

Chapter 10: Cross-cutting Issues relating to the Built Environment

Summary

- A number of issues apply across the built environment, including district heating, planning, microgeneration, water efficiency and waste.
- District heating has evolved significantly - networks are now highly efficient, with sophisticated heating controls. A number of local studies have identified significant opportunities for energy savings from district heating. Equivalent work needs to be carried out to investigating likely opportunities in other areas.
- The source of heat for a network will affect its energy efficiency and reduction in greenhouse gas emissions: waste industrial heat or biomass-fired combined heat and power (CHP) are likely to offset the most greenhouse gas emissions.
- While district heating and CHP are supported by a number of policies, this has not resulted in the level of deployment for which there is potential. A number of interventions may assist, including financial support for up-front costs, support through land-use planning with positive encouragement for heat mapping by local authorities, and support to local authorities in establishing ESCOs to develop district heating schemes.
- Planning can play a key role in achieving the energy efficiency targets to be set in the Energy Efficiency Action Plan. In particular, permitted development, positive planning policies relating to design and orientation of buildings, microgeneration, and district heating are relevant. Strategic and local development plans can proactively consider energy infrastructure, travel modes and distances travelled, reducing the upfront costs and resource to achieve energy efficiency targets.
- The most cost-effective energy efficiency measures alone will not achieve our emissions reduction targets. Microgeneration must also play a role.
- A number of Scottish Government initiatives already support microgeneration (and larger-scale renewable energy technologies), including the Energy Saving Scotland Home Renewables and the Community and Renewable Energy Scheme (CARES). The Climate Change (Scotland) Act requires Ministers to bring forward permitted development rights for domestic air-source heat pumps and micro-wind turbines within six months of this section of the Act coming into force.
- From April 2010, the UK Department of Energy and Climate Change (DECC) will be introducing Feed-In Tariffs (FITs) for electricity generators under 5 MW.
- Two aspects of water efficiency affect energy consumption: the energy used to produce drinking water and to treat it; and how much energy is used to heat the water we use in our homes and businesses. The Scottish Government will consider the impact of water efficiency regulation in building standards and take this into account when reviewing the building standards in 2013. We have also funded a pilot water advice service, the first of its kind in Europe.
- The Scottish Government recently launched its consultation on the National Waste Management Plan. It works to the principle of zero waste - eliminating the unnecessary use of raw materials, re-using products where possible, and recovering value from products when they reach the end of their lives, either through recycling, composting or energy recovery. Eliminating the use of raw materials and reusing our unwanted goods can reduce energy use and associated greenhouse gas emissions from products.

Introduction

10.1 This chapter covers a number of issues which apply across the built environment – domestic, non-domestic, and the public sector within this. These include district heating,

planning, microgeneration, water efficiency and waste. There are significant links in a number of these areas, particularly district heating and microgeneration, to the Renewable Heat Action Plan being developed.

District heating and combined heat and power

What is district heating and combined heat and power?

10.2 District or community heating normally refers to the supply of heating on a community scale from decentralised, locally-installed, and sometimes off-grid boiler plant or combined heat and power (CHP) plant via a network of very well insulated pipes which usually carry hot water to homes, businesses and community buildings. District heating has evolved significantly from the days when it was first installed. Networks are now highly efficient, with sophisticated heating controls that allow suppliers to maintain the network and consumers to manage their heat use easily.

10.3 In some community heating (or community energy) schemes, the pipework may cover just a large block of flats, whereas district heating refers to a network of buildings. Generally, the larger the network, the larger and more efficient the plant providing the heat can be, but the higher the heat loss and energy required to pump water. Such networks can be many miles long. In Denmark, where district heating accounts for about 60% of the heat supplied, cities such as Copenhagen receive heat from large-scale power stations and energy from waste plants situated up to 24 miles away.¹⁵⁶ Properly installed pipes can easily last fifty to a hundred years or more.¹⁵⁷

10.4 The source of heat for a network will affect the energy efficiency and reduction in greenhouse gas emissions provided by the overall network. Heat sources may be modular and can include the following:

- waste industrial heat (such as from power stations, chemical or food processing);
- gas-fired CHP;¹⁵⁸
- biomass-fired CHP;
- gas or biomass boilers (often to provide back-up or top-up heat).

10.5 The long lifetime of a properly installed and well-maintained heat network allows the central plant to be upgraded or replaced as new more efficient or low emission technologies become available or more cost-effective.

10.6 Waste industrial heat, if this is available, and biomass-fired CHP are likely to offset the most greenhouse gas emissions in the majority of situations. The development of heat networks powered by biomass will be covered in the Scottish Government's Renewable Heat Action Plan, being published Autumn 2009. In certain situations, gas-fired CHP can be an important first step to achieving a biomass CHP heat network, for example, where the network isn't yet large enough and so the heat demand not high enough for biomass CHP. Currently, smaller-scale gas CHP is a more proven technology than small-scale biomass CHP. It is also currently more cost-effective to apply the best air quality filters to larger biomass plants.

¹⁵⁶ See DECC, 'Heat and Energy Saving Strategy Consultation', 2009 (http://hes.decc.gov.uk/consultation/consultation_summary).

¹⁵⁷ See www.iea-dhc.org/reports/summary/dhcV_6.pdf, p. 35.

¹⁵⁸ CHP plant is normally an engine. However, fuel cells, a more recent and currently much more expensive technology, also provide heat and power. The proportion of heat and power provided by a fuel cell is more evenly weighted compared with traditional CHP engines which provide more heat. Fuel cells can use hydrogen as a fuel.

10.7 As the capital costs of developing heat networks can be high, they are often developed in stages. While the ideal heat source is normally waste industrial heat or biomass, using gas-fired CHP in the early stages of a network still represents significant energy and greenhouse gas savings, as the efficiency of a good quality gas-fired CHP engine is normally around 85%, compared with the efficiency of most of Scotland's fossil fuel electricity power stations of around 35%. This is because a lot of heat produced in Scotland's electricity power stations is wasted (see Chapter 8, paragraph 8.39).

10.8 CHP, particularly gas-fired CHP, can come in a wide range of sizes, from micro (applicable to a large house) to the size of large electrical power stations. In 2008, total electrical output from Good Quality CHP¹⁵⁹ was about 28 TWh, equivalent to around 7% of UK electricity production.¹⁶⁰ Even for gas-fired CHP, units suitable for individual homes tend to be at the field trial stage of development.

Cost

10.9 In a study to assess the cost of carbon abatement policies in the Netherlands, CHP was identified as one of the lowest-cost solutions - lower than building insulation, condensing boilers and wind power.¹⁶¹ Ideally CHP technologies need a relatively consistent heat demand as they need to run for many hours a year to be more cost-effective. This is often the case in buildings such as hospitals, leisure centres (particularly with swimming pools), prisons, hotels or care homes.

10.10 The development of a district heating network is often based on an 'anchor load' – a building or group of buildings with a relatively constant heat demand - and extended from this point. However, the networks are expensive to install and the lack of experience of district heating in the UK, coupled with lengthy payback periods, means that district heating is not very attractive in the present commercial and regulatory environment. The cost-effectiveness of a district heating network is highly dependant on the distance between where the heat is produced and where it will be used.

10.11 Much of the modern development of heat networks has required the involvement of an energy services company, or ESCO (see paragraphs 12.39-12.41). The need to set up such an organisation can delay the development of heat networks and add to the costs. However, there are now more commercial ESCOs in the UK that developers or public bodies may choose to work with. Where it is considered necessary to set up a not-for-profit community ESCO to maximise the benefit to the local community, such as with Aberdeen Heat and Power (see Box 10.1), sharing experience and paperwork, such as template contracts, with organisations that have already gone through this process may reduce set-up time and costs.

Opportunity for district heating and CHP

10.12 Denmark, Finland, Russia, Latvia and the Netherlands have all expanded their use of CHP to about 30-50% of total power generation.¹⁶² These countries have taken differing

¹⁵⁹ Good quality CHP refers to CHP capacity that is registered and certified by the UK CHP Quality Assurance Programme (www.chpqa.com) as being of high efficiency. This is an auditable accreditation methodology for assessing, certifying and monitoring CHP schemes that provide heat to industry, commercial and domestic customers.

¹⁶⁰ Digest of UK Energy Statistics, 'CHP capacity, output and fuel use by sector' (DUKES 6.8) (www.berr.gov.uk/energy/statistics/source/chp/page18528.html).

¹⁶¹ Boonekamp et al, 2004. Quoted in International Energy Agency, Cogeneration and District Energy, 2009 (www.iea.org/files/CHPbrochure09.pdf).

¹⁶² International Energy Agency, 'Combined Heat and Power: Evaluating the benefits of greater global investment', 2008 (www.iea.org/Textbase/Papers/2008/chp_report.pdf).

approaches. For some, the approach has focused on the local planning process; others have had state or city owned energy companies, while still others have focused on government fiscal support.

10.13 AEA Technologies identified the UK potential for CHP deployment in the areas of industry, individual buildings and community heating in a 2007 report.¹⁶³ It estimated a potential for new generation by 2015 of as much as 81 TWh of electricity and savings of 57 TWh. The largest potential was identified within the medium- to low-temperature industry group, which includes chemical, engineering and food industries. Significant potential was also identified for refineries and Liquid Natural Gas (LNG) plants, and in individual public and commercial buildings.

10.14 There are a number of successful district heating schemes in Scotland (see Box 10.1). A number of individual studies have also identified significant opportunities for energy and emissions savings by using district heating to deploy waste industrial heat or CHP. Examples include Glasgow, Falkirk (using waste heat from Grangemouth), the extension of the existing network in Aberdeen, and more than one site in Edinburgh.¹⁶⁴ However, such studies have not been carried out consistently in all local areas where heat networks are likely to deliver significant energy and heat savings.

Box 10.1 Examples of successful district heating schemes in Scotland

Aberdeen Heat and Power

Aberdeen Heat and Power Company, a not-for-profit energy services company (ESCO), was established by Aberdeen City Council in 2003. It has installed a CHP district heating system into a number of areas in the city, including in:

- 4 multi-storey blocks in Stockethill (288 flats in total); a swimming pool, sheltered accommodation (45 flats);
- 4 multi-storey blocks (188 flats) and the Academy in Hazlehead;
- 3 sheltered accommodation blocks, 3 multi-story blocks (503 flats), and a sports facility changing room in Seaton.

As an example of the benefits, replacing the electric storage heating in Stockethill with district CHP reduced CO₂ emissions by 40% and halved the heating bills of residents, 70% of whom were thought to be in fuel poverty. The total project cost was approximately £1.8 million. Aberdeen Heat and Power has identified a number of further opportunities for significant energy savings and emissions reductions by extending the heat network and is seeking the finance to do so. Other local authorities considering setting up such an ESCo could benefit considerably from the experience at Aberdeen.

Edinburgh University

Since 2003 Edinburgh University has installed CHP systems on three of its campus sites:

- Pollock Halls of Residence, home to more than 2000 undergraduates – the system provides heat to 1,400 dormitory rooms in six houses plus two refectory and administrative buildings via an existing hot water distribution system in walkway ducts, saving 450 tCO₂ annually and costing £1 million;
- Kings Building campus - an existing central plant and steam distribution system was replaced with a CHP system and a new hot water distribution system – the option chosen based on the lowest whole-life costs; and
- George Square – a tri-generation system providing heat, cooling and power was installed replacing the 50-year-old steam boilers.

10.15 A number of interventions have been highlighted as providing potential support for district heating in order to overcome the barriers associated with these technologies and to take advantage of the opportunities it present. This includes financial support for up-front costs, particularly for district heating pipes, support through land-use planning with positive encouragement for heat mapping by local authorities, and support to local authorities in establishing ESCOs to develop district heating schemes.¹⁶⁵

¹⁶³ DEFRA, 'Analysis of the UK potential for combined Heat and Power', 2007

(www.defra.gov.uk/environment/climatechange/uk/energy/chp/pdf/potential-report.pdf).

¹⁶⁴ See PB Power for Edinburgh City Council and WWF Scotland and Greenpeace, 'Powering Edinburgh into the 21st Century', 2006 (www.greenpeace.org.uk/media/reports/powering-edinburgh-into-the-21st-century) and studies by individual developers.

¹⁶⁵ WWF, 'Carbon Countdown for Homes', 2009

(www.wwf.org.uk/what_we_do/changing_the_way_we_live/research/?2121).

10.16 Currently, district heating and combined heat and power are supported to varying degrees by a number of policies and activities including:

- The EU Emissions Trading System;
- Exemption from the Climate Change Levy and the Renewables Obligation;
- Encouragement of district heating in the second National Planning Framework and a tool to help masterplanning (see below);
- Scottish Government draft planning guidance in relation to thermal power stations which includes how applicants should consider the issue of waste heat usage.¹⁶⁶
- The publication by Scottish Government of a heat map of Scotland, commissioned by Forum for Renewable Energy development in Scotland (FREDS).¹⁶⁷
- Programmes such as the Energy Efficiency Design Awards, which has received applications for funding for smaller-scale CHP projects in existing housing;
- CEEF funding (see Chapter 9), which has been used in Aberdeen to link the new sports pavilion at Hazlehead into the district heating scheme; and
- The Scottish Government's Community and Renewable Energy Scheme (CARES) – providing free advice and grant for technical assistance and capital installation of renewable district heating.

10.17 However, for a number of these measures district heating and CHP are not the core purpose of the support mechanism and to date this support has not seen the levels of deployment that have been identified as opportunities for these technologies. This suggests that greater support is needed.

Q 46: Given the powers available to Scottish Government, which actions should we focus on to support the deployment of low-carbon district heating?

Q 47: What actions should other key stakeholders, such as local authorities and industry, be encouraged to focus on to support low-carbon district heating. How should Scottish Government help to achieve this?

Planning

10.18 Planning is referred to a number of times throughout this consultation as playing a key role in achieving the energy efficiency targets to be set in the Energy Efficiency Action Plan and the emissions targets set in the Climate Change (Scotland) Act. Key areas include:

- permitted development of small-scale low- and zero-carbon equipment (see below);
- local policies which encourage or require:
 - i) the appropriate design and orientation of buildings to reduce energy demand;
 - ii) connection to existing low-carbon heat networks;
 - iii) design so that future connection to planned heat networks is possible;
 - iv) deployment of other small-scale low and zero carbon technologies;
- strategic and local development plans which support reduced energy consumption by:
 - i) reducing the need for transport (see paragraphs 11.9-11.10);
 - ii) identifying sites or routes for larger-scale decentralised energy infrastructure (see below).

10.19 Following the consultation on the draft consolidated Scottish Planning Policy (SPP),¹⁶⁸ the SPP will need to be updated in certain subject areas and alterations made to

¹⁶⁶ See www.scotland.gov.uk/Topics/Business-Industry/Energy/Infrastructure/Energy-Consents/Thermal-Guidance

¹⁶⁷ See www.scotland.gov.uk/About/FOI/Disclosures/2007/10/AEAHeatMap2007.

¹⁶⁸ See Scottish Planning Policy Consultative Draft (www.scotland.gov.uk/Publications/2009/04/01132105/0).

existing policy owing to recent legislation. It is proposed that those policy changes will be subject to a 6-week consultation beginning in October 2009; and will cover aspects of Sustainable Development and Climate Change.

10.20 Planning authorities have an important role in facilitating more decentralised patterns of energy generation and supply. The second National Planning Framework (NPF2) indicates that they should take account of the potential for developing heat networks when preparing development plans and considering major development proposals. To support the Government's drive towards a low-carbon economy, relationships between waste, heat and other forms of energy should be fully considered by planning authorities at an early stage in the preparation of development plans and in determining major planning applications.

10.21 Some local authorities have already done significant work to identify where heat networks would be appropriate in their area. To make full use of this work it is important to ensure this is embedded into development plans and planning policies. As an example, Sustainable Glasgow, a collaboration between Glasgow City Council, the University of Strathclyde and a number of energy partners, has identified significant opportunities for heat networks in the centre of Glasgow. By mapping where heat demand is high (using gas demand data), identifying sites where heat is currently being wasted (by talking to organisations that are likely to have significant amounts of waste heat) and considering opportunities for conveniently laying heat pipes (such as existing tunnels), a detailed map of the city has been built up. This work provides the information necessary to support implementation through the planning process.

10.22 The Scottish Government intends to publish and promote a tool to help developers and masterplanners to understand the opportunities and requirements for a cost-effective district heating (DH) scheme. The tool compares options for DH (including CHP) against individual installations of low-carbon equipment, set in the context of tightening energy standards, as recommended by the Sullivan report (see Chapter 6).

Q 48: How can Scottish Government best support this activity? Are there partner organisations which can assist?

Disparity between energy performance as designed, as built and as managed

10.23 The Sullivan Report stressed the importance of compliance with building regulations and the need for robust mechanisms to ensure that improved building standards are actually met in completed buildings. For issues such as energy there was a concern that incorrect detailing or poor assembly of components can have a significant impact on overall performance. A requirement for greater certainty during the construction stage was recognised. Therefore Building Standards Division has been consulting to seek the views and opinions of key stakeholders and users of the building standards system in Scotland on aspects of the system that relate to compliance with the national building regulations (see Chapters 6 and 8, paragraphs 6.17 and 8.15).

Microgeneration: Low- and Zero-Carbon Technologies

10.24 As noted in Chapter 1, energy efficiency is often the most cost-effective option in reducing energy consumption and greenhouse gas emissions. However, alone it will not deliver the Scottish Government's emissions reductions targets. Increasing the use of renewable energy will also be required.

10.25 This section outlines the role that small-scale (under 50 kW) low- and zero-carbon technologies could play in meeting our ambitious emissions reduction and renewables

targets. It summarises current and future support and substantive research, and questions how we can achieve mass market uptake of these technologies.

10.26 We have already set very ambitious renewable energy targets – 20% of Scottish energy use coming from renewable sources by 2020. Specific targets include 50% of electricity demand from renewable sources by 2020 and 31% by 2011, and 11% of heat demand by 2020.

10.27 Small-scale low- and zero-carbon technologies have huge potential to deliver CO₂ reductions from both heat and electricity production. They could also help to create a more diverse and secure energy supply and could reduce fuel poverty, particularly in hard-to-treat homes and off-gas areas.

10.28 The Climate Change (Scotland) Act requires local development plans to include greenhouse gas emissions policies. The Scottish Government is working to ensure that the approach to that is both practical and proportionate in the context of planning reform, roll-out of low- and zero-carbon technologies; delivery of our climate change obligations and reports on the operation of this requirement.

Current support

10.29 The Scottish Government already supports a number of initiatives aimed at removing what we understand to be the main barriers to widespread uptake of microgeneration. These include upfront costs, a lack of understanding amongst consumers of the benefits of generating their own energy, and planning.

10.30 The **Energy Saving Scotland Home Renewables** and the **Community and Renewable Energy Scheme (CARES)**¹⁶⁹ which formerly were the combined Scottish Community and Householder Renewable Initiative (SCHRI), serve to provide encouragement for householders and not-for-profit community organisations to take forward their own renewable energy projects.

10.31 Domestic consumers can access up to 30% of the costs of installation of low- and zero-carbon technologies to a maximum of £4,000. Community projects are eligible for up to £150,000 for capital projects or £15,000 for technical support. These programmes, which have been running since 2002, have supported over 3000 installations and offered more than £23 million worth of grants. Since 2007, the Scottish Government has tripled support for these programmes, bringing total annual investment to £13.5 million.

10.32 The following programmes, outlined more fully in other chapters, also include an element of funding for low- and zero-carbon technologies, though this is not the main purpose of these programmes:

- The Carbon Emissions Reduction Target and the Community Energy Saving Programme (CERT and CESP, see 6.21);
- The Energy Assistance Package (see 6.29);
- Pathfinder Domestic Loans Scheme (see 6.41);
- Energy Efficiency Design Awards (see 6.44);
- Energy Saving Scotland small business loans (see 8.34); and
- Central Energy Efficiency Fund (see 9.14)

10.33 As well as financial support, we also offer tailored support on low- and zero-carbon technologies to householders, SMEs and community organisations. The Energy Saving

¹⁶⁹ Cares also funds larger-scale renewable energy projects up to 1MW capacity.

Scotland Home Renewables advice programme, which was launched in 2008, provides intensive, hands-on support to householders. It takes them through the installation process step by step, from choosing the most appropriate technology and applying for grant support to help with planning issues and follow-up support once the technology has been installed. Demand for this service has been such that we have accelerated roll-out by doubling the number of Home Renewables advisers.

10.34 Advice and support is available to SMEs from the Energy Saving Scotland small business loans scheme. Whether or not they go on to apply for a loan, SMEs can receive a free audit of their premises and recommendations on the most suitable technology for their circumstances. Similarly, community organisations receive comprehensive, hands-on support through CARES' dedicated Development Officers located across Scotland.

10.35 The Scottish Government's ambition is to see renewable capacity in every Scottish community. To that end, we announced a package of measures in 2009 help authorities create a more sustainable school estate, including School Renewable Development Officers and training for local authorities to help them secure sustainable school design. These are outlined in more detail in Chapter 9, paragraph 9.24.

Permitted Development and Microgeneration

10.36 Planning permission has traditionally been cited as a significant barrier to uptake of microgeneration. Secondary planning legislation was introduced in March 2009 which grants permitted development rights in certain circumstances for a range of low- and zero-carbon technologies on domestic buildings. This means that it is easier and cheaper to install these technologies than previously as planning permission is no longer required.

10.37 However, Permitted Development Rights for air source heat pumps and micro-wind turbines are not currently included. Research examining the detailed issues on these technologies will report by the end of 2009. The Climate Change (Scotland) Act requires Ministers to bring forward permitted development rights for domestic air-source heat pumps and micro-wind turbines within six months of this section of the Act coming into force (i.e. expected to be February 2010).

10.38 Similarly, the Climate Change (Scotland) Act requires Ministers to bring forward permitted development rights for microgeneration in non-domestic buildings.

Policy & research

10.39 The Scottish Government has commissioned and contributed to a number of pieces of research to help shape future policy on low- and zero-carbon technologies. These include:

- Generating the Future: An analysis of policy interventions to achieve widespread microgeneration penetration in Scotland;
- A Low Carbon Buildings Standards Strategy for Scotland;
- Location, Location, Location: Domestic small-scale field trial report;
- Review of Energy Efficiency and Microgeneration Support in Scotland.¹⁷⁰

10.40 In terms of current and future research, we have appointed SQW Energy to deliver a study on Permitted Development Rights for micro-wind turbines and air source heat pumps in domestic buildings. We are also part-funding the Energy Saving Trust's new field trials on heat pumps and solar thermal technologies.

¹⁷⁰ See www.scotland.gov.uk/Publications/2008/05/30140737/0

Future support

10.41 Scottish Government will publish guidance on the building integration of low- and zero-carbon equipment, highlighting potential impacts on the building for both new-build and retrofitted installations, and measures to optimise performance. Sections on solar water heating and air, ground and water source heat pumps will be published in December 2009, with further technologies, including biomass, to follow in 2010. Guidance emphasises that initial efforts should be made by demand reduction through measures such as improving energy efficiency, before the installing new technologies.

10.42 From April 2010, DECC will be introducing Feed-In Tariffs (FITs) for electricity generators under 5 MW in the UK. The exact structure and delivery mechanism of the FITs will be decided following the close of the consultation on 15 October 2009. However, the scenario being proposed includes a diverse mix of technologies and capacities ranging from under 50 kW up to 5 MW, with tariffs for both electricity generation and export to the grid.

10.43 According to the modelling carried out by DECC, the revenue that could be generated from the FIT varies with the type and scale of the technology. A typical household which generates 2500 kWh per year and sells 1000 kWh of this to the grid could earn around £800 a year on a solar PV tariff. It could also make savings of around £150 per year on its fuel bills from generating its own electricity.

10.44 With this new revenue stream becoming available, it is estimated that the number of installations of small-scale low- and zero-carbon electricity generating technologies could increase to 870,000 by 2020 across the UK. Approximately 87,000 of these are estimated to occur in Scotland, with the vast majority (around 80,000) in domestic properties.

Q 49: With the introduction of cash-back schemes, should Scottish Government support for small scale low- and zero-carbon technologies be adjusted? If so, how?

Water efficiency

10.45 There are two aspects to water efficiency that affect energy consumption. The first is the energy used to produce drinking water to get it to our homes and businesses, and then to collect and treat the waste water afterwards. The second is how much energy is used to heat the water we use in our homes and businesses – the less hot water we use, the less energy we use as we are not heating it up.

10.46 Looking at the first aspect, the more water we use, the more energy is required to produce and deliver it. For every 1000m³ (1 megalitre or MI) of water supplied in 2007/8, Scottish Water would typically be required to use 291 kWh of electricity. Every 1MI of waste water collected and treated consumes 1,472 kWh of electricity.¹⁷¹

10.47 In recent years, the energy intensity of water and wastewater services has increased by around 2% per annum as Scottish Water invests in improving assets to meet more stringent regulatory and service standards. In comparing Scottish Water with the UK water industry, we find that energy demand is lower for water provision owing to the greater use of gravity to move water. However, it is higher for waste water as a consequence of the geography and demography of Scotland, which needs relatively more small waste water treatment works across the country compared with England and Wales.

¹⁷¹ These figures are based on the energy consumption of Scottish Water for treatment and pumping during 2007-08, averaged across its asset base. They will vary over time according to season and to the measures Scottish Water may be putting in place to improve service. They should not be regarded as static figures.

10.48 Scottish Water is committed to working towards a low-carbon water industry and is engaged in developing carbon management programmes across its business (see Chapter 9). This will help address the energy used within water services.

10.49 With respect to the efficient use of water in homes and businesses, from both the supply and the drainage discharge aspects, the guidance to the building standards already provides safe design advice on rainwater harvesting systems, greywater recycling and the use of waterless closets.

10.50 In considering the energy used to heat water, research highlights that for homes:¹⁷²

- As building standards for energy improve, the proportion of the energy used in new homes to heat water is much higher. It also grows as standards improve, compared to existing homes.
- The way in which households use water varies enormously.
- For existing homes, the majority of energy used is for space heating, but the potential for energy and CO₂ savings from water efficiency is still significant.
- Water efficient retrofit devices that save hot water (e.g. tap aerators, low flow shower heads) can save more CO₂ and energy than cold water retrofits (such as dual flush WC retrofits). However, all result in reduced CO₂ emissions and energy use.
- Behavioural change is significant. Spending less time in the shower and washing up in a bowl rather than under a running tap can have more impact than installing water saving technology. Without addressing behaviour, technology alone may not deliver the expected savings.
- In most households the way in which water is heated will differ between appliances (for example, electricity is commonly used to heat water for washing machines but gas is used to heat water from taps) – this means different costs and CO₂ emissions for the same amount of hot water.

Action on water

10.51 Water conservation was considered by a Building Standards Advisory Committee working party, which was concluded in December 2008. The Scottish Government's Building Standards Division has been working very closely with colleagues from England and Wales on the further consideration of water conservation within building regulations. The Scottish Government will consider the impact of water efficiency regulation in building standards and take this into account when reviewing the building standards in 2013.

10.52 The Saving Water in Scotland Network was established in June 2006. The network includes Scottish Water, the Scottish Parliament, the Scottish Government, regulators, agriculture, business, consumer representatives and NGOs. It is designed to share expertise and consider future measures to increase water efficiency.

10.53 Scottish Water has a Sustainable Development Policy in place which includes the sustainable management of water resources. Promoting the protection and management of water resources and encouraging customers to use water wisely is a component of this policy. The Climate Change (Scotland) Act (section 74) also requires Scottish Water to promote water conservation and water-use efficiency.

10.54 The Energy Saving Trust and Waterwise are piloting a water advice service, the first of its kind in Europe.¹⁷³ The project is to develop integrated energy and water saving advice

¹⁷² Energy Saving Trust, 'Quantifying the water and carbon effects of water saving', Summary report, 2009. Available in the library section at: www.energysavingtrust.org.uk/corporate.

¹⁷³ Funded by Scottish Government, DECC, and EU Life+. See www.energysavingtrust.org.uk/corporate/Global-Data/Publications/Conflicts-and-Synergies-report-Stakeholders for more details.

for consumers. The advice is being provided in London, Edinburgh and Cardiff from September 2009 to August 2010. The aim is to influence consumer behaviour to reduce associated energy use and CO₂ emissions through reduced use of water, to preserve natural resources, and to move towards a water saving culture. This will bring together and exploit the synergies of two very compatible topic areas (water and energy) that, to date, have often been treated as separate entities. This pilot will test the one-stop approach of providing consumers with expert advice on a range of sustainability issues with linked messages and the potential for rolling out a water advice service on a wider scale.

10.55 As referred to in Chapter 8, Envirowise is a Scottish Government funded programme that provides advice to businesses on resource efficiency, waste prevention and sustainable use of water (see paragraph 8.38).

Waste

10.56 Waste management contributes around 4% to Scotland's Greenhouse Gas Emissions. Some of this is as a result of methane emitted when waste decomposes in landfill sites, while some is due to the transportation and treatment of waste.

10.57 The Scottish Government is working to the principle of zero waste - eliminating the unnecessary use of raw materials; re-using products where possible, and recovering value from products when they reach the end of their lives through either recycling, composting or energy recovery, in accordance with the waste hierarchy. Eliminating the use of raw materials and reusing unwanted goods can save energy use and associated greenhouse gas emissions from products being made, as well as the need to find an appropriate way to dispose of materials. The same can apply in certain cases to recycled goods. For example, the energy needed to produce aluminium from used drinks cans is much less than to make aluminium from aluminium ore.

10.58 The choice, design and siting of waste treatment infrastructure should make appropriate links to energy efficiency, renewable energy and planning considerations. The use of the biodegradable part of waste (such as food) to produce renewable fuels such as biogas or as a solid fuel are also considerations for the planning system, as the location, design and choice of waste treatment infrastructure can affect whether productive uses can be found for both the energy and heat that waste treatment can generate. The siting of such infrastructure can also affect the energy needed, due to distance and transport mode, to transport waste and treated material to and from a site. We are currently seeking responses to our consultation on the Zero Waste Plan for Scotland, which will cover these issues and action in this area.¹⁷⁴

¹⁷⁴ See www.scotland.gov.uk/Topics/Environment/waste-and-pollution/Waste-1/wastestrategy.