Chapter 8

A. Wider economic and social considerations
B. Differences in national circumstances
C. Key findings

Chapter 8: Wider economic and social considerations and differences in national circumstances

Introduction and key messages

In this chapter we set out our analysis of impacts from meeting the fourth budget. We consider the range of impacts listed in the Climate Change Act in two sections:

A. Wider economic and social considerations, including impacts for competitiveness, the fiscal balance, security of supply and fuel poverty

B. Differences in circumstances across the devolved administrations

We considered these aspects in detail in our 2008 report, where we concluded that the various risks could be mitigated through appropriate policy tools.

In this report we update our earlier analysis and consider high level impacts through the 2020s. We reach a similar set of conclusions to those in our 2008 report.

Our key messages are:

- **Competitiveness impacts** are currently mainly addressed through issuing of free allowances in the EU ETS. Competitiveness risks in the 2020s will depend on a future international agreement, and the extent to which this results in binding carbon constraints and equal carbon prices for competing firms. Where competitiveness concerns remain, these could be addressed through sectoral agreements or border levelling.
- **Fiscal impacts:** In the period to 2030 fiscal rebalancing will be needed to maintain both incentives and revenues; absent rebalancing, fiscal impacts from meeting the fourth carbon budget are likely to be small and manageable.
- **Security of supply** risks due to increasing levels of intermittent power generation through the 2020s can be managed through a range of flexibility options including demand side response, increased interconnection and flexible generation. Decarbonisation of the economy will reduce the reliance on fossil fuels through the 2020s and thus help mitigate any geopolitical risks of fuel supply interruption and price volatility.
- **Fuel poverty** is currently a problem which should be addressed through targeted energy efficiency improvement and other instruments such as social tariffs. The impact of meeting the first three carbon budgets on fuel poverty is broadly neutral, given the offsetting effects of energy efficiency improvements and rising energy prices. Measures to meet carbon budgets in the 2020s can help to address fuel poverty in some cases (e.g. solid wall insulation and low carbon heat) and need not exacerbate it (e.g. if power sector decarbonisation takes place within a framework of new market arrangements).

- **Devolved administrations.** Significant abatement opportunities exist at the national level across all of the key options (i.e. renewable electricity, energy efficiency, low carbon heat, more carbon efficient vehicles, agriculture and land use). We project scope to reduce direct emissions in the devolved administrations by around 48% in Scotland, 36% Wales and 49% in Northern Ireland given active policy support from the national governments.

A. Wider economic and social considerations

We now consider the following wider economic and social impacts of meeting the fourth carbon budget and driving down emissions through the 2020s:

1. Competitiveness impacts
2. Impacts for the fiscal balance
3. Security of supply impacts
4. Fuel poverty impacts

1. Competitiveness impacts

Recap of our 2008 report

Competitiveness impacts are a potential issue where energy-intensive firms subject to a carbon price compete in global markets with firms not subject to a carbon price. In this situation profits could be eroded, and at the extreme, production may relocate to regions with weaker emission constraints (i.e. emissions would leak from the UK, staying at the same level or increasing internationally).

In our 2008 report we presented detailed analysis of potential competitiveness impacts for meeting UK carbon budgets in the context of the EU's 2020 package. This showed that there are risks of leakage for a limited number of sectors subject to a combination of a high energy cost share within total costs and significant exposure to international trade, and accounting for less than 1% of GDP. The impacts of leakage could be pronounced in certain areas with significant impacts for the local economy (e.g. iron and steel in Wales).

We considered three key levers for mitigating competitiveness risks:

- **Global sectoral agreements:** bringing all firms within a specific sector into a global agreement.
- **Free allocation of emission allowances:** issuing of free allowances to energy intensive firms within the EU ETS.
- **Border levelling:** introduction of border tariff adjustments reflecting the carbon content of imported or exported goods, in order to levelise carbon costs across regions.

We argued that a global agreement is the first-best solution and border levelling is in principle relatively attractive given perverse consequences from free allowance allocation. However, for practical purposes the EU have decided to grant free allowances. Whilst not ideal, the EU approach should mitigate competitiveness impacts for firms in the EU ETS in the period to 2020.

Competitiveness impacts in the 2020s

A rising carbon price through the 2020s would increase costs, particularly for energy-intensive firms, and could increase competitiveness risks if firms in other countries are not subject to the same carbon price.

The extent to which there will be a uniform carbon price facing all competing firms will depend on the nature of a future international deal and the way in which carbon markets develop:

- Where all countries are subject to emissions reduction targets, and where these translate to binding caps and/or carbon prices at the industry level, firms in all regions would be subject to carbon prices and competitiveness risks would therefore be minimised.
- Full mitigation of competitiveness risks would require integration of regional carbon markets or similar carbon constraints across countries such that there is uniform global carbon price.

At the moment there is a great deal of uncertainty of the nature of an international deal for the 2020s, both as regards the global pathway and financing arrangements for emissions reductions to deliver this pathway (see chapter 2).

Where a future deal results in caps for some but not all countries and/or where regional carbon markets are not integrated, the same options for mitigating competitiveness risks in the period to 2020 would be available in the 2020s (i.e. sectoral agreements, free allocation of allowances, border levelling). Given these options, any competitiveness issues could be addressed and do not provide a rationale against legislating an ambitious fourth carbon budget.

Going forward, we will monitor developments in the international framework as part of annual progress reports to Parliament, and will consider how emerging carbon markets and emissions reduction targets may impact on UK competitiveness in the context of carbon budgets.

2. Impacts for the fiscal balance

Recap of our 2008 report

In our 2008 report we focused on the most significant fiscal impacts, both positive and negative, likely to arise as a direct result of the policies used to pursue carbon budgets in the period to 2020:

- Positive impacts on the fiscal balance included increased revenues from auctioning of EU ETS allowances.
- Negative impacts included likely reductions in revenue from transport (fuel duty and Vehicle Excise Duty) and purchase of offset credits.

- The net impact could be either positive or negative depending on how EU ETS auctioning progresses.

Overall, we concluded that any net negative impacts would be of a small order of magnitude relative to the total fiscal envelope and would therefore be manageable.

Fiscal impacts of meeting the fourth carbon budget

We have extended the analysis in our 2008 report to cover emissions scenarios for the 2020s and have focused on the most significant likely fiscal impacts. Additional impacts on the fiscal balance may arise from a range of policies which we have not addressed in detail due to uncertainties in policy design going forward (e.g. the Carbon Reduction Commitment (CRC), Green Investment Bank, and/or any additional instruments required in aviation). Our approach is based on the current fiscal framework; we show that the order of magnitude of any negative impact on the fiscal balance is likely to be small relative to total revenues. This should be manageable particularly given scope for significant rebalancing over the next two decades to maintain revenues.

EU ETS revenues

Revenues will increase over the next decade as the proportion of EU ETS allowances auctioned increases. By 2020 UK revenues under the EU 20% package could be £2 billion to £3.5 billion, with the upper figure representing full auctioning of the UK's allowance allocation and the lower if 40% were allocated for free in line with current plans[1].

Going beyond 2020, there are three revenue drivers:

- Revenues will increase as the proportion of auctioning increases (assuming that this is not 100% by 2020).
- Revenues will fall as the EU ETS cap tightens. At a minimum under current EU ETS legislation (20% package) the cap will continue to tighten through the 2020s on a straight line from the path to 2020, although a more stringent cap is likely to be required (see chapter 2, Box 2.3).
- The price of carbon will increase (e.g. we assume to a global price of £70/tCO_2 in 2030, see chapter 2).

Assuming the EU ETS cap is tightened (i.e. consistent with a 30% package and further reductions thereafter), we estimate that the combination of these factors could result in annual EU ETS revenues for the UK of £3 billion to £8.5 billion by 2030[2]. This range reflects the potential cap in 2030 (see chapter 2, Box 2.3) and the proportion of auctioned allowances, with the lower figure reflecting auctioning levels in 2020 and the higher figure reflecting full auctioning. The introduction of a carbon price underpin (chapter 2) would strengthen confidence and provide a lower bound for these revenue streams going forward.

1 The European Commission is currently finalising their plans for free allocation. This is an indicative figure based on historical shares of emissions and assuming 100% auctioning in the power sector.

2 This reflects direct revenues, assuming the UK's share of EU ETS allowances is around 10%. Actual revenues to the Exchequer would be lower to the extent that businesses eligible to pay Corporation Tax treat their allowances as a tax deductible expense.

Transport revenues

Currently, annual fuel duty and VED receipts are around £26 billion and £6 billion respectively. Fuel duty accounts for 5% of total tax receipts and VED 1%.

Under an unchanged fiscal regime, meeting the fourth carbon budget in the way that we have recommended would result in reduced revenues due to improved efficiency of conventional vehicles and increased penetration of electric vehicles in the 2020s (see chapter 4):

- Average fleet efficiency would improve
  - from 135g/km in 2020 to 91g/km in 2030 for conventional and plug-in hybrid cars
  - from 180g/km in 2020 to 126g/km in 2030 for conventional and plug-in hybrid vans
- Electric and plug-in hybrid penetration of the fleet would increase to 31% (cars) and 29% (vans) by 2030, of which only plug-in hybrids would pay fuel duty, and this only on longer journeys.

The total revenue impact of these changes would be up to around £10 billion:

- Fuel duty revenues would fall by up to £3 billion in 2030 relative to our reference emissions projection (see chapter 4).
- VED revenues would fall very substantially by 2030 since almost all new cars, as well as the fleet average, would be more efficient than the current threshold for zero rating; the total impact could be up to £7 billion. However, this could be offset by adjusting VED banding in line with vehicle efficiency improvement.

These effects illustrate the need for fiscal rebalancing in the period to 2030. Given that UK roads are likely to become increasingly congested over time, one option which should be seriously considered is the introduction of road pricing, which would have environmental, economic and fiscal benefits (see our 2009 Progress Report).

If road pricing is to be introduced, our analysis suggests that this should be in addition to, and not instead of, fuel duty. The reason for this is that early reduction of fuel duty would encourage increased travelling and emissions which would more than offset the environmental benefits of road pricing. In addition, reduction of fuel duty would also undermine incentives for purchase of electric cars.

Credit purchase

Under our Global Offer budget (chapter 3), provision is made for the purchase of up to 35 MtCO_2 credits by the Government in order to meet the difference from the Domestic Action budget. At a price of £45/tCO_2 this would represent an exposure to the Exchequer of up to around £2 billion in 2025.

Overall fiscal impact in the fourth budget period

Under the current fiscal framework by 2030 the net impact would be negative, with revenue reductions from the transport sector and the cost of credit purchase outweighing increased revenues from EU ETS auctioning.

The order of magnitude of any negative fiscal impacts through the 2020s relative to total revenues is likely to be small (e.g. 1% to 2%) and with adjusted VED banding and full auctioning of EU ETS allowances impacts could be broadly neutral or even positive.

To the extent that further rebalancing is necessary or desirable in the 2020s (e.g. the Government has committed to increase the proportion of tax revenue accounted for by environmental taxes), key options for consideration should include a carbon price underpin, new/revised taxes to reduce aviation emissions, and congestion charging to reduce road emissions.

3. Impacts on security of supply

Carbon budgets will have an impact on two aspects of security of supply:

- Technical security of supply (or reliability) – the degree of certainty that energy supply will be available immediately when consumers want it. This is mainly an issue in the power sector.
- Geopolitical and economic security of supply – the extent to which the UK can be free of reliance on sources of energy which are geopolitically insecure or inherently and harmfully volatile in price. This is an issue in power, heat and transport.

Technical security of supply

Reducing emissions in the 2020s will increase the challenges for maintaining technical security of supply in the power sector:

- The challenge of balancing supply and demand at each point in time will increase as more intermittent wind generation is on the system – wind is variable, volatile and difficult to forecast.
- Low-carbon plant such as nuclear and CCS are less economically and technically flexible than conventional plant, and thus less able to respond to fluctuations in intermittent generation and demand.
- Electrification of heat will increase the variability, seasonality and peakiness of electricity demand.

However, analysis we commissioned from Pöyry Energy Consulting suggests that technical security of supply can be maintained in a radically decarbonised power system in 2030, while ensuring costs of power sector decarbonisation do not rise above 0.4% of GDP, through a range of flexibility options such as measures to facilitate demand-side response, increased interconnection or flexible generation.

To ensure that technical security of supply is not compromised it will be important to accompany increased investment in low-carbon generation with the following measures:

- The planned roll-out of smart grids and smart meters, which will help to effectively engage opportunities on the demand side.
- New electricity market arrangements which facilitate investment in options for flexibility.
- It will also be important to ensure that the transition to new market arrangements is managed in a way that ensures that an investment hiatus does not occur during the transitional period as new arrangements are introduced in the early 2010s.

Geopolitical security of supply

Concerns about geopolitical security of supply may ease somewhat depending on whether large supplies of shale gas come to market in the next years.

Where security of supply remains a concern, this would be addressed through emissions reductions in the 2020s reducing the need for imported fossil fuels:

- Increased electrification in the context of a decarbonised power sector and energy efficiency improvements will reduce reliance on fossil fuels in the transport and heat sectors.
- Low-carbon technologies in the power sector will reduce reliance on fossil fuels, and a diverse mix of low-carbon technologies in the power sector will protect against increases in costs or technical difficulties with any one technology. The same is true of biomass and biogas in industry.
- Electricity market reform can shield consumers from electricity price fluctuations, which otherwise would be driven by volatile gas and carbon prices.

4. Impacts on fuel poverty

Fuel poverty drivers

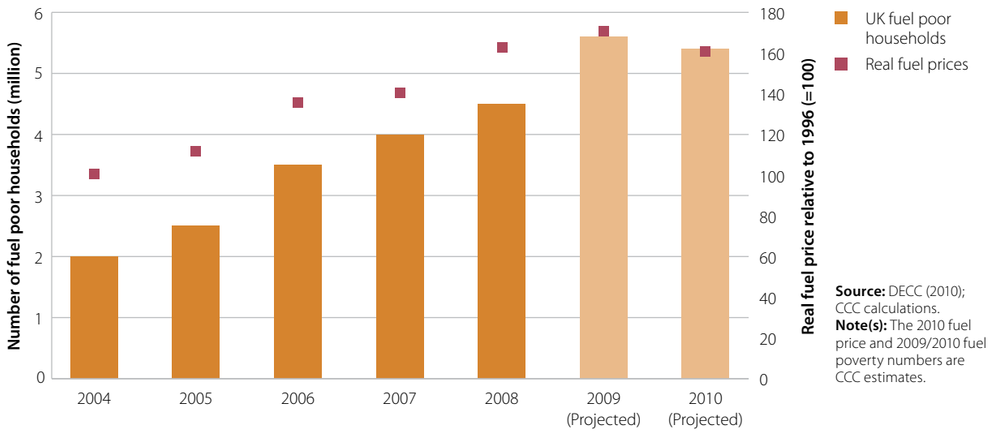
Fuel poverty is driven by levels of energy prices, energy consumption, energy efficiency and household income. Therefore, the fuel poverty impacts from meeting carbon budgets work in two offsetting ways:

- Fuel poverty increases due to higher energy prices to support low carbon power generation.
- Fuel poverty is mitigated by support for energy efficiency measures (e.g. loft and cavity wall insulation) and potentially also by the deployment of low carbon heat.

Fuel poverty to 2020

In our 2008 report, we suggested that higher energy prices in 2020 were broadly offset by energy efficiency improvements such that there would be a similar number (3.5 million, based

Figure 8.1: Fuel poverty and fuel prices (2004-2010)



Source: DECC (2010); CCC calculations.
Note(s): The 2010 fuel price and 2009/2010 fuel poverty numbers are CCC estimates.

on the Government's estimates for 2006) of households in fuel poverty at the end of the third budget period as before the first budget period.

Since the publication of the 2008 report, rising energy prices have resulted in a significant increase in the number of fuel poor. The Government's most recent estimate is that there were 4.5 million fuel poor households in 2008, with a projection that this is likely to have risen to 5.4 million in 2010 (Figure 8.1), and with more pronounced fuel poverty in the devolved administrations (Box 8.1).

Box 8.1 Regional variations in fuel poverty

A household is said to be in fuel poverty if it needs to spend more than 10 per cent of its income on fuel to maintain an adequate level of warmth. Fuel poverty is modelled on DECC energy prices data and housing condition surveys in the four nations. While England, Wales and Northern Ireland use broadly similar methodologies, Scotland uses a more stringent interpretation of a satisfactory heating regime for pensioners, the long-term sick and the disabled.

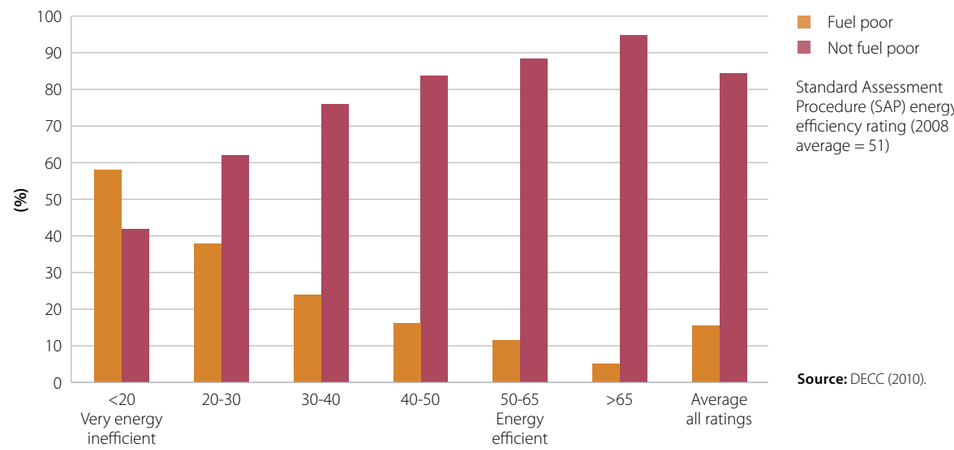
Latest estimates of numbers in fuel poverty are:

UK	Scotland	Wales	Northern Ireland
15.6% (2008)	33% (2008)	26% (2008)	34.2% (2006)

There are a number of regional variances in the factors that drive fuel poverty, in particular household income and connection to the gas grid:

- **Household income:** on average, gross disposable annual household income per head in Scotland (£14,301), Wales (£13,073) and Northern Ireland (£13,260) is below the UK average (£14,872)
- **Off-gas properties:** The devolved administrations have higher proportions of properties that are off the gas grid and thus are generally more expensive to heat. While in England only 9% of properties have no gas connection, in Northern Ireland around 75% are off-grid, while in Scotland and Wales the figures are 21% and 16% respectively.

Figure 8.2: Percentage of fuel poor versus non-fuel poor households and energy efficiency of housing England, 2010)



Source: DECC (2010).

Going forward, gas and electricity prices to 2020 are expected to rise faster than in our 2008 report, and household income growth is likely to be lower than previously envisaged. Therefore the number of fuel poor at the end of the third budget period is likely to be significantly higher than we projected in 2008, although not as a consequence of meeting carbon budgets.

This issue can and should be addressed through energy efficiency improvements and other measures, such as social tariffs and income transfers (e.g. winter fuel payments). In this respect, while the 2010 Spending Review cut the budget of the main energy efficiency programme for the fuel poor in England (Warmfront) by two-thirds, the Government also announced a new mandatory social price support and a new Supplier Obligation to provide fuel poverty mitigation from 2013.

Fuel poverty impacts of meeting the fourth carbon budget

Through the 2020s there are opportunities for meeting carbon budgets that at the same time can help ease fuel poverty, through measures to reduce energy bills and low carbon heat:

- **Energy efficiency improvement.** Improving the insulation of older, especially solid-walled, properties through the 2020s could significantly benefit fuel poor households.
  - There are higher levels of fuel poverty among those living in poorly insulated properties (e.g. in England 40% of the fuel poor live in houses with an energy efficiency rating below 40 (Figure 8.2). Typically this means solid walls, single glazing and no gas boiler).
  - A recent report[3] for Peabody Housing Association suggests that at current energy prices, solid wall insulation can reduce the prevalence of fuel poverty by about 50%.

3 http://www.peabody.org.uk/media/7071502/peabody_carbon_reportoct09.pdf

  - In our Medium Abatement scenario we assume that almost half of all solid-walled properties will be insulated by 2030.
  - Targeted support mechanisms for fuel poor households will be necessary to allow them to take up solid wall insulation which has high upfront costs.
- **Electricity market arrangements.** New arrangements to reduce the risks (and therefore costs) of low carbon plant and to break the link between rising carbon prices and electricity prices would limit the fuel poverty impacts of power sector decarbonisation through the 2020s (see chapter 6). Without such new arrangements, electricity prices would rise through the 2020s in line with a carbon price increasing to £70/tCO_2, with additional price increases to cover the costs of low carbon generation.
- **Low carbon heat.** We envisage significant penetration of low carbon heat through the 2020s, with the possibility of investment in district heating (see chapter 5). Given rising fossil fuel prices, low carbon heat options and district heating can offer cost savings relative to conventional gas or oil boilers:
  - Low carbon heat options are particularly cost-effective in off-grid homes, primarily in rural areas. These homes have a higher incidence of fuel poverty (e.g. in England 25% of rural households are fuel poor). Our analysis suggests that up to half of off-grid homes could have their heat demand met by low carbon heat options such as heat pumps and biomass boilers.
  - However, running costs (in particular for heat pumps) depend on correct sizing, installation and efficient operation. Complementary measures such as post-installation technical support are thus particularly important for fuel poor homes to ensure cost savings.
  - While low carbon heat will be cost-effective from a social perspective, low income homes are likely to require financial support to cover capital costs which will remain higher than for conventional boilers.

Therefore fuel poverty programmes which include targeted mechanisms for energy efficiency and low carbon heat, together with ongoing social tariffs/income transfers should mitigate any incremental fuel poverty impacts from meeting carbon budgets through the 2020s.

B. Differences in national circumstances

Our approach to assessing differences in national circumstances through the 2020s involves three steps:

1. Derive a reference emissions projection to 2030 for each of the devolved administrations that takes into account, as far as possible, differences in current and projected trends across the devolved administrations.

2. Present the results of analysis carried out for the 2020s and the period of the fourth budget on abatement opportunities across a range of sectors, highlighting where particular opportunities and challenges exist for the devolved administrations.

3. Put these together to provide indicative scenarios for the 2020s.

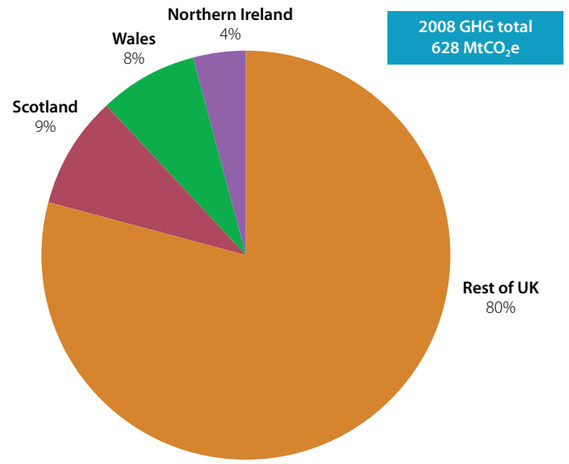
1. Current and projected emissions

Current emissions

The latest greenhouse gas inventory for the devolved administrations is for 2008 and shows higher shares of emissions relative to population and GDP shares (Figure 8.3):

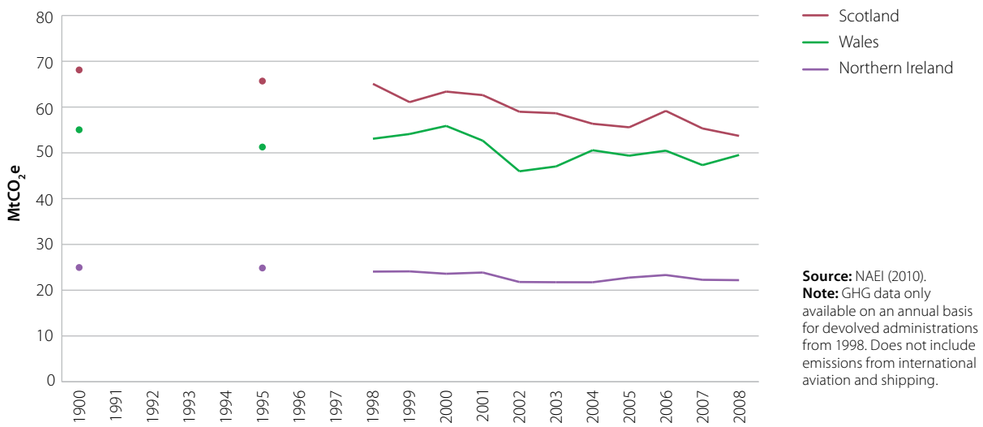
- Emissions in Scotland of 53.7 MtCO_2e account for around 9% of total UK emissions, relative to the Scottish share in UK population of around 8% and in UK GDP of around 8%.
- Emissions in Wales of 49.5 MtCO_2e account for around 8% of total UK emissions, relative to the Welsh share in UK population of around 5% and in UK GDP of around 4%.

Figure 8.3: Greenhouse gas emissions in the devolved administrations as proportion of UK total (2008)



Source: NAEI (2010).
Note: Does not include international aviation and shipping emissions.

Figure 8.4: Greenhouse gas emissions from 1990 to 2008, Scotland, Wales and Northern Ireland



Source: NAEI (2010).
Note: GHG data only available on an annual basis for devolved administrations from 1998. Does not include emissions from international aviation and shipping.

- Emissions in Northern Ireland of 22.2 $MtCO_2e$ account for around 4% of total UK emissions, relative to the Northern Irish share in UK population of around 3% and in UK GDP of around 2%.

Emissions trends since 1990 vary between the devolved administrations (Figure 8.4):

- Emissions have fallen since 1990 by 21% in Scotland, 10% in Wales and 11% in Northern Ireland.
- Over the last 5 years to 2008, emissions have fallen by an average of 1% in Scotland and 0.4% in both Wales and Northern Ireland each year over that period.
- The latest year of data available for the devolved administrations is for 2008 (showing falls of 2.9% in Scotland and 0.4% in Northern Ireland, and a rise of 4.7% in Wales due mainly to a coal-fired power station coming back on to the system). Therefore it is not yet possible to assess the full impact of the recession in 2009 as we did for the UK as a whole (where emissions fell 8.6% in 2009). However, 2009 macroeconomic data for the devolved administrations suggests similar falls in emissions will have occurred.

Projected emissions to 2020

Under our Extended Ambition scenario, emissions in the devolved administrations fall 21% in Scotland, 13% in Wales and 27% in Northern Ireland by 2020 from 2008 levels (Box 8.2 and Figure 8.5).

Box 8.2 Deriving emissions projections for the devolved administrations

Our methodology follows that of our 2008 report:

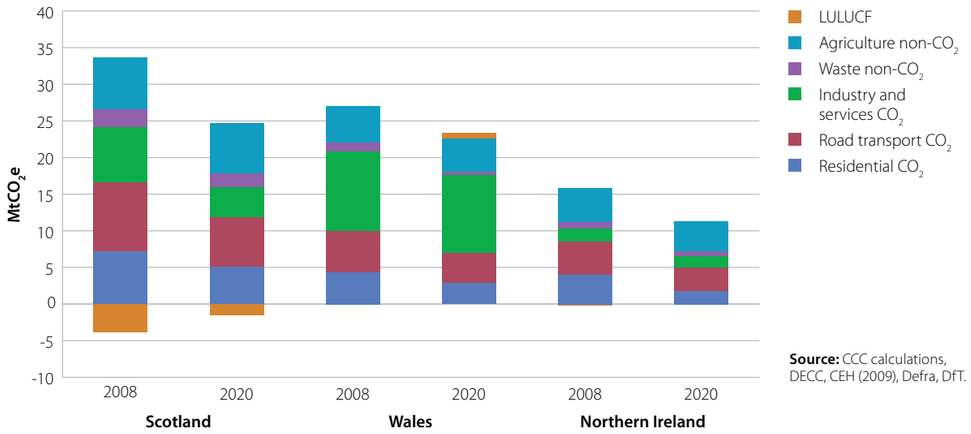
- Residential and industry and services CO_2 emissions are derived from the DECC Energy Model forecasts of UK energy demand using nation-specific fuel consumption shares and forecast trends in number of households and economic circumstances across each nation.
- This does not account for potential future variations in demand for energy or varying shares of abatement that may be achieved in the devolved nations (for example through nation specific implementation of measures to reduce carbon intensive energy consumption), or in the fuel mix (for example if the gas grid was extended in Northern Ireland).
- Road transport (cars, vans, HGVs and buses) emissions projections are produced from the DfT National Transport Model for Scotland and Wales, while Northern Ireland's are emissions estimated on the basis of road transport fuel consumption.
- Emissions from land use, land use change and forestry are produced separately for each UK nation by the Centre for Ecology & Hydrology, currently projected to 2020.
- Projections for non- CO_2 gases are published separately for the devolved administrations (latest published October 2009). These are currently published to 2025, therefore we have assumed a flat trend thereafter to 2030.

Estimates of abatement potential from detailed sector models are netted from these reference projections. These emissions projections exclude the power sector, industrial process, and transport sectors other than road.

There is a similar pattern of abatement potential in devolved administrations as in the UK, but with the following key differences:

- Residential sector emissions could fall by around a third in Scotland and Wales and by up to half in Northern Ireland compared to just over a quarter in the UK as a whole
- The combination of a high share of energy intensive industries combined with limited abatement potential is reflected in the lower overall projected fall in Wales' emissions to 2020
- Agriculture abatement is more pronounced, given the higher share of agriculture emissions in devolved nations.

Figure 8.5: Devolved administration reference emissions in the Extended Ambition scenario to 2020



Source: CCC calculations, DECC, CEH (2009), Defra, DfT.

The actual entry point to the 2020s will in part depend on the actions and policies developed towards meeting devolved administration targets covering this period (Box 8.3).

Box 8.3 Devolved Administration emissions reductions targets to 2020

Each of the devolved nations has set their own targets for emissions reductions over the next decade:

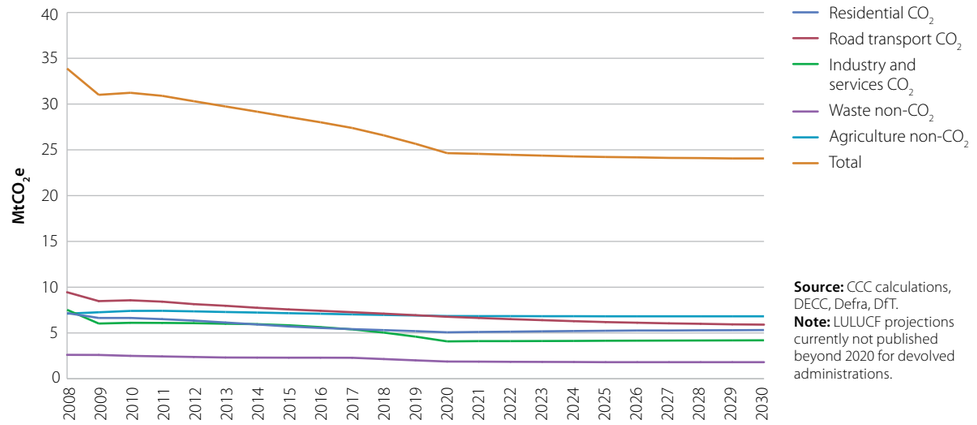
- Scotland has legislated a 42% cut in 2020 relative to 1990 covering all greenhouse gases and emissions, including international aviation and shipping. On the latest baseline year data available this requires Scotland's net greenhouse gas emissions to reduce to 40.7 $MtCO_2e$ in 2020.
- Wales has set a target to reduce all greenhouse gases by 40% by 2020 against a 1990 baseline, which suggests emissions will have to fall to just under 33 $MtCO_2e$ in 2020.
- Northern Ireland is aiming to reduce greenhouse gas emissions by 25% below 1990 levels by 2025. Although there are no annual or interim targets currently set, to achieve the 25% cut by 2025 on steady path of emissions reductions from now suggests emission should be around 20 $MtCO_2e$ in 2020 compared to just over 22 Mt CO_2e now.

Projected emissions to 2030

Disaggregating the UK reference projection to 2030[4] suggests emissions falls between now and 2030 of 26% in Scotland, 14% in Wales and 33% in Northern Ireland; this projection assumes no additional abatement effort beyond 2020 (Figures 8.6, 8.7 and 8.8)

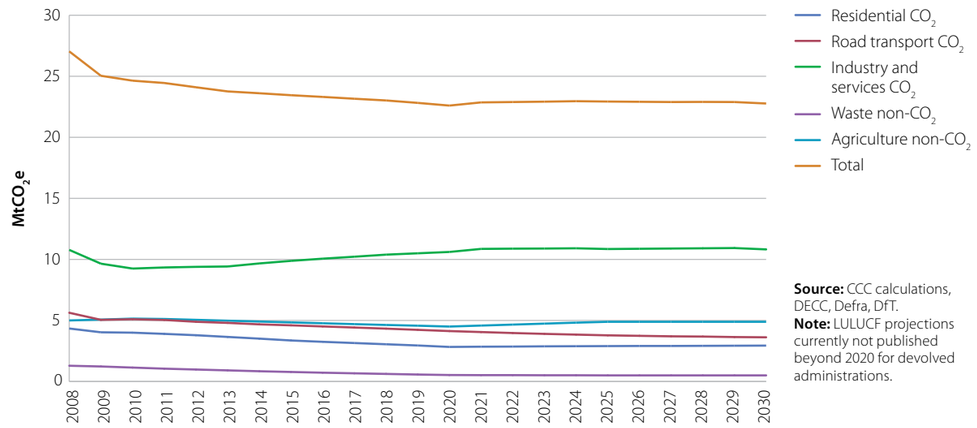
4 These projections exclude LULUCF as current projections are only available for devolved administrations to 2020.

Figure 8.6: Reference projection to 2030 – Scotland



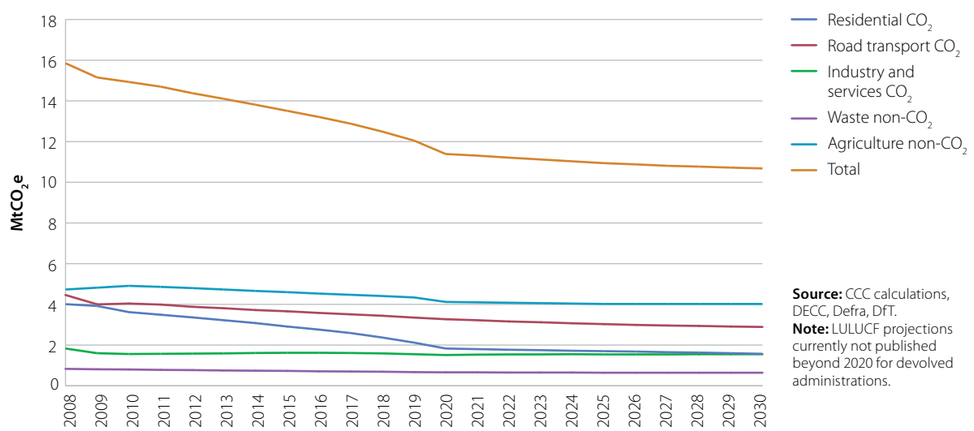
Source: CCC calculations, DECC, Defra, DfT.
Note: LULUCF projections currently not published beyond 2020 for devolved administrations.

Figure 8.7: Reference projection to 2030 – Wales



Source: CCC calculations, DECC, Defra, DfT.
Note: LULUCF projections currently not published beyond 2020 for devolved administrations.

Figure 8.8: Reference projection to 2030 – Northern Ireland



Source: CCC calculations, DECC, Defra, DfT.
Note: LULUCF projections currently not published beyond 2020 for devolved administrations.

2. Abatement opportunities through the 2020s

In developing emissions reduction scenarios for the devolved administrations, the next step is to consider abatement opportunities across the key emitting sectors. Following this, we net our estimates of feasible emissions reductions from the reference emissions projection. A cross-cutting point is that delivering feasible emissions reductions will require new policies, both at the UK and devolved levels, given the balance of reserved and devolved powers.

Although we do not include the power sector in the reference emissions projection, or abatement scenarios, we briefly discuss the potential contribution to decarbonising the UK's power sector from the devolved nations, given the significant resource potential in each area.

Power sector

Much of the UK renewable electricity resource potential lies in the devolved administrations (e.g. potential resource in Scotland amounts to 40% of Britain's offshore wind, 80% of wave, and 50% of tidal resource).

Although only a small amount of this resource has been exploited to date, there are significant investments in the pipeline and ambitious targets in place:

- **Scotland** produced around 40% of the UK's total renewable electricity generation in 2009. Leases awarded so far indicate 1.6 GW of wave and tidal energy could be deployed in the Pentland Firth and Orkney Waters by 2020. In addition, offshore wind sites with around 11 GW of potential capacity have been granted commercial leases in Scottish Territorial Waters and Round 3 Crown Estate licensing rounds. The Scottish Government recently increased its target for renewable electricity consumption from 50% to 80% in 2020 on the path to meet 100% of Scotland's electricity demand from renewables through the 2020s.
- In **Wales** renewable electricity generation accounted for around 6% of the UK total, including 10% of generation from wind in 2009. Around 600 MW of offshore wind capacity has received planning approval, with the Welsh Assembly Government aiming to add up to 20 GW of renewable capacity in the period to 2025, which would generate twice the current level of demand.
- **Northern Ireland** accounted for 4% of the UK's renewable electricity generation in 2009 and almost 10% of wind generation. Demonstration of tidal energy is continuing in the waters of Strangford Lough. The Northern Ireland Executive has set a target to generate 40% of electricity from renewable sources by 2020.

Given the resource potential and ambitious targets, the devolved administrations have an important role to play contributing to required UK power sector decarbonisation through the 2020s (see chapter 6). The extent of this contribution will depend on a range of factors including the economics of renewable technologies and the enabling framework which we will consider further in our renewable energy review, to be published in Spring 2011.

Buildings: Energy efficiency and low carbon heat

There is potential in the devolved administrations for emissions reductions from both energy efficiency and low carbon measures through the 2020s:

- At the UK level, we have highlighted scope in the residential sector for ongoing insulation of solid walls through the 2020s. This opportunity exists also at the national level, particularly in Scotland where the proportion of households with solid walls is around 25%, and in Wales, where the proportion is around 20%.
- Zero carbon homes and buildings regulations will make a useful contribution to emissions reductions, although these will impact on only a small proportion of the total buildings stock in 2030.
- Detailed analysis of potential for low carbon heat at the UK level (see chapter 5) also included analysis of opportunities at the level of the devolved administrations in residential and non-residential buildings. This analysis suggests substantial scope for emissions reductions from low carbon heat in the devolved administrations (e.g. 3 $MtCO_2$, 2 $MtCO_2$ and 1.3 $MtCO_2$ in Scotland, Wales and Northern Ireland respectively). Northern Ireland has a relatively higher share of low carbon potential in the residential sector, reflecting the widespread absence of gas and the high proportion of the population using coal and oil for heating compared to the UK as a whole.

Industry

Our analysis suggests that over 90% of cost effective industry emissions reductions from short pay-back energy efficiency improvement will be achieved in the period to 2020. Emissions reductions in the traded sector over this period will occur disproportionately across the devolved administrations reflecting different industry shares in total emissions (e.g. the share of

CO_2 emissions covered by EU ETS in Scotland is around 55%, with a share of 63% in Wales and 36% in Northern Ireland, compared with 50% UK wide).

In the 2020s, there are significant opportunities for additional abatement (see chapter 5), including:

- For low carbon heat, there is scope for emissions reductions potential up to 1.6, 1 and 0.5 $MtCO_2$ in Scotland, Wales and Northern Ireland respectively, including from increased penetration of biomass and biogas in industry
- For CCS, our analysis suggests significant potential for carbon capture across a number of sites in Scotland and Wales. Although we do not anticipate these would be deployed until later in the 2020s, earlier deployment could ensue depending on capital investment cycles, market conditions, technological developments etc. We therefore include early deployment of industry CCS in our high scenario. The Scottish Government is exploring the potential for carbon capture for storage under the North Sea with the aim of moving from demonstration to deployment through the 2020s.

Our analysis of additional abatement options in the carbon-intensive industry sectors[5] suggests there is potential by 2030 for:

- In Scotland, an additional 0.3 $MtCO_2$ with particular opportunities in the cement sector.
- In Wales, a further 1.5 $MtCO_2$, the majority of which is concentrated in the iron and steel sector.
- In Northern Ireland, 0.2 $MtCO_2$, primarily in the cement sector.

Transport

The main opportunities for reducing transport emissions through the 2020s are more efficient conventional vehicles, increased penetration of electric and plug in hybrid vehicles, and biofuels. However there are also important demand-side measures, such as the promotion of 'Smarter Choices', eco-driving, and developing cycling infrastructure, for which devolved administrations control the relevant policy levers. Disaggregating potential across these key options suggests significant scope at the level of the devolved administrations in 2030, over and above abatement already achieved through Extended Ambition measures to 2020:

- Scotland – additional potential abatement of around 1.0 $MtCO_2$
- Wales – additional potential abatement of around 0.6 $MtCO_2$
- Northern Ireland – additional potential abatement of around 0.5 $MtCO_2$

5 A further 0.4Mt CO2 and 0.7 MtCO2 abatement potential was identified in the refining sector in Scotland and Wales respectively, however this sector is not part of the industry baseline here and we exclude this from the scenario developed for devolved administrations.

Agriculture and land use

Agriculture is particularly important in the economies of the devolved administrations, reflected in this sector's share of emissions of 14%, 11% and 23% in Scotland, Wales and Northern Ireland respectively, compared to 8% for the UK as a whole.

There is significant potential for emissions reductions through a range of soils and livestock measures, which are being explored in each devolved nation:

- The Scottish Government has outlined over 0.3 $MtCO_2e$ abatement potential in 2020 from policies aimed at improving efficiency and developing renewable energy
- The Welsh 'Glastir' programme supports farmers to develop sustainable land management approaches and encourages on-farm renewable energy generation
- The Northern Ireland Executive is consulting on a range of measures to reduce emissions including better livestock management and optimising renewable energy and fuel efficiency on farms.

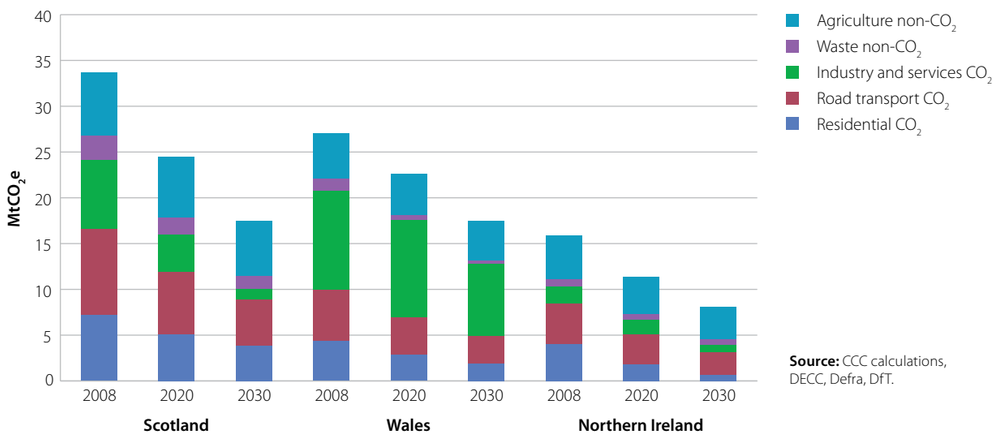
Beyond 2020 our Medium Abatement scenario suggests that in agriculture there is around 10 $MtCO_2e$ emissions reduction potential available in the UK as a whole in 2030 at a cost of less than £70/tCO_2 (see chapter 7). Analysis of the potential at the devolved administration level suggests:

- A range of potential abatement between 1.2 and 1.7 $MtCO_2e$ in Scotland, 0.9 and 1.2 $MtCO_2e$ in Wales, and 0.9 and 1.1 $MtCO_2e$ in Northern Ireland.
- A Medium scenario of around 1.4, 1.1 and 1.0 $MtCO_2e$ reduction in 2030 in Scotland, Wales and Northern Ireland respectively. This abatement potential forms a higher share of overall abatement in devolved nations than in the UK as a whole, and is in line with their higher shares of agriculture emissions.
- However, any abatement already achieved in 2020 should be netted from the 2030 figures.

In addition there are opportunities for reducing emissions through devolved administration approaches to land use and forestry:

- Scotland has a significant proportion of the UK's carbon store in its peat soils. The importance of protecting and managing this is highlighted in the Scottish Government's land use strategy consultation. Targets to increase the carbon sink impact of forests require 10,000 hectares of woodland creation per annum by 2015, with potential to increase this to 15,000 hectares being considered.
- The Welsh Assembly Government is seeking to increase woodland creation rates to 5,000 hectares per annum and is considering a range of other land use measures.
- In Northern Ireland, the Department for Agriculture and Rural Development consultation proposals to reduce emissions include measures for locking in carbon in soils and peatlands and in new and existing woodlands.

Figure 8.9: 2008 emissions, 2020 reference projection, and 2030 medium scenario – Scotland, Wales and Northern Ireland



Source: CCC calculations, DECC, Defra, DfT.

3. Scenarios for emissions in the devolved administrations

We now bring together our reference emissions projections and our assessments of abatement potential and set out indicative emissions scenarios for the devolved administrations through the 2020s. Our analysis suggests that in total there is potential to reduce direct emissions in the sectors analysed by around 48%, 36%, and 49% by 2030 in Scotland, Wales and Northern Ireland in the Medium Abatement scenario, compared to 2008 (Figure 8.9). We will use this analysis to help inform our advice on targets on emissions reduction in Scotland in 2011.

4. Developing options to reduce emissions at the national level

In each of the key areas, deep cuts in emissions through the 2020s from the abatement options above will require action now to develop options, both at the UK and at the national levels:

- New policies will be required to support energy efficiency improvement in the period to 2020 and beyond.
- Government support will be required for development of markets for low carbon heat and electric vehicles.
- Government financial and other support will be required if renewable electricity resource potential is to be exploited.
- New policies will be required to encourage farmers to reduce emissions.

Given the balance of reserved and devolved powers, there will often be an important role for the UK in driving emissions reductions. However, the devolved administrations have a crucial role to play, ensuring that appropriate incentives are in place to encourage implementation of measures where cost effective potential is available.

C. Key findings

Competitiveness risks: proportion of UK GDP from energy and trade-intensive sectors in 2020.

<1%

Possible EU ETS fiscal revenues generated in 2030.

Up to £8.5bn

Impact on fuel poverty of meeting carbon budgets to 2020.

Neutral

2020 target for emissions reduction in Scotland from 1990 levels.

42%

2020 target for emissions reduction in Wales from 1990 levels.

40%

2025 target for emissions reduction in Northern Ireland from 1990 levels.

25%