Sustainable Development Commission Scotland

A Burning Issue

Energy from Waste in Scotland

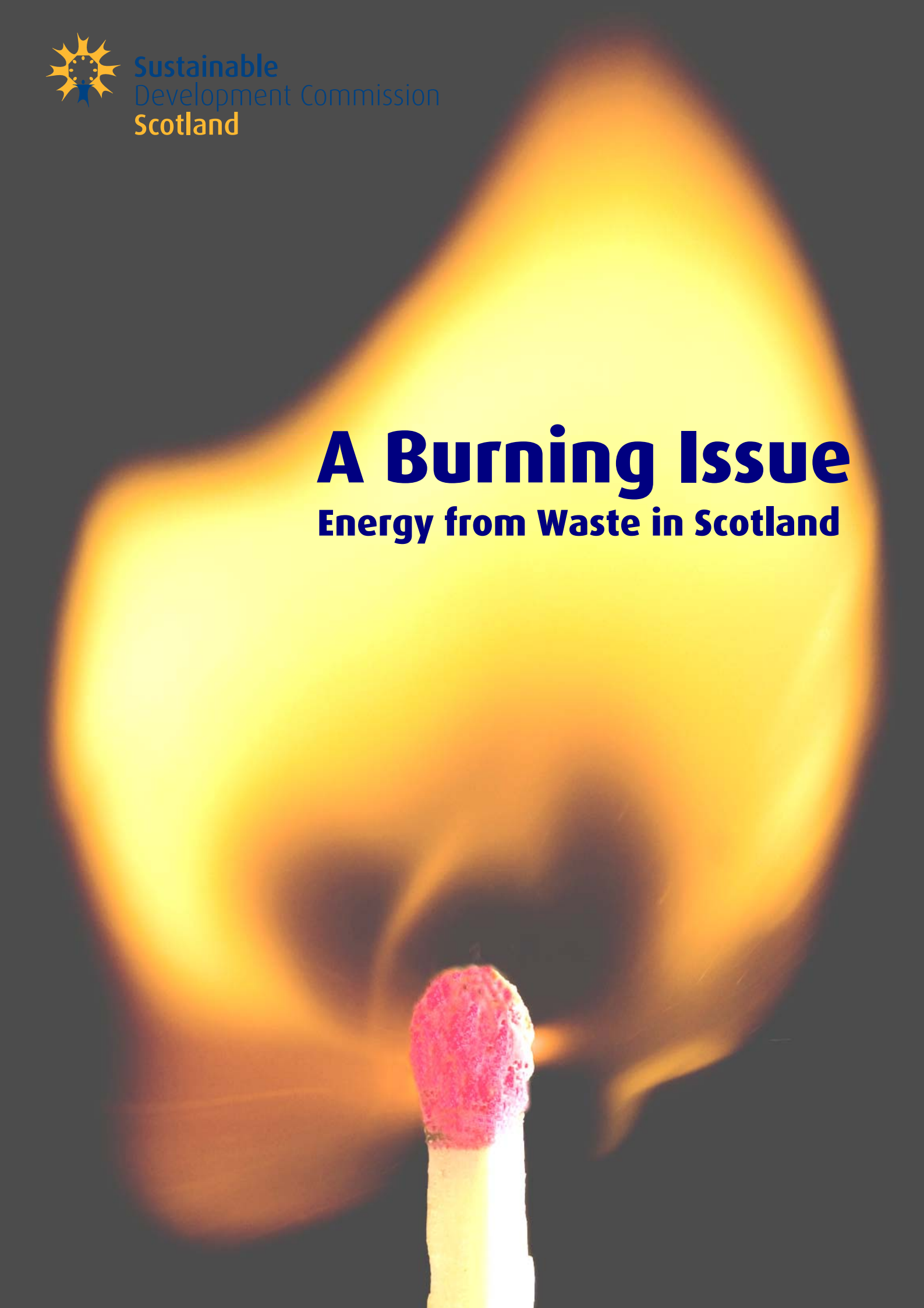


Table of Contents

1. Executive Summary

The Sustainable Development Commission Scotland has been asked to provide advice to the Scottish Government on waste policy and the role of energy from waste. In particular we have assessed how energy from waste fits with the principles of sustainable development.

Owing to the short timescale of our review, our report has concentrated on strategic policy issues. We have also sought to focus our attention and recommendations on energy from municipal waste. However, because of the integrated nature of waste management, and the need to consider how energy from waste fits with moves to create a zero waste society, our recommendations have also touched on other aspects of waste policy, including commercial waste, recycling, reuse and reduction schemes. However, our comments on these wider issues are not meant to be comprehensive.

Our recommendations are set out below. Here we set out our recommendations from our investigation, while in the Appendix we apply these conclusions to the direct questions asked of us by the Scottish Government.

Summary of Overall Conclusion and Recommendations

The overall conclusion of our review is that energy from waste may be, in the right circumstances, compatible with sustainable development and a move toward a Zero Waste society

We are of the clear view that further improvements can be made to recycling in Scotland, but are persuaded that recycling alone will not move Scotland away from landfilling of waste.

Experience from other parts of Europe highlights that strong performance in waste minimisation and recycling can go hand in hand with the use of energy from waste, and countries using energy from waste have been able to make significantly more progress on diverting waste from landfill.

Overall, we see that it is realistic for the Scottish Government to plan a limited role for energy from waste, provided that it is part of an integrated strategy for waste minimisation, improved re-use and recycling. We would therefore like to see clearer criteria in use to better guide the development of energy from waste plants in Scotland. Specifically we would like to see the following:

- No waste to be thermally treated unless separation of recyclables has first taken place
- Energy from waste systems need to be evaluated on their ability to reduce carbon emissions
- Energy from waste plants should recover energy to a minimum efficiency level of 60%
- Schemes should be developed in accordance with the proximity principle
- Discussion and planning about local infrastructure must only take place following proper engagement of local communities and stakeholders
- Operators must follow high standards of good practice in site management and work to establish good neighbour agreements
- The Renewables Obligation should continue to support advanced technologies and CHP only
- Schemes developed using PPPs or future alternatives should use clear output criteria so that schemes do not undermine wider policy.

Action is also needed to make improvements elsewhere in the waste management process to deliver greater resource efficiency *and* reduced dependence on energy from waste as a disposal option, while providing clearer sustainability benefits. Specifically:

- Government should revise the existing National Waste Plan, using this opportunity to assess setting increased post-2020 recycling targets, and waste minimisation targets that go beyond the existing waste stabilisation target
- Government needs to think more clearly about the role of planning, building regulations, energy and procurement policy in supporting sustainable waste management goals
- More action is taken on composting and anaerobic digestion to reduce levels of biological waste going to landfill
- More action is taken by the commercial and industrial sectors to reduce overall levels of waste being generated.

We believe that the Scottish Government's aspiration to move toward a Zero Waste society provides a good framework for deciding the best way forward. *If* waste policy is to accord with sustainable development, a number of conditions for the development and use of energy from waste must be met.

Our recommendations are as follows:

1. CURRENT PERFORMANCE

Strong positive delivery on recycling is welcome, but much more can be achieved

In the last four years Scotland has moved from poor to slightly below average performance in comparison to the rest of Europe. The fact that this has been delivered in a short timescale should be applauded and represents a significant policy achievement. Scotland is ahead on delivery of recycling targets, and we see no reason why future targets cannot also be met. It would certainly be possible to extend existing targets upwards beyond 2020. Government should review recycling targets as part of the introduction of an updated National Waste Plan.

To properly inform policy decisions and to track progress, there needs to be better information about Scotland's waste

We have been struck by how little monitoring of waste management is taking place across Scotland. This is particularly the case for commercial and industrial wastes. The Scottish Government, local authorities and the private sector need to have a better understanding of the materials in our waste and the relative proportions in order to make decisions on the basis of sound evidence.

In the longer term Councils need to see that waste minimisation is a core part of their conventional waste management responsibilities, not an additional activity. This must be backed up by Local Area Agreements

While some local authorities are making good progress on recycling, it is clear that others are finding this difficult and do not see recycling or activities further up the waste hierarchy as a core part of their waste management duties.

To date, much of the progress in recycling has been delivered because of funding through the Strategic Waste Fund. The roll out of Local Outcome Agreements (including the roll up of funding into the 2008-09 Settlement) provides an opportunity for local authorities to take on more direct responsibility for delivery of wider action on waste. It will be important that in the Local Area Agreements local government also commits to a framework on Zero Waste that goes above and beyond delivery of recycling targets but also covers waste minimisation.

2. COMMENTS ON ZERO WASTE

Current Waste Policy is driven primarily by landfill avoidance. Using the framework of achieving Zero Waste will allow the Government to shift its focus onto resource efficiency

Government has struggled to shift its attention from recycling to waste prevention. Without a change of focus to prevention, many stakeholders will not have confidence that energy from waste is being used as part of the solution, rather than instead of wider action.

The adoption of the framework of Zero Waste should give Government a clearer direction.

Government must look more closely at the role of business in delivering sustainable waste management

Policy action is focused on municipal waste, but households only generate 13% of Scotland's waste. Government should look more closely at what other policy interventions might be used to encourage further action by industry, including use of devolved powers to drive action on waste avoidance, and consideration of landfill bans to prevent the landfilling of materials that are easily recyclable.

Government should look more closely at construction and demolition waste which makes up 47% of all waste in Scotland. The Government should consider good practice in this area and seek to impose stricter minimum standards through planning consents for new construction, building regulations and building control.

Planning, economic development and energy policies need to be better integrated to facilitate the efficient recovery of energy from waste

There are clear limits to how Government can make waste policy more sustainable without also making changes in other areas of policy. A systems approach is needed if all issues are to be addressed coherently.

A Revised National Waste Plan is needed to refresh existing waste policy commitments.

This should include an Action Plan setting out clear milestones for recycling and waste minimisation in municipal and business wastes.

3. SPECIFIC COMMENTS ON ENERGY FROM WASTE

Only residual waste that has been subject to pre-treatment and recovery of easily recyclable materials should be deemed suitable for thermal treatment

One relevant concern often raised in the debate on energy from waste is how to fit plant alongside existing and increasing activity on recycling. As a bare minimum, thermal treatment should only come after recovery of recyclable materials.

Energy from waste systems should be evaluated on their ability to reduce carbon emissions from displaced fossil fuels and reduced landfill methane

Given the Scottish Government's commitments on Greenhouse Gas reductions and an expected Climate Change Bill in 2008-09 setting a target of emissions reductions of 80% by 2050, waste policy proposals must work to deliver a contribution to this target.

Assessments of energy from waste plant options need to incorporate the relative carbon savings of different plant scales and types. The greenhouse gas profile of schemes must be factored into decision-making on (a) funding support and (b) planning decisions.

With limited exceptions all energy from waste plants should recover energy to a minimum level of efficiency no less than 60%

We recommend that the Scottish Government sets minimum efficiency standards for new energy from waste plant (this criteria excludes Advanced Combustion Technologies such as anaerobic digestion). We would wish to see a minimum of 60% efficiency for new plant, which will encourage the development of schemes that can deliver clear resource efficiency benefits. This efficiency standard will favour the development of heat only and combined heat and power applications.

In developing energy from waste schemes, a presumption for appropriate scale schemes that accord with the proximity principle should be established

While we have not looked in any great detail at the current set of proposals for energy from waste plants in Scotland, we are concerned that if thermal treatment guidelines are not followed properly, there is a risk that future schemes will be centralised, electricity only plants.

Any energy from waste plants must develop Good Neighbour Agreements to ensure that local communities have an opportunity to raise concerns about the working of a plant

Communities around energy from waste plants can have concerns about vehicle movements, smells, noise and emissions from the plant. Good Neighbour Agreements or Charters can help ensure that these issues can be resolved. Plants should also ensure that data on performance and emissions are easily available to the general public to demonstrate compliance with existing emissions criteria set by SEPA and the EU Waste Incineration Directive.

Engagement with local communities and stakeholders must take place as part of the discussion and planning for waste management infrastructure, scheme locations and types

Without active involvement and support from local communities, energy from waste will remain a controversial policy choice. However, good practice demonstrates that engagement is a powerful tool in involving people in discussions about how a local area takes responsibility for waste management.

The Renewables Obligation (Scotland) should remain focused on supporting combined heat and power and advanced treatment technologies

The Renewables Obligation already encourages the use of CHP and advanced technologies such as anaerobic digestion. An expected review of these provisions needs to ensure that the current position remains in place so that support is only given to CHP and other advanced forms of treatment.

We are concerned that Public Private Partnerships need to use clear criteria in contracts and tenders to ensure delivery of energy from waste infrastructure fits with wider waste policy objectives

If PPPs are to be used, then clear criteria based on the desired outcomes set out in waste policy should be used to ensure that schemes can work within (rather than undermine) wider action on minimisation and recycling.

In developing alternative funding options such as the proposed Scottish Futures Trust, clear criteria must also be used for investments in waste infrastructure.

2

Introduction

In August 2007 the Scottish Government sought the advice of the Sustainable Development Commission Scotland (SDC) on the issue of future waste policy, looking in particular at options for energy from waste, and if or how such an approach could be compatible with sustainable development criteria and the new administration's commitment to move toward a Zero Waste society.

The SDC is the Government's[1] independent advisory body for sustainable development. The SDC reports to the Prime Minister and First Ministers of Scotland and Wales, and the First Minister and Deputy First Minister in Northern Ireland. Established in 2000, the SDC is chaired by Jonathon Porritt and comprises 19 Commissioners supported by a 50 strong Secretariat. Our Scottish team is based in Edinburgh.

In particular the Scottish Government posed four questions:

1. How much impact do you think that waste prevention measures could make in reducing and reversing the growth in municipal waste over the period up to 2020?
2. What level of recycling and composting of municipal waste from kerbside collections/ recycling points and centres do you think is feasible in Scotland in the short term (say 2010) and for the further target years 2013 and 2020?
3. Should thermal treatment to generate energy from waste play a part in our thinking and, if so, what level of contribution do you think is appropriate given the commitment to the waste hierarchy and the priority attached to waste prevention and recycling and composting in that hierarchy?
4. If you consider that thermal treatment is not consistent with sustainable development in Scotland, what alternative measures should we be considering to eliminate the gap between our landfill diversion targets and the realistic contribution that can be made by waste prevention and recycling and composting?

Methodology

The SDC has sought to focus on how the Scottish Government might approach energy from waste in the context of the principles of sustainable development. In helping us to review this issue we have met with a number of stakeholders and also reviewed key documents from the Scottish Government and other bodies, including the September 2007 Audit Scotland report *Sustainable Waste Management in Scotland*[2]. We also attended the Scottish Government's October 2007 Waste Summit as an observer and took note of the different views and positions outlined by participants. Finally, we also visited the Shetland Waste to Energy Plant and associated district heating scheme and the Dundee Energy Recycling Ltd Plant to review the direct experiences of those working in existing energy from waste plant around Scotland.

Waste and Sustainable Development

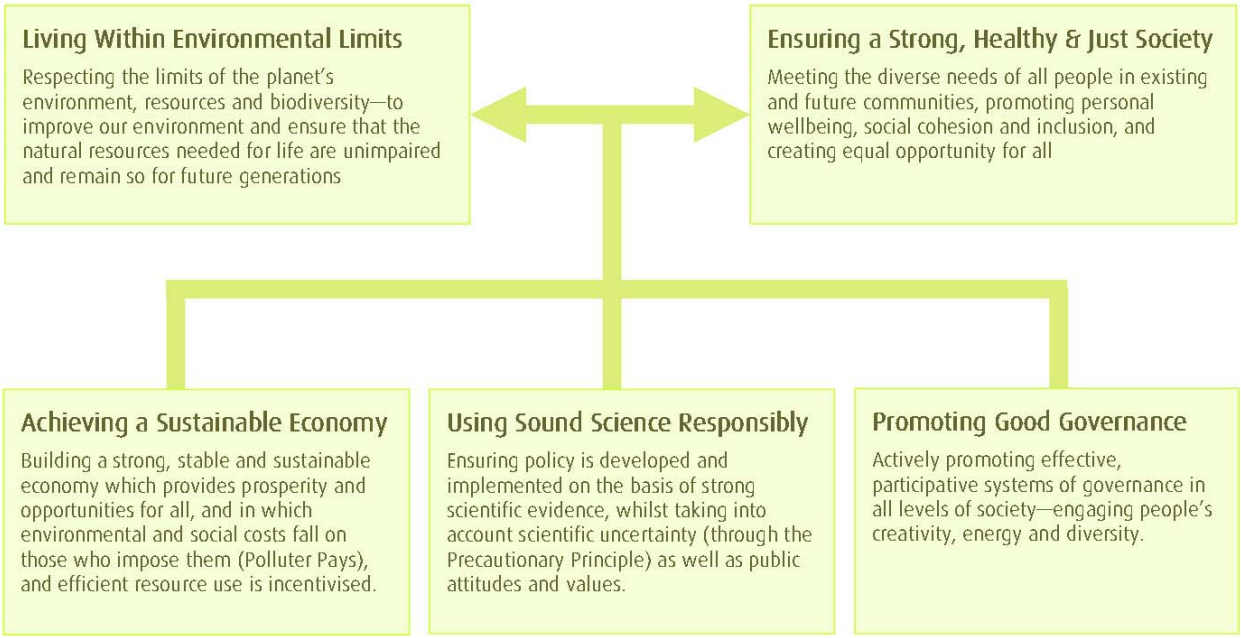
The SDC and Government have agreed a common approach to assessing whether or not policy delivery is sustainable - these are the five principles of sustainable development (see Figure 1 below).

The principles are outlined in the UK Framework for Sustainable Development - *One Future, Different Paths*[3] agreed by the Prime Ministers and First Ministers across the UK. Following on from *One Future, Different Paths*, these principles have been adopted by the Scottish Government in *Choosing Our Future*[4], Scotland's sustainable development strategy.

The goal of sustainable development is to enable all people throughout the world to satisfy their basic needs and enjoy a better quality of life without compromising the quality of life of future generations.

For the Scottish Government that goal will be pursued in an integrated way through a sustainable, innovative and productive economy that delivers high levels of employment, and a just society that promotes social inclusion, sustainable communities and personal well-being. This will be done in ways that protect and enhance the physical and natural environment, and use resources and energy as efficiently as possible.

Figure 1: The Five Principles of Sustainable Development



Government must promote a clear understanding of, and commitment to, sustainable development so that all people can contribute to the overall goal through their individual decisions.

Scottish Government Priorities

The new Government's priorities are cognate to the principles of sustainable development. The purpose of Government is "to focus the Government and public services on creating a more successful country, with opportunities for all of Scotland to flourish, through increasing sustainable economic growth."[5] Government has set out five Strategic Objectives, and action on sustainable development is being led through the Greener Objective. Waste policy relates to this Objective but will have impacts on each of the other four, and in particular the Wealthier & Fairer objective. The five Strategic Objectives are as follows:

- **Wealthier & Fairer** – Enable businesses and people to increase their wealth and more people to share fairly in that wealth
- **Safer & Stronger** – Help local communities to flourish, becoming stronger, with safer places to live, offering improved opportunities and a better quality of life
- **Smarter** – Expand opportunities for Scots to succeed, from nurture through to life-long learning, ensuring higher and more widely shared achievements
- **Healthier** – Help people to sustain and improve their health, especially in disadvantaged communities, ensuring better, local, and faster access to health care
- **Greener** – Improve Scotland's natural and built environment and the sustainable use and enjoyment of it.

The priorities of the Greener Objective are as follows:

- Climate change
- Consumption & production
- Sustainable places
- People & nature.

Waste policy can make a contribution to each of these objectives, but in particular the first two.

Our Report Structure

Following on from our Summary and Introduction (Chapters 1 and 2), Chapter 3 reviews the existing waste policy framework, looks at examples from abroad and then concludes with an assessment of the role of wider Government policy in supporting sustainable waste management.

Chapter 4 contains our analysis of current waste policy based on the five principles of sustainable development. We finish with our Conclusion in Chapter 5.

As part of our Review we have also compiled Case Studies of Zero Waste work in New Zealand and Australia, the Shetland Energy from Waste plant and associated District Heating Scheme and Anaerobic Digestion.

3

A Review of the Waste Policy Framework

Sustainable Development in Scotland: A review of progress

In *Sustainable Development in Scotland: A review of progress by the Scottish Executive*[6], the SDC reviewed progress since December 2005 on delivery of Choosing Our Future, Scotland's sustainable development strategy. This report was published in September 2007. As a part of this the SDC reviewed current progress on waste policy as highlighted by relevant indicators.

Our key findings on waste policy were as follows:

- There has been substantially increased investment in waste minimisation and prevention programmes over recent years by both the Executive and Local Authorities
- There has been good progress on household recycling. However, some stakeholders have expressed concern that the Executive is not releasing Strategic Waste Fund (SWF) monies quickly enough to allow local authorities to put in place the necessary infrastructure to meet the next round of more demanding targets
- Despite these positive steps, Scotland's overall production of waste continues to increase. Waste from the commercial sector is a particular concern[7]
- There is untapped potential for the enterprise networks to work with the waste industry to promote the creation of businesses and jobs in sustainable waste management, and thus to contribute to resource efficiency
- The commitment of the new Government that Scotland should aspire to be a zero waste economy is very welcome. The Sustainable Development Commission supports the intention to consult on new national standards for waste management.

Our Assessment confirmed that significant progress is being made on municipal waste recycling. Despite this, an appraisal of the broader picture revealed that overall trends on waste are still negative and that domestic waste arisings continue to grow. It should also be noted that municipal waste represents approximately three million (13.6%) of the 22 million tonnes of waste that Scotland produces each year and that far less progress has been made in addressing industrial and commercial waste.

Our recommendations to Government on overall waste policy were as follows:

- Procurement policies and activities should continue to develop requirements to specify the use of recycled products and to drive down waste
- The Green Jobs Strategy should be revised to give a clearer role to the enterprise networks to support the commercial sector in delivering significant waste reductions
- There is a need for the new Government to work actively with retailers, manufacturers and others to reduce packaging waste
- Work should be undertaken to build on the concept of a Zero Waste economy, similar to the way in which the concept of 'carbon neutral' has taken root. This should draw on international examples of best practice in this area
- The Scottish public have an important role to play in increasing recycling rates. Further engagement with the public on these issues is required if we are to achieve further significant progress on recycling.

Waste Policy in Scotland

Scotland's historic performance on waste management has been poor in absolute terms and in comparison with our European neighbours. Changes in the way Scotland deals with waste have come about largely because of changes to European legislation. In particular the EU Landfill Directive[8] set targets for reducing landfill. Article 5(1) requires member states to reduce the amount of biodegradable municipal waste going to landfill (see Table 1).

The main implication of this approach is that there is an absolute limit placed on the quantity of biodegradable municipal waste that can be landfilled by each target date. This means that if the amount of biological municipal waste continues to grow then increasing quantities will need to be diverted from landfill. This is one of the reasons why Scotland's waste stabilisation target is important.

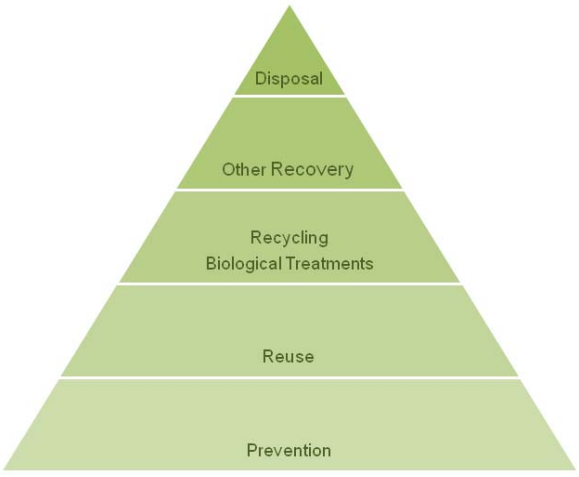
Table 1: EU Landfill Directive targets and the consequences for Scotland

	2010	2013	2020
EU Landfill Target	75% of 1995 level	50% of 1995 level	35% of 1995 level
Scottish targets (maximum landfill level allowed)	1.32 million tonnes	0.88 million tonnes	0.62 million tonnes

Scotland's approach to waste management stems from the National Waste Strategy[9] which was published by the Scottish Environment Protection Agency (SEPA) and adopted by the Scottish Executive in 1999. The principles underpinning the strategy are as follows:

- **Sustainability:** meeting the needs of the present without compromising the ability of future generations to meet their own needs
- **Self-sufficiency and the proximity principle:** waste should be managed and disposed of as close as practicable to where it is generated
- **The waste hierarchy:** to move as close as possible to the top of the hierarchy by minimising the waste generated, reusing waste materials, recycling, and, where this is not possible, disposing of waste in ways that unlock or recover energy
- **Best Practicable Environmental Option:** a method of option appraisal to help identify the best ways of dealing with waste in light of social, environmental, economic, practicality and other policy issues.

Figure 2: The Waste Hierarchy



Using the waste hierarchy is an important part of sustainable waste management. Figure 2 shows the waste hierarchy and Table 2 shows where different waste management options sit within the waste hierarchy.

Table 2: Outline of the waste management options within the waste hierarchy (in descending order of preference)

Prevention	Strict avoidance of waste, reduction at source and product reuse
Reuse	The multiple use of a product in its original form, for its original purpose or for an alternative, with or without reconditioning
Recycling	Using waste materials in manufacturing other products of an identical or similar nature
Biological Treatment	Composting , anaerobic digestion
Energy Recovery	Energy from waste
Disposal	Incineration without energy recovery or landfilling of waste

In 2003 SEPA and the Executive brought together eleven Area Waste Plans to create a National Waste Plan.[10] As well as setting out how the Landfill Directive targets could be met, it set out the following targets:

- Increase the amount of municipal waste which is recycled or composted to 25% by 2006, and 55% by 2020
- Reduce landfilling of biodegradable municipal waste to 1.5 million tonnes per year by 2006 (i.e. 85% of the amount sent to landfill in 1995)
- Stop the growth in the amount of municipal waste produced by 2010
- Provide segregated kerbside waste collections to over 90% of households by 2020
- Recover energy from 14% of municipal waste
- Provide widespread waste minimisation advice to businesses
- Develop markets for recycled material to help recycling become viable and reduce costs.

Waste Policy & Sustainable Development

The *National Waste Plan*, which sets the strategic framework for action in this area, predates *Choosing Our Future*. Given this, the specific commitments to action on waste within the Sustainable Development Strategy are limited. Commitments made in *Choosing Our Future* were to:

- Continue investment in more sustainable waste solutions
- Work with SEPA to decrease business waste to landfill
- Consult on a domestic waste prevention plan
- Review by spring 2006 how best to support businesses in making more efficient use of resources
- Promote consumer awareness of waste issues.

These objectives have all been delivered, although progress on some has not been as rapid as intended.

Waste Planning Policy

In 2007 the Scottish Government also published updated planning policy on waste, known as SPP10.[11] This noted that to date a number of planning authorities had failed to take account of the need for waste management infrastructure in their local plans. Key elements of SPP10 are as follows:

- Planning reform aimed at supporting the provision of waste infrastructure through better performance in developing planning and management while placing communities and environmental justice at the heart of decision making
- Appropriate sites would generally be on employment and industrial land, though variation would be allowed if there is sensible justification for doing so, and the SPP supports a planned approach to the identification of sites
- Planning authorities are required to encourage the provision of waste separation and collection of recyclable material when considering proposals for new development
- Waste reduction at demolition and construction sites should be supported through protocols and site management.

The 2007 Budget and Spending Review

In November 2007 the Scottish Government published its *Economic Strategy*[12] and the *Scottish Budget: Spending Review 2007.*[13] Government sets out a range of Outcomes to support delivery of its five strategic objectives. On waste policy, Government commits to move Scotland towards a zero waste society, stating:

> *We should also minimise the materials and energy we waste, moving towards a 'zero-waste' society. We are supporting local authorities in developing a strategy for increasing recycling, and we are taking forward measures aimed at preventing waste. Local authorities will also deliver our EU obligations to reduce the amount of biodegradable municipal waste sent to landfill.*[14]

The Spending Review also sets an aspiration for Scotland to achieve recycling levels of the European countries that have made most progress to date.

Local authorities will be expected to contribute to the achievement of all of the Government's Strategic Objectives and the successful delivery of the national outcomes. To this end the Government is now working to develop Single Outcome Agreements which will:

- Include the contribution which the local authority will make to delivering the high level targets, the national Strategy Objectives, outcomes and indicators
- Cover all existing outcome agreements and planned policy within the Single Outcome Agreement framework
- Include local priorities within the national outcomes, in terms of local outcomes and indicators, and how these will be delivered
- Include details of how local authorities will work in partnership with their Community Planning Partners in the prioritisation and delivery of both national and local outcomes.

In return for local government committing to deliver Government outcomes, the Scottish Government will be reducing levels of ring-fenced funding and

giving local government greater flexibility in how it meets these outcomes. One significant area now taken out of ring-fencing and rolled up into the 2008-09 Settlement is the Strategic Waste Fund.

The possibility exists that the Zero Waste aspiration and action on waste will be lost in the new agreements – this would be a wasted opportunity.

What is Zero Waste?

A vital consideration in our work is defining how Scotland might realise a Zero Waste ambition. The Scottish Government and SEPA identified Zero Waste as an emerging concept in the 2003 National Waste Plan.[15] The concept originated from the Japanese Total Quality Management (TQM) system for industry and grew out of the concept of zero defects.

The National Waste Plan uses a definition of Zero Waste from the Zero Waste New Zealand Trust, that:

- Zero Waste is a unifying concept for a range of measures aimed at eliminating waste and allowing us to challenge old ways of thinking
- Reconfigures the current waste management culture to a value recovery culture
- Encourages new ways of thinking and the use of new tools so that normal everyday activities contribute to the answer rather than the problem
- Shifts from a linear resource use–disposal culture to a 'closed loop' system mimicking nature's successful strategies
- Supports communities in achieving a local economy that operates efficiently, sustains good jobs and provides a measure of self-sufficiency
- Maximises recycling, minimises waste, reduces consumption and ensures that products are made to be reused, repaired or recycled back into nature or the marketplace.

To help in our analysis we looked at a number of international initiatives and governments that are attempting to use the concept of Zero Waste to inform their action on waste issues. Our review of other countries' waste policies has been far from exhaustive, and has focused on Australia and New Zealand where the concept seems to be in more common use than in Europe.

Some key points quickly emerge from a review of Zero Waste policies in these countries:

- Overall, European countries are further ahead in development of sustainable waste systems than other industrialised nations. European Directives have driven policy further than has yet been delivered outside of Europe
- Scotland itself seems to have achieved higher rates of recycling to date than countries such as Australia and New Zealand where action on waste has only recently been framed by a Zero Waste approach
- Countries and regions now using the Zero Waste approach have set out a strategic approach that aims to go further than the level of commitment currently set out in Scotland and much of Europe. This suggests that while, to date, these countries have not achieved superior waste management performance they may be able to do so in the future.

This leads the SDC to the following view on a Zero Waste approach:

- A Zero Waste framework is a powerful means of framing action on waste throughout the waste hierarchy
- A Zero Waste framework shifts attention from waste management (end of pipe) towards reduction. To date most action in Europe has been driven by landfill avoidance and maximisation of recycling. Less successful has been action on overall minimisation
- A Zero Waste framework sets out a clear direction of travel and milestones
- A prerequisite of a Zero Waste policy is better coordination between municipal and commercial waste management and recognition that both need equal attention
- To be effective a Zero Waste policy framework must be backed by a cohesive shift in policy and delivery.

Below are case studies from action in Western Australia and New Zealand, where government has set out a clear structure to help tackle the unsustainable nature of current waste practices and move towards a zero waste society.

CASE STUDY: Zero Waste in Western Australia

In 2004 the State Government published its *Statement of Strategic Direction for Waste Management in Western Australia*. The Statement set out a vision, goal and foundation principles for waste management. Critically it sets out "the way forward" that explains how the State will move from waste management (landfill and some recycling); through to prevention over a clearly defined timescale (see Figure 3 below). Delivery is tasked to its Waste Management Board.[16 & 17]

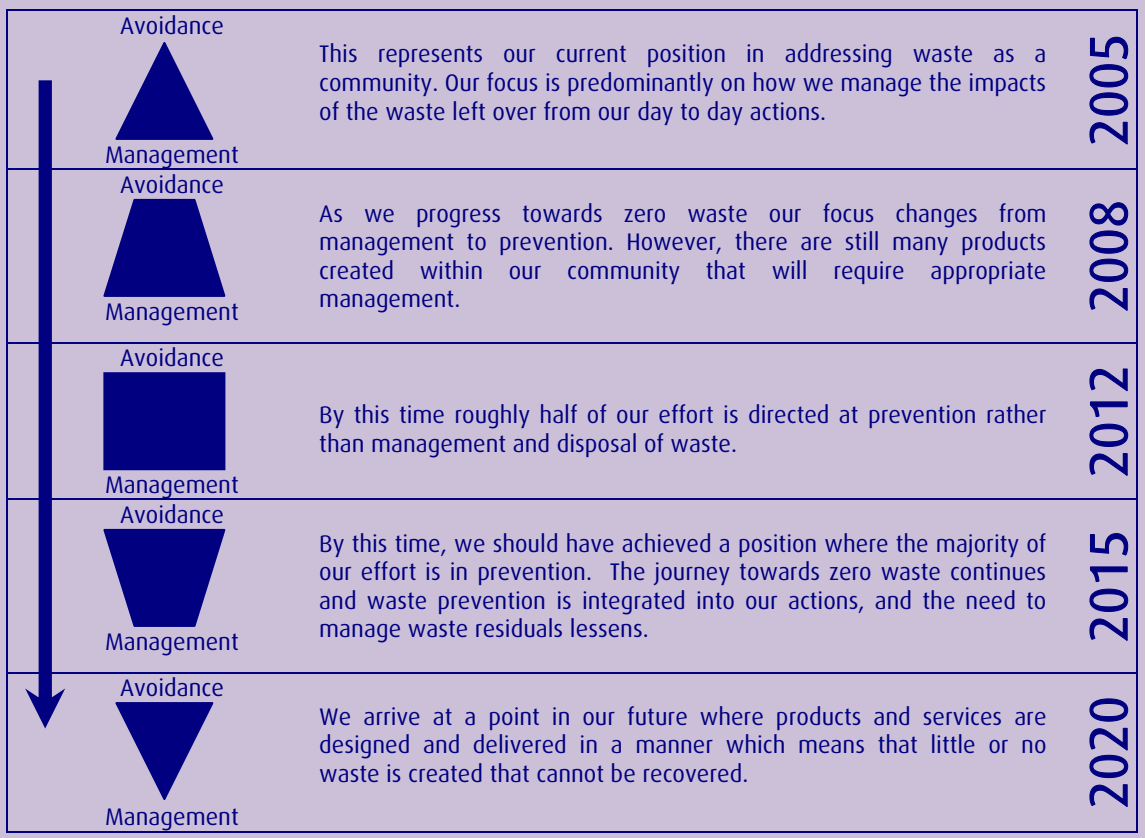
The Statement then sets out programme priorities for the period 2004-07 which are matched by separate Business Plans that have clear budgets and measurable targets to deliver the Vision over time. This work is backed up by separate auditing of progress. The Waste Management Board describes zero waste as follows:

> "The Board has a vision for Western Australia – Towards Zero Waste. Though Zero Waste is an aspirational concept, it is also a powerful new one that enables us to challenge old ways of thinking and inspires new attitudes and behaviour. Zero Waste is a philosophy and a goal that will guide people to re-design our resource-use system to emulate natural processes where no waste exists".

It then goes on to state that Zero Waste:

- Is about managing resources and eliminating waste, rather than managing waste and eliminating resources
- Means a profound change in the attitude of society and the way we handle resources, design, manufacture and consumption
- Is a guiding design philosophy for eliminating waste at source and at all points down the supply chain requiring action by everyone throughout the lifecycle of products and materials
- Brands existing and emerging initiatives that contribute to the elimination of waste
- Has direct and indirect broad environmental and economic benefits
- Is the foundation of a sustainable closed-loop materials economy
- Ensures that nothing is generated as an output, deliberately or otherwise, that does not become a useful input into another process.

Figure 3: Western Australia's path of transition towards zero waste and a waste free society



CASE STUDY: Zero Waste in New Zealand

The 2002 New Zealand Waste Strategy introduced the concept of Zero Waste into New Zealand waste policy and practice and set out a programme of large and small actions for the medium term, as well as some far reaching, longer-term commitments[18]. The Strategy recognised that:

> "Up to now, waste policies have tended to focus on *end of pipe* solutions by dealing with disposal rather than prevention. Yet there is a direct link between the amount of waste we produce and our rate of economic growth. The long-term challenge is to break this link and achieve sustainable growth by learning how to use resources more efficiently — to produce more with less."

In response, the Strategy focused its attention on waste minimisation and set a comprehensive set of targets to deliver this. Some of these targets are shown below:

Targets for waste minimisation

- By December 2005, all councils will ensure that procedures for waste minimisation have been addressed for all facilities and assets they manage and will have set target reductions based on public health, environmental and economic factors
- By December 2010, all regional councils will ensure that at least 25 percent of all existing industrial resource consent holders have in place a recognised waste minimisation and management programme.

Targets for organic wastes

- By December 2003, all territorial local authorities will have instituted a measurement programme to identify existing organic waste quantities, and set local targets for diversion from disposal
- By December 2005, 60 percent of garden wastes will be diverted from landfill and beneficially used, and by December 2010, the diversion of garden wastes from landfill to beneficial use will have exceeded 95 percent
- By December 2010, the diversion of commercial organic wastes from landfill to beneficial use will have exceeded 95 percent.

Targets for construction and demolition wastes

- By December 2008, there will have been a reduction of construction and demolition waste to landfills of 50 percent of December 2005 levels measured by weight.

Target for trade wastes

- By December 2005, all territorial local authorities will ensure that all holders of new or renewed trade waste permits will have in place a recognised waste minimisation and management programme.

Recent Action

In 2006, the Waste Minimisation (Solids) Bill was introduced into the Parliament by Member Nandor Tanczos. This Bill was subsequently adopted, with amendments, by the New Zealand Government which issued a Cabinet Paper agreeing to update the 2002 Strategy[19]. There are two particular changes to the 2002 Strategy proposed in 2007:

- **Securing dedicated funding for solid waste minimisation and management:** The Government is committed to securing dedicated funding for further waste minimisation and management, including the improvement of national infrastructure
- **Regulation to allow for mandatory product stewardship:** The Government is committed to product stewardship schemes as a way of minimising and managing waste, especially for products that cause particular environmental harm or pose disposal problems, such as electronic waste.

The Cabinet Paper is described as "a change of focus for waste minimisation activities – from the current, largely voluntary approach, to increased use of regulatory back-up and price-based mechanisms. The package will empower central and local government agencies to take a stronger lead on waste minimisation, and to achieve more consistent performance on waste minimisation from region to region."

As in all western economies, New Zealand has struggled to change the direction of its waste management. It is clear from the renewed strategy, that while the 2002 Strategy produced some direction, waste levels continued to rise, and New Zealand did not move to waste reduction as hoped. The new focus will need to be backed up by coordinated action to deliver valuable waste minimisation and reductions in the amount of waste being generated.

Scotland's Record on Waste Management

The first thing to note here is that the level of domestic waste is small in comparison to Scotland's level of commercial and industrial waste. In 2005/06 an estimated 22.22 million tonnes of controlled waste arose in Scotland. The breakdown of waste (see Figure 4) is as follows:[20]

- Household: 2.89 million tonnes
- Commercial & Industrial: 8.41 million tonnes
- Construction & Demolition: 10.60 million tonnes
- Agriculture: 320,000 tonnes.

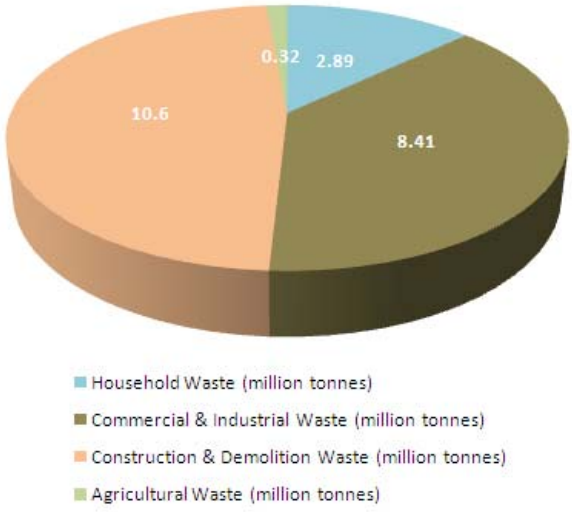
The focus on treatment of municipal waste stems from the fact that local authorities have duties relating to the management of this waste, as well as the fact that the EU Landfill Directive focuses on the reduction in the amount of biodegradable municipal waste going to landfill. Scotland's performance on the treatment of municipal waste is shown in Figures 5 and 6.

The publication of the *National Waste Plan* in 2003, and European requirements for action, heralded a new approach to waste management. Recent years have seen a significant rise in domestic recycling in Scotland.

While in 1998 recycling rates were only at 4% and Scotland was near the bottom of the league table of EU nations, the current rate for 2006 stands at 25.2%, and interim figures for 2007 suggest that a rate of almost 30% is being achieved.[21] The 2006 figures showed that ten local authorities had recycling and composting rates of less than 20%; now only two are achieving less than 20%, meaning that the worst-performing authorities are rapidly improving. Local authority performance is shown in Figures 7 and 8 below. However, there remains a significant disparity between local authorities, suggesting that some have embraced the importance of sustainable waste management more seriously than others and/or have found solutions to achieving waste targets.

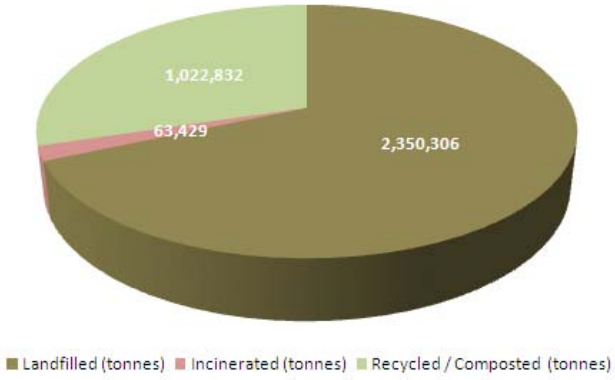
While increasing recycling rates will be easier in certain locations owing to differences in social make-up, property type and property density, there are similar challenges in other European countries where action on recycling has been more effective. It is hard to avoid the conclusion that some authorities are failing to see recycling, never mind reuse and minimisation, as a core part of their waste management responsibilities.

Figure 4: Scottish Waste Arisings: Breakdown by Sector (2005/2006)



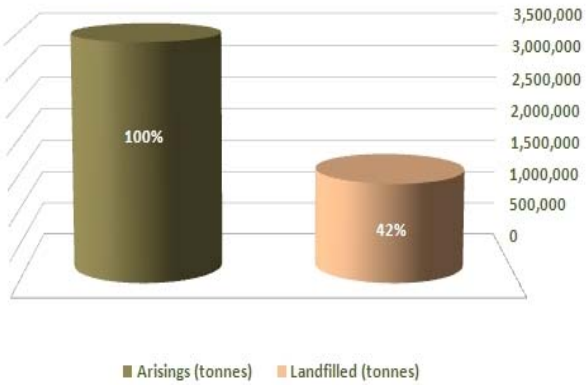
Source: SEPA (2007) Waste Data Digest 7

Figure 5: Total Scottish Municipal Waste Arisings (2005/06)



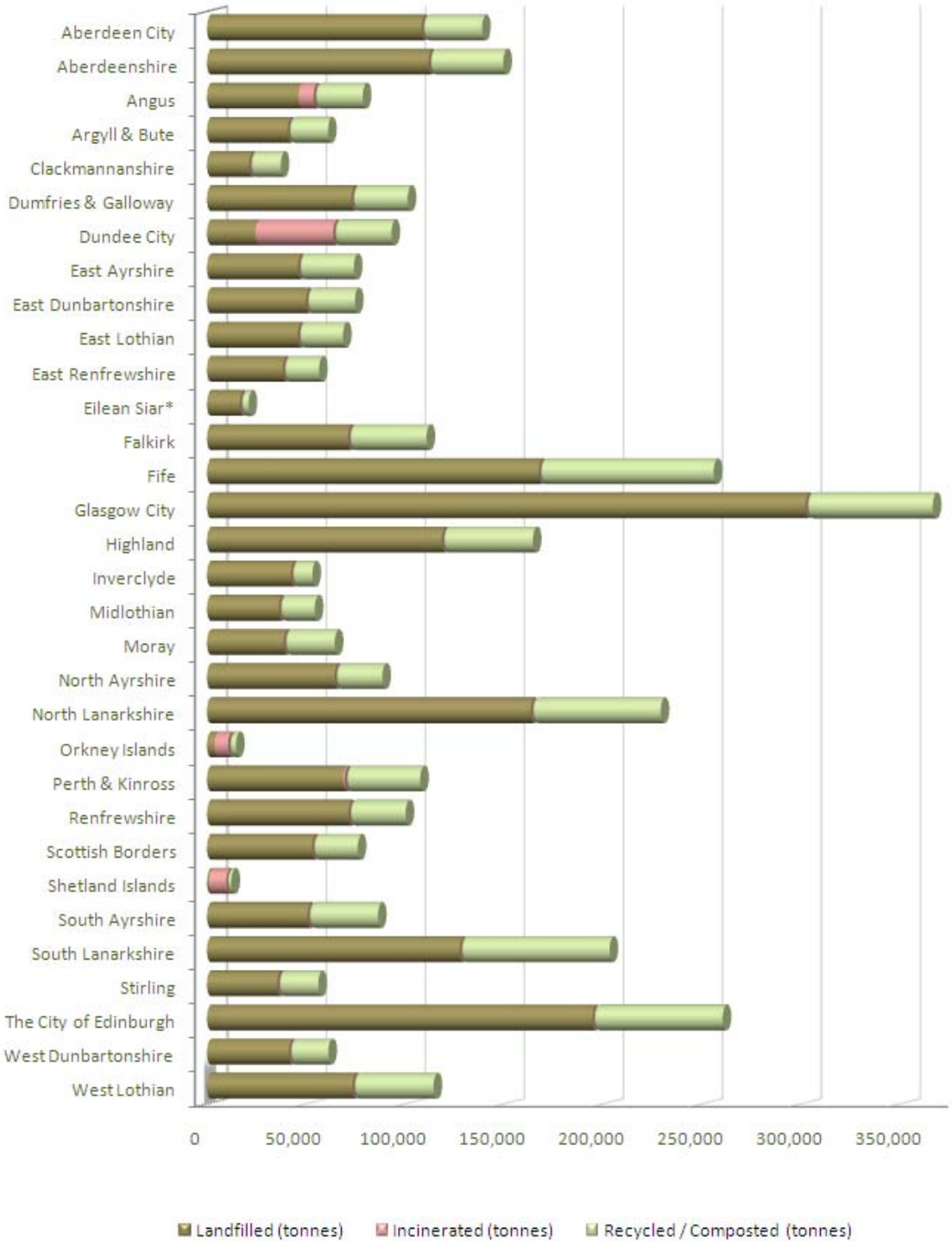
Source: SEPA (2007) Waste Data Digest 7

Figure 6: Scottish Biological Municipal Waste Arisings (2005/06)



Source: SEPA (2007) Waste Data Digest 7

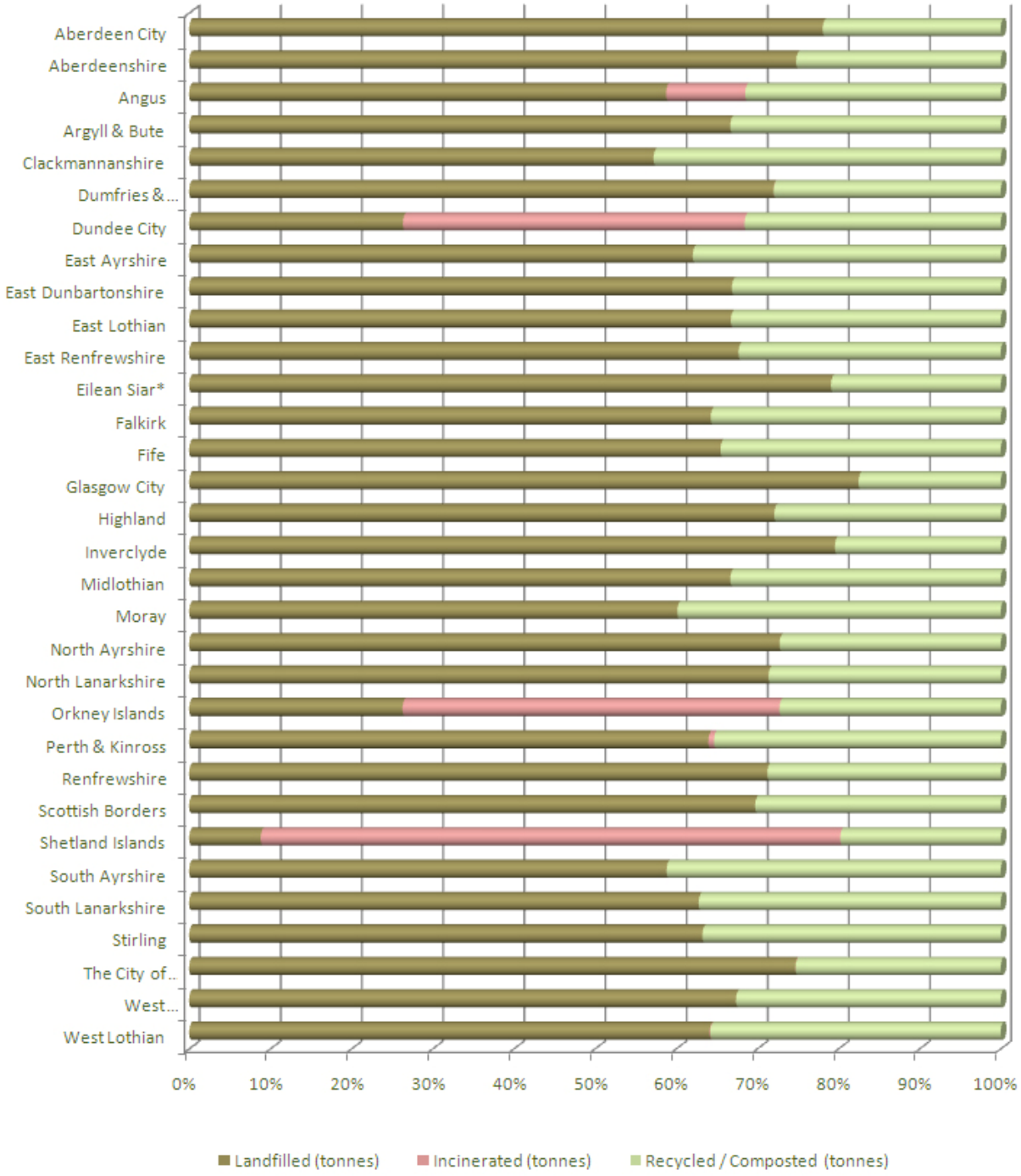
Figure 7: Local Authority waste management performance by tonnage collected (July 2006 to June 2007)



* The data for Eilean Siar is provisional as the verification is not finalised

Source: SEPA (2007) Latest Landfill Allowance Scheme date for July 2006 to June 2007

Figure 8: Local Authority waste management performance by percentage (July 2006 to June 2007)



* The data for Eilean Siar is provisional as the verification is not finalised

Source: SEPA (2007) Latest Landfill Allowance Scheme date for July 2006 to June 2007

Overall however, current progress in leading authorities gives us confidence that Scotland will be able to continue increasing its recycling rates.

Action in Wales

Relevant to our discussion is a comparison with recent Government announcements in Wales.

In late October the Welsh Assembly Government convened a meeting with council leaders urging them to consider proposals to recycle and compost 70% of municipal waste by 2025.[22] The current rate – 27.6% - is slightly lower than Scotland's.

Table 3 highlights the key elements of the Welsh Assembly Government's proposals. These are ambitious targets, and will required focused government support if they are to be delivered. It is not known if any targets have been set for minimising waste.

These targets are instructive given Wales' and Scotland's similar positions in terms of waste management and levels of recycling. The focus is clearly on rapidly increasing recycling rates, but coupled with strict caps on the use of landfill.

As part of action on recycling, the Welsh Assembly Government is looking to ensure that composting and anaerobic digestion plays a large part by setting a minimum contribution, and there is a recognition that energy from waste will need to play a role in landfill diversion though it is capped at a level equivalent to the 30% of municipal waste remaining after recycling delivers it 70% contribution.

Table 3: Proposed Welsh Assembly Government Municipal Waste Targets

	2013	2020	2025
Recycling	52%	64%	70%
Minimum % of composting /anaerobic digestion	15%	15%	15%
Energy from waste cap	30%	30%	30%
Landfill cap		10%	5%

Comparing Performance in the EU

While action on recycling is significant we also note that data shows Scottish performance is still below the EU average. In 2004, the last year for which EU wide figures are available, 45% of municipal waste was landfilled and 18% incinerated. The remainder was recycled or composted (see Figure 9). We have compared Scotland's 2006 figures with these EU 2004 figures, so it may be the case that Scotland is making less progress compared to other European countries than the figures might suggest.

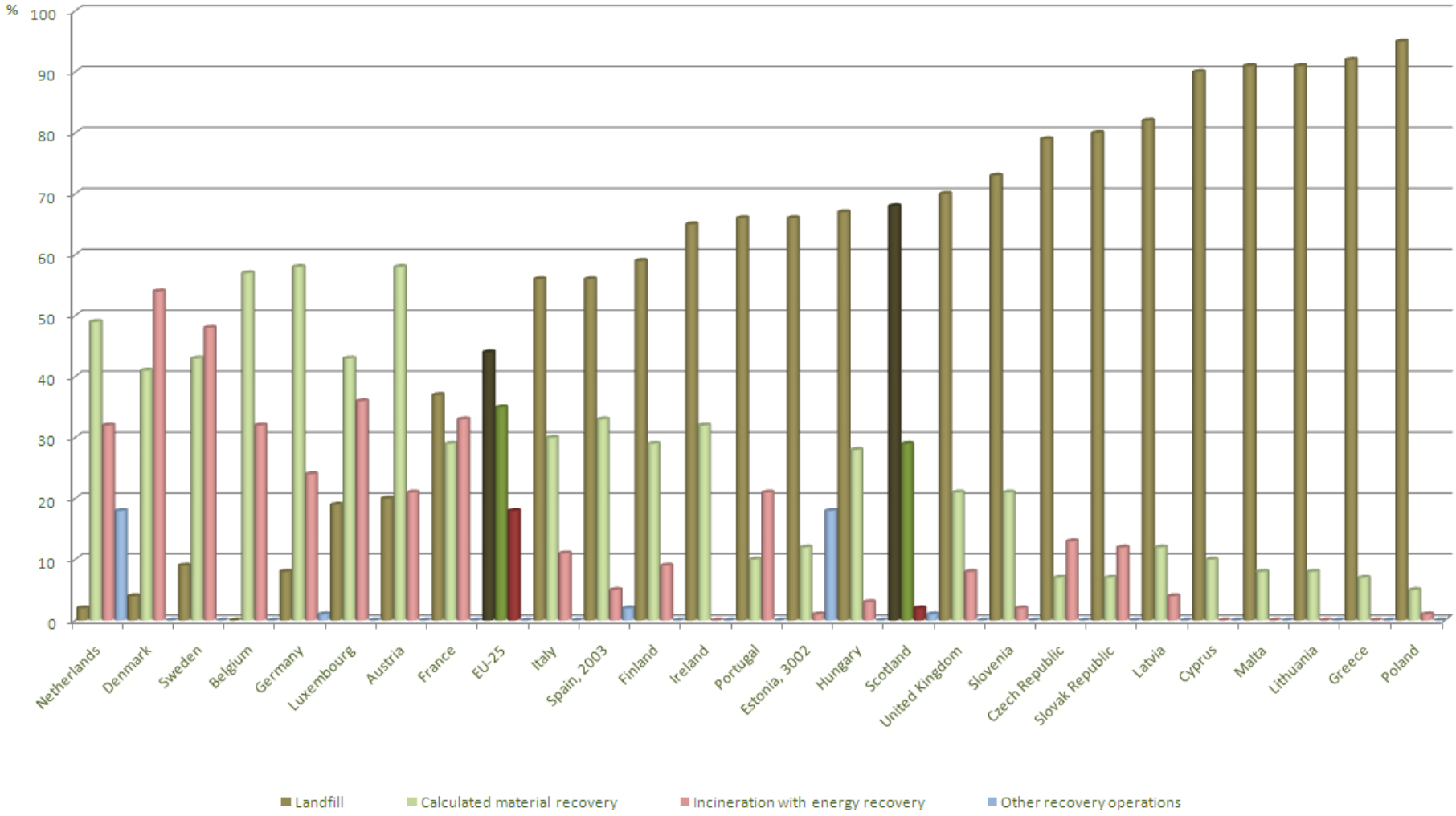
Countries that have made significant progress in diverting municipal waste from landfill have tended to use both recycling/composting and energy from waste to do so. Energy from waste is widely used in Denmark, Sweden, Luxembourg, the Netherlands, Belgium, France, Germany and Austria, and all of these countries have above average recycling rates. Some of these countries are now extending incineration in order to comply with landfill bans.[23]

However, there are significant differences in approaches to waste management within this group. Some countries have high levels of incineration because of a historic shortage of available landfill capacity. Available research also shows that some countries that have traditionally focused primarily on recycling and composting and have achieved high rates – such as Austria and Germany – are now increasing their use of energy from waste. In 2000 Austria incinerated less than 10% of its municipal waste, but by 2005 this had grown to approximately 20%.

This experience suggests that it has been possible for European countries to focus on increasing levels of recycling, and this can be done either with or without energy from waste plants. However, both Germany and Austria are now turning to energy from waste as a means of decreasing use of landfill further, and it is clear that the top performing EU countries all use energy from waste as a part of their waste management and all have been able to reduce landfill levels below 20%. Similarly they all recycle at least 40% of their municipal waste.

Countries such as Denmark, Sweden, Luxembourg, France, Belgium and the Netherlands all have energy from waste levels above 30%. What is not yet clear is whether such levels will fall as these countries develop recycling further.

Figure 9: Use of landfill, incineration and material recovery across Europe (2004)



Note: Scottish figures are for 2006. Scottish and EU25 average figures are highlighted for ease of comparison
Source: European Environment Agency (2007) & SEPA (2007b)

The wider role of Government in supporting waste policy

One clear lesson from our review of waste policy is that inadequacies in the current waste management situation stem from the fact that collection authorities and those working in waste policies are focused on issues that relate to "end of pipe" matters. Thus Government waste policy relates to how to collect and dispose of waste generated, and primary focus is obviously on domestic waste for which government has responsibility.

However if Government wishes to deliver a more sustainable waste policy then support is needed from other parts of Government. We cover these issues later on in our report but gather them here for clarity. They relate in particular to planning, building regulations, energy policy procurement.

Planning

Scottish Planning Policy 10 – Planning for Waste Management (SPP10) sets out how planning authorities in Scotland should consider applications for waste infrastructure. However, there is a wider role for the planning system in sending signals to wider society on how to avoid or treat waste.

It is important that Scottish planning decisions take into account relevant SEPA Guidelines for Thermal Treatment of Municipal Waste.[24] This is due to be supplemented with more detailed Criteria. The Guidelines urge the development of plant that delivers "efficient energy recovery". SEPA uses four Guidelines which are:

1. In accordance with the National Waste Strategy, where thermal treatment with energy recovery is appropriate, it must play an integrated role with other waste management methods. These methods could include waste prevention, reuse, biological treatment, recycling and landfill
2. Thermal treatment of appropriate segregated waste, with efficient energy recovery (for example combined heat recovery and power generation), may be an appropriate method for management of waste
3. Research into cleaner technological solutions for thermal treatment and energy recovery will be encouraged
4. Where the development of a thermal treatment plant is consistent with the National Waste Plan, local authorities and/or others should work in partnership to ensure that the thermal treatment plant is appropriately sized and suitably located on a national basis.

These Guidelines are a material planning consideration for both development plans and decisions on individual scheme applications. This is clearly recognised in SPP10. The Criteria will also be a material planning consideration. It will be important that the Scottish Government ensures that local planning decisions relating to energy from waste plants properly follow this Guidance.

The planning system, either through national policy or through local delivery should send clearer signals on the following issues:

- Planning consents on new development should be conditional on stricter action in dealing with construction waste
- Planning consents must properly use the Guidelines developed by SEPA on the thermal treatment of waste
- Planning needs to support the provision of district heating networks and facilitate work to co-locate potential heat producers and heat demand. We return to this below in our discussion on energy policy
- Decisions on waste policy and individual schemes to include proper engagement processes to involve the local community
- Developers seeking planning permission should be encouraged to develop Good Neighbour Agreements as part of conditions for development.

Building Regulations

The current Building Regulations account for sustainable development and as part of this include a range of social and environmental criteria. The Sullivan Report has now made recommendations on new building regulations.[25] In reviewing the recommendations of this, the Scottish Government and the Scottish Building Standards Agency (SBSA) should ensure that building regulations are updated to limit the production of construction and demolition wastes; and factor in provision of recycling infrastructure in new developments.

Building Regulations should be setting a long-term framework to progressively limit the level of construction and demolition waste being sent to landfill, to give a clear signal and timeframe to the construction sector. Relevant here is the proposed Net Waste Method being developed by WRAP as a waste metric for the construction sector. Government and the SBSA should consider the worth of the Net Waste Method for inclusion in the future standard.

Energy Policy

Current government energy policy relates primarily to electricity, oil and gas. However, within these areas there has been little focus on heat. For example Ofgem is the regulator of the gas and electricity markets, meaning that the commodity of heat is overlooked and regulated only by proxy (through the gas market). Government itself has no policy on heat, except for how it relates to energy efficiency.

There is a need for Government to gain a clearer view of how it can use policy to move the heat market towards a more affordable, low carbon secure market over time. The Forum for Renewable Energy Development in Scotland is currently looking at the issue of renewable heat and will report to the Scottish Government in early 2008. However, there is a need to look at wider heat policy, in particular at how to make more efficient use of gas and how to minimise waste from current heat use. Within this there may be a greater role for CHP and district heating.

It is worth noting that district heating systems are rare in the UK but common in many parts of Europe, and in particular Scandinavia. It is also significant that many countries with high levels of energy from waste also tend to have high levels of district heating networks. Earlier in this report we noted the higher carbon efficiency of using energy from waste to generate heat or CHP rather than simply electricity. However, we also have to note that in the absence of wider heat policy Ministers will struggle to persuade the waste sector to deliver plants that are not electricity only.

In Scandinavia energy from waste plants can connect to established district heating networks, meaning that energy from waste is just one of the fuel inputs. In Denmark around 60% of households receive heat from district heating schemes. Of this, 17.3% comes from biomass and 25.3% from waste. Danish success relates primarily to a well-defined legal framework around which heat supply is mandated. Despite making it obligatory to connect CHP to heat networks and banning electric heating, the development of this heat transmission network took approximately 20 years to deliver. In Sweden, approximately 40% of heat supply comes from district heating, though approximately 62% of this is fuelled by biomass.[26]

However, the expected penetration of energy from waste plants in Scotland will be too small to build any significant district system capacity in Scotland on this basis alone. Therefore if Government is to be effective in delivering carbon efficient energy from waste plants, it urgently needs a Heat Strategy, which sets out proper incentives and minimum standards and also tasks local authorities with the development of heat plans and consideration of how to develop heat networks in local plans.

One of the current drivers is the availability of Renewable Obligation Certificates (ROCs) for the proportion of electricity coming from renewable/biomass sources.[27]

A generator burning waste can be issued ROCs if:

- The waste by which it is fuelled in that month has been converted to a liquid; or
- It is a CHP generating station with CHPQA accreditation; or
- The waste is a liquid fossil fuel (e.g. RFO).

However, energy from waste plants where the electricity is produced by pyrolysis, gasification or anaerobic digestion do not have a similar requirement, and can be eligible for ROCs without CHP. If these processes are used to manufacture a fuel (gas or liquid) from waste then that fuel is eligible under the RO. Finally, CHP generating stations burning waste will only receive ROCs if they are also accredited under the RO and under the CHPQA programme.[28]

In practice, there has been limited take up of use of the Obligation for energy from waste plants, because since most plants process a mix of wastes, it can difficult to separate out and claim against the biomass part being incinerated, and because of existing efficiency criteria.

The Scottish and UK Governments are currently considering changes to the Renewables Obligation. One potential issue of concern is the proposed development of a sliding scale of ROC values for plants with a threshold of 70% or less.[29] The inclusion of threshold criteria is important to ensure that plants with low efficiency are not supported. Government should link this ROC value with similar restrictions set in planning to ensure that only electricity being generated through higher efficiency waste plants is eligible for ROCs. We recommend an efficiency value of 60% is used. However, we recommend that such efficiency criteria not be applied to the Advanced Combustion Technologies, which bring wider sustainability benefits.

Public Procurement

If Government wishes to encourage others to take action it must first demonstrate leadership on sustainability. Also, it can use its significant purchasing power to support market development

of products and services. *Sustainable Development: A Review of Progress by the Scottish Executive* highlighted that Government is taking seriously the challenge of reducing the environmental impact of its estate. Government has announced the establishment of a National Procurement Centre of Expertise. This will develop a sustainable procurement plan and lead on collaborative procurement of common goods and services on behalf of the wider Scottish public sector. As part of this the Centre should look at how procurement could support sustainable waste policies. This should include the following:

- Specification of materials that can be reused or recycled, or which are made from recycled materials
- Specification of materials that avoid the creation of unnecessary food and packaging waste
- Setting minimum standards in the refurbishment and construction of new public buildings that equate with best practice in the minimisation of construction waste
- Using the public estate (e.g. council housing, housing association properties, hospitals, schools and leisure centres) to help underpin local action to install district heating networks.

4

Our Analysis

To help us assess how energy from waste fits into a sustainable waste policy we have framed our analysis in terms of the five principles of sustainable development. To recap these are:

- Living within environmental limits
- Supporting a healthy, just society
- Delivering a sustainable economy
- Using sound science
- Using good governance.

Living within environmental limits

There are two separate (but related) aspects to evaluating the environmental aspects of waste. In the first instance, the disposal of waste breaches the condition of living within environmental limits if the materials - that eventually end up as waste - are extracted beyond the ability of environmental processes to renew these resources. This would require that wherever possible resources should be used in an efficient way such that they do not become waste. This indeed, is the aspiration of a Zero Waste society.

Where waste is being produced, however, then the interpretation of living within environmental limits requires that waste management is conducted in a manner that is ecologically sustainable. Landfilling materials that may have alternative productive uses does not accord with this condition. It is therefore important to look at alternatives to landfill, one of which could be energy from waste. Here we will sketch out the circumstances in which the main elements of the waste hierarchy - including energy from waste - could be seen to be living within environmental limits.

Maintaining Action on Recycling

The recent Audit Scotland report *Sustainable Waste Management*[30] highlights a number of areas where recycling could be improved. We have analysed this report as part of our work. The report noted the existence of a multitude of collection systems, concern about lack of learning from pilots, and insufficient focus on the development of recycling markets, and few examples of local authorities working jointly either to deliver waste management or to negotiate the sale of recyclables.

The report also referenced Government analysis on future costs of recycling. This analysis suggests that that increasing rates of recycling in Scotland will lead to higher costs. The average cost of achieving a rate of up to 30% will be £120 per tonne in today's prices, while achieving a rate of over 40% will cost over £217 per tonne.[31]

At the Scottish Government Waste Summit on the 3rd October we were struck by the presentation given by David Dougherty in which he contrasted recycling experience in the UK with Canada and the USA.[32] He was of the clear view that in the UK not enough focus was being given to the use of the private sector and market development. In particular he recommended the following:

- **Expand the range of materials collected**
  Data presented suggested that sorting costs fell when a greater range of materials were collected. In his examples material recycling facilities (MRFs) sorting eight materials into five categories were doing so at a cost of between £38 and £52 per tonne, whereas those sorting between 12 and 15 materials were doing so at a cost of £30 per tonne
- **Treat recycling as a business**
  Recycling is a business with costs and revenues; not just a waste option with ever increasing costs. Examples from the USA demonstrated that MRFs were able to sell for a higher value than the cost of sorting and making a return of £20 to £35 per tonne. This revenue could be used to offset collection costs
- **Use financial incentives**
  Different markets require different incentives, meaning the Scottish Government and local authorities need to consider carefully what will work in Scotland to change people's attitudes *and* actions
- **Use financial incentives in a wide variety of commercial ventures**
  There are opportunities to use incentives to encourage the commercial sector to reduce levels of waste generation; for example on construction and demolition waste.

While it is clear that the laws of diminishing returns will apply, and that at some point the cost effectiveness of recycling will diminish, the presentation given at the Waste Summit highlights the need for more analysis of this, and targeted Government support to increase revenues gained from recycled materials being collected. Increasing revenues will obviously support ongoing increases in recycling in Scotland.

We would like to see the Scottish Government working with REMADE Scotland, the Waste &

Resources Action Programme (WRAP) and the Convention of Scottish Local Authorities (CoSLA) to look more closely at this issue. It may be worthwhile piloting the collection of a greater number of materials, as well as supporting local authorities in working together to gain better prices for recyclables collected.

In the last four years Scotland has moved from poor to slightly below average delivery, in comparison to the rest of Europe. The fact that this has been delivered in a short timescale should be applauded and represents a significant policy achievement. However, experience from the European Union highlights the fact that more can be done, and that Government is right to continue action on recycling.

We see no reason why existing targets cannot be met and it may be possible to increase targets for 2020 or 2025. The National Waste Plan should be reviewed in 2008 and set out clear reviewed targets.

Current Action on Waste Minimisation and Reuse

The Scottish Government supports action on waste minimisation and reuse in a number of ways. These are set out in detail in the *Household Waste Prevention – Action Plan (Scotland)*[33] and the *Business Waste Framework*.[34]

The primary aim of the *Household Waste Prevention – Action Plan (Scotland)* is to deliver the *National Waste Plan* aim to stop growth in municipal waste by 2010, and the Action Plan has 20 action points that seek to deliver this.

Government also supports a number of reuse schemes, primarily run by community recycling companies. These community businesses run a range of schemes such as computer refurbishment, furniture recycling (in actual fact this is mostly for reuse rather than recycling) and waste wood recycling (often a combination of reuse and recycling). Schemes are often in operation because of social objectives – for example provision of training and employment – rather than purely for resource efficiency objectives which are seen to be a secondary benefit. However, anecdotal evidence from the sector is that it struggles to get required support because government is not good at recognising the wider benefits these organisations can bring. To help remedy this the Community Recycling Network Scotland and its members are involved in piloting "Public Social Partnerships" in North Lanarkshire, Renfrewshire and Edinburgh to look at how local authorities can include social clauses in procurement tenders and contracts that supports joint delivery of diverse objectives such as reuse, recycling and social care.[35]

Despite these various initiatives, Scotland's waste production is still rising. The most recent waste figures from SEPA confirm that in 2005/06 the average household produced 1,197 kg of waste, which is about 2% more than in 2004/05.[36]

From this our finding is that Government has struggled to shift its attention to waste prevention. Without a change of focus many stakeholders will not have confidence in government intentions behind action on energy from waste.

While the Scottish Government is seeking to stabilise waste production most local authorities are working on an assumption that they will be faced with increasing levels of waste. While in the current climate this presumption could be seen as more realistic, there is a clear danger that this assumption will be self fulfilling.

Without local authorities looking more seriously at their role in supporting national minimisation and reuse initiatives, there is a danger that the national stabilisation target will be missed. More creative thinking is therefore needed from national and local government on how they work with the not-for-profit and business sectors to minimise, reuse and recycle more of Scotland's waste.

Finally, it is clear that financial support for reuse and minimisation work pales by comparison to expenditure on recycling initiatives and disposal. Scottish Government and local authorities have legal responsibility and greatest control over municipal waste. They have understandably focused attention here, and most intervention (in financial and policy terms) has been on shifting between simple collection and landfill to mixed collection, and recycling alongside landfill.

The adoption of a Zero Waste Framework and the roll-up of Strategic Waste Funding into the 2008-09 Settlement should give Government a clearer direction and help it to set out how it intends to shift priorities over time towards prevention and not just simple management.

Energy from Waste, Pollution Impacts and Resource Efficiency

One particular problem facing Government is a belief that there is public concern about use of this technology as a waste disposal option. This contrasts with experience abroad and also in Shetland where the district heating scheme and energy from waste plant seem to enjoy high levels of public acceptance.

Public concern is often focussed on more traditional larger scale incineration options, but it should be

noted that there are a range of energy from waste technologies (with inherent differences in efficiencies and emissions) including standard moving grate incineration, fluidised bed incineration, gasification, pyrolysis and anaerobic digestion.

In the UK experience may be tempered by previous experience of older incinerator plant used before the EU Waste Incineration Directive[37] forced such plants to close or install higher standard pollution control equipment. In addition, public outcries in Newcastle and London relating to poor management of contaminated ash further tarnished the image of incineration as a waste management option. In looking at current legislation it is clear that existing pollution control standards are rigorous and that the use of energy from waste plants will not breach safe air pollution levels. Public concern about energy from waste can be deeply rooted: therefore operators need to ensure that information about the operation of a plant is easily available, and plants need to develop Good Neighbour Agreements (see below) to ensure open discussion with a local community.

Today, most discussion of the environmental impact of energy from waste is focussed on debate about the efficient use of resources. A number of bodies have concerns about the role of energy from waste in diverting materials from recycling and contend that this is not efficient either in material resource efficiency or in terms of greenhouse gas emissions.

Under the heading of Sound Science & Good Governance we look at the issue of how greenhouse gas emissions and related policies should be influencing waste policy decisions.

It is clear that, if incorrectly delivered, there is a danger that energy from waste plant *could* cut across existing recycling initiatives. This need not necessarily be the case. Data from elsewhere in Europe confirms that high use of energy from waste and high recycling rates can go together (see Figure 9). Closer to home, it is worth noting that of the three local authorities that use energy from waste as their main method of disposal (Dundee, Orkney and Shetland) the recycling rates differ markedly (at 31.6%, 27.2% and 19.8% respectively[38]). Lower levels of recycling in the Shetland Islands are perhaps more due to their geographic isolation rather than the presence of the energy from waste plant.

To ensure that current and future action on recycling is not undermined local and national government must therefore look more closely at how it contracts for energy from waste plant so that recycling schemes and energy from waste go forward hand in hand.

However, we see that defining the debate as one of energy from waste versus recycling does not properly reflect the issues at stake. In our discussions with stakeholders we have met with concern that development of energy from waste plants might undermine recycling initiatives, and therefore deliver poor resource efficiency.

We share these concerns, but see this analysis as incomplete. On balance a focus on recycling versus energy from waste is preventing a much wider conversation about (a) waste minimisation and (b) the proper application of different technology options to local circumstances.

On this last point we are particularly pleased to see the recent development of anaerobic digestion infrastructure in the Western Isles. We would like to see more focus and encouragement of anaerobic digestion in Scotland, not least because as a technology it is well suited to the treatment of biodegradable waste streams that are being targeted by the EU Landfill Directive. Below is a case study setting out further information on anaerobic digestion.

CASE STUDY: Anaerobic Digestion

Anaerobic Digestion is one method for converting biomass, using bacteria to break down organic material in the absence of oxygen. The aim is the production of a methane-rich biogas, which can be combusted to generate electricity and heat. The organic material used may include industrial wastewater, manure, garden waste and organic food residues such as vegetable peelings. The technology itself is proven and is common elsewhere in Europe, particularly in Germany where there are 3,500 biogas plants in operation.

While capital costs for anaerobic digestion plant are high, payback times for installations tend to be short because of the avoided cost of waste disposal.

Anaerobic Digestion in the Western Isles

Since August 2006 Comhairle nan Eilean Siar has been collecting organic waste from households in the Western Isles for treatment at its Creed waste treatment plant in Stornoway. The plant is the first in the UK to incorporate anaerobic digestion of source-separated biowaste (food, paper and garden waste) on a commercial scale. Aided by the plant the Council's recycling and composting rate has increased from 11.6% to 20.9% between 2005 and 2007.

A split-bodied vehicle is used to collect household residual waste and source-separated organic material including kitchen and garden waste, cardboard and paper from householders. Both types of waste are treated separately at the Creed site but undergo similar pre-treatment processes of crushing and size-separation.

The organic waste is crushed repeatedly until the particles are a maximum of 50 mm in size before being transferred to the anaerobic digestion plant. Here, the material is heated at 57 degrees Celsius for around 26 days which more than complies with Animals By-Products Regulations that require it to be heated at this temperature for a minimum of five hours.

After 26 days, the solid material is drained of liquid and transferred to a windrow where it matures for 18 days into compost suitable for use as a soil conditioner.

The £10 million contract was funded by the Scottish Government. It can process up to 20,000 tonnes of material every year and has the capacity to produce 2,000 tonnes of low-grade soil conditioner and 4,000 tonnes of high-grade compost each year.

Biogas produced from the anaerobic process is converted into power and the digester has the capacity to produce 250 kilowatts a year of electricity and heat in a combined heat and power engine. Around half is used to power the treatment facility and the remainder is exported to the local grid.

The residual waste undergoes a different process. It is crushed and screened, with all oversize material - larger than 50 mm - sent to landfill. Undersize material, which is less than 50mm is transferred to an in-vessel composter, where it matures in the closed chambers for around 16 days to ensure the optimum amount of pathogens are killed off. This material will be then used as a low-grade soil conditioner, or alternatively may be landfilled.[39 & 40]

Anaerobic Digestion in Westray

Westray is the largest of Orkney's north isles with a population of just under 600, and the island has committed to become a 100% renewable energy community, aiming to produce the equivalent amount of renewable energy as is consumed at present from fossil fuel derived energy.

A recent addition to this plan is the construction of an anaerobic digestion plant on the Westray farm of Tuquoy built with assistance from Orkney Enterprise and Orkney Islands Council. Using cow slurry and grass silage, biogas is being extracted in the anaerobic digestion plant. When fully operational, the digester will be capable of handling 3,200 tonnes per annum of organic materials.

Local company Heat and Power Ltd was awarded two grants in spring 2007 from the Scottish Government's Scottish Biomass Scheme: the first to support the establishment of a growers group to supply grass as an energy crop, and the second to help the company construct its second digester using grass and cow slurry to produce biogas.

Westray Development Trust also hopes to support the development of other anaerobic digestion plant to divert organic household waste from landfill.

Supporting a Healthy, Just Society

Waste management policy and practice has a role to support a healthy and just society by minimising any health impacts of particular areas of waste policy; ensuring siting of infrastructure does not adversely impact on one particular social group or locality and through providing employment opportunities.

Location of Plant

In the last chapter we highlighted the tensions that exist between building energy from waste plants to generate heat, combined heat and power or electricity. There are related tensions that fit with decisions about the location of plant.

SPP10 encourages waste treatment infrastructure, such as energy from waste, to be sited on employment or industrial land, but does allow for local variation where there is sensible justification for doing so. Owing to concerns about local acceptability developers and local authorities may wish to site infrastructure away from residential areas. This is understandable, though not if it then frustrates the ability of any plant to supply locally based heating demand.

Tensions also exist between the economics of larger plant, versus the development of smaller plants focused on meeting local waste treatment needs. For example, Edinburgh, Midlothian, West Lothian, East Lothian and Scottish Borders are working together in development of a Lothian and Borders Outline Business case. One option may be the development of a single large plant handling waste from across all of these authorities, while in Skye The Highland Council is considering development of a smaller energy from waste plant on the island that will take waste from Skye and provide heating.

In making decisions about plant it will be important for developers and local authorities to involve the local population both in any decision and also through development of good neighbour agreements. We note that the Dundee plant has a longstanding Good Neighbour Charter with the local community which has helped resolve concerns within the local neighbourhood about the plant's operation (see below).

Research conducted by the Scotland & Northern Ireland Forum for Environmental Research (SNIFFER) into links between environmental quality and social deprivation suggests that there are links between the quality of the local environment and social deprivation.[41] The research showed that:

- People in the most deprived areas are far more likely to be living near *industrial pollution, derelict land* and *rivers of poorer water quality* than people in less deprived areas
- For *landfills, quarries and opencast sites* the patterns of relationship between deprivation and population proximity are less distinct. At a national scale there is no evidence to suggest that deprived populations are more likely than others to live near to landfill sites
- People living in the most deprived areas are more likely to experience poorer air quality than those living in less deprived areas.

Given existing experience to date, the focus should be on ensuring that the location of any future plants is not to the detriment of particular communities.

It is also worth bearing in mind that local circumstances will mean that there is no "one size fits all" solution. For example while there are valuable lessons from the experience in Shetland developing energy from waste infrastructure (see Shetland Case Study) alongside a district heating network, it is worth bearing in mind that there are significant differences that stem primarily from the remote location of the authority and the cost differentials that exist (e.g. in energy costs or in taking recyclate to market).

Using the Proximity Principle

In developing energy from waste schemes, a presumption for appropriate scale schemes that accord with the proximity principle should be established unless larger schemes can deliver clear resource efficiency benefits.

While this principle is shared by the Scottish Government and SEPA, there is a risk that this will not be delivered by local authorities and the private sector.

While we have not looked in any great detail at the current set of proposals for energy from waste plants in Scotland, we are concerned that there is a risk that schemes proposed could be for more centralised, electricity only plants. If so this would signal that insufficient regard is being given to the principles of sustainability, self-sufficiency and proximity set out in the National Waste Strategy, though it is accepted that these principles are not easily defined.

To ensure that sustainability is properly factored into decision making we recommend that the

Scottish Government sets minimum efficiency standards for new energy from waste plant. We would wish to see a minimum of 60% efficiency for new plant (this criteria does not cover advanced treatment technologies such as anaerobic digestion), which will encourage the development of schemes that can deliver clear resource efficiency benefits.

CASE STUDY: Experience of Energy from Waste in Shetland

The Shetland energy from waste plant is sited in Lerwick and works alongside an associated district heating scheme which has been operational for close to ten years. The main works for the Lerwick District Heating Scheme took place during 1998 and the first property was connected in November 1998.

The district heating receives most of its energy from the energy from waste plant, but also has back up oil boilers in a peak load boiler station. In 2006 a thermal storage tank was connected which now allows surplus heat to be stored and helps manage peak morning load when oil boilers traditionally had to be used. Based on the first year's operation, it is estimated that the thermal storage tank will pay for itself in approximately five years.

The energy from waste plant replaced an older traditional incinerator that did not comply with the EU Waste Incineration Directive. The plant treats approximately 22,000 tonnes of waste each year, which includes the bulk of Shetland's combustible domestic, commercial, fish, clinical and industrial waste, as well as pre-selected municipal waste from Orkney. The plant uses a moving grate incinerator with waste heat boiler, and exports an average 6.8MW of heat energy to the district heating scheme. The combustion process of the waste is 80% efficient and the 90% availability level of the plant demonstrates reasonable operational efficiency.[42 & 43]

Above: The Energy from Waste Plant in Lerwick Harbour

From the 22,000 tonnes of waste combusted each year, 300 tonnes of metal and 5,000 tonnes of bottom ash are recovered and 520 tonnes (of filter cake and fly ash) is sent for special treatment. The energy from waste plant is now working at full capacity; to respond to this the local authority is giving attention to waste minimisation initiatives, and increasing the level of recycling of municipal waste (rates now stand at 19.8%), in part so it can reduce the overall calorific value of waste and therefore increase throughput in the plant.

The district heating scheme itself has grown significantly since its inception and is now also working at close to full capacity. It has a network of over 27 kilometres of mains pipe and now has over 850 customers, including 110 non-commercial and public sector customers. These 110 customers – which include local schools, hospitals, the leisure centre and museum - account for about 63% of the heat output and help to underpin the economic viability of the scheme. Each customer has a heat exchanger - providing hot water for space heating and hot water - which replaces a traditional boiler.

The scheme has proved popular in the town. A survey of new users has shown very high levels of satisfaction, and the scheme has been able to benefit from word of mouth recommendations from existing customers. As a result the scheme has been closed to new applications while the operators – Shetland Heat Energy and Power Limited (SHEPL) – look at options for connecting new sources of heat generation.

Above: The SHEPL offices and peak load boiler station. The large silo at the rear is the thermal store. Behind the plant is the Lerwick Oil Fired Power Station

SHEPL has calculated that the scheme is now responsible for annual reductions of 11,250 tonnes of carbon dioxide, 500 tonnes of sulphur dioxide and 1,000 tonnes of NOx emissions that would have been caused by continuing reliance of fossil fuelled heating systems (primarily oil systems since the island does not have a mains gas supply).

SHEPL estimates that use of a local source of heating has meant that £800,000 per annum of expenditure now stays on the island, and that users are saving between £400,000 and £600,000 per year because of rising oil prices.[44 & 45]

Above: A typical heat exchange unit

To meet rising demand, SHEPL is considering alternative heat sources. These include:

- A wind to heat scheme using two turbines producing 1.6MW of electricity. This would power the energy from waste plant, before any surplus is diverted to the district heating scheme. This would add capacity equivalent to 200 additional homes
- Combustion of waste oils that are currently taken off the mainland at significant cost. These include waste cooking oils and waste industrial oils from local processor Shetland Oil Tools which is currently seeking consent from SEPA to burn this oil
- Use of waste heat from nearby industrial plants. The energy from waste plant is located in the harbour area alongside a number of major industrial sites including Shetland Catch, which has a high energy load for refrigeration. It has been estimated that between 2 to 5 MW of heat could be gained from the development of a CHP system for industrial users in the harbour area.

Delivering a Sustainable Economy

Development of energy from waste plants in Scotland will require investment from the private sector. It is clear that such investment is available, provided that the waste policy framework is clear to, and can be relied upon by, operators and investors. As a part of this the Polluter Pays principle necessitates that the environmental costs of a practice are paid alongside the economic ones and not separately or by a different group.

However, given the need to look at waste policy using a systems approach, there are relevant questions about how different aspects of waste policy and relevant funding can be mutually supportive instead of competitive. This question applies both to funding from the private sector and Government.

The role of business in supporting domestic recycling

Business has an important role in helping local authorities make cost savings in current and future recycling. Local authorities have been very successful in developing cost effective collection systems for old-style waste management. However reliance on the Strategic Waste Fund means that not all authorities have looked closely enough at opportunities to minimise costs or to maximise revenues from recycling.

Local authorities need to do more to develop recycling markets, and we note the work of WRAP and REMADE on this issue.

Integrating action on domestic and commercial waste

Questions remain about the integration of domestic waste management and policy with commercial waste management. Waste infrastructure (particularly landfill) has traditionally been shared. While commentators we spoke to during the course of our review differed as to how much the commercial sector will continue to rely on local government to provide necessary infrastructure, Government needs to take commercial waste issues into account when making future decisions on waste infrastructure.

Businesses, and in particular SMEs, need to have waste infrastructure available to them, and in rural areas there may be insufficient waste volumes to justify the private sector putting in infrastructure solely for use by business. In these instances, local government may struggle to avoid taking wider responsibility for strategic decisions on waste management. As part of this government may also be able to support and encourage business toward more sustainable forms of waste management. This is particularly important now that local government has greater responsibilities for local economic development.

Action on Commercial and Industrial Waste

It has been estimated that approximately 93% of the materials we use never end up in saleable products at all but are discarded during the production process and that approximately 80% of what we produce is discarded after a single use.[46] This means that the end user has direct control over only 7% of the materials we consume. This makes the role of business crucial in improving overall resource efficiency.

As well as the use of producer responsibility packaging regulations (which requires those who put packaging on the market to recover a proportion of it) the UK Government also has reserved powers in relation to packaging, including provisions on excess packaging. Beyond these regulations, support for the plan is primarily through funding support (for example to WRAP and Envirowise) and voluntary initiatives such as the Courtauld Commitment.[47] However, the Scottish Government has stated that it will consider further legislation if these types of voluntary action do not produce expected results.

The Scottish Government's *Household Waste Prevention Policy* and *Business Waste Framework* are both welcome, but both rely primarily on voluntary measures. Based on linked work from the SDC's Supermarkets Review[48] we see that there is a wider role for government in working with the commercial and in particular the retail sector to tackle rising waste levels.

Because European regulation relates primarily to domestic waste, this is where most Government action has taken place. However, most of the waste generated in Scotland stems from the commercial and industrial sectors. The way in which businesses deliver products and services to the public will drastically impact on the level of waste generated by households. Therefore greater focus on commercial waste will also support delivery of more sustainable domestic waste management.

Government should look at what other policy interventions might be used to encourage further action by industry, either to change products business supplies to purchasers that become

household waste, or to reduce the levels of waste generated by business itself. Government should also look more closely at what devolved powers exist that could be used to mandate action on waste avoidance.

One commitment that Government has already made is to annually review the use of landfill bans. The Landfill (Scotland) Regulations 2003 already prohibit the landfilling of a number of materials such as infectious clinical waste and tyres. Some countries have introduced more widespread landfill bans that include material that can be recycled, composted or thermally treated. **It is the SDC view that the Government should give strong consideration to setting bans for domestic or commercial items for which clear recycling or reuse markets already exist**. This would act as a strong incentive to suppliers to either support wider recycling or look at product re-manufacture to assist businesses and individuals in recycling.

Candidate materials would include glass bottles, green waste, paper/card, plastic bottles, untreated wood and textiles. In setting any landfill ban Government could set long lead in times to send signals to households, authorities and particularly to commercial companies to develop ways of dealing with this material. It is also worth noting that energy from waste plants would also indirectly benefit from having certain materials (or a proportion of) removed from the waste stream, particularly glass and many plastics. Glass has no calorific value but melts at a low temperature and impacts on plant operation, while the high calorific value of plastics limit the volume of waste that can be treated as plants are constrained by maximum thermal throughput as well as by physical waste volume.

Tackling Construction and Demolition Waste

Government needs to take more action to reduce Scotland's level of construction and demolition waste, which makes up 47% of all waste and is by far the largest single waste stream in Scotland. Of the ten million tonnes produced, almost three million tonnes is still landfilled[49], an amount greater than all of Scotland's household waste. The Government should look at best practice in this area and seek to impose stricter minimum standards through planning consents for new construction, building regulations and building control. Government itself could show leadership by setting more ambitious standards for building work associated with public buildings (including planned new social housing).

Of particular interest is WRAP's recent work to develop, test and introduce an accepted metric for measuring progress towards 'waste neutrality', called the Net Waste Method for the construction sector.[50]

The Net Waste Method relates specifically to materials efficiency on individual construction projects, i.e. the materials entering and leaving the site, and opportunities to 'close the loop'. It is aimed at enabling developers and contractors to optimise a project's design and delivery, rather than influencing the types of materials used. The outcome-based target encourages contractors to consider various ways of reducing wastage, and to prioritise those where the business and environmental case is strongest. By focusing on the top 5-10 changes, the impact can be maximised whilst minimising the effort.

Traditionally, waste has been measured by weight or volume. However, to determine Net Waste, WRAP is proposing that value is used as the indicator because:

- It will identify cost savings and motivate improvement in commercial organisations;
- It can be estimated from existing data on waste quantities; and
- It helps contractors identify priorities, such as waste reduction and the use of recovered materials in higher-value applications.

WRAP will be making web-based tools available and testing the method with the construction industry.

Given current discussions underway on a revised set of Building Regulations for 2012, **the Scottish Government and Scottish Building Standards Agency should consider the worth of the Net Waste Method for inclusion in the future standard**.

Funding Waste Infrastructure

Another issue that needs consideration is how Government decides on proposals from the private sector for new infrastructure. In this document we have noted the relevant criteria relating to greenhouse gas emissions, proximity etc. that we see need to be taken into account. Where Government is part-funding new infrastructure it will be easier for it to set minimum criteria. However, Government needs to make sure that SPP10 is used effectively to ensure that waste infrastructure being developed by local government and the private sector (to treat domestic and/or commercial and industrial waste) also accords with the principles of sustainable development.

While the Scottish Government has expressed a wish to develop a Scottish Futures Trust, at present PPP remains an option for the funding of public infrastructure.

If PPP schemes are to be used, then clearer criteria based on outputs should be used. We are concerned that criteria based on inputs – e.g. level of waste to be processed - may prejudice delivery of wider recycling work. Relevant output criteria would be considerations such as specifying technology types, setting minimum carbon standards or setting minimum technology and/or efficiency standards.

If the Scottish Government brings forward a Scottish Futures Trust, this must also ensure that when funding waste infrastructure, it uses clear output criteria and properly works alongside wider waste policy considerations such as waste minimisation and recycling.

It is also clear that there is significant interest in the private sector in developing waste energy infrastructure on a merchant basis. Local authorities must ensure that they maintain delivery on recycling through properly structuring any contracts with plant operators/owners. The planning system must also ensure that any energy from waste plants developed also meet sustainable waste criteria.

Sound Science & Good Governance

To ensure confidence in energy policy and delivery in general and in any developed plants in particular, it will be important that there is open provision of data on operation of any plants and confidence in decisions made about energy from waste infrastructure.

The open provision of such data and use of Good Neighbour Agreements and local liaison committees will be important in helping to build confidence. It will also be important that the public sees appropriate information is used in decisions on any plant that is consented by government.

The Use of Engagement

If public concern about energy from waste is to be overcome, communities and stakeholder groups need to be actively involved in discussion and planning of waste management infrastructure. Experience of engagement demonstrates that if communities have been involved in relevant policy decisions they are more likely to understand both the need for infrastructure (e.g. recycling, composting and energy from waste infrastructure) and also their role in supporting sustainable waste management policy (e.g. through recycling, composting or reducing their waste).

The public has genuine and relevant concerns about issues such as noise, vehicle movements, emissions and smells from waste plants. These need to be taken seriously by local authorities and the waste industry in discussing site and technology options, as well as by the operators or any resulting infrastructure.

The EU Waste Incineration Directive sets strict emissions criteria that all energy from waste plant has to comply with. This is backed by Guidelines and monitoring by SEPA. To overcome concerns about any resulting plant, it will be important that plant operators work with SEPA to ensure that data on emissions and operation is easily available by the general public.

At the heart of good governance is the need to engage the public and stakeholders systematically.[51] A two-way engagement process deepens the understanding and commitment of both decision-maker and participant. In doing so stakeholders, citizens and consumers will not only be more prepared to make changes themselves, they will also be much more likely to permit, and not resist, the significant shifts in policy that sustainable development requires.

From the Government's perspective, public and stakeholder engagement offers the following direct benefits:

- **It informs** the public and key stakeholders, not only through direct/indirect provision of information but also by stimulating public **conversations** on key issues
- It ensures **acceptable consultation processes** which generate a full and usable understanding of the public's concerns and aspirations around key issues and decisions
- It allows the information gained through these processes to increase the **robustness** of the resulting policy, and the likelihood of its implementation.

In addition, an engagement programme would deliver the following strategic benefits in line with Government priorities on sustainable development and democratic renewal:

- Generate shared **ownership** and responsibility across society for addressing the difficult issues that we face. This will raise the likelihood of successful implementation of sustainable policies, rather than leaving Government in a defensive position searching for 'quick-fix' measures
- Understand how to **engage the local community** in critical, long-term strategic decisions and change that involve significant complexity and uncertainty. Policy-makers will increasingly be presented with complex issues of strategic importance, which need to be dealt with as whole system rather than single issues, taking into account conflicting departmental objectives. A full 'public engagement' programme would enable significant shifts in policy and action.

Developing Good Neighbour Agreements

Wherever plant might be located, it will still be the case that a local community will have concerns. Furthermore, if higher efficiency plants are to be used, there will be a need to locate plant within a reasonable distance of other heat users (householders and/or business).

Operators should establish Good Neighbour Agreements or Charters with local residents and other local businesses so that any concerns about local impacts can be raised and hopefully resolved. The experience from the Dundee energy from waste plant highlights that such agreements can be an important tool in resolving problems and building confidence.

Under the Dundee Good Neighbour Charter[52], Dundee Energy Recycling Limited has agreed to:

- Consult openly with local people
- Keep strict environmental standards above the legal requirements
- Allow residents the right to inspect the plant
- Provide a file of 'jargon-free' information to local libraries, including statistics on emissions and other data from the Scottish Environment Protection Agency, as well as additional information requested by residents
- Take part in a liaison group of company representatives, local residents and scientific advisers, which meets at least four times a year.

DERL puts its "healthy relations with our community" down to the Charter. As well as ensuring regular inspections of the plant, the community forum has worked with DERL to sort out concerns about smells coming from the plant, and moving the vehicle route away from a school entrance.

Energy policy and waste policy links

To look properly at the possible role of energy from waste it is also important to consider related aspects of energy policy.

Government energy policy aims to deliver a stable, affordable, diverse and low carbon energy system. Within this context energy from waste could therefore make a contribution to energy needs.

Information from other parts of Europe demonstrates that energy from waste is common in other countries, and makes a contribution to meeting energy needs (see Figure 9 above).[53] Here in Scotland both the Dundee and Shetland plants are capable of providing heat. However, only the Shetland one does so. Looking ahead at decisions on future energy from waste plant, concern has been expressed by commentators that the preference amongst developers is for construction of electricity only plants.

There are a number of reasons for this. Firstly, electricity is a more flexible commodity than heat. It can be generated on site but then easily distributed to users elsewhere through the distribution and transmission system. The plant operator needs only contract for a connection to the network and the sale of electricity to a supply company. An exception to this rule is the use of anaerobic digestion; a process that produces a gas that can be used to provide energy in a number of different ways. A case study on anaerobic digestion is included for more information above.

Secondly, having a plant that provides heat requires siting of the within a reasonable distance of a heat load. It also means that the size of plant may have to be limited if there are low or inconsistent levels of heat loads present.

However, it is also clear that heat-only or combined heat and power (CHP) plants will operate at higher efficiencies than electricity only plant (upwards of 80% efficiency for CHP compared to as low as 12 to 15% for electricity only plant). Furthermore, experience of district heating shows that it can be an affordable, reliable source of heating for commercial and domestic users.

In England, Scotland and Wales, only five of the twenty-two existing municipal waste incinerators generate heat as well as (or instead of) electricity. However, recent experience suggests an improving situation: of the twelve schemes either under

construction or going through planning, six plan to generate heat. In Scotland, three out of the four schemes with planning permission or in scoping plan to generate heat[54], suggesting that Scottish guidelines on thermal treatment are having some bearing on industry thinking north of the border.

Energy from Waste plants could receive financial support through the Renewables Obligation (Scotland) if using biodegradable materials. The Obligation can act as a strong incentive to waste plant developers to specify electricity projects instead of other scheme types such as combined heat and power and heat only schemes.

In practice however, there has been limited take up of use of the Obligation for energy from waste plants, because only the element of generation which is derived from biodegradable sources can be claimed against (and because most plants process a mix of wastes, it is difficult to separate out and claim against the renewable part being incinerated) and due to increasingly strict criteria set by the Obligation.

However, Government is currently considering how the Renewables Obligation could be adjusted to offer more targeted support to a wider range of renewable technologies. This may offer an opportunity to re-examine the energy from waste eligibility criteria.

It is our conclusion that Government waste policy has been unable to make strong enough links between waste and energy policy, primarily because of the absence of policy on heat.

Waste Policy & Climate Change

One key aspect of governance that needs to be given more consideration in decision making is the contribution waste policy makes to Government action on climate change.

In 2008, the Scottish Government is expected to launch its consultation on a proposed Climate Change Bill setting a target of reducing Scotland's carbon emissions by 80% by 2050. This is the equivalent of a 3% reduction each year, which will be challenging to deliver. Future decisions on waste infrastructure must therefore take into account how they could deliver carbon savings. Savings could either be through better use of material resources, or by better comparison between alternative waste management options.

SEPA is developing the use of a Waste and Resources Assessment Tool for the Environment (WRATE) to assist national and local government in looking at the impact of different waste collection and treatment options. WRATE is a life cycle assessment (LCA) tool for comparing different approaches to the management of municipal solid waste.[55] As local authorities (either through their planning or waste management functions) seek to scope out the role of energy from waste, they need to make better use of this tool in considering future waste options and help them to fulfil SEPA's *Guidelines for the Thermal Treatment of Municipal Waste*.

Government requirements mean that the shadow price of carbon (SPC) should be assessed as part of any project appraisal. The SPC should form part of the assessment as set out in the HM Treasury Green Book. The SPC values the increase or decrease in emissions of greenhouse gas emissions resulting from a proposed policy. Put simply, the SPC captures the damage costs of climate change caused by each additional tonne of greenhouse gas emitted (converted into carbon dioxide equivalent - CO_2e - for ease of comparison). Updated interim guidance[56] has been issued by the UK Government, and is intended to bring this appraisal work into line with the Stern Review[57] assessment of the social cost of carbon.

The SPC should be used by government to assess alternative policy choices and whether different choices produce different carbon costs and impacts. Given related climate change policy, the Scottish Government should also decide on what minimum carbon standards it wishes to set for waste treatment. Given the potential range of technologies available Government should set minimum carbon standards for use in Scottish planning and funding decisions. With the exception of Advanced Combustion Technologies such as anaerobic digestion **all energy from waste plant should recover energy to a minimum level of efficiency no less than 60%**.

Using reliable information on Scotland's waste

We have been struck by how little monitoring of waste management is taking place. The Scottish Government and local authorities need to have a better understanding of the materials in our waste and the relative proportions. This is particularly concerning because much of the investment being put into recycling is to ensure that Scotland meets EU targets on the percentage of biological waste going to landfill. WRAP is currently studying food waste and early results suggest "much higher" levels in municipal waste than earlier studies have found[58]. If so, composting and anaerobic digestion would need to make a greater contribution to recycling/composting targets than previously thought.

If the biological content is higher than currently estimated then this would mean Government targets needing to be revised upwards to meet the absolute limits imposed by the Landfill Directive. Conversely, if levels are lower then targets could perhaps be reduced down. It is better to know actual levels sooner so that local government can plan effectively.

More accurate data on the composition of municipal waste would give clarity on whether the proposed actions will be sufficient to hit these targets.

The Scottish Government should undertake a compositional analysis of waste to give a clearer idea on actual fractions of Scottish waste, and in particular the level of biological waste. Furthermore, when local authorities introduce new initiatives, there needs to be more learning and assessment of progress so that they can better assess success of their minimisation, reuse and recycling schemes. Data on relative tonnages collected is insufficient for this.

Updating the National Waste Plan with an Action Plan

We are concerned by one of the key conclusions of the recent Audit Scotland report that it is unlikely that Government will be able to hit landfill diversion targets for 2013, particularly if it wants to see a significant role for energy from waste. It will be difficult for local government and the private sector to deliver the necessary infrastructure for energy from waste plants prior to 2013.

Government should (a) remain focussed on how to increase recycling (which can be implemented more quickly) and (b) to think clearly about what action is required for 2020, including giving clear direction on what energy from waste infrastructure will be needed at this point.

The private sector and local authorities require a long term policy framework and confidence in the delivery of this framework. We strongly agree with the Audit Scotland recommendation that **the Scottish Government should publish an action plan showing key milestones towards 2010, 2013 and 2020.** This Action Plan should be framed around the move to Zero Waste.

This Action Plan is needed given the fact that the National Waste Strategy and National Waste Plan are now eight and four years old. Both have proved effective documents at moving attention from landfill to recycling and waste figures show good progress here. Now is an appropriate time to review achievements on recycling to look at if the recycling target can be raised. We are of the view that this is possible. More importantly, this review should consider how to take more action on commercial and industrial wastes and finally, look at setting waste minimisation targets that go beyond the existing target of stabilising domestic waste levels by 2010.

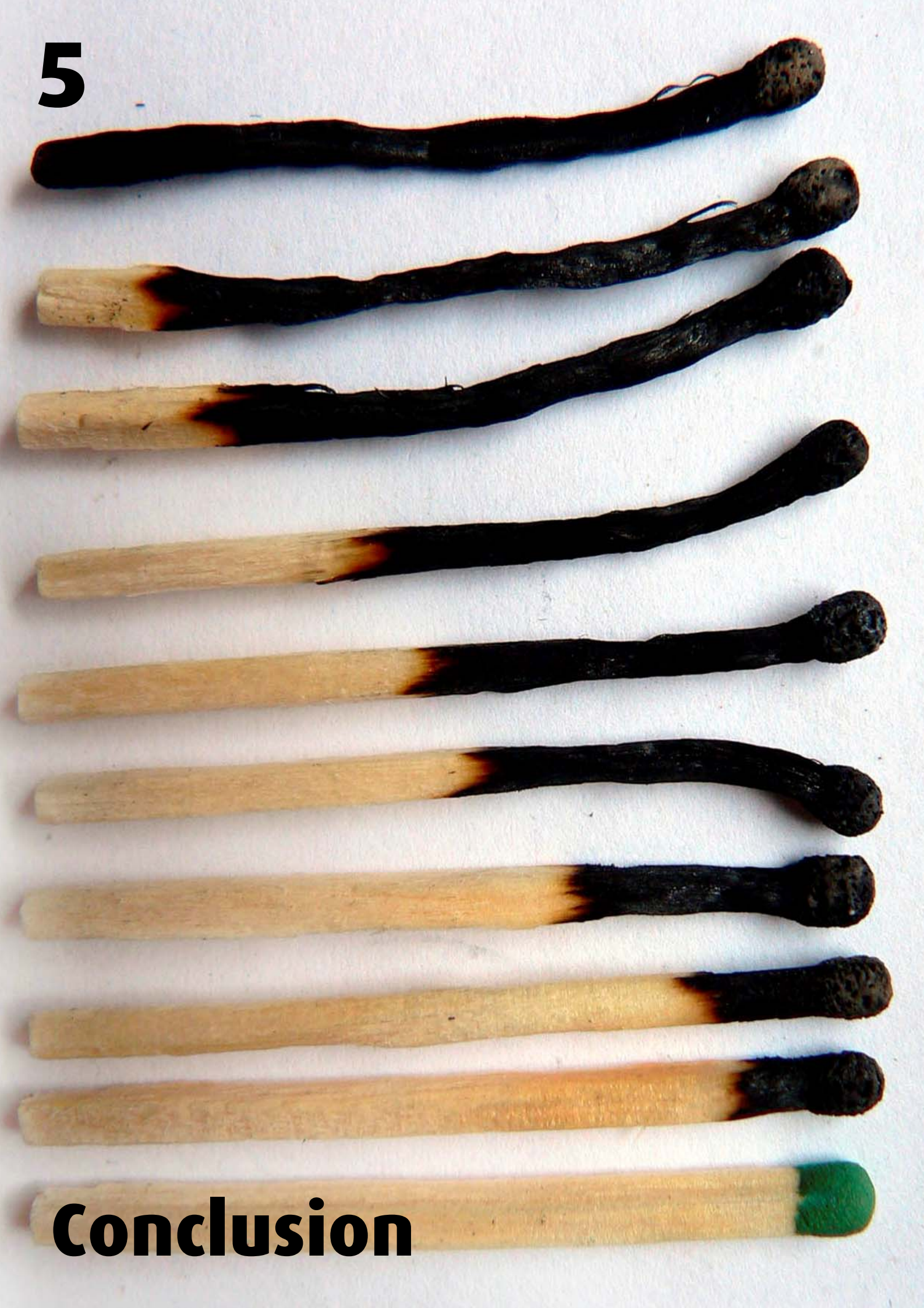
Changing the Culture of Waste Management

While **some local authorities** are making good progress on recycling, it is clear that others are finding this difficult and **do not see recycling or activities further up the waste hierarchy as a core part of their waste management duties**.

To date, much of the progress in recycling has been delivered because of funding through the Strategic Waste Fund. The roll out of Local Outcome Agreements (and the roll up of this source of funding into the 2008-09 Settlement) is an opportunity for local authorities to take on more direct responsibility for delivery of wider action on waste. It will be important that in the Local Outcome Agreements local government also commits to a framework on Zero Waste that goes above and beyond delivery of recycling targets but also covers waste minimisation.

As part of this delegation of responsibility, **Councils need to see that resource efficiency is a core part of their conventional waste management responsibilities, not an additional activity.**

5



Conclusion

It has been estimated that approximately 93% of the materials we use never end up in saleable products at all but are discarded during the production process and that approximately 80% of what we produce is discarded after a single use.[59] In Scotland the bulk of this waste still ends up being landfilled, and each year the amount of waste Scotland produces increases. Therefore in order to increase our resource efficiency and competitiveness action on movement towards a Zero Waste society needs to be a priority.

One potential tool in the transition to Zero Waste would be energy from waste. The overall conclusion of our review is that energy from waste may be, with the right conditions, compatible with sustainable development and a move toward a Zero Waste society and it is therefore realistic for the Scottish Government to plan for a limited role for energy from waste in Scotland.

We are of the clear view that further improvements can be made to recycling in Scotland, but are persuaded that recycling alone will not move Scotland away from landfilling of waste.

Three key factors emerge from our Review. Firstly, we would like the Scottish Government to set out clear criteria on how energy from waste plants should be delivered. Secondly, Government should take the opportunity to revise the National Waste Plan to set out a clear path to reflect the movement of policy to a framework for Zero Waste. Finally, Government needs to work harder to move the focus of waste management in Scotland onto a discussion of waste minimisation.

Setting Clear Criteria for Energy from Waste

More action is needed to make improvements elsewhere in the waste management process to deliver greater resource efficiency *and* reduced dependence on energy from waste as a disposal option.

We believe that the Scottish Government's aspiration to move toward a Zero Waste society provides a good framework for deciding the best way forward. *If* overall waste policy is to accord with the principles of sustainable development, **our review has highlighted a number of conditions that should be used to guide the development and use of energy from waste.**

Revising the National Waste Plan

If local authorities are to deliver on 2010, 2013 and 2020 targets they need to have clear, staged milestones. For its part Government needs to ensure that Local Outcome Agreements reflect new policy aspirations on Zero Waste. Therefore it would be appropriate that **the National Waste Plan should be revised as follows**:

- **Assess the existing recycling target.** Delivery of recycling targets to date has been strong, meaning that Scotland has an opportunity to divert an increasing proportion of its waste from landfill
- **Set targets that go beyond the existing waste stabilisation target.** 2013 and 2020 targets could be set that deliver waste minimisation.
- **Identify more clearly the role of business in meeting Zero Waste targets.** As well as increasing competitiveness, minimising production of waste by business will support Scottish Government *Greener* Priorities.

Moving Waste Policy up the Hierarchy

National and local Government have struggled to move delivery of waste policy up the Waste Hierarchy. Action on meeting EU landfill diversion targets was long overdue, though delivery of rapid increases in recycling levels has been impressive.

The Scottish Government's announcement that it is to use the framework of Zero Waste – and related commitments in the Spending Review 2007 - to define more clearly the direction of policy is therefore welcome. A major concern however, is that **much of the debate around management of Scotland's waste is stuck within a debate around energy from waste versus recycling. We see this as a false debate.**

If Government had to choose it would be more sustainable to give priority to a 5% reduction in domestic waste being generated, not to a 5% increase in recycling of domestic waste. Recycling an increasing percentage of an increasing volume is less sustainable than recycling a fixed amount of a decreasing volume.

We would like the Scottish Government to review its waste stabilisation target with a view to going beyond this and making overall waste reductions in accordance with a Zero Waste Framework. **Increasing Scotland's recycling target *without* also looking at further action on waste minimisation would be a missed opportunity.**

Appendices

Appendix One: Our Response to Government Questions on Waste Policy

Here we outline our answers to the specific questions that Government posed in commissioning this work.

1. How much impact do you think that waste prevention measures could make in reducing and reversing the growth in municipal waste over the period up to 2020?

The Government has a target to stabilise volumes of domestic waste produced by 2010. Despite this aim, local authorities are developing scenarios for waste management that show a continued growth in waste generation.

This suggests that a step change in approach and performance is essential in order to pursue a waste policy informed by sustainable development.

It is now also important to consider the impact of the expected Climate Change Bill, which will set out a target to reduce carbon emissions by 80% by 2050. In this context we would expect waste policy to change in order to make a contribution to greenhouse gas emission reductions.

This would move waste policy beyond the existing waste stabilisation targets to a more ambitious and holistic approach to waste – namely Zero Waste. More action is required to increase resource (including carbon) efficiency by firstly reducing overall volumes of waste being produced and secondly by giving greater consideration to the carbon reductions within choices in the hierarchy (for example between different energy from waste options).

Action to date has focused on how to deal with waste generated in a more sustainable way through diverting waste away from landfill toward more recycling. In practice this has resulted in a lack of attention on factors further up the waste hierarchy.

Setting policy in the context of Zero Waste provides Scotland with the opportunity to look afresh at waste policy and to give more priority to overall resource efficiency (including greenhouse gas emission reductions).

We note the experience of Western Australia which has committed to move towards a zero waste society between now and 2020. As part of this the State is committed to putting half of its effort into prevention by 2012. Scotland should seek to implement a similar programme using Zero Waste as the framework for policy development and as part of this set a target to reduce waste beyond the existing 2010 waste stabilisation target.

2. What level of recycling and composting of municipal waste from kerbside collections/ recycling points and centres do you think is feasible in Scotland in the short term (say 2010) and for the further target years 2013 and 2020?

To support delivery of the Landfill Directive targets, Government has set interim targets for recycling and composting of 25% by 2006; 30% by 2008 and 55% by 2020.

Experience in the last five years clearly shows that Government policy has been very effective at driving waste management in a sustainable direction because interim targets are being met. To date authorities have been focused on establishing collection and treatment facilities, but they also need to look more closely at the development of markets and the expansions of collections. This leads us to believe that recycling/composting targets are achievable if more attention is given to the use of recycling markets and to increase the range of materials collected to offset rising expenditure.

The most recent data confirms that despite a rapid increase in the level of recycling, Scotland's performance on municipal recycling/composting is still below the EU25 average, highlighting that there is more Scotland could do.

We recommend that Government reviews existing recycling targets. While this may mean that energy from waste has a smaller role to play, any increase in recycling should aim primarily to divert waste from landfill.

Interim figures suggest that Scotland has already hit its 2008 target, so by 2010 should be making steady progress to the 55% target. In this case, Government might wish either to extend the 2020 target to 60%, or to set a higher target for a date further in the future (e.g. 2025).

However, we are also aware that one of the requirements of a Zero Waste approach is to make the primary focus waste minimisation. We are therefore concerned that increasing the recycling

target (for example delivering 60% or 70%) could merely focus even more attention on recycling at the expense of policy action on minimisation.

It would be more sustainable to recycle a fixed percentage of a reducing amount of waste, than an ever increasing level. The Government's priority should be on making reductions in waste volume. Therefore Government should look to set targets linked to 2013 and 2020 that go beyond the waste stabilisation target and set out waste reduction targets.

These revised recycling targets and new reduction targets could come as part of a revised National Waste Strategy and Action Plan that properly sets out how national and local Government Zero Waste Policy, including increased commitments towards waste minimisation and reuse.

3. Should thermal treatment to generate energy from waste play a part in our thinking and, if so, what level of contribution do you think is appropriate given the commitment to the waste hierarchy and the priority attached to waste prevention and recycling and composting in that hierarchy?

Thermal treatment of waste can be sustainable. Energy from waste is an appropriate part of a pathway toward zero waste aspirations and is not incompatible either with increasing recycling and reducing waste volumes or better waste management practices.

If recycling can meet higher targets, there is scope for reductions in the role of energy from waste. However, priority should be on movement away from landfill, and energy from waste is of course a preferred treatment option to landfill which remains Scotland's main disposal route for domestic waste.

The priority for using energy from waste ought to be the ability of this technology to divert biological municipal waste from landfill, given the fact that this is the primary driver behind European directives, and because unlike for many recyclables there is little market demand for collecting and recycling of biological material. Given this, we would like to see more Government focus on anaerobic digestion and encouragement of schemes to use this technology in Scotland.

When considering applications for energy from waste plant (both funding and planning applications) Government needs to give greater weight to issues relating to climate change and the relative efficiencies of different energy from waste technologies. To do this Government needs to set minimum energy efficiency and environmental standards for such facilities. SEPA's thermal treatment guidelines are a good starting point here.

We are also concerned about how Government is seeking to ensure that the proximity principle is adhered to in considering waste treatment options. While we have not looked in detail at individual schemes we would like to see assurances from Government that future schemes will be for higher efficiency plant. Without this, there is a risk that Scotland will see the construction of larger scale centralised schemes that avoid local treatment and may have lower resource efficiency than alternative smaller scale local proposals.

However, we recognise that without related policy developments in energy, planning, building regulations and procurement there are limits to what waste policy itself can do to ensure that more sustainable outcomes are delivered.

4. If you consider that thermal treatment is not consistent with sustainable development in Scotland, what alternative measures should we be considering to eliminate the gap between our landfill diversion targets and the realistic contribution that can be made by waste prevention and recycling and composting?

While we note that thermal treatment could be consistent with sustainable development, specific criteria are needed to guide how energy from waste is developed. Energy from waste or higher levels of recycling are not a substitute for doing more to encourage waste prevention.

To date, most policy actions on prevention and reuse have been voluntary ones. If we are to deliver existing waste stabilisation targets and ultimately deliver waste reduction to support wider climate change targets then better performance is needed and this raises the potential to move beyond voluntary measures. An Action Plan setting out a Framework for Zero Waste is the right place in which to do this and we would commend the approach we have found in governments such as Western Australia and New Zealand to the Scottish Government.

Government should (a) look to set waste minimisation targets for municipal waste that go beyond existing stabilisation targets; and (b) set minimisation targets for commercial, industrial, construction and demolition wastes.

Appendix Two: Abbreviations

AD	Anaerobic Digestion
BERR	Department for Business, Enterprise and Regulatory Reform
CHP	Combined Heat and Power
CHPQA	Quality Assurance for Combined Heat and Power
CO_2e	Carbon Dioxide Equivalent
CoSLA	Convention of Scottish Local Authorities
DEFRA	Department for Environment, Food and Rural Affairs
DERL	Dundee Energy Recycling Limited
ENDS	Environmental Data Services
EU	European Union
MRF	Materials Recycling Facility
PPP	Public, Private Partnership
RO	Renewables Obligation
ROC	Renewable Obligation Certificate
ROS	Renewables Obligation Scotland
SBSA	Scottish Building Standards Agency
SDC	Sustainable Development Commission
SEPA	Scottish Environment Protection Agency
SHEPL	Shetland Heat Energy and Power Limited
SME	Small or Medium Sized Enterprise
SNIFFER	Scotland and Northern Ireland Forum for Environmental Research
SPC	Shadow Price of Carbon
SPP10	Scottish Planning Policy 10 (Planning for Waste Management)
WRAP	Waste and Resources Action Programme
WRATE	Waste and Resources Assessment Tool for the Environment

References

1 This report is an advisory report for the Scottish Government. In this report when we refer to Government we refer solely to the Scottish Government, not other parts of Government. Where we refer to the Scottish Executive, this is in reference to work conducted by the Government in Scotland prior to the change of name to the Scottish Government. The term "Scottish Executive" remains the legal identity of the Government in Scotland

2 Audit Scotland (2007) Sustainable Waste Management

3 UK Government, Scottish Executive, Welsh Assembly (2004) One Future Different Paths

4 Scottish Executive (2005) Choosing Our Future – Scotland's Sustainable Development Strategy

5 Scottish Government (2007a) The Government Economic Strategy

6 Sustainable Development Commission (2007) Sustainable Development: A Review of Progress by the Scottish Executive

7 In *Sustainable Development in Scotland: A Review of Progress by the Scottish Executive* we noted that "Despite these positive steps, Scotland's overall production of waste and the amount of material being sent to landfill continues to increase. Waste from the commercial sector is a particular concern". This statement was partially inaccurate and has now been updated in the version quoted in this report.

7 EU (1999) Council Directive 99/31/EC of 26 April 1999 on the Landfill of Waste

8 SEPA (1999) National Waste Strategy

9 Scottish Executive & SEPA (2003) The National Waste Plan

11 Scottish Government (2007b) Scottish Planning Policy 10: Planning for Waste Management

12 Scottish Government (2007a)

13 Scottish Government (2007c) Scottish Budget: Spending Review 2007

14 Scottish Government (2007c) p.40

15 Scottish Executive & SEPA (2003) , p.90

16 Department of Environment and the Waste Management Board (2004) Strategic Direction for Waste Management in Western Australia

17 Waste Management Board (2006) The Vision in Action: Business Plan and Budget 2006-07

18 Ministry for the Environment (2002) The New Zealand Waste Strategy

19 Ministry for the Environment (2007) Cabinet Paper: "Towards a Sustainable New Zealand: Measures to minimise solid waste"

20 SEPA (2007a) Waste Data Digest 7 (including 2005 and 2005/2006 data)

21 SEPA (2007b) The November 2007 Landfill Allowance Scheme dataset released by SEPA shows that between July 2006 and June 2007 the average recycling rate was 29.8%

22 ENDS, November (2007) Issue 394, "Wales considers 70% recycling target", p.42

23 European Environment Agency (2007) The road from landfilling to recycling: common destination, different routes

24 SEPA (2004) Guidelines for Thermal Treatment of Municipal Waste. Forthcoming Thermal Treatment Criteria will update these guidelines.

25 SBSA (2007) A Low Carbon Building Standards Strategy for Scotland

26 DEFRA/BERR (2007) Renewable Heat Support Mechanisms: Review conducted by Ernst and Young

27 Ofgem (2007) Renewables Obligation: Fuel Measurement and Sampling Guidance, Ref: 57/07

28 The CHPQA programme is a scheme that Future Energy Solutions (FES) runs on behalf of Defra. A qualifying station will hold a valid Secretary of State Combined Heat and Power Exemption Certificate 2 (SoS Certificate) and a CHPQA Certificate.

29 ENDS, November (2007) Issue 394, "BERR acts to maintain support for energy from waste plants", p.11

30 Audit Scotland (2007)

31 Audit Scotland (2007)

32 Scottish Waste Summit, 3rd October 2007, Edinburgh

22 Scottish Executive & SEPA (2007b) Household Waste Prevention – Action Plan (Scotland)

21 Scottish Executive & SEPA (2007a) Business Waste Framework

35 For more information see the Community Recycling Network for Scotland (www.crns.org.uk)

36 SEPA (2007a)

37 EU (2000) Directive 2000/76/EC of the European Parliament and of the Council of 4 December 2000 on the incineration of waste

38 SEPA (2007b).

39 Let's Recycle (2007) "Western Isles expects recycling boost with MBT". www.letsrecycle.com

40 Information provided by Comhairle nan Eilean Siar. See www.cne-siar.gov.uk

41 SNIFFER (2005) Investigating Environmental Justice In Scotland: Links Between Measures of Environmental Quality and Social Deprivation

42 Shetland Islands Council (2006) Energy Recovery Plant information sheet

43 Shetland Islands Council (2006) Lerwick District Heating/Energy Recovery Plant/Waste Management Targets and Performance 2005-06 information sheet

44 Shetland Heat Energy and Power Limited (2007) Update Information Sheet, August 2007

45 Shetland Heat Energy and Power Limited (2007) Lerwick District Heating Scheme, Briefing Notes for Visitors, August 2007

46 Von Weizsacker, E, Lovins, A B, and Lovins HL, (1997) Factor 4:Doubling Wealth – Halving Resource Use

47 WRAP's Courtauld Commitment was signed by 13 grocery retailers in 2005. The initiative was developed between government and trade groups. These groups have pledged to (a) design out packaging waste growth by 2008; (b) deliver absolute reductions in packaging waste by March 2010; (c) identify ways to tackle the problem of food waste.

48 Sustainable Development Commission (2008) Supermarkets Review – forthcoming publication

49 Information based on 2004 data provided by SEPA

50 WRAP (2007) The Net Waste Method – testing a new standard for measuring waste neutrality

51 Environment Council (2006) Designing engagement for the waste sector. Also, for more information on engagement see the SDC website section on engagement

52 Green Futures (2001 and 2006) www.forumforthefuture.org.uk/greenfutures/articles/60492 and http://www.forumforthefuture.org.uk/greenfutures/articles/602682

53 European Environment Agency (2007)

54 ENDS, November (2007) Issue 394, "mass burn begins its big breakthrough", pp.28-31

55 The Environment Agency: Waste and Resources Assessment Tool for the Environment

56 DEFRA (2007) How to use the Shadow Price of Carbon in policy appraisal – Interim Guidance

57 HM Treasury (2006) Stern Review on the Economics of Climate Change

58 ENDS, November (2007) Issue 394, "Wales considers 70% recycling target", p.42

59 Von Weizsacker, Lovins and Lovins (1997)

The Sustainable Development Commission Scotland is the Scottish Government's independent advisory body on sustainable development.

The Commission reports to the First Minister of Scotland on key policy areas including regeneration, sustainable buildings, local government, energy and food. SDC helps government, public bodies, local authorities and businesses put sustainable development at the heart of what they do.

Sustainable
Development Commission
Scotland

Osborne House
1 Osborne Terrace
Edinburgh
EH12 5HG

0131 625 1880

Scotland@sd-commission.org.uk

www.sd-commission.org.uk/scotland