

Greenhouse Gas Emissions

July 2013

Introduction

This briefing provides a summary of total greenhouse gas emissions to include the latest results for 2011. It examines total greenhouse gas emissions at Welsh and UK level over time and progress towards targets, using the production and end-user approaches. Information on performance in 2011 against the Welsh Government's target that greenhouse gas emissions within devolved competence should reduce by at least 3% per year compared to the 2006-10 baseline is due to be published in the Welsh Government's Climate Change Strategy for Wales Second Annual Progress Report in autumn 2013. It is therefore not included in this research note.

Greenhouse gas emissions targets

Figure 1 provides an overview of the targets the UK Government and the Welsh Government have set to reduce greenhouse gas emissions up to 2050. To obtain further information on the targets, click on the links within each box. In the diagram, CO₂e is carbon dioxide equivalent emissions from greenhouse gases (GHGs).

Figure 1: UK and Welsh Government greenhouse gas emission reduction targets up to 2050

UK Targets

<p>Kyoto Reduce the basket of six greenhouse gases by 12.5% compared to 1990 levels by 2008-2012</p>	<p>2020 CO₂e Target Reduce CO₂e emissions by at least 34% compared to 1990 levels by 2020</p>	<p>2050 CO₂e Target Reduce CO₂e emissions by 80% compared to 1990 levels by 2050</p>	<p>CO₂e Budgets for 2008-2012, 2013-2017, 2018-2022, and 2023-2027</p>
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Wales Targets

<p>Annual Targets from 2011 Annual reduction of 3% in CO₂e emissions, in areas of devolved competence</p>	<p>Annual Sectoral Targets Set minimum contribution to CO₂e emission reductions over a 10 year period</p>	<p>2020 Target Net CO₂e emissions reduced by at least 40% compared to 1990 levels</p>	<p>2050 Target Net CO₂e emissions reduced by at least 80% compared to 1990 levels</p>
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Source: [AEA Greenhouse Gas Inventories for England, Scotland, Wales and Northern Ireland: 1990-2011](#), page 3, June 2013; and Welsh Government, [Climate Change Strategy for Wales](#) page 34, October 2010 for Welsh targets.

Greenhouse gas emissions using the 'production' approach and performance against targets

The production approach calculates emissions according to where emissions are produced. This is relatively easy to calculate and allocate to national accounts. However, it does not account for products that are made elsewhere and imported. Progress against the targets outlined in this research note is measured using the production approach.

Total greenhouse gas emissions are made up of six gases; carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride.¹ Table 1 shows greenhouse gas emissions since the base year in Wales and the other UK nations using the production approach.

Table 1 shows that:

- **In 2011, total net greenhouse gas emissions in Wales were 43.8 Mega tonnes (Mt), and this has decreased by 2.5Mt between 2010 and 2011, a decrease of 5%.** The Welsh Government states that this was largely due to a decrease in residential sector emissions. The 2010 figures may have been higher than those for 2011 due to the cold winters at the start and end of 2010.²
- **In 2011 emissions in Wales were 20.6% lower than the base year (1990 or 1995).³**
- **In comparison with the other UK nations, Wales has reduced its emissions by 8.5 percentage points less than the UK average since the base year. Scotland and England have had larger percentage reductions in emissions than Wales, while Northern Ireland's reductions were lower.**

Table 1: Greenhouse gas emissions and percentage change from base year (1990 or 1995), Wales and the UK, 1995 to 2011 (Mt CO₂ e)

Year	Wales		England		Scotland		Northern Ireland		United Kingdom	
	Emissions (Mt)	Percentage change from base year	Emissions (Mt)	Percentage change from base year	Emissions (Mt)	Percentage change from base year	Emissions (Mt)	Percentage change from base year	Emissions (Mt)	Percentage change from base year
Base Year	55.3	..	609.7	..	70.5	..	24.0	..	774.3	..
1995	51.4	..	547.5	..	68.5	..	24.6	..	711.8	..
1998	53.1	-3.8	535.4	-12.2	67.5	-4.4	24.0	0.1	702.5	-9.3
1999	54.3	-1.7	506.3	-17.0	64.4	-8.7	24.4	1.5	671.2	-13.3
2000	56.2	1.7	506.3	-17.0	66.7	-5.5	24.1	0.1	674.0	-13.0
2001	53.0	-4.1	513.0	-15.9	65.9	-6.5	24.4	1.7	677.4	-12.5
2002	46.2	-16.4	504.2	-17.3	61.8	-12.3	22.2	-7.8	656.3	-15.2
2003	47.2	-14.5	512.0	-16.0	61.2	-13.2	22.1	-8.0	663.1	-14.4
2004	50.9	-7.9	510.1	-16.3	58.8	-16.7	22.0	-8.5	661.8	-14.5
2005	48.7	-11.8	506.6	-16.9	57.8	-18.1	22.8	-5.1	655.3	-15.4
2006	50.2	-9.1	498.6	-18.2	60.9	-13.6	23.1	-3.8	651.2	-15.9
2007	47.2	-14.6	497.0	-18.5	56.5	-19.9	21.8	-9.4	640.3	-17.3
2008	49.1	-11.1	483.2	-20.8	55.2	-21.8	21.7	-9.7	626.1	-19.1
2009	42.8	-22.5	441.3	-27.6	51.4	-27.1	20.1	-16.5	572.6	-26.1
2010	46.4	-16.1	451.3	-26.0	54.5	-22.7	20.9	-12.8	590.0	-23.8
2011	43.8	-20.6	421.4	-30.9	48.8	-30.8	19.8	-17.5	549.1	-29.1

Source: AEA, **Greenhouse Gas Inventories for England, Scotland, Wales and Northern Ireland: 1990-2011: Devolved Administration GHG Inventory Pivot Tables**, (By-source tabs) June 2013

Note: Emissions from international aviation and shipping are excluded from the figures for Scotland so that they are comparable with the figures for the other devolved nations, which do not include these emissions. This has also been done in the AEA report.

¹ AEA, **Greenhouse Gas Inventories for England, Scotland, Wales and Northern Ireland: 1990-2011**, page iv, June 2013 [accessed 21 June 2013]

² Welsh Government, **Devolved administration greenhouse gas inventories, 1990-2011**, 7 June 2013 [accessed 21 June 2013]

³ Under the Kyoto Protocol, Annex 1 parties are able to use 1990 or 1995 as the base year for emissions of hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride, and a number of parties, including the United Kingdom and devolved nations, use 1995.

Figures 2 and 3 shows the trend of greenhouse gas emissions in Wales in comparison with the UK trend and the trend lines to achieve Welsh and UK Government targets by 2020. It can be seen from figures 2 and 3 that:

- **To reach the Welsh Government’s 2020 target of reducing greenhouse gas emissions by 40% below the base year, emissions in Wales will need to be reduced by a further 19.4 percentage points over the next nine years.**

To reach the UK Government’s 2020 target of reducing greenhouse gas emissions by 34% below the base year, emissions across the UK will need to be reduced by a further 4.9 percentage points over the next nine years. For Welsh greenhouse emissions to reduce by an equivalent amount needed to achieve the UK target, they will need to be reduced by a further 13.4 percentage points over the next nine years.

Figure 2: Trends in total net greenhouse gas emissions against Welsh Government 2020 target from 1990 to 2011, (against base year) Wales (a)

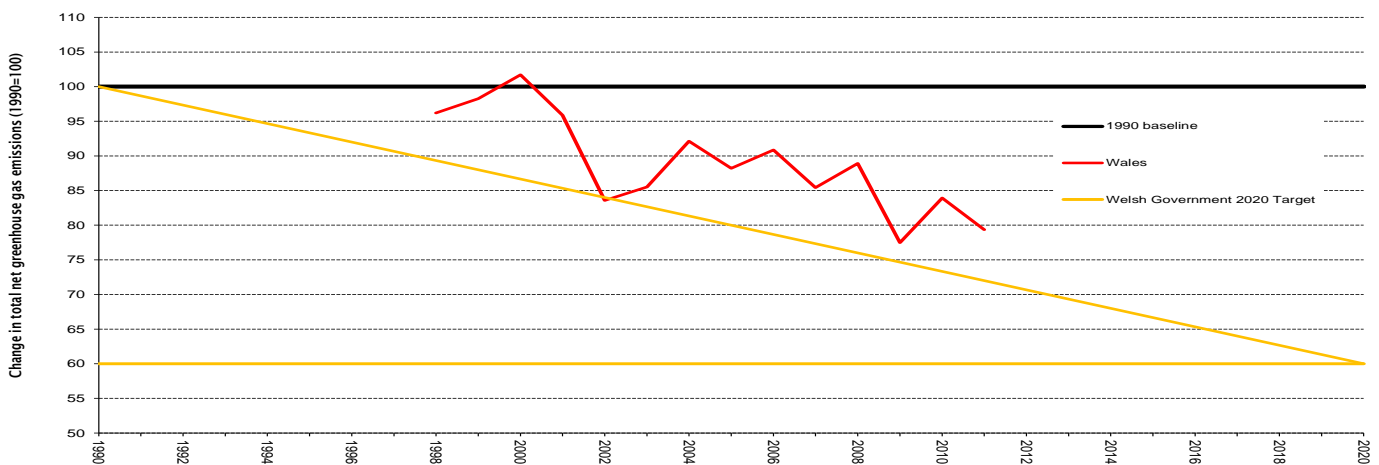
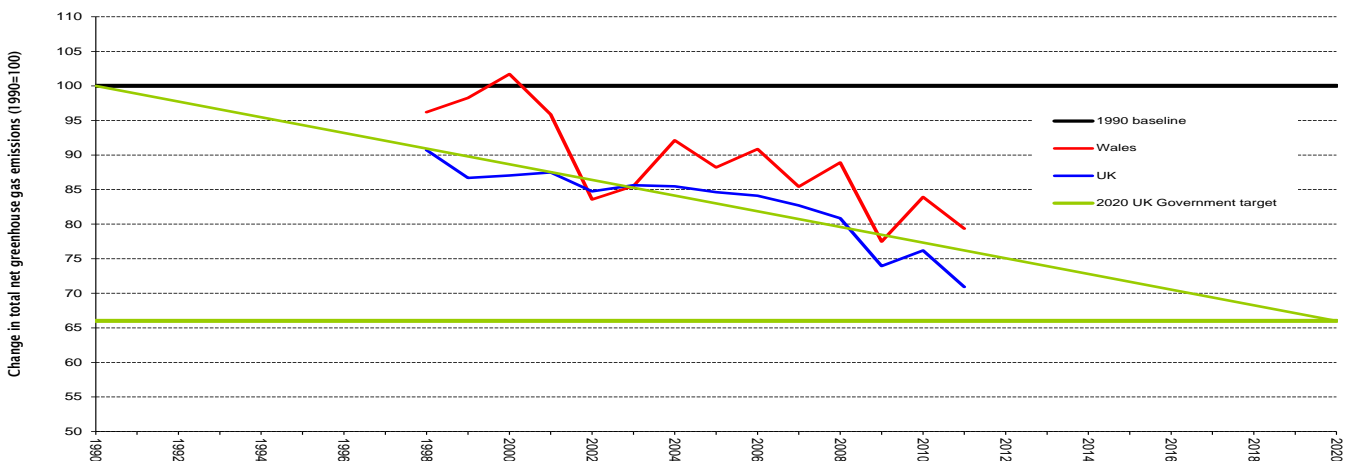


Figure 3: Trends in total net greenhouse gas emissions against UK Government 2020 target from 1990 to 2011, (against base year) Wales and UK (a)



Source for both graphs: AEA, *Greenhouse Gas Inventories for England, Scotland, Wales and Northern Ireland: 1990-2011*, June 2013

Note:

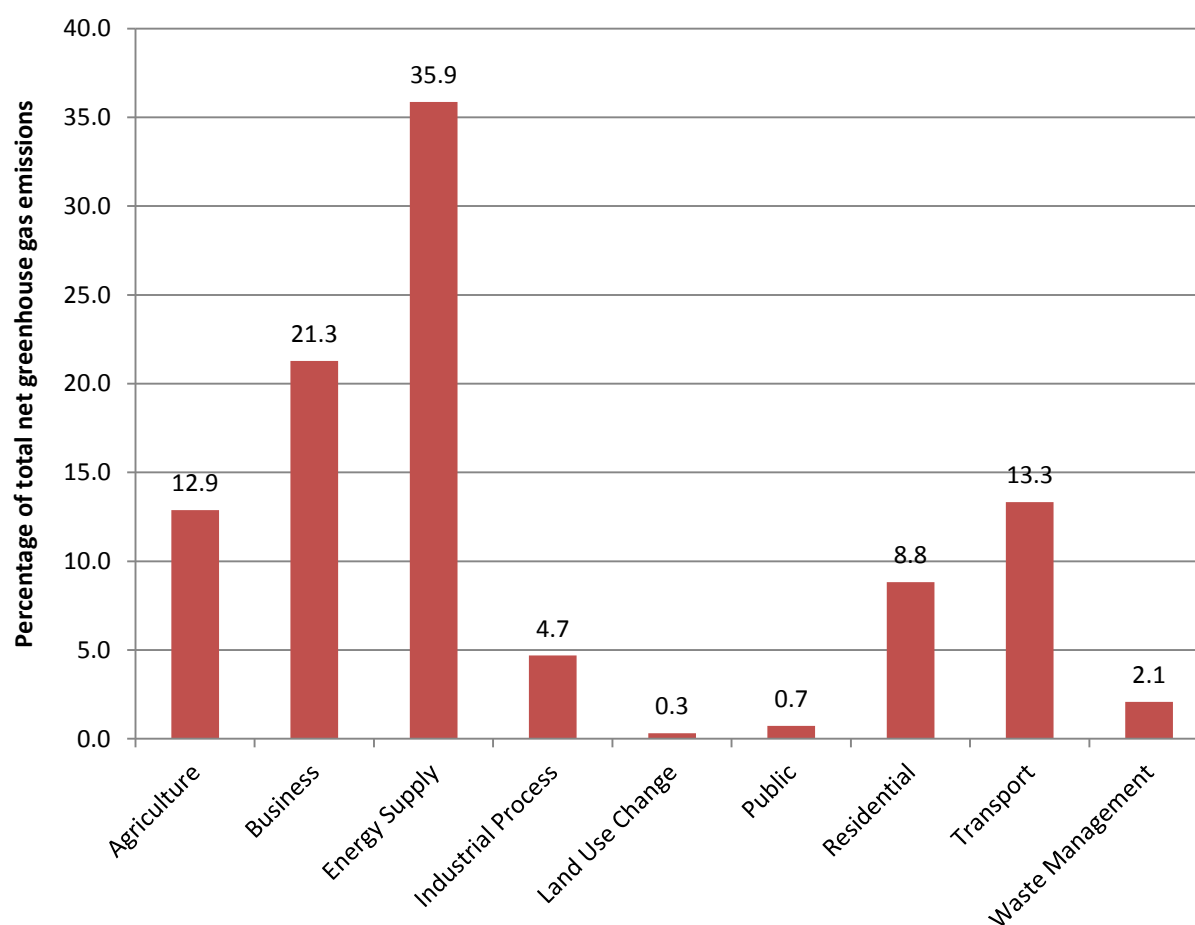
- (a) For figures prior to 1998, data is only available for 1990 and 1995; therefore these years have not been included on the trend lines.

Greenhouse gas emissions by sector in Wales using the 'production' approach

Figure 4 shows total net greenhouse gas emissions in Wales in 2011 broken down by sector.

- In 2011 the energy supply sector produced most greenhouse gas emissions of any sector, 36% of all Welsh greenhouse gas emissions. The main sources of emissions in the energy sector were electricity production at power stations and refinery emissions.⁴
- Other sectors which produced over 10% of Welsh greenhouse gas emissions in 2011 were **business**, **transport** and **agriculture**.

Figure 4: Total net greenhouse gas emissions by sector, 2011 (per cent)



Source: AEA, [Greenhouse Gas Inventories for England, Scotland, Wales and Northern Ireland: 1990-2011: Devolved Administration GHG Inventory Pivot Tables](#), (By-source Wales tab) June 2013 and Research Service calculations

⁴ AEA, [Greenhouse Gas Inventories for England, Scotland, Wales and Northern Ireland: 1990-2011](#), page 70, June 2013 [accessed 21 June 2013]

Greenhouse gas emissions under the 'end-user' approach

The end-user approach calculates emissions according to where the product of those emissions is consumed. This accounts for all the emissions associated with the consumption of energy, rather than those associated with the geographical location of where energy production takes place. Non-energy production emissions are still counted at the place of production. The figures shown below **exclude exports outside the UK**.

Table 2: End-user greenhouse gas emissions excluding exports and percentage change from base year (1990 or 1995), Wales and the other UK countries, 1990 to 2011 (Mt CO₂ e)

Year	Wales		England		Scotland		Northern Ireland		United Kingdom	
	Emissions (Mt)	Percentage change from base year	Emissions (Mt)	Percentage change from base year	Emissions (Mt)	Percentage change from base year	Emissions (Mt)	Percentage change from base year	Emissions (Mt)	Percentage change from base year
1990	54.7	..	607.7	..	74.7	..	24.9	..	771.1	..
2003	45.5	-16.9	521.7	-14.1	57.9	-22.4	23.5	-5.4	663.1	-14.0
2004	46.0	-16.0	519.8	-14.5	56.8	-23.9	23.6	-4.9	661.8	-14.2
2005	43.7	-20.1	515.3	-15.2	57.1	-23.5	24.1	-3.0	655.3	-15.0
2006	44.4	-18.9	512.0	-15.7	56.2	-24.8	24.4	-1.9	651.2	-15.5
2007	43.3	-20.8	504.1	-17.0	54.3	-27.3	23.9	-4.1	640.3	-17.0
2008	41.9	-23.4	492.3	-19.0	54.5	-27.0	22.7	-8.5	626.1	-18.8
2009	37.0	-32.3	448.0	-26.3	50.3	-32.6	22.1	-11.2	572.6	-25.8
2010	40.6	-25.8	459.0	-24.5	52.0	-30.3	22.7	-8.6	590.0	-23.5
2011	38.1	-30.3	426.3	-29.8	47.9	-35.9	21.2	-14.6	549.1	-28.8

Source: AEA, [Greenhouse Gas Inventories for England, Scotland, Wales and Northern Ireland: 1990-2011: Devolved Administration GHG Inventory Pivot Tables](#), (End User tab) June 2013 and Research Service calculations

It can be seen from table 2 that:

- **In 2011, end-user greenhouse gas emissions in Wales were 38.1 Mt, which is a decrease of 30.3% since 1990.**
- Since 1990, emissions in Wales using the end-user approach have decreased by a greater percentage than England and Northern Ireland, but less than Scotland.

Wales has lower end-user emissions than production emissions. In 2011 end-user emissions were 13% lower than emissions measured using the production approach.⁵ This is because Wales is a net exporter of electricity to England

⁵ AEA, [Greenhouse Gas Inventories for England, Scotland, Wales and Northern Ireland: 1990-2011](#), page xi, June 2013 [accessed 21 June 2013]

Further information

For further information on greenhouse gas emissions statistics please contact **Gareth Thomas** (GarethDavid.Thomas@Wales.gov.uk), Research Service.

See also:

- AEA, **Greenhouse Gas Inventories for England, Scotland, Wales and Northern Ireland: 1990-2011**
- Welsh Government, **Climate Change Strategy for Wales**
- Welsh Government, **Climate Change Strategy for Wales: First Annual Progress Report**

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