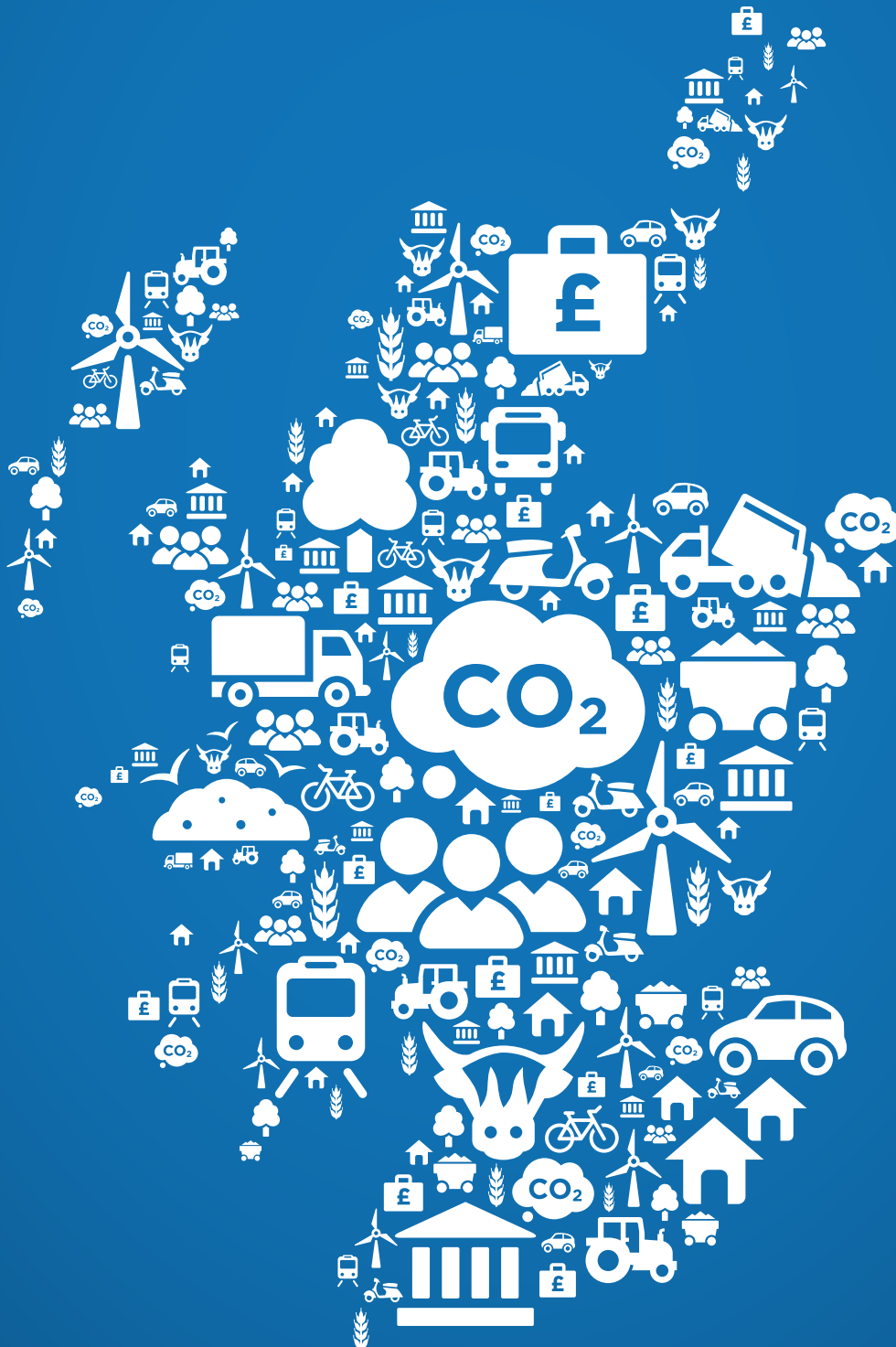




Reducing emissions in Scotland 2015 progress report

Committee on Climate Change | March 2015



Reducing emissions in Scotland

2015 progress report

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The Committee on Climate Change



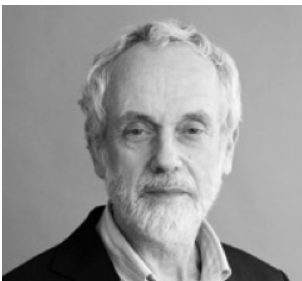
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Introduction and executive summary

This is our fourth report on Scotland's progress towards meeting emission reduction targets, as requested by Scottish Ministers under the Climate Change (Scotland) Act 2009.

The Scottish Act sets a long-term target to reduce emissions of greenhouse gases (GHGs) by 80% in 2050 relative to 1990, with an interim target to reduce emissions by 42% in 2020. Secondary legislation passed in October 2010 and October 2011 also set a series of annual emission reduction targets for 2010 to 2022 and 2023 to 2027 respectively. We will advise the Scottish Government on annual targets for the period 2028 to 2032 in December 2015.

Emissions data for Scotland and the other devolved administrations are produced with a significant delay compared to the UK as a whole and comprehensive data are only available for 2012. We therefore focus on progress against the 2012 annual target.

We also consider 2013 emissions data for the power sector and the rest of the traded sector under the EU Emissions Trading System (mainly industry), as well as macroeconomic and temperature data. We discuss underlying progress towards reducing emissions through the development and implementation of policies and measures. We will update this assessment once 2013 Scottish emissions data is available, in our June 2015 UK progress report.

Our key messages from this analysis are:

- **Annual target missed:** Net emissions rose 0.5% in 2012, attributed to increased heating demand from colder temperatures compared to a mild 2011, and an increased use of coal. When adjusting for the weather emissions would have fallen slightly (1%). Emissions in 2012 were higher than the 53.226 MtCO₂e target, by around 2.4 MtCO₂e (4.5%). This is the third time that Scotland has missed an annual target.
- **Inventory changes have made legislated targets harder to reach:** The cumulative effect of inventory changes since 2008 has been to add 5.4 MtCO₂e to baseline emissions. Without these inventory changes it is likely Scotland would have met its 2012 target.
- **We will work with the Scottish Government to address the issue:** Further inventory changes are pending. We recommend that the Scottish Government should continue to investigate further abatement from measures that go beyond current policies. We also propose to agree a process and timeline with the Scottish Government to advise on the implications for Scottish targets of significantly improved inventory data that is expected later in 2015 and again in 2017.
- **Scotland performed better than the UK as a whole in 2012:** Gross Scottish greenhouse gas emissions, including international aviation and shipping, rose by 0.8% in 2012. This compared to a 2.7% increase for the UK as a whole. Since 1990, gross Scottish emissions have fallen nearly 30% compared to 24% for the UK as a whole.
- **Scotland has made good progress in a number of areas and is often leading the UK:** There has been good progress in deploying renewable electricity generation capacity, in installing community and locally-owned energy projects and in rolling out area-based energy efficiency programmes.

- **More action is needed to meet future targets:** There has been less progress in other areas including transport, renewable heat, agriculture and forestry, and the waste sector. Even in areas of good progress, further action will be needed to meet Scotland's ambitious 2020 target.

We recommend that the Scottish Government strengthens policies for low-carbon heat, energy efficiency, the public sector, transport, and agriculture and land use (Recommendations Box).

Recommendations to the Scottish Government

Low-carbon heat

- Review and address barriers within the public sector to ensure that opportunities for low-carbon heat are taken up, including access to finance, lack of awareness, capacity and lack of knowledge and skills.
- Work with local authorities and community groups to promote the domestic Renewable Heat Incentive to householders alongside the finance under the Warm Homes Fund and Home Energy Scotland Renewables Loan. Consider further roll-out of roadshows to demonstrate renewable heat technologies.
- Consider further action to facilitate heat networks, for example through a Scottish equivalent of the Heat Networks Delivery Unit, requiring consideration of district heating in new developments; and obliging local authorities to connect to existing heat networks where technically possible to provide anchor loads.

Energy Efficiency

- Carry out an evaluation of current energy efficiency programmes (especially the area-based schemes) to help determine the best way to implement supplier obligations as they become devolved.
- Develop effective energy efficiency schemes for multi-tenanted properties (e.g. 'tenement action areas'), as flats make up 38% of the Scottish housing stock.
- Make energy efficiency funding available over a sufficiently long timescale to ensure that complex projects can be completed.
- Ensure that policies effectively target electrically-heated homes both in terms of energy efficiency improvement and incentives for low-carbon heat.
- Adopt ambitious minimum energy efficiency standards in both owner-occupied and privately rented private sector housing within regulations planned for consultation in spring 2015.

Public sector

- Set ambitious CO₂ reduction targets for government buildings and consider extending the public bodies duties under the Climate Change Act (Scotland) to require other public bodies to do the same.

Transport

- The Scottish Government and Scottish local authorities should consider introducing measures to address non-financial barriers to electric vehicles (EVs), e.g. through free or preferential access to parking and bus lanes and through raising awareness about electric vehicles through public procurement.
- 'Smarter Choices Smarter Places' programme should be extended beyond 2016 to allow funding of longer-term behaviour change programmes.
- Consider other options to drive down emissions such as congestion charging.
- Speed limits are likely to be fully devolved to Scotland in the future. The Scottish Government should evaluate how speed limits (in particular greater enforcement) could help with meeting carbon targets.
- Air passenger duty is also likely to be devolved in the future. The Scottish Government should assess the carbon impact of any proposed changes to the duty.

Recommendations to the Scottish Government (continued)

Agriculture

- Carry out a survey to establish whether there has been Farming for a Better Climate (FFBC) uptake beyond the Climate Change Focus Farms and what measures have worked.
- Look at lessons from Scottish Environment Protection Agency's diffuse pollution priority catchment work of working in partnership with the agricultural community to inform future action.
- Develop the second Report on Policies and Proposals (RPP2) to achieve a 90% uptake of cost-effective nitrogen efficiency to further encourage farmers to make changes.

Peatlands

- Adopt the RPP2 proposal for 21,000 ha peatland restoration per year as a policy to drive commitment.

Forestry

- Consider introducing additional measures and/or funding to ensure the woodland creation target is met.

We set out the analysis underpinning these conclusions in the following 7 sections. In each section we first present a summary of progress against targets, followed by a discussion of emission trends.

- 1 Emissions: targets and trends
- 2 Energy supply and consumption
- 3 Homes and communities
- 4 Business and the public sector
- 5 Transport
- 6 Agriculture, rural land use and forestry
- 7 Waste

1 Emissions: targets and trends

Summary of progress

Target	Progress
<p>2050 and interim targets</p> <p>The Climate Change (Scotland) Act 2009 sets a target to reduce emissions of greenhouse gases by 80% by 2050. The Act also establishes an interim target for 2020 of at least 42%.</p>	<p>Net Scottish emissions in 2012 were 26.4% lower than 1990 levels. This is an average reduction of 1.2% per year, compared to a requirement of 3% per year from now to 2020 to meet the 2020 target.</p> <p>Recent inventory changes have made the achievement of the interim target more difficult.</p>
<p>Annual target</p> <p>Secondary legislation passed in October 2010 and October 2011 set annual emission reduction targets for 2010 to 2022 and 2023 to 2027 respectively.</p> <p>The 2012 target for net emissions is 53.226 MtCO₂e.</p>	<p>In 2012, net Scottish emissions were 55.67 MtCO₂e, therefore the target was missed.</p> <p>This was the third annual target to be missed.</p>
<p>Domestic effort target</p> <p>The Climate Change (Scotland) Act 2009 requires that reductions in net Scottish emissions of greenhouse gases account for at least 80% of the reduction in the net Scottish emissions account in any target year.</p>	<p>There was no reduction in net emissions in 2012. No EU ETS carbon units (except those surrendered under the EU ETS) have been credited to the account.</p>

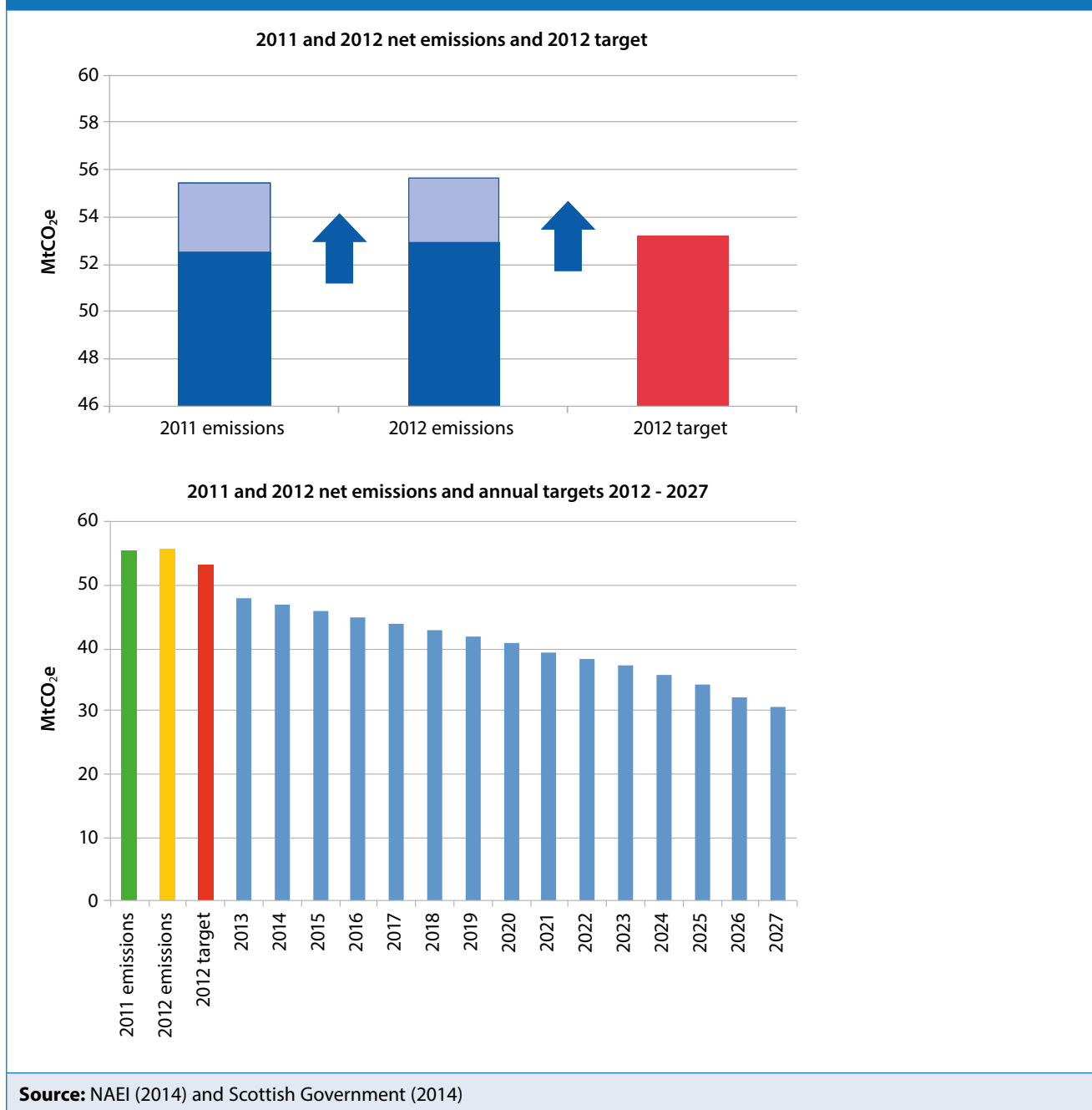
Greenhouse gas inventory data for 1990-2012

Scotland's emission targets are set on a net basis¹: they account for sales and purchases in the EU ETS, which covers power stations and energy-intensive industries. The increase in net emissions from 2011 to 2012 (the latest data available) was 0.3 MtCO₂ (0.5%).

When accounting on a net basis (as required under the legislation), emissions in 2012 were 55.67 MtCO₂e which is 2.4 MtCO₂e higher than the 53.226 MtCO₂e target. Scotland therefore missed its legislated target. (Figure 1.1).

¹ Net emissions in Scotland are calculated using the Net Scotland's Emissions Account (NSEA) which takes into account non-traded emissions, surrendered units and Scotland's assigned EU ETS cap (known as the Specified Amount).

Figure 1.1: Scotland's net emissions in 2011 and 2012: comparison against 2012 target and longer term trajectory



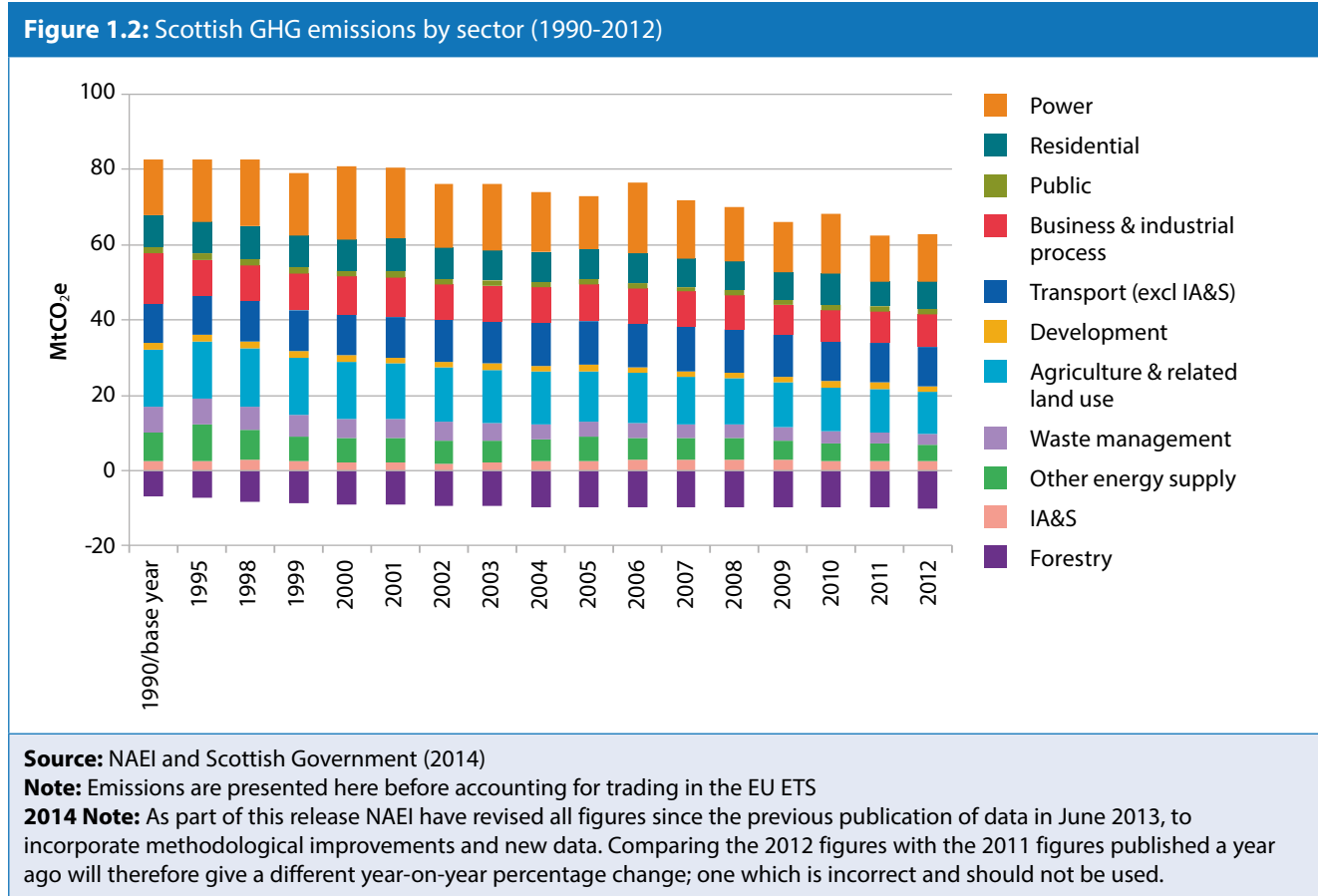
Whilst year-on-year net emissions rose 0.5%, gross Scottish greenhouse gas emissions (i.e. not including sales and purchases in the EU ETS), including international aviation and shipping, rose by 0.4 MtCO₂e (0.8%) to 52.9 MtCO₂e in 2012. This compares to a 2.7%² increase for the UK as a whole. Gross emission increases were driven from increases in the residential and power (Figure 1.2):

- Residential sector emissions rose by 0.7 MtCO₂e (11%) in 2012 which was the largest increase of any sector but in line with the UK trend. This can be attributed to increased heating demand from colder temperatures compared to a milder 2011.
- Power sector emissions also rose, by 0.5 MtCO₂e (4%), in 2012 due to a small increase in coal use.

² This figure includes international aviation and shipping and therefore differs from what was reported in our 2013 UK progress report.

- There were small increases in transport, development and business and industry emissions, while there were reductions in emissions from international aviation and shipping, waste, agriculture and related land use.

The reasons behind these emission changes are discussed in the following chapters.



In 2012, Scotland accounted for 9.4% of total UK emissions, slightly higher than its 7.7% share of UK Gross Value Added (GVA) and population. There are some important differences between the Scottish and wider UK economies:

- The relatively larger share of agriculture in Scotland as a proportion of total emissions (18% compared to 10.5% at UK level);
- The size of the forest sink in Scotland, which in 2012 is equivalent to almost 56%³ of the total UK sink.

Overall, Scottish gross emissions were 29.9% lower in 2012 than in 1990, compared to a 23.6% decline for the UK as a whole.

3 Recent inventory changes have increased the size of the Scottish sink by 9% in 2011, although less than the overall UK sink (which increased by 45%). As a result, the Scottish sink is now a lower percentage of the UK sink than previously (68% in our 2014 report).

Inventory changes

There have been several revisions to the Scottish greenhouse gas inventory since annual targets were legislated in 2009. These changes reflect improvements in the methodology for estimating emissions. Such improvements are welcome but they have made the targets increasingly difficult to achieve because the targets were set on an absolute basis.

The most recent revision added 1.2 MtCO₂e to Scotland's estimated emissions in 2011, and 2.6 MtCO₂e to 1990 emission levels, bringing the total cumulative effect of revisions to the 1990 baseline to 5.4 MtCO₂e. The 2012 target has therefore been missed by a smaller amount than the cumulative effect of the inventory changes.

Our 2014 progress report highlighted two basic options for addressing the inventory revision:

1. Revise the targets to allow for the inventory revision or recast current targets in terms of year-on-year emission reductions.
2. Adapt to the inventory change by finding additional emission reductions over and above those identified in the 2nd Report on Policies and Proposals (RPP2⁴).

Additional emissions reduction would have to come from the non-traded sector because of the fixed cap on possible emission reduction in the traded sector (under the EU Emissions Trading Scheme). In 2012, the non-traded sector accounted for 31.1 MtCO₂ of emissions (56% of net emissions). Additional abatement is possible. However finding abatement to fully offset the impact of the inventory changes would require successfully completing many additional areas of emission reduction (e.g. insulating all the remaining houses alongside significant transport switching and increased afforestation).

If the Scottish Government wanted to consider a target revision, it would be sensible to wait until the latest inventory improvements have been made. Improvements to agricultural emissions are due to be completed this year, and will be incorporated into the current inventory model at the devolved administration level to provide the 1990-2013 GHG estimates. A second improvement, using a higher resolution model for the 1990-2015 inventory, will be published in 2017.

We recommend that the Scottish Government should continue to investigate further abatement from measures that go beyond current policies. Additionally, we propose agreeing a process and timeline with the Scottish Government to advise on the implications of the improved inventory data.

Change in 2013

Scotland's annual target for 2013 is 48 MtCO₂e. This implies a 14% reduction from 2012. When the target was set it was assumed that the EU ETS cap (due to the change from phase II to phase III) would account for most of this reduction.

4 Low Carbon Scotland: Meeting our Emissions Reduction Targets 2013-2017: The Second Report on Proposals and Policies (RPP2).

For 2013, while emission data are available at a UK level, we expect data relating to Scotland to become available in June 2015. To the extent possible, we are planning to report on 2013 emissions data for Scotland and the other devolved administrations in our June 2015 progress report to the UK government.

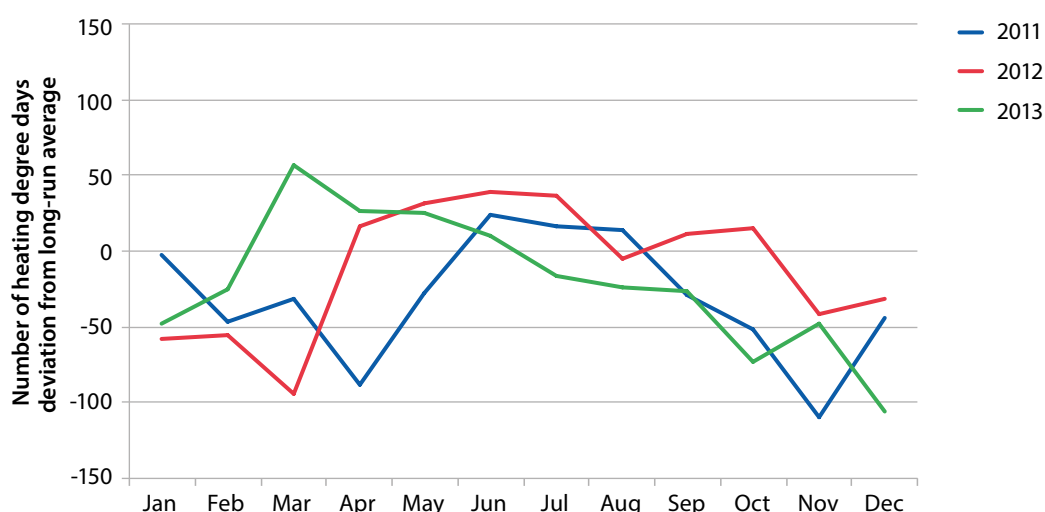
In this section, we draw on other data that can provide an indication of what is likely to have happened to emissions in Scotland in 2013.

Emissions data for the UK show that economy-wide emissions fell by 2% in 2013. This was driven by falling emissions in the power sector as several coal plants closed permanently. However, the winter of 2013 was also a little cooler than 2012, thus resulting in higher heating-related emissions. In our 2014 progress report to the UK Parliament, we concluded that without the impact of weather, emissions might have fallen by 2.5%.

We have considered contextual data available for Scotland for 2013, and expect that Scottish emissions are also likely to have decreased, to a similar extent to that for the UK as a whole:

- Temperatures in spring of 2013 were below the long-term average (Figure 1.3) leading to a slight increase in the number of heating days for the year. At the UK level, this led to a 3% increase in gas consumption and a similar increase in heating demand is likely to have been seen in Scotland.
- There was an increase in overall economic activity in Scotland, with total GVA up nearly 1.6% (in line with UK). Growth was largest in the construction sector (3%) in 2013.
- Changes in the mix of power generation by fuel (Figure 1.4) suggest a decrease in gross emissions, reflecting a decrease of 9% in coal-fired electricity generation in both Scotland and the UK.

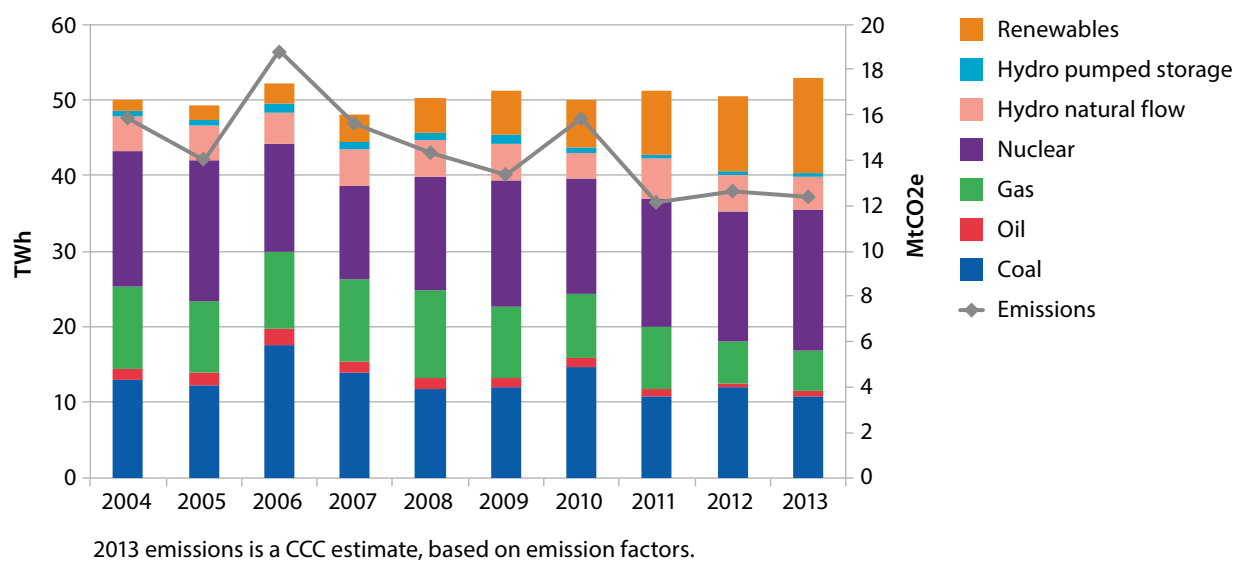
Figure 1.3: Temperature data – number of heating degree days variation from the long-run average (2011–2013)



Source: Vesma.com (2014)

Note: Heating degree days (HDDs) are calculated relative to a baseline temperature, typically 15.5°C, which is the outside temperature above which a building needs no heating. One HDD is the number of degrees centigrade deviation from the base temperature of the actual temperature on a given day (e.g. if the temperature was 5.5°C for one day the number of HDD would be 10). Long-run average is 1971-2000. Points above the x-axis reflect colder than average temperatures, and points below indicate higher than average temperatures.

Figure 1.4: Power sector – generation by fuel type and emissions (2004–2013)



Source: DECC (2014), NAEI (2014) and CCC calculations

Note: Emissions for 2004-2012 are sourced from the NAEI greenhouse gas inventory. 2013 is a CCC estimated, based on emission factors. Generation amounts for 2012 have been updated in 2014 to account for revisions in the data.

In previous years, we have looked at the changes in emissions from the EU ETS to give an indication of trends in emissions in Scotland. However, changes in the scope of the EU ETS in 2013 mean that it is not possible to compare the installation-level data for 2013 with previous years.

The Scotland EU ETS cap for 2013 will be set in March 2015 so we are unable, at present, to estimate whether the level of emissions would be higher or lower than the target for this year. It is expected that the cap will be much lower than in 2012. We will return to assess progress against the 2013 target in our June progress report to the UK Parliament when final data on Scottish emissions are available.

Assessing progress against the 2020 interim target is also difficult without information about the level of the cap. We have previously said that this target would be very challenging as it goes beyond UK level targets. The recent inventory changes have made the achievement of the interim target increasingly difficult.

The following sections consider the latest emission trends, targets and policies, and implementation of emission reduction measures by sector, using the most up-to-date data available for individual sectors.

2 Energy supply and consumption

Summary of progress

Target	Progress
Deliver the equivalent of at least 100% of gross electricity consumption from renewables by 2020, with an interim target of the equivalent of 50% of gross electricity consumption from renewables by 2015.	<p>In 2013, Scotland's generation from renewables was equivalent to 44% of Scotland's gross electricity consumption. This was an increase from 40% in 2012 and means the 2015 target is likely to be met.</p> <p>To meet the 2020 target, the average rate of deployment from 2015 onwards will need to increase significantly to 1.4 GW per year. This is higher than the maximum achieved in any year to date (1 GW in 2012). However, in principle, if the projects currently under construction or consented are built then the target should be met.</p>
Enable local and community ownership of at least 500MW of renewable energy by 2020.	<p>At the end of June 2013, an estimated minimum of 285 MW of community and locally-owned renewable capacity was operational in Scotland, an increase of 40% on the estimate for the previous year⁵.</p> <p>A further 679 MW of community or locally-owned renewable energy capacity is in various stages of development. As of June 2013, 74 MW is under construction, 283 MW is consented but not built, 101 MW is in planning, 198 MW is in scoping and there is a further 22 MW whose stage of development is unclear.</p> <p>If the projects under construction are completed then about 75% of those that are already consented need to be built in the next 5 years to achieve the target.</p>
At least 100,000 homes to have adopted some form of individual or community renewable heat technology for space and/or water heating.	<p>The Scottish Government's draft heat generation policy document proposed a target for district heating, of 1.5 TWh of heat to be delivered by district heating by 2020. In addition, the Scottish Government is committed to connect up to 40,000 homes to heat networks by 2020.</p>
Seek transmission system upgrades and increased interconnection capable of supporting the projected growth in renewable capacity.	<p>The transmission infrastructure is likely to be able to accommodate 2020 renewable output despite some delays in transmission and interconnection projects.</p> <p>In our 2014 UK progress report, we highlighted that a further 22GW of transmission infrastructure would be required beyond 2020 in order to cost-effectively accommodate increasing levels of low-carbon generation. Upgrades to the transmission network would be required in Scotland and Northern England, as this is where the majority of the renewable generation is expected.</p>
Demonstrate carbon capture and storage (CCS) at commercial scale in Scotland by 2020, with full retrofit across conventional power stations thereafter by 2025-30.	<p>Peterhead CCS project was chosen as one of two projects to take forward to the front end engineering and design (FEED) stage.</p> <p>The Scottish Government has committed to maintain coal as part of the energy mix. However, it has stated that any applicants seeking consent under Section 36 for a new coal-fired power station are required to show a capture unit covering a minimum size of 300MWe.</p>

5 www.energysavingtrust.org.uk/scotland/organisations/communities/community-renewables/community-energy-reports

Target	Progress
Source 11% of heat demand from renewable sources by 2020, and to have a largely decarbonised heat sector by 2050. Milestone of 3.5% in 2012.	Renewable heat accounted for 3.0% of Scotland's non-electrical heat demand in 2012, missing the 2012 milestone of 3.5%. The current pipeline of projects does not provide enough capacity to achieve the 2020 target. However, Scotland is doing better than the rest of the UK.
Meet at least 30% of overall energy demand from renewables by 2020.	11.6% of energy demand was met from renewables in 2012. Scotland is over a third of the way to meeting this target. By 2020, if final energy consumption has reduced by 12% relative to 2005–2007 average and all consented renewable electricity and heat projects are built, this target will be met.
Reduce final energy demand in Scotland by 12% by 2020 relative to the 2005-2007 average demand, covering all fuels and sectors.	Consumption in 2012 was 12.8 TWh (8%) below the 2012 target level and only 1 TWh below the 2020 level. This looks on track to meet the 2020 target by 2014.

Latest emissions trends

Energy supply⁶ remains the largest source of emissions in Scotland. It accounts for 17.1 MtCO₂e (27%) of total greenhouse gas emissions. In 2012, emissions from energy supply increased 1.4%, but were still 23.5% lower than in 1990.

Power generation accounts for 12.7 MtCO₂e (74%) of emissions within the energy supply sector. Emissions can have large annual variations depending on the operation of a single plant or operating conditions for renewables (Figure 2.1), though the overall changes in 2012, 0.5 MtCO₂e (4%), were smaller than recent years. In 2012:

- The increase in emissions reflected an increase in the carbon intensity of power generation, as electricity generation from coal increased substantially, by 1.1 TWh (10%), following a fall of 27% in 2011.
- Electricity generation from renewables increased by 0.8 TWh (6%). Wind power increased by 1.3 TWh (16%) due to increased wind generating capacity; however, hydropower generation decreased by 0.5 TWh (9%) due to low rainfall.

Gross emissions data for the Scottish power sector in 2013 are not yet available⁷. However, 2013 data on power generation by fuel type show changes in the fuel mix, as well as an overall increase in generation (Figure 1.4):

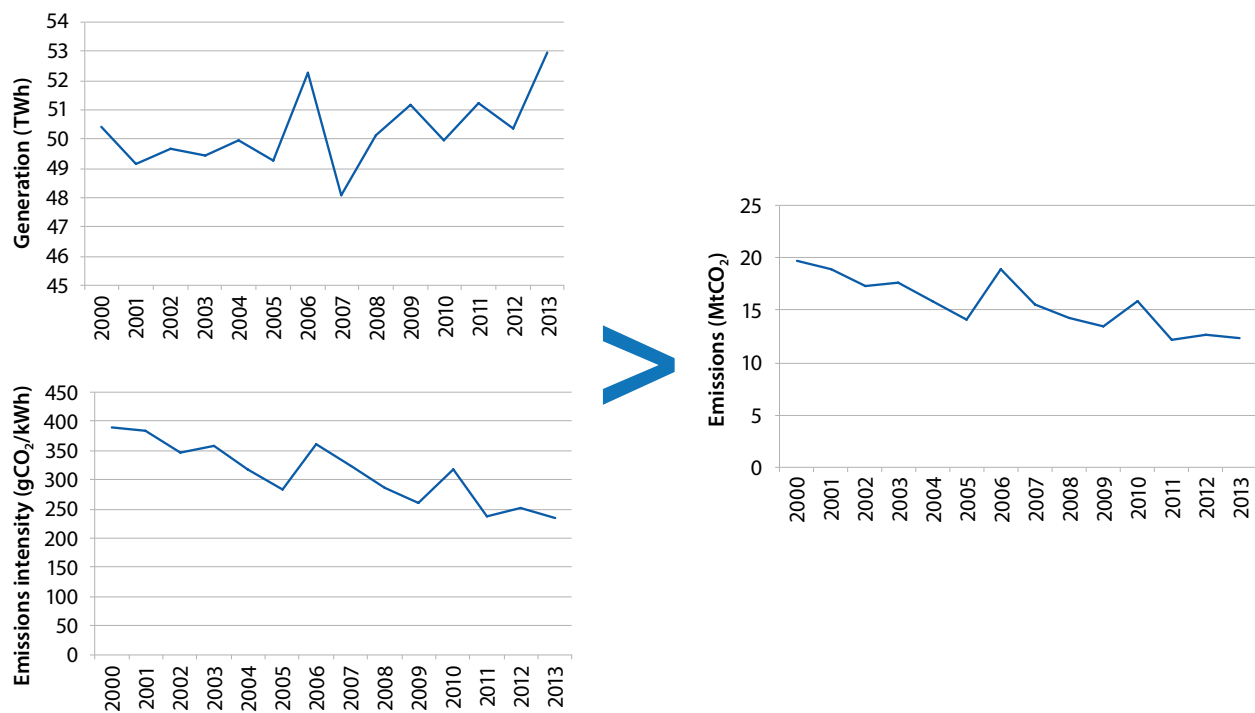
- Overall, generation of electricity rose by 2.6 TWh (5%).
- Coal generation decreased by 1.1 TWh (9%) close to the level in 2011.
- Gas generation decreased slightly by 0.2 TWh (3.5%).
- Generation from renewable sources increased by 2.4 TWh (16%).

These changes suggest that the emissions intensity of the power sector in 2013 decreased, as generation increased but estimates of gross emissions decreased.

⁶ The energy supply sector includes emissions from fuel combustion for electricity and other energy sources

⁷ 2013 actual emissions are not yet available for 2013, however 2013 emissions for the power sector have been estimated in Figures 1.4 and 2.1 based on available data on generation by fuel type and emissions factors for each fuel/station type.

Figure 2.1: Historic trends in electricity generation, emissions intensity and total emissions (2000–2013)



Source: DECC (2014), NAEI (2014) and CCC calculations.

Note: NAEI Inventory data for 2013 is not available for the power sector in Scotland. We have estimated 2013 emissions based on available data on generation by fuel type and emission factors for each fuel/station type.

Targets and policy

The Scottish Government has set a number of targets for the energy sector which have implications for CO₂ emissions:

- Meet at least 30% of overall energy demand from renewables by 2020.
- Reduce final energy demand in Scotland by 12% by 2020 compared to 2005–2007 average demand, covering all fuels and sectors.
- Deliver the equivalent of at least 100% of gross electricity consumption from renewables by 2020, with an interim target of the equivalent of 50% of gross electricity consumption from renewables by 2015.
- Enable local and community ownership of at least 500MW of renewable energy by 2020.
- Seek transmission system upgrades and increased interconnection capable of supporting the projected growth in renewable capacity.
- Demonstrate carbon capture and storage (CCS) at commercial scale in Scotland by 2020, with full retrofit across conventional power stations thereafter by 2025–30.
- Source 11% of heat demand from renewable sources by 2020, and to have a largely decarbonised heat sector by 2050.

Most of these targets go further than those that apply to the UK. Provided they are implemented effectively, Scotland has the potential to lead the UK in renewable energy and energy efficiency. In the following sections, we explain and assess the schemes that have contributed to progress in each target area.

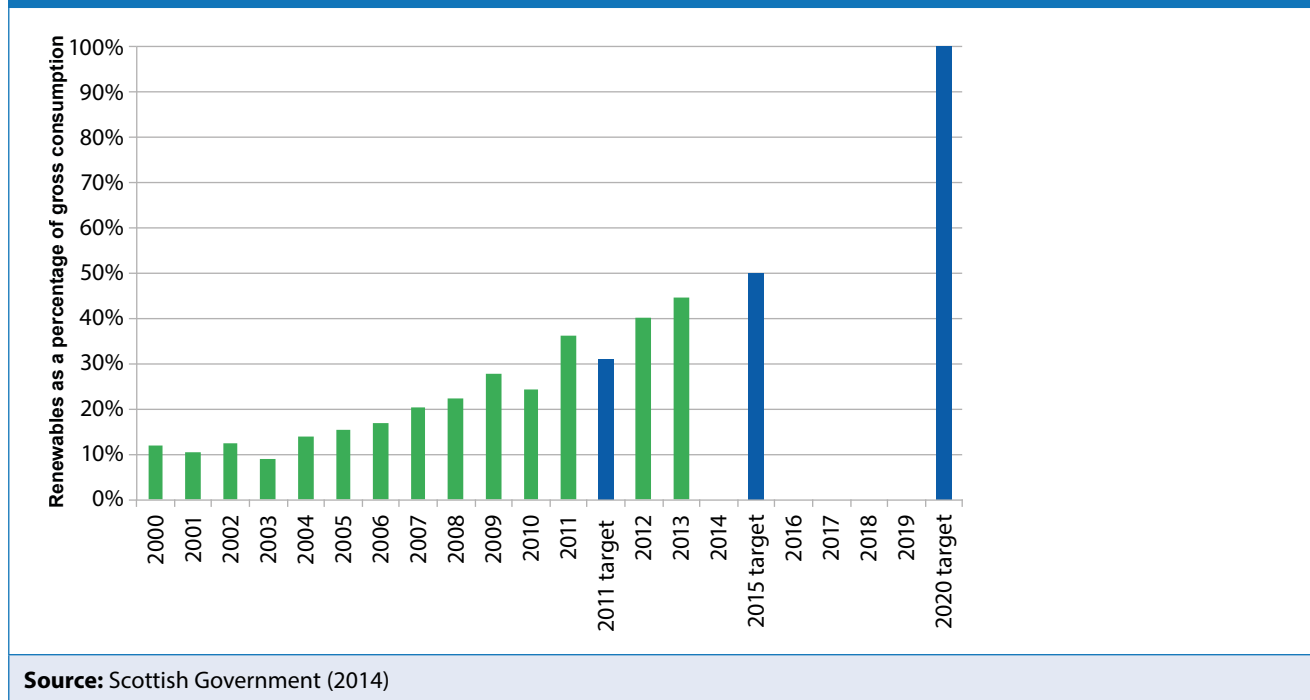
Progress decarbonising the power sector

Renewable energy

Scotland is on track to achieve the 50% of gross electricity interim target, with electricity generation from renewables showing a continuing upward trend.

- Between 2003 and 2013, generation from renewables in Scotland increased from 3.7 TWh to 17 TWh, accounting for 32% of total UK generation from renewables in 2013.
- In 2013, Scotland’s generation from renewables was equivalent to 44% of Scotland’s gross electricity consumption (Figure 2.2). This was an increase from 40% in 2012.

Figure 2.2: Renewable generation as a percentage of gross consumption – actual 2000–2013, and targets for 2011, 2015 and 2020.

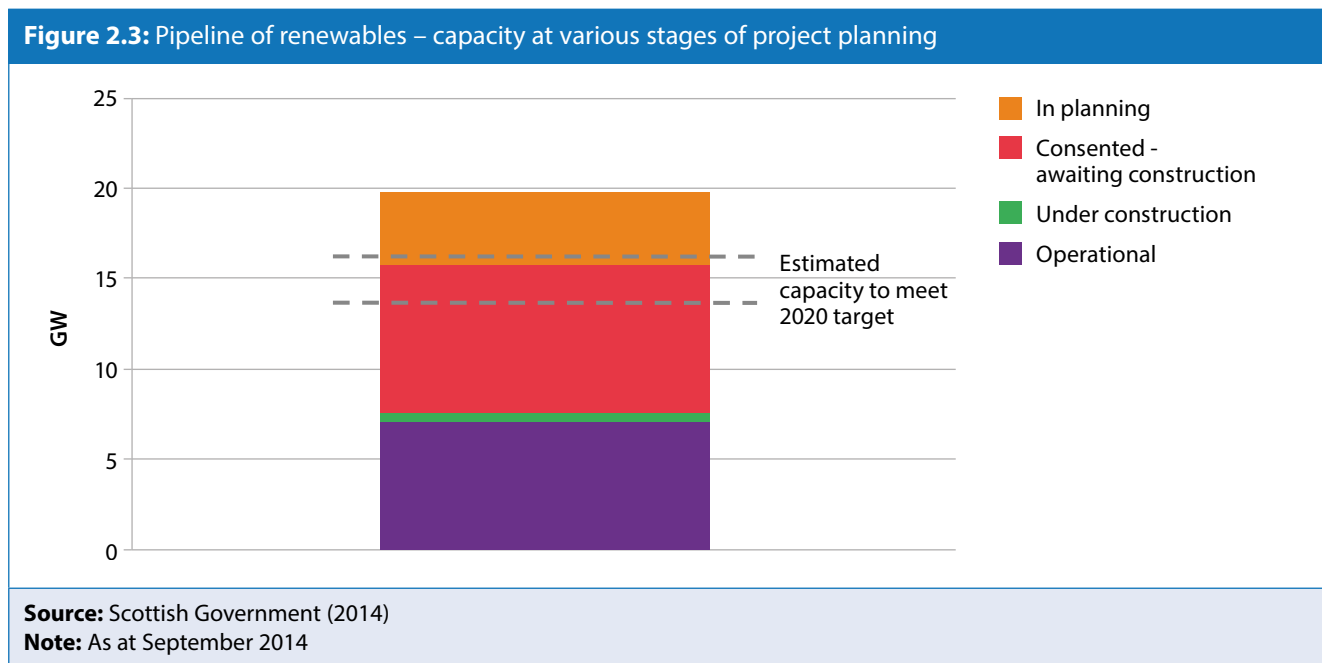


Installed renewable capacity in Scotland increased by 0.8 GW in 2013 to 6.6 GW. Scottish renewable plant accounted for 34% of the UK’s renewable installed capacity in 2013, a decrease from 37% in 2012. Wind capacity in Scotland was 4.7 GW in 2013 which accounted for 42% of the UK’s wind capacity.

It is estimated that between 14 and 16 GW installed renewable capacity will be needed in 2020 to generate the equivalent of 100% of Scotland's electricity consumption. To achieve this, the pace of increase in capacity and renewable generation will need to rise:

- The average rate of deployment between 2008 and 2013 was 0.65 GW.
- To meet the target, the average rate of deployment from 2015 onwards would need to increase significantly to 1.4 GW per year. This is higher than the maximum achievement in any year to date (1 GW in 2012).

There is a sufficient pipeline of projects either consented or under construction to meet this target (Figure 2.3). As of September 2014, operational projects have increased to 7.1 GW, and consented projects have increased by 4.4 GW since 2013. This is partly due to the Beatrice offshore wind farm, with a capacity of 664 MW, being awarded planning permission and an advance Contract for Difference (CfD) in early 2014. However, the rate of conversion from consented to operational status is not certain.



Evidence submitted to the Committee by Scottish Renewables suggested that:

- The outlook for offshore wind is becoming less favourable. In 2012, there were 16 projects either in scoping, planning or awaiting construction equating to 10.6 GW. By September 2014, only one of these projects had become operational, whilst eight were still awaiting construction. The other seven scoping projects had not been taken any further.
- Renewables Obligation (RO) investment is likely to continue for another two years until the move to Contracts for Difference (CfDs) under the Electricity Market Reform (EMR). CfD funding is only available to a limited number of projects and implementation of the proposed CfD (and needed transmission investment) for generation on the islands is essential if the current 580 MW of consented projects on the Orkney Isles, Shetland Isles and Westerns Isles are to proceed. However, in February 2015 in the first EMR auction, one Scottish offshore wind farm with 448 MW of capacity was allocated a CfD for the next 15 years which is a significant boost to Scottish renewables.

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- Wave generation is making limited progress with one of the leading Scottish wave energy companies entering administration and another one downsizing substantially. However, the Scottish Government has recently awarded £14.3m to Wave Energy Scotland, a body set up to speed up and encourage private investment in the marine energy industry.
 - Tidal power is making more progress in Scotland. The world's largest planned tidal energy project, MeyGen, will be built in the inner Pentland Firth in Scotland. The project will deliver nearly 400MW of renewable power with construction beginning in early 2015.

We will consider issues related to EMR in more detail in our June 2015 progress report to the UK Parliament.

While most renewable power generation is incentivised through GB-wide schemes like the RO, the Scottish Government has some additional financial instruments available.

- The Scottish Government's £103 million Renewable Energy Investment Fund (REIF) was created in 2012 to support renewables in Scotland, providing loans, equity and guarantees. In 2014, the fund was allocated a further £3.5 million investment. The priorities for the fund are currently marine, community and district heating projects.
- In 2014/2015 and 2015/2016, there is provision for £18.8 million Highlands and Islands Enterprise investment in renewables.

These additional instruments are useful but are relatively small-scale compared to funding under the RO and CfDs. The Scottish Government can also play an important role in planning and forging political consensus.

Coal

The 2400 MW Longannet plant (one of the largest in Europe) is the only significant operational coal-fired generation plant in Scotland⁸.

Longannet has opted in to the Transitional National Plan (TNP) from 2016 until 2020. The TNP is designed to allow operators time to comply with the stricter Industrial Emissions Directive limits, although they would have to operate within the overall emissions limits set by the TNP. However, in late 2014 Scottish Power, which owns Longannet, decided not to progress the power station in the UK's capacity market auction for the delivery of electricity generating capacity for the winter of 2018/19, citing high costs of grid connection. Therefore the future of the plant appears in doubt.

⁸ Cockerzie coal-fired plant closed in 2013 under the Large Combustion Plant Directive.

Local and community generation

The Scottish Government has a target for local and community ownership of at least 500 MW of renewable energy by 2020. This seems to be feasible given current capacity on the system and in the pipeline, although there have been suggestions that difficulties in obtaining grid connections could be a barrier. Community and locally-owned energy can play a useful role in progress towards carbon targets as it serves to raise awareness of climate change and improves acceptance of renewable energy⁹. At the end of June 2013:

- An estimated minimum of 285 MW of community and locally-owned renewable capacity was operational in Scotland, an increase of 40% on the estimate for the previous year¹⁰. This total capacity in 2013 was split between 168 MW of electrical capacity and 114 MW of thermal capacity.
- The largest proportion (42%) of operational community and locally owned capacity is on Scottish farms and estates¹¹. Community groups own 15% of total operational capacity.
- The majority of capacity in operation is from wind turbines, at 155MW. The second largest category is energy from biomass (wood), at 69MW. These two technologies together account for 78% of operational capacity. Installations of biomass boilers and wind turbines on farms and estates typically have very large capacities (>2MW), leading to the farms and estates owning the largest share of installed operational capacity.
- A further 679 MW of community or locally-owned renewable energy capacity is in various stages of development. In June 2013, 74 MW was under construction, 283 MW was consented but not built, 101 MW was in planning, 198 MW was in scoping and there is a further 22 MW whose stage of development was unclear.

The main financial incentive to encourage the uptake of small-scale renewable electricity-generating technologies is the GB-wide Feed in Tariff (FiT) scheme (Box 2.1), which was introduced on 1 April 2010. Alongside FiTs, the Scottish Government Community and Renewable Energy Scheme (CARES) (Box 2.2) provides support, advice and loans to community groups and rural businesses who want to generate renewable energy.

In 2014, the Scottish Government launched a Community Energy Policy (CEP) statement which sets out the Scottish Government's record of support for community energy, as well as new ambition for holistic local energy solutions. The Scottish Government has also introduced the £250,000 Challenge Fund to support research into exploring Scotland's geothermal capacity to meet the energy needs of local communities.

9 Evidence from other countries suggests that increased engagement of communities increases acceptance and support for large low-carbon infrastructure. This can translate to greater understanding, less opposition and a quicker, cheaper development process. There may also be additional benefits such as increased awareness of energy and climate change issues and strengthening communities. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/275169/20140126Community_Energy_Strategy.pdf

10 www.energysavingtrust.org.uk/scotland/organisations/communities/community-renewables/community-energy-reports

11 Within these statistics 'ownership' of renewable projects is not restricted to cases where the organisation owns the entire renewable installation. It also includes cases where a community group or farmer has helped to meet part of the cost in return for some benefit, such as a share in the income generated. In such cases, a percentage of the installation's capacity equal to the share owned by the community or local owner is counted towards the target. Ownership does not include cases where the only benefit to the farmer or community group is a land rental payment from the owner or developer of the installation, or installations that generate community benefit payments but that are fully owned by another organisation.

Box 2.1: Feed in Tariff (FIT)

Residential and community installers, as well as businesses, are eligible for FITs. The majority of domestic technologies qualify for the scheme, including solar (PV), wind turbines, hydroelectricity, anaerobic digesters and micro combined heat and power (CHP).

- In Scotland, there was 5.3 MW of capacity from community installations under FITs by January 2015. Capacity was split between photovoltaic and wind, with four small – medium hydro schemes.
- In addition, there were 71 MW of capacity from domestic installations, again largely photovoltaics and wind, but also hydro and micro CHP installations.
- Total installations in Scotland (including commercial and industrial) make up almost 7% of total GB installations under the FITs, in line with Scotland's share of GB population and GVA.

Box 2.2: CARES

The Scottish Government Community And Renewable Energy Scheme (CARES) provides grant funding for community projects to help fund start-up costs such as feasibility studies and community consultation, with further pre- and post- planning loans to help progress schemes. Since it began in 2011, CARES has provided assistance to 139 projects. In November 2014, it was announced that 17 further local energy projects had been awarded funding to support the development of green energy schemes. The winning proposals included addressing grid constraints, innovative district heating schemes, hydrogen production and energy storage.

Example projects include:

- The Caol district heating scheme in the Highlands aims to provide low-carbon heating with fixed fuel supply costs to an area of the Highlands that is off-grid with high levels of fuel poverty. The scheme will serve 296 social housing properties along with two planned new schools and a community centre. It will use a water source heat pump or biomass boilers located in the schools.
- The Energyzing Inch community scheme north west of Aberdeen would allow the connection of turbines to the Inch Energy Hub via underground cable and fibre optic ducting. The hub will incorporate megawatt scale battery storage, facilitating grid stability, and will include alongside it a 1MW biomass boiler. For users a reduction in energy bills of 20 to 30% could be possible.

Overall, Scotland has made significant progress on community energy and the recent capacity increase has been much faster than elsewhere in the UK.

Transmission and interconnection

The RPP2 established a target for the Scottish Government to seek transmission system upgrades and increased interconnection capable of supporting the projected growth in renewable capacity. Scotland's geography, in particular its islands and highland areas, mean that transmission and connection onto the electricity grid can be difficult and costly. There are a number of projects and investments that aim to address this and support future growth in renewables:

- By 2014, around £200 million had been invested in the £1 billion Western (Scotland Stage 1) HVDC Link joint venture between National Grid and Scottish Power Transmission. The link will bring renewable energy from Scotland to homes and businesses in England and Wales. It is on track and is anticipated to be completed by 2016. A further link, Scotland Stage 2, is currently under review.

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- It is estimated that work will begin on the Southwest Scotland Connections Project in 2015 – a new transmission network on the borders of Southwest Scotland. This will enable significant¹² (around 400MW) renewable generation to be connected to the grid.
 - The Irish-Scottish Links on Energy Supply (ISLES) project aims to connect offshore renewable sources between Scotland, Northern Ireland and Republic of Ireland. In October 2013, the ISLES Zone was approved as a Project of Common Interest by the EU Commission, and has been awarded £0.9 million investment from the Scottish Government in 2014-15 and 2015-16.
 - A £750 million subsea interconnector linking renewable projects in the Western Isles to the mainland has been planned for the past 10 years. However, the project has suffered numerous setbacks, with estimated completion now in 2019.

The transmission infrastructure is likely to be able to accommodate 2020 renewable output despite some delays in transmission and interconnection projects. In our 2014 UK progress report, we highlighted that a further 22GW of transmission infrastructure would be required UK-wide beyond 2020 in order to cost-effectively accommodate increasing levels of low-carbon generation. Upgrades to the transmission network will be required in Scotland and Northern England, as this is where the majority of the renewable generation is expected.

Carbon capture and storage (CCS)

Carbon capture and storage has a very important role to play in cost-effective decarbonisation of the economy. It allows for continued use of some fossil-fuel-fired power generation and has a crucial role in decarbonising heavy industry. Additionally, it provides the potential for negative emissions if used in conjunction with bioenergy, and can open up other decarbonisation pathways.

In 2013, the Peterhead CCS project in Aberdeenshire was chosen as one of two projects to take forward to the front end engineering and design (FEED) stage, as part of the UK Government's CCS Commercialisation Programme. The current schedule is such that this could come on the system around 2020, and make a significant contribution to Scottish power sector decarbonisation. If all the stages of the project progress as planned up to 1 MtCO₂ emissions per year could be captured from the Peterhead Power Station. These would then be transported by pipeline and stored under the North Sea in the depleted Goldeneye gas reservoir.

The North East of Scotland has been identified as one of the best places in Europe to develop CCS. There are many other possible CCS projects in Scotland that could be in operation by the end of the 2020s. The development of further CCS projects would be consistent with the Scottish Government's commitment to maintain coal as part of the energy mix. It has stated that any applicants seeking consent under Section 36 for a new coal-fired power station are required to include a capture unit covering a minimum size of 300MW_e.

12 www.swsproject.com/doc/SWS_AWGC/AWGC_FinalReport_0902.pdf

Low-carbon heat

Overview

Low-carbon heat is supported through a combination of GB-wide policy (primarily the Renewable Heat Incentive, with some support under the Energy Company Obligation for district heating), and Scottish Government financing which aims to boost low-carbon heat uptake, promote district heating and community heat, as well as tackle fuel poverty. In addition, low-carbon heat can be promoted through building regulations and the planning system, both of which are devolved.

In Scotland, a large number of dwellings are not on the gas grid, including more than half of households in rural Scotland. These dwellings are more likely to be using higher carbon-fuels (e.g. heating oil) or electricity for heating. The residential sector in Scotland has significant opportunity and scope for savings from low-carbon heat, although the current low price of heating oil has reduced the cost incentive for change.

The Climate Change (Scotland) Act 2009 requires Scottish Ministers to produce a plan for the use of renewable sources and to report regularly on progress. A Renewable Heat Action Plan was published in November 2009 and updated in 2010. It was refreshed again in 2011 with new actions and details. The draft Heat Generation Policy Statement published for consultation in March 2014 sets out the Scottish Government's proposed comprehensive framework to largely decarbonise the heat sector by 2050.

Progress against targets

The Scottish Government's target is to source 11% of heat demand from renewable sources by 2020, and to have a largely decarbonised heat sector by 2050.

In 2013, Scotland had around 0.66 GW of operational renewable heat capacity¹³, and 18% increase from 2012. The heat output from this is estimated to be 2.9 TWh.

Biomass and biomass CHP together account for 83% of capacity and 90% of output. The estimated capacity for renewable heat from biomass CHP has almost doubled from 144MW in 2012 to 261MW in 2013. The largest addition has come from the 65 MW Markinch Biomass CHP Plant (the largest biomass plant in the UK) which provides power and steam to a paper manufacturer, as well as feeding power into the grid.

The Scottish Government has recently changed the method for reviewing progress against its renewable heat target. Previously output was measured as a percentage of projected heat demand for 2020. However, a report from Audit Scotland¹⁴ suggests that the Scottish Government's estimate of total heat demand in 2020 (60 TWh) could be up to a third too low, based on data from the Department of Energy and Climate Change (DECC). The Scottish Government¹⁵ now plans to track progress towards the renewable heat target by estimating against the current level of heat demand, as opposed to a projection for 2020.

13 Energy Saving Trust (2014): 'Renewable Heat in Scotland 2013': www.energysavingtrust.org.uk/businesses/reports/renewable-heat-report-2013

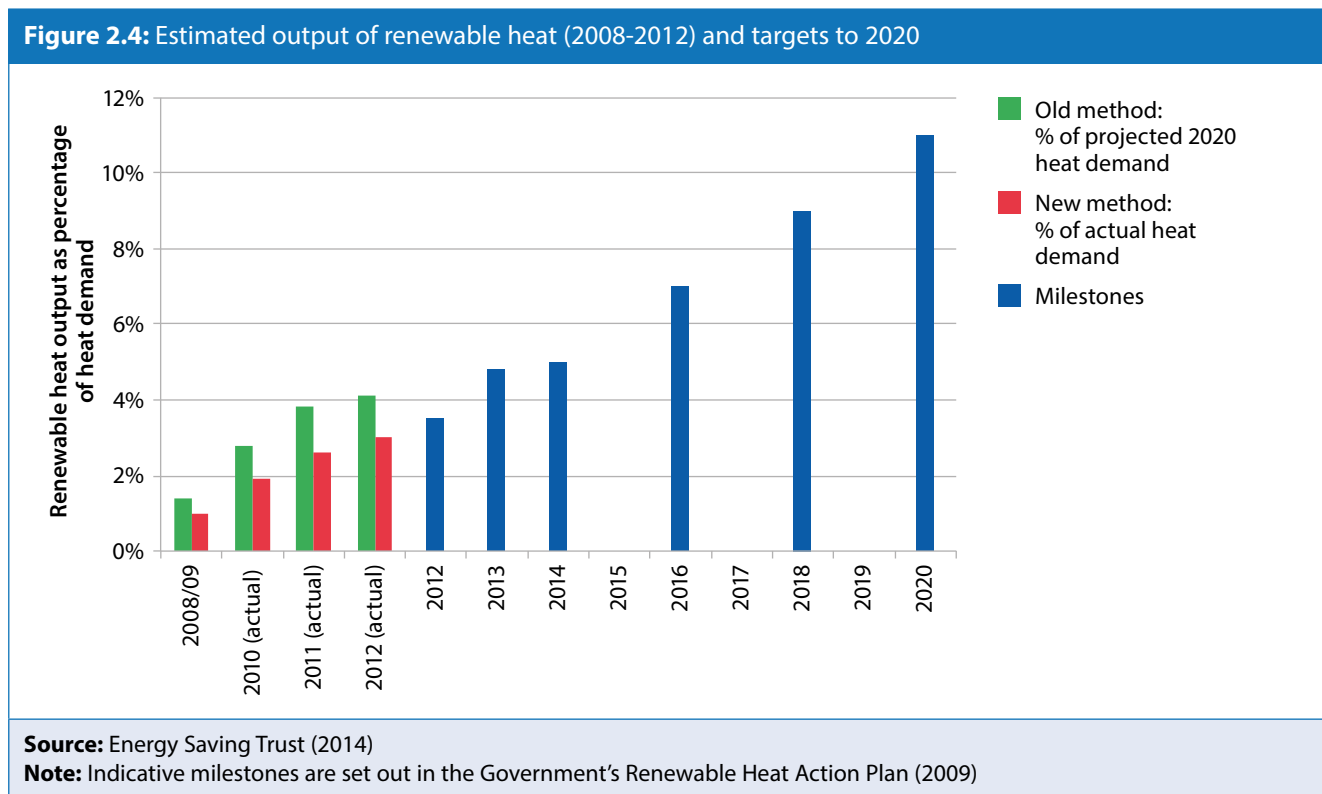
14 www.audit-scotland.gov.uk/docs/central/2013/nr_130912_renewable_energy.pdf

15 Scottish Government, Energy in Scotland Report: www.scotland.gov.uk/Resource/0044/00444530.pdf

The latest available estimate is for 2012, due to a lag in the final energy consumption data for Scotland published by DECC:

- Non-electrical heat demand in Scotland in 2012 was estimated to be 83 TWh by taking Scotland’s final energy consumption and subtracting electricity and transport consumption.
- Renewable heat output in 2012 was estimated to be 2.5 TWh.

Therefore, it is estimated that renewable heat generation equated to 3.0% of Scotland’s non-electrical heat demand in 2012, missing the 2012 milestone of 3.5%. Progress under the new heat target methodology compared to the previous measure (Figure 2.4) demonstrates the effect of this methodological improvement.



The pipeline of large-scale renewable heat projects (mainly biomass and CHP) in 2013 could potentially bring total heat output to around 4.5 TWh per year.

- There is an estimated 43 MW of capacity under construction, which could provide a further 470 MWh of renewable heat.
- A further 163 MW of capacity is either consented but not built, or submitted to local planning authorities for planning permission which could provide 2.3 TWh. This figure is significantly lower (60%) than last year due to Forth Energy’s announcement in March 2014 that it was not continuing with renewable energy projects in Grangemouth and Rosyth and withdrawal of its planning application for the Dundee site.
- If 50% of these consented or submitted for planning projects are operational by 2020, along with those already operational and under construction in 2013, there would be a total capacity of 786MW and 4.5TWh of renewable heat output. This would account for 7.5 % of estimated heat demand which could be met by low carbon sources in 2020 (assuming 2020 heat demand to be 60 TWh).

On this basis, if all the consented projects are operational by 2020, 9.5% of estimated heat demand could be met by 2020, or 6.3% if the estimate for heat demand in 2020 does prove to be a third too low.

Policy

Scotland has performed well compared to the GB-average in terms of deployment of renewable heat under the Renewable Heat Incentive (RHI).

- The first phase of the RHI focused on the industrial and commercial sectors. By January 2015, over 1270 MW of renewable heat capacity had been accredited under the scheme, with 21% of this capacity in Scotland. This is a greater proportion than would be expected based on either GVA or population (both 8%). The RHI has made biomass boilers very attractive to hotels and estates.
- The second phase from April 2014 covered additional technologies and extended to the residential sector. The total number of applications in the residential sector by January 2015 was almost 22,000 with 16% (3,800) of these in Scotland. This is a higher proportion than would be expected from Scotland's share of the GB housing stock (9%). 86% of the installations were in off-grid properties, compared to 73% across Great Britain.
- Prior to the second phase of RHI, residential installations qualified for support under the Renewable Heat Premium Payment (RHPP). The RHPP scheme, which ended in March 2014, supported a total of 153MW of installed capacity, with 16% of this in Scotland.

A number of additional policies are in place to support low-carbon heat in Scotland:

- The District Heating Loan Fund is open to local authorities, registered landlords, small and medium-sized enterprises (SMEs) and energy service companies (ESCOs); and provides loans of up to £400,000 per project for low-carbon, and renewable technologies. The Scottish Government's draft heat generation policy document proposed a target for district heating, for 1.5 TWh of heat to be delivered by district heating by 2020. In addition, the Scottish Government is committed to connect up to 40,000 homes to heat networks by 2020. There is £8 million of funding for district heating loans between 2014 and 2016.
- On the residential side, the £50 million Warm Homes Fund provides funding for renewable energy projects to support communities in fuel poverty, and the Home Energy Scotland Renewables Loan Scheme provides interest free loans of up to £10,000 for renewable heat installations for owner occupiers. Between 2013 and 2014, 660 loans were awarded for renewable heat technologies under the scheme, totalling £4 million.

Scotland is performing well relative to the rest of the UK on low-carbon heat uptake. Whilst Scotland is aiming for a similar level of low-carbon heat uptake in 2020 (11%, compared to a 12% UK-wide ambition), current RHI uptake figures show an above-average share of take-up in Scotland, particularly in non-domestic applications.

Despite good progress, further actions are required if the 2020 heat target is to be achieved. There are a number of areas where the Scottish Government could further promote the uptake of low-carbon heat (e.g. change the planning framework to require consideration of low-carbon heat, or establishing a Heat Networks Delivery Unit). Local authorities could play a pivotal role, for example by providing anchor loads for district heating schemes. In addition, the public sector could play an exemplar role in installing low-carbon heat systems.

Energy consumption

The Scottish Government has set a target to reduce final energy consumption by 12% by 2020, relative to a baseline of 2005 – 2007 consumption. The target (and series of targets to 2020) was published in the Energy Efficiency Action Plan in 2010 and established under the Climate Change (Scotland) Act 2009.

The latest data show that total final consumption¹⁶ in Scotland fell by 4.6 TWh (3%) in 2012, a reduction of 11.8% compared to the 2005 – 2007 average baseline. Overall, consumption was 12.8 TWh (8%) below the 2012 interim target level (Figure 2.5) and only 1 TWh below the 2020 target. Consumption is on track to meet the 2020 level as early as 2014.

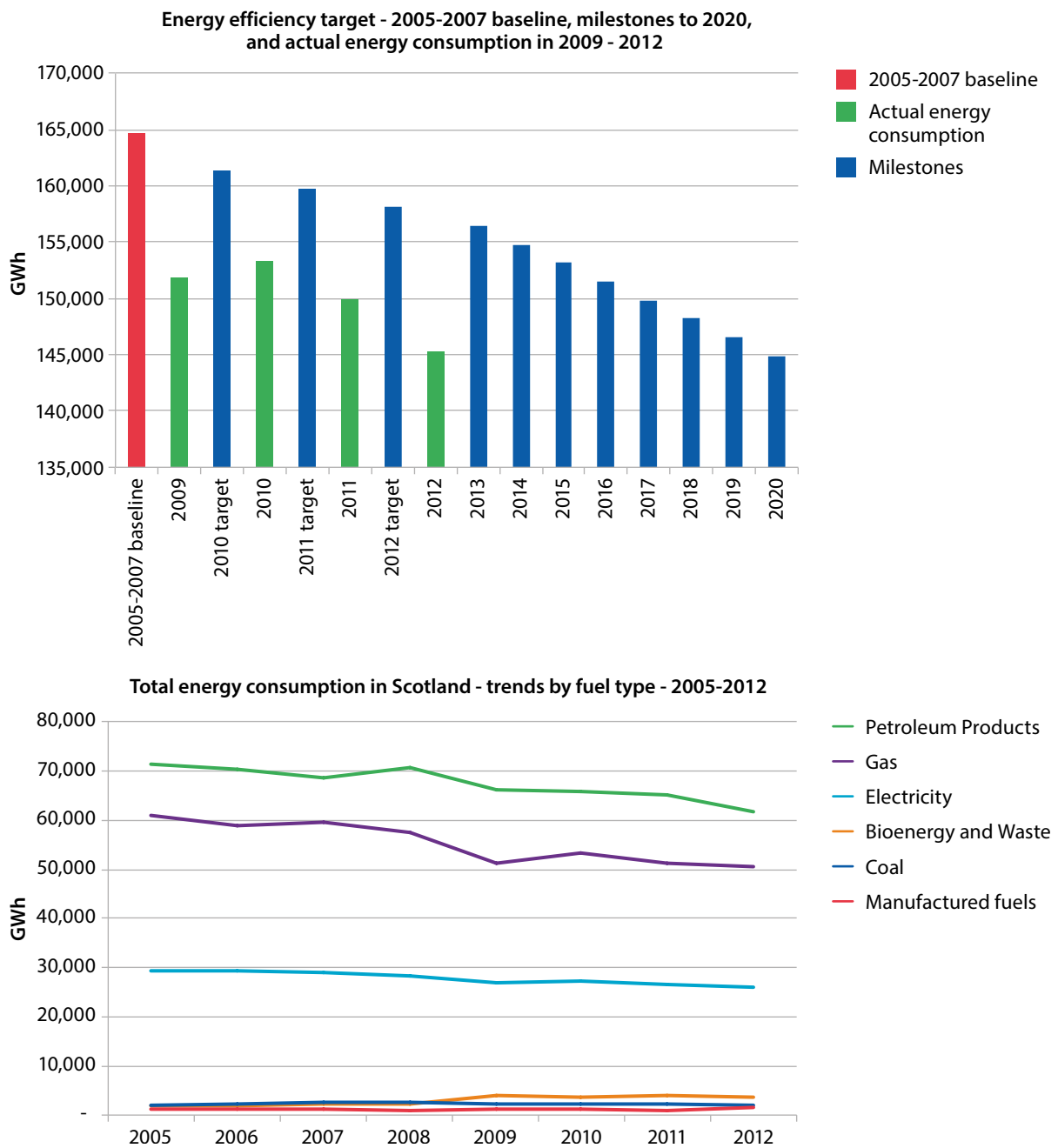
The main driver of these reductions in energy consumption has been a large fall in consumption of petroleum products and a small fall in gas consumption¹⁷, which together account for the majority (77%) of total energy consumption in Scotland.

We discuss in subsequent sections to what extent this reduction in energy consumption has been due to the implementation of measures.

¹⁶ For sub-national consumption data, only gas is temperature adjusted.

¹⁷ It should be noted that the gas consumption data are weather corrected and therefore these figures do not reflect the large increases in actual consumption caused by colder-than-average winter months.

Figure 2.5: Total energy consumption in Scotland



Source: DECC (2014)

Note: Covers coal, manufactured fuels, petroleum products, electricity, bioenergy and wastes in the commercial and industry, residential and transport sectors.

The Scottish Government has set a further target to meet at least 30% of overall energy demand from renewables by 2020. Total energy consumption (including all fuels and consuming sectors) in 2012 was 145 TWh, 11.6% of this was from renewables. By 2020, if final energy consumption has reduced by 12% relative to the 2005–2007 average and all consented renewable electricity and heat projects are built, this target will be met.

Recommendations

The Scottish Government is not on track to meet its renewable heat target. The analysis above suggests this is because there are insufficient projects in the pipeline. We recommend that the Scottish Government:

- Review and address barriers within the public sector to ensure that opportunities for low-carbon heat are taken up, including access to finance, lack of awareness, capacity and lack of knowledge and skills.
- Work with local authorities and community groups to promote the domestic RHI to householders alongside the finance under the Warm Homes Fund and Home Energy Scotland Renewables Loan. Consider further roll-out of roadshows to demonstrate renewable heat technologies.
- Consider further action to facilitate heat networks, for example through a Scottish equivalent of the Heat Networks Delivery Unit; requiring consideration of district heating in new developments; and obliging local authorities to connect to existing heat networks where technically possible to provide anchor loads.

3 Homes and communities

Summary of progress

Milestone	Progress
Every home to have loft and cavity wall insulation, where this is cost-effective and technically feasible, plus simple measures such as draught-proofing and pipe lagging.	<p>The Scottish House Condition Survey (SHCS) shows that:</p> <ul style="list-style-type: none"> • The number of homes with loft insulation of more than 200mm (close to the recommended level of 275mm¹⁸) increased by 143,000 homes (15%) in 2013 to 1.1 million homes. There has been a substantial increase since 2003 when just 258,000 homes had more than 200mm of loft insulation installed. • There are 27,000 dwellings which do not have loft insulation but would be suitable and at least a further 647,000 could benefit from topping up levels of loft insulation to the recommended level. • In 2013, the number of properties with cavity wall insulation increased by 61,000 to 1.2 million (69%) but there remain a further 554,000 (31%) uninsulated.
Sustainable Housing Strategy (SHS) aims to make sure that no-one in Scotland has to live in fuel poverty, as far as practicable, by 2016.	In 2013, fuel poverty in Scotland rose to 39.1% (around 940,000 households) from 35.2% in 2012.
SHS aims to deliver a step-change in the provision of energy efficient homes to 2030 through retrofit of existing housing and improved building regulations for new build homes.	From October 2015, new building regulations will come into effect which will mean new buildings (both domestic and non-domestic) will be more energy efficient. For new-build homes, the regulations are more stringent than in England and Wales. There has been some progress in building retrofit but there is still much to be done. Progress has been affected by changes in the ECO.

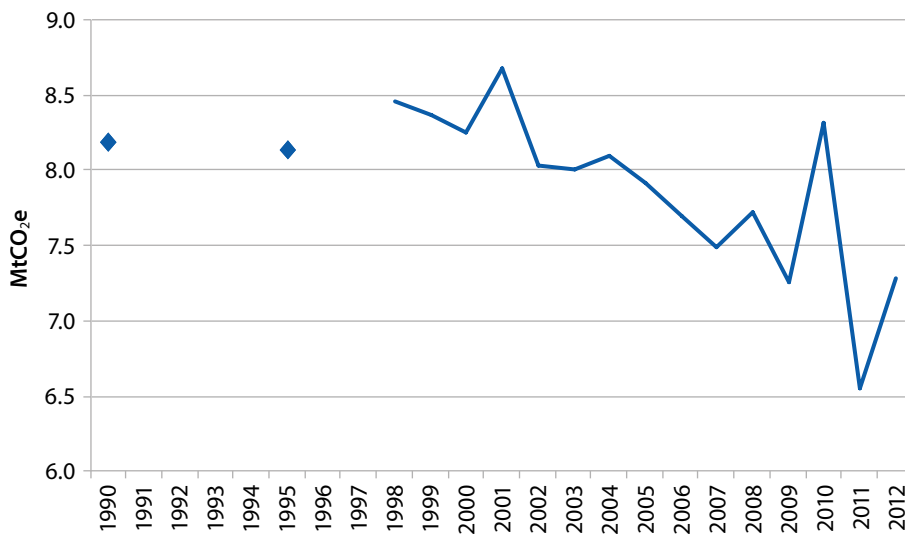
Latest emissions trends

In 2012, emissions from the residential sector in Scotland were 7.3 MtCO₂e, 11% higher than in the previous year and slightly below the UK level increase (12%) This followed a marked decrease in emissions from the sector in 2011 due to warmer temperatures. Residential emissions account for 12% of total emissions in Scotland in 2012, and were 11% below their 1990 level (Figure 3.1).

The rise in emissions in 2012 can be attributed primarily to the colder temperatures in 2012 compared to a mild 2011 (Figure 1.3), which led to increased heating demand. Adjusting for temperature changes, emissions from the residential sector would have increased only slightly (0.5%) in 2012. Temperature change adjustments suggest an underlying fall in residential gas consumption by 1% in 2012 (Figure 3.2), following a reduction of 4.5% in 2011. This is likely to reflect the continuing implementation of energy efficiency measures and response to rising gas prices (gas prices rose 9.3% in UK in the 2012).

¹⁸ As recommended by the Energy Saving Trust (EST).

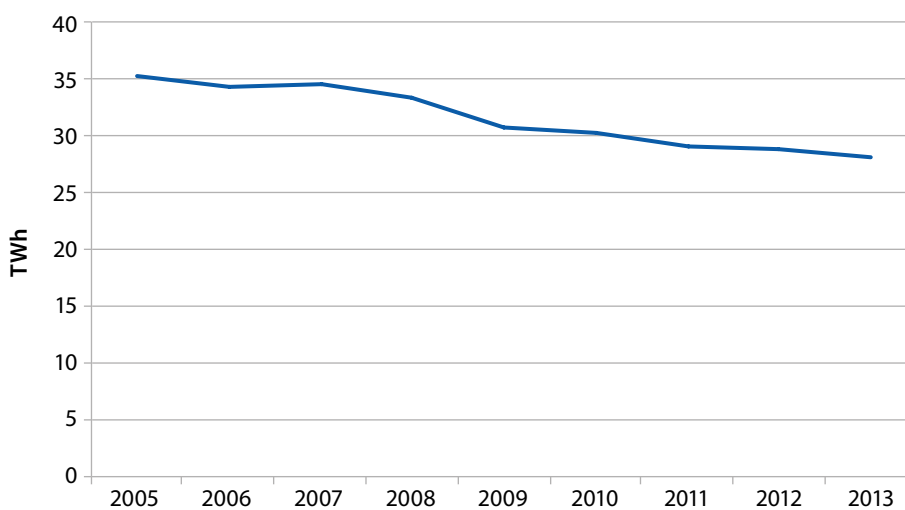
Figure 3.1: Residential sector emissions in Scotland (1990-2012)



Source: NAEI (2014)

Note: GHG emissions data is not available for Scotland for 1991-1994, or 1996-1997.

Figure 3.2: Residential gas sales (2005–2013) – weather corrected



Source: DECC (2014)

Note: The data used covers the gas year – the period from 1 October through to the following 30 September (i.e. 9 months of the reference year). The data are also weather corrected.

Overview

Policy to address residential sector emissions is partially devolved. Minimum energy efficiency standards for electrical appliances are set at EU level, while the main energy efficiency schemes aimed at improving the thermal performance of existing homes, (the Green Deal and the Energy Company Obligation (ECO)) are GB-wide, as is the Renewable Heat Incentive (see section 2). Under the new devolution proposals, the implementation of the ECO would be devolved to Scotland. The Scottish Government provides funding for additional energy efficiency programmes. Furthermore, building regulations and fuel poverty are devolved matters, although Scotland is also covered by the fuel poverty-focused elements of the ECO.

The Scottish Government has set out a number of 2020 milestones for the residential sector:

- Every home to have loft and cavity wall insulation, where this is cost-effective and technically feasible, plus simple measures such as draught-proofing and pipe lagging;
- Every home is to be heated with gas central heating to have a highly efficient boiler with appropriate controls; and
- At least 100,000 homes to have adopted some form of individual or community renewable heat technology for space and/or water heating.

The 2013 Sustainable Housing Strategy (SHS) set out a vision for warm, high quality, affordable, low-carbon homes and a housing sector that helps to establish a low-carbon economy across Scotland. The strategy aims to:

- Make sure that no-one in Scotland has to live in fuel poverty, as far as practicable, by 2016;
- Deliver a step-change in the provision of energy efficient homes to 2030 through retrofit of existing housing and improved building regulations for new-build homes.

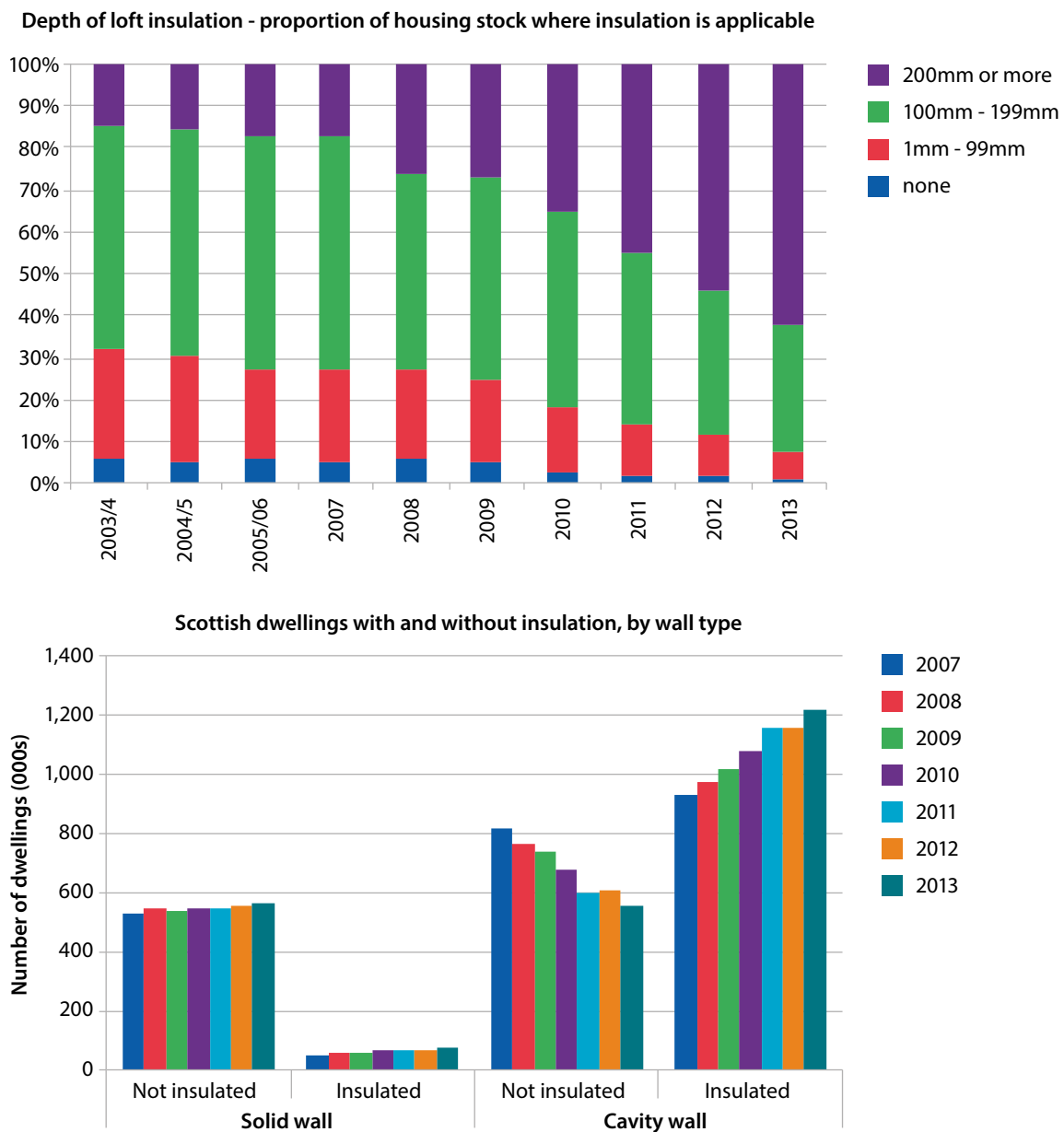
In the following sections, we look at progress in installing insulation measures and consider the schemes that have contributed to progress towards the residential sector and fuel poverty milestones.

Progress in insulation measures

The proportion of Scottish homes with insulation has increased steadily in recent years. However, there is still significant potential for an increased rate of loft and cavity wall insulation. Furthermore, 89% of dwellings with solid or other non-cavity walls currently do not have insulation (Figure 3.3).

- The Scottish House Condition Survey (SHCS) shows that the number of homes with loft insulation of more than 200mm (close to the recommended level of 275mm) increased by 143,000 homes (15%) in 2013 to 1.1 million homes. There has been a substantial increase since 2003 when just 258,000 homes had more than 200mm of loft insulation installed.
- There are 27,000 dwellings which do not have loft insulation but would be suitable and at least a further 647,000 could benefit from topping up levels of loft insulation to the recommended level.
- The SHCS indicates that in 2013, the number of properties with cavity wall insulation increased by 61,000 to 1.2 million (69%) in Scotland, but there remain a further 554,000 (31%) uninsulated.
- Around one quarter of properties in Scotland have solid or other types of walls (including timber frame) compared to a third of properties in the UK as a whole. Of these dwellings, the proportion insulated remained constant between 2010 and 2013 at around 11%, (71,000 properties were insulated in 2013 but more than 0.5 million remain uninsulated).

Figure 3.3: Loft, cavity and solid wall insulation in Scotland (2003/04–2013)



Source: Scottish House Condition Survey for 2013 – Scottish Government (2014)

Note: In 2013 there were 606,000 dwellings where loft insulation is not applicable.

In 2013, there was a change in GB-wide energy efficiency policy, from the Carbon Emission Reduction Target (CERT) programme to the Green Deal and Energy Company Obligation (ECO). This led to much lower installation numbers in 2013 compared to 2011 and 2012:

- The Scottish Government has estimated that there were 11,000 loft insulation installations and 20,000 cavity wall insulation installations, under the ECO in 2013. This is compared to the last year of CERT where there were 142,000 loft insulation installations and 40,000 cavity wall insulation installations. Solid wall installations in the first year of ECO were 5,000, 1,000 more than the last year of CERT.

- The latest ECO statistics from DECC show that up to September 2014, there were 112,500 ECO measures delivered in Scotland. This was 12% of the total measures delivered under the scheme in Great Britain (Table 3.1).
- No breakdown of the types of measures installed is available for Scotland for 2014 but insulation figures are likely to show a similar trend to GB-wide figures:
 - In 2014, under ECO, the total number of lofts insulation installations increased 41% from 2013, equating to a total of 313,500.
 - The number of cavity wall insulation installations rose by 69% to 462,000, while solid wall insulations rose by 37% to 75,500.

Delivery of insulation measures has been particularly difficult in some of the more remote areas of Scotland. The lowest delivery rates under the ECO in the whole of the UK in 2013 were in the Shetlands and Orkney Island.

Table 3.1: Provisional number of ECO measures by ECO obligation and proportion of GB total (up to September 2014)

	Carbon Saving Target (CSO)	Carbon Savings Community (CSCO)	Affordable Warmth (HHCRO)	Total Number of ECO measures delivered
Scotland	50,580 (13%)	22,966 (11%)	38,975 (10%)	112,521 (12%)
Great Britain	379,377	205,582	379,442	964,401

Source: DECC (2014)

Energy efficiency policy

The Scottish Government runs its own energy efficiency schemes which work to leverage ECO funding, as well as providing additional measures. The Home Energy Efficiency Programmes for Scotland (HEEPS) has been in operation since April 2013 (Box 3.1) and prioritises fuel poor and vulnerable households.

In February 2014, the Scottish Government announced that a further £20 million of investment will be added to the 2015-2016 budget of £94 million for improvements to domestic energy efficiency, bringing the total to £114 million. Funding available to fuel poor households is higher per household in Scotland than in in England, where there is no funding beyond the ECO.

Box 3.1: Home Energy Efficiency Programmes for Scotland

There are three main strands to Scotland's Home Energy Efficiency Programmes (HEEPS):

- Area-based schemes are delivered by local authorities and prioritise fuel poor areas, providing a range of insulation measures. £60 million of funding has been announced for 2014/15. Around £42 million will be split between the 32 councils, while the remaining £18 million will be made available to local authorities to develop larger-scale schemes. In 2013/14, almost 25,000 energy efficiency measures were delivered through area-based schemes. Around 15,000 of these were in the private sector and the remainder in social rented sector stock. The majority of these (51%) were solid wall insulation. Area-based schemes have been important at developing local skill sets, however in some remote areas delivery has been difficult (e.g. due to lack of accommodation for contractors).
- The Affordable Warmth Scheme (AWS) is offered to households who are vulnerable to fuel poverty as defined by the UK Government's ECO Affordable Warmth group.

Box 3.1: Home Energy Efficiency Programmes for Scotland (continued)

- A 2-year extension to the Energy Assistance Scheme (EAS), worth £32 million, provides repairs and replacement insulation and central heating measures. This is focusing on the most vulnerable and poor households which were previously eligible for heating and insulation measures, but who would otherwise miss out under the Affordable Warmth Scheme.

Alongside funding for physical measures, the Scottish Government also funds Home Energy Scotland (HES) through HEEPS to provide free and impartial advice to all householders in Scotland and ensure they can be referred through the most appropriate scheme tailored to their personal circumstances. The service also provides advice on behaviour change. In 2013/14, over 49,000 people contacted HES with over 45,000 (92%) taking up offers of help.

Additional funding is being provided under the Green Homes Cashback Scheme, which has recently been extended to include local authorities and Registered Social Landlords. This scheme offers cashback on energy efficiency measures recommended in a property's Green Deal assessment. Social landlords can apply for grants of up to £1 million, with a maximum of £1,200 available per home. Upgrades funded under the scheme include insulation, new boiler, glazing, fitting of low energy light bulbs, and new heating controls. The most recent phase launched in June 2014 with £10.5 million for householders and £4.5 million for social landlords.

There is uncertainty over the overall level of investment for 2014/15 due to the changes to ECO but the Scottish Government aims to continue to use HEEPS funding to maximise leverage of energy company funding. To achieve this, in 2014 the Scottish Government revised the HEEPS criteria to maximise ECO delivery in Scotland.

Stakeholders have told us that HEEPS has provided continuity and certainty, especially for installation of more challenging measures such as solid wall insulation, in the face of UK Government changes to ECO in 2014. However, funding timescales under HEEPS have been challenging, especially for more complex projects. Furthermore, with flats making up 38% of the Scottish housing stock, more effective policies are needed for multi-tenanted properties where residents are seen as unlikely to proactively push for communal measures due to perceived challenges in getting agreement and securing finances¹⁹.

In addition to financial incentives, the Scottish Government has implemented standards for energy efficiency performance:

- The Scottish Housing Quality Standard (SHQS) introduced in 2004 sets a minimum energy efficiency rating for social properties. Social landlords are required to achieve the SHQS by April 2015. The SHQS minimum efficiency rating element will be superseded by the new Energy Efficiency Standard for Social Housing (ESSH), published in March 2014. Achievement of ESSH by social landlords will mean that approximately 600,000 social houses will be either EPC band C or D by 2020.
- A consultation on regulations for minimum energy efficiency standards for owner-occupied and privately rented properties is planned for spring 2015. This has potential to go further than England and Wales where only privately rented homes will be required to be a minimum rated band E for energy efficiency by 1st April 2018. The Scottish Government has been working with representatives from consumer, environmental, local authority and the private sector to develop draft regulations before Scottish Ministers decide what standards, if any, should apply, and what lead time would apply before standards are introduced.

While Scottish energy efficiency policy is well developed and more comprehensive than that available in England, fuel poverty remains a serious problem.

¹⁹ www.consumerfutures.org.uk/files/2013/05/Communal-improvements.pdf

Fuel poverty

Fuel poverty in Scotland is more pronounced than for the UK as a whole. The accuracy of estimated numbers of fuel poverty in Scotland changed in 2013, mostly due to improvements in the modelling²⁰ of household energy consumption. The Scottish fuel poverty definition and new energy model is different to that used in England, so we are unable to compare most recent data. Overall, the updated model has led to higher estimates of household energy consumption resulting in a 6-8% point increase in the estimated fuel poverty rate for each year in the period 2010-2012.

- In 2012 (the last year for which comparable data is available), using the old model, 27% of Scottish households were in fuel poverty compared to 4% at UK level.
- In 2013, using Scotland's new fuel poverty model, fuel poverty in Scotland rose to 39.1% (940,000 households) from 35.2% in 2012.

Fuel poverty depends on a range of factors, including energy prices, household incomes, heating requirements and the characteristics of the dwelling. Households which are not on the gas grid are more likely to be in fuel poverty, as are those with electrically-heated homes (Table 3.2).

Table 3.2: Latest fuel poverty statistics in Scotland by dwelling characteristics

Dwelling characteristic		Oct 2011	2012	2013
Primary heating fuel	Gas	35%	31%	35%
	Electricity	49%	49%	56%
Urban/Rural	Urban	37%	33%	36%
	Rural	48%	46%	55%
Gas grid	On gas grid	38%	33%	37%
	Not on gas grid	46%	44%	50%

Source: Scottish House Condition Survey 2013 (2014).

Increased fuel prices alone, according to the Scottish Housing Condition Survey, would have led to nearly a 6% rise in fuel poverty in 2013. However, around a 1/3 of this potential was mitigated by growth in household income and energy efficiency improvements in housing stock.

Scotland has a higher proportion of electrically-heated homes (13%) than UK-wide (7%). These are mostly smaller properties, in particular flats with a large proportion in the rental sector and high levels of fuel poverty. Our December 2014 report on energy prices and bills found that as the costs of support for low-carbon investment is currently passed through the electricity bill; these households pay a higher proportion of their energy bill towards low-carbon policy costs than dual-fuel homes and this will rise to 2030. Homes in the North of Scotland are affected most, because they already have the highest per unit prices of all the public electricity supply regions of the UK. Targeting electrically-heated homes in these regions with energy efficiency measures and low-carbon heat is particularly important for fuel poverty alleviation.

²⁰ The new energy model has greater flexibility enabling more accurate representation of the official definition of fuel poverty in setting the required heating regime for vulnerable households. The Scottish Government defines fuel poverty as: A person is living in fuel poverty if, to heat their home to a satisfactory standard (typically defined as 21 degrees for the main living area and 18 degrees for other occupied rooms), they would need to spend more than 10% of their household income on fuel.

Recommendations

- Carry out an evaluation of current energy efficiency programmes (especially the area-based schemes) to help determine the best way to implement supplier obligations as they become devolved.
- Develop effective energy efficiency schemes for multi-tenanted properties (e.g. ‘tenement action areas’), as flats make up 38% of the Scottish housing stock.
- Make energy efficiency funding available over a sufficiently long timescale to ensure that complex projects can be completed.
- Ensure that policies effectively target electrically-heated homes both in terms of energy efficiency improvement and incentives for low-carbon heat.
- Adopt ambitious minimum energy efficiency standards in both owner-occupied and privately rented sector housing within the regulations planned for consultation in spring 2015.

4 Business and the public sector

Summary of progress

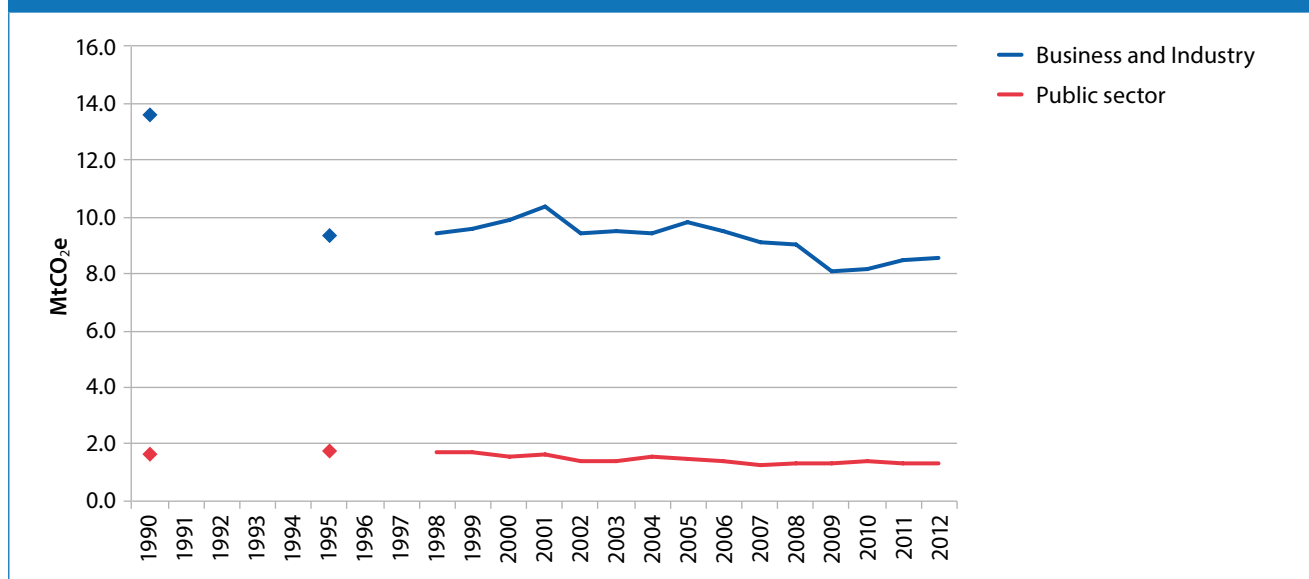
Milestone	Progress
The public sector will have reduced its energy consumption by at least 12% by 2020 relative to 2005–2007 average.	Energy consumption data in Scotland are not broken down by sector so it is not possible to assess progress for this milestone. However, Scottish public sector organisations will be required to report on their compliance with climate change duties under new proposals this year.
By 2027, there will be a complete transformation in the way Scottish public bodies work and in how their estates are managed. This will be achieved through implementing and exceeding existing carbon management plans, adopting sustainable procurement processes and through supporting governance arrangements.	As above, Scottish public organisations will be required to report on their compliance with climate change duties under new proposals this year.
By 2027, there will have been significant progress in transforming energy use in industry and business through resource efficiency measures and low carbon technologies such as CCS and fuel switching.	UK and EU policies to date have failed to drive progress towards a low-carbon industry sector. UK industry roadmaps are under development but will have to be turned into action.
By 2050, direct emissions from the sector will be almost zero.	Emissions from business and industrial processes (including some emissions within the EU ETS) were 8.5 MtCO ₂ e in 2012, accounting for 14% of total emissions in Scotland. Between 1990 and 2012 emissions fell by 37%, but they increased by 0.6% in 2012.

Latest emissions trends

Emissions from business and industrial processes (including some emissions within the EU ETS) were 8.5 MtCO₂e in 2012, accounting for 14% of total emissions in Scotland. Between 1990 and 2012 emissions fell by 37%, but they increased by 0.6% in 2012 (Figure 4.1). The increase in emissions in the sector in 2012 is likely to have reflected continued economic growth.

In 2012, emissions from the public sector were 1.4 MtCO₂e, representing just 2% of Scotland's total. Emissions rose by 4% in 2012 due to increased heating demand, but were 18% below 1990 levels (Figure 4.1).

Figure 4.1: Scottish business, industry and public sector GHG emissions (1990-2012)



Source: NAEI (2014)

Note: Inventory GHG data is not available for Scotland for 1991-1994 or 1996-1997

Milestones and progress

Emissions are addressed through energy and resource efficiency measures, the decarbonisation of electricity, and the decarbonisation of heat.

The Scottish Government has set the following milestones for business, industry and the public sector:

- The public sector will have reduced its energy consumption by at least 12% by 2020.
- By 2027, there will be a complete transformation in the way Scottish public bodies work and in how their estates are managed. This will be achieved through implementing and exceeding existing carbon management plans, adopting sustainable procurement processes and through supporting governance arrangements.
- By 2027, there will have been significant progress in transforming energy use in industry and business through resource efficiency measures and low carbon technologies such as CCS and fuel switching.
- By 2050, direct emissions from the sector will be almost zero.

It is difficult to assess progress against these targets. For example, energy consumption data in Scotland are not broken down by sector so it is not possible to assess progress in the public sector towards its energy consumption target.

A number of EU, UK and GB policies cover emissions from business and the public sector, including the EU ETS, CRC Energy Efficiency Scheme, Climate Change Levy and Climate Change Agreements (CCAs), the Energy Savings Obligations Scheme, and the RHI (see section 2). Our 2014 UK progress report²¹ found that the current policy landscape is both administratively complex and uneven in the incentives it provides. We have therefore highlighted the scope for rationalisation and filling the gaps (e.g. for small and medium-sized enterprises).

The UK Government has been facilitating a process aimed at producing 2050 decarbonisation roadmaps for key industrial sectors. We have called for the Government to publish a strategy based on these roadmaps by 2017, aimed at delivering abatement in the 2020s. We have also highlighted the need a clear approach to demonstration and commercialisation of industrial CCS.

The Scottish Government has a few additional policies for these sectors:

- The Resource Efficient Scotland advice service was launched in April 2013, providing support to businesses, third sector and public sector organisations to reduce costs through implementing resource efficiencies in energy, raw materials, water and waste management.
- Interest-free loans are available to SMEs from £1,000 to £100,000 for resource efficiency projects.
- They also offer loans for renewable energy projects, with an interest rate of 5% for businesses signing up for FITs, or the RHI.

While these are useful, emissions in industry and the commercial sector will remain mainly under the influence of EU and UK policies.

Public sector

We have previously stressed that it is important for the public sector to set an example and deliver against ambitious targets. The Climate Change (Scotland) Act 2009 includes a duty on public bodies to contribute to the delivery to climate change targets under the Act. Assessing progress against this duty is currently difficult due to data limitations.

Although emissions in the public sector have increased in 2012, progress was made in 2013 in the Scottish Civil Estate and Parliament, although this represents a small part of the public sector in Scotland:

- In 2013, the Scottish Parliamentary Corporate Body (SPCB) reduced its emissions by 12% compared to 2012, a reduction of 32% since 2005/6. Its carbon management plan lays out a target to reduce emissions by 42% by 2020. The majority of the emission reduction has been achieved by reducing the electricity and gas consumed in the Parliament building and through a reduction in the carbon intensity of grid electricity. In addition, it has reduced consumption of water and paper and the total amount of waste produced. The majority of its intermediate targets for 2014/2015 have either already been met or are close to being met.

21 www.theccc.org.uk/wp-content/uploads/2014/07/CCC-Progress-Report-2014_web_2.pdf

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- The Scottish Civil Estate²² and Sustainability Report for 2013/2014 reports on performance and environmental sustainability of the Scottish Civil Estate against key indicators, one of which is energy consumption. However, consumption has actually gone up and in 2013/2014 was 8.5% higher per m² than in 2010/11. Waste recycling increased from 65% in 2011/2012 to 94% due to increasingly sophisticated off-site segregation of general waste that was formally sent to landfill, and water consumption decreased from 23.6 m³/FTE to 14.2 m³/FTE.

From November 2015, Scottish public bodies are likely to be required to report on compliance with the Climate Change Act public bodies duties. The Scottish Government published a consultation on this in February 2015, and estimates that this will affect 150 organisations, including councils and NHS Boards. Organisations will have to report their emissions, savings from carbon projects, as well as renewable energy generation and consumption. While better, mandatory reporting will be a step forward, and goes further than the UK as a whole, public sector bodies should also be required to set ambitious CO₂ reduction targets.

Recommendations

- Set ambitious CO₂ reduction targets for government buildings and consider extending the public bodies duties under the Climate Change Act (Scotland) to require other public bodies to do the same.

22 This includes buildings of the core Scottish Government and 8 executive agencies.

5 Transport

Summary of progress

Milestone	Progress
A mature market for low carbon cars resulting in achievement of an average efficiency for new cars of less than 95 gCO₂/km.	<p>Improvement in new car efficiency continued in 2013, driven by the EU directive targeting 95 gCO₂/km by 2020.</p> <ul style="list-style-type: none"> • CO₂ intensity of new cars fell from 133.0 gCO₂/km in 2012 to 128.3 gCO₂/km in 2013, a 3.5% reduction. This is in line with the UK but higher than Wales and Northern Ireland. • This outperforms the CCC's UK-wide indicator of 142 gCO₂/km for 2013 – consistent with progress towards a 95 gCO₂/km target in 2020 and meets the EU 2015 target of 130 gCO₂/km two years early. • The CO₂ intensity of new cars in Scotland fell by a further 3% in 2014, to 124.4 gCO₂/km.
An electric vehicle (EV) charging infrastructure in place in Scottish cities.	<p>At the end of January 2015, there were approximately 850 public charging points across Scotland²³, approximately 40 of them being rapid. The proportion of UK sales of electric vehicles taking place in Scotland decreased to 6% in 2013, increasing to 7.5% in 2014. This remains lower than Scotland's overall share of car sales in the UK (9%).</p> <p>Plans are underway for rapid charge points at 50 mile intervals on Scotland's primary road network, with Transport Scotland having been awarded £600,000 funding for 2014/2015.</p>
Personalised travel planning advice provided to all households.	<p>Personalised travel planning was provided to 50,000 households through the Smarter Choices Smarter Places programme in 2012.</p>
Effective travel plans in workplaces with more than 30 employees.	<p>The Energy Saving Trust's Low Carbon Transport Loan Fund received applications from 42 organisations in 2011 – 2012 seeking interest-free funding for workplace travel plan measures such as cycle storage and video conferencing technology.</p>
At least 10% of all journeys made by bicycle.	<p>In 2013, 1% of journeys were by bike, well below the 2020 ambition of 10%. This figure has remained at around 1% since 2003.</p>
By 2030 the Scottish Government aims to see significant progress in decarbonisation of road transport, through the wholesale adoption of electric cars and vans, and conversion to hybrid or alternatively-fuelled HGVs and buses, along with a significant modal shift and significant steps to decarbonise rail and maritime transport.	<p>Transport Scotland announced funding of £4.75m for a fifth Scottish Green Bus Fund. A further 32 new low carbon buses purchased under round 4 of the fund are expected to join the Scottish fleet by 31 March 2015.</p> <p>ChargePlace Scotland and Switched on Fleets are Scottish initiatives to encourage electric vehicle use domestically and in the work place.</p>

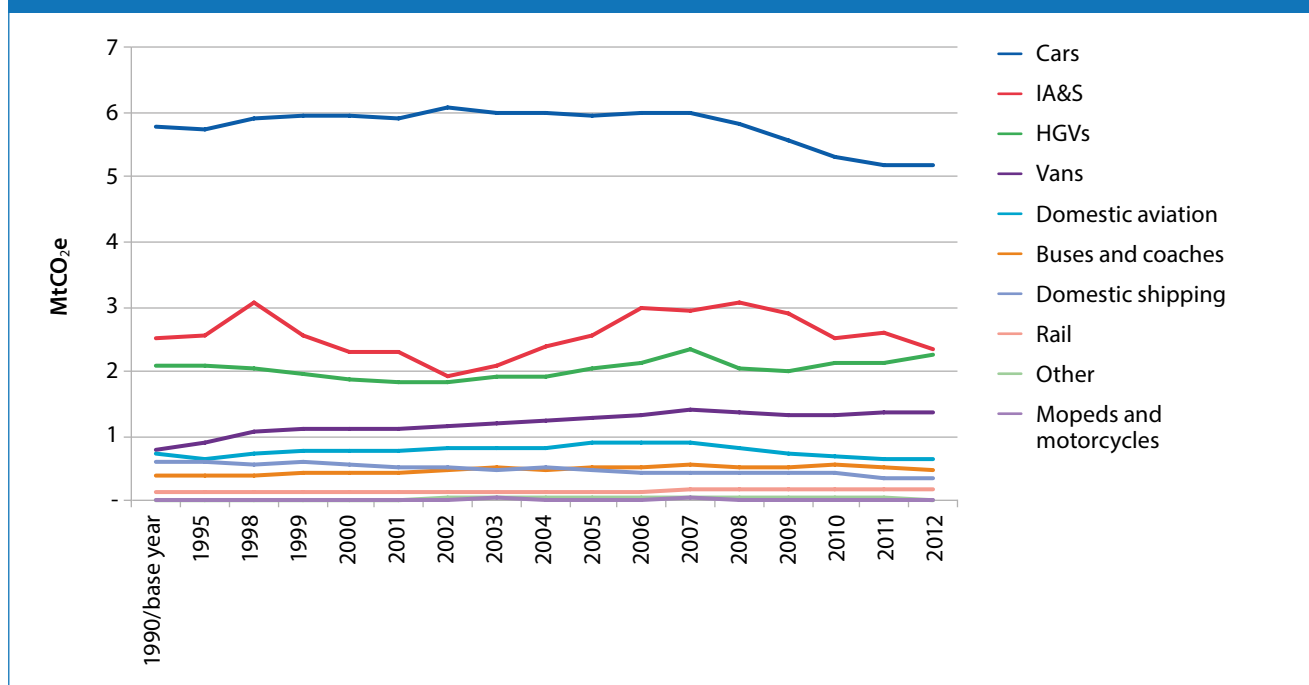
23 <https://www.zap-map.com/statistics/#charger-type>

Latest emission trends

The Scottish Government's emission targets cover emissions from all transport in Scotland, including international aviation & shipping (IA&S). In 2012, total transport emissions fell 1.3%, and are 1% lower than 1990 levels. Within the total emissions changes have varied by mode (Figure 5.1).

- Cars are the largest source of emissions accounting for 40% of the total at 5.2 MtCO₂e. Emissions from cars fell by 1% in 2012 and overall are 11% lower than in 1990. This reflects a continued levelling off in vehicles-kilometres travelled and improvements in new car efficiency (Figure 5.2).
- International aviation and shipping emissions were 2.4 MtCO₂e in 2012, 20% of total transport emissions. This is a decrease of 9% from 2011 and emissions are 6% lower than 1990 levels.
- Emissions from heavy goods vehicles (HGVs) account for 16% of Scotland's transports emissions at 2.3 MtCO₂e. Emissions rose by 6% in 2012 and are now 8% higher than in 1990.
- Emissions from vans were 1.4 MtCO₂e in 2012, 10% of total transport emissions. Emissions increased by 1% during 2012 and are 73% above 1990 levels.
- The remaining 14% of emissions comprise domestic aviation and shipping, buses, rail and motorcycles.

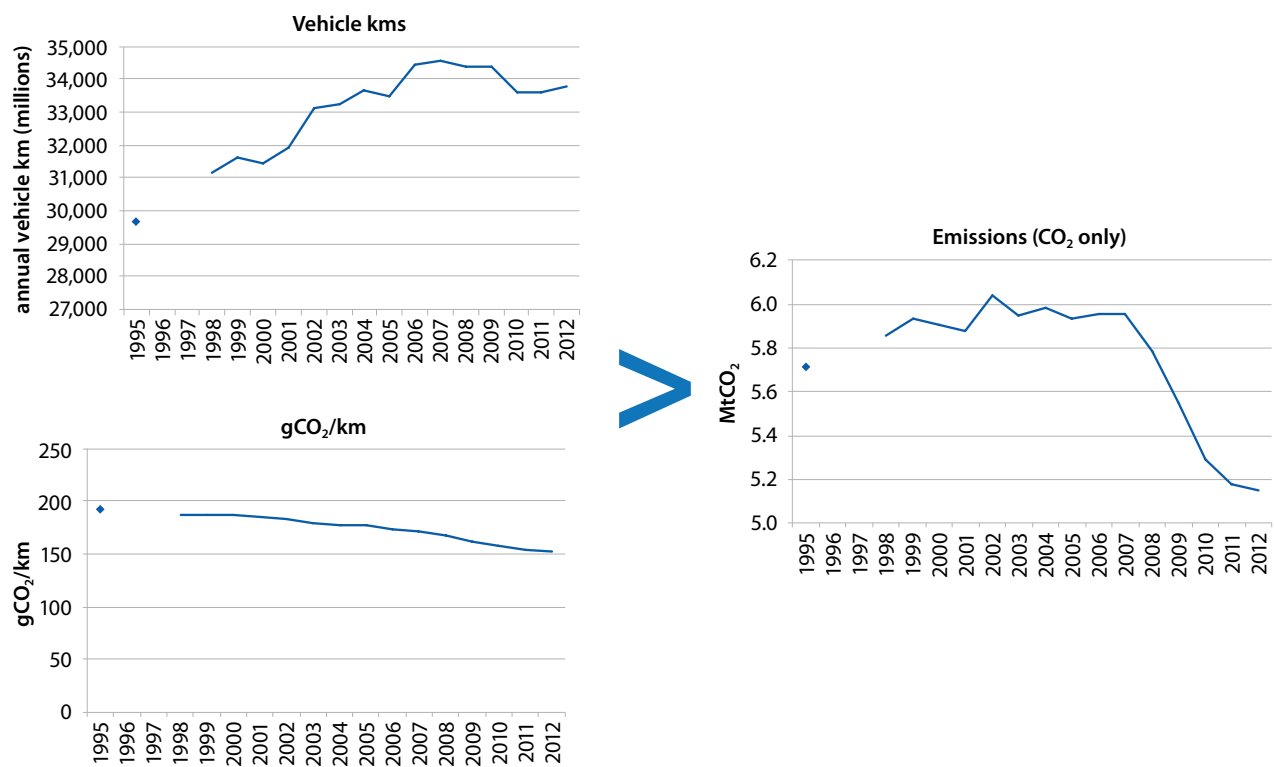
Figure 5.1: Transport emissions by mode (1990-2012)



Source: NAEI (2014)

Note: Inventory GHG data is not available for Scotland for 1991-1994 or 1996-1997

Figure 5.2: Historic trends in vehicle km, gCO₂/km and car emissions, Scotland (1995-2012)



Source: NAEI (2014), Scottish Transport Statistics No.32 – 2013 edition, chapter 5: road traffic. CCC calculations.

Note: Inventory GHG data is not available for Scotland for 1996-1997

Overall transport emissions accounted for 21% (13 MtCO₂e) of total Scottish emissions and make up a large proportion of non-traded sector emissions (37% of Scotland’s non-traded sector target in 2012). Therefore, they are of particular importance for the achievement of Scottish targets.

Milestones and progress

The Scottish Government is aiming for almost total decarbonisation of the transport sector by 2050 and has set a number of milestones for new car efficiency, electric vehicles, cycling and travel behaviour change. Achievement of targets depends on a mix of EU, UK and Scottish Government measures, namely EU car and van efficiency standards and Scottish measures to promote modal shifts and a switch to electric vehicles. Local authorities play a key role in implementing transport measures as they have control over a number of provisions including cycling plans, buses and concessionary travel.

As part of the devolution settlement, Scotland is likely to get additional powers to set speed limits which could reduce fuel consumption. They are also likely to get control over air passenger duty and have suggested that the duty might be cut by 50%. This could lead to increased carbon emissions if it were to result in an increase in flight and passenger numbers. There are no targets to reduce emissions from international aviation and shipping as these are largely set internationally.

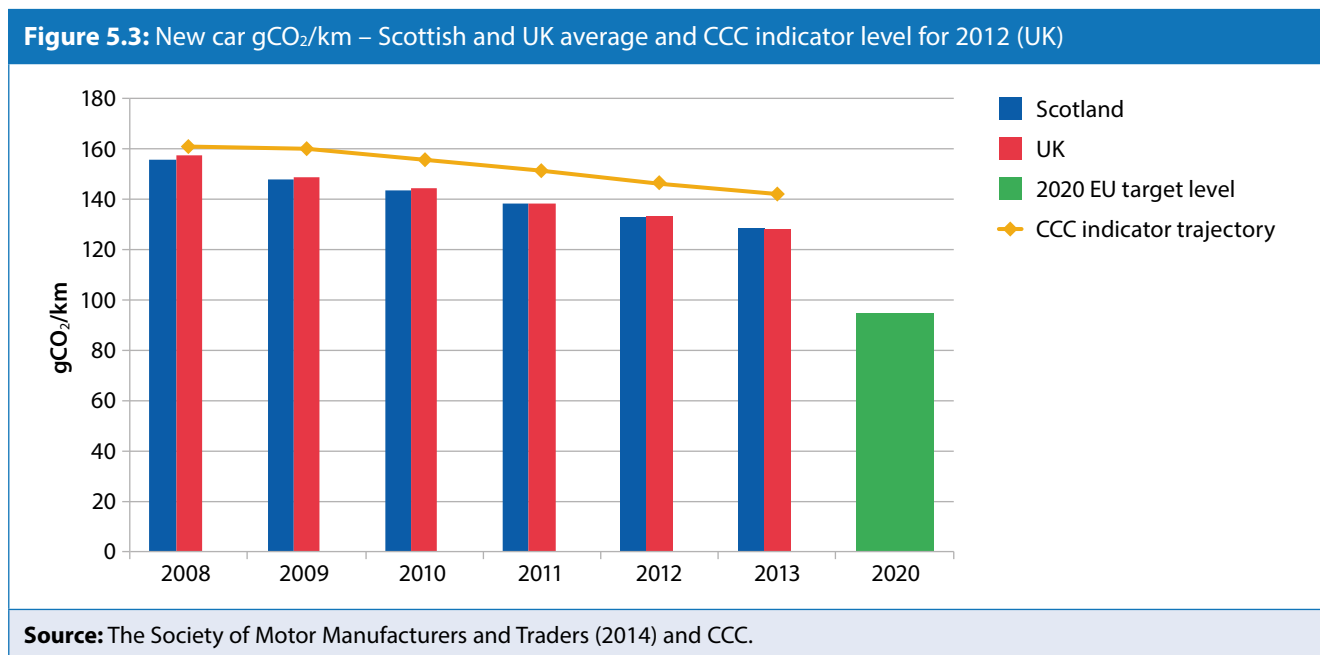
In January 2015, the Scottish Government announced a consultation for a Low Emission Strategy for Scotland. The strategy’s objectives include transport and climate change. The strategy sets out initial proposals for a national Low Emission Zones framework for setting of emission standards and procedures which would be applicable across Scotland.

New car efficiency

Good progress in improving new car efficiency continued in 2013 (Figure 5.3), driven by the EU directive targeting 95 gCO₂/km by 2020.

- CO₂ intensity of new cars fell from 133.0 gCO₂/km in 2012 to 128.3 gCO₂/km in 2013, a 3.5% reduction. This is in line with the UK but higher than Wales and Northern Ireland.
- This outperforms the CCC's UK-wide indicator of 142 gCO₂/km for 2013 – consistent with progress towards a 95 gCO₂/km target in 2020 and meets the EU 2015 target of 130 gCO₂/km two years early.
- The CO₂ intensity of new cars in Scotland fell by a further 3% in 2014, to 124.4 gCO₂/km.

Although this progress is positive, a number of studies^{24, 25} have found evidence that there is a growing gap between test-cycle emissions and emissions from cars driven in real-world conditions. In our 2014 UK Progress Report, we estimated that taking account of this gap implies that real world emissions are broadly in line with our indicator trajectory, rather than outperforming it.



24 TNO (2012) Supporting Analysis regarding Test Procedure Flexibilities and Technology Deployment for Review of the Light Duty Vehicle CO₂ Regulations.

25 ICCT (2013) From laboratory to road.

Electric vehicles

As part of the UK-wide Office for Low Emissions Vehicles' (OLEV) Plugged in Places Scheme and the Low Carbon Vehicle Procurement Support Scheme, the Scottish Government has committed £2 million between 2014 and 2015 to support work across low-carbon vehicles. Plans are underway for rapid charge points at 50 miles intervals on Scotland's primary road network, with Transport Scotland having been awarded £600,000 funding for 2014/2015. This will help to meet Scotland's target to have an electric vehicle (EV) charging infrastructure in place in Scottish cities, as well as significant progress in decarbonising road transport.

- At the end of January 2015, there were around 850 public charging points across Scotland²⁶, approximately 40 of them being rapid.
- EV sales in Scotland increased 245% in 2014.
- The proportion of UK sales of EVs taking place in Scotland decreased to 6% in 2013, increasing to 7.5% in 2014. This remains lower than Scotland's overall share of car sales in the UK (9%).
- Research²⁷ has shown that out of the five councils in the UK with the highest number of EVs in their fleet, four are in Scotland. Dundee council had the highest number of EVs (38) following an active programme of replacing diesel pool cars with electric. The Dundee area also has over 30 charging points.

Scotland has a number of other schemes to encourage electric vehicle use including the Scottish Green Bus Fund, ChargePlace Scotland and Switched on Fleets (Box 5.1).

Box 5.1: Scottish electric vehicles schemes

Transport Scotland announced funding of £4.75m for a fifth **Scottish Green Bus Fund**. The aim of the fund is to further support the wider roll out of low carbon buses across Scotland and builds on the success of previous rounds of the fund. Support, through three rounds, has helped secure purchase of 94 new low-carbon buses. A further 32 new low-carbon buses purchased under round 4 are expected to join the fleet by 31 March 2015.

The **ChargePlace Scotland** (CPS) scheme is currently in its third year and enables EV drivers to charge their vehicles for free at the vast majority of publicly available CPS points. CPS has available funding for domestic charge points, grants for work place points and community planning partnerships for local authorities to install publically available charge-points. The High Powered Interoperable Network (HPIN) involves the installation of high powered rapid charge points at 35 mile intervals on routes connecting Scotland's towns and cities.

Switched on Fleets is an initiative being funded by Transport Scotland and operated by Energy Saving Trust during 2014/15 and 2015/16. It offers free analysis of public sector fleets to identify new opportunities for the cost effective deployment of EVs. In June 2014, an additional £1 million was made available to fund EVs in Scottish car clubs in 2014/15.

²⁶ <https://www.zap-map.com/statistics/#charger-type>

²⁷ www.2020climategroup.org.uk/news/scottish-councils-leading-way-electric-vehicle-adoption/

Cycling

Scottish transport statistics shows that in 2013, 1% of journeys were by bike, well below the 2020 ambition of 10%. This figure has remained around 1% since 2003.

The Cycling Action Plan 2013 highlights a number of actions, under broad themes of leadership and partnership, infrastructure integration and road safety, as well as promotion and behavioural change. £20 million of funding has been allocated for 2014/15 and 2015/16 to Sustrans Community Links Programme for exemplar projects that facilitate the use of cycling and walking for everyday commuter journey. A further £7 million of funding has been allocated for 2014/15 for walking and cycling infrastructure, with an additional £4 million to support the development of cycling infrastructure through partnership work by Sustrans and local authorities.

Behaviour change

The following behaviour change milestones have been set:

- Personalised travel planning advice provided to all households.
- Effective travel plans in workplaces with more than 30 employees.

Progress in these areas is difficult to assess, however the **Smarter Choices Smarter Places** (SCSP) pilot programme has been a success in terms of the outcome. Within SCSP seven pilot areas in Scotland received funding and implemented local programmes between 2009 and 2012, and personalised travel planning was provided to 50,000 households. The aim of the SCSP programme was to foster more sustainable travel habits, by encouraging behaviour changes and by investment in infrastructure and service improvements. Following the Going Smarter evaluation (Box 5.2) of the SCSP pilot programme²⁸, £5 million of funding has been announced for 2015/2016 for the behavioural change aspects of the programme to be rolled out across Scotland. This is a one-year funded programme; however as behaviour change is recognised as a long-term process there is a desire to secure further funding to continue the programme beyond March 2016.

The Energy Saving Trust's Low Carbon Transport Loan Fund received applications from 42 organisations in 2011-2012 seeking interest-free funding for workplace travel plan measures such as cycle storage and video conferencing technology. A web resource, ChooseAnotherWay²⁹, has been developed to provide organisations with support, advice, case studies and travel planning tools.

To encourage behaviour change, it may be necessary to explore other options such as congestion charging. Congestion charging has been successful in reducing the amount of vehicles on the roads in two UK cities (London and Durham³⁰).

28 www.transportscotland.gov.uk/system/files/documents/tsc-basic-pages/SCSP_-_Goingsmarter_-_Final_version_-_Do_not_edit.pdf

29 www.chooseanotherway.com/index.php

30 www.ciht.org.uk/download.cfm/docid/560EA947-66D1-490D-8E91A97F34D979D0
www.c40.org/case_studies/londons-congestion-charge-cuts-co2-emissions-by-16

Box 5.2: Going Smarter

The Going Smarter report highlighted that in all pilot areas trips made on foot increased, while the proportion of trips made as a car driver decreased. It found that the attitudes of those taking part changed: with improved perceptions of local neighbourhoods and communities, positive attitudes towards walking and cycling and improved perceptions of bus travel, with the exception of bus fares where perceptions declined markedly. With the 2015/2016 funding:

- Transport Scotland has grant funded 'Paths for All' to administer the programme and provide support for the projects.
- Proposals are required from each local authority on the work they intend to take forward. Projects must encourage and promote active and sustainable transport as the entire focus of the initiative, or as a significant element.

Recommendations

- The Scottish Government and Scottish local authorities should consider introducing measures to address non-financial barriers to electric vehicles (EVs), e.g. through free or preferential access to parking and bus lanes and through raising awareness about EVs through public procurement.
- 'Smarter Choices Smarter Places' programme should be extended beyond 2016 to allow funding of longer-term behaviour change programmes.
- The Scottish Government should consider other options to drive down emissions such as congestion charging.
- Speed limits are likely to be fully devolved to Scotland in the future. The Scottish Government should evaluate how speed limits (in particular greater enforcement) could help with meeting carbon targets.
- Air passenger duty is also likely to be devolved in the future. The Scottish Government should assess the carbon impact of any proposed changes to the duty.

6 Agriculture, rural land use and forestry

Summary of progress

Milestone	Progress
Reduction target for agriculture of 1.3 MtCO₂e from 2006 levels by 2020 to help towards a 42% reduction by 2020 in all emissions.	Since 2006 emissions in agriculture have decreased 0.87 MtCO ₂ e (9%). However, this target is difficult to assess due to changes in the methodology used to measure agricultural emissions since it was set.
Increase afforestation rate to plant 10,000 hectares per year, with 100,000 hectares planted by 2022.	Tree planting rates are markedly below the rates seen in the 1970s. The 10,000 hectare target has yet to be achieved: <ul style="list-style-type: none"> • Around 7,000 hectares of new forest were planted in 2013, this rose to just over 8,000 hectares in 2014. • Rates will have to rise substantially if 100,000 hectares are to be planted by 2020.

Agriculture and land use emissions

Emissions from the agriculture sector are largely non-CO₂ gases, with half due to nitrous oxide and over one third (42%) due to methane. Agricultural soil emissions make up 45% of emissions, followed by enteric emissions (31%). The biggest sources of emissions in land use were related to agriculture and developments (the conversion of land to settlements). However, these are more than offset by carbon sequestered from forestry and grassland which were a net emissions sink in 2012, absorbing around 10 MtCO₂e.

Emissions from lowland peat and the horticultural use of peat are included in emissions accounting, but emissions from upland peatlands are not captured. This is an issue for Scotland, where most of the UK's upland peat is located. Similarly, carbon sequestration from the restoration of peat (e.g. re-wetting of peatland) is not currently captured in the emissions inventory. However, the Scottish Government intends to include peatland restoration activity within Scottish emissions accounting from the 1990 – 2013 inventory. This is based on the new Intergovernmental Panel on Climate Change (IPCC) methodology for wetlands and in line with voluntary reporting under the United Nations Framework Convention on Climate Change.

Latest emissions trends

There is ongoing uncertainty in the emissions inventory for the agriculture, land use and forestry sector, and agriculture in particular, not just for Scotland but for the UK as a whole. This is the subject of a current research programme which will start to feed through into improvements in the accuracy of the inventory from 2013 onwards (for the devolved administrations). The UK is ahead globally on research on measuring agriculture emissions, and Scotland is taking a lead within the UK.

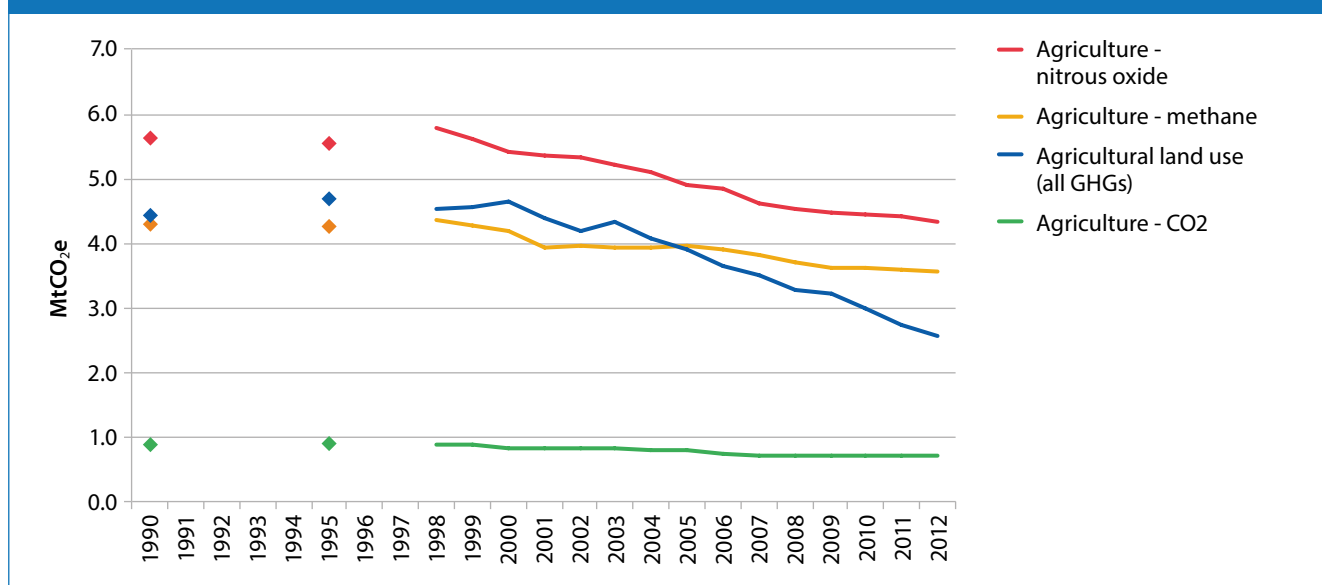
Current estimates show that emissions from agriculture and related land use were about 11 MtCO₂e in 2012, 18% of Scotland's total (compared to around 11% at the UK level). Emissions fell by nearly 3% in 2012 and were 27% lower than 1990 levels (Figure 6.1). The latest inventory increased emissions in 2011 from 10.5 MtCO₂e to 11.5 MtCO₂e. The figures in the inventory break down as follows:

- Methane emissions fell by 17% between 1990 and 2012, from 4.3 MtCO₂e to 3.6 MtCO₂e, as a result of falling numbers of livestock and improving livestock productivity. Emissions fell by 1% in 2012.
- Nitrous oxide emissions declined by 2% in 2012 to 4.3 MtCO₂e, and were 23% lower than 1990 levels reflecting a reduction in the use of fertiliser.
- Emissions from agriculture-related land use fell by 42% between 1990 and 2012, dropping from 4.4 MtCO₂e to 2.6 MtCO₂e. This was driven by a reduction in emissions from land converted to cropland. Emissions declined by 6% in 2012.
- CO₂ emissions from on-farm stationary (e.g. heating farm buildings) and mobile (e.g. tractors and harvesters) combustion were 0.7 MtCO₂e in 2012, having declined 18% since 1990. Emissions remained the same in 2012 from 2011.

There is considerable uncertainty over these numbers, despite their apparent accuracy when noted in the inventory. We will revisit what is happening to agricultural emissions in more detail following improvements in how the inventory is assessed over the coming years.

The forestry sector in Scotland is a net emissions sink. In our 2014 Scotland progress report, we reported that the sink in Scotland had declined in 2011 from 2010 levels. However, the most recent inventory increased the size of the sink by 3% in 2010 and by 9% in 2011. The size of the sink increased slightly in 2012 (about 0.4%) to around 10 MtCO₂e and is 41% larger than in 1990 (Figure 6.2). The rate of increase has been slowing since 2004, reflecting historic low planting rates for new trees – current net carbon sequestration rates are currently reducing year-on-year due to the lower proportion of young trees in Scottish forests.

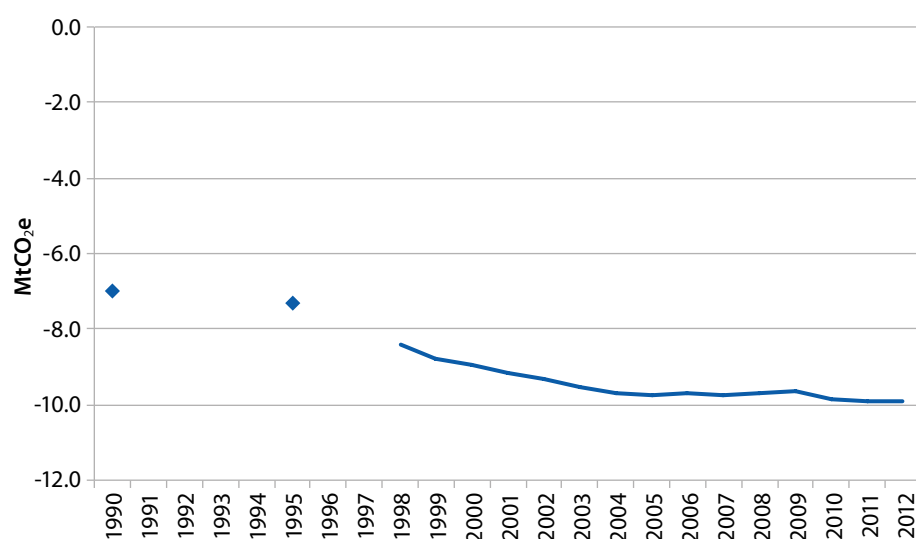
Figure 6.1: Agriculture and land use emissions (1990–2012)



Source: NAEI (2014)

Note: Inventory GHG data is not available for Scotland for 1991–1994 or 1996–1997

Figure 6.2: Forestry emissions (1990-2012)



Source: NAEI (2014)

Note: Inventory GHG data is not available for Scotland for 1991-1994 or 1996-1997

Land use related to development accounted for 3% of overall Scottish emissions in 2012, at 1.7 MtCO₂e. This was 2% higher than 2011, but 3.5% below 1990 levels, and reflected an increase in the conversion of land to settlements in 2012.

Milestones and progress

Rural land use emissions and sequestration are addressed through a combination of improved agricultural practice, woodland creation and management, and peatland restoration. Scottish policies and targets to address these are:

- The Climate Change Delivery Plan (June 2009) proposes a reduction target for agriculture of 1.3 MtCO₂e by 2020. This is the equivalent of a 10 % reduction in emissions in the agricultural sector.
- Increase afforestation rate to plant 100,000 hectares over a 10 year period.
- Scotland's first Land Use Strategy was laid to Parliament in 2011 to ensure that land is managed for multiple benefits, including reduced emissions. Under the Climate Change (Scotland) Act 2009, the strategy has to be reviewed in 2015.

Scotland has a number of initiatives to help meet targets and reduce emissions, including:

- Farming for a Better Climate initiative
- Scottish Farming innovation Network
- Funding for peatland restoration
- Woodland Creation Grants

We now consider progress of these targets and initiatives.

Farming programmes

The Farming for a Better Climate initiative (FFBC) was launched by the Scottish Government and Scotland's Rural College in 2009, and is designed to encourage voluntary uptake of win-win actions in 5 key action areas:

- Using energy and fuels efficiently
- Developing renewable energy
- Locking carbon into soil and vegetation
- Optimising application of fertilisers and manures
- Optimising livestock management and storage of waste

As part of the initiative, Scotland's Rural College worked with four volunteer farmers, other local farmers and industry specialists to identify and demonstrate mitigation measures which could be applicable to various different types of farms. An evaluation of the first phase of the programme demonstrated savings in carbon emissions from the focus farms of around 10-12%, despite challenging weather conditions. However, it is unlikely that such changes in farm practices will be captured in the inventory, given the current methodology largely applies global emissions factors to fertiliser application and livestock numbers. This should change when improvements to the methodology feed through into the accuracy of the inventory.

In 2014, the Scottish Government announced that the initiative would receive £0.8 million funding for 2014/2015 and 2015/2016. Nine new farms have volunteered to investigate the on-farm benefits from taking a low-carbon approach through FFBC.

The Scottish Government has noted that 90% of farms in Scotland would need to take up farm practice changes suggested under FFBC in order to meet the 10% emission reduction target. In the RPP2, the Scottish Government said that given the cost effectiveness of the measures in the FFBC, they anticipated that better information provision would increase voluntary uptake by around 50% for most of the measures. Some of the livestock measures may experience lower uptake in the short term due to learning barriers.

Alongside the challenges with monitoring the effect that FFBC has on greenhouse gas emissions at a national level, there is, at present, no monitoring of how many farmers have adopted particular measures or aim to adopt measures. There is a need for better monitoring to measure the impact of FFBC.

The Scottish Government has stated that if sufficient progress is not made there is an intention to introduce regulation in this area. Stakeholder evidence suggests that this approach would not be favoured by farmers. There may be some useful lessons from the Scottish Environment Protection Agency's diffuse pollution priority catchment work of working in partnership with the agricultural community.

Scotland's Farming Innovation Network is a £200,000 three year initiative that started in 2013, which aims to inform and inspire farmers and growers to implement best management practices for sustainable and profitable agriculture based on organic, low input and low carbon principles. It is delivered by the Soil Association Scotland and is funded by the Scottish Government's Scotland Rural Development Programme with co-funding from industry.

The Scottish Government announced in 2014 a requirement for **nutrient management planning** by some farmers as part of the Common Agriculture Policy's (CAP) Greening element. At present the requirement has not been fully confirmed and only applies to grassland farmers, but it could be a model for fertiliser reduction and efficiency on other farms. Alongside this, the RPP2 has a proposal to achieve a 90% uptake of cost-effective nitrogen efficiency measures, which could be regulated.

Peatlands

Peatlands cover 1.7 million hectares, approximately 23% of Scotland's land area, and contain up to 1.7 billion tonnes of carbon. Scottish peatlands account for 60% of the UK's peatlands and 4% of Europe's total peat carbon store. Historically, these peatlands have been damaged or drained, but there has been little drainage over the past two decades. It is estimated that 47,000 hectares of peatland in Scotland have benefitted from restoration since 1990.

Peatlands supporting bog habitats can, in favourable states, deliver annual greenhouse gas savings through sequestration of up to 0.5 – 0.7 tonnes carbon per hectare per year. Peatlands in Scotland covering 1.7 million hectares could therefore potentially deliver around a million tonnes of carbon sequestration per annum.

In addition to the £1.5 million of funding committed for funding peatland restoration between 2012 and 2015, the Scottish Government has announced a further £15 million of funding for peatlands for 2014/15 and 2015/16. Scotland's 2014 National Peatland Plan: Working for our Future sets out proposals for research and awareness-raising. The main aim set out in the plan is to manage, protect and restore peatlands to maintain their natural functions, biodiversity and benefits. By 2020, the plan aims to see:

- No more loss of peatlands with their condition improving rather than deteriorating.
- A Peatland Code will be in place governing private funding of peatland conservation and restoration, and peatland management included in national carbon accounting.
- The Flow Country (a large area of peatland and wetland in Caithness and Sutherland) will have moved from the UK Tentative List towards being a fully inscribed World Heritage Site.

The plan is a sensible objective but does not define a mechanism for action in these areas.

The Scottish Government intends to include peatland restoration activity (a voluntary inclusion by member states) within Scottish emissions accounting from the 1990–2013 inventory. This is based on the new Intergovernmental Panel on Climate Change (IPCC) methodology for wetlands.

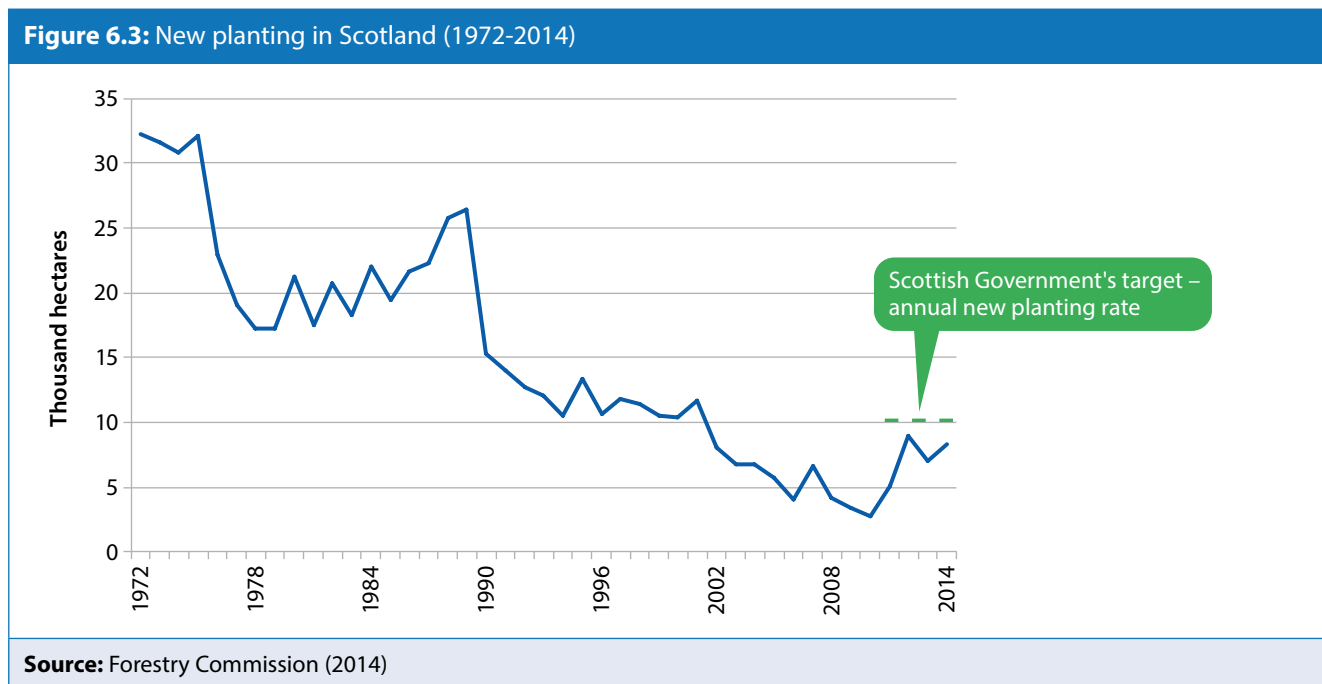
Forestry

Tree planting rates have been declining since the 1970s, reaching a low of just 2,700 hectares in 2010 (Figure 6.3). They have increased since then, largely as a result of the Scottish Rural Development Plan (SRDP), and the RPP2 contained a policy to increase the afforestation rate to 10,000 hectares per year, creating 100,000 hectares by 2020. The 10,000 hectare target has yet to be achieved:

- Around 7,000 hectares of new forest were planted in 2013, this rose to just over 8,000 hectares in 2014.

- Rates will have to rise substantially if 100,000 hectares are to be planted by 2020.
- Whilst tree planting rates are still markedly below the rates seen in the 1970s they were the highest in ten years in 2012 at 9,000 hectares.

The Forestry Grant Scheme (FGS) in Scotland run by the SRDP also supports the creation of new woodlands and the sustainable management of existing woodlands. From 2014 to 2020, the SRDP has £252 million available through this scheme with support under eight categories. One of the categories, provides support to the private sector for woodland creation, improvement and maintenance, with target areas for creation identified. Woodland creation has £61m funding available for 2014/2015 and 2015/2016.



Recommendations

- Carry out a survey to establish whether there has been Farming for a Better Climate (FFBC) uptake beyond the Climate Change Focus Farms and what measures have worked.
- Look at lessons from the Scottish Environment Protection Agency's diffuse pollution priority catchment work of working in partnership with the agricultural community to inform future action.
- Develop the RPP2 proposal to achieve a 90% uptake of cost-effective nitrogen efficiency to further encourage commitment.
- Adopt the RPP2 proposal for 21,000 ha peatland restoration per year as a policy to drive commitment.
- Consider introducing additional measures and/or funding to ensure the woodland creation target is met.

7 Waste

Summary of progress

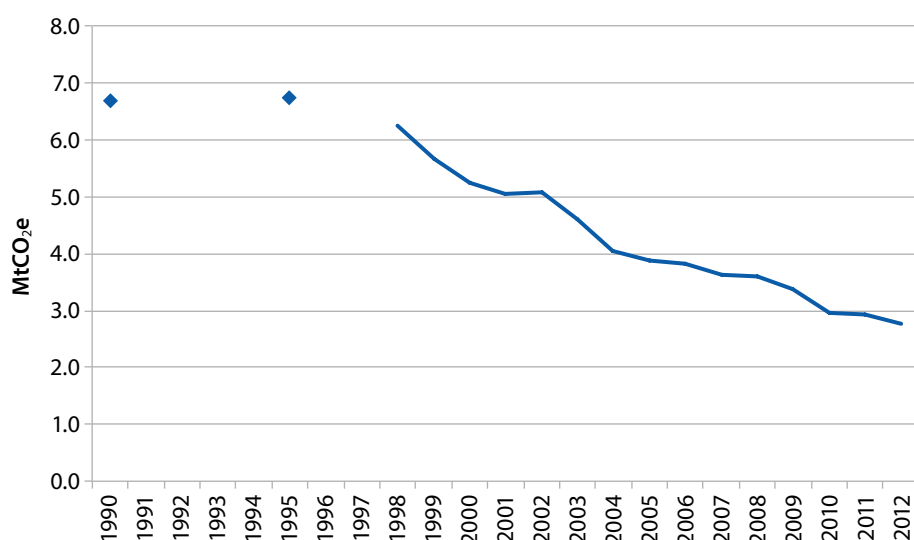
Milestone	Progress
<p>Proportion of household waste recycled/composted/reused:</p> <ul style="list-style-type: none"> ● 40% by 2010 ● 50% by 2013 ● 60% by 2020 ● 70% by 2025 	<p>The latest figures for household waste show 42% of household waste was being composted, recycled or reused in 2013, an increase of 1% point from 2012. This shows that Scotland has missed the second Zero Waste Plan target for 2013 (50%); however 9 out of 32 of Scotland's councils have met the 50% target.</p>
<p>Recycling 70% of all waste (including commercial and industrial waste) by 2025.</p>	<p>In 2012, total generated waste from household, construction and demolition, and commercial and industrial sources was 11.3 million tonnes. Out of this 4.7 million tonnes (41.5%) was recycled.</p>
<p>Reducing the proportion of total waste sent to landfill to a maximum of 5% of all waste by 2025.</p>	<p>The proportion of total waste arisings sent to landfill rose from 35% in 2011 to 40% in 2012. However the amount sent to landfill actually decreased 3.5% to 4.5 million tonnes.</p>
<p>Zero Waste (Scotland) Regulations (2012):</p> <ul style="list-style-type: none"> ● All businesses and organisations to present dry recyclables (metals, plastics, paper, card and glass) for collection from 1 January 2014. ● Food waste businesses to present food waste for separate collection (over 50 kg of waste from January 2014 and over 5 kg of waste from January 2016). ● Local authorities to provide a basic recycling service to all households by 1 January 2014. ● Local authorities to offer a food waste recycling service in non-rural areas from 1 January 2016. ● A ban on material collected for recycling going to landfill or incineration from 1 January 2014. ● A ban on municipal biodegradable waste going to landfill by 1 January 2021. 	<p>General Progress in the Zero Waste Plan:</p> <p>The funding for the Zero Waste Plan is estimated to be £23 million in 2014/2015 for support of a range of programmes to reduce waste and use materials efficiently for both economic and environmental benefits. In addition, the budget funds work to tackle litter and fly tipping.</p> <p>In March 2014, Zero Waste Scotland, which is funded by the Scottish Government, established a Scottish Recycling Fund which has £3.8 million to develop or expand materials reprocessing capacity and remanufacturing facilities in Scotland.</p>
<p>Safeguarding Scotland's Resources – Blueprint For A More Resource Efficient and Circular Economy report contains the following targets:</p> <ul style="list-style-type: none"> ● Reduce waste arisings in Scotland by 7% by 2017 against 2011 baseline ● Reduce waste arisings in Scotland by 15% by 2025 	<p>In 2012 total waste arisings fell by 14%, to 11.4 million tonnes. This is already exceeding the 2017 target to reduce waste arisings by 7% compared to 2011 level.</p>

Latest emission trends

In 2012, emissions from the waste sector in Scotland were 2.8 MtCO₂e. This was 5% lower than in 2011 and 59% below 1990 levels (Figure 7.1). Total waste arisings in Scotland fell by 14%.

Methane released from waste in landfill is the main source of emissions in the waste sector. Landfill emissions have fallen steadily over time, reflecting a reduction in the amount of waste sent to landfill, through waste diversion and a reduction in waste arisings. Action to capture or mitigate landfill gases has also contributed to a reduction in emissions from waste management.

Figure 7.1: Waste sector emissions (1990–2012)



Source: NAEI (2014)

Note: Inventory GHG data is not available for Scotland for 1991-1994 or 1996-1997

Milestones and progress

Zero Waste Plan

Scotland's Zero Waste Plan (2010) set a number of targets for the waste management sector:

- Targets for the proportion of household waste recycled/composted/reused:
 - 40% by 2010
 - 50% by 2013
 - 60% by 2020
 - 70% by 2025
- Recycling 70% of all waste (including commercial and industrial waste) by 2025
- Reducing the proportion of total waste sent to landfill to a maximum of 5% of all waste by 2025

The latest figures for household waste show 42% of household waste was being composted, recycled or reused in 2013 (Figure 7.2), an increase of 1% point from 2012. This shows that Scotland has missed the second Zero Waste Plan target for 2013 (50%); however 9 out of 32 of Scotland’s councils have met the 50% target.

- The highest performing authority with a 58.9 % recycling rate was Clackmannanshire.
- Dumfries & Galloway, Dundee City, Eilean Siar, Glasgow City and the Orkney Islands all fell below 30%, with the Shetland Islands recording a household recycling rate of just 13.5%.
- Recycling rates will require substantial improvement to meet the 60% target in 2020.

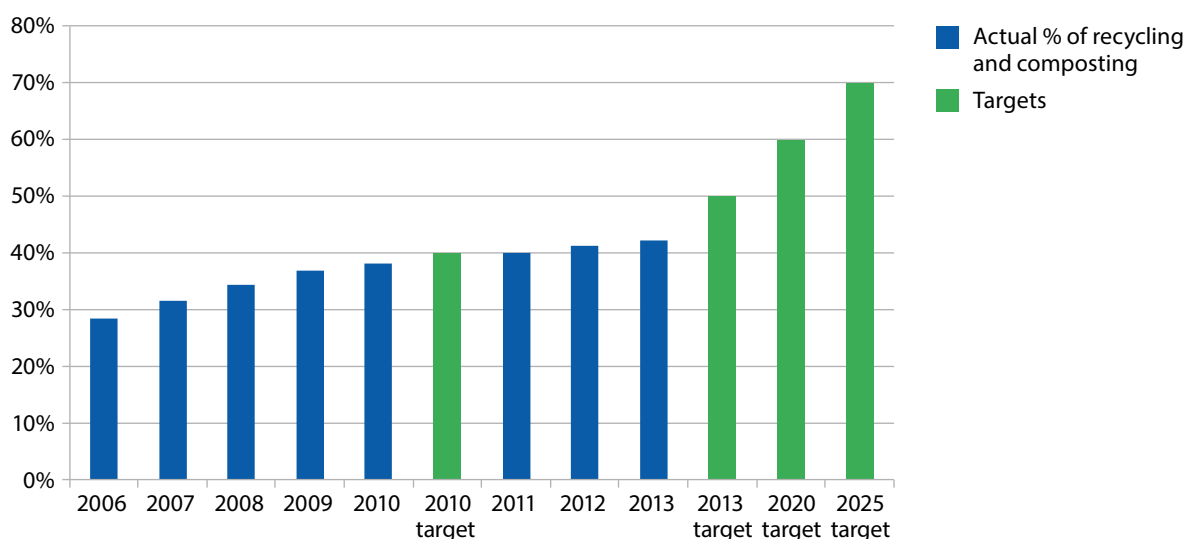
There could be an improvement in 2014, as a number of new measures have now been introduced, including waste regulations which require councils to provide recycling services to all households; as well as rolling out food waste collections across Scotland. In addition, from October 2015 there are wider actions to cut litter and waste such as the introduction of carrier bag charges.

In terms of the target to reduce waste sent to landfill, the proportion of total waste arisings sent to landfill rose from 35% in 2011 to 40% in 2012 (Figure 7.3). However, in terms of tonnes, the amount sent to landfill actually decreased 3.5% to 4.5 million tonnes.

The funding for the Zero Waste Plan is estimated to be £23 million in 2014-2015 for support of a range of programmes to reduce waste and use materials efficiently for both economic and environmental benefits. In addition, the budget funds work to tackle litter and fly tipping.

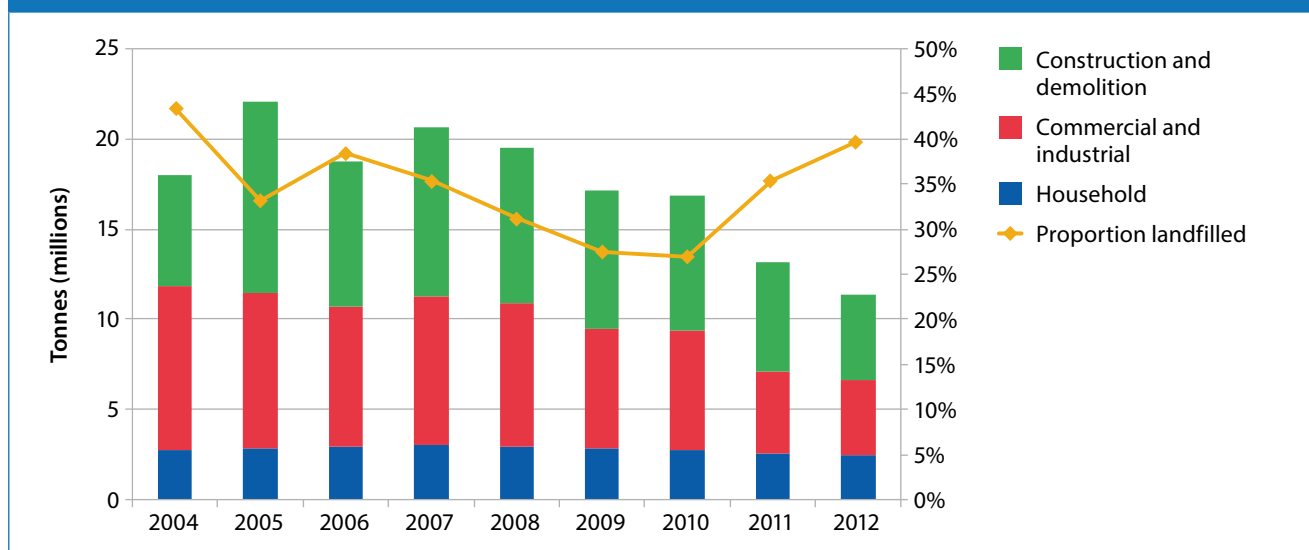
From 2015, the Scottish Parliament will have new financial powers on disposals to landfill, following on from the Landfill Tax (Scotland) Act 2014. The Scottish Landfill Tax is set 10% higher than the UK rate for the first three years of the Scottish Tax.

Figure 7.2: Percentage of household waste recycled and composted 2006–2013 and targets to 2025



Source: SEPA (2014)

Figure 7.3: Waste arisings in Scotland by source and proportion of waste landfilled (2004–2012)



Source: SEPA (2014)

Zero Waste Regulations

In 2012, the Scottish Parliament passed the Zero Waste (Scotland) Regulations, which will provide the statutory underpinning to help Scotland achieve its waste targets. The key points from the Regulations are:

- All businesses and organisations to present dry recyclables (metals, plastics, paper, card and glass) for collection from 1 January 2014.
- Food waste businesses to present food waste for separate collection (over 50 kg of waste from January 2014 and over 5 kg of waste from January 2016).
- Local authorities to provide a basic recycling service to all households by 1 January 2014.
- Local authorities to offer a food waste recycling service in non-rural areas from 1 January 2016.
- A ban on material collected for recycling going to landfill or incineration from 1 January 2014.
- A ban on municipal biodegradable waste going to landfill by 1 January 2021.

In March 2014, Zero Waste Scotland, which is funded by the Scottish Government, established a Scottish Recycling Fund which has £3.8 million to develop or expand materials reprocessing capacity and remanufacturing facilities in Scotland. It is a key tool to support the Scottish Government's objectives for sustainable economic growth under its Low Carbon Economic Strategy (2010) and the move towards a more circular economy under Safeguarding Scotland's Resources (2013).

In October 2013, the Scottish Government published *Safeguarding Scotland's Resources – Blueprint For A More Resource Efficient and Circular Economy*. This report forms part of the Zero Waste agenda for Scotland and develops a waste prevention plan as required by the EU Waste Framework Directive. The report contains the following targets:

- Reduce waste arisings in Scotland by 7% by 2017 against 2011 baseline
- Reduce waste arisings in Scotland by 15% by 2025

In 2012 total waste arisings fell by 14%, to 11.4 million tonnes (Figure 7.3). This is already exceeding the 2017 target to reduce waste arisings by 7% compared to 2011 level.

In addition to the measures set out the Zero Waste Plan, and underpinned by legislation in the form of the Zero Waste (Scotland) Regulations, the Scottish Government is also looking into the feasibility of capturing methane emitted from closed or inactive landfill sites.

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