow chemicals or solvents to drip back into the original tank for re-use, rather than going as waste into a bund.</li> <li>• Capture and re-use solvents from cleaning units.</li> </ul>
Raw materials selection	<ul style="list-style-type: none"> <li>• Discuss with your suppliers how to choose materials to minimise waste or facilitate the re-use or recycling of waste.</li> <li>• Are materials over-specified, for example could a lighter grade of material be just as effective?</li> <li>• Could greater recycled content be used in materials?</li> <li>• Can lesser grades of chemicals be used for the same results? (e.g. changing from 48% sulphuric acid to 20% sulphuric acid? In almost all cases the unit cost will be cheaper.</li> </ul>
Procurement	<p>For waste contracts:</p> <ul style="list-style-type: none"> <li>• Who deals with the waste contract for your business?</li> <li>• Do you know who your waste contractors are?</li> <li>• Do you know how much and for what services you are paying your waste contractor?</li> <li>• Renegotiate according to changes implemented in your Action Plan.</li> </ul> <p>For materials:</p> <ul style="list-style-type: none"> <li>• Eliminate over-ordering in order to gain a marginally better price per unit. Remember that for stock which goes out of date, there is a waste cost impact as well.</li> <li>• Consider consolidating suppliers for materials to reduce the number of parts, packaging and deliveries required.</li> </ul>
Material receipt and material storage	<ul style="list-style-type: none"> <li>• Inspect incoming goods to make sure that they are in good condition, and that any drums or similar of liquids or materials are not dented, rusty or leaking.</li> <li>• Once received in good condition, materials should be stored in a manner which affords them protection, to avoid losses in storage (which will end up being added to the waste costs).</li> <li>• For materials with shelf-life, be aware of stock control according to expiry date with materials to be used in order of oldest first.</li> <li>• Undertake stock audits and housekeeping audits regularly, to identify excess materials and to address the root-cause of this. Remember, prevention is better than cure!</li> <li>• Check for over-packaged goods arriving from suppliers – can these be provided in returnable containers? Ask suppliers for assistance.</li> <li>• Recycle paper, card and plastic packaging where possible.</li> </ul>

Area	Waste Minimisation Tips
Procedures and training	<ul style="list-style-type: none"> <li>• Procedures and work instructions help to maintain controls on waste reduction – whether in a production process or an office. Keep these simple and to the point.</li> <li>• Provide training for operators and managers – and refresh the training regularly.</li> </ul>
Avoiding waste in offices	<ul style="list-style-type: none"> <li>• General waste at-desk bins are recommended to be removed in multi-user offices and replaced with segregated waste bins (e.g. paper, plastics, general waste).</li> <li>• Cancel junk mail and unwanted publications delivered to your business.</li> <li>• Encourage computer users to use electronic tracked changes for review rather than hard-copy printed review. Encourage print preview to be used to check printing is as expected before hitting the ‘print’ key!</li> <li>• Discourage printing where possible, and use electronic storage for files (don’t forget to back-up!).</li> <li>• Remember that toner cartridges often can be hazardous waste – many charities will accept these.</li> <li>• Technology can help to control printing and provide monitoring data – but will require investment in IT.</li> </ul>
Avoiding packaging waste	<ul style="list-style-type: none"> <li>• Assess the packaging used and received in your business. Where can packaging be eliminated?</li> <li>• Work with your supply chain and customers to find solutions (such as returnable crates or jigs) which will save both parties money.</li> <li>• See Invest NI Guide on ‘Packaging Optimisation’.</li> </ul>
Segregation and waste containers	<ul style="list-style-type: none"> <li>• Segregate waste where this is viable.</li> <li>• Communicate clearly to the workforce about types of materials to be segregated and which bins these are to be placed into.</li> <li>• Plan carefully for container locations and sizes to encourage compliance with any waste segregation plans.</li> <li>• Lockable skips help prevent fly-tipping and mixing of waste materials.</li> <li>• Only responsible persons are to have keys for lockable skips.</li> </ul>
Signage	<ul style="list-style-type: none"> <li>• Ensure waste containers are clearly and consistently labeled.</li> <li>• For multiple sites, keep waste signage consistent across all sites.</li> <li>• Use photographs, images (ticks/crosses) and colour – especially where a workforce may not speak English as a first language.</li> </ul>
Baling and compaction	<ul style="list-style-type: none"> <li>• Baling waste such as cardboard and plastic may be viable – undertake a review first to check this is commercially viable. Renting or purchase of baling equipment is possible – a trial may also be possible.</li> <li>• Baling and compaction require space for machinery and the bales, and the equipment requires competent operators.</li> </ul> <p>Communicating with cleaners.</p> <ul style="list-style-type: none"> <li>• If your waste collections in the business will be changed, or a new segregation programme put in place, remember to communicate this to your cleaners. Put in place a work instruction and ensure this is trained out and available to other staff providing cover.</li> <li>• Check that any segregated waste collections are being done correctly.</li> </ul>

Area	Waste Minimisation Tips
Communicating with cleaners	<ul style="list-style-type: none"> <li>• If you change waste collections in the business, or put in place a new segregation programme, remember to communicate this to your cleaners. Put in place a work instruction and ensure that current and cover staff are trained in this.</li> <li>• Check that any segregated waste collections are being done correctly.</li> </ul>
Waste uplift frequency	<ul style="list-style-type: none"> <li>• Remember that reducing overall waste arising and segregating recyclable waste will normally mean you require less frequent general waste uplifts. Is your business getting the appropriate waste management service?</li> <li>• If you consider how full your bins and skips are before uplift, then you can consider using smaller bins and less frequent uplifts, or baling/compacting waste or stacking to reduce void space as much as possible before uplift.</li> </ul>
Supply chain	<ul style="list-style-type: none"> <li>• Work with suppliers to reduce secondary packaging – there could be a win-win and cost saving for both parties.</li> <li>• Work with suppliers to set up a return system for packaging.</li> <li>• Require suppliers to reduce waste or wasteful practices on your site.</li> <li>• Require contractors to comply with your environmental policy and waste minimisation programmes.</li> </ul>
Checking	<ul style="list-style-type: none"> <li>• Have a system in place to check waste programmes are working. This can be as simple as a walk-round at the end of a shift, looking in bins and highlighting errors and good practice to the responsible person (e.g. Shift Manager).</li> <li>• Consider a trial using clear bin-liners so that the contents can be easily checked.</li> <li>• Record results and consider publishing a league table of good performers!</li> </ul>



# 4.0 Waste Legislation

4.0	Legislation . . . . .	32
4.1	The Duty of Care . . . . .	32
4.2	Hazardous Waste . . . . .	34
4.3	Waste which must be separately collected . . . . .	34
4.4	Carriage of Dangerous Goods . . . . .	35
4.5	Liquid Waste . . . . .	35

## 4. Waste Legislation

Legally it is a requirement for all businesses to comply with the 'duty of care' for waste. In Northern Ireland duty of care is a requirement under Article 5 of the Waste and Contaminated Land (Northern Ireland) Order 1997. It applies to all controlled waste, which consists of commercial, industrial and household wastes, including hazardous waste. This means your business has a duty to ensure that any waste it produces is handled in a safe manner in accordance with law.

You have responsibility until the waste has been properly disposed of or fully recovered. If you do not comply with the duty of care, and your waste is disposed of illegally, this is a criminal offence and you could be held responsible. Convictions can result in fines.

### 4.1 The Duty of Care

The four principal aims of the duty of care are as follows:

Duty of Care Aims	Practical Guidance
<p>1. To prevent the deposit, disposal or recovery of waste without a licence, contrary to the conditions of a licence or in a manner likely to cause environmental pollution or harm to health</p>	<p>You must check that the person handling your waste is authorised to take it and has an appropriate licence, registered with the Northern Ireland Environment Agency (NIEA), as evidence. Under The Controlled Waste (Registration of Carriers and Seizure of Vehicles) Regulations (Northern Ireland) 1999 waste must only be uplifted by a registered waste carrier who therefore possesses a Waste Carriers Licence.</p> <p>It is also an offence under The Waste Management Licensing Regulations (Northern Ireland) 2003 to carry out activities including recycling, baling, composting or dismantling waste materials without an appropriate permit, Waste Management Licence or registered exemption.</p> <p>Public registers of licence holders are available to check on the NIEA website.</p> <p>Waste Carriers Database:  <a href="http://www.doeni.gov.uk/niea/waste-home/public_reg/reg-waste-carrier-transporter/carriers.htm">http://www.doeni.gov.uk/niea/waste-home/public_reg/reg-waste-carrier-transporter/carriers.htm</a></p> <p>Waste Management Licences Database:  <a href="http://www.doeni.gov.uk/niea/waste-home/public_reg/waste-management-licensing/licensed.htm">http://www.doeni.gov.uk/niea/waste-home/public_reg/waste-management-licensing/licensed.htm</a></p> <p>Information on exemptions for activities you may perform, such as baling, along with application forms are available at:  <a href="http://www.doeni.gov.uk/niea/waste-home/public_reg/waste-management-licensing.htm">http://www.doeni.gov.uk/niea/waste-home/public_reg/waste-management-licensing.htm</a></p>
<p>2. To contain waste and prevent its escape</p>	<p>Waste must always be stored securely during storage, transportation and management to ensure escape is prevented.</p> <p>Escape can occur by a number of means and can impact the environment and health. This may be as a result of accidental spillages or leaks, waste blowing away in the wind, waste falling while stored or transported, odour emissions through incorrect storage provisions and the scavenging of waste by animals or humans.</p> <p>For example – storage of waste oils:</p> <ul style="list-style-type: none"> <li>• The container should be fit for purpose – be in good condition, of a sufficient strength and integrity and have a tightly fitted lid.</li> <li>• Waste oil drums should be stored on a bund to contain any leakage. A bund is a secondary containment system. To function properly as an interim containment of spills, the bund must be kept empty and in good condition (i.e. not full of rainwater!).</li> <li>• The bund should have a capacity of at least 110% of the maximum container contents, or 25% of the contents of the total (whichever is the greater).</li> </ul>
<p>3. To ensure that waste is transferred only to authorised persons</p>	<p>Waste may be handed on only to authorised persons, those that are licensed, whether this be a waste carrier, who may or may not be the waste manager, a holder, broker or dealer.</p> <p>It is important for a business producing waste to be aware of the following waste chain, and that evidence of authorisation is available for every step.</p> <p>Charities and similar businesses who handle recycling will either be licensed or have a letter of exemption from NIEA.</p>

Duty of Care Aims	Practical Guidance
<p>4. To ensure all waste is transferred with correct documentation</p>	<p>A transfer note must be completed, signed and kept by the parties involved if waste is transferred. This is a requirement of The Controlled Waste (Duty of Care) Regulations (Northern Ireland) 2002.</p> <p>Waste Transfer Notes (WTNs) should be retained for a minimum of two years.</p> <p>WTNs should include the following specifics:</p> <ul style="list-style-type: none"> <li>• An adequate description of the waste;</li> <li>• The quantity of waste transferred (the weight where available);</li> <li>• If in a container, the kind of container e.g. a 40 cubic yard skip;</li> <li>• Location of uplift;</li> <li>• Date and time of the uplift;</li> <li>• If you are using a season ticket the period for which it is valid;</li> <li>• The appropriate code from the European Waste Catalogue (EWC);</li> <li>• A declaration that the duty to comply with the waste hierarchy has been fulfilled;</li> <li>• Names and addresses of the transferor (the person currently in control of the waste) and the transferee (usually either a registered waste carrier or a waste management licence holder (waste manager));</li> <li>• The Standard Industry Classification (SIC) code of the business where the waste was produced;</li> </ul> <p>Signatures of both the transferor and transferee (electronic signatures are acceptable).</p> <p>Where hazardous waste is transferred, a consignment note should also be completed. The Hazardous Waste Regulations (Northern Ireland) 2005 state that a consignee must send a completed copy of each consignment note to the NIEA 'forthwith'. They are also required to send the producer/holder/consignor of the waste a completed copy of the consignment note within 30 days of accepting the waste.</p> <p>Consignment notes should be retained for a minimum of three years.</p> <p>For further guidance on WTNs visit the nibusinessinfo website:  <a href="http://www.nibusinessinfo.co.uk/content/complete-waste-transfer-notes">http://www.nibusinessinfo.co.uk/content/complete-waste-transfer-notes</a></p> <p>For further guidance on duty of care and your obligations see:  <a href="http://www.doeni.gov.uk/niea/waste_management_the_duty_of_care_-_a_code_of_practice.pdf">http://www.doeni.gov.uk/niea/waste_management_the_duty_of_care_-_a_code_of_practice.pdf</a></p> <p>Checking Waste Carriers are authorised... A Public Register of information is available at  <a href="http://www.doeni.gov.uk/niea/waste-home/public_reg/reg-waste-carrier-transporter/carriers.htm">http://www.doeni.gov.uk/niea/waste-home/public_reg/reg-waste-carrier-transporter/carriers.htm</a></p>

### 4.2 Hazardous Waste

It is important to be aware that some waste will be hazardous, i.e. harmful to the environment or to human health, and these should be identified and dealt with in an appropriate manner. Most businesses will produce small amounts of hazardous waste.

Examples of hazardous waste include lead acid batteries, some waste electrical and electronic equipment (WEEE) such as cathode ray tubes and flat-screens containing mercury bulbs, fluorescent tubes, solvent-containing paints and inks, oils, oily rags and spent liquid chemicals. Certain types of animal by-product waste may also be classified as hazardous under three categories: Category 1 is the highest hazard (such as connective tissue) and Category 3 is the lowest hazard (e.g. bones).



Lead-Acid Batteries



WEEE



Mineral Oil

Waste classified as hazardous on the basis of the List of Wastes Regulations (Northern Ireland) 2005. Guidance is available on the identification of hazardous waste from NIEA:

[http://www.doeni.gov.uk/niea/classification\\_of\\_hazardous\\_waste\\_17.6.2011.pdf](http://www.doeni.gov.uk/niea/classification_of_hazardous_waste_17.6.2011.pdf)

[http://www.doeni.gov.uk/niea/wm2\\_appendixa2005.pdf](http://www.doeni.gov.uk/niea/wm2_appendixa2005.pdf)

The Hazardous Waste Regulations (Northern Ireland) 2005 sets out requirements for those that produce or deal with hazardous waste. Hazardous wastes must be segregated from the general waste stream for separate collection by a licensed contractor, and the duty of care still applies. There are also separate requirements for explosives covered by the Explosives Act 1875; and most radioactive waste.

### 4.3 Waste which must be separately collected

Some waste streams must be separately collected for separate treatment and must not be disposed of to landfill. In practice, this means they must not be mixed with general waste or recycling waste and must be sent for separate treatment.

Some waste which must be separately collected may have hazardous properties; however, not all of these waste streams are hazardous (e.g. alkaline batteries are not considered hazardous whereas lead-acid batteries are considered hazardous waste).

WEEE must be separately collected and is identified on most equipment with the 'crossed out wheelie bin' symbol:



Batteries



WEEE

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#### 4.4

##### **Carriage of Dangerous Goods**

Some hazardous wastes will be classed as dangerous goods and will therefore require special transport arrangements under the Carriage of Dangerous Goods & Use of Transportable Pressure Equipment Regulations 2009. Requirements include specially trained drivers, specific labelling of goods and specific equipment.

#### 4.5

##### **Liquid Waste**

Liquid waste to landfill is banned. Typical liquid wastes arising from businesses include edible cooking oil waste (non-hazardous but must be separately collected), mineral oil waste and spent chemicals (both hazardous). As for solid waste, liquid waste should be stored to prevent escape and pollution of the environment. The duty of care still applies.

Businesses producing trade effluent (i.e. a wastewater from an industrial process) can dispose of this to sewer if licensed to do so with the appropriate body (e.g. NI Water), and within the conditions of the permit or licence. Domestic sewerage does not require a permit for discharge into a sewer. For more information on reducing water use please refer to the Invest NI 'Water Efficiency Guide'.



# 5.0 Signposting Data

5.0	Signposting Data .....	37
5.1	Invest NI Sustainable Development Team .....	37
5.2	Other Sources .....	37

## 5. Signposting Data

The following signposting data is provided to identify key sources of information on waste-related matters relevant to businesses in Northern Ireland:

### 5.1

#### Invest NI Sustainable Development Team

Invest NI is committed to supporting your business performance through waste minimisation. This does not only include compliance with legislation, but also good practice techniques including on-site waste management, communications with your workforce and contractors, training and equipment or technologies.

Please do not hesitate to contact us if we can be of further assistance to support your company to become more resource efficient.

#### Invest Northern Ireland - Sustainable Development Team

**Telephone: 028 9069 8868**

**Email: [sustainabledev@investni.com](mailto:sustainabledev@investni.com)**

Invest NI offers the following support to businesses in Northern Ireland:

- Impartial advice and information is delivered by Technical Advisors (Invest NI and external) and also through the Invest NI website ([www.investni.com](http://www.investni.com)) and the nibusinessinfo portal [www.nibusinessinfo.co.uk](http://www.nibusinessinfo.co.uk), Invest NI can provide tailored support to qualifying businesses to assess and reduce energy, water and materials costs.
- Invest NI provides a wide portfolio of support for Northern Ireland businesses with a total annual expenditure of more than £30,000 on water, energy, waste and raw materials. The aim of this support is to improve the competitiveness, productivity and sustainability of local businesses through identification and achievement of cost savings in the consumption of water, energy and raw materials.
- A free audit can identify and prioritise projects to reduce the cost of water, energy, waste or materials in qualifying companies. These companies can also access up to 5 days of further free technical consultancy to help them take forward projects that will realise cost savings in a timely and cost-effective way.
- This technical support can address a wide range of questions to help firms to progress suitable projects to the point of implementation and can include, for example: identification of waste reduction opportunities; minimising product losses; reviewing packaging requirements or use; environmental or energy management systems; equipment

specification and identification of suppliers of more efficient equipment.

- Invest NI also provides 'industrial symbiosis' services which generate opportunities to identify and match excess resource in one business – like waste, transport, storage, skills, production capacity or energy – with another where it could be profitably used. Industrial symbiosis activities include business workshops to identify potential matches between business participants along with follow-up visits and engagements with individual businesses to progress matches.
- Finance from Invest NI to help companies install new equipment is also available. Invest NI will periodically open calls for applications for Capital Grants of up to £40,000 to support those small and medium-size businesses already being supported by Invest NI to purchase/install new equipment to reduce their water and materials costs. Interest-free energy efficiency loans of between £3,000 and £400,000 are available through Carbon Trust. The size of the loan available will depend on the energy saving potential of any particular project – please see: [www.carbontrust.com/client-services/northern-ireland](http://www.carbontrust.com/client-services/northern-ireland)
- Under the current EU rules an upper threshold of €200,000 of aid can be provided to any business in a rolling three-year period. For further information see Commission Regulation (EC) number 1998/2006 of 15 December 2006 or visit the EU Europa website [www.europa.eu](http://www.europa.eu).

### 5.2

#### Other Sources

Source	Description
<a href="http://www.investni.com">www.investni.com</a>	Provides information on the Invest NI Sustainable Development services.
<a href="http://www.netregs.org.uk">www.netregs.org.uk</a>	Provides information on waste legislation.
<a href="http://www.nibusinessinfo.co.uk">www.nibusinessinfo.co.uk</a>	Provides information on waste minimisation.
<a href="http://www.wrap.org.uk">www.wrap.org.uk</a>	Provides information on waste and resource efficiency and access to a wide range of case studies.

For further support on waste minimisation and resource efficiency, there are a number of business support tools currently available (at time of publication), including information available to all businesses:

Website-based information – good practice guides and case studies see [www.investni.com](http://www.investni.com).

Training seminars and events are held locally throughout Northern Ireland by Invest NI's Sustainable Development Team.

Other training sources are available through private consultancies and training bodies. Some training may be part or fully funded:

- Training programmes (through local government bodies such as councils);
- Training courses through private or academic providers;
- Consultancy advice and assistance.

# Appendices

Appendix A: Waste Action Plan - Summary Template .....40

Appendix B: Waste Action Plan - Improvement Action Business Case Template.....41

**Appendix A:**

Waste Minimisation Efficiency Action Plan – Summary Template

Improvement Action Number, Title & Responsibility	Estimated Annual Saving			Implementation Cost £	Payback Period Years
	£	tCO2e	Environmental		
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
TOTAL			Tonnes (materials) Tonnes (waste) Tonnes (recycling)		



**Appendix B:**

Waste Minimisation Efficiency Action Plan – Improvement Action Business Case Template

Improvement Action No: \_\_\_\_\_ Title: \_\_\_\_\_

Estimated Annual Saving			Implementation Cost £	Payback Period
£	tCO2e	Environmental		
		Tonnes materials saved Tonnes waste eliminated		
Description				
Rationale (including expected outcome – savings etc)				
Project Risks				
Next Steps				
Responsibility				







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If you require this brochure in an alternative format (including Braille, disk, audio cassette or in minority languages to meet the needs of those whose first language is not English) then please contact:

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T : 028 9069 8273

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