

Sustainability Committee

Annex A

Scoping Paper for the Committee's Carbon Reduction Scrutiny Inquiry

This paper outlines the suggested scope of a committee inquiry into carbon reduction, and summarises some of the current issues surrounding the subject.

1. Scope

The likely overall aim of the inquiry is to establish what action is necessary in order for Wales to meet or exceed its carbon reduction targets.

This may include the following:

- Conducting a review of legislation at the UK and European levels that has an impact on Wales' carbon dioxide emissions, and of good practice elsewhere that could be replicated in Wales.
- Examining the performance of Welsh Assembly Government policies and funding in reducing carbon dioxide emissions in line with a full contribution to UK-wide targets.
- Investigating which further means of reducing carbon dioxide emissions in Wales can only be delivered through the introduction of further legislative competence.
- Making recommendations about the next steps that could be taken by both the Welsh Assembly Government and the National Assembly for Wales in order to make more rapid progress on carbon dioxide emission targets.

On 13 February 2007, the First Minister stated in Plenary that:

The main categories of human activity in Wales in emitting carbon dioxide, in order of volume, are: electricity generation, at 40 per cent, manufacturing and construction combined, at 25 per cent, and then road transport and residential sectors at about 10 per cent each¹.

It is suggested that the inquiry will be broken down into the following phases to examine specific areas of activity that have the potential to reduce Wales' carbon dioxide emissions:

- Residential carbon reduction
- Carbon reduction by transport
- Carbon reduction by industry and public bodies
- Carbon reduction from electricity generation (including renewable energy)
- Rural land use management and carbon reduction

The inquiry could also examine the contribution of planning to carbon reduction. A report could be produced in response to each phase of inquiry.

¹ RoP, p.46, 13 February 2007,
<http://www.cynulliadcymru.org/bus-home/bus-chamber/bus-chamber-second-assembly/bus-chamber-second-assembly-rop/57fb7a9ea3e58592d26b15dcb9e9e6ea.pdf?langoption=3&ttl=Y%20Cofnod>



The Welsh Affairs Committee conducted an inquiry into Energy in Wales in 2006. The inquiry concentrated on energy production and energy supply issues including nuclear power, biomass, and wind, wave and solar energy. The Committee may like to take into account their conclusions during the inquiry.

In March 2007, the Expert Panel on Resources Management for Wales published detailed recommendations and an action plan for overcoming barriers to Wales becoming more resource efficient². It recommended that "resource efficiency is treated as a low carbon issue and that carbon footprint is adopted as the single key performance indicator". The Committee may like to take into account their conclusions during the inquiry.

² The Expert Panel on Resources Management for Wales, *Low carbon Wales: To improve resource efficiency in Wales*, http://www.swan.ac.uk/media/Media_14179.en.pdf

2. Carbon reduction in Wales

"By our actions we can limit climate change. However, we can do so only if we start to limit our CO₂ emissions now and in the next decade".

Professor Brian Hoskins, Royal Commission on Environmental Pollution³

The Welsh Assembly Government's climate change commitments are laid out in the Environment Strategy for Wales⁴:

Greenhouse gas emissions are minimised, consistent with Wales **contributing fully to meeting UK-wide targets** and in line with more specific Wales targets that are under development.
[emphasis added]

Since the publication of the Environment Strategy, there have been no announcements about 'more specific Wales targets'.

Prior to the elections for the Third Assembly, the First Minister ruled out annual carbon dioxide emission reduction targets because of the nature of the industrial sector in Wales; a year of low steel production, for example, would cause a reduction in emissions unrelated to energy conservation measures⁵. However, the One Wales document⁶ commits the Welsh Assembly Government to:

"...aim to achieve annual carbon-equivalent emissions reductions of 3 per cent per year by 2011 in areas of devolved competence. We will set out specific sectoral targets in relation to residential, public and transport areas. We will work with the heavy industry/power generation industries to reduce emissions in those sectors".

In 1997, the UK committed itself to a domestic target of reducing carbon dioxide emissions by 20 per cent below 1990 levels by 2010⁷. Since the one clear aim of the Environment Strategy's climate change mitigation section is to 'contribute fully to meeting UK-wide targets', one interpretation of this aim is that the Welsh Assembly Government has a target to reduce Welsh carbon dioxide emissions by 20 per cent below 1990 levels by 2010.

Figure 1 shows the performance of the UK countries in reducing carbon emissions over the period 1990-2004. Note that emissions in Wales and Northern Ireland have increased over that period.

³ Scottish Parliament, *Environment and Rural Development Committee Official Report 26 January 2005*, <http://www.scottish.parliament.uk/business/committees/environment/or-05/ra05-0302.htm#Col1525>

⁴ Welsh Assembly Government, *Environment Strategy for Wales*, May 2006, p.21, http://new.wales.gov.uk/topics/environmentcountryside/epg/Environment_strategy_for_wales/About_the_strategy/?lang=en

⁵ RoP pp.31-32, 12 June 2007, <http://www.cynulliadcymru.org/bus-home/bus-chamber/bus-chamber-third-assembly-rop.htm?act=dis&id=52854&ds=2007/6>

⁶ Labour and Plaid Cymru, *One Wales: A progressive agenda for the government of Wales*, June 2007, http://news.bbc.co.uk/1/shared/bsp/hi/pdfs/27_06_07_onewales.pdf

⁷ DEFRA, *Progress towards national and international targets*, <http://www.defra.gov.uk/environment/climatechange/uk/progress/index.htm>

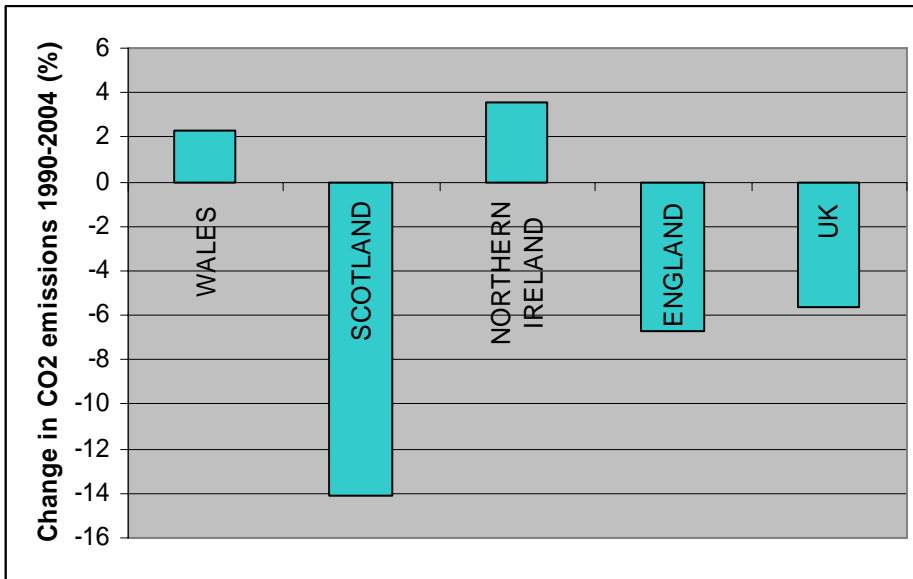


Figure 1 Change in CO₂ emissions over the period 1990-2004

In the last year for which information is available (2004), carbon dioxide emissions in Wales were 15.6 per cent higher than they would need to be if Wales were to meet its 'full contribution' to the UK's carbon dioxide emission reduction target⁸.

In order to meet the 2010 emissions target, Welsh emissions need to reduce by 4.1 per cent per year between 2005 and 2010. This emission reduction path is shown in Figure 2, along with the actual carbon dioxide emissions up to 2004, and the 'desired emissions' path (the declining path of emissions that would have been required since 1997 in order to reach the 2010 target). The value for 1997 that has been used is the point on the trend line between the values for 1995 and 1998.

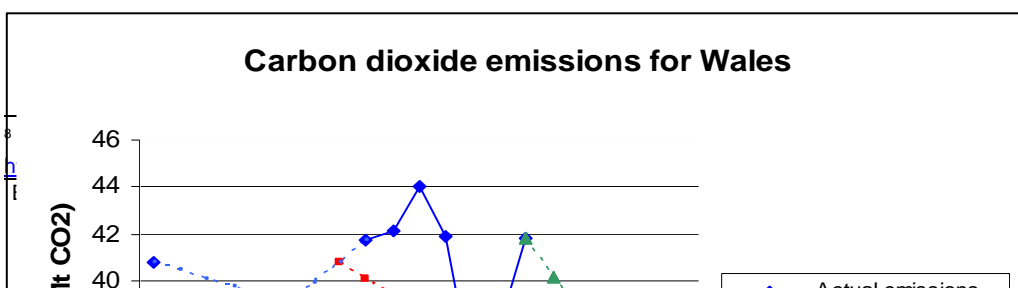


Figure 2 Carbon dioxide emissions for Wales: actual, desired, and required

Actual emissions: Baggot L et al., 2005. *Greenhouse Gas Inventories for England, Scotland, Wales and Northern Ireland: 1990-2004*, http://www.airquality.co.uk/archive/reports/cat07/0611081428-419_Reghg_report_2004_Main_Text_Issue_2.pdf

Desired and Required emissions calculated by MRS

A study in Oxfordshire identified carbon reduction as a social equity issue. It determined that 61 per cent of transport emissions were produced by the highest-emitting quintile, and less than 1 per cent by the lowest-emitting quintile⁹. The same study determined that people earning more than £40,000 produce 3.6 times as much carbon emissions from transport as those earning less than £10,000¹⁰.

"Let me put it this way. If you have 100 per cent of the economy's greenhouse gas emissions covered by trading schemes, then you would guarantee that you would live within your means".

David Miliband, Former Secretary of State for the Environment¹¹

⁹ Brand C et al., 2006. *Counting your carbon: The development and deployment of integrated travel emissions profiles*, Transport Studies Unit, University of Oxford, http://www.tsu.ox.ac.uk/research/oxontravel/reports/ea_rep_short_final_incl_AnnexA.pdf

¹⁰ Brand C, 2006. *Integrated travel emissions profiles: Case study report*, Transport Studies Unit, University of Oxford, http://www.tsu.ox.ac.uk/research/oxontravel/reports/ESRC_ITEP_rep3_final.pdf

¹¹ House of Commons, *Select Committee on Environment, Food and Rural Affairs: Examination of witnesses*, <http://www.publications.parliament.uk/pa/cm200607/cmselect/cmenvfru/534/7052315.htm>

3. Residential carbon reduction

'Housing' is field 11, and 'Town and country planning' is field 18, of Schedule 5 of the *Government of Wales Act 2006*.

The residential sector is thought to account for about 10 per cent of the carbon dioxide emissions in Wales¹². Around two-thirds of the housing stock that will be standing in 2050 is likely to have been built before 2005¹³; the average existing home requires four times the energy to heat as one built to the latest building regulations¹⁴. In 2004, approximately 84 per cent of domestic energy was used on space and water heating (61 per cent for space heating and 23 per cent for hot water)¹⁵.

All new buildings funded or built on land disposed of by the Welsh Assembly Government must now meet the BREEAM Ecohomes Excellent environmental standard¹⁶.

In 2004, residential customers in Wales consumed 5,600GWh of electricity¹⁷. Of the total residential electricity consumption, the proportions used by different types of usage are as follows: miscellaneous appliances 21 per cent, cold¹⁸ appliances 18 per cent, internal lighting 16 per cent, consumer electronics 16 per cent (of which two-fifths is from televisions), cooking 15 per cent (more than one-quarter of which is from kettles), and wet¹⁹ appliances 14 per cent²⁰. The standby facility is responsible for an estimated 6 per cent of domestic electricity consumption²¹. By 2020, home computers and consumer electronics are projected to account for 45 per cent of electricity used in the home²².

Energy consumption for lighting has increased by 63 per cent between 1970 and 2000, and by 11 per cent between 1990 and 2000, mainly due to the shift from rooms being lit by single ceiling bulbs towards multi-source lighting²³. The UK Government is currently looking to implement a ban on the sale of incandescent bulbs by 2011.

¹² RoP, p.46, 13 February 2007,

<http://www.cynulliadcymru.org/bus-home/bus-chamber/bus-chamber-second-assembly/bus-chamber-second-assembly-rop/57fb7a9ea3e58592d26b15dcb9e9e6ea.pdf?langoption=3&ttl=Y%20Cofnod>

¹³ DCLG, *Review of sustainability of existing buildings*, November 2006,

http://www.communities.gov.uk/pub/291/TheEnergyEfficiencyofDwellingsInitialAnalysis_id1506291.pdf

¹⁴ DEFRA, *UK energy efficiency action plan 2007*,

http://ec.europa.eu/energy/demand/legislation/doc/neeap/uk_en.pdf

¹⁵ DBERR, *Domestic energy consumption by end use, 1970 to 2005*,

http://stats.berr.gov.uk/energystats/ecuk3_6.xls

¹⁶ DEFRA, *UK energy efficiency action plan 2007*,

http://ec.europa.eu/energy/demand/legislation/doc/neeap/uk_en.pdf

¹⁷ DTI, *Digest of United Kingdom energy statistics 2006*,

http://www.dtistats.net/energystats/dukes06_c5.pdf

¹⁸ Fridges, fridge freezers, and freezers

¹⁹ Washing machines, washer/driers, and dishwashers

²⁰ DTI, *Digest of United Kingdom energy statistics 2006*,

http://www.dtistats.net/energystats/dukes06_c5.pdf

²¹ DTI and National Statistics, *Energy consumption in the United Kingdom*, July 2002,

<http://www.berr.gov.uk/files/file11250.pdf>

²² Energy Saving Trust, *The ampere strikes back: How consumer electronics are taking over the world*,

<http://www.energysavingtrust.org.uk/uploads/documents/aboutest/TheAmpereStrikesBack%2024thJuly07.pdf>

²³ DTI and National Statistics, *Energy consumption in the United Kingdom*, July 2002,

<http://www.berr.gov.uk/files/file11250.pdf>

The main means of reducing the carbon dioxide burden from dwellings currently being used are the following:

Welsh Assembly Government

- Reducing demand for space heating in existing buildings, through **grants or other financial incentives** and awareness-raising about improving insulation.
- Changing the **energy source** for space and water heating to more carbon-efficient sources (encouraging the penetration of the **gas network** throughout Wales – determined by negotiation with private companies; improving the supply infrastructure and consumption of **biomass heating** – determined by the Welsh Assembly Government through grants, and through negotiation with the private sector)

UK Government

- Reducing demand for space heating in new buildings, by requiring better standards of insulation through **Building Regulations**.
- Increasing the use of **renewable energy** in **new-build dwellings** (minimum level (currently nil) determined by the UK Government under Building Regulations, but local authorities may be able to vary the requirement for renewable energy)
- Changing the **energy source** for space and water heating to more carbon-efficient sources (encouraging the uptake of **renewable space and water heating** sources – assisted via the UK Government through grants or other financial incentives)
- Legislating to **ban energy-inefficient appliances** (such as filament light bulbs – currently determined by the EU and UK Government, but possible scope for legislative competence; Italy is planning to ban the sale of appliances that are not A-rated for energy efficiency)

Europe

- Reducing the **energy demand of appliances** (reducing stand-by energy use, and legislating for improved minimum standards for energy-efficiency – both determined by the EU)
- Legislating to **ban energy-inefficient appliances** (such as filament light bulbs – currently determined by the EU and UK Government, but possible scope for legislative competence; Italy is planning to ban the sale of appliances that are not A-rated for energy efficiency)

The former Environment, Planning & Countryside Minister announced an aspiration in Plenary on 13 February 2007 that all new buildings would be carbon neutral by 2011 and stated that the Welsh Assembly Government would be opening negotiations with the UK Government with a view to seeking devolution of building regulations²⁴.

²⁴ Welsh Assembly Government, Carwyn Jones AM, Minister for Environment, Planning & Countryside, *Sustainable Buildings*, Cabinet Oral Statement, 13 February 2007
<http://new.wales.gov.uk/about/cabinet/cabinetstatements/cabinetstates2007/1257479/?lang=en>



The Assembly Government launched a consultation on the draft *Planning Policy Statement: Planning and Climate Change*, in December 2006²⁵. One of the aims of the statement is to provide leadership to local authorities, which will start to influence how they consider stepping up the standards of development by the private sector beyond those in current building regulations.

²⁵ Welsh Assembly Government, *Planning Policy Statement, Planning for Climate Change*, Consultation draft, December 2006
<http://new.wales.gov.uk/consultations/closed/planclocons/1193217/?lang=en>

4. Carbon reduction by transport

"Mitigation of climate change in the transport sector will require a reduction in the demand for travel, in particular for the most carbon-intensive modes, i.e. car and air".

Dr Christian Brand, University of Oxford Transport Studies Unit²⁶

'Highways and transport' is Field 10 of Schedule 5 of the *Government of Wales Act 2006*.

Travel comprised 43 per cent of average per capita carbon emissions in 2005²⁷. Of this total, 67 per cent is personal car travel, 28 per cent is holiday air travel, and 5 per cent is 'other travel'. According to the Eddington Review, transport pricing should better reflect the carbon impacts of travel²⁸.

Higher carbon modes of transport (air and motoring) have become relatively cheaper than lower carbon modes (bus and rail), and highest carbon cars are taxed disproportionately lightly²². The Department for Transport's policy performance on carbon emission reduction has been described by the House of Commons Environmental Audit Committee as 'not nearly good enough'²².

Road transport

Road transport accounts for approximately 16 per cent of the total carbon dioxide emissions in Wales²⁹, and passenger cars are estimated to account for more than 60 per cent of the carbon emitted by transport activities³⁰. Transport is the most rapidly growing source of emissions³¹, it is the only sector in which emissions have been rising consistently since 1990, and emissions in the sector are projected to carry on rising³². The average annual distance travelled by car increased by around three per cent between 1995-97 and 2005³³. Total road traffic was forecast to grow by 17 per cent between 2000 and 2010³⁴.

Carbon dioxide emissions from private transport increase as speed increases above 60mph³⁵ (see Figure 3), and are also greater at very low speeds. Assuming a 5 per cent share of UK road traffic in Wales, research indicates:

²⁶ Brand C et al., 2006. *Counting your carbon: The development and deployment of integrated travel emissions profiles*, Transport Studies Unit, University of Oxford,

http://www.tsu.ox.ac.uk/research/oxontravel/reports/eoa_rep_short_final_incl_AnnexA.pdf

²⁷ DEFRA, *UK energy efficiency action plan 2007*,

http://ec.europa.eu/energy/demand/legislation/doc/neeap/uk_en.pdf

²⁸ Department for Transport, *Transport's role in sustaining UK's productivity and competitiveness: The case for action*, December 2006, <http://www.dft.gov.uk/162259/187604/206711/volume3>

²⁹ In 2005, road transport in Wales used 1.94 million tonnes of fuel (DBERR: <http://www.berr.gov.uk/files/file40201.xls>). 1.94 million tonnes = 2.62 billion litres of fuel. Total CO₂ emissions = 3.07 + 3.51 = 6.58 million tonnes (see calculation below for further details)

³⁰ In 2005, passenger cars in Wales used 982,000 tonnes of petrol and 237,000 tonnes of diesel (DBERR:

<http://www.berr.gov.uk/files/file40201.xls>). 1 litre of either fuel weighs 0.74kg, so the litres used of petrol were 1.33 billion and diesel 320 million. Petrol emits 2.31kg CO₂ per litre, diesel 2.68kg CO₂ per litre. Total CO₂ emissions in 2005 were 3.07 + 0.86 = 3.93 million tonnes. Total transport emissions were approximately 6.45 million tonnes (5 per cent of UK transport emissions excluding international aviation and shipping: <http://www.dft.gov.uk/pgr/statistics/datatablespublications/energyenvironment/tsqbchapter3energyandtheenvi1863>)

³¹ DEFRA, *Key Facts About: Global Atmosphere*,

<http://www.defra.gov.uk/environment/statistics/globalatmos/kf/gakf07.htm>

³² House of Commons Environmental Audit Committee, *Reducing Carbon Emissions from Transport*, <http://www.publications.parliament.uk/pa/cm200506/cmselect/cmenvaud/981/981-i.pdf>

³³ Department for Transport, *National Travel Survey 2005*,

http://www.dft.gov.uk/stellent/groups/dft_transstats/documents/downloadable/dft_transstats_612469.pdf

³⁴ Department for Environment, Transport and the Regions, *Transport Ten Year Plan 2000: Background Analysis*,

http://www.dft.gov.uk/stellent/groups/dft_about/documents/pdf/dft_about_pdf_503943.pdf

³⁵ UK Energy Research Centre, *Getting the genie back in the bottle: Limiting speed to reduce carbon emissions and accelerate the shift to low carbon vehicles*, January 2006,

- Strict enforcement of the 70mph speed limit on motorways would cut carbon dioxide emissions by 183,000 tonnes per annum (54 per cent of cars exceed the speed limit on motorways³⁶).
- Reducing the maximum speed limit to 60mph would cut carbon dioxide emissions by 345,000 tonnes per annum³⁷.

National road speed limits are a reserved matter.

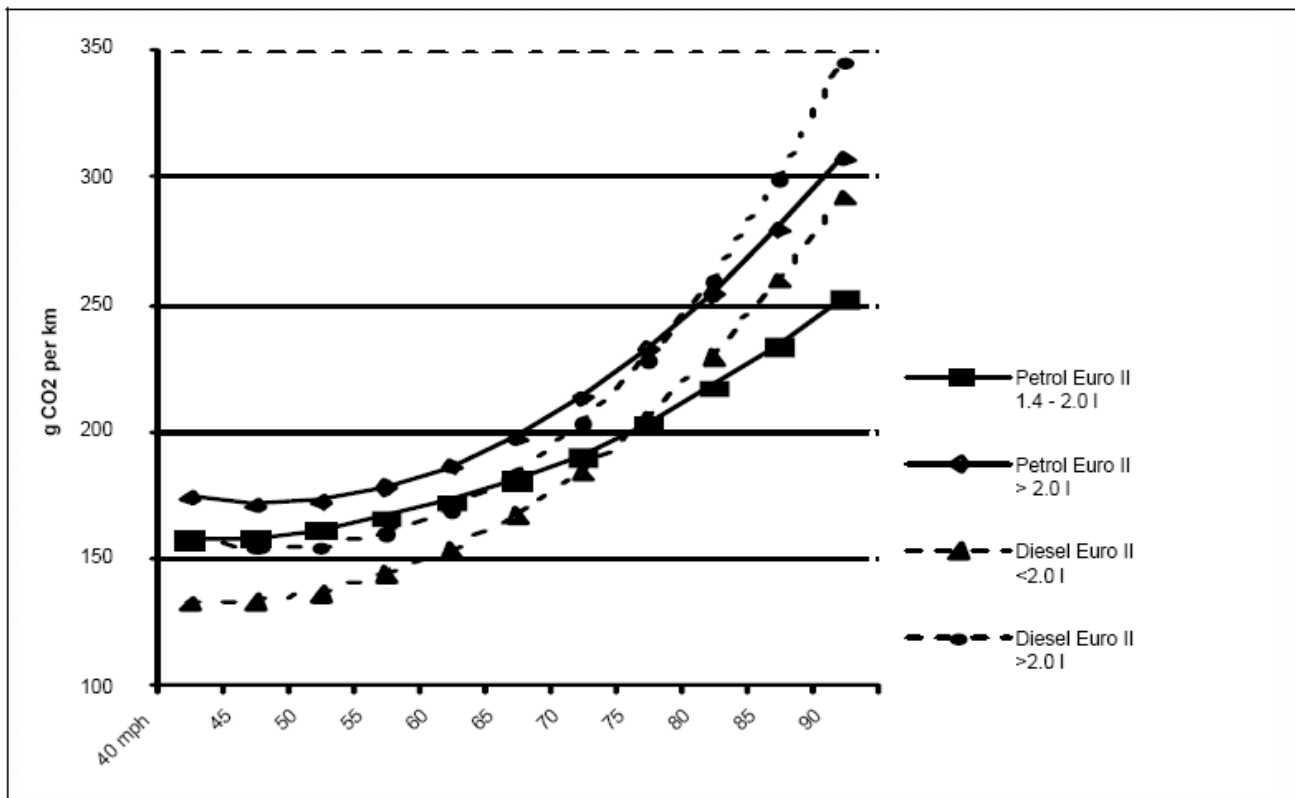


Figure 3 Changes in carbon dioxide emissions with speed (source: NETCEN National Atmospheric Emissions Inventory)

The key factors in encouraging walking and cycling are an overall reduction in motorised transportation and a reduction in the speed of remaining vehicles in urban areas³⁸. Powers to restrict speed in urban areas are currently available to local authorities and their traffic partners, through planning techniques such as 'home zones'³⁹, and through speed limit restrictions and enforcement.

The biggest currently used drivers of reducing the carbon dioxide emissions from road transport are:

www.ukerc.ac.uk/component/option.com_docman/task.doc_download/gid.807/

³⁶ Department for Transport, *Statistical release on vehicle speeds in Great Britain: 2006*,

<http://www.dft.gov.uk/pgr/statistics/datatablespublications/roadstrafficspeedscongestion/vehiclespeeds/gb/statrelease06>

³⁷ UK Energy Research Centre, *Getting the genie back in the bottle: Limiting speed to reduce carbon emissions and accelerate the shift to low carbon vehicles*, January 2006,

www.ukerc.ac.uk/component/option.com_docman/task.doc_download/gid.807/

³⁸ British Medical Association, *Memorandum by the British Medical Association: Walking in towns and cities*, January 2001,

<http://www.parliament.the-stationery-office.co.uk/pa/cm200001/cmselect/cmenvtra/167/167ap15.htm>

³⁹ Home Zones,

<http://www.homezones.org/homeUK.html>

Welsh Assembly Government

- **Improving safe provision and connectivity of routes for cyclists and pedestrians** (determined by the Welsh Assembly Government)
- **Substituting road transport with rail and bus** (incentivising the transport of freight by train – determined by UK Government; improving the Welsh railway system – determined by a partnership of the Welsh Assembly Government, the Train Operating Companies and Network Rail; improving Welsh bus transport – determined by a partnership of the Welsh Assembly Government and bus companies)

UK Government

- **Reducing demand for driving** (awareness-raising, provision of alternatives, and using the planning system to reduce demand – all determined by the Welsh Assembly Government; introducing traffic demand management systems such as congestion charging – determined by local authorities; increasing fuel duty – determined by the UK Government)
- **Reducing the portion of private travel that takes place at higher-emission speeds** – both low and high speeds (enforcing speed limits on motorways – determined by police authorities; improving the flow of traffic in congested areas – influenced by many of the other options described in this section)
- **Reducing demand for fuel-inefficient vehicles**, and increasing demand for fuel-efficient models (increasing the tax levied on road transport fuel, and varying the Vehicle Excise Duty on cars, depending on their fuel efficiency – determined by the UK Government)
- **Incorporating surface transport into the EU Emissions Trading Scheme** (the UK Government is currently examining this possibility)

Europe

- **Increasing the fuel efficiency of private transport** (driving down the gCO₂/km value for new cars – determined by the EU)
- **Decreasing the fossil fuel component of transport fuel** (increasing the proportion of fuel from renewable and non-fossil sources – determined by the EU. Concerns have been raised over the sustainability of this approach⁴⁰)

The *Transport (Wales) Act 2006* places a duty on the Welsh Assembly Government to promote safe, integrated, sustainable, efficient and economic transport as well as a statutory requirement to produce a Wales Transport Strategy. A consultation draft of the **Wales Transport Strategy Connecting Wales**⁴¹ was published in July 2006. One of the strategy's three themes is to achieve greater use of the more sustainable and healthy forms of travel and specifically a reduction in single-occupancy car

⁴⁰ Many organisations have raised concerns. This leaked memo is an example of the concern among officials of DBERR. Leaked memo, *Draft options paper on renewables target*, <http://www.endseuropedaily.com/docs/70815a.pdf>

⁴¹ Welsh Assembly Government, *Connecting Wales*, July 2006
[Connecting Wales](#)

use. A final version of the strategy is due to be published later in 2007. Each of the four regional transport consortia is also preparing a regional transport plan.

The Welsh Assembly Government set out its plans for the future maintenance and improvement of trunk roads in Wales in the March 2002 report, *Trunk Road Forward Programme*. Following a review of Transport Policy in 2004, the Assembly Government issued updated information on the programmes⁴². This updated information was integrated into four priority phases as follows:

- 'Phase 1' – programmes due to start by March 2007;
- 'Phase 2' – programmes that could be ready to start by April 2010;
- 'Phase 3' – programmes that are unlikely to start before April 2010, and;
- 'On hold' – recognised programmes that have no proposed start dates.

The M4 Magor to Castleton scheme (Newport bypass) is currently in Phase 2.

Air transport

Air transport is undergoing the most rapid increase of any transport sector: even under the Department for Transport's best case scenario for carbon emissions, aviation will account for a quarter of the UK economy's "entire capacity to emit carbon" by 2050⁴³. The rapid growth of air traffic throughout the world has been described by the Sustainable Development Commission as one of the most severe threats to the global environment today⁴⁴. Passenger growth at Cardiff International Airport in the ten years to 2002 was 9.8 per cent per annum⁴⁵, greater than the UK regional average.

The climate impacts associated with air transport are more severe than those associated with emissions at ground level. Most commentators apply a multiplication factor of 2.7 to aviation emissions to cover the radiative forcing effect of emissions at high altitudes⁴⁶.

Demand management is currently the only realistic means of limiting the carbon dioxide emissions from air transport, principally through price signals (determined by UK Government). Evidence indicates that price affects the demand for flying, in particular for non-business trips⁴⁷.

⁴² Welsh Assembly Government, *Trunk Road Forward Programme*
<http://new.wales.gov.uk/topics/transport/roads/?lang=en>

⁴³ House of Commons Environmental Audit Committee, *Reducing Carbon Emissions from Transport*,
<http://www.publications.parliament.uk/pa/cm200506/cmselect/cmenvaud/981/981-i.pdf>

⁴⁴ Sustainable Development Commission, *Missed Opportunity: A Critique of the Air Transport White Paper*,
<http://www.sd-commission.org.uk/publications/downloads/Missed%20Opportunity-Combined.pdf>

⁴⁵ Department for Transport, December 2003, *The Future of Air Transport: Key Facts – Wales*,
http://www.dft.gov.uk/stellent/groups/dft_aviation/documents/page/dft_aviation_031526.pdf

⁴⁶ Anderson K et al, 2006, *Growth scenarios for EU and UK aviation: Contradictions with climate policy*, Tyndall Centre for Climate Change Research, January 2006,
http://www.tyndall.ac.uk/publications/working_papers/wp84.pdf

⁴⁷ Brons M et al, 2002. Price elasticities of demand for passenger air travel: a meta-analysis, *Journal of Air Transport Management*, 8 (3), 165-175.

5. Carbon reduction by industry and public bodies

The large industrial sector accounts for approximately 28 per cent of the emissions in Wales⁴⁸. In 2004, industrial and commercial customers in Wales consumed nearly 11,000GWh of electricity⁴⁹. The public sector in the UK is responsible for 8 per cent of carbon dioxide emissions⁵⁰. 25 per cent of the public sector's total carbon footprint is accounted for by activities in buildings⁵¹; 56 per cent of the energy consumed by commercial and public buildings is used for heating, and 15 per cent for lighting⁵².

All new buildings funded or built on land disposed of by the Welsh Assembly Government must now meet the Ecohomes Excellent environmental standard⁵³.

'Economic development' is field 4, 'Local government' is field 12, and 'Public administration' is field 14 of Schedule 5 of the *Government of Wales Act 2006*.

The main currently used means of reducing the carbon dioxide emissions from industry and public bodies are the following:

Welsh Assembly Government

- Encouraging the implementation of continually improving **Environmental Management Systems** in industry and public bodies, in order to reduce their environmental impacts (the Welsh Assembly Government has a role in encouraging uptake of free advice schemes, and raising awareness of financial savings).
- Changing the **energy source** for space and water heating to more carbon-efficient sources (encouraging the penetration of the **gas network** throughout Wales – determined by negotiation with private companies; improving the supply infrastructure and consumption of **biomass heating** – determined by the Welsh Assembly Government through grants, and through negotiation with the private sector).
- Improving the **environmental efficiency** of working (promoting the use of tele- and video-conferencing, introducing more flexible working patterns, promoting working from home)
- The public sector in particular has a role in stimulating demand for environmentally beneficial products through its **procurement** activities (Welsh Assembly Government and local authorities)

UK Government

⁴⁸ Calculated from EUETS submissions

⁴⁹ DTI, *Digest of United Kingdom energy statistics 2006*,

http://www.dti.gov.uk/energy/energy_stats/dukes06_c5.pdf

⁵⁰ DEFRA, *UK energy efficiency action plan 2007*,

http://ec.europa.eu/energy/demand/legislation/doc/neeap/uk_en.pdf

⁵¹ *ibid*

⁵² Pout C et al, 2002. *Carbon dioxide emissions from non-domestic buildings: 2000 and beyond*. BRE: Watford, England.

⁵³ DEFRA, *UK energy efficiency action plan 2007*,

- Increasing the use of **renewable energy** in new developments (minimum level (currently nil) determined by the UK Government under Building Regulations, but local authorities may be able to vary the requirement for renewable energy)

One of the factors influencing Wales' high per capita emissions is the presence of energy-intensive industry. Port Talbot Steelworks, for example, accounts for approximately 16 per cent of all carbon emissions in Wales⁵⁴. Improving the carbon efficiency of the biggest emitters has a large impact on Wales' emissions. The largest carbon dioxide emitters in Wales are captured under the **EU Emissions Trading Scheme** (EUETS), and have carbon reduction targets appertaining to that scheme. A total of 61 installations in Wales are members of the EUETS, representing about 56 per cent of total emissions from Wales, however, only 39 Scheme members emitted carbon dioxide in 2006. Emissions in 2006 were 3 million tonnes in excess of the allowance⁵⁵, although the scheme is estimated to have saved 1.3 million tonnes of carbon dioxide per year for each of the three years of the current scheme. The details of the 39 EUETS emitters are shown in Table 1.

Table 1 Welsh emitters captured under the EUETS, with their emissions in 2005 and 2006

Installation Name	Installation Type ⁵⁶	CO2 Emissions (tonnes)	
		2005	2006
Aberthaw Power Station	Electricity generation	5,264,973	7,340,340
Port Talbot Steelworks	Industry	6,132,851	6,589,194
Connahs Quay Power Station	Electricity generation	3,434,321	3,158,476
Chevron Limited - Pembroke	Industry	2,320,641	2,251,765
Total Milford Haven Refinery	Industry	1,038,345	1,234,371
Baglan Bay Power Station	Electricity generation	1,104,318	1,142,501
Uskmouth Power Plant	Electricity generation	993,930	866,925
Deeside Power Station	Electricity generation	978,825	640,379
Padeswood Works	Industry	300,016	623,006
Shotton Combined Heat and Power Station	Industry	542,497	485,252
Barry Power Station	Electricity generation	321,303	237,008
Kronospan Ltd	Industry	82,971	104,287
Celsa Manufacturing (UK) Limited	Industry	56,197	63,051
Point of Ayr Terminal	Industry	57,581	54,992
UPM-Kymmene (UK) Ltd	Industry	51,947	46,010
Airbus UK Ltd	Industry	34,189	35,154
Corus Packaging Plus UK	Industry	39,745	35,111
Pont-y-Felin Insulation	Industry	33,189	31,539
Solutia UK Limited - Newport	Industry	26,765	28,377
Warwick International Ltd - Mostyn	Industry	26,440	23,241
Corus UK Ltd	Industry	22,049	21,625
Alphasteel Limited	Industry	20,978	20,889
Novera Energy Mines Gas Generation Plant	Industry	18,828	15,160
Bridgend Boiler House (Ford)	Industry	12,620	12,040
University Hospital of Wales	Public	9,664	9,548
Visteon Swansea - Boiler House	Industry	8,014	8,074
RF Brookes - Rogerstone Park	Industry	7,319	7,912
District Energy Ltd	Industry	5,697	6,183

http://ec.europa.eu/energy/demand/legislation/doc/neeap/uk_en.pdf

⁵⁴ Calculated from EUETS submissions

⁵⁵ Environment Agency Wales, *Response to an information request*.

⁵⁶ Type assessed by MRS



Solutia Generating Plant - District Energy Ltd	Industry	5,666	5,597
Corus Colors	Industry	7,189	5,459
Morrison Hospital	Public	5,641	5,386
RAF St Athan	Public	7,542	5,367
Dennis Ruabon Tiles Ltd	Industry	3,320	3,002
Bro Morgannwg NHS Trust - PoW Hospital	Public	2,945	2,889
South Cornelly Power Station	Electricity generation	2,262	2,790
Celsa Manufacturing (UK) Ltd - New Melt Shop ⁵⁷	Industry		2,775
Dynevor Arms LNG Storage Facility	Industry	2,552	2,512
Magnox Electric Ltd - Wylfa	Electricity generation	909	640
Cardiff IDC	Industry	57	264
Total		22,984,297	25,129,091

The total carbon dioxide emissions by sector for Welsh installations captured by the EUETS are:

Electricity generation – 13,389,059 tonnes
 Industry – 11,716,842 tonnes
 Public – 23,190 tonnes

For the EUETS establishments, more than half of the industrial output of carbon dioxide is accounted for by Port Talbot Steelworks, and more than half of the output of carbon dioxide from electricity generation is accounted for by Aberthaw power station. Together, these two installations account for approximately 33 per cent of Welsh emissions.

⁵⁷ Joined Scheme in 2006 as a 'New Entrant'

6. Carbon reduction from electricity generation (including renewables)

Energy does not appear as a separate field in Schedule 5 of the *Government of Wales Act 2006*. Oil and gas (apart from pollution); the generation (>50MW), transmission and supply of electricity (apart from pollution); and energy conservation (apart from the encouragement of energy efficiency otherwise than by prohibition or regulation) are all UK Government reserved matters.

The electricity generation sector accounts for approximately 32 per cent of the carbon dioxide emissions in Wales⁵⁸. In order to obtain large reductions in Welsh emissions, in addition to substantially **increasing energy efficiency measures**, it will be necessary to move towards **lower-emission methods of electricity generation**, including tidal and wave, biomass, solar, wind, and landfill gas⁵⁹.

A total of 8 per cent of electricity generated was lost in 2005⁶⁰. Of this total, 19 per cent was lost through high voltage transmission systems, 76 per cent through distribution, and 5 per cent through theft and meter fraud. Reducing demand for electricity will reduce the need for transmitting electricity, and thereby reduce the losses associated with centralised electricity generation.

One of the factors influencing Wales' high per capita emissions is the presence of carbon-intensive electricity generators which produce more electricity than Wales uses; Wales is an exporter of electricity. Aberthaw power station, for example, accounts for 18 per cent of all carbon emissions in Wales⁶¹. Improving the carbon efficiency of the biggest emitters has a large impact on Wales' emissions. The largest carbon dioxide emitters in Wales are members of the **EU Emissions Trading Scheme**, and have carbon reduction targets appertaining to that scheme (see section 5).

Renewable energy generation

The **Energy Wales Route Map** consultation⁶² contains commitments to secure 4TWh* per annum of renewable electricity production by 2010 and 7TWh by 2020, and, on a holistic basis, to achieve measurable carbon dioxide emission reduction targets for 2020. The Welsh Assembly Government has indicated that it will publish its energy policy document after the Sustainable Development Commission has completed its **report into tidal renewable energy** (expected in autumn 2007). The UK Government's **Marine Bill** White Paper has implications for the development of marine renewables in Wales.

*TWh
= TeraWatt hour
= one billion
kiloWatt hours
of electricity

The 4TWh target requires the installation of renewable energy capacity of about 1,500MW; the installed capacity by the end of 2005 was 526MW⁶³. Of the remaining 1,000MW, the Welsh Assembly Government expects 80 per cent to come from onshore wind, and the rest from offshore wind and

⁵⁸ Calculated from EUETS submissions

⁵⁹ WWF and Stockholm Environment Institute, *Reducing Wales' ecological footprint*, http://www.wwf.org.uk/filelibrary/pdf/ef_rdcngwales_full.pdf

⁶⁰ DTI, *Digest of United Kingdom energy statistics 2006*, http://www.dti.gov.uk/energy/gystats/dukes06_c5.pdf

⁶¹ Calculated from EUETS submissions

⁶² Welsh Assembly Government, *Energy Wales: Route map to a clean, low-carbon and more competitive energy future for Wales*, 2005, <http://new.wales.gov.uk/docrepos/40382/4038231141/40382112412/energyroutemape.pdf?lang=en>

⁶³ DTI, *Energy Trends*, September 2006, <http://www.dti.gov.uk/files/file34201.pdf>

other renewables⁶⁴. Figure 4 shows progress in meeting the 4TWh target⁶⁵ (note that the 'actual' curve is expected to depart substantially from the 'required' curve when figures for 2006 are published in December 2007).

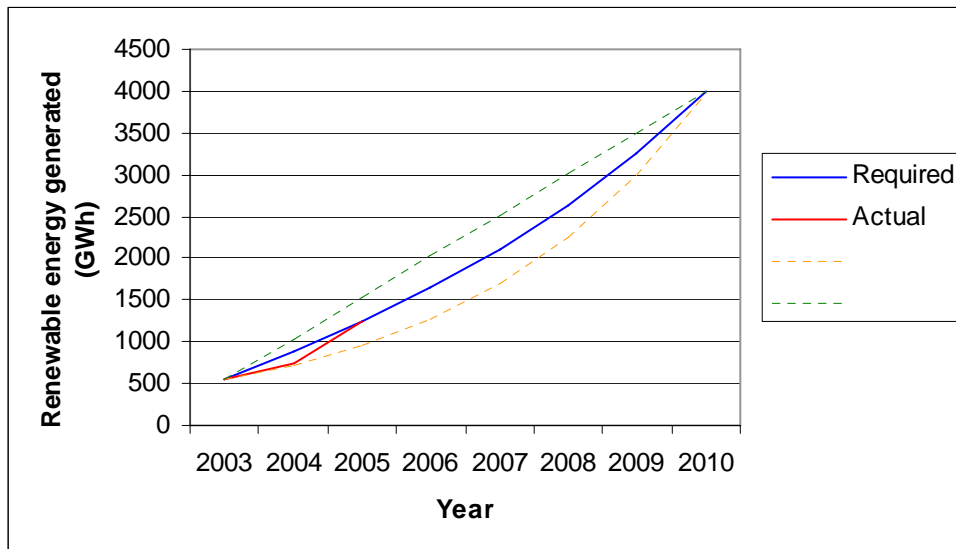


Figure 4 Progress in meeting the 4TWh target for renewable energy generation

Actual generation: 2003 and 2004 from DTI, *Other fuels at regional and local authority level*,

<http://www.dti.gov.uk/energy/statistics/regional/other/page36195.html>, 2005 from DTI, *Energy Trends*, September 2006, <http://www.dti.gov.uk/files/file34201.pdf>

Required generation calculated by MRS as an average of compound and linear increase in generation⁶⁶

According to the DTI, renewable energy provided 4 per cent of all electricity generated in Wales in 2005⁶⁷. The total of 1,233GWh comprised 281GWh of hydropower, 715GWh wind and wave power, 176GWh of landfill gas, and 61GWh of other biofuels⁶⁸. Wind power in Denmark fulfils 20 per cent of national energy requirements⁶⁹.

A memo from officials to UK Ministers notes that the UK 2020 renewables target to be implemented by the EU in December is likely to be 9-16 per cent because "the UK has achieved little so far on renewables"⁷⁰. The memo also noted that current policies are expected to deliver around a 5 per cent share of energy for renewables by 2020.

⁶⁴ Welsh Assembly Government, *Technical Advice Note 8: Planning for Renewable Energy*, July 2005, http://new.wales.gov.uk/docrepos/40382/4038231121/403821/403821/40382/TAN_8/tan8-pages1-21-e.pdf?lang=en

⁶⁵ Note that renewable energy generation figures were not disaggregated from UK figures until 2003. Figures for 2006 will be published in December 2007.

⁶⁶ This method of calculation provides the best match for the renewable energy generation history in Wales, and gives a profile that allows for . The dotted series represent a linear increase (green) and a compound increase (orange), which require increases to be large either early or later in the series.

⁶⁷ DTI, *Energy Trends*, December 2006, <http://www.dti.gov.uk/files/file36183.pdf>

⁶⁸ DTI, *Energy Trends*, September 2006, <http://www.dti.gov.uk/files/file34201.pdf>

⁶⁹ Danish Wind Industry Association, *Did you know?*, <http://www.windpower.org/en/didyouknow.htm>

⁷⁰ Memo, *Draft options paper on renewables target*, <http://www.endseuropedaily.com/docs/70815a.pdf>

Technical Advice Note (TAN) 8⁷¹ provides technical detail on the land use planning considerations of renewable energy, with the delivery of the Route Map targets forming the core of the Technical Advice Note.

In 2005, there were 82,000 microgeneration installations across the UK, of which only 3,000 were generating electricity (78,000 were solar water heating installations installed before 2000)⁷². The UK Government's Microgeneration Strategy suggests that 30-40 per cent of electricity demand could be met by microgeneration⁷³. The Welsh Assembly Government's Microgeneration Action Plan⁷⁴ has the following targets:

- 20,000 microgeneration heating units installed by 2012, with around 100,000 by 2020
- 10,000 micro-electricity units installed by 2012, with around 200,000 by 2020
- 50 combined heat and power and/or district heating systems in place by 2020

Regulating to require microgeneration on new buildings is regarded by the Welsh Assembly Government as being the best means to encourage uptake⁷⁵.

Electricity consents

Planning application consent rests with local authorities in Wales for all sub-50MW applications. At present, responsibility for consenting to power stations with a generating capacity of greater than 50MW in Wales and England rests with the Secretary of State for Business, Enterprise and Regulatory Reform, under the provisions of Section 36 of the *Electricity Act 1989*⁷⁶. The Assembly Government is a formal consultee in the consents process but has no statutory role in the final decision.

The UK Government's **White Paper, Planning for a Sustainable Future** proposes a fundamental reform of planning for nationally significant infrastructure projects, including energy projects above 50MW and major gas infrastructure projects in Wales and England. An **independent infrastructure planning commission** is proposed to examine and take decisions on applications for nationally significant infrastructure projects, as well as projects designated by national policy statements or UK Ministers. Two or three of the commissioners would be appointed on the advice of the Welsh Assembly Government, reflecting the role of the commission in determining nationally significant energy projects in Wales. The White Paper notes that "Welsh Ministers have made clear that they will continue to pursue the devolution of energy consents over 50MW."

⁷¹ Welsh Assembly Government, *Technical Advice Note 8: Planning for renewable energy*, July 2005, http://new.wales.gov.uk/docrepos/40382/4038231121/403821/403821/40382/TAN_8/tan8-pages1-21-e.pdf?lang=en

⁷² DEFRA, *UK energy efficiency action plan 2007*, http://ec.europa.eu/energy/demand/legislation/doc/neeap/uk_en.pdf

⁷³ DTI, *Our energy challenge: Power from the people*, March 2006, <http://www.dti.gov.uk/files/file27575.pdf>

⁷⁴ Welsh Assembly Government, *Microgeneration action plan for Wales*, March 2007, <http://www.walesresilience.org/docrepos/40382/4038231141/40382112413/20.03.07-micro-eng?lang=en>

⁷⁵ *ibid*

⁷⁶ OPSI, *Electricity Act 1989*, http://www.opsi.gov.uk/ACTS/acts1989/Ukpga_19890029_en_1.htm

7. Rural land use management and carbon reduction

The 'land use, land use change and forestry' (LULUCF) category of emissions accounting is a balance between carbon emissions (as a result of soil emissions and deforestation) and carbon removals (primarily as a result of afforestation). LULUCF activities in Wales lead to a net removal (433,000 tonnes) of carbon dioxide emissions from the atmosphere⁷⁷. At a UK level, the biggest contributing factors to the LULUCF balance are:

- Land converted to forest land (64 per cent of removals)
- Land (soil) converted to grassland (33 per cent of removals) – less significant in Wales than in other parts of the UK
- Land (soil) converted to cropland (59 per cent of emissions) – less significant in Wales than in other parts of the UK
- Land (soil) converted to settlements (26 per cent of emissions)

Agricultural systems contribute to carbon emissions through⁷⁸:

- The direct use of fossil fuels in farm operations
- The indirect use of embodied energy in inputs that are energy intensive to manufacture (eg fertilisers)
- The cultivation of soils resulting in the loss of soil organic matter

Agriculture also sequesters carbon through⁷⁹:

- Accumulating carbon in the soil
- Accumulating carbon in above-ground biomass as a permanent sink or as an alternative fuel to fossil fuel

The three main currently used means by which agriculture can contribute to reducing carbon emissions are through **increasing carbon sinks** in soil organic matter and above-ground biomass (including through organic and other sustainable farming types); **reducing direct and indirect energy use** (reducing reliance on externally-derived fertilisers, pesticides and fossil fuels); and **increasing renewable energy production** (such as using biomass energy for heat, electricity and transport)⁸⁰.

Other means of reducing agriculture's impact include **maintaining forests** and other vegetated areas; **using compost** to build up the organic content of soil; **reducing soil erosion** by leaving soil covered over in winter and leaving buffer strips and hedges as protective barriers; and entering land into **carbon trading/storage systems**⁸¹.

⁷⁷ DEFRA, *Local and regional CO₂ emissions estimates for 2004 for the UK*,

<http://www.defra.gov.uk/environment/statistics/globalatmos/download/regionalrpt/laregionalco2rpt20061127.pdf>

⁷⁸ Ball AS and Pretty JN, 2002. Agricultural influences on carbon emissions and sequestration. From: Powell et al. (eds), *UK organic research 2002: Proceedings of the COR Conference, 26-28th March 2002, Aberystwyth*, pp. 247-249.

⁷⁹ *ibid*

⁸⁰ *ibid*

⁸¹ Farming Futures, *General ways to mitigate climate change*, <http://www.farmingfutures.co.uk/documents/Section%20Attachments/FS4.pdf>