



Reducing emissions in Scotland: 2014 progress report



Committee on Climate Change
March 2014

Acknowledgements

The Committee would like to thank:

The members of the Secretariat who prepared the analysis and contributed to the report: Verity Howell, Ute Collier, Adrian Gault and Nisha Pawar.

Organisations who provided support: The Scottish Government.

Front cover images: top and bottom left pictures, credit Jenny Hill.



Contents

The Committee on Climate Change	4
Introduction and executive summary	6
1. Latest emissions trends	9
2. Energy supply	16
3. Homes and communities	25
4. Business and the public sector	31
5. Transport	33
6. Agriculture, rural land use and forestry	37
7. Waste	41

The Committee on Climate Change



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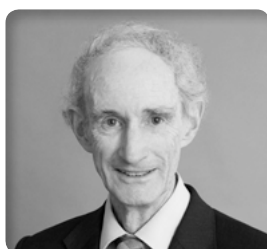
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Introduction and executive summary

This is our third 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 relative to 1990. 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.

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 2011. We therefore focus on progress against the 2011 annual target.

We also consider 2012 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. Furthermore, we discuss underlying progress towards reducing emissions through the development and implementation of policies and measures.

Our key messages from this analysis are:

- Gross emissions in Scotland fell by 9.9% in 2011, with large reductions of over 20% in the power and residential sectors. In the power sector these reductions were due to switching from coal to renewable power generation, as rainfall and therefore hydroelectric generation increased and new wind capacity was added to the system. Residential emissions reductions were primarily due to the weather (2011 was milder than 2010), but also increased levels of insulation and a demand response to higher gas prices.
- Notwithstanding this reduction, Scottish emissions were slightly higher than the legislated target in 2011 (by around 0.8 MtCO₂e compared to a target of 53.4 MtCO₂e). This can be attributed to the recent revision of the Scottish greenhouse gas inventory, which added 1.2 MtCO₂e to estimated emissions in 2011. However, this revision should not distract from the assessment of underlying progress reducing emissions. While the inventory revision represents an improvement in the methodology for estimating emissions, it will continue to make achievement of currently legislated targets more difficult. There are two basic options for addressing this. The first is to adjust targets, for example by recasting these in terms of year-on-year emissions reductions or by revising the targets to allow for the inventory revision. The second would be to adapt to the inventory change by finding additional opportunities to reduce emissions that go beyond current and proposed policies.



- Scotland has made good progress in a number of key emitting sectors, namely renewable electricity, implementation of some home insulation measures, and fuel efficiency of new vehicles. However, challenges remain to achieve the stretching targets in these areas set out by the Scottish Government. For example, an increase in the rate of investment in renewable electricity generation is required, there remain many lofts, cavity and solid walls to insulate, and the current pipeline for renewable heat needs to be developed if the 2020 target is to be achieved. In other areas, such as electric vehicles and smarter travel choices, there is a need to build on good progress achieved through pilot projects. It is likely that faster rates of progress are needed in business and industry, and agriculture; and increased tree planting rates and peatland restoration rates are also required, together with increases in household recycling rates and reductions in waste sent to landfill.
 - **Renewable power.** 2012 was a record year for adding renewable capacity to the power system, with 1 GW coming on to the system, compared to the previous record of 0.7 GW. However, sustained investment at a rate of 1.2 GW per year is required if the Scottish target for renewable generation is to be achieved.
 - **Renewable heat.** There is uncertainty over the progress of renewable heat deployment towards the 2020 target, and while there is a healthy project pipeline, this is insufficient to meet the renewable energy target. It will be important for Scotland to leverage funding provided under the Renewable Heat Incentive to support required investment.
 - **Residential energy efficiency.** Scotland did well leveraging funding under the Carbon Emissions Reduction Target (CERT) and has made good progress on loft insulation. However, there has been a drop-off in the rate of cavity wall insulation and limited progress on solid walls and the change in funding from CERT to the Energy Company Obligation (ECO) has led to a significant decline in installation of insulation measures in 2013. Going forward, there is a need to leverage funding under ECO, to make continued progress on loft and cavity wall insulation and to increase the level of solid wall insulation, where this is cost-effective. There may also be a need for the Scottish Government to increase levels of funding, given the recent reduction in the ambition of the ECO.
 - **Non-residential and industry.** It is challenging to assess progress in Scotland for the non-residential and industrial sectors given the poor availability of data. Evidence for the UK as a whole suggests limited progress. Given the lack of additional policies, this is also likely to be true at a Scottish level. The key innovations needed here are the rationalisation of instruments for the commercial sector and the development of road maps for industry; we will return to these approaches in our report to the UK Parliament in July this year.
 - **Surface transport.** There has been an outperformance on our indicator of progress for new cars towards achieving the EU efficiency standard in Scotland, as at the UK level. However, the electric vehicle market needs to be developed further through investment in charging infrastructure, and Scotland needs to consider next steps to build on Smarter Choices Smarter Places pilots.

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- **Agriculture, land use and forestry.** Pilot projects on new farming practice are promising and consideration should now be given to how these will be scaled up. The Scottish Government has announced additional funding to support peatland restoration for 2014/15 and 2015/16; it is important to decide now how this money will be spent to preserve significant carbon stocks in the peatlands. Higher tree planting rates will be required in order to achieve the afforestation rate target of 10,000 hectares per year. Planting rates were low in 2013 due to poor weather conditions.
 - **Waste.** Scotland has set ambitious targets and there has been some progress towards achieving these (for example, a reduction in overall waste, and an increase in household recycling rates). However, the pace of increase in recycling rates needs to accelerate, and the amount of waste sent to landfill needs to be reduced if targets are to be achieved.
 - Overall, despite the first two legislated targets being missed, underlying progress appears on track in most sectors. However, going forward, the achievement of both annual emission targets and sectoral targets remains very challenging.

We set out the analysis underpinning these conclusions in the following 7 sections:

1. Latest emission trends
2. Energy supply
3. Homes and communities
4. Business and the public sector
5. Transport
6. Agriculture, rural land use and forestry
7. Waste



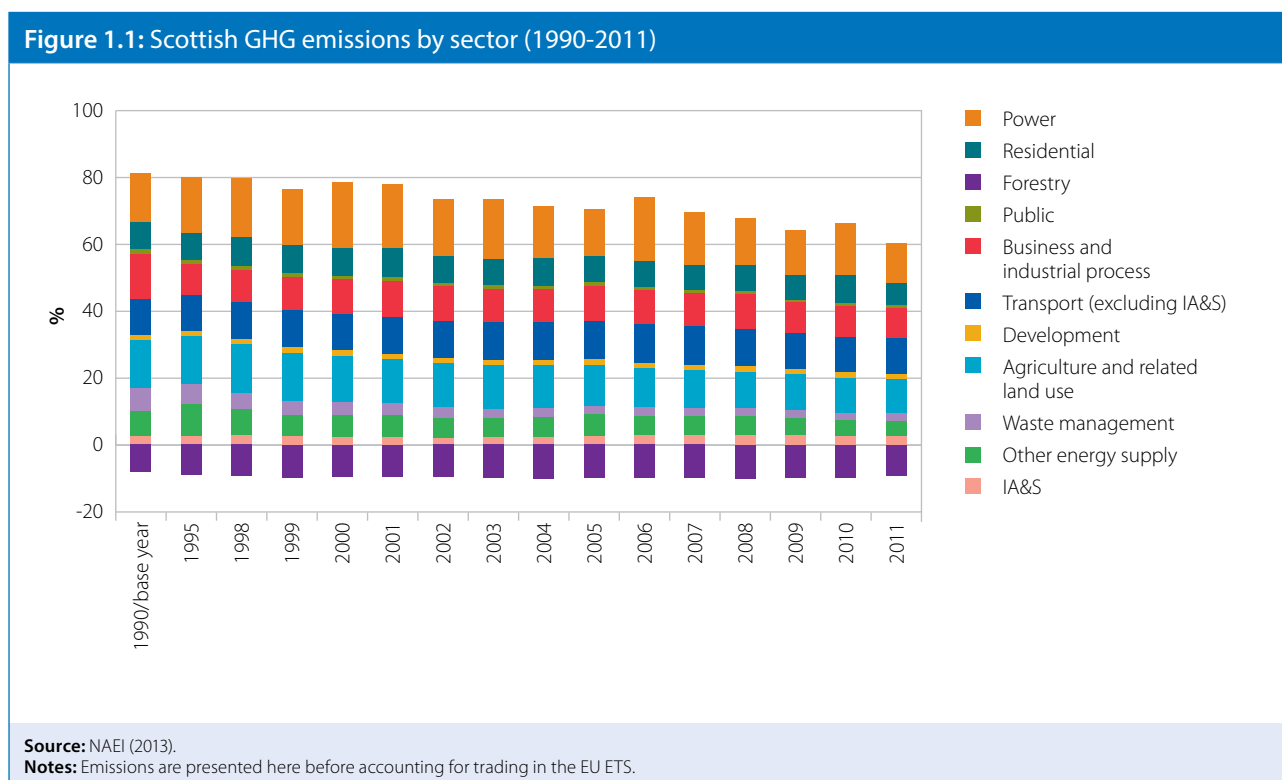
1. Latest emissions trends

We start by considering trends in economy-wide emissions for 2011 and economic data for 2012, before looking at emissions and progress implementing measures on a sector-by-sector basis.

Greenhouse gas inventory data for 1990-2011

Unadjusted emissions

Gross Scottish greenhouse gas emissions (i.e. emissions net of any adjustment for trading in the EU Emission Trading Scheme - ETS) fell by 5.6 MtCO₂e (9.9%) to 51.3 MtCO₂e in 2011 (the latest data available), driven by large reductions in emissions from the power and residential sectors (Figure 1.1). This is a larger fall than for the UK as a whole (6.9%).



In 2011, Scotland accounted for 9.3% of total UK emissions, slightly higher than its 8% share of UK Gross Value Added (GVA). An important difference is the relatively larger share of agriculture in Scotland as a proportion of total emissions (20% compared to 10% at a UK level). Another key difference is the relative size of the forest sink in Scotland, which is equivalent to almost 68% of the total UK sink.

Following an 18% increase in 2010, power sector emissions fell substantially, by 3.7 MtCO₂e (23%) in 2011 (Figure 1.2), as a result of fuel switching and increased renewables generation:

- There was reduced consumption of coal in power stations, with coal-fired electricity generation falling by 3.9 TWh (27%) in 2011.
- Electricity generation from renewables increased by 44% (4.2 TWh), as both hydropower and wind generation increased.
 - Hydropower generation increased 63% (2 TWh), after the very low output from hydropower in 2010 due to low rainfall, whilst in 2011 Scotland had the highest rainfall on record.
 - Wind power increased 44% (2 TWh) due to increased wind generating capacity.

Residential sector emissions also fell substantially in 2011, by 1.8 MtCO₂e (21%) from 2010. This can be attributed primarily to the warmer temperatures in 2011 compared to 2010 (Figure 1.3), which led to lower heating demand. However, even allowing for temperature changes, residential gas consumption data suggest that demand fell by 4.5% in 2011 (Figure 1.4). This is likely to reflect a combination of increased gas prices (9.4% in Scotland, in line with the UK) and the implementation of energy efficiency measures (see section 3).

In the public sector, reduced heating demand also resulted in a fall of emissions by 0.1 MtCO₂e (14.5%).

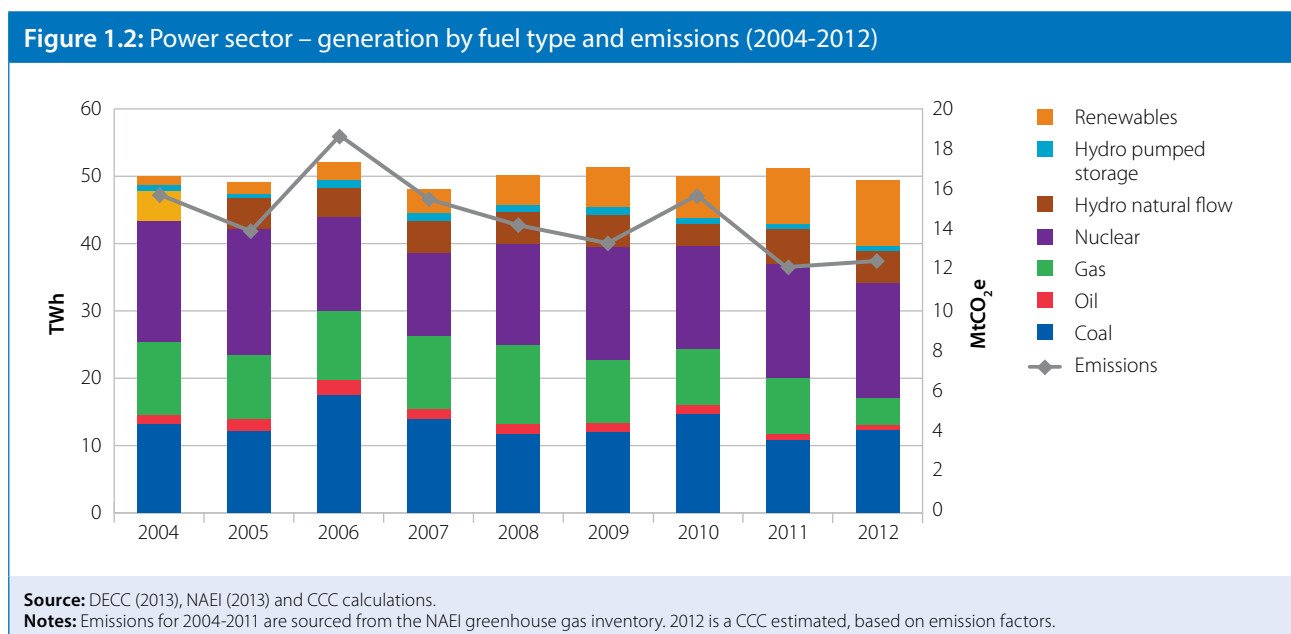
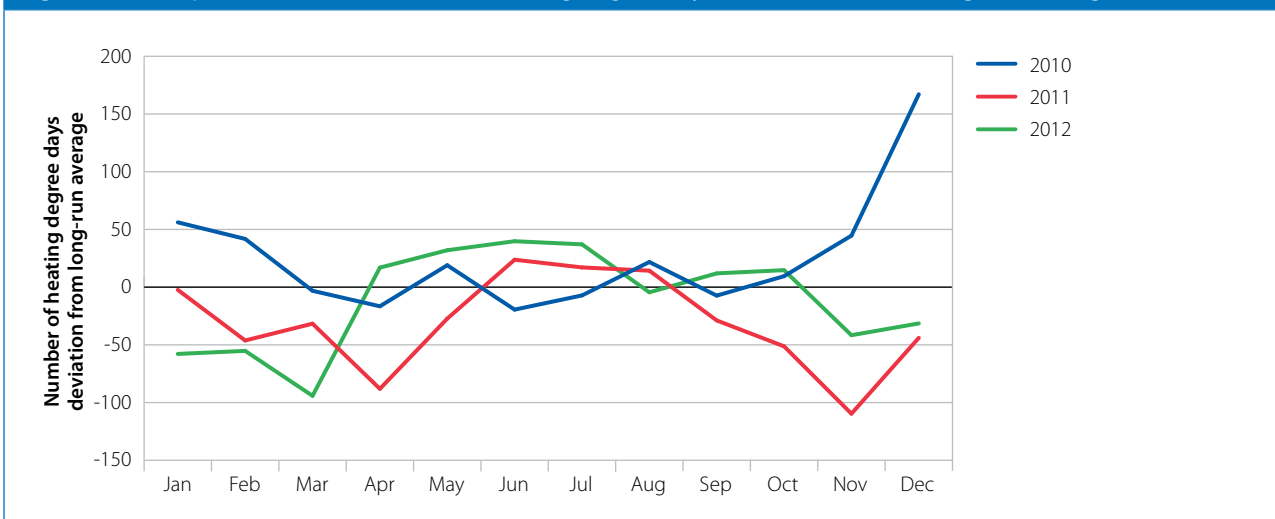




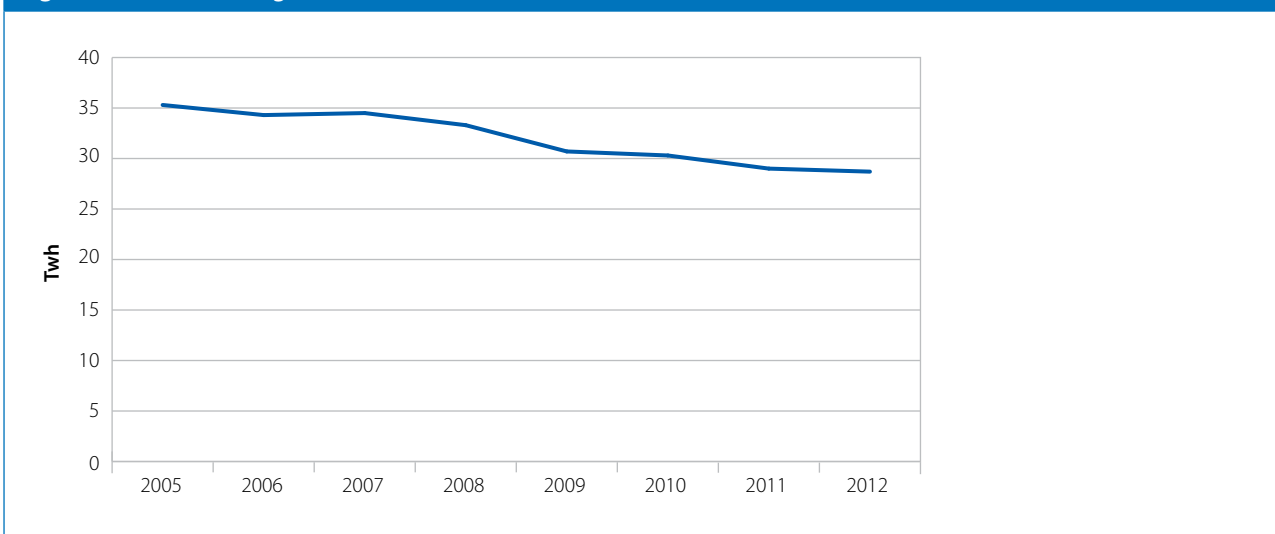
Figure 1.3: Temperature data – number of heating degree days variation from the long-run average (2010-2012)



Source: Vesma.com (2013).

Notes: 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: Residential gas sales – weather corrected (2005-2012)



Source: DECC (2013).

Notes: The data used covers the gas year – the period from 1 October to the following 30 September. The data are also weather corrected.

There were small reductions in waste management, agriculture & related land use, other energy supply and transport:

- Emissions fell by 0.1 MtCO₂e in the waste management sector (2.8%), by 0.1 MtCO₂e in the agriculture & related land use sector (2.7%) and by 0.1 MtCO₂e (2.7%) in other energy supply.
- Transport (excluding international aviation & shipping) emissions fell by 0.2 MtCO₂e (2.1%).

There were small increases in international aviation & shipping, development and business & industrial processes:

- Emissions from international aviation and shipping (IA&S) rose by 0.1 MtCO₂e (3.8%) and are now 1.7% higher than their baseline 1990 level.
- Emissions also rose in development¹ (1.9%) and business & industrial processes (0.9%), but the combined increase was relatively small at just over 0.2 MtCO₂e.

In the forestry sector, Scotland has a relatively large emissions sink (9.1 MtCO₂e). This shrank for the second successive year, reducing net removals by 0.5 MtCO₂e. Tree-planting rates picked up slightly in 2011, but were still markedly below the rates seen in the 1970s.

Overall, Scottish emissions were 30% lower in 2011 than in 1990.

Net emissions versus the 2011 target

Scotland's emission targets are set on a net basis – that is they account for trading in the EU ETS, which covers power stations and energy-intensive industries. Whilst gross emissions fell by 9.9%, the reduction in net emissions was 2.9%, reflecting the fact that Scotland was a net seller of allowances in the EU ETS in 2011.

The recent revision of the Scottish greenhouse gas inventory added 1.2 MtCO₂e to Scotland's estimated emissions in 2011.

When accounting on a net basis, and using revised estimates of Scottish emissions in 2011, these were higher than the 53.4 MtCO₂e target, by around 0.8 MtCO₂e (Figure 1.5).

It is important to note that the difference between estimated emissions and the target is less than the impact of the inventory revision. It can therefore be argued that the target was missed mainly because of the inventory revision.

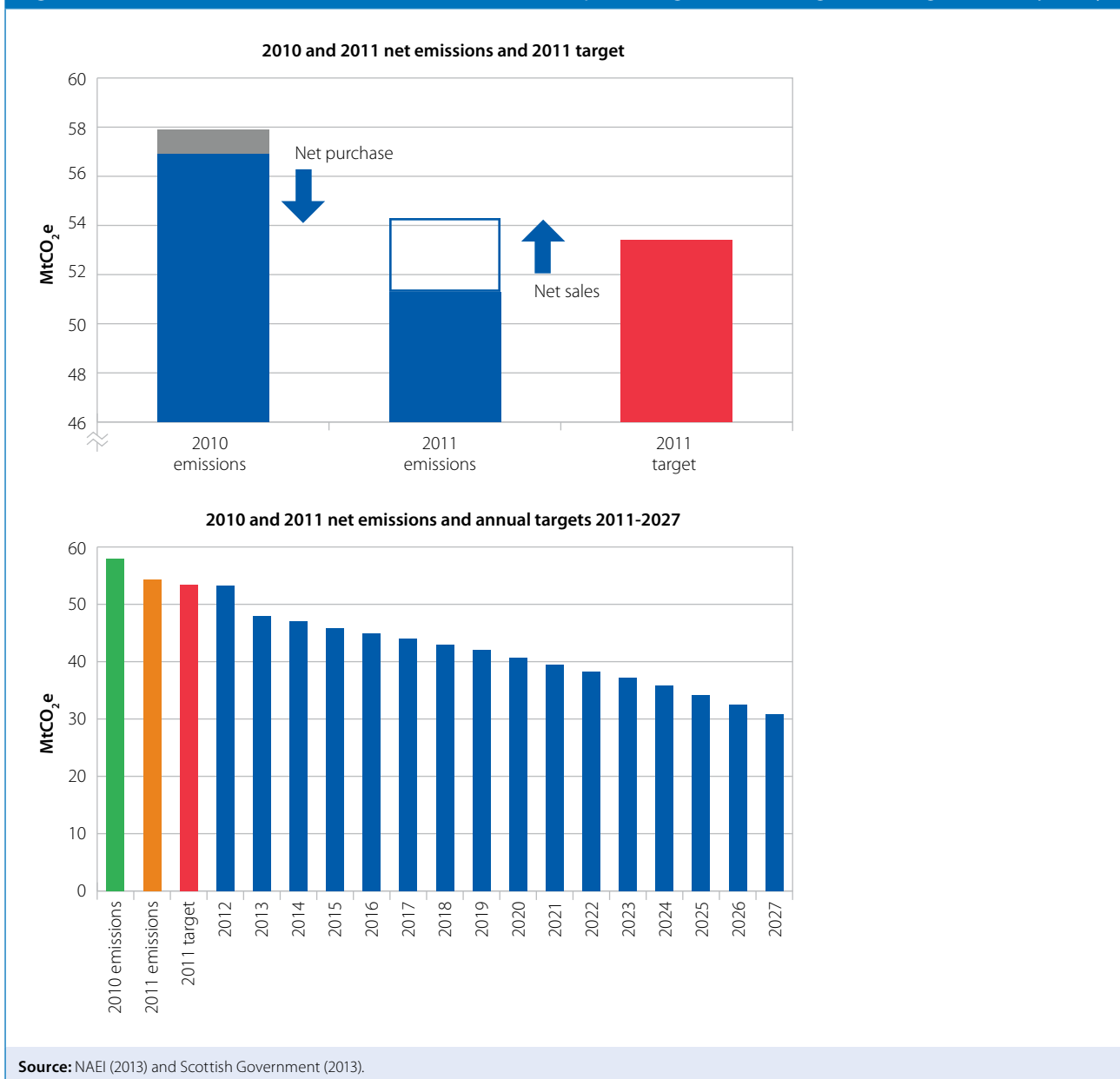
However, inventory revisions should not distract from the assessment of underlying progress reducing emissions. While the revision is to be welcomed, given that it reflects an improved methodology for estimating emissions, it will continue to make achievement of currently legislated targets more difficult, especially as further revisions are likely as agricultural emissions estimates are improved. There are two basic options for addressing the inventory revision. The first is to take account of the inventory change in assessing progress, for example by recasting current targets in terms of year-on-year emissions reductions or by revising the targets to allow for the inventory revision. The second would be to adapt to the inventory change by finding additional emissions reductions over and above those identified in RPP2².

¹ The largest proportion of emissions in this sector is the conversion of land to settlements.

² Low Carbon Scotland: Meeting our Emissions Reduction Targets 2013-2027: The Second Report on Proposals and Policies (RPP2).



Figure 1.5: Scotland's net emissions in 2010 and 2011: comparison against 2011 target and longer term trajectory



Change in 2012

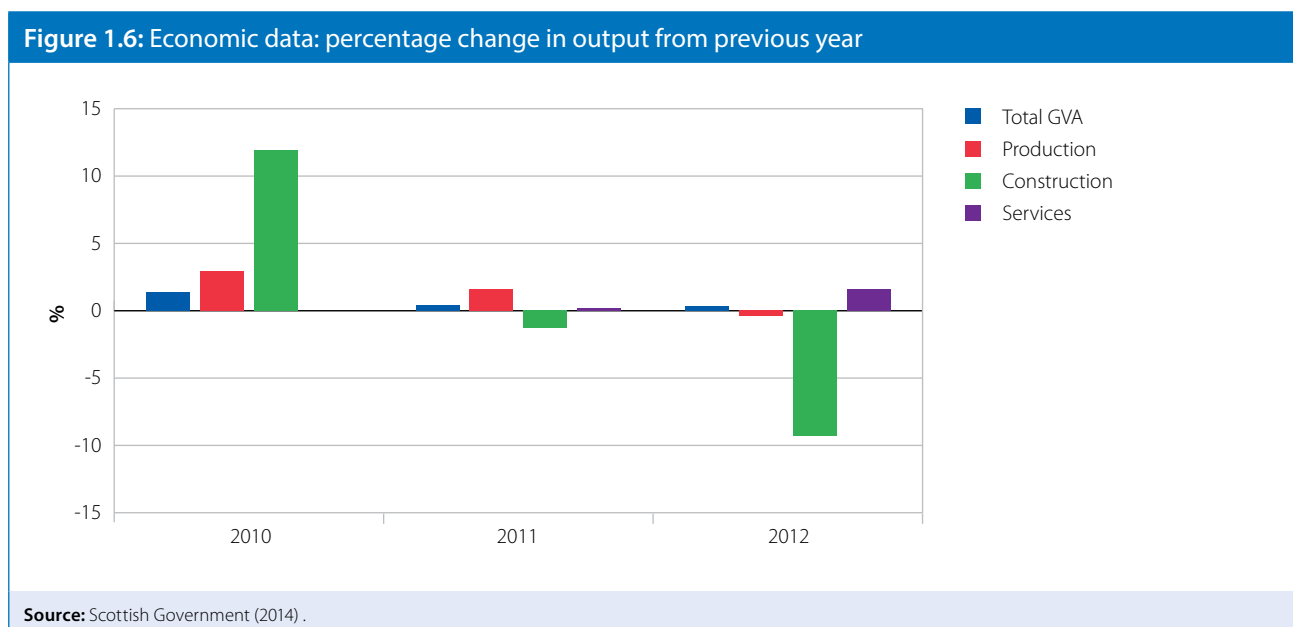
For 2012, while final emissions data are available at a UK level, data relating to Scotland will only be available in June 2014. We will report on 2012 emissions data for Scotland and the other devolved administrations in our July 2014 progress report to the UK government.

In this section we draw on other data that can give an indication of what is likely to have happened to emissions in Scotland in 2012.

Emissions data for the UK showed that economy-wide emissions increased by 3.2% in 2012. This increase in emissions at a UK level was due to relatively cold winter months in 2012 compared with 2011 and switching from gas to coal in power generation. In our 2013 progress report to the UK Parliament, we concluded that after allowing for these temporary effects, emissions fell by 1 to 1.5%. The context for this underlying reduction was one of very little GDP growth in 2012, together with real increases in energy and fuel prices.

We have considered contextual data available for Scotland for 2012 and expect that Scottish emissions are also likely to have increased in 2012, although to a lesser extent than for the UK as a whole, particularly in the traded sector of the economy (i.e. power generation and energy-intensive industry).

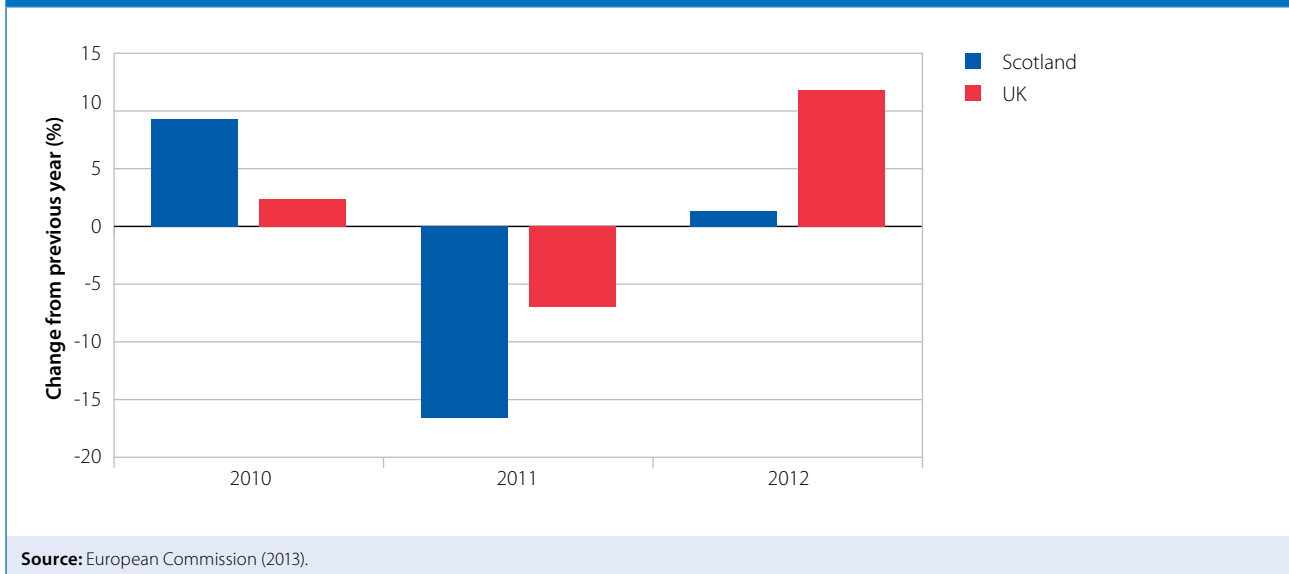
- Reflecting colder winter months in 2012, it is likely that energy demand for heating, and associated emissions, increased relative to 2011.
- There was a small increase in overall economic activity in Scotland in 2011, with total GVA up 0.3% (in line with the UK). Growth was 2% in the services sector but there was a sharp decline of 9% in the construction sector in 2012 (Figure 1.6).
- Data on changes in the mix of power generation by fuel (Figure 1.2) and EU ETS emissions data³ (Figure 1.7) suggest only a slight increase in gross emissions. The increase in EU ETS emissions of 1% is much lower than the 12% increase at the UK level and reflects a smaller increase in coal-fired electricity generation in Scotland in 2012 (14% compared to 32% for the UK).



³ Data on emissions from installations in the EU ETS are reported to the European Commission and are available ahead of economy-wide data for 2012, which will be available for Scotland later in 2014.



Figure 1.7: Percentage change in Scotland's EU ETS emissions from previous year (2010, 2011 and 2012)



However, the lower increase in Scottish traded sector emissions measured on a gross basis is not relevant when considering whether the emissions target for 2012 was met, given that this is accounted for on a net basis. If the increase in non-traded sector emissions for the UK were to have been replicated for Scotland in 2012, and adding this to the EU ETS cap for 2012, this would suggest a level of emissions higher than the target in this year. We will return to assess progress against the 2012 target when final data on Scottish emissions are available.

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

Latest emissions trends

At 16.9 MtCO₂e in 2011, energy supply⁴ remains the largest source of emissions in Scotland, accounting for 28% of total greenhouse gas emissions. In 2011, emissions from energy supply fell by 22.5% and were 24% lower than in 1990.

Within the energy supply sector, power generation (12.2 MtCO₂e) accounts for most (71%) of emissions. The operation of a single plant or operating conditions for renewables can lead to large annual variations in power sector emissions (Figure 2.1), as shown by a fall of 23% in 2011, after an increase of 18% in 2010.

- The reduction in emissions in 2011 reflected a reduction in the carbon intensity of power generation, as electricity generation from nuclear and renewable sources increased substantially in 2011, by 20% (5.8 TWh), while coal-fired power generation fell by 27%.
- Electricity generation from renewables increased by 44% (4.2 TWh), due to both an increase in hydropower generation (63%, after the very low output from hydropower in 2010 due to low rainfall, whilst in 2011 Scotland had the highest rainfall on record) and wind power (44%) due to increased wind capacity.

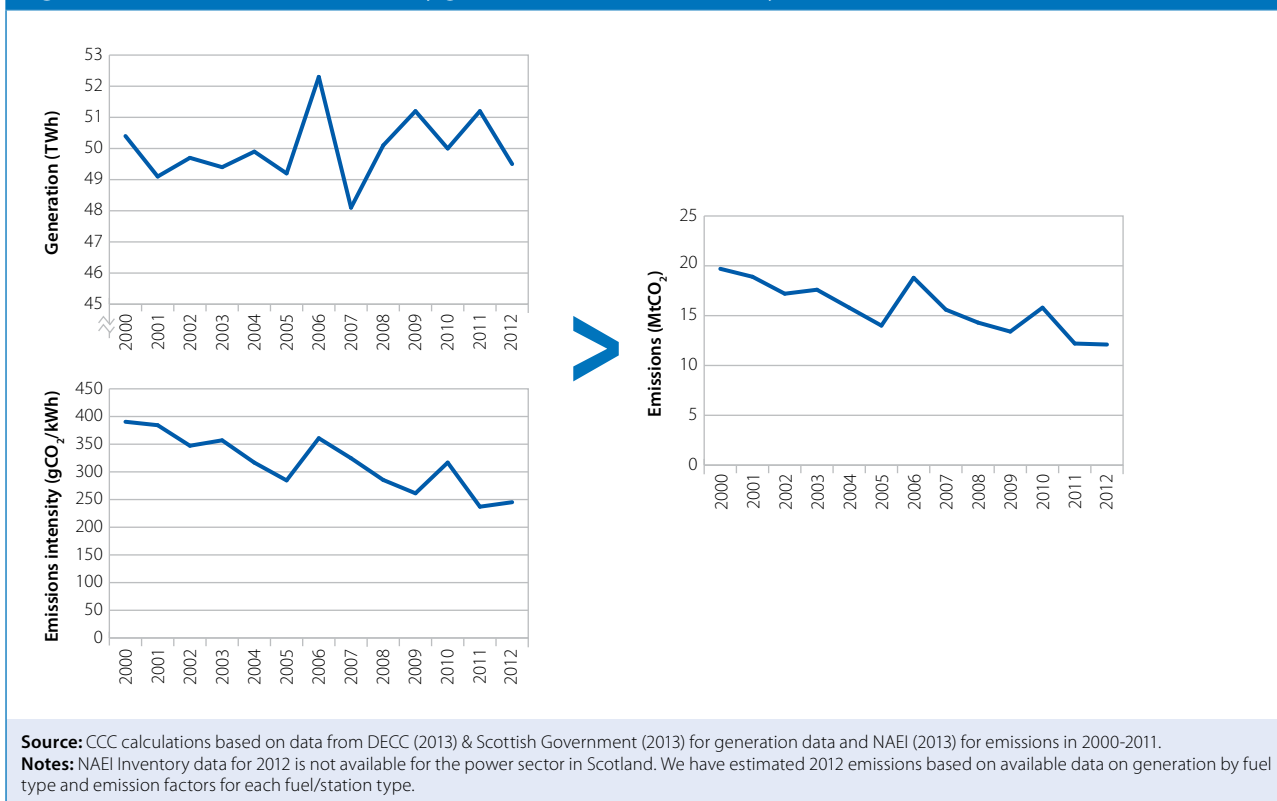
Gross emissions data for the Scottish power sector are not yet available for 2012. However, 2012 data on power generation by fuel show changes in the fuel mix, as well as an overall fall in generation (Figure 2.1):

- Overall, generation of electricity fell by 3.9%.
- Coal generation increased by 1.6 TWh (14%).
- Gas generation more than halved to just 4 TWh.
- Generation from renewable sources increased by 1 TWh (7.5%).
- In addition, data from the EU ETS showed that verified emissions from power stations rose 5% in 2012. Despite a fall in generation, therefore, emissions from the sector in Scotland are likely to have increased.

⁴ The energy supply sector includes emissions from fuel combustion for electricity and other energy sources.



Figure 2.1: Historic trends in electricity generation, emissions intensity and total emissions in Scotland (2000-2012)



Targets and policy

The Scottish Government has set a number of targets for the energy sector:

- Meet at least 30% of overall energy demand from renewables by 2020.
- Reduce final energy demand in Scotland by 12% by 2020, 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 energy consumption from renewables by 2015.
- Enable local and community ownership of at least 500MW of renewable energy by 2020.
- Demonstrate carbon capture and storage (CCS) at commercial scale in Scotland by 2020, with full retrofit across conventional power stations thereafter by 2025-30.
- To seek transmission system upgrades and increased interconnection capable of supporting the projected growth in renewable capacity.

Most of these targets go further than UK-wide targets and, provided they are implemented effectively, Scotland has the potential to lead the UK in renewable energy and energy efficiency. In the following sections, we assess progress against these targets to date.

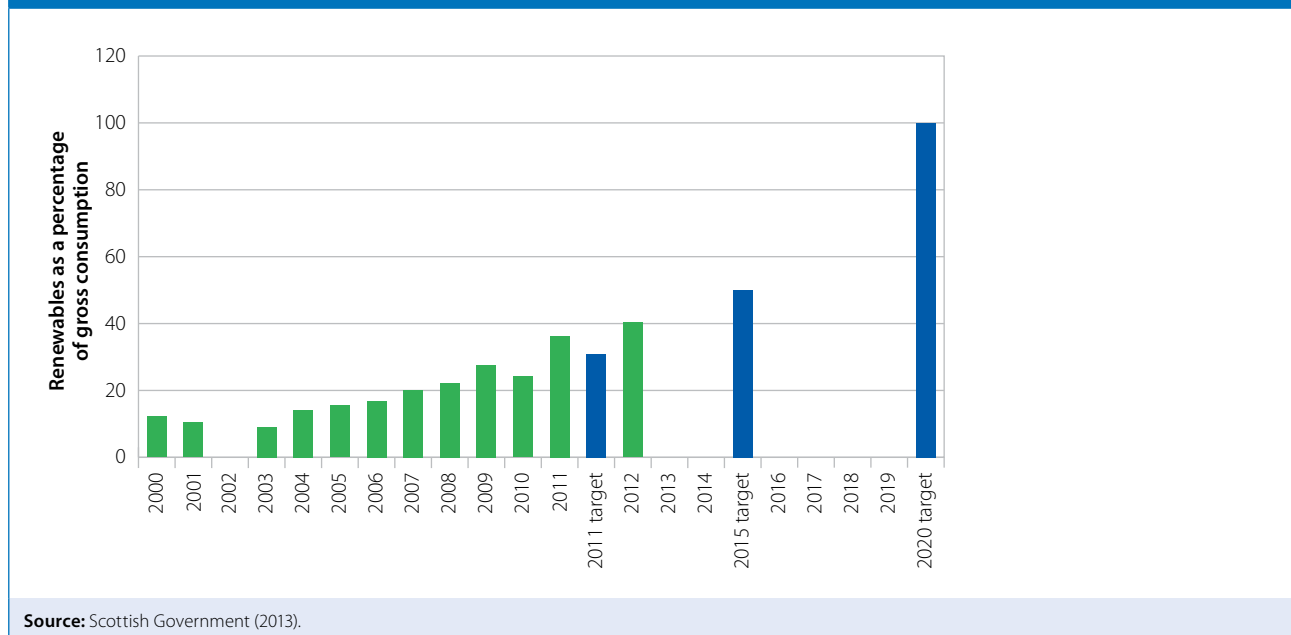
2.1 Progress decarbonising the power sector

Renewable energy

For renewable power, the Scottish Government's target is to 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 energy consumption from renewables by 2015.

In 2012, Scotland's generation from renewables was equivalent to 40% of Scotland's gross electricity consumption (Figure 2.2). This was an increase from 36% in 2011 and continued the recent broadly upward trend towards the 50% target in 2015.

Figure 2.2: Renewable generation as a percentage of gross consumption – actual 2000-2012, and targets for 2011, 2015 and 2020.



- Installed renewable capacity in Scotland increased by almost 250% between 2003 and 2012, from 1.7GW to 5.8 GW. The largest annual increase was between 2011 and 2012 when 1 GW of capacity (mainly onshore wind) was added. Scottish renewable plant accounted for 37% of the UK's renewable installed capacity in 2012, slightly lower than the 40% in 2011.
- Between 2003 and 2012, generation from renewables in Scotland increased from 3.7 TWh to 14.8 TWh, accounting for 35% of the UK total generation from renewables in 2012.

However, the recent pace of increase in renewable generation still needs to rise in order for Scotland to meet both the interim and 2020 targets.

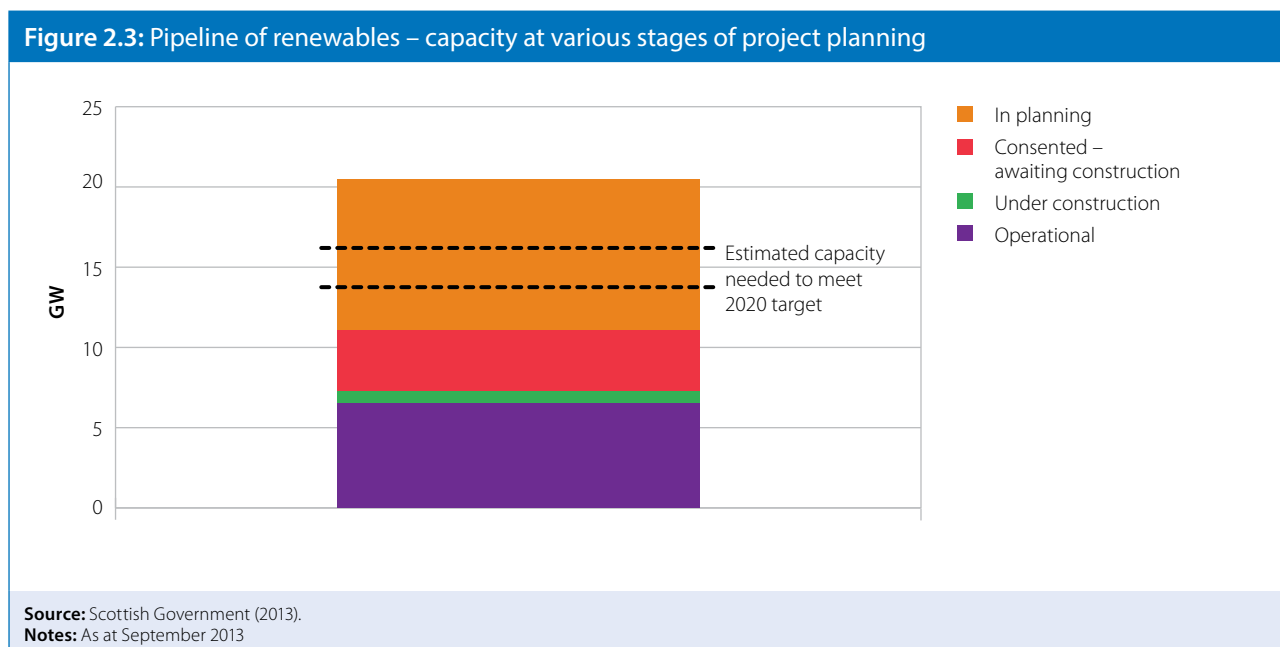
- Prior to the record increase of 1 GW capacity added in 2012, the previous highest capacity addition was 0.7 GW in 2008.
- The average rate of deployment between 2008 and 2012 was 0.6 GW.



- It is estimated that between 14 and 16 GW installed renewable capacity will be needed in 2020 to generate 100% of Scotland's electricity consumption. To meet this, the average rate of deployment needs to increase to 1.2 GW per year.

While there is a sufficient pipeline of projects either consented or in planning (Figure 2.3), there are some indications that the investment climate for renewables has become more difficult. For example, figures from Scottish Renewables show that investment in offshore wind farms in Scotland dropped to £28.9 million in 2013, a decline of 55% on the previous year. The 2020 target therefore remains very challenging.

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. The priorities for the fund are currently marine, community and district heating projects.



Coal

With the closure of the 1200 MW Cockerhills coal-fired plant in 2013, Scotland now only has one significant operational coal-fired plant, the 2400 MW Longannet plant (one of the largest in Europe). With one-third of the capacity retired, there is now less potential for large annual emissions variations due to fuel switching to or from coal.

While Cockerhills had to close under the Large Combustion Plant Directive, Longannet is being upgraded and has opted into 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. Therefore, even under the 100% renewable consumption target, Scotland could still be producing significant emissions from burning coal (e.g. depending on the operating regime, Longannet could emit up to 15MtCO₂e a year in the early 2020s).

Carbon capture and storage (CCS)

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.

- A contract has recently been signed for government funding for the FEED process, with £100m to be shared between Peterhead and the second project, the White Rose CCS project in Yorkshire.
- The FEED process is expected to last throughout 2014 and 2015, with a final investment decision expected from Shell by the end of 2015.
- A decision by the UK Government is expected early in 2016.
- This would allow the project to become operational by 2020. Up to 10 MtCO₂ emissions could be captured from the Peterhead Power Station and then transported by pipeline and stored under the North Sea in the depleted Goldeneye gas reservoir.

The second CCS project in Scotland (Grangemouth) which was being considered under the UK Government's Commercialisation Competition, was shortlisted but did not receive funding for FEED. Previously there were plans for CCS at Longannet but these have been abandoned.

Community generation

The Scottish Government has a target for local and community ownership of at least 500 MW of renewable energy by 2020. This would seem to be feasible given current capacity on the system and in the pipeline, although careful monitoring of the rate of conversion from consented to operational capacity will be required.

- At the end of June 2012, an estimated minimum of 204 MW of community and locally-owned renewable generation was operational in Scotland, an increase of 39% on the estimate for the previous year⁵. This total capacity in 2012 was split between 88 MW of electrical capacity and 117 MW of thermal capacity.
- A further 647 MW of community or locally-owned renewable energy capacity is in various stages of development, as at June 2012. 68 MW is under construction, 266 MW is consented but not built, 172 MW is in planning, 126 MW is in scoping and there is a further 15 MW whose stage of development is unclear.
- Based on operational capacity and the further 647 MW of capacity identified as in development, it would appear that Scotland is on track to meet its 2020 target. However, the rate of conversion from consented to operational will need to be monitored.

⁵ <http://www.scotland.gov.uk/Topics/Business-Industry/Energy/RoutemapUpdate2013>



The main financial incentive to encourage the uptake of small-scale renewable electricity-generating technologies is the GB-wide Feed in Tariff (FiT) scheme, which was introduced on 1 April 2010. 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 were 2.5 MW of community installations under FiTs by February 2014. Capacity was split between photovoltaics and wind, with one small hydro scheme.
- In addition, there were 120 MW of domestic installations, again largely photovoltaics and wind, but with some hydro and micro CHP installations.
- Total installations in Scotland (including commercial and industrial) make up almost 8% of total GB installations under the FiTs, in line with Scotland's share of GB population and GVA.

In addition, the Scottish Community and Renewable Energy Scheme (CARES) provides support, advice and loans to community groups and rural businesses who want to generate renewable energy. Grant funding is available for community projects to help fund the start-up costs such as feasibility studies and community consultation, with further pre- and post- planning loans to help progress schemes. The Scottish Government provided funding of £8.2 million in 2013/14, with a further £6.2 million of funding for 2014/15.

2.2 Low-carbon heat

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.

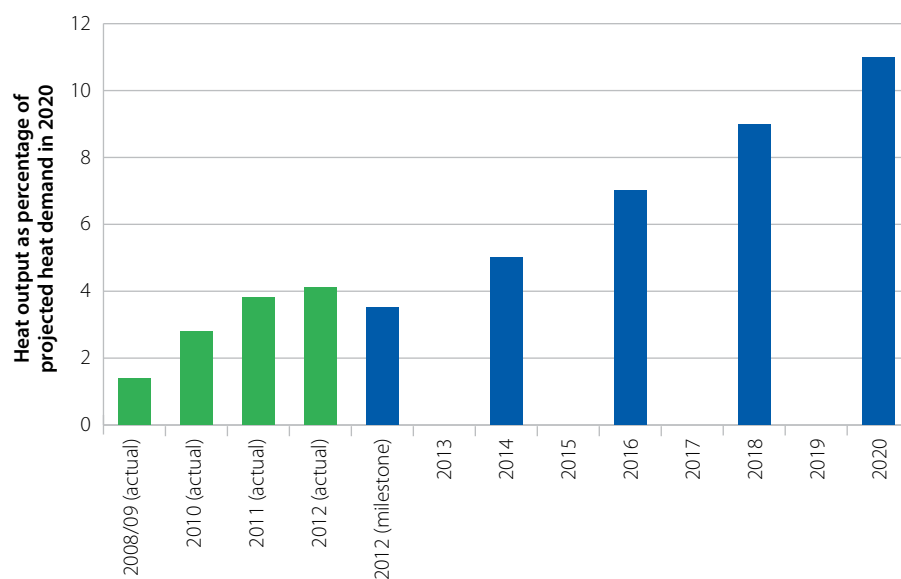
In 2012, Scotland had around 0.6 GW of operational renewable heat capacity⁶. The heat output from this is estimated to be 2.5 TWh, equivalent to 4.1% of Scotland's total forecast non-electrical heat demand in 2020 and is above the target of 3.5% for 2012 set out in the Renewable Heat Action Plan (2009) (Figure 2.4).

The residential sector in Scotland is likely to provide a greater opportunity for low-carbon heat than in the UK as a whole, given that Scotland has a higher proportion of dwellings that are not on the gas grid. This is particularly the case in rural areas in Scotland, where more than half of households are off the gas grid. These dwellings are likely to be using higher-carbon fuels with more price volatility (e.g. heating oil), and thus there is more scope for savings.

It is therefore important for the Scottish Government to support deployment under the Renewable Heat Incentive (RHI), a GB-wide policy which provides payments to those who generate and use renewable energy to heat their buildings.

⁶ Energy Saving Trust (2013): 'Renewable heat in Scotland 2012': <http://www.energysavingtrust.org.uk/scotland/Take-action/Get-business-funding/Renewable-Heat-in-Scotland-2012>

Figure 2.4: Estimated output of renewable heat in 2012 against indicative interim milestones to 2020 target



Source: Energy Saving Trust (2013).

Notes: Indicative milestones are as set out in the Scottish Government's Renewable Heat Action Plan (2009).

- The first phase of the RHI⁷ focuses on the industrial and commercial sectors. By December 2013, the scheme had supported almost 600 MW of installed capacity, with 21% of this capacity in Scotland. This is a greater proportion than would be expected based on either GVA or population shares (both 8%).
- The second phase of the scheme covers additional technologies and will be extended to the residential sector in Spring 2014.
- In the interim, residential installations qualify for support under the Renewable Heat Premium Payment (RHPP). As at December 2013, the RHPP scheme had supported almost 100 MW of installed capacity, of which 16% is in Scotland. Again, this is a higher proportion than would be expected from Scotland's share of the GB housing stock (9%).

There are a number of additional policies in place to support the RHI in Scotland:

- The District Heating Loan Fund is open to local authorities, registered social 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. Around £2 million has provided funding for 13 projects, and the Scottish Government has committed a further £8 million of funding 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 up to £10,000 for renewable heat installations for owner occupiers.

⁷ <https://www.ofgem.gov.uk/ofgem-publications/85818/non-domesticrenewableheatincentivequarterlyreportissue8.pdf>



- The Scottish Government has recently published its draft heat generation policy document for consultation⁸. This includes a target for district heating, currently expected to be 1.5 TWh of heat delivered by district heating by 2020. In addition, the Scottish Government is committed to connect up to 40,000 more homes to heat networks by 2020.

The pipeline of large-scale renewable heat projects (mainly biomass CHP) could potentially bring total heat output to around 4.6 TWh per year or 7.6% of Scotland's total forecast non-electrical heat demand in 2020.

- There is an estimated 125 MW of capacity currently under construction.
- A further 423 MW of capacity is either consented but not built or submitted to local planning authorities for planning permission.
- Assuming that 50% of these projects are operational by 2020 would give a total installed capacity of 898 MW.

These figures suggest that more needs to be done to meet the 2020 heat target, which is measured against estimated non-electrical heat demand. Even if all the projects in the pipeline went ahead and were operational by 2020, only 9.6% of estimated heat demand could be met by low-carbon sources by 2020, below the 11% target. However, a recent report from Audit Scotland⁹ suggests that the Scottish Government's estimate of total heat demand in 2020 could be up to a third too low, based on data from the Department of Energy and Climate Change (DECC). This makes achieving the 2020 target even more challenging.

The Scottish Government now plans to monitor progress against actual heat demand data rather than estimated 2020 demand figures. Based on actual data for 2011, performance against the target would have been 2.6% rather than 3.8%. The Scottish Government is now looking to develop a more accurate annual measure of renewable heat.

2.3 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 consumption¹⁰ in Scotland fell by 3.9 TWh (2.5%) in 2011. Overall consumption was 10.4 TWh (6%) below the 2011 target level (Figure 2.5).

⁸ Towards decarbonising Heat: Maximising the Opportunities for Scotland. <http://www.scotland.gov.uk/Resource/0044/00445639.pdf>

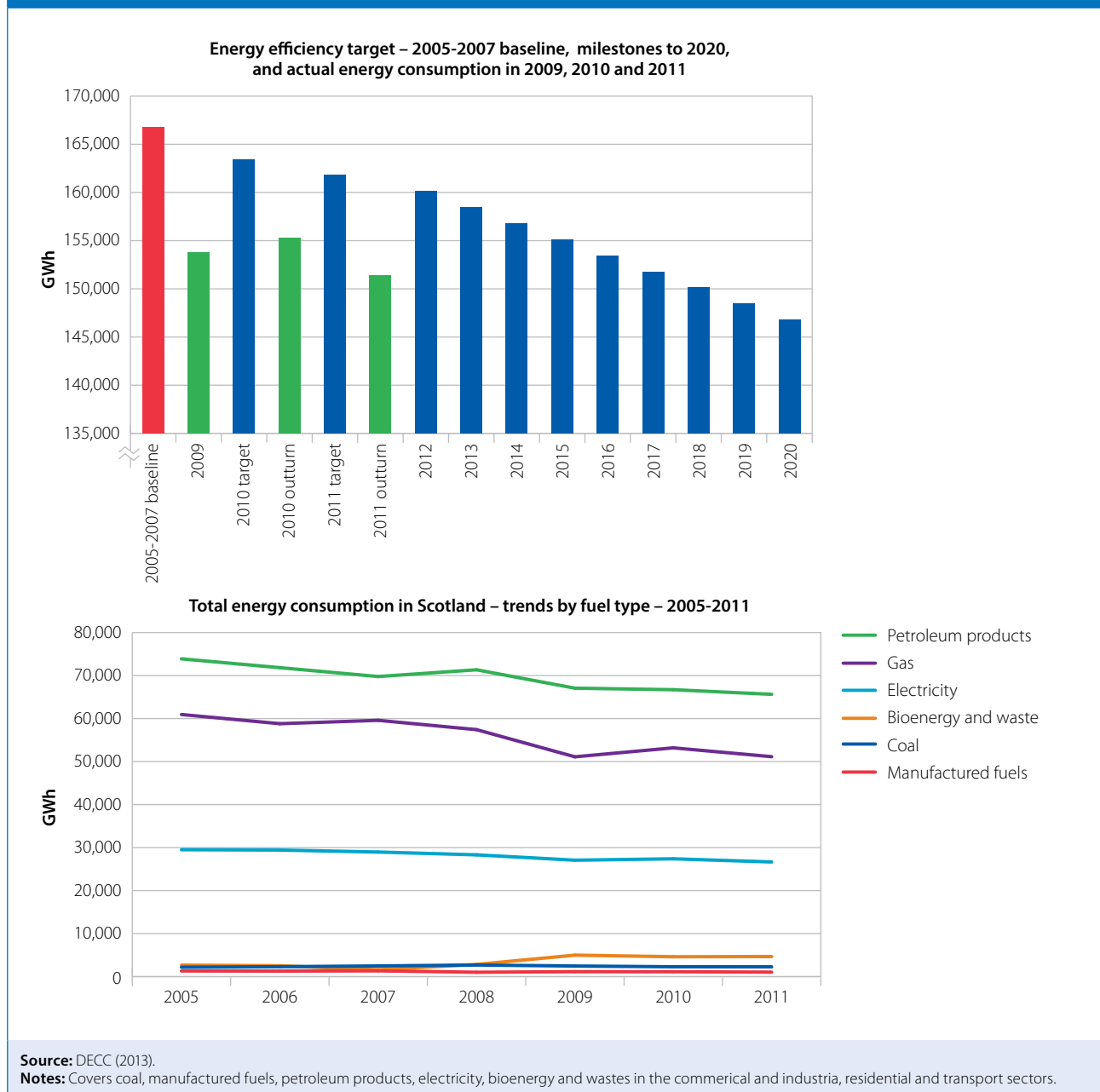
⁹ http://www.audit-scotland.gov.uk/docs/central/2013/nr_130912_renewable_energy.pdf

¹⁰ For sub-national consumption data, only gas is temperature-adjusted.

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

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

Figure 2.5: Total energy consumption in Scotland



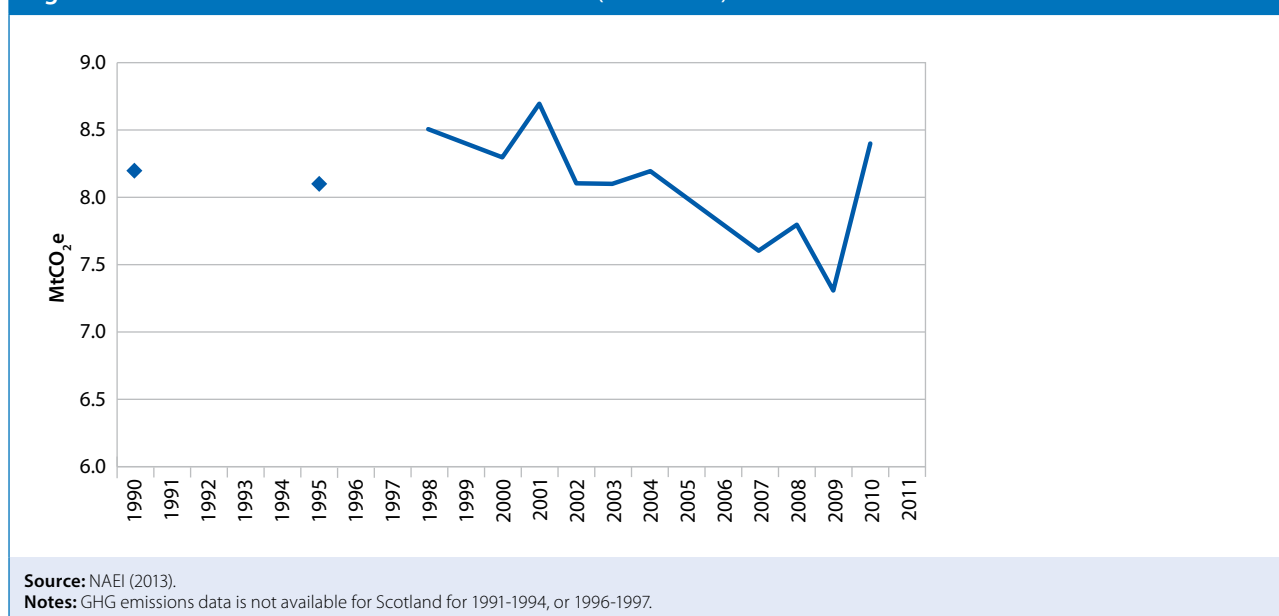


3. Homes and Communities

Latest emissions trends

In 2011, emissions from the residential sector in Scotland were 6.6 MtCO₂e, 21% lower than in the previous year. This followed a marked increase in emissions from the sector in 2010 due to the exceptionally cold winter temperatures. Residential emissions accounted for 13% of total emissions in Scotland in 2011, and were 19.5% below their 1990 level (Figure 3.1).

Figure 3.1: Residential sector emissions in Scotland (1990-2011)



Milestones and progress

Policy to address residential sector emissions is partially devolved. While the main energy efficiency schemes, the Green Deal and the Energy Company Obligation (ECO) are GB-wide, the Scottish Government provides funding for additional energy efficiency programmes. Furthermore, building regulations and fuel poverty are devolved matters.

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 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 Sustainable Housing Strategy (SHS) sets 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 consider progress towards the residential sector and fuel poverty targets.

Progress in insulation measures

The proportion of Scottish homes with insulation has increased steadily in recent years. However, there is still significant potential for increased rates of loft and cavity wall insulation, and 89% of dwellings with solid and other types of walls currently do not have insulation (Figure 3.2).

- Under the previous GB-wide Carbon Emissions Reduction Target (CERT) programme, 411,000 loft insulation measures were installed in Scotland over the 5 years of the programme (2008-2012), 11% of the total installed in Great Britain. The Scottish House Condition Survey showed that the number of homes with loft insulation of more than 200mm (close to the recommended level of 275mm¹¹) increased by 164,000 homes (20%) in 2012, to 975,000 homes. In 2003/04, just 258,000 homes had more than 200mm of loft insulation installed.
- Whilst these figures show a marked improvement in levels of loft insulation, there are still 31,000 dwellings which do not have loft insulation but would be suitable and at least a further 801,000 could benefit from topping up levels of loft insulation to the recommended level.
- There were 218,000 recorded cavity walls insulation installations in Scotland under CERT, 9% of the GB total under the programme, in line with Scotland's share of the GB housing stock. The Scottish House Condition Survey indicated that in 2012, 1.16m properties in Scotland have cavity wall insulation, but there remain a further 606,000 uninsulated properties with cavity walls. However, there was a marked slowdown in the pace of cavity wall insulation in Scotland in 2012, with an increase of just 3,000 houses with insulated cavity walls.
- Around one-quarter of properties in Scotland have solid or other types of walls (including timber frame). Of these dwellings, in 2012 only 11% (66,000) were insulated with more than 0.5 million remaining uninsulated¹².

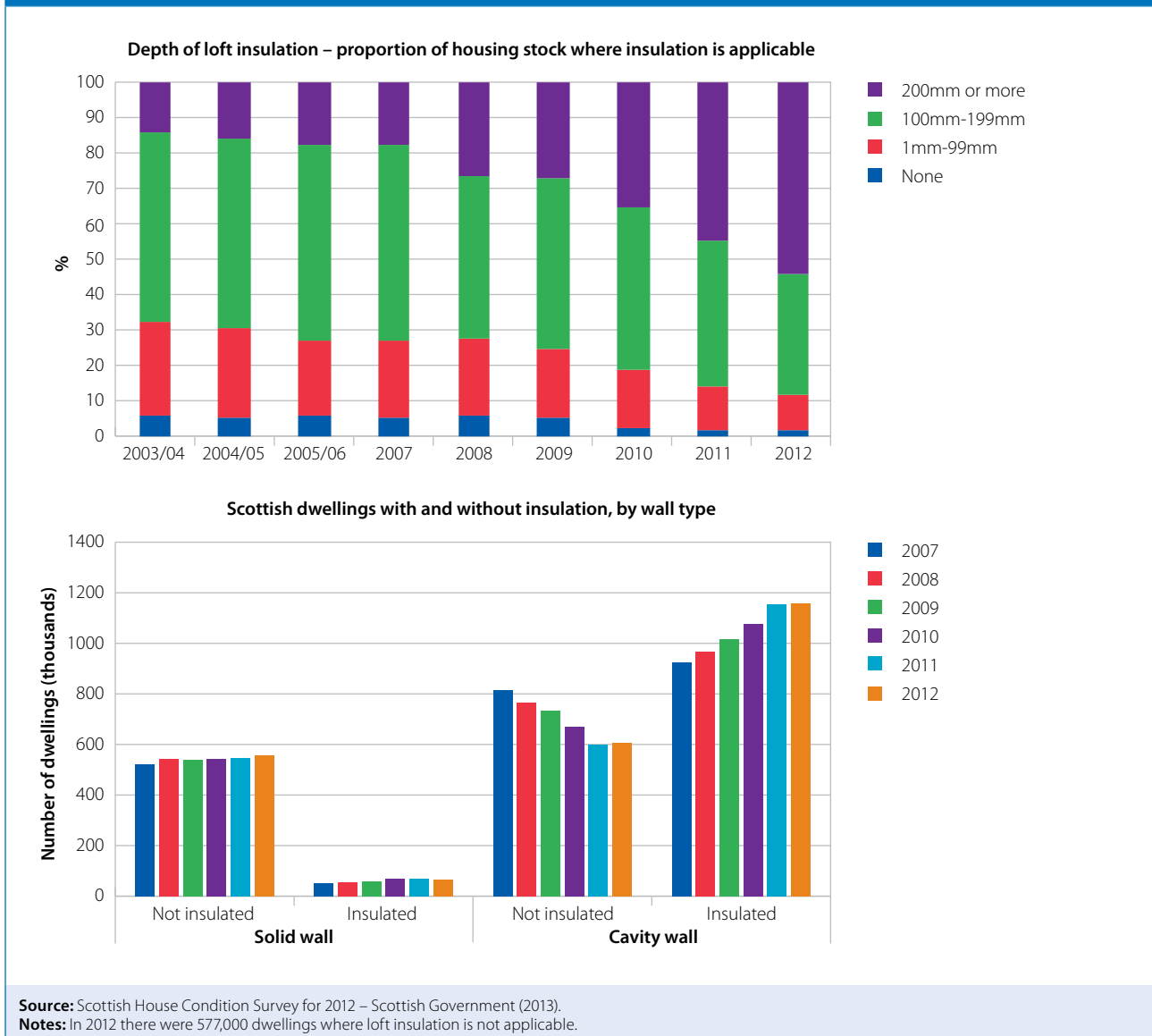
With the major shift in energy efficiency policy to the Green Deal and Energy Company Obligation (ECO) in 2013, recent installation numbers for energy efficiency measures are much lower than in 2011 and 2012.

¹¹ As recommended by the Energy Saving Trust (EST).

¹² The Scottish House Conditions Survey (SHCS) showed that the absolute number of homes with insulated solid/other walls fell by 2,000 between 2011 and 2012. This change was not found to be statistically significant and can be attributed to random variation in the sample of the SHCS and does not represent a real change in the stock. These figures are not easily comparable with UK-wide figures as outside Scotland there is less timber-frame construction and no separate figures are collected for solid walls only.



Figure 3.2: Loft, cavity and solid wall insulation in Scotland (2003/04-2012)



- The latest ECO statistics from DECC showed that in the first year of the scheme, there were 58,100 ECO measures delivered in Scotland. This was 11% of the total measures delivered under the scheme in Great Britain (Table 3.1).
- No breakdown of types of measures installed is available for Scotland but insulation figures are likely to show a similar trend to GB-wide figures.
 - In 2013 under the ECO only around 130,000 lofts were insulated in Great Britain, whereas in 2012, 1.17 million were insulated under CERT and CESP.
 - The number of cavity walls insulation installations fell by 73% to 172,000 while solid wall installations declined by 60% to less than 28,000.

Table 3.1: Provisional number of ECO measures by ECO obligation and proportion of GB total				
	Carbon Saving Target (CSO)	Carbon Savings Community (CSCO)	Affordable Warmth (HHCRO)	Total Number of ECO measures delivered
Scotland	24,200 (13%)	6,166 (6%)	27,708 (12%)	58,058 (11%)
Great Britain	193,337	96,093	239,456	528,886
Source: DECC (2014)				

- By the end of September 2013, 9,677 cashback vouchers had been issued in Scotland under the Green Deal, and of these, 2,143 vouchers, with a value of £1.2 million, had been paid following the installation of measures. Nearly two-thirds of the paid vouchers have been for easy measures such as condensing boilers, loft insulation and LED light bulbs.

As we pointed out in our 2013 UK progress report to Parliament, the low delivery of measures under the ECO suggests that further incentives are needed.

The UK Government responded to this with various changes in December 2013.

- These should strengthen incentives for delivery of low-cost measures, for example, by making more measures eligible, and providing stamp duty rebates.
- However, they also reduce ambition of the ECO Carbon Savings Target by 33%.

The overall implication of these changes for installation numbers is unclear, but it is likely that substantial additional policy effort by the Scottish Government will be necessary if it is to achieve its insulation and fuel poverty targets.

Fuel poverty

Fuel poverty remains a major problem for Scotland, and is more pronounced than for the UK as a whole:

- Fuel poverty in Scotland was significantly above the UK average in 2011 (the latest year for which comparable data are available), at 31% and 17% of households, respectively¹³.
- In 2012, fuel poverty in Scotland fell to 27% of households, but this is still substantially higher than it was in 2003/04 when the fuel poverty rate was 16%.
- More recent estimates from the Association for the Conservation of Energy¹⁴ suggests that fuel poverty continued to increase in Scotland, reaching 760,000 at the beginning of 2013 and 960,000 households at the beginning of 2014, which is likely to reflect recent substantial increases in energy bills. This compares to 647,000 households in the latest Scottish House Condition Survey which contained data for 2012.

¹³ The Scottish Government defines fuel poverty as: a person is living in fuel poverty if, to heat their home to a satisfactory standard, they would need to spend more than 10% of their household income on fuel.

¹⁴ <http://www.energybillrevolution.org/wp-content/uploads/2014/01/ACE-and-EBR-fact-file-2014-01-Fuel-Poverty-update-2014.pdf>



Fuel poverty depends not just on energy prices, but also on 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). Scotland has a higher proportion of electrically-heated homes (15%) than UK-wide (9%).

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

Dwelling characteristic		2009	2011	2012
Primary heating fuel	Gas	31%	26%	22%
	Electricity	44%	42%	42%
Urban/Rural	Urban	32%	28%	24%
	Rural	48%	41%	40%
Gas grid	On gas grid	32%	29%	24%
	Not on gas grid	51%	48%	52%

Source: Scottish House Condition Survey 2012.

Fuel poverty is a devolved matter, although Scotland is also covered by the fuel poverty-focused elements of the ECO (the Affordable Warmth Scheme). In addition, there are Scottish Government funded measures under the new Home Energy Efficiency Programmes for Scotland which was launched in April 2013. There are two main strands of the programme:

- Area-based schemes are delivered by local authorities and prioritise fuel poor areas, providing a range of insulation measures. £55 million of funding was allocated for area-based schemes in 2013/14, but this was £5 million less than was originally budgeted for due to difficulties getting local authorities to sign up for the full amount of the second instalment of funding. £60 million of funding has been announced for 2014/15.
- A 2-year extension to the Energy Assistance Scheme (EAS), which is worth £32 million and 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.
- Additional measures aimed at fuel-poor households include the Warm Homes Fund and an extended Green Deal Cashback scheme.
 - Rural off-gas grid households can access a £50 million Warm Homes Fund which provides grants and loans to support renewable energy projects (including district heating) in fuel poor communities.

-
- The Scottish Government extended the Green Deal Cashback Scheme 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 lightbulbs, and new heating controls.

Overall, the Scottish Government is aiming at a total spend of £200 million per year, including £125 million from the ECO. Funding available to fuel poor households is higher in Scotland than in England, where no funding beyond the ECO is available.

However, fuel poverty remains a serious problem in Scotland and it seems unlikely that the 2016 target will be met.

There is a particular issue of the risk to electrically-heated households, of which there is a higher proportion in Scotland. While the Warm Homes Fund provides opportunities for electrically-heated rural households, additional measures may be required to target electrically-heated households in urban areas.



4. Business and the public sector

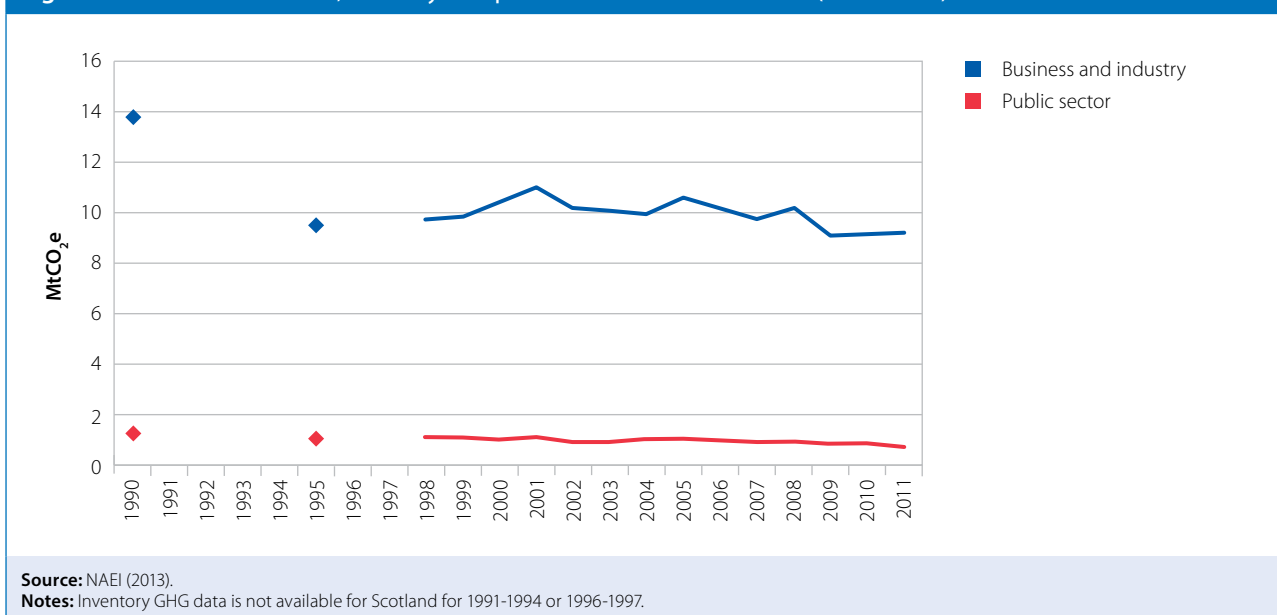
Latest emissions trends

Emissions from business and industrial processes (including some emissions within the EU ETS) were 9.2 MtCO₂e in 2011, accounting for 18% of total emissions in Scotland. Between 1990 and 2011 emissions fell by 32%, but they increased by 0.9% in 2011 (Figure 4.1).

The increase in emissions in the sector in 2011 is likely to have reflected continued economic growth following a return to growth in 2010 after the 2009 recession.

In 2011, emissions from the public sector were 0.7 MtCO₂e, representing just 1.5% of Scotland's total. Emissions fell by 0.2 MtCO₂e (15%) in 2011 and were 39% below 1990 levels (Figure 4.1).

Figure 4.1: Scottish business, industry and public sector GHG emissions (1990-2011)



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.

There are a number of EU and UK/GB policies which 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 non-domestic Green Deal and the RHI (see section 2). Our UK progress report has found that most of these policies lack in effectiveness:

- **EU ETS:** the price signal from the EU ETS is weak due to excess allocation of allowances and the recession.
- **CCAs:** the scope of emissions covered by the CCAs was reduced by 60% in 2013 to non-EU ETS emissions but all energy used remains eligible for Climate Change Levy discount. This implies weakened incentives.
- **CRC:** after a number of changes to the scheme in recent years (e.g. dropping revenue recycling and abolishing the league table), the CRC is now essentially a modest carbon tax which is unlikely to provide major additional energy efficiency incentives for the business and public sectors.

The Scottish Government has 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 overheads through improved energy, material resource and water efficiency.
- In 2009, Scottish Procurement launched a national electricity supply contract which provided enough green electricity to cover the entire requirement for those areas of the public sector which adopted the electricity supply contract (it was almost universally adopted). 2 TWh of electricity were provided by Whitelee onshore wind farm and this green electricity did not attract any premium. A replacement contract went live in April 2013, and incorporates 28,000 supply points using 2.8 TWh of electricity and facilitating improvements in environmental performance through access to energy reduction technologies and energy management advice from the supplier.

Overall, it is difficult to assess progress in the business and public sectors due to data limitations.



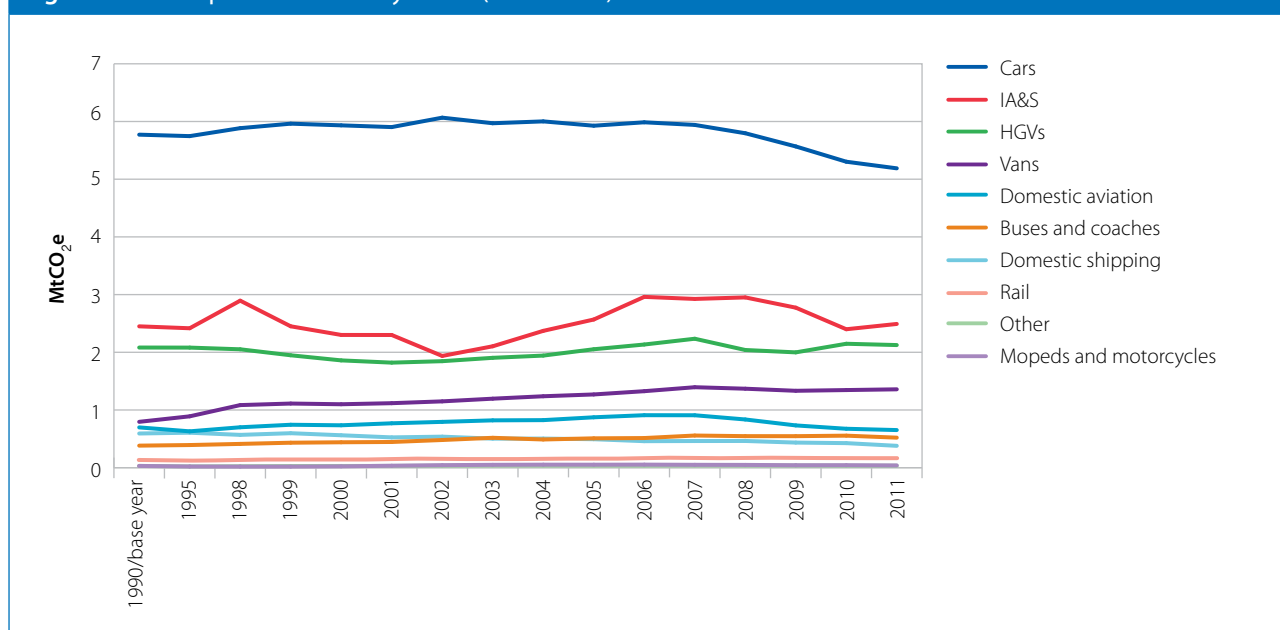
5. Transport

Latest emission trends

The Scottish Government's emission targets cover emissions from all transport in Scotland, including international aviation & shipping (IA&S). In 2011, total transport emissions fell by 1% in 2011, but are 0.1% higher than in 1990. Within total transport emissions, emissions changes have varied by mode (Figure 5.1):

- The largest source of emissions is those from cars, which accounted 40% of the total at 5.2 MtCO₂e. Emissions from cars fell by 2% in 2011 and overall are 10% lower than in 1990. This reflects a levelling off in vehicle-kilometres travelled and improvements in new car efficiency (Figure 5.2).
- International aviation and shipping emissions were 2.5 MtCO₂e in 2011, 19% of total transport emissions. This is an increase of 4% from 2010 and emissions are now 2% higher than 1990 levels.
- Emissions from heavy goods vehicles (HGVs) accounted for 16% of Scotland's transport emissions at 2.1 MtCO₂e. Emissions fell 1% in 2011 but are 2% higher than in 1990.
- Emissions from vans were 1.4 MtCO₂e in 2011, 10% of total transport emissions. Emissions increased by 1% during 2011 and are 71% above 1990 levels.
- The remaining 15% of emissions are comprised of domestic aviation and shipping, buses, rail and motorcycles.

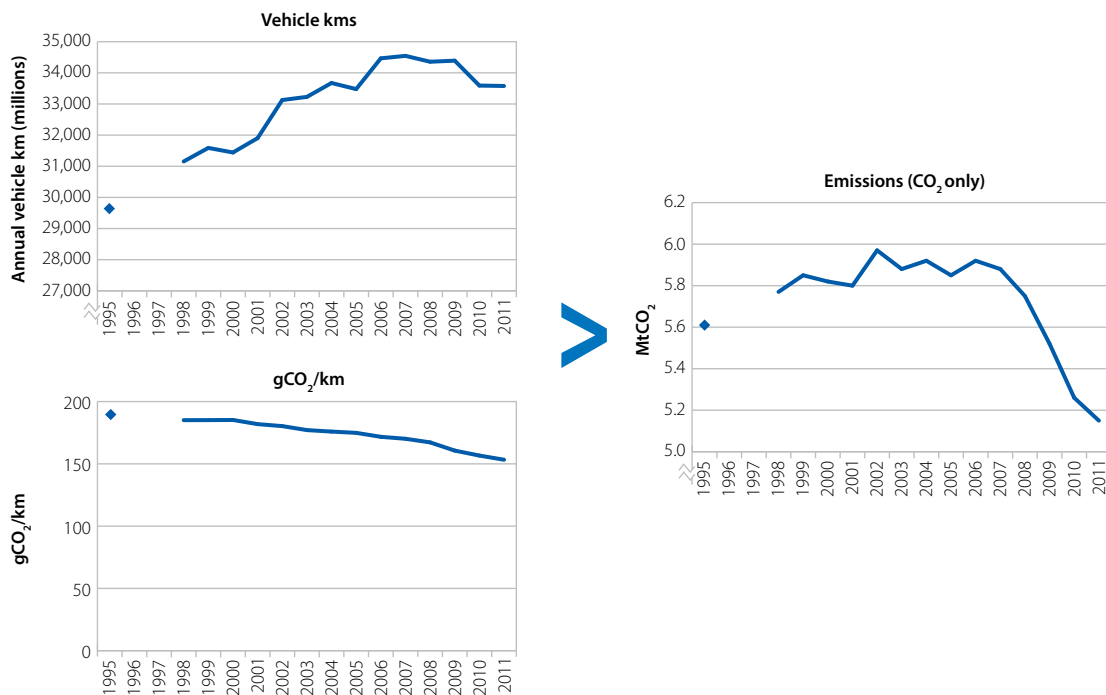
Figure 5.1: Transport emissions by mode (1990-2011)



Source: NAEI (2013).

Notes: 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 in Scotland (1995-2011)



Source: NAEI (2013), Scottish Transport Statistics No.31 – 2012 edition, chapter 5: road traffic. CCC calculations.
Notes: Inventory GHG data is not available for Scotland for 1996-1997.

Overall transport emissions accounted for 25% (13 MtCO₂e) of total Scottish emissions and make up a large proportion of non-traded sector emissions (42% of Scotland’s non-traded sector target in 2011). 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. The following milestones have been set for 2020:

- A mature market for low carbon cars resulting in achievement of an average efficiency for new cars of less than 95 gCO₂e/km.
- An electric vehicle (EV) charging infrastructure in place in Scottish cities.
- Personalised travel planning advice provided to all households.
- Effective travel plans in workplaces with more than 30 employees.
- At least 10% of all journeys made by bicycle.
- In addition, 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.

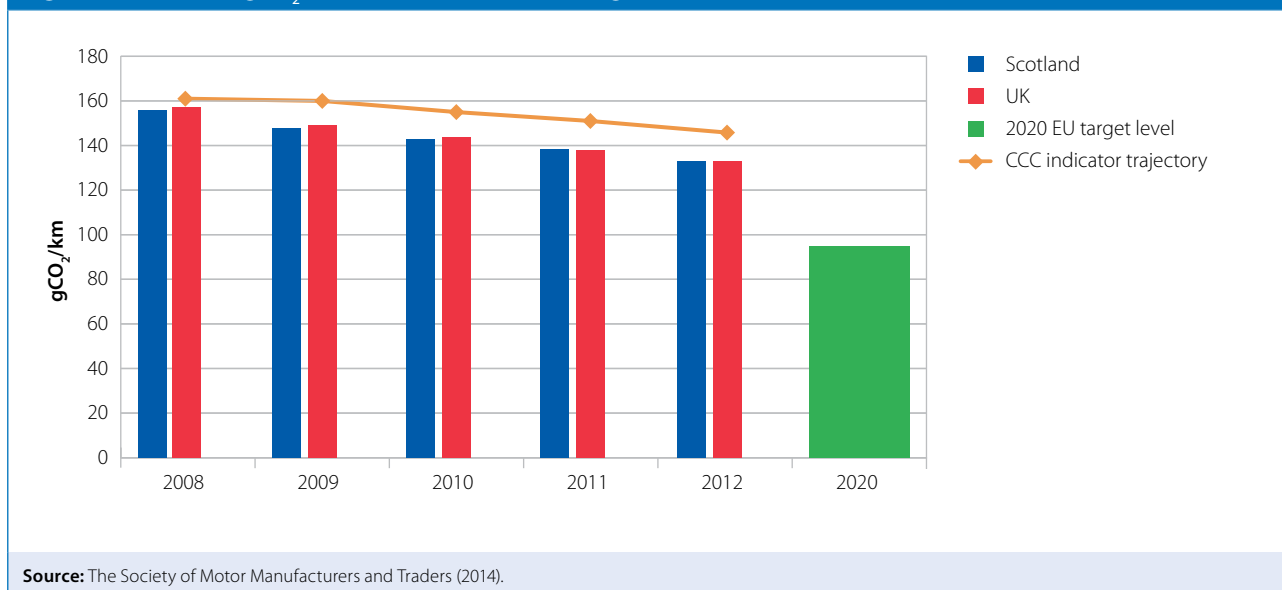


Achievement of these targets will depend on a mix of EU and Scottish Government measures, namely EU car and van efficiency standards and Scottish measures to promote modal shift and a switch to electric vehicles. To date, there has been mixed progress towards these targets:

- The strong progress in recent years on an improvement in **new car efficiency** continued in 2012 (Figure 5.3):
 - CO₂ intensity of new cars fell from 138.3 gCO₂/km in 2011 to 133 gCO₂/km in 2012, a 3.8% reduction.
 - The CCC's indicator for 2012 – consistent with progress towards a 95 gCO₂/km target in 2020 – is 145.8 gCO₂/km.
 - Therefore CO₂ intensity of new cars is currently out-performing our indicator, by around 9% in 2012.
 - The CO₂ intensity of new cars in Scotland fell by a further 3.6% in 2013, to 128.4 gCO₂/km. This improvement in new car efficiency is driven by an EU directive targeting 95 gCO₂/km.
- Seven pilot areas in Scotland received funding under the **Smarter Choices Smarter Places (SCSP)** programme and implemented local programmes between 2009 and 2012. The aim of the programme was to foster more sustainable travel habits, both by encouraging behaviour change and by investment in infrastructure and service improvements. There were a number of observed travel behaviour changes which can be related to the SCSP programme goals:
 - An average annual financial saving on direct transport expenditure of £62 per resident, equivalent to about £9 million per year across the seven pilot areas.
 - Various health gains from increased physical activity which can be valued using standard health valuation techniques.
 - Carbon reductions total 16,400 tonnes of CO₂ per year, which is valued at £0.9 million per year using current carbon values, equivalent to £6 per capita.
 - However, it is not possible to say to what extent these impacts can be directly attributed to the SCSP programme and to what extent they were influenced by other factors.

No further funding has yet been confirmed for any future SCSP work.

Figure 5.3: New car gCO₂/km – Scottish and UK average and CCC indicator level for 2012 (UK)



- As part of the Office for Low Emission Vehicles' (OLEV) Plugged in Places Scheme and the Low Carbon Vehicle Procurement Support Scheme, the Scottish Government has invested more than £8 million in low-carbon vehicles and recharging infrastructure since 2010. At the end of September 2013, there were approximately 300 charging points across Scotland and a further 200 in non-public locations. 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 2014/15. For **electric vehicles** the proportion of UK sales of electric vehicles taking place in Scotland increased to 8% in 2012, before falling back to 6% in 2013. This is lower than Scotland's overall share of car sales in the UK (9%).
- In 2012/13, £1.9 million of funding was awarded under the Scottish Green Bus Fund for an additional 24 new low-carbon emission buses (LCEBs) taking the total number of buses purchased under the fund to 94 vehicles. A further £2 million of funding will be available in an additional round of funding.
- In terms of **cycling**, Scottish transport statistics show that in 2011/12, just 0.9% of journeys were by bike, well below the 2020 ambition. The Scottish Government published an updated Cycling Action Plan in 2013, which highlighted a number of key achievements since the publication of the first Cycling Action Plan in 2010. A number of actions have been identified, under the broad themes of Leadership and Partnership, Infrastructure Integration and Road Safety and Promotion and Behavioural Change.

Therefore, while progress on new car efficiency is good, more needs to be done on encouraging smarter choices and electric vehicles.



6. Agriculture, rural land use and forestry

Emissions from the agricultural sector are largely non-CO₂ gases, with over half of emissions (53%) due to nitrous oxide and over one-third (37%) due to methane. Agricultural soil emissions make up almost half (49%) of emissions, followed by enteric emissions (34%).

The forestry and rural land use sector was a net emissions sink in 2011, absorbing 9.1 MtCO₂e. The biggest source of emissions is cropland and developments (conversion of land to settlements), which is more than offset by carbon sequestered from forestry and grassland.

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 captured in the emissions inventory.

Latest emissions trends

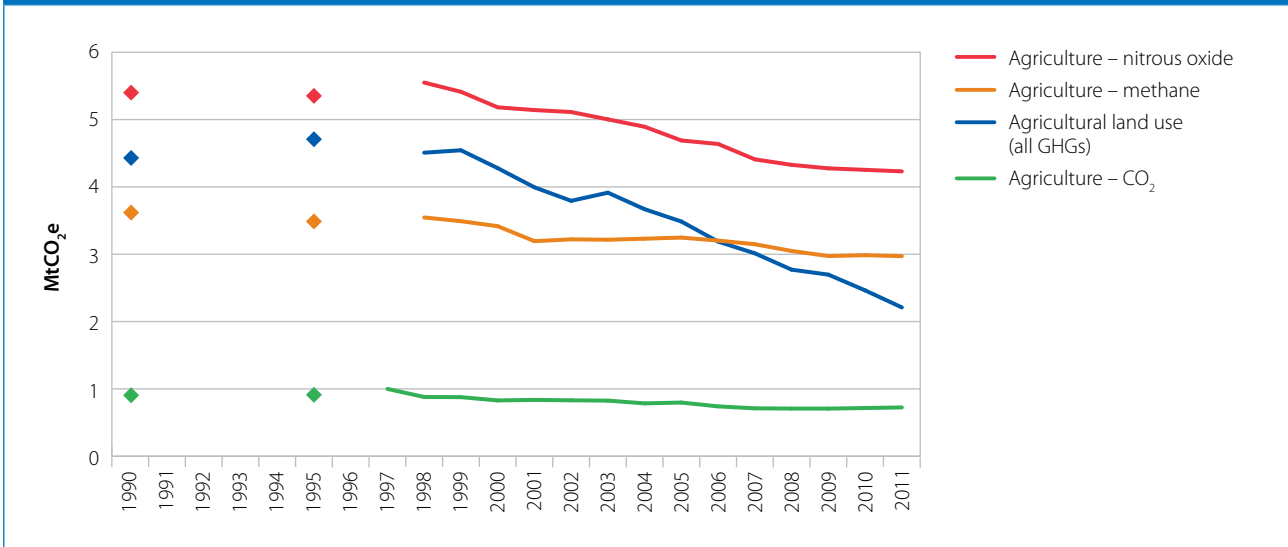
There is ongoing uncertainty in the emissions inventory for the agriculture, land use and forestry sector, and agriculture in particular, not just for Scotland but for the UK as a whole. This is the subject of a current research programme which should start to feed through into improvements in the accuracy of the inventory from 2014 onwards.

Current estimates show that emissions from agriculture and related land use were 10.1 MtCO₂e in 2011, 20% of Scotland's total (compared to around 10% at the UK level). Emissions fell by 2.7% in 2011 and were 29% lower than 1990 levels (Figure 6.1).

- Methane emissions fell by 18% between 1990 and 2011, from 3.6 MtCO₂e to 3 MtCO₂e, as a result of falling numbers of livestock and improving livestock productivity. Emissions edged down by 0.5% in 2011.
- Nitrous oxide emissions declined by 0.5% in 2011, and were 22% lower than 1990 levels. Emissions were 4.2 MtCO₂e in 2011, reflecting a reduction in the use of fertiliser.
- Emissions from agriculture-related land use halved between 1990 and 2011, dropping from 4.4 MtCO₂e to 2.2 MtCO₂e. This was driven by a reduction in emissions from land converted to cropland. Emissions declined by 10% in 2011.
- CO₂ emissions from on-farm stationary (e.g. heating farm buildings) and mobile (e.g. tractors and harvesters) combustion were 0.7 MtCO₂e in 2011, having declined by 19% since 1990. However, emissions increased by 1% in 2011.

The forestry sector in Scotland is a net emissions sink, although the size of the sink declined by 5% to 9.1 MtCO₂e in 2011. The size of the emissions sink has been declining since 2005, but it is still 11% larger than it was in 1990 (Figure 6.2). This recent reduction in size reflects historic low planting rates for new trees as current net carbon sequestration rates are currently reducing year-on-year due to the lower proportion of young trees in Scottish forests.

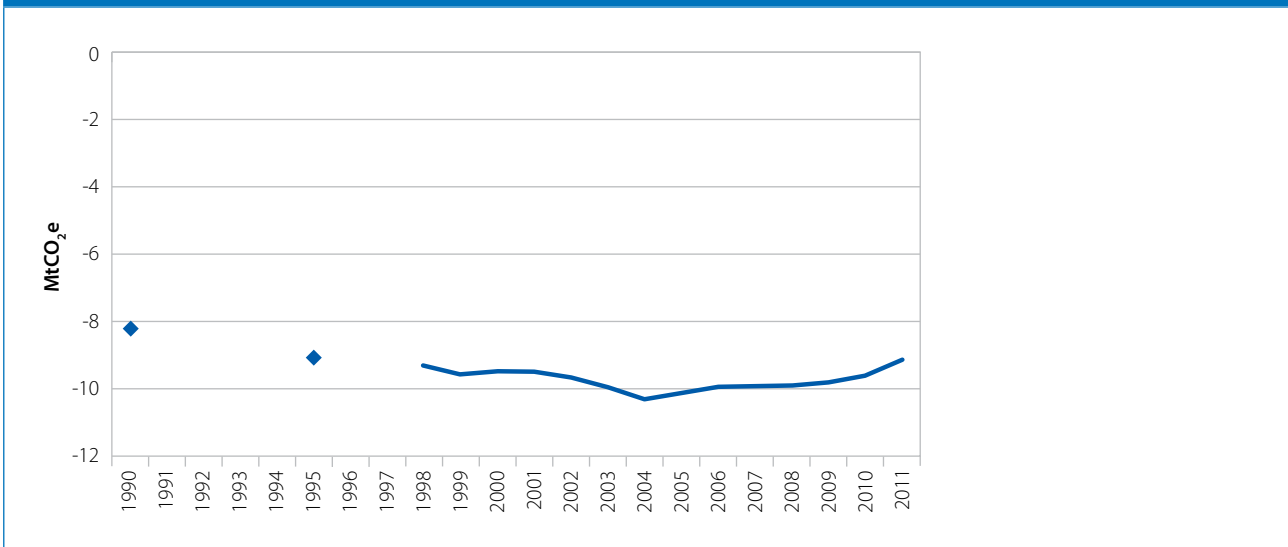
Figure 6.1: Agriculture and land use emissions (1990-2011)



Source: NAEI (2013).

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

Figure 6.2: Forestry emissions (1990-2011)



Source: NAEI (2013).

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

Land use emissions related to development accounted for 3% of overall Scottish emissions in 2011, at 1.7 MtCO₂e. This was 2% higher than 2010, but 5% below 1990 levels, and reflected an increase in the conversion of land to settlements in 2011.

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 to address these are:



- Farming for a Better Climate initiative
- Funding for peatland restoration
- Increase in afforestation rate, planting 100,000 trees over a 10 year period

We now consider progress in these three areas.

6.1 Farming programmes

The Farming for a Better Climate initiative 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, the Scottish Rural College is working 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. Various mitigation actions have been implemented by the focus farms and data have been collected on a regular basis, enabling the effectiveness of the mitigation actions to be assessed. The initial data suggest that there has been a reduction in emissions from livestock as a result of the actions implemented by the focus farms, although a third year of data are required before this can be fully evaluated. Wet weather has led to a smaller-than-expected fall in emissions, leading to longer livestock housing periods, lower grass and crop yields and an increase in grain drying.

However, it is unlikely that these 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 may change when improvements to the methodology feed through into the accuracy of the inventory.

The EU Farm Structure and Methods survey for Scotland provides important baseline and time series data when considering the environmental impact of agricultural production and specific farm practices. However, it does not provide information as to how many farmers have adopted particular measures.

6.2 Peatlands

Peatlands cover approximately 20% of Scotland's land area, equivalent to around 1.7 million hectares, and contain up to 1.7 billion tonnes of carbon. Scottish peatlands account for 60% of the UK's peatlands and 4% of the 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.

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. The Scottish Government is currently working with stakeholders to develop a plan for how this money should be allocated, with the focus on peatland restoration.

The Scottish Government intends to include peatland restoration activity within Scottish emissions accounting in future, based on the new Intergovernmental Panel on Climate Change (IPCC) method for wetlands.

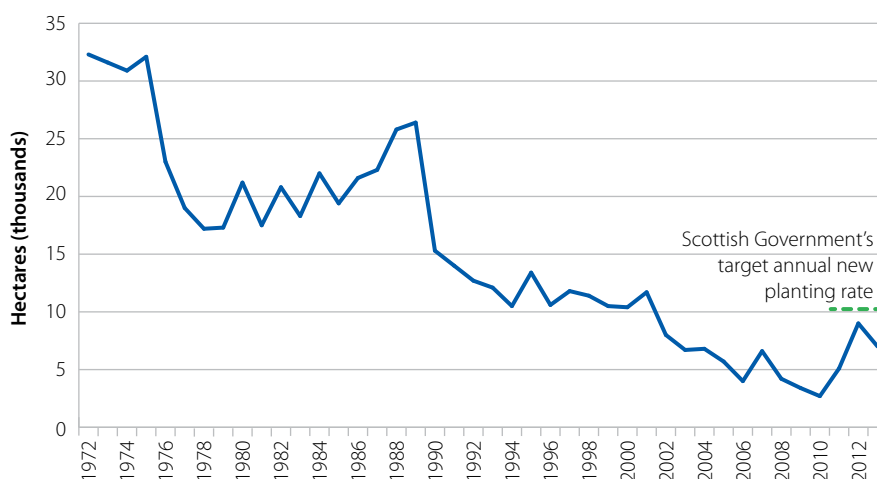
6.3 Forestry

New tree planting rates have been declining since the 1970s and reached 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, 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 9,000 hectares of new forest were planted in 2012,
- However, the rate of afforestation fell again in 2013, and just 7,000 hectares were planted. The decline in 2013 was due to poor weather conditions early in the year, which made it difficult to plant in many areas of Scotland. Although the whole grant budget had been fully committed, not all the tree planting work could be carried out.

While poor weather conditions cannot be foreseen, it still remains to be seen whether the 10,000 hectare target can be achieved.

Figure 6.3: New planting in Scotland (1972-2013)



Source: Forestry Commission (2013).



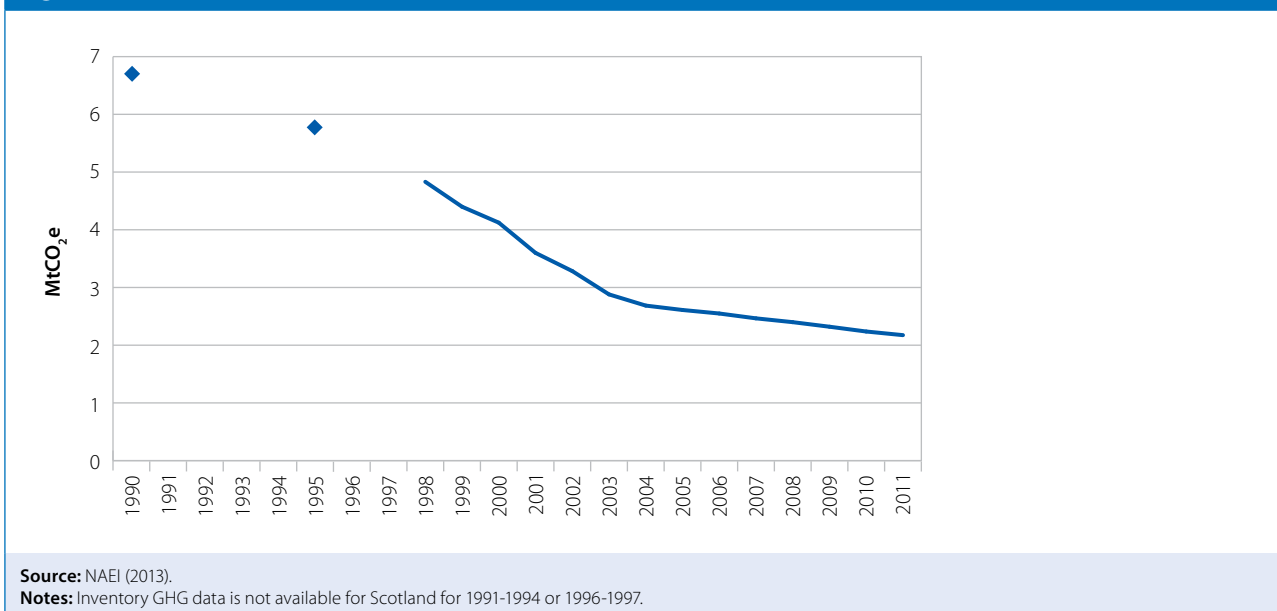
7. Waste

Latest emission trends

In 2011, emissions from the waste sector in Scotland were 2.2 MtCO₂e. This was 3% lower than in 2010 and 68% below 1990 levels (Figure 7.1).

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, both 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. In 2011, total waste arisings fell sharply, by 22%.

Figure 7.1: Waste sector emissions (1990-2011)



Milestones and progress

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.

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 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 2012/13, £850,000 was invested through local authorities, land owners and facilities managers to install new recycling facilities in some of Scotland's busiest public places.

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.

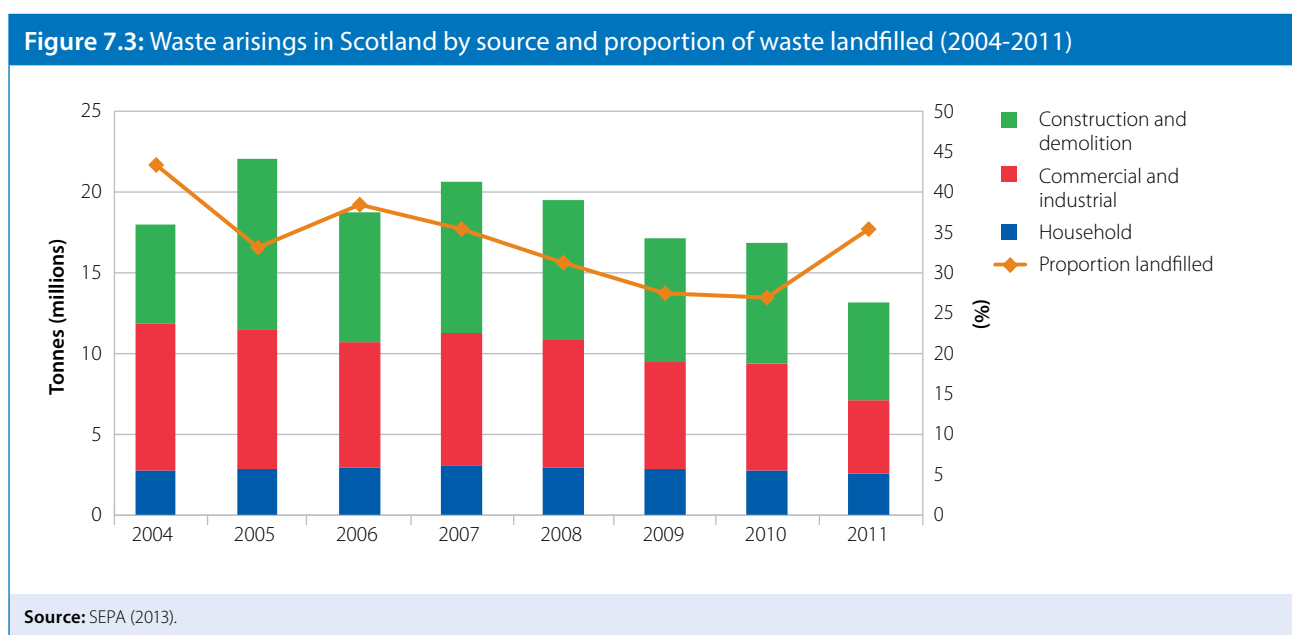
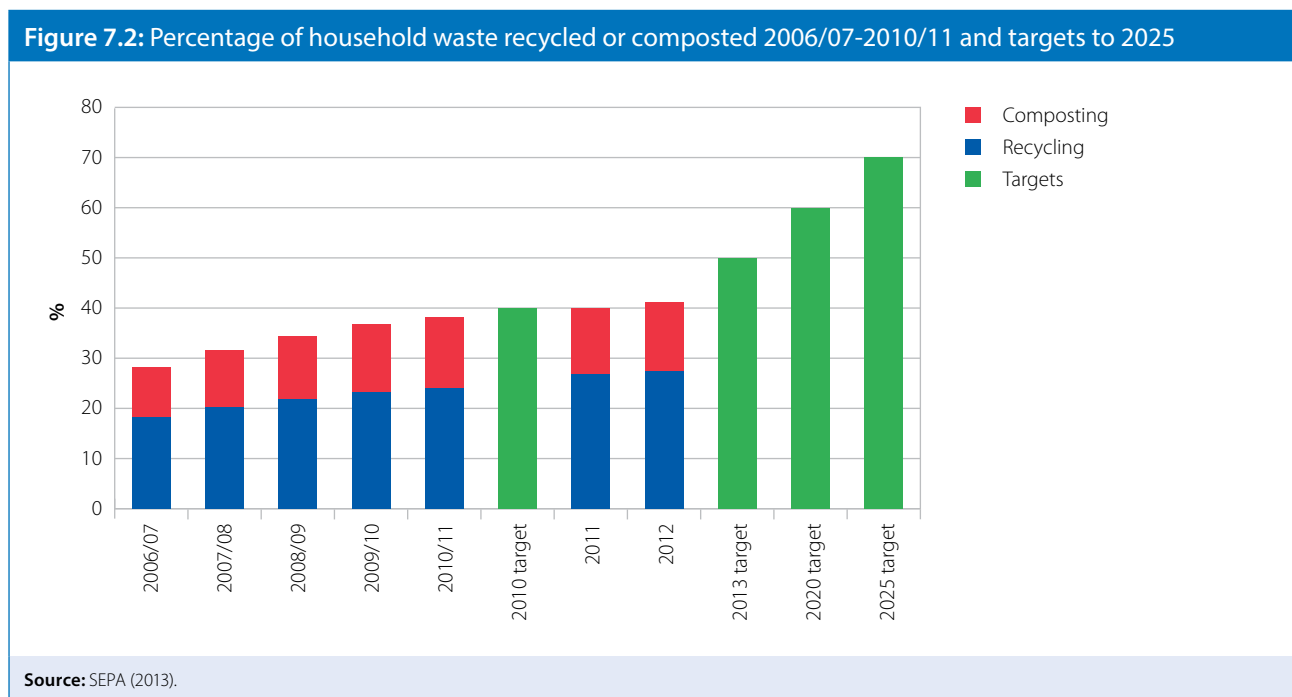
Progress towards the waste targets has been mixed:

- The latest figures for household waste show that Scotland missed the first Zero Waste Plan target for 2010, with 38% of household waste being composted, recycled or reused in 2010/11. The rate of composting/recycling/re-using increased slightly in 2011, to 40%, and again to 41% in 2012 (Figure 7.2), but this will still require a substantial improvement in during 2013 to make the second target of 50% in 2013.



- In terms of the target to reduce waste sent to landfill, the proportion of total waste arisings sent to landfill fell from 43% in 2004 to 27% in 2010. However, the proportion increased sharply to 35% in 2011 (Figure 7.3), although this was due to changes in how commercial and industrial waste data were calculated¹⁵. Total waste arisings in Scotland fell by 22% in 2011, to 13.2 million tonnes, but the amount of waste sent to landfill increased by 3% to 4.7 million tonnes.

Further effort will be needed to achieve Scotland’s ambitious waste targets. New recycling and food waste regulations for businesses and local authorities came into effect from January 2014, and these should help increase recycling rates in Scotland.



¹⁵ From 2011, data on waste arisings for the commercial and industrial sectors (relating to waste produced by businesses and excluding construction and demolition (C&D) waste) are based on SEPA regulatory data, using data from licensed/permitted site returns and exempt activities to provide estimates of arisings. Prior to this, data on wastes produced by businesses were collected by directly surveying businesses. A representative sample of businesses was surveyed in the years 2004 and 2006, and the data from these surveys were then extrapolated to produce estimates for 2005, 2007, 2008, 2009 and 2010.



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