Committee on Climate Change

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31st January 2011

Dear Roseanna

Committee on Climate Change: advice on a cumulative emissions budget for Scotland

Stewart Stevenson wrote to me in August 2009 requesting advice from the Committee on Climate Change in relation to annual emissions targets and a number of related issues.

The response to this request was set out in our February 2010 report *Scotland's path to a low-carbon economy*, which included options for the 2020 emissions target, proposals for annual targets from 2010 to 2022, assessment of the balance between domestic action and credit purchase to meet targets, and recommendations on approaches to aviation and shipping emissions.

This letter completes the response to the original request, and sets out our advice on a Scottish cumulative emissions budget covering the period 2010 to 2050. Our approach is to take the legislated 2020 and 2050 targets as a given. Therefore designing a fair and safe cumulative budget requires determining an appropriate Scottish contribution to global emissions pathways between 2020 and 2050.

Our key messages are:

- We define a fair and safe Scottish cumulative emissions budget as an appropriate contribution to required global emissions reductions consistent with limiting risks of dangerous climate change. A minimum Scottish contribution to the required global pathway is broadly characterised by equal annual percentage emissions reductions between 2020 and 2050. Combining this with emissions reductions required from now to 2020 gives a cumulative emissions budget of 1,250 $MtCO_2e$ between 2010 and 2050.
- Our analysis suggests that there are cost effective options on the path to 2050 for Scotland to deliver the cumulative budget largely through domestic abatement, and according to a path characterised by a 60% emissions cut in 2030.

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- Delivering emissions reductions in practice will require new policies to be introduced now, both as regards meeting the legislated 42% target for 2020 and preparing for going beyond this in the 2020s.

We set out the analysis underpinning these key messages in more detail in the attachment to this letter.

Our next advice to the Scottish Government will be recommendations on annual targets for 2023-2027 (due May/June 2011) and on credit purchase for the period 2013-17 (due May/June 2011).

In the meantime we would be happy to discuss the recommendations in this letter with you, and our Secretariat would be happy to share with you the underlying evidence and analysis base.

Yours

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Chair, Committee on Climate Change

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Attachment: Summary of Committee's analysis on a cumulative emissions budget for Scotland

In August 2009 the Committee was asked by the Scottish Government for views on a *fair and safe* aggregate amount of net Scottish emissions for the period 2010-2050. We have taken this to mean an appropriate Scottish contribution to global emissions pathways consistent with the climate objective underpinning the Scottish Climate Change Act, and advise that an appropriate cumulative emissions budget would be 1,250 $MtCO_2e$.

We now set out in more detail the analysis that underpins our recommendation in six sections:

i. The Committee's climate change objective and the global emissions pathways consistent with meeting this objective
ii. A fair and safe Scottish cumulative emissions budget consistent with the required global emissions pathway
iii. Domestic action towards meeting a Scottish cumulative emissions budget
iv. Costs and wider economic and social considerations
v. Implications for policy
vi. Future work of the Committee

(i) The Committee's climate change objective and required global pathways

Climate change objective

The starting point in our analysis is the Committee's climate change objective, to keep central estimates of global mean temperature change by 2100 to as little above 2°C as possible, and to limit the likelihood of temperature change above 4°C to very low levels (e.g. to below 1% probability).

We proposed this objective in December 2008 in our report *Building a low carbon economy: the UK's contribution to tackling climate change*, based on an assessment of climate change damage and opportunities for reducing emissions. In our December 2010 report. *The fourth carbon budget: reducing emissions through the 2020s* (hereinafter referred to as "the fourth budget report"), we provide an updated assessment of the science and conclude that this objective remains appropriate.

Global emissions pathways to deliver the objective

Global emissions pathways that deliver this objective are characterised by peaking of global emissions by around 2020, followed by deep cuts in the 2020s and a halving of global emissions by 2050 (relative to 1990); significantly later peaking of global emissions (e.g. in 2030) would leave unfeasibly high rates of emissions reduction to achieve the climate objective.

We have considered whether beyond early peaking, a lower rate of emissions reductions through the 2020s with deeper cuts from 2030 may be desirable.

However, our analysis suggests that delaying action in this way would raise the costs and risks of achieving the climate objective (see the fourth budget report).

(ii) A fair and safe emissions budget consistent with the required global emissions pathway

Our approach in determining a fair and safe emissions budget for Scotland is to accept legislated emissions levels for 2050 and 2020, and to define the path between these two points.

Scotland's 2050 emissions target

Given early peaking of global emissions followed by 3-4% annual emissions reductions to 2050, average global emissions per capita would be of the order 2 tCO_2e. For Scotland to be around this level would require an emissions reduction in 2050 of 80% relative to 1990 levels; this is the legislated emissions reduction in the Scottish Climate Change Act.

The target for 2020

The Scottish legislated target for 2020 is to reduce emissions by 42% relative to 1990 levels. Our previous analysis has shown that this target is consistent with the EU's 30% emissions target, which in turn is appropriate as a contribution to required global emissions reductions in 2020. It is a particularly stretching target given the decision to include emissions from international aviation and shipping in the target. In our February 2010 report to the Scottish Government, we showed that the target could be achieved, but that this would require new policies and a tightening of the EU ETS cap:

- There are opportunities to reduce Scottish emissions through a range of measures including energy efficiency improvement, deployment of renewable heat, improving fuel efficiency of vehicles and use of public transport, decarbonisation of the power sector, providing support for farmers to reduce emissions, and increasing woodland cover.

- However, unlocking emissions reduction potential to the extent needed to achieve the 42% target will require new policy approaches to strengthen incentives (see Section (v) below): current policies have not delivered emissions reductions commensurate with what will be required going forward.

- In order that traded sector emissions are sufficiently reduced, and assuming that these are accounted based on a notional Scottish EU ETS cap, achieving the 42% target will require that the EU ETS cap is tightened in line with proposals for moving from the EU's economy wide 20% to 30% emissions reduction targets for 2020 relative to 1990 levels.

In defining a Scottish cumulative emissions budget, we assume a 42% target for 2020, with the strong caveat that achieving this will be very challenging, and that new policies should be introduced as a matter of urgency in order that it remains feasible.

The path from 2020 to 2050 and the cumulative budget

Given a global emissions pathway characterised by equal annual percentage emissions reductions, it is hard to imagine a future global deal under which developed countries such as Scotland would be required to deliver less than equal annual percentage reductions, given that this would then require deeper cuts in other countries.

It may also be the case that developed countries are required to go beyond equal annual percentage emissions reductions depending on the financing arrangements agreed under a future deal. Therefore equal annual percentage reductions at the Scottish level should be seen as a minimum level of ambition, with the need to increase ambition depending on a future global agreement covering the period to 2030 and beyond.

Going from Scottish emissions cuts of 42% in 2020 to an 80% cut in 2050 requires annual emissions reductions of around 3.5%. The 2030 emissions reduction under this path is around 60% below 1990 levels (63% excluding international aviation and shipping), with an associated cumulative budget of around 1,250 $MtCO_2e$ between 2010 and 2050

(iii) Domestic action towards meeting a Scottish cumulative emissions budget

In our fourth budget report we presented Scottish emissions scenarios to 2030 comprising cost effective measures on the path to 2050 for a number of key sectors:

- **Buildings**: continued insulation measures and low carbon heat options (e.g. heat pumps) offer potential to cut emissions in 2030 by almost 60% relative to current levels.
- **Road transport***:* measures on both the demand side and on vehicle efficiency/roll out of low carbon vehicles (e.g. electric cars and vans) could result in a halving of road transport emissions in 2030 relative to current levels.
- **Industry:** there is potential to cut emissions in 2030 by almost half relative to current levels through energy efficiency measures together with use of biomass and biogas.
- **Agriculture and land use:** abatement opportunities relating to soils and livestock could reduce emissions in 2030 by around 15% relative to today. There is also potential for increasing the carbon sink impact of forests through

afforestation measures and scope for limiting carbon emissions by protecting stores in Scotland's peat soils

To complete an economy wide picture it is necessary to develop scenarios for power, aviation and shipping to 2030:

- **Power**. We assume a generation mix in 2030 consistent with current targets and policy on power generation; this is characterised by significant renewable capacity, with some CCS coal and gas generation. This results in average emissions of between 30 and 50 gCO_2 / kWh, which is broadly comparable with our assessment of where the UK should aim in 2030. It requires an 85% reduction in average emissions relative to current levels.

- **Aviation**. We assume that aviation emissions are flat at 1.6MtCO_2 on a net basis consistent with the EU ETS cap (0.6Mt and 1.0 Mt CO_2 from domestic and international aviation emissions respectively).

- **Shipping**. We assume that Scottish shipping emissions follow the STEPS projection, under which there is a 34% increase to 2020 from 2010 estimates, but following which emissions are flat at 2005 levels on a net basis - reflecting abatement opportunities and / or a future international agreement to limit shipping emissions.

Combining the scenarios in our fourth budget report and the assumptions above on power, aviation and shipping emissions results in 2030 emissions that are around 60% below 1990 levels.

This implies that it is feasible and desirable to meet the fair and safe cumulative budget - characterised by a 2030 cut of around 60% relative to current levels - through domestic abatement rather than the purchase of credits.

The results of UK level MARKAL modelling are also consistent with this conclusion:

- The cost effective way to deliver the fair and safe budget is through equal annual percentage reductions on the path from 2020 to 2050, resulting in 2030 emissions reductions of 60% relative to 1990 levels.
- The costs of domestic abatement to deliver this path are generally favourable relative to the costs of purchasing credits.

We therefore recommend that the aim should be to deliver the fair and safe budget according to an equal annual percentage emissions reduction from 2020 to 2050, and to do so largely based on domestic abatement rather than purchase of credits.

(iv) Costs and wider social and economic considerations

We estimate that the cumulative budget could be achieved at a cost of around 1-2% of GDP:

- We estimated a cost of meeting the Scottish target to reduce emissions in 2020 by 42% relative to 1990 levels to be less than 1% of GDP (see *Scotland's path to a low carbon economy*).
- We estimated a cost of meeting the indicative UK target of a 60% emissions reduction in 2030 relative to 1990 levels to be less than 1% of GDP (see the fourth budget report); given a similar range of abatement options in Scotland, we would expect a cost of the same order of magnitude.
- We estimated a cost of meeting the UK target of an 80% emissions reduction in 2050 relative to 1990 levels to be of the order 1-2% of GDP (see *Building a low carbon economy – the UK's contribution to tackling climate change*); we would expect a similar order of magnitude of costs in Scotland given available abatement opportunities.

We have previously assessed fuel poverty, competitiveness and security of supply impacts and concluded that these are important issues that should be addressed as part of a broader strategy for reducing emissions:

- **Fuel poverty**. This is likely to increase over the next decade in line with increasing energy prices, with scope to offset this through energy efficiency improvement. Beyond 2020, further fuel poverty impacts will depend on the costs of low carbon power and heat sources. Fuel poverty impacts should be addressed through energy efficiency improvement, social tariffs and / or targeted income transfers.
- **Competitiveness**. This is a potential issue for energy intensive industries, where energy costs represent a significant share of total costs. Potential impacts over the next decade are mitigated through granting of free allowances in EU ETS. Beyond that, any remaining risks could be addressed through sectoral agreements or border tariff adjustments.
- **Security of supply**. Although renewable generation is intermittent, this can be addressed through a range of flexibility options including demand response, interconnection and balancing generation. Moving to a low carbon power system will reduce reliance on imported fossil fuels with volatile and potentially high prices.

(v) Implications for policy

We have previously highlighted the need for new policies to drive emissions reduction over the next decade including:

- **Energy efficiency improvement**. Stronger incentives are required to improve energy efficiency in residential and non-residential buildings, including better information, and reduced transaction costs for implementation of measures. We have suggested that a whole house and neighbourhood approach would be beneficial for the residential sector.
- **Sustainable transport**. Roll out of the smarter choices initiatives to encourage switching from cars to public transport could make a significant contribution to transport decarbonisation, and is within the devolved powers.
- **Agriculture.** Better information and possible fiscal or regulatory levers would help to unlock low cost potential for reducing emissions from soils and livestock.
- **Land use.** Land management policies, and policies to increase afforestation rates should help to recover the important carbon sink present in Scotland's forests.

In order to prepare for the deep emissions cuts that will be required in the 2020s, new policies will be required:

- **Electricity market reform.** New approaches will be required to the electricity market in order to support power sector decarbonisation; these will be developed at the UK level, given the balance of reserved and devolved powers, but there will be an important role for the Scottish Government, particularly in terms of ensuring that required investments gain planning approval.
- **Support for renewable heat.** Financial and other support will be required to encourage roll out of renewable heat in residential and non-residential sectors. Although financing under the renewable heat incentive will be at the GB level, there will be an important role for the Scottish Government raising awareness, interfacing renewable heat and energy efficiency policies, and ensuring that an appropriate planning framework is in place.
- **Support for electric vehicles.** There is an important role for the Scottish Government putting in place enabling arrangements for electric car market development (e.g. supporting the development of a charging infrastructure), to complement UK level financial support for this key technology.

(vi) Future work of the Committee

We have been asked by the Scottish Government to provide advice on emissions targets for the 2020s, the purchase of credits to meet targets, and to report on progress reducing emissions:

- We will report on annual targets for the period 2023-2027 in May/June 2011
- We will advise on the use of credits to meet targets covering the period 2013-2017 in May/June 2011
- We will report on progress reducing emissions in Scotland in our annual report to the UK Parliament in June 2011, and directly to the Scottish Government in January 2012