

Climate Change Seminars: Supporting effective debate on the Scottish Climate Change Bill

Seminar Three: Policy options to achieve the 80% cut (part two)

Introduction

The third of the four seminars considered the potential for action in three key policy areas: energy generation, transport and land management, sequestration and sinks. Presentations to the seminar were made by **Dr. Keith McLean** (Scottish and Southern Energy plc), **Prof. Tom Rye** (Napier University) and **Dr Robert Matthews** (Macaulay Land Use Research Institute).

Energy Generation

Energy generation is the sector where the most visible action to cut GHGs has been undertaken in the last decade through the provision of new, large scale renewable energy facilities. Progress on renewable electricity in Scotland has been impressive – renewables now generate 19% of Scotland's electricity and the Government is on target to achieve 50% renewable electricity by 2020. This progress demonstrates the potential for renewable electricity to contribute significantly to cutting Scotland's emissions.

Despite this progress there are challenges facing the generation sector in fully contributing to a low carbon future. It is worth noting that less than a quarter of Scotland's energy is delivered in the form of electricity – the rest is in the form of heat (around half Scotland's total energy consumption) and transport (the remaining quarter). Moving from where we are now to 50% renewable electricity by 2020 is equivalent to less than a 1% per annum cut in Scotland's overall GHGs – the requirement is therefore that heat and transport deliver cuts equivalent to 2% of the Scottish total every year. Given that just 1% of heat and 0.5% of transport fuel is currently from renewables this poses a major challenge.

Achievement of these targets can of course be made easier by an active programme of cutting demand for energy and increasing the efficiency of use. Here there is huge potential, particularly in cutting space heating requirements in the domestic sector. Figure 1 (overleaf) shows the cuts in energy use in new build that are expected by moving to zero carbon homes by 2016. However, far more significant will be action to cut the carbon footprint of the existing stock.

For the energy that cannot be cut through conservation there is also the potential to switch fuel source. This is particularly the case for transport where over time more and

more transport could be powered by electricity or hydrogen drawn from renewable sources. Such an approach will of course require far greater generation of renewable energy than is currently envisaged and this in turn requires Government to invest significantly in the infrastructure that could deliver such a transformation of the economy.

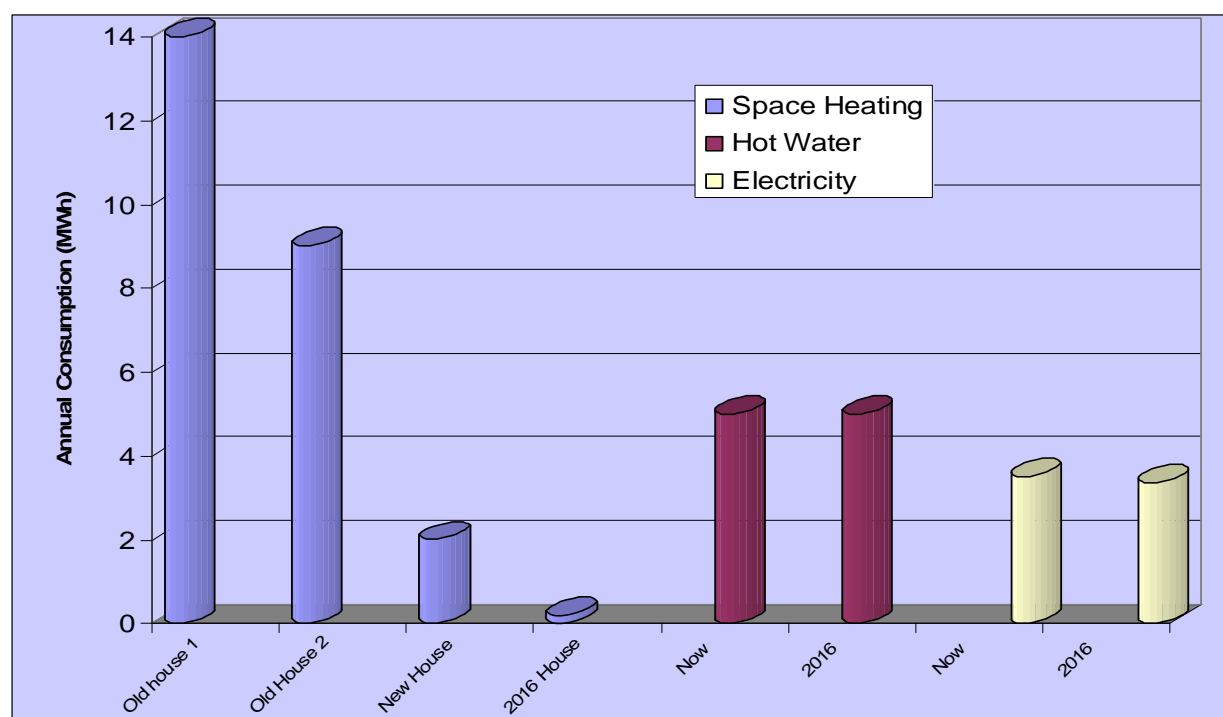


Figure 1: Potential for reductions in energy use for space heating, hot water and electricity for current and future design specifications

Transport

Transport is a policy area where emissions and many other indicators of sustainability continue to go in the wrong direction – between 1990 and 2003 transport emissions in Scotland grew by 6% while total Scottish emissions fell by 14% (see table overleaf).

Transport accounts for 23% of Scotland's emissions (2005 figure) making it the second largest source of emissions. Even excluding international air transport, if transport trends continue as they are then in 20 years time sectoral emissions will be 60% higher than at present.

The current **Scottish Transport Strategy** does include a high level commitment to cut emissions but neither current transport trends or expenditure (over the next few years road spending is set to increase while public transport remains static) are likely to achieve this objective.

Breakdown of Scottish emissions by sector in 2003, and change from 1990

Sector	2003 emissions and removals (MtC)	1990 emissions and removals (MtC)	1990-2003 change in emissions and removals (MtC)	1990-2003 % change
Energy	6.53	6.33	0.20	3%
Transport	2.99	2.82	0.18	6%
Business (includes industrial processes)	2.18	3.70	-1.52	-41%
Agriculture	2.07	2.44	-0.37	-15%
Residential	1.99	1.94	0.05	2%
LUCF emissions	1.41	1.45	-0.04	-3%
Public	0.27	0.52	-0.25	-48%
Waste	0.20	0.40	-0.20	-51%
Total emissions (excluding removals)	17.64	19.59	-1.95	-10%
LUCF removals	-2.75	-2.28	-0.46	20%
Total net emissions	14.89	17.31	-2.42	-14%

For surface transport the levels of GHG emissions are determined by a range of factors including population, vehicle technology, trip frequency and length, carbon intensity of fuel, mode of transport and level of vehicle occupancy. Modelling shows that it is only by addressing all these factors that significant cuts in transport emissions can be achieved.

Specific actions, not all of which are in the remit of the Scottish Government, should include:

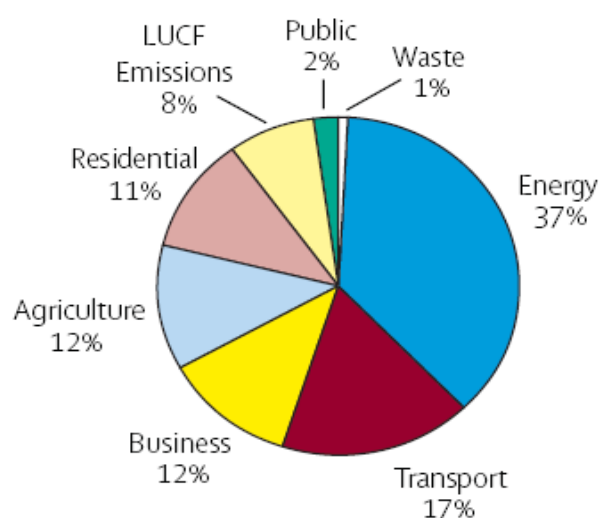
- Encouragement of a shift to smaller vehicles through fiscal measures (as has happened in Italy and the Netherlands)
- Incentives to use 2nd generation biofuels
- Mode shift through cheaper, more frequent public transport with cheap integrated ticketing, measures to make public transport faster than car travel, the provision of safe infrastructure for walking and cycling and information to help people make smarter choices
- Trip reduction and trip shortening through land use policies encouraging slow modes (walking and cycling), the provision of employment and services closer to where people live and through road pricing/parking restraint

Most importantly it is worth placing far greater emphasis than at present on local transport rather than large national infrastructure projects. Such measures have already been applied in many European cities including Copenhagen and Freiburg with positive outcomes.

Land Management, Sequestration and Sinks

The impact of land management on Scotland's greenhouse gas emissions is often overlooked. At present around 20% of Scotland's emissions are from agriculture and land use; at the same time 16% of Scotland's total emissions are sequestered by land and there is potential to enhance this significantly (Fig 2 and 3). It is also worth noting that for land, the most significant GHG emissions are not of carbon dioxide but of other gases namely Nitrous Oxide (N₂O) and Methane (CH₄).

Sources of emissions taking no account of removals



Net emissions and removals

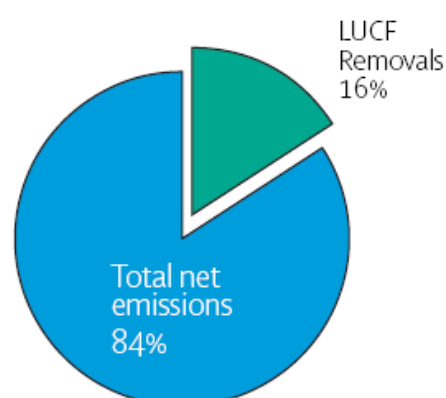


Fig 2 and 3: Emissions by sector and also removals from Land Use Change and Forestry (LUCF)

An analysis of trends in land emissions shows that there has been a 60% decline in net emissions from land use since 1990 and also a large (78%) increase in sequestration from land use and forestry. This has made an important contribution to reducing Scotland's overall emissions but there is much that can still be achieved.

Looking forward the important actions on agricultural management that could be taken include:

- The development of energy crops that are carbon neutral¹
- Further enhancement of sequestration through changes in land cover and land management
- Reducing methane emissions from livestock

¹ There has been a lot of controversy about energy crops but there still remains potential for the development of crops which do have a positive carbon impact and which minimise wider negative impacts

- Enhancing the efficiency of fertiliser use – this could also yield financial savings to farmers

It is calculated that together these actions could save 1.57MtCO₂e (million tonnes carbon dioxide equivalent) making a significant contribution to reducing overall emissions. Further savings could be achieved by converting arable land to grass, although the impacts of this (in terms of increased need for food imports etc) would have to be factored into the overall appraisal of the carbon benefit.

Enhanced forest cover could also play an important role in coming decades. The Scottish Forestry Strategy sets out an intention to increase forest cover to 25% of Scotland's land area. The achievement of this could sequester an additional 6.8MtCO₂e per annum. To maximise carbon benefits it is however important that afforestation occurs on suitable soils – in general these are found in land currently used for agriculture – disturbing peatlands could actually lead to a net increase in emissions. Sink potential can also be enhanced by maximisation of the carbon uptake of woodlands through better management.

Looking forward other challenges present themselves in delivering enhanced sinks. Land in Scotland is finite. The question is therefore how we balance the competing priorities for land – as a source of food, bioenergy, carbon storage and biodiversity and also as a place for leisure and recreation.