

8.

**WASTE AND
RESOURCE
EFFICIENCY**



8. Waste and resource efficiency

8.1 Introduction

8.1.1 This chapter addresses greenhouse gas emissions arising from waste produced and landfilled in Scotland. When organic materials break down in landfill sites they produce potent greenhouse gases, mainly methane, which is approximately 25 times more potent than carbon dioxide. Over 92% of territorial emissions in the waste sector arise from landfill.

8.1.2 The chapter also discusses wider actions to help lower global greenhouse gas emissions through our work to reduce Scotland's dependency on primary resources.

8.2 Our ambitions for decarbonising waste

8.2.1 We published our **Zero Waste Plan** in 2010, setting out our vision for a zero waste society; a society where waste is a valuable resource, landfill is phased out, and increasing amounts of materials are reused or recycled, leaving only limited amounts to be treated.²⁴¹ This is complemented by actions to progressively design out avoidable waste from our economy.

8.2.2 The Zero Waste Plan sets waste management targets including:

- the proportion of household waste subsequently recycled, composted and or prepared for re-use. The targets are 40% by 2010, 50% by 2013, 60% by 2020 and 70% by 2025;
- recycling 70% of all waste (including commercial and industrial waste) by 2025; and
- reducing the proportion of total waste sent to landfill to a maximum of 5% of all waste by 2025.

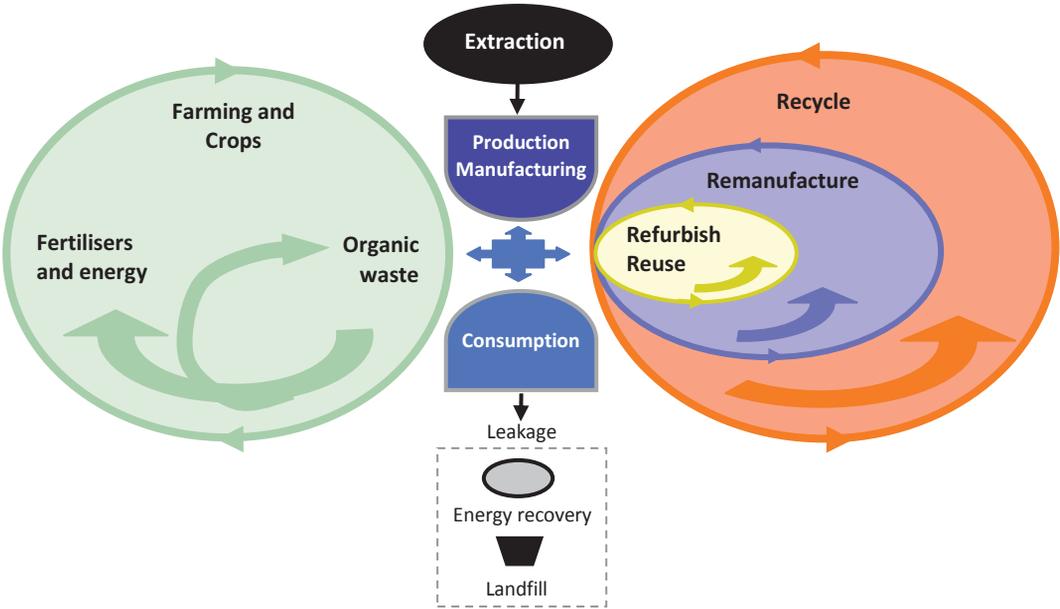
²⁴¹Scottish Government, Zero Waste Plan: www.scotland.gov.uk/Publications/2010/06/08092645/0

8.2.3 To deliver on the Zero Waste Plan’s commitment to develop a waste prevention programme, we have consulted on Safeguarding Scotland’s Resources – a programme for the sustainable use of our materials.²⁴² This proposes ambitious targets to cut Scotland’s total waste from households and businesses by 5% by 2015 and by 15% by 2025, through measures covering:

- working with key business sectors to cut waste and use energy and materials more efficiently – delivering environmental benefits and improving competitiveness;
- promoting reuse through improving supply as well as demand for reused items, including strengthening the reuse sector; and
- influencing behaviours, including through education and communications such as last year’s food waste prevention campaign.

8.2.4 By 2050, we aim to achieve full recycling of our waste; landfill will no longer be necessary, and waste as we know it will have been designed out of our economy and way of life. Scottish companies will not only be reprocessing recycled materials for new products, they will be at the forefront of changes to manufacturing and retail that will have transformed how goods and services are provided to the public (Figure 8.1).

Figure 8.1: Zero Waste - a more circular model of resource use



²⁴² Scottish Government, Safeguarding Scotland’s Resources: <http://www.scotland.gov.uk/Topics/Environment/waste-and-pollution/Waste-1/latest/ssrsea>

8.3 Where we are now

8.3.1 In 1999, Scotland produced 14.6 million tonnes of waste, with around 10.9 million tonnes going to landfill and less than 5% recycled. Today our recycling rate is over 40% and we have reduced the total amount of waste sent to landfill by 58% i.e. 6.3 million tonnes (2010-11).

8.3.2 In 1990, Scottish emissions from waste management were 6.7 MtCO₂e. In 2011, waste contributed 2.2 MtCO₂e or 4% of total Scottish emissions.²⁴³ The combined effect of reduced waste to landfill and action to mitigate or capture landfill gases means waste management emissions have fallen by 67% since 1990.

8.4 Decarbonisation policies

8.4.1 **Landfill gas** is the main waste related contributor to our territorial greenhouse gas emissions. In 2012, the Scottish Parliament passed the **Waste (Scotland) Regulations 2012**.²⁴⁴ These regulations introduced measures to transform how waste and recyclables are processed in Scotland. Specific measures introduced by the regulations include:

- a requirement for businesses to present dry recyclables (metals, plastics, paper, card and glass) and food waste for collection;
- a requirement on local authorities to provide householders with a collection service for dry recyclables and food waste;
- a ban on materials collected separately for recycling going to landfill or incineration; and
- introducing a ban on biodegradable municipal waste going to landfill by the end of 2020.

8.4.2 These regulations – coupled with waste prevention measures in our forthcoming Safeguarding Scotland's Resources programme - will progressively change both the **amount** and **composition** of waste going to landfill. The combined effect of these regulations will be to reduce annual emissions from landfill by 214 ktCO₂e in 2027.

²⁴³ Scottish Greenhouse Gas Emissions 2011: www.scotland.gov.uk/Publications/2013/06/1558

²⁴⁴ The Waste (Scotland) Regulations 2012: www.legislation.gov.uk/ssi/2012/148/contents/made

Using waste to generate energy and reduce emissions

8.4.3 Waste has the potential to be a considerable source of energy. For instance, if all of the estimated two million tonnes of annual food waste in Scotland was used in anaerobic digestion, it could generate enough electricity to power a city the size of Dundee, while also producing fertilisers to meet 10% of our arable farming needs.

Global pressures on resources

By 2050, we will share our planet with **two billion more citizens**. Furthermore, estimates indicate that three billion new wealthier consumers will enter the global market by 2030. Business and global economies may thrive on providing for these new demands, but they will place further strains on natural resources. Demographic and consumer trends are already heightening global competition for a range of resources. Prices of food, non-food agricultural items, metals, and energy are at a higher level than at any time in the past century. These trends are already affecting businesses.

In a recent survey²⁴⁵ over 80% of chief executives of manufacturing companies said that raw materials shortage was a risk to their business in 2012. While we expect these pressures to lead businesses to look much harder at their processes to reduce reliance on materials, we are working to insulate our economy from such resource pressures and to take advantage of the economic opportunities they will bring.

8.5 Decarbonising proposal

8.5.1 We are examining opportunities for **capturing gas** from closed or inactive landfill sites. Methane capture can be economically viable and incentives, such as the **renewable obligation certificates**²⁴⁶, already provide financial support to landfill operators. However, once landfill sites close the capture rates are generally too small to make investment in gas capture infrastructure viable.

²⁴⁵ EEF: The Manufacturers' Organisation (2012) Executive Survey 2012.

²⁴⁶ Renewables Obligations: www.scotland.gov.uk/Topics/Business-Industry/Energy/Obligation-12-13

8.5.2 Through Zero Waste Scotland,²⁴⁷ we are mapping out opportunities for enhanced gas capture across Scotland. The final report will provide the basis from which to make the future policy decisions required to achieve the abatement potential.

Energy from waste

In 2010, the Sustainable Development Commission reported that energy from waste could contribute around 3% of Scotland's total heat and electricity demand.²⁴⁸ The study focused on the use of combustion and anaerobic digestion with biogas capture and the main technologies that could contribute to these outputs. It emphasised that the greatest output could be achieved if thermal output is used for heat, as this would be more than 80% efficient. Thermal-only output could equate to around 6% of Scotland's existing heat demand.

These opportunities need to be set against the Scottish Government's policy of continually reducing Scotland's residual waste and minimising the need for residual waste treatment through increased rates of recycling and reuse, and waste prevention.

8.6 Supporting and enabling measures

8.6.1 The Zero Waste Plan is an economic strategy: it aims to maximise the value of all the material resources we use in our economy, helping to create new business opportunities as well as helping businesses and local authorities find savings in how they use materials and manage their waste.

8.6.2 At the heart of these changes is a shift toward a more circular model of resource use and economic growth that ultimately designs waste out of our economy (Figure 8.1). This isn't simply about using less and recycling more. It's about supporting new forms of manufacturing, redesigning products and packaging, reshaping supply chains and stimulating innovative new ways to transform recyclables into new, higher value materials. The opportunities stretch across all sectors, from the motor industry to the oil industry through to retail and farming.

²⁴⁷ Zero Waste Scotland: www.zerowastescotland.org.uk

²⁴⁸ Sustainable Development Commission. Energy from Waste Potential in Scotland, 2010: www.scotland.gov.uk/Resource/Doc/311011/0098129.pdf

Behaviour change

8.6.3 Section 3.5, earlier in this document, discusses the important role of understanding and influencing behaviour in meeting our climate change targets. The required shift in how materials are used in our economy needs a behavioural step-change on valuable items often discarded as waste. A key element of our national engagement is through our Greener Scotland campaign which aims to motivate collective action to help make Scotland a cleaner, greener place.²⁴⁹ A recent focus of this campaign has been preventing food waste and future campaign work will focus on recycling Scotland's food waste.

Changeworks Recycling's Business Recycling Services - Our Dynamic Earth

Changeworks Recycling carries out free and bespoke waste audits for all clients to enable them to engage with the waste they produce. An audit carried out for Dynamic Earth enabled it to focus in on a number of key waste reduction areas, and to understand how working practices could be changed to divert food waste from landfill.

To inspire staff, Changeworks arranged a visit to the Scottish Parliament to allow Our Dynamic Earth staff to see food waste recycling operations. This provided Dynamic Earth with the knowledge and techniques to embed new waste reduction techniques, resulting in a 300% increase in food waste recycling.

Market development

8.6.4 Through Zero Waste Scotland and the enterprise agencies we are working to encourage investment in new forms of infrastructure to increase 'closed-loop' recycling of materials and to support increased reuse or repair of products. This includes:

- investing £6 million in Scotland's anaerobic digestion capacity;
- supporting the development of new plastics reprocessing infrastructure through loan and capital grant funds;
- developing the evidence base for reprocessing of materials including nappies, end of life vehicles and tyres; and
- providing funds to support innovation and investment in leading edge technologies.

²⁴⁹ Greener Scotland: www.greenerScotland.org/

Resource efficiency

8.6.5 Using materials more efficiently and preventing waste is fundamental to addressing carbon impacts. Established in April 2013, the Resource Efficient Scotland programme provides a more accessible, integrated energy and resource efficiency service for business and public bodies.²⁵⁰ This holistic approach to low carbon transition aims to help more organisations to reduce their emissions, save money and increase their competitiveness. The programme will focus on implementation to maximise the carbon and financial benefits of resource efficiency actions.

Waste and global carbon emissions

8.6.6 In 2011, we introduced a world leading carbon tool for measuring benefits of recycling over landfill.²⁵¹ The tool not only looks at the avoided methane emissions from landfill, it assesses the “life-cycle” carbon emissions created from the production and consumption of materials. It calculates the carbon saved through recycling of the materials rather than using new, raw materials. The tool is currently being updated to allow us to examine the global carbon benefits of all actions taken in Scotland to recycle, reuse or prevent waste.

Supporting innovation through public procurement

By creating new markets for sustainable products and services, public procurement can play a critical role in attracting investment in new infrastructure and the creation of new supply chains for sustainable products and services.

One example would be refurbished IT and telecommunication equipment. If sections of the public sector were committed to purchasing a fixed proportion of refurbished IT and telecommunication equipment, it could help stimulate investment in new or existing sophisticated refurbishment facilities to supply the new demand for these products in Scotland, creating new jobs and growth of an important manufacturing base. For the public sector, such investment could help create a stable supply chain of low carbon and resource efficient goods. The Scottish Government’s Procurement reform work includes a series of proposals on the smarter use of public procurement to encourage innovation and growth.

²⁵⁰ See subsection 6.6 for further detail on Resource Efficient Scotland.

²⁵¹ Zero Waste Scotland, Carbon Metric: www.zerowastescotland.org.uk/carbonmetric

8.7 Costs and benefits

8.7.1 The overall cost of managing the implementation of the Zero Waste plan and the Waste (Scotland) Regulations 2012 will be significantly lower than the current cost of dealing with Scotland's waste. There is a net financial saving of the order of £17 million per year, with savings increasing to over £21 million by 2025. This amounts to a total saving of £173 million in net present value terms over the period 2013-2025.

8.7.2 Environmental benefits are estimated to be in the region of £1.4 billion (net present value) following full implementation of the Waste (Scotland) Regulations 2012. Most of these environmental benefits are attributed to reduced global carbon emissions.

8.7.3 A recent UK study estimated around 2.3% of GDP could be saved through straightforward resource efficiency measures, using raw materials more efficiently and generating less waste.²⁵² In 2010, that would have translated into potential savings to the Scottish economy of in excess of £2.9 billion. Around half of the savings (£1.54 billion) would be made within businesses. The research also looked at longer-term best practice savings that could be achievable by 2050, giving an additional savings potential of around 5% of GDP - more than £6.3 billion on current figures.

²⁵² WRAP: Meeting the UK Climate Challenge: The contribution of resource efficiency:
[www.wrap.org.uk/sites/files/wrap/Final%20Report%20EVA128_SEI%20\(1\)%20JB%20SC%20JB3.pdf](http://www.wrap.org.uk/sites/files/wrap/Final%20Report%20EVA128_SEI%20(1)%20JB%20SC%20JB3.pdf)

Table 8.1: Highlights of progress since publication of RPP1

Waste and Resource Efficiency	Summary
<p>Policies</p> <p>Zero Waste Plan - Waste prevention plan</p> <p>Zero Waste Plan - Information and awareness programmes</p> <p>Zero Waste Plan - Drive recycling towards 70% for all waste by 2025</p> <p>Zero Waste Plan - Separate collection of key materials</p> <p>Zero Waste Plan - Expand recycling on the go facilities</p> <p>Zero Waste Plan - Introduce progressive landfill bans</p>	<p>In 2011, we consulted on Safeguarding Scotland's Resources- a plan to reduce the occurrence of waste even before the need to treat or manage it.</p> <p>In 2012, we established Resource Efficient Scotland - making it easier for businesses and public organisations to cut waste and use materials and energy more efficiently, improving productivity.</p> <p>In 2011, we implemented high profile campaigns to influence behaviours to prevent waste and boost recycling</p> <p>The recycling and composting rate for household waste has increased from less than 5% in 1999 to over 40% in 2011.</p> <p>Since 2011, 665,500 properties or 28% of total households, now receive a food waste collection service from their local authority. We expect 1.1 million households (46% of total households) to have access to a food waste collection service by the end of 2013.</p> <p>Three-fold increase in food waste processing capacity since 2008 with infrastructure able to process over 300,000 tonnes now on stream.</p> <p>In 2012, we introduced the Waste (Scotland) Regulations 2012 that phased in requirements for collection of food waste and dry recyclables - creating a step-change in the availability and quality of recycling services available to homes and businesses across Scotland.</p> <p>£850,000 invested through local authorities, land owners, and facilities managers in 2012-13 to install new recycling facilities in some of Scotland's busiest public places. The initiative was backed by best practice guidance.</p> <p>In 2012, we legislated to ban any metal, plastic, glass, paper, card and food collected separately for recycling from going to incineration or landfill; and to ban biodegradable municipal waste going to landfill from January 2021.</p>

Table 8.2: Summary of Waste and Resource Efficiency policies and proposals

Waste and Resource Efficiency	EU, UK or Scottish measure	Maximum abatement potential (KtCO ₂ e) in 2020	Maximum abatement potential (KtCO ₂ e) in 2027	Earliest start date
Policies				
Zero Waste Policies (pre May-2010)				
Policies in place prior to the zero waste plan include:				
<p>Waste Framework Directive</p> <p>EU Framework for the management of waste lays down a number of provisions covering a variety of areas, including the definition of waste, the waste hierarchy, and re-use & recycling targets.</p> <p>Landfill Directive</p> <p>This includes targets for reducing the amount of biodegradable municipal waste sent to landfill - of 75% of the 1995 baseline by 2010, 50% by 2013 and 35% by 2020.</p> <p>Landfill Tax</p> <p>A tax on active wastes in landfill rising on an £8 per year escalator rising to £80 per tonne by 2014-15.</p>	<p>EU</p> <p>EU</p> <p>UK</p>	<p>748</p>	<p>871</p>	<p><2010</p>
Zero Waste Plan				
<p>The Scottish waste policies in the RPP are all drawn from the Zero Waste Plan. The Zero Waste Plan is now the Scottish Government's overarching strategy for making the most efficient use of resources by minimising Scotland's demand on primary resources, and maximising the reuse, recycling and recovery of resources instead of treating them as waste.</p>	<p>Scottish</p>	<p>141</p>	<p>290</p>	<p>2010</p>

<p>For territorial carbon abatement, the key policy is a ban on biodegradable municipal waste going to landfill (from 1 January 2021), thus helping to substantially reduce harmful emissions of methane. This ban was introduced by the Waste (Scotland) regulation 2012.</p> <p>The regulations also place a requirement on businesses to present food waste for collection, and a requirement on local authorities to provide householders with a collection service for food waste. The abatement from this action is incorporated in the figures above.</p> <p>Accompanying policies that will contribute either assist in deliver these policies and or reduce carbon emissions outside of the UK include:</p> <ul style="list-style-type: none"> • Working with food retailers and brands through the Courtauld Commitment to meet stretching targets to reduce packaging and food waste. • National campaigns to influence public behaviours to recycle more and waste less - supported by local roadshows in partnership with LAs and retailers. ▪ Creation of the Resource Efficient Scotland programme is making it easier for businesses and public organisations to cut waste and use materials and energy more efficiently, improving productivity. 			
Proposal			
<p>Enhanced Capture of Landfill Gas</p> <p>The Scottish Government is examining opportunities to capture methane emitted from closed or inactive landfill sites.</p>	<p>Scottish</p>	<p>163</p>	<p>140</p>
		<p>2013</p>	