Reducing emissions and preparing for climate change in **Wales**

2011 Progress Report

Committee on Climate Change | **October 2011**

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Contents

Committee on Climate Change

The Committee on Climate Change (the Committee) is an independent body established under the Climate Change Act (2008) to advise UK and devolved administration government on setting and meeting carbon budgets, and preparing for climate change.

The Committee comprises:

Lord Adair Turner
Lord Turner of Ecchinswell is the Chair of the Committee on Climate Change and Chair of the Financial Services Authority. He has previously been Chair at the Low Pay Commission, Chair at the Pension Commission, and Director-General of the Confederation of British Industry (CBI).

David Kennedy, Chief Executive
David Kennedy is the Chief Executive of the Committee on Climate Change. Previously he worked on energy strategy at the World Bank and the design of infrastructure investment projects at the European Bank for Reconstruction and Development. He has a PhD in economics from the London School of Economics.

Professor Sam Fankhauser
Professor Samuel Fankhauser is acting Co-Director of the Grantham Research Institute on Climate Change at the London School of Economics, a Director at Vivid Economics and a member of the Adaptation Sub-Committee. He is a former Deputy Chief Economist of the European Bank for Reconstruction and Development.

Sir Brian Hoskins
Professor Sir Brian Hoskins, CBE, FRS is the Director of the Grantham Institute for Climate Change at Imperial College and Professor of Meteorology at the University of Reading. He is a Royal Society Research Professor and is also a member of the National Science Academies of the USA and China.

Professor Julia King
Professor Julia King CBE FREng is Vice-Chancellor of Aston University. She led the 'King Review' for HM Treasury in 2007/8 on decarbonising road transport. She was formerly Director of Advanced Engineering for the Rolls-Royce industrial businesses. Julia is one of the UK's Business Ambassadors, supporting UK companies and inward investment in low-carbon technologies.

Lord Robert May
Professor Lord May of Oxford, OM AC FRS holds a Professorship jointly at Oxford University and Imperial College. He is a Fellow of Merton College, Oxford. He was until recently President of The Royal Society, and before that Chief Scientific Adviser to the UK Government and Head of its Office of Science & Technology.

Professor Jim Skea
Professor Jim Skea is Research Director at UK Energy Research Centre (UKERC) having previously been Director of the Policy Studies Institute (PSI). He led the launch of the Low Carbon Vehicle Partnership and was Director of the Economic and Social Research Council's Global Environmental Change Programme.

The **Adaptation Sub-Committee** supports the Committee in its scrutiny of the Government's work to ensure that the UK is adapting to climate change and comprises:

Lord John Krebs
Professor Lord Krebs Kt FRS, is currently Principal of Jesus College Oxford and Chair of the Adaptation Sub-Committee. Previously, he held posts at the University of British Columbia, the University of Wales, and Oxford, where he was lecturer in Zoology, 1976-88, and Royal Society Research Professor, 1988-2005. From 1994-1999, he was Chief Executive of the Natural Environment Research Council and, from 2000-2005, Chairman of the Food Standards Agency. He is a member of the U.S. National Academy of Sciences. He is chairman of the House of Lords Science & Technology Select Committee and also sits on the main Committee.

Dr. Andrew Dlugolecki
Dr. Andrew Dlugolecki is a consultant on climate change, advising the Carbon Disclosure Project, the Munich Climate Insurance Initiative and the United Nations Environment Programme Finance Initiative. He worked at Aviva Group for 27 years and has contributed to the Intergovernmental Panel on Climate Change's work on the impacts of climate change on finance and insurance.

Professor Jim Hall
Professor Jim Hall is Director of the Centre for Earth Systems and Engineering Research and is a civil engineer with expertise in flood and coastal engineering. He was a key contributor to the Foresight Future Flooding Project and an advisor to the Stern Review. He is Deputy Director of the Tyndall Centre for Climate Change Research and a Fellow of the Royal Statistical Society.

Professor Anne Johnson
Professor Anne Johnson trained as a public health doctor and is currently Director of Population Health at University College, and a Professor of infectious diseases epidemiology. She was a member of the UCL/Lancet Commission report on managing the health effects of climate change published in May 2009 and is currently Chair of the Medical Research Council Population Health Sciences Group.

Professor Tim Palmer
Professor Tim Palmer (FRS) is an expert in climate modelling and the physics of climate science. He pioneered approaches to representing uncertainty in weather and climate forecasts and was lead author of the third assessment report of the Intergovernmental Panel on Climate Change (IPCC). He is currently Head of the Probability Forecast Division at the European Centre for Medium Range Weather Forecasts, and Royal Society 2010 Anniversary Research Professor in climate physics at Oxford University.

Professor Martin Parry
Professor Parry is a visiting Professor at Imperial College and was Co-Chair of Working of Group II (Impacts, Adaptation and Vulnerability) of the Intergovernmental Panel on Climate Change's (IPCC) 2007 Assessment Report. He was chairman of the UK Climate Change Impacts Review Group, and a coordinating lead author in the IPCC first, second and third assessments. He has worked at the Universities of Oxford, University College London, Birmingham and University of East Anglia.

Sir Graham Wynne
Graham Wynne, CBE, spent 15 years as a city planner, before joining the RSPB in 1987. He was Director of Conservation and then Chief Executive of the RSPB from 1998-2010. He is a member of the Natural Environment PSA Delivery Board, the Foresight Land Use Futures High Level Group and is a Council member of BirdLife International.

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The members of the Secretariat who prepared the analysis and contributed to the report: Sebastian Catovsky, Ute Collier, Adrian Gault, Swati Khare-Zodgekar, Laura McNaught, David Thompson and Jo Wilson

Organisations who provided support: The Welsh Government and the Climate Change Commission for Wales

Part 1: Progress towards reducing emissions

This part of the report sets out the approach to this initial assessment of progress towards reducing emissions in Wales, and the analysis underpinning the main conclusions.

1. Definition of the Welsh emission reduction target
2. Strategy to meet reductions and assessment of the level of ambition
3. Approach to measuring progress
4. Latest emission data in Wales and UK
5. Progress implementing measures by sector
    a) Transport
    b) Business
    c) Residential
    d) Agriculture and land use
    e) Waste
    f) Public sector

1. Wales' emission reduction targets

Target for emissions within Welsh competence
The Welsh Government's Climate Change Strategy[1] set a target to reduce emissions within devolved competence by 3% each year from 2011, against a baseline of average emissions over 2006-2010.

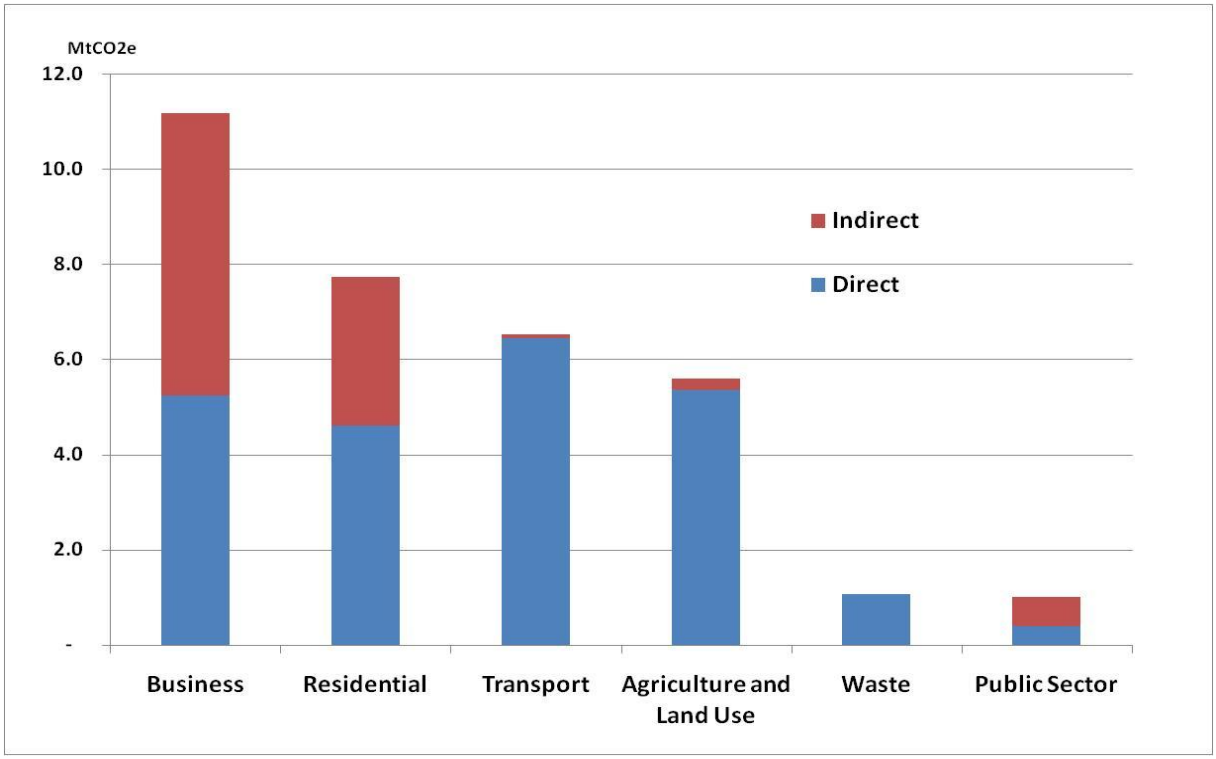
The 3% target covers direct emissions from all sources in Wales except those within the EU Emissions Trading Scheme (EU ETS, energy supply and energy-intensive industries). It also includes emissions from electricity use, as attributed to the end-users of electricity with a UK-wide average grid intensity factor.

The target covers around 70% of total Welsh greenhouse gas emissions, within which the majority are direct rather than indirect, and the key emitting sectors are transport, business, residential and agriculture:

- Emissions covered by the target were 30.1 $MtCO_2e$ in 2009, compared to total Welsh greenhouse gas emissions of 42.6 $MtCO_2e$; the key source of emissions not covered by the target is the power sector and energy intensive industries in the EU ETS.
- Of emissions covered by the target, around 70% of these are direct and 30% indirect (i.e. electricity related).
- The largest sectoral source of emissions is business, followed by residential, transport and agriculture (Figure 1).

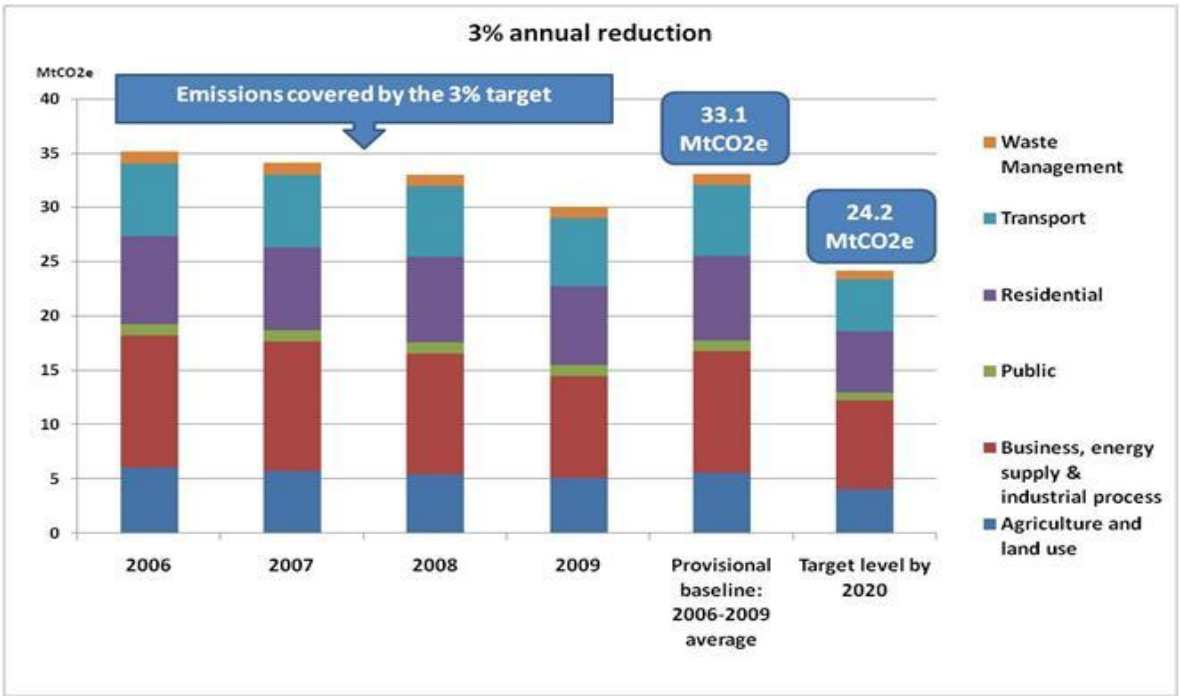
[1] *Climate Change Strategy for Wales* (2010). Available from: http://cymru.gov.uk/topics/environmentcountryside/climatechange/tacklingchange/strategy/walesstrategy/?lang=en

Figure 1: Average emissions by sector, 2006 - 2009



Given that data is currently only available to 2009, the baseline for the target cannot yet be fully defined. However, on the basis of data for 2006-09 (i.e. three of the four years on which the baseline is calculated), the baseline would be 33.1 $MtCO_2e$ (Figure 2). Together with a 3% annual emission reduction, this implies a target of 24.2 $MtCO_2e$ in 2020.

Figure 2: Emissions in the baseline 2006 – 2009, provisional baseline, and 2020 target



Target for all Welsh emissions

In addition to the target for emissions under Welsh competence, there is a separate target to reduce all Welsh emissions by 40% from 1990 levels (55.6 $MtCO_2e$) by 2020.

The difference between the two targets related to emissions from energy intensive industries in EU ETS (i.e. these are included in the economy wide target).

The economy wide target requires that emissions are reduced from 42.6 $MtC0_2e$ in 2009 to 33.3 $MtCO_2e$ in 2020.

The two targets are compatible: providing the power sector in Wales decarbonises to the same extent as the UK as a whole and there is no increase in emissions from energy intensive sectors, delivering the 3% target could deliver the economy-wide reduction required[2].

The economy wide target is more ambitious than the UK's currently legislated carbon budget, which requires a 34% emissions reduction on 1990 levels in 2020.

The Welsh target is defined on a gross basis, and therefore does not account for emission reductions in EU ETS through purchase of offset credits or EUAs. This is in contrast to the UK, where carbon budgets are defined on a net basis (i.e. after purchase of EUAs and offset credits in EU ETS). Comparing the target with our projected gross emissions for the UK suggests a greater level of ambition in Wales (we project a 37% cut in gross emissions in 2020 relative to 1990 at the UK level).

2. Strategy to meet reductions and assessment of the level of ambition

The Welsh Climate Change Strategy was launched a year ago, in October 2010, setting out the commitment to reduce emissions by 3% each year from 2011 on the 2006 – 2010 baseline.

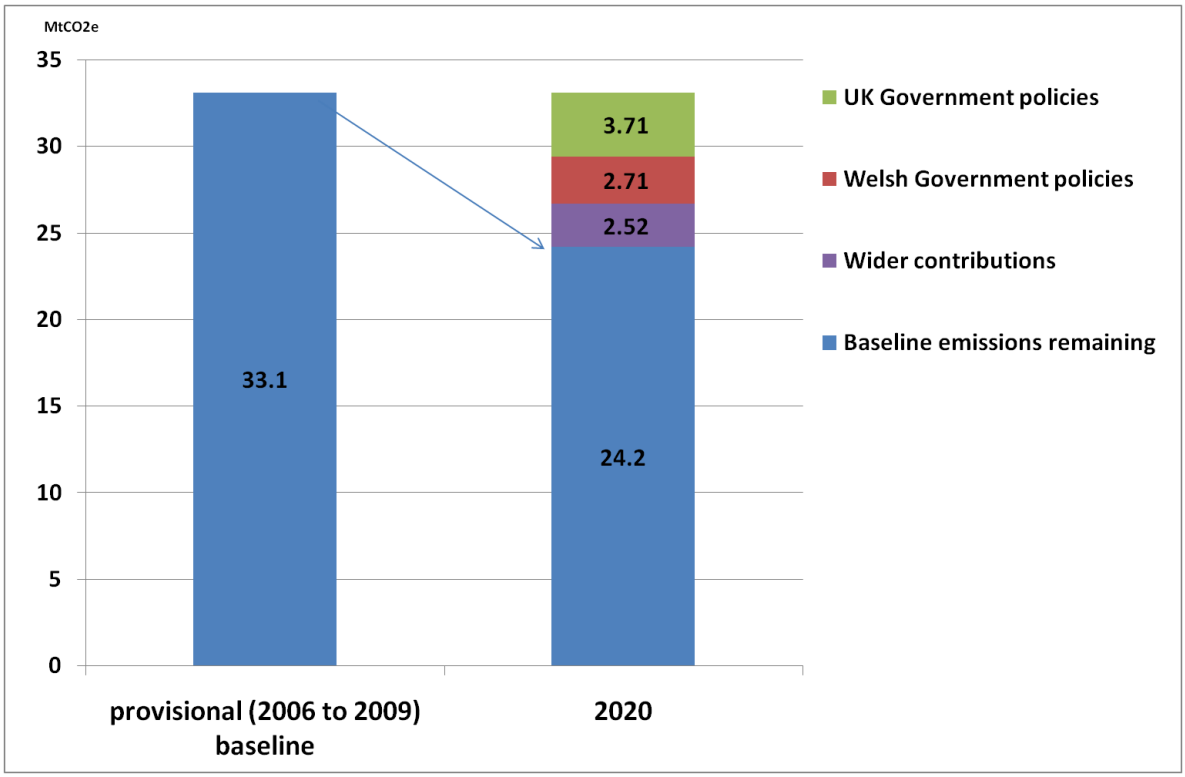
Accompanying the Strategy were delivery plans for both mitigation and adaptation, setting out the range of measures the Welsh Government, in conjunction with others, would take to meet the commitments in the Strategy.

The Strategy recognises that the Welsh Government should complement UK level policies, and other actors (e.g. local authorities, public sector organisations, businesses, community organisation, wider behaviour change).

However, while the contribution from other actors is significant (i.e. it accounts for a third of total envisaged abatement, see Figure 3) it is not well defined. Therefore in order to provide more confidence that required emissions reductions will be delivered, more details of wider contributions should be provided.

2 I.e. if the emissions in the 3% sectors reduce from 33.1 to 24.2 $MtCO_2e$ and to meeting the economy-wide target requires a reduction from 42.6 to 33.3 $MtCO_2e$, this requires a reduction from 9.5 $MtCO_2e$ to 9.1 $MtCO_2e$ across power stations and energy-intensive sectors, which should follow from decarbonising the Welsh power sector in line with the UK and if emissions in the energy-intensive sectors do not increase.

Figure 3: Provisional baseline emissions 2006 - 2009, and savings by 2020 from UK and Welsh Government policy and wider contributions[3]



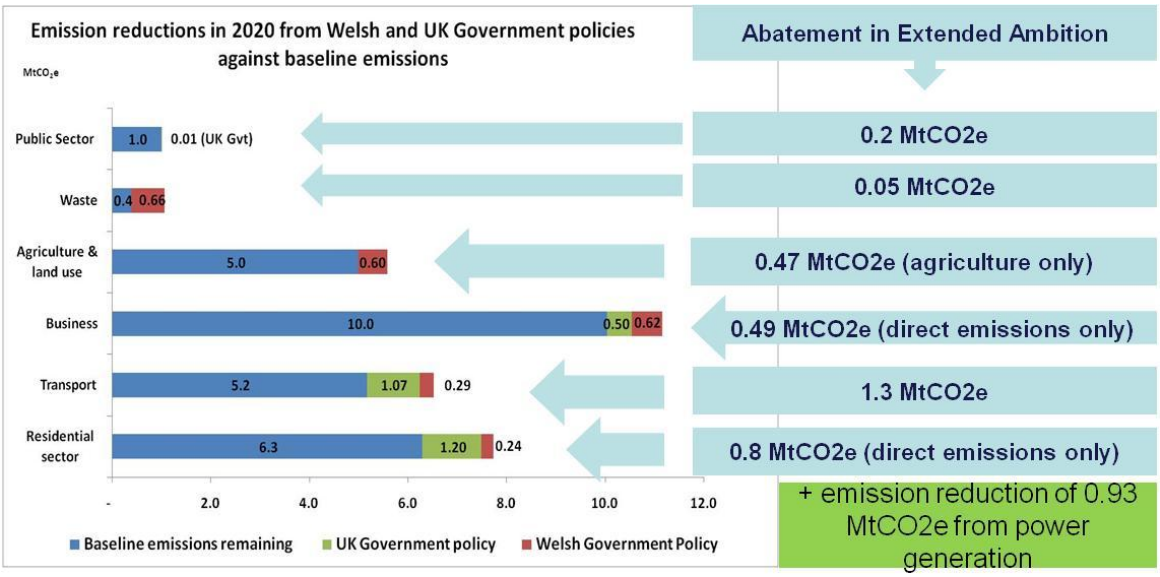
At the sectoral level, the strategy identifies most scope for reducing emissions in the business, transport and residential sectors (Figure 4). Comparing these assessments with our UK level assessments suggests an appropriate level of ambition in transport and waste, but scope for additional emissions reductions in residential, business, public, agriculture and power sectors:

- **Transport**: the level of ambition in the strategy broadly reflects potential for improvement in car and van efficiency, and implementation of measures to encourage consumer behaviour change (e.g. Smarter Choices).
- **Waste**: the level of ambition for reducing waste emissions is higher than that in the UK, reflecting more ambitious targets for diverting of waste from landfill.
- **Agriculture and land use**: emission reductions quantified in the strategy result mainly from afforestation policies. Our analysis has identified significant potential for emissions reduction through a range of soils and livestock measures that could be more directly targeted in the strategy.
- **Residential sector**: emission reductions targeted could largely be achieved through power sector decarbonisation and electricity related efficiency improvement. However, we estimate scope for direct emissions reductions of 0.8 $MtCO_2$ (e.g. through boiler replacement, insulation etc), which may not be fully reflected in the strategy; this should be clarified.

[3] The provisional baseline is estimated based on the definition set out in the Welsh Government's Climate Change Strategy, updated for 2009 emission data.

- **Business**: emission reductions targeted here are significantly below our estimate of potential from power sector decarbonisation and electricity related energy efficiency improvement (up to 3 $MtCO_2$). Our analysis suggests that there is scope to reduce direct, non-traded emissions by around 0.5 $MtCO_2$ through a combination of energy efficiency improvement and renewable heat deployment, both of which should be fully reflected in the strategy (to the extent that this is already the case, then this should be clarified).
- **Public sector**. Very low emissions reductions envisaged from the public sector are incompatible with our assessments of potential for efficiency improvement and renewable heat, and Welsh policies in this area.
- **Power generation**. The strategy assumes a 0.93 $MtCO_2$ emissions reduction through changing grid intensity which is not allocated to a specific sector. However, our analysis suggests an emissions reduction of around 3.4 $MtCO_2$ (i.e. due to a 40% change in grid intensity), hence the statements above that residential and business targets could largely be achieved indirectly through supply side measures.

Figure 4: Ambition in the Welsh Climate Change Strategy versus CCC estimates of abatement potential (Extended Ambition scenario[4])



It may be that some of these discrepancies are accounted for by allocating responsibility for these policies to other actors. However, this is currently uncertain given the lack of detail about their specific contribution.

[4] The Extended Ambition (EA) scenario was initially defined in the Committee's 2008 Report ("Building a low carbon economy": http://www.theccc.org.uk/pdf/TSO-ClimateChange.pdf) recommending the first three carbon budgets at the UK level. It reflects the abatement potential to 2020 from policies that are broadly committed to in principle (but where further definition and implementation is required).
It is characterised by widespread insulation of lofts and cavities, some insulation of solid walls, significant penetration of low carbon heat, deep cuts in emissions from transport and some lifestyle changes in homes and transport. From the UK level analysis we estimate Wales' abatement potential to 2020 on a bottom-up basis where possible, and through disaggregating from the UK-level results in other cases.

3. Approach to measuring progress

It is currently difficult to assess progress reducing emissions against targets for a number of reasons:

- We do not yet know the baseline for the 3% target – data for 2010, the final year of the baseline, will be available in late 2012
- Emission data is not yet available for the years to which the targets relate, i.e. 2011 onwards.
- Although the Welsh Government is developing a set of forward indicators against which progress can be assessed, these will not be available until later this year.

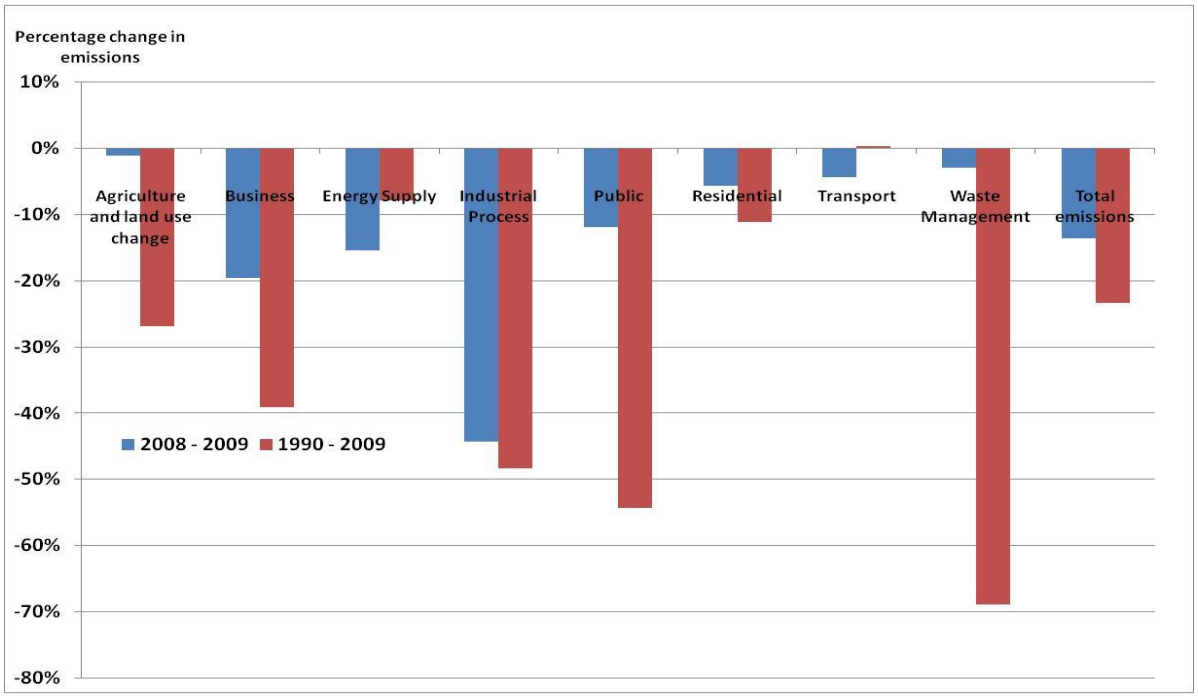
Given these challenges, our focus is on an assessment of emissions data for 2009, inferences from UK and EU ETS data for 2010, assessment of any evidence on key emissions drivers, and development of policies required to achieve future emissions reductions.

4. Latest greenhouse gas emissions trends in Wales and UK

2009

The latest available emissions data for Wales is for 2009, showing that total emissions fell by 14% in Wales in 2009 to 42.6 $MtCO_2e$[5]. This was driven by reductions in all sectors, but particularly by sharp falls in emissions from business, industry and electricity sectors (Figure 5).

Figure 5: Percentage change in Wales' emissions, 2008 - 2009 and 1990 - 2009



[5] The equivalent fall in the UK as a whole was 9% in 2009.

The reduction for those sectors covered by the 3% target was less pronounced (i.e. around 9%), given that this excludes energy intensive industries; this reduction was driven mainly by non-traded business, residential and transport emissions reductions.

The impact on the baseline for the 3% target is to reduce this from 34.03 $MtCO_2e$ to 33.1 $MtCO_2e$. This implies a small reduction in the required absolute annual emissions reduction (from 1.02 $MtCO_2e$ to 0.99 $MtCO_2e$). However, this is likely to increase slightly in 2010, when we expect that emissions increased (to be confirmed when Welsh data is available).

2010

EU ETS, economic, power sector and temperature data available for 2010, suggest that emissions in Wales increased in 2010:

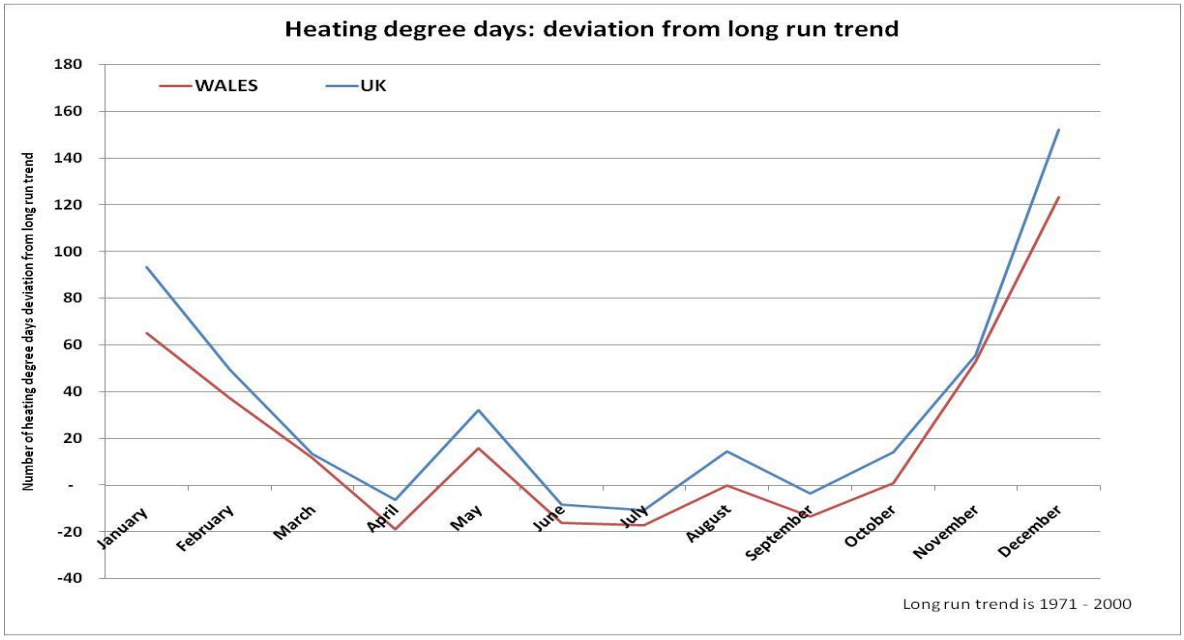
- EU ETS data show emissions in the traded sector in Wales rose 5% in 2010, compared to 2% across the UK as a whole.
- This reflects a higher increase in output from Welsh industry and commercial sectors, which outstripped the increase in UK output (Table 1).
- Power sector emissions are likely to have increased as a result of increased power demand (e.g. demand grew by 1% at the UK level) and increased grid intensity (this rose slightly due to nuclear outages).
- Wales also experienced temperatures significantly below the long run average (Figure 6). This is likely to have increased heating demand and caused a corresponding increase in emissions in the residential and non-residential sectors.

Whereas UK emissions increased by around 3% in 2010, the increase is likely to have been greater in Wales, given larger increases in energy intensive industries and higher shares of these industries in the total. For those sectors covered by the 3% target (i.e. excluding energy intensive industries), the increase may be more commensurate with that at the UK level.

Table 1: Percentage change output in production, manufacturing and service sectors, Wales and UK as a whole, 2009 and 2009

	GVA		Production		Manufacturing		Service sector	
	2009	2010	2009	2010	2009	2010	2009	2010
Wales	-2.2%	N/A	-15.3%	+4.7%	-15.5%	+5.6%	-1%	+1%
UK	-2.1%	+1.6%	-10%	+2.0%	-10.7%	+3.6%	-5%	+1%
Wales and UK sector indices: StatsWales								

Figure 6: Deviation from long run trend in heating degree days[6] in 2010 – Wales and UK



5. Progress against meeting the Welsh targets set out in the Welsh Climate Change Strategy – implementation of policies and measures

a) Transport

Emission trends

Transport emissions covered by the 3% target currently amount to 6.5 $MtCO_2e$ in the baseline (from 2006-2009) and account for 20% of the 3% target emissions:

- Emissions are almost entirely comprised of direct/non-traded emissions, of just under 6.5 $MtCO_2e$, whilst emissions from electricity use attributed to the sector amount to 0.08 $MtCO_2e$.
- Overall, emissions in the sector fell 5% in 2009, driven by a 4% fall in direct emissions and a 13% fall in electricity use emissions.

Reducing emissions

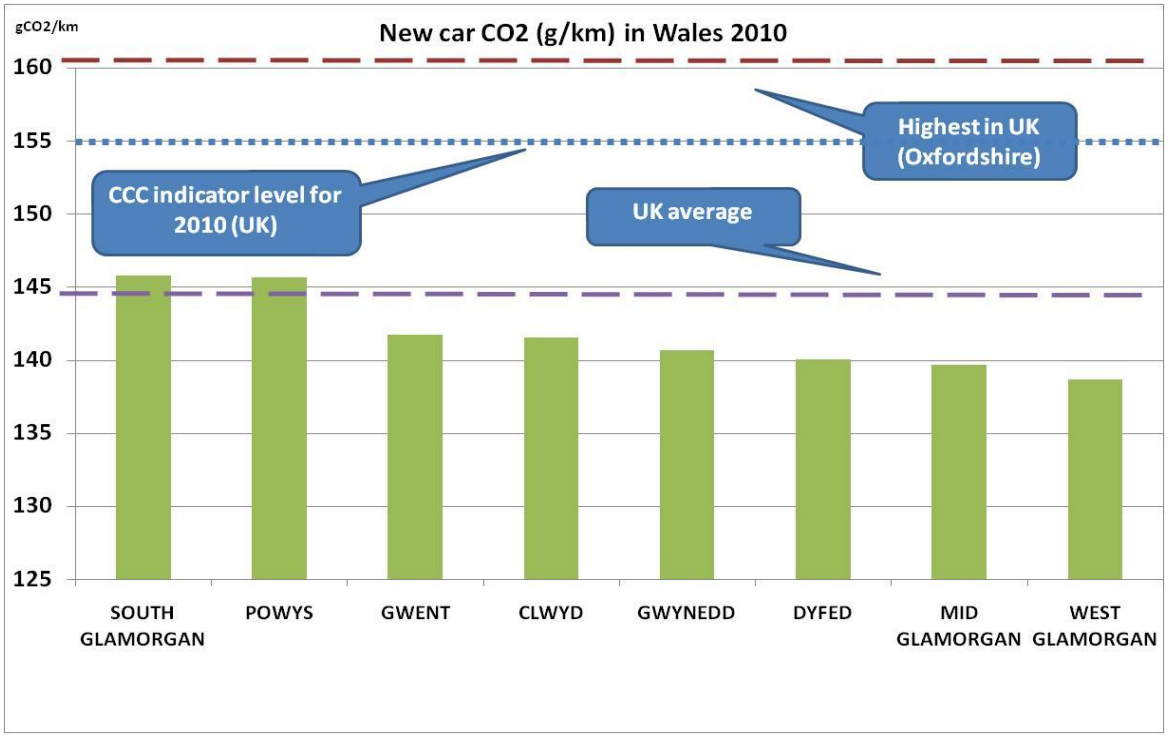
The Strategy estimates that by 2020 emissions can be reduced by 1.36 $MtCO_2e$:

- 1.07 $MtCO_2e$ from UK Government / EU measures; and
- 0.29 $MtCO_2e$ from Welsh Government measures

The main measures at the UK / EU level to reduce emissions are fuel efficiency standards and greater use of renewable energy sources for transport (the strategy estimates together will produce savings of 0.96 $MtCO_2e$ in Wales in 2020). In this respect, there was progress both at UK and Welsh levels reducing new car emissions in 2010 (e.g. across Wales, these were substantially below the Committee's indicator level for 2010, see Figure 7).

[6] 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).

Figure 7: New car gCO_2/km in Wales compared to UK average and CCC indicator level for 2010



The strategy also estimates that fuel duty increases (to £0.60 per litre by 2013) will deliver savings in Wales of 0.11 $MtCO_2e$ in 2020. The current rate is slightly below this, but set to increase to £0.6097 from 1 January 2012.

At the Welsh level, where there are opportunities to encourage behaviour change and to support development of electric car markets, there has been some but limited progress:

The Sustainable Travel Centre initiative is one of the key measures in the Strategy. It was piloted in Cardiff and is being rolled out to 4 further cities/towns over 2011-12. Additional funding is also being provided to promote Personalised Travel Planning – ensuring this is rolled out to all of the population living in urban areas (i.e. around 65%) is desirable.

Although not successful in achieving Plugged-in Places funding priority consideration should be given to supporting electric vehicle infrastructure through available funding.

b) Business

Emission trends

Emissions in the baseline for the business sector account for 34% of the emissions covered by the 3% target, standing at 11.2 $MtCO_2$ (average over 2006 – 2009):

- 5.2 $MtCO_2e$ direct emissions
- 5.9 $MtCO_2e$ indirect emissions
- In the latest year of data (2009) emissions fell 15% as direct emissions fell 19% and indirect emissions fell 13%
- However, given the return to economic growth across most sectors of the Welsh

economy, and the increased demand for heating during the particularly cold winter months of 2010, it is likely that emissions will have increased in 2010. This was the case in the UK as a whole, where emissions from commercial buildings for example, increased by 4%

Reducing emissions

The Strategy sets out policies that aim to reduce emissions by 1.12 $MtCO_2e$ by 2020:

- 0.5 $MtCO_2e$ from UK Government policies; and
- 0.62 $MtCO_2e$ from Welsh Government policies

At the UK level, a number of policies are in place aimed at delivering emissions reductions across the business sector (e.g. the Carbon Reduction Commitment, Climate Change Agreements).

At the Welsh level, the focus is on providing advice and working in partnership with the Carbon Trust, both focused on energy efficiency improvement.

We have questioned whether this approach will address the full emissions reduction potential in the SME sector, and have suggested the need for better information through roll out of Display Energy Certificates, and the possible use of stronger policies (e.g. minimum regulatory standards)

There is also likely to be an opportunity for the Welsh Government to encourage the take up of renewable heat in conjunction with finance provided at the UK level under the Renewable Heat Incentive (e.g. the Welsh Government should consider developing a renewable heat strategy).

c) Residential

Emission trends

Emissions in the baseline for the residential sector accounted for 23% of the emissions covered by the 3% target, standing at 7.7 $MtCO_2e$:

- 4.6 $MtCO_2e$ direct emissions and 3.1 MtCO2e indirect emissions
- In the latest year of data (2009) direct emissions fell 6%, while indirect emissions fell 10%
- However, given the extremely cold temperatures experienced during the winter months of 2010, it is possible that emissions will have risen again in 2010 and demand for heating will have increased. This was the case in the UK as a whole, where emissions in the residential sector increased 8% in 2010, although our analysis found that adjusting energy consumption for weather, total energy consumption would have fallen.

Reducing emissions

The Strategy sets out policies that aim to reduce emissions by 1.74 $MtCO_2e$ by 2020:

- 1.20 $MtCO_2e$ from UK Government policies; and
- 0.54 $MtCO_2e$ from Welsh Government policies

The main energy efficiency programme in Wales for the residential sector is the 'Arbed' area based scheme (Box 1 - arbed). This appears to have been successful in significantly improving the energy rating of a significant number of homes through a range of measures including (more challenging) solid wall insulation.

Box 1 – Strategic Energy Performance Investment Programme (arbed)

Phase 1 (2010/11) launched with £30m Welsh Government funding, which levered in a further £30m from a range of sources including CERT, CESP, housing associations and councils.

The scheme targeted regeneration areas in Wales and took a community/street-by-street and whole house approach. In total in the first year, over 6,700 measures were installed in over 6,000 homes.

Around 3,000 solid wall insulations took place – equivalent to a significant proportion of the solid walls insulated in GB in 2010 (20%). Other measures included over 1,000 solar hot water installations, 1,800 solar PV panels installations, and over 100 heat pumps were installed to properties off the gas grid.

Evidence suggests that the measures had a marked improvement on the energy performance of households treated. Energy Performance Certificate[7] (EPC) ratings were generated for around 2,000 of the properties, showing an improvement from 88% of properties being rated F, to 91% becoming rated C.

There were also wider impacts of the scheme include accrediting 8 installers for renewable installations. The scheme also achieved significant cost reductions, by taking advantage of economies of scale. This has may have been an important factor in helping to draw in additional funding.

More detailed evaluations of the impact on fuel bills and performance of measures, including heat pumps, will be taking place over the coming year.

Phase 2 is now underway, supported by £45m initial funding from the European Regional Development Fund, which will be match-funded.

More generally, Wales has been relatively successful in delivering measures under CERT and CESP (e.g. compared to its 5% share in the GB building stock, see Tables 2 and 3).

However, acceleration in the pace at which measures are implemented is required both at UK and Welsh levels if full potential for emissions reduction is to be addressed.

The policy instruments for delivering this acceleration are the Green Deal and the Energy Company Obligation, within which there is an important role for the Welsh Government: In particular there is scope for scaling up the area based approach to home insulation already in place in Wales (e.g. as in the Arbed scheme, see Box 1).

This would complement other schemes identified in the Strategy to support demand-led energy efficiency improvement, community based heating and consumer behaviour change (see Box 2 – further residential measures).

[7] EPC's provide a rating for residential and commercial buildings, showing their energy efficiency based on the performance of the building itself and its services (such as heating and lighting). EPCs are required whenever a building is built, sold or rented out.

Table 2: CERT measures

	Cavity Walls					Loft Insulation			
CERT YR	**1**	**2**	**3**	**TOTAL**		**1**	**2**	**3**	**TOTAL**
Wales	34,526	27,808	19,175	81,509		49,392	44,423	33,915	127,730
GB	524,634	502,165	345,508	1,372,307		675,188	584,353	467,851	1,727,392
% in Wales	7%	6%	6%	6%		7%	8%	7%	7%

Table 3: CESP measures

CESP to June 2011	Wales	GB	% in Wales
Schemes approved	**28**	**201**	**14%**
Dwellings	**1,335**	**12,703**	**11%**
Measures	**2,124**	**26,112**	**8%**

Box 2 – Further residential measures

In addition to the arbed scheme there are a number of other measures in place in the residential sector:

Demand-led energy efficiency programmes focused on fuel poverty (NEST)

- The first quarter in which Wales' fuel poverty scheme 'NEST' was operational was 1 April – 30 June 2011.
- A total of 1,200 whole house assessments were carried out in the first quarter, with 200 packages installed (covering new heating systems, replacement boilers, loft and cavity insulation and draught proofing). Planning permission is underway for a number of solid wall and solar PV measures.

In 2008, 26% of households in Wales were estimate to be in fuel poverty. More recent data available for other parts of the UK suggests that overall the number of fuel poor households in the UK as a whole increased by 1 million in 2009.

Supporting community scale energy generation

- Operated by the Energy Saving Trust, the Welsh Government has provided £8m funding for a Community Scale Renewable Energy Generation Project. Projects are anticipated to receive between £100,000 - £300,000 to help install community generation systems. It is hoped that these will generate enough electricity that can be sold back to the National Grid or neighbouring communities.

Behaviour change at home

- The Welsh Government's Climate Change Communications and Engagement Strategy sets out how the Welsh Government intends to deliver on the commitments in the Climate Change Strategy to encourage the behaviour changes needed to reduce emissions and prepare for climate change.

Along with transport, the residential sector is one of the two areas selected as part of new behaviour change research. The Welsh Government has commissioned work to identify the actions that should be focused on – i.e. those that will achieve the greatest emission reduction and are most likely to be taken up. As these are getting underway now, we will revisit the progress on these in our subsequent reports.

d) Agriculture and land use

Emission trends

In 2009 emissions from agriculture and land use amounted to 5.6 $MtCO_2e$, accounting for around 17% of the emissions covered by the 3% target. This was comprised of:

- Methane emissions of 2.4 $MtCO_2e$, nitrous oxide emissions of 2.4 MtCO2e, and 0.5 $MtCO_2e$ associated with agricultural combustion.
- Indirect emissions from electricity use contribute a further 0.244 $MtCO_2e$
- Overall, emissions associated with land use, land use change, and forestry are a small net sink in Wales, of -0.258 $MtCO_2e$.

In 2009, overall emissions from agriculture and land use fell 2%. Unlike other sectors, 2010 data for agriculture is not yet available for the UK as a whole therefore there is little indication of how emissions will have moved and impacted the baseline in Wales at this time.

Reducing emissions

There are no UK-led measures in the agriculture and land-use sectors in Wales, given the balance of reserved and devolved powers.

The focus of Welsh policy is on woodland creation, and provision of grants and information to support improved farming practice (e.g. through the Glastir programme, Farming Connect, and the dairy and red meat road maps which are aimed at reducing emissions throughout the supply chain).

While each of these approaches should have a positive impact reducing Welsh agriculture and land use emissions, it is unclear precisely what these are aimed at achieving. We have identified significant potential for emissions reduction through a range of soils and livestock measures that does not appear to be specified in the Strategy. We therefore recommend that these programmes are aligned with underlying abatement potential, and that policy approaches using stronger levers and incentives are considered.

e) Waste

Emission trends

Waste emissions in Wales amount to 1.1 $MtCO_2e$ in the 2006 – 2009 baseline and account for 3% of the emissions covered by the 3% target. There are no indirect emissions attributed to this sector, with the vast majority of emissions (methane) arising from landfill.

Emissions in the waste sector in Wales fell 3% in 2009. Currently non-CO_2 data for 2010 in the UK as a whole is available, but not disaggregated by sector.

Reducing emissions

Savings of 0.66 $MtCO_2e$ are to be delivered through the following Welsh measures:

- Diversion of all biodegradable municipal waste (collected by local authorities) from landfill by 2020.
- Diversion of other biodegradable waste (from ‘other’ municipal, commercial, industrial

and construction and demolition sectors) from landfill by 2025

This ambition is reflected in statutory targets for municipal waste, requiring that recycling rates reach:

- 52% in 2012-2013; and rise gradually to
- 70% by 2025.

The latest available data suggests a continuing downward trend in waste emissions:

- LA municipal waste reused, recycled or composted in Wales increased from 44% to 48% between April-June 2010 and the same quarter in 2011;
- Total municipal waste produced in Wales decreased from 413,000 tonnes in April-June 2010 to 393,000 tonnes in the same quarter of 2011;
- Residual household waste produced per person in Wales has also continued to decrease, falling from 70kg per person in April to June 2010 to 62kg per person in April to June 2011

If this progress can be maintained and targets achieved, Wales will have gone beyond the UK as a whole in reducing its waste emissions.

f) Public sector

Emission trends

Public sector emissions covered by the 3% target amounted to 1 $MtCO_2e$ in the 2006-2009 baseline, having fallen 11% in 2009. Emissions account for 3% of the 3% target and are comprised of:

- 0.4 $MtCO_2e$ direct emissions, associated with heating etc
- 0.6 $MtCO_2e$ from electricity use

In the UK as a whole in 2010, public sector emissions fell by 1%, reflecting a significant reduction in electricity related emissions, largely offset by an increase in direct emissions.

Reducing emissions

The importance of the leadership role of government in both reducing its own emissions and enabling/encouraging wider contributions is highlighted, and a range of measures listed in the Strategy:

- Embedding action on climate change.
- Reducing the carbon footprint of the Assembly Government estate.
- Reducing the carbon footprint of the NHS.
- Reducing the carbon footprint of education services.
- Enabling wider contributions from others.
- Land use planning.

- Spatial Plan Low Carbon Regions work and Marine Spatial Planning.

However, there is not a currently target for public sector emissions reductions. Our analysis suggests scope for direct emissions reductions in the public sector of around 0.2 $MtCO_2e$ available in 2020 from a mix of energy efficiency measures and renewable heat, with additional potential for greater efficiency in power use.

Given its important leadership role, we recommend that the Welsh Government should set a target for public sector emissions reductions, and underpinning targets at the local level to ensure that these are achieved.

Part 2: Progress in preparing for climate change in Wales

1. Request for ASC's advice on Wales' Adaptation Framework

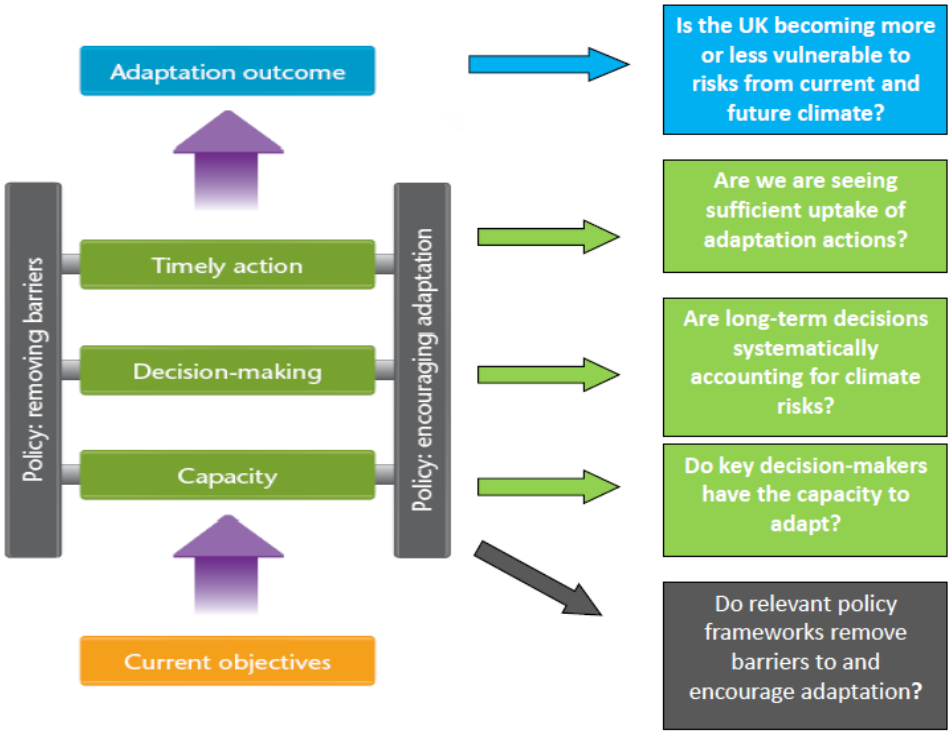
The Welsh Climate Change Strategy also included an adaptation framework, along with an adaptation delivery plan, setting out the Welsh Government's approach to preparing for and adapting to climate change. It aims to build adaptation to climate change into decision-making and deliver actions that enable Wales to respond to the challenges and opportunities presented by climate change.

As part of the first progress report to the Welsh Government, the Adaptation Sub-Committee (ASC) of the UK Committee on Climate Change (UKCCC) was asked to:

- Review the adaptation framework and progress against the actions within the adaptation delivery plan; and
- Provide advice on the formation and delivery of the sectoral adaptation plans.

We reviewed progress in adaptation in Wales using the ASC's preparedness ladder (Figure 1) that sets out the key steps that we would expect to see implemented if the UK and devolved administrations were sufficiently preparing for climate change.[8]

Figure 1: The ASC's preparedness ladder, which characterises adaptation as progressing from building capacity, to embedding climate change into long-term decisions, and taking timely adaptation action that leads to an adaptation outcome.



[8] Adaptation Sub-Committee (2010) *How prepared is the UK for climate change?* The scope of the report covered UK-wide issues for reserved matters and England only issues for those matters that are devolved.

2. Review of progress with the adaptation framework and actions within the Adaptation Delivery Plan

From our review of activity since the adaptation delivery plan was published last year, we find that the Welsh Government and associated delivery bodies are making good progress in implementing several aspects of the plan.

Strategic issues

At the **strategic level**, the Welsh Government has continued to support the UK Climate Change Risk Assessment and associated economic appraisal of adaptation options. These will provide a key evidence base for setting plans and priorities for the next phase of Wales' adaptation framework.

The Adaptation Framework is supported by the UK Climate Change Act (2008) which confers authority to Welsh Ministers to direct organisations to report on their progress on adaptation.[9] Statutory guidance from the Welsh Government for Reporting Authorities is in the process of being finalised, following a period of consultation. Some Welsh authorities have already submitted reports voluntarily, including the water companies that operate in Wales.

Despite this progress, there remain some risks to delivery in the coming year:

- *Future delivery of adaptation advice:* the UK Climate Impacts Programme (UKCIP) is a key delivery body for several actions in the delivery plan on increasing awareness and understanding of climate change impacts for businesses, local authorities and other public agencies. However, UKCIP's contract to support and promote UK-wide adaptation to climate change ended last month (September 2011). Over the next six months UKCIP functions will pass over to the Environment Agency, with the provision of tailored support continued in England only. The Welsh Government is in the process of establishing a knowledge transfer programme which is aimed at delivering advice on climate change. It will be important to clarify the new relationship between the Welsh Government and the Environment Agency's adaptation delivery function – or set out what alternative arrangements for provision of adaptation advice and guidance it will put in place.
- *Sectoral adaptation plans.* Wales' adaptation delivery plan commits the Welsh Government to work with key stakeholders to produce adaptation plans across five priority sectors: natural environment, infrastructure, communities, health, and business and tourism. The links between these and the ASC's own priority areas for early adaptation action are set out in Box 1. To date only the health adaptation plan has been published (see details in Box 2). In the coming year, the Welsh Government will need to ensure the remaining plans are produced. Section 3 provides our advice on how these plans should be developed.

[9] In addition, the UK Secretary of State can request reports from organisations in Wales that operate in reserved areas, including energy companies, strategic airport operators, rail companies, harbour authorities, lighthouse authorities, and electric communications.

Box 1. The ASC's priority areas and the Welsh Government's sectors for adaptation

The ASC has identified five generic priorities for early adaptation action based on decisions that are sensitive to today's climate and that have long-lasting or far-reaching consequences.[10] These align well with the sectors identified in the Welsh Government's (WG's) adaptation framework, although there are some differences in definition and scope of sectors:

ASC / WG	Land use planning	Providing infrastructure	Designing and renovating buildings	Managing natural resources	Emergency planning
Infrastructure	X	X			
Communities	X		X		X
Health			X		X
Business & tourism		X	X	X	X
Natural environment	X			X	

Box 2. Health sector adaptation plan

Using UKCP09, the plan sets out the range of potential direct and indirect impacts on public health from climate change in Wales (both negative and positive). It identifies the priorities for action, the adaptation objectives, work to be undertaken and the agency responsible for delivery.

The latest available summary of progress highlighted that responding to swine flu had delayed a number of measures, but the vast majority were completed or are ongoing. Several actions require the outcomes of the UK Climate Change Risk Assessment and final guidance on Welsh Ministers Adaptation Reporting Powers before starting.

The plan acknowledges some key data gaps, and highlights that improvements should be made to surveillance in terms of the health effects of climate change, population exposures and associated health outcomes. As the plan notes, this information would support the development of early warning systems, assessment of the magnitude of climate change impacts, as well as more quantitative evaluation of adaptation strategies.

[10] Adaptation Sub-Committee (2010) *How prepared is the UK for climate change?* Available from: http://www.theccc.org.uk/reports/adaptation

Sectoral issues

We reviewed progress across the activities set out in the delivery plan. We found that progress is generally good, but somewhat variable across the sectors. In many cases, adaptation policies/programmes are now in place. Some are due to be completed in the near future, while some others are still under development or currently out for consultation (Table 1).

Balance of coverage

While progress on implementation of the Welsh adaptation delivery plan is well underway, the main focus has been on the lower parts of ASC's preparedness ladder, namely building capacity by providing guidance and evidence about potential risks and embedding consideration of climate change into long-term decision-making.

The delivery plan does not focus as much on the higher rungs of the ASC's ladder – timely action and outcomes. The plan does not explicitly measure trends in climate-related impacts or in Wales' underlying vulnerability to climate change, or the uptake of adaptation actions. Some examples of the types of trends that could be measured in relation to flood risk include:

- Costs of damages to buildings and infrastructure from flooding
- Amount and type of development in flood risk areas
- Changes in area of urban greenspace and hard surfacing
- Uptake of structural flood defences
- Uptake of property level flood resilience/resistance measures
- Area of agricultural land flooded annually

These trends will need to be understood in order to assess the long-term effectiveness of the Welsh Government's adaptation programme in managing Wales' vulnerability to a changing climate. To help with this, the ASC and Welsh Government commissioned an initial scoping of a set of indicators that could be used to monitor such trends.[11] This identified where effort should be focussed to obtain relevant datasets.

The focus on capacity and decision-making is not unexpected given the stage of development of the plans. The next section sets out our advice on how best the Welsh Government's adaptation framework can progress up the preparedness ladder, drawing on our earlier review of plans elsewhere across the UK.

[11] AEA Technology (2011) *The provision of research to identify indicators for the Adaptation Sub-Committee – final report.* Available from: http://downloads.theccc.org.uk.s3.amazonaws.com/ASC%202nd%20Report/ED56687%20Final%20Report%20Issue%203_130711.pdf

Table 1. Delivery status for adaptation policies in the delivery plan	
Status of policies/programmes	**Relevant policies or programmes by ASC priority area**
Completed and published	**Land use planning** Guidance published to give **regeneration** projects information about how their master-plans for development should account for future climate, as well as providing criteria and principles relating to climate change 'proofing' that the Welsh Development Agency will consider in approving funding. **Buildings** Working group, comprised of the relevant authorities and stakeholders set up to promote **Sustainable Urban Drainage Systems** (SuDS) in Wales.[12] Provides guidance, resources and examples of SuDS sites in Wales. **Infrastructure** Water companies in Wales have voluntarily submitted reports to the Secretary of State (as water is a devolved matter). Welsh Water, for example, has incorporated the latest climate scenarios into water resource planning and has assessed resilience to potential climate impacts over the next 25 years. **Natural Resources** Woodlands for Wales Strategy recently refreshed to include the role of **woodlands and trees** in climate change adaptation (and mitigation). Actions include promoting the ability of trees to reduce temperatures by providing shade for people and buildings, particularly in urban areas, and their ability to help to reduce the pressure on urban drainage systems. Compendium of best practice examples of **biodiversity** adaptation in Wales published by the Countryside Council for Wales. **Emergency planning** The Environment Agency in Wales has been running a **flood awareness** programme over the last year and has visited over 62,000 properties in 160 of the most at risk communities in Wales. 92 per cent of the households and businesses

[12] http://www.sudswales.com/about/

Table 1. Delivery status for adaptation policies in the delivery plan	
Status of policies/programmes	**Relevant policies or programmes by ASC priority area**
	said their awareness of flooding had been raised, and over 17,500 confirmed they would take practical action to prepare for flooding as a result of the visit. Eight community flood plans are completed, a further 56 under development and have 200 communities interested in taking a community flood plan forward. Funding has been secured to continue roll out through 2012.
Nearly completed	**Land use planning** Lead Local Flood Authorities' **Local Flood Risk Management Strategies** are due in December 2011. **Buildings** **Building regulations** are due to be devolved to Wales from 2012 – the Delivery Plan states there will be consultation on regulations that address ventilation and energy performance throughout 2012 with implementation for 2013. The draft strategy on priorities for action in the **historic environment** is due by the end of 2011. **Infrastructure** The 22 **local transport plans** were replaced by 4 regional transport plans in 2010. For the first time in 2011 the annual progress report guidance produced by the regional transport consortia will include a review of climate change risks. This is due by end of 2011. **Natural resources** In the **Agriculture** sector the Glastir land management scheme will provide funding for measures such as improving water efficiency (rainwater collection, storage tanks etc), providing tree shelter belts for water inception, and creating wildlife corridors. This will be operational from 2012, though applications are being processed now. The **Natural Environment Framework**, which will address climate change and habitat management together, was consulted on in 2010.[13] The timetable for action (Feb 2011) indicates that proposals for delivery and any changes to regulatory arrangements will be set out by December 2011.

[13] http://wales.gov.uk/consultations/environmentandcountryside/eshlivingwalescons/?lang=en

Table 1. Delivery status for adaptation policies in the delivery plan	
Status of policies/programmes	**Relevant policies or programmes by ASC priority area**
	Emergency planning For **local authorities**, the Delivery Plan set out to build on the 'Changing Climate, Changing Places' (CCCP) programme to develop an adaptation model for local authorities in Wales. The three year CCCP project set out to identify what local authorities needed to do to make communities more resilient to the impacts of climate change and increase capacity of local authorities to address the consequences of climate change. An evaluation is now complete and the findings of the project are being used to develop a Climate Change Adaptation Local Authority Guide. This is due to be published in January 2012. The Delivery Plan includes one action within the **Business and Tourism** sector, to provide adaptation advice to businesses, to be delivered over 2010-2012. The Welsh Government's business advice website[14] provides information and tools for businesses to assess the risks from disruption. However, more targeted engagement with the business community is to form part of the Adaptation Knowledge Transfer programme (described under 'Strategic Actions') to be operational from late 2011 onwards.
Under consultation or further development	**Land use planning** The review of **Shoreline Management Plans** (SMPs) was due to be complete by March 2011. At this stage each of the SMPs have been reviewed/consulted on and new plans are being prepared and finalised. The **National Strategy for Flood and Coastal Erosion** which was due to be finalised in 2010 has been delayed as the consultation highlighted that a Strategic Environmental Assessment (SEA) should be carried out. This is now due to be published in 2011. **Infrastructure** Currently the Wales **Strategic Infrastructure Plan** is still under development **Natural resources** The Welsh Government consulted on Marine Plans between Feb and May 2011, seeking views on how **marine planning** should be approached in Wales and what needs to be considered as marine plans are developed over 2012/13.

[14] http://business.wales.gov.uk/bdotg/action/layer?site=230&topicId=1087319936

3. Advice on the formation and delivery of the Sectoral Adaptation Plans

From our work to date on the UK's preparedness, we have identified a number of key principles based on our ladder that could be applicable as the sectoral adaptation plans are developed.

Define and set out adaptation outcomes to address the risks and opportunities presented by climate change.

Ultimately the goal of adaptation is to materially reduce the costs and damages from climate change and enhance the opportunities in a cost-effective way. These can be expressed as conventional economic metrics (e.g. monetary damage from flooding), quality of life measures (e.g. number of people affected by drought) or environmental measures (e.g. species lost). The adaptation framework and sector plans should establish clear policy priorities for the most significant consequences facing Wales from climate change.

There will need to be a process for evaluating the effectiveness of the framework and sector plans in delivering these adaptation outcomes. Key to this will be understanding the trends in climate impacts affecting Wales and trends in the country's underlying vulnerability to climate risks.

Enable the early uptake of low-regret adaptation actions in the short term

The sector plans should identify the types of cost-effective, low-regret adaptation actions that can be taken up in the short term. These could include for example, installing water efficiency measures when replacement appliances required (i.e. end-of life) in residential buildings.

However, where there is not widespread take-up of such measures, it will be important that the sector plans also identify barriers to take-up and put in place mechanisms to remove them, such as incentives or regulation. Barriers could include insufficient information being available or short term objectives being prioritised over long term implications of climate change.

Ensure key decision-makers explicitly and systematically consider future climate risks and adaptation in long-term plans.

It is important that adaptation is not just 'name-checked' in policy, particularly for decisions that have long term consequences and/or irreversible impacts. The adaptation framework already characterises the key stakeholders each measure is relevant for and the range of other bodies that will jointly deliver some of the actions. It will be important that the sector plans ensure that the full range of actors including local authorities and communities, infrastructure providers, businesses and statutory agencies are factoring climate change into their decision-making. If there are gaps, then the Welsh Government should aim to consider how to enable and ensure long-term decision-making explicitly accounts for climate change.

Identify the potential benefits and opportunities from climate change

This could be relevant for all sectors, but particularly business and tourism.

Annex A: Request from the Welsh Government

The Welsh Government wrote to the Committee in March 2011 requesting advice on progress against the Welsh Government's Climate Change Strategy, published in October 2010. Specifically, the Committee was asked to:

1. Consider the latest emission data (2009) and contextual indicators to assess the impact on the baseline from which targets will be measured (2006-201015)

2. Draw out any implications from the more recent UK data (2010)

3. Assess the progress of implementation of measures outlined in the Strategy for each sector, specifically:
   a) Public and business sector
   b) Residential emissions
   c) Transport
   d) Agriculture, land use and waste
   e) Wider sectoral contributions, including Climate Change Engagement Strategy, where appropriate
   f) Adaptation

4. Provide recommendations on further actions and measures for both emission reduction and adaptation

[15] Although at this time only GHG emission data for 2006 – 2009 is available. 2010 data will be published in September 2012.