Chapter 10
The UK's carbon targets for 2020 and the role of the Committee on Climate Change

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Introduction

The United Kingdom has the most advanced climate change legislation in the world. In November 2008 parliament adopted a new Climate Change Act with broad support from all political parties. Together with new legislation on energy and planning, enacted at the same time, and the creation of a new Department for Energy and Climate Change a month earlier, the act defines Britain's policy approach to climate change and puts in place the institutional arrangements needed to meet its ambitious objectives.

The act breaks new institutional ground in at least three respects. First, it sets a legally- binding long-term emission target for 2050. The act obliges the UK to reduce its greenhouse gas emissions by at least 80% below 1990 levels by mid-century. Policymakers around the globe have endorsed such long-term goals, including the leaders of the G8 nations at their 2007 and 2008 meetings. However, the UK is the first country so far to put this commitment into law. The target is formulated as a minimum requirement, which leaves open the option of further cuts if necessary.

Second, the act puts in place a framework through which the long-term target can be achieved. It commits the UK to a series of legally-binding five-year carbon budgets that will guide the country toward the long-term goal. The budgets provide a benchmark against which the country's emissions performance can be measured. They help to create regulatory certainty for investors, while maintaining enough flexibility for mid-term

** The paper draws heavily on the inaugural report of the Committee (CCC 2008). However, the views expressed in this article are our own and do not necessarily reflect those of the Committee. We are grateful to the members of the Committee and the staff of the CCC Secretariat. A summary with an emphasis on the analytical and methodological underpinnings of the CCC recommendations is Fankhauser et al (2009).*

corrections. The five-year time horizon is thought to be long enough to absorb short-term fluctuations in emissions, for example due to weather extremes or fluctuations in the business cycle.

Third, the Climate Change Act establishes a new independent body, the Committee on Climate Change (CCC), which advises the government on carbon budgets and monitors progress in meeting them in an annual report. Applying a transparent, evidence-based approach to setting and meeting budgets, the CCC helps to support the development of robust carbon strategies and increase the likelihood of meeting the ambitious emissions reduction targets it helps to set. The legal framework requires the discussion of CCC advice and its annual progress reports in parliament, lending the CCC considerable leverage to hold the government to account.

The CCC, which had been active in shadow-form since February 2008, issued its first set of recommendations in October 2008, when it advocated a long-term emissions reduction objective for the UK of at least 80%, relative to 1990, and the extension of the target to all greenhouse gases, not just CO_2. These recommendations were subsequently adopted and incorporated in the Climate Change Act.

In December 2008, the Committee published its first full report (CCC, 2008). The report elaborates on the reasoning behind the 80% recommendation and proposes emissions targets for the first three carbon budgets (2008-2012, 2013-2017 and 2018-2022). It recommends that by 2020 UK greenhouse gas emissions should come down by 42% as part of a stringent international agreement that builds on the current Kyoto commitments. Until such an agreement is reached the UK should commit to a 34% unilateral cut.

This paper summarises the rationale behind the CCC's 2008-2022 recommendations. It shows how the proposed 2020 targets can be met through a combination of measures in energy, transport, housing and industry. And it asks what the wider social and economic consequences of the carbon budgets might be, including the likely cost to the economy, the impact on competitiveness, fuel poverty, energy security and the fiscal position and the implications for the devolved administrations. (There is a method for allocating responsibility for administering aviation emission under the EU ETS, but this would not remain tenable if full international agreement were to be reached. In shipping there is a major problem with the "leakage" of emissions).

The proposed carbon budgets from 2008 to 2022

The introduction of five-year carbon budgets is arguably the key institutional innovation of the Climate Change Act. The recommendations for the UK's first three carbon budgets, up to the year 2022, were therefore at the core of the CCC's inaugural report.

The recommendations for 2008 - 2022:

- Each carbon budget constitutes a distinct five-year target. However, the CCC used the year 2020, the mid-point of the third budget period, to take a "sighting shot" at appropriate budgets for periods one to three. The CCC recommended a two-track approach with two state-contingent targets (see Chart 1):

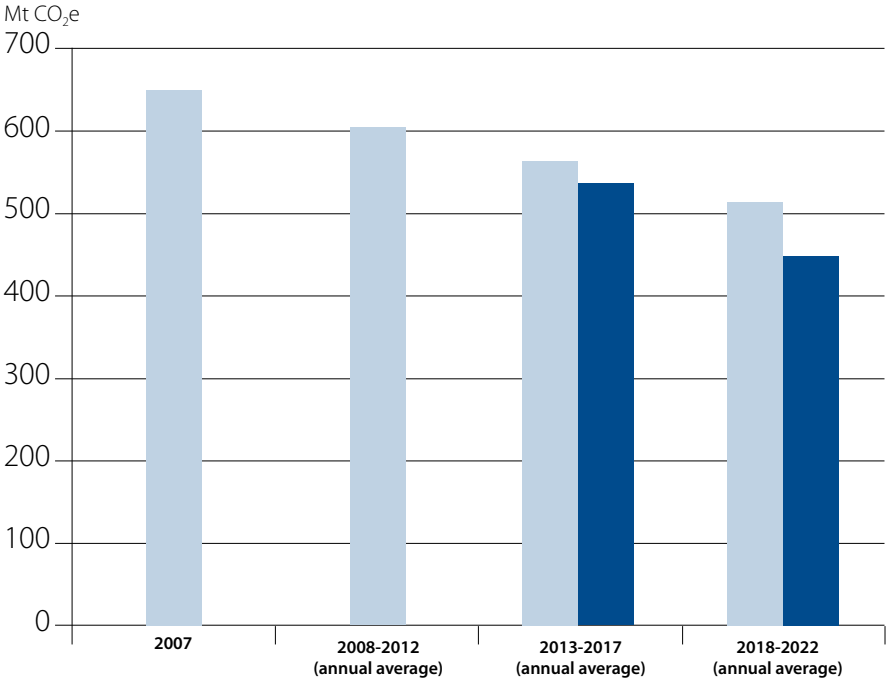
- An interim target of -34%, relative to 1990, to which the UK should commit unilaterally; and

- An intended target of –42%, relative to 1990, which the UK should adopt if a meaningful successor to the Kyoto Protocol can be agreed.

Consistent with the long-term target the carbon budgets cover all Kyoto gases despite uncertainty in the measurement of non-CO_2 emissions, particularly in agriculture. However, the CCC recommended excluding emissions from international shipping and to some extent aviation until a transparent and sensible way is found to allocate emissions to the national level. The CCC recognises the importance of international transport emissions though, and will monitor them in its annual progress reports. The level of ambition in the proposed budgets reflects likely progress in reducing emissions in aviation and shipping, and both sectors are included in the 2050 target.

Although the budgets are set for the country as a whole, the underlying analysis distinguishes between the traded sector and the not-traded sector of the economy. The traded sector includes high emitting industries like energy, metals and ceramics that are covered by the EU ETS. As of 2012, the EU ETS will also cover aviation. The emissions targets for the traded sector are set at EU level and firms have the option to buy and sell emissions permits across the EU. They may also import a limited number of emission reduction credits from international offset schemes like the Clean Development Mechanism. The carbon budget records traded sector emissions net of these cross-border transactions.

Chart 1: CCC recommendation for the 2008-2022 carbon budgets



Source: CCC (2008).

The non-traded sector includes transport, residential and non-residential buildings and the non-EU ETS part of the economy (e.g. the service sector, small and medium sized enterprises). Domestic policy levers are needed to influence non-traded emissions. In principle, it would be possible to use international offsets to net out emissions in the non-traded sector. However, the CCC recommended that this should not be allowed under the interim budget. The rule may be relaxed under the intended budget, when international offsets may be used to ease the move to the tighter target.

Carbon budgets in the wider climate change context

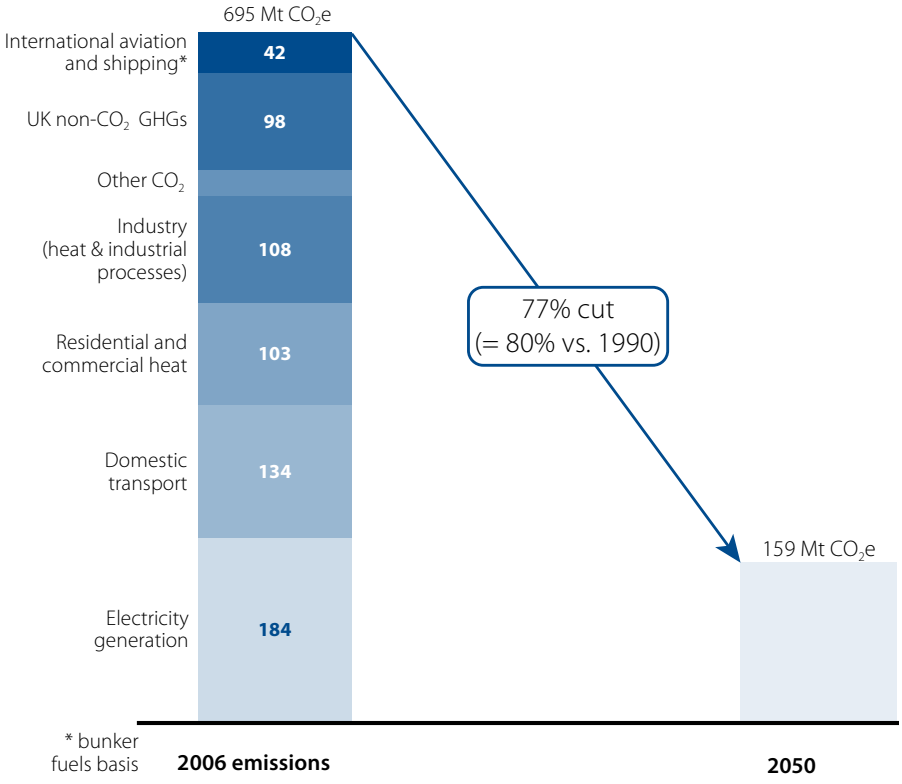
In recommending the three carbon budgets the CCC was guided by three key concerns: (i) the need for consistency with EU-wide energy and climate change policy, (ii) the need to be consistent with the 2050 objective and make an adequate early contribution to the 2050 target; and (iii) the need for budgets that are ambitious but technically and economically feasible.

The distinction between an interim and intended budget was a direct result of the desire to align the targets with EU policy, which distinguishes a "unilateral" target (a 20% EU-

wide emission cut) and a "global cooperation" target (a 30% emission cut). The CCC felt this was an appropriate way to approach the international negotiations for a post-2012 agreement. The targets proposed for the UK are roughly consistent with the obligations that the EU-internal burden sharing methodology imposes on the UK.

The proposed budgets set the UK on course to meet its 2050 target. The 2050 target requires Britain to reduce its greenhouse gas emissions from 695 $MtCO_2e$ in 2006 to 159 $MtCO_2e$ in 2050 (see Chart 2). This is equivalent to an annual average reduction of 3.3% over the next 40 years. The proposed carbon budgets start off with a lower reduction rate of 2.8% per annum until 2020 for the intended budget. This would then have to increase to 3.5% per annum between 2020 and 2050. Although the initial reduction rate is lower than the long-term average, the CCC felt it was adequate. In an environment of high uncertainty, the proposed targets also provide the flexibility to make cost-effective mid-term corrections should new information become available (Watkiss et al., 2008).

Chart 2: Current UK emissions and the 2050 target



Note: UK emissions in 2006 (including international transport) were 16% lower than in 1990. Hence, a 80% emissions cut relative to 1990 translates into a (1 - 0.20/0.84) = 77% reduction from today. Source: CCC (2008).

To test whether the proposed carbon budgets are technically and economically feasible – the third consideration in setting the targets – the CCC systematically assessed the emission reduction potential in each of the main sectors of the economy. We turn to this analysis next.

Meeting the 2008-2022 target

The CCC used a bottom up approach to identify emission reduction opportunities in the UK and thus ascertain the feasibility of the proposed targets. Detailed marginal abatement cost curves were derived for all relevant sectors, including electric power, transport, buildings and industry and the non-CO2 sectors.

The potential for cost-effective abatement

In establishing the overall abatement potential, the main focus was on options costing less than a central cut-off price of £40 per tonne (the assumed carbon price in 2020). However, in many cases more expensive measures were also included based on their "dynamic efficiency" – that is, their long-term potential for deep emission cuts later on – or to start driving down the costs of promising technologies.

A distinction was made between the theoretically feasible potential and the realistically achievable potential, which takes into account barriers in the uptake of measures. The realistic potential reflects a judgment on the prevailing policy framework, the way it might be strengthened and the incentives it gives to take up theoretically feasible abatement options. In this respect, the CCC distinguished between three policy scenarios:

- **The current ambition scenario** includes measures which cost less than the £40 per tonne cut-off, or which are covered by existing policies, but is cautious about their realistically achievable potential. The scenario includes significant progress towards low-carbon electricity generation, and some progress on improving fuel efficiency in new cars.

- **The extended ambition scenario** includes "more ambitious but still reasonable assumptions" about the realistic reduction potential of existing policies, plus a number of measures which would cost more than £40 per tonne, but which are "important stepping stones on the path to 2050". The scenario is "broadly in line" with policies to which the government or the EU are committed in principle, but which have yet to be implemented.

■ **The stretch ambition scenario** adds further abatement options for which there is no policy commitment at the moment, for example "more radical new technology deployment and more significant lifestyle adjustments".

The CCC concluded from this analysis that in order to meet the interim target, the existing policy framework would have to be strengthened to reach "extended ambition" level or more. If this is done there would be no need to resort to the purchase of international offset, and the CCC advised against this option for the interim budget.

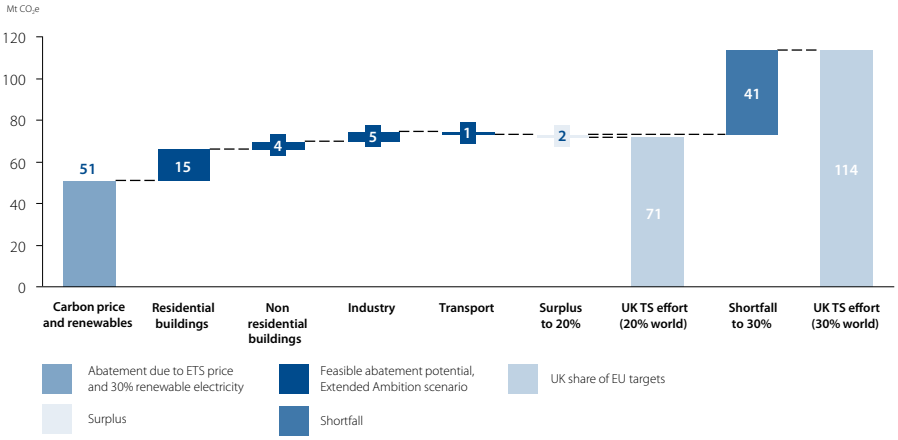
For the intended target, "extended ambition" would have to be combined with an increased reliance on carbon offsets or additional measures envisaged under the "stretch ambition scenario". The more generous use of offsets could thus help to move from the interim to the more ambitious intended target.

Reduction potential by sector

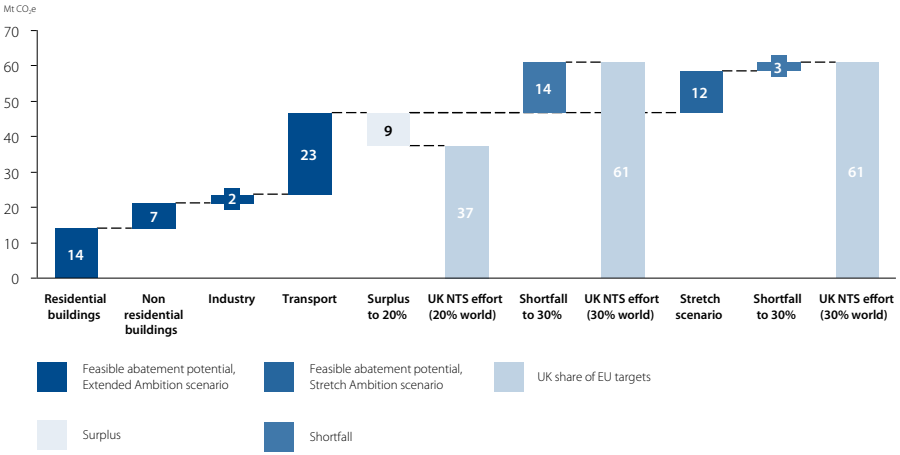
Chart 3 details the emission reductions each sector of the economy may contribute to the overall target. Two thirds of the emission reductions required under the interim target is expected to come from the traded sector, that is installations covered by the EU ETS. Within the traded sector a large part of the emission cuts will have to occur in the electricity sector. Decarbonising the electricity sector is central to meeting the 80% mid-century target and initial steps towards that goal will have to be taken by 2020.

Chart 3: Delivery of the Carbon Budgets

(a) Emission reductions in sectors covered by the EU ETS (2020)



(b) Emission reductions in non-traded sectors (2020)



Source: CCC (2008).

Several low-carbon power generation options are available in the first three budget periods, including renewable technologies like onshore and offshore wind. Although storage issues remain, nuclear power is also likely to be attractive, particularly if the pace of renewable energy deployment is insufficient. A range of policies will be required to support the deployment of these technologies. Chief among them is the creation of a clear carbon price signal within the EU ETS over the long-term, but additional policy levers will also be required (e.g. relating to planning and transmission).

Carbon capture and storage (CCS) remains untested and will contribute little during the first three budget periods. However, it will be important to demonstrate the technical and commercial feasibility of CCS during this period at industrial scale, as the government now intends to do. The CCC recommended that conventional coal-fired power plants should only be built on the expectation that they will be retrofitted with CCS equipment by the early 2020s.

In the non-traded sector, there is a large potential for low-cost emissions cuts in residential and non-residential buildings through energy efficiency improvement and lifestyle changes. However, realising the full potential would require a much stronger policy framework, for example in the form of stricter appliance standards, higher-powered incentives for Supplier Obligations (or Carbon Emission Reduction Targets (CERT) as it is currently known) and perhaps changes in the delivery mechanisms and business models for energy efficiency. The realistic potential is therefore only about half the technical potential. Even more ambitious would be attempts to unlock the considerable, albeit more expensive, potential for renewable heat (mainly biomass) and micro-generation (e.g. solar energy). This would require considerable additional policy levers.

The long-term decarbonisation of transport will ultimately require a switch away from fossil fuel-based combustion engines to electric vehicles, biofuels or hydrogen technology. The best approach to decarbonisation may vary in different segments of the transport sector. However, only electric cars are expected to make a meaningful contribution to the first three carbon budgets. In the short-term, the main contributions from the transport sector will come from improvements in current technology and demand-side measures like changes in modal split, more efficient driving or a switch to smaller cars. The main lever will have to be policies at EU level to bring down the carbon efficiency of new cars from currently around 160 grams of CO2 per kilometre (in the UK) to 100 g/km or less.

The potential to reduce emission reduction also exists for non-CO_2 gases, for example in agriculture and waste (a sector which has already cut emissions by half since 1990). However, this potential is as yet less well understood and emissions are more difficult to measure.

The wider social and economic impact

In making its recommendations, the potential social and economic implications were an important concern for the CCC. The Climate Change Act explicitly requires the CCC to have due regard for the wider social and economic impacts from the carbon budgets, in particular the effect on industrial competitiveness, fuel poverty, security of supply and the government's fiscal position. Another key concern is the impact on the UK's regions and the devolved administrations.

The CCC found that the social and economic impact of the budget was manageable, but complementary measures will be needed to mitigate some of them, in particular in the case of fuel poverty and the competitiveness of selected industries. The CCC concluded that the UK could meet the proposed carbon budgets at a cost of less than one percent of GDP – considerably lower than the cost of addressing the current crisis in the financial sector.

One of the main concerns is fuel poverty. The CCC acknowledged that the higher energy prices required to meet the carbon budgets would, without compensating action, increase the number of fuel poor households (defined as households that spend more than 10% of their income on energy). However, the instruments to mitigate this effect – energy efficiency improvements, income transfers or social tariffs – are available and the costs of doing so are manageable. The CCC noted in particular the merits of energy efficiency improvement amongst fuel poor households, which can serve both environmental and social objectives.

Another key concern is the impact of unilateral action on business. Again, the CCC felt that adverse effects on UK competitiveness can easily be mitigated through an appropriate design of the policy framework. Competitiveness effects are potentially important for only a small number of industries (e.g. steel) that are both energy intensive and operating in a

globally competitive market (and thus unable to pass on higher costs to consumers). The instruments to address competitiveness issues include border carbon price adjustments, the free allocation of permits to selected industries and the negotiation of globally binding sector agreements. It is appropriate to deal with competitiveness concerns at the European, or even global, levels, and the issue featured prominently in the design of the third phase of the EU Emissions Trading Scheme.

Important in the current economic context, the CCC found that the carbon budgets would not undermine the sustainability of public finances. The budgets have a number of fiscal implications. On the one hand, revenue from auctioned permits for the EU ETS will raise additional revenues. On the other hand, there will be a loss in fuel duty revenues (unless the way it is levied is revised), and perhaps VAT and corporate tax revenues (depending on the economic impact of the budgets). Overall, the fiscal impact is expected to be mildly negative in the early years, but should become positive by 2020.

In the UK, the fight against climate change generally goes hand in hand with attempts to improve energy security. Decarbonising power generation and increasing energy efficiency will reduce the UK's exposure to volatile oil and gas prices, and reduce the risk of supply interruptions. There are technical security of supply concerns arising from the intermittent nature of renewable energy sources like wind. However, since these can be addressed through back up capacity, intermittency is ultimately an issue of cost, rather than security of supply. Regulatory incentives may be needed though, to ensure that adequate back up capacity is provided by the liberalised market.

The social and economic impacts of the carbon budgets are not spread uniformly across the country. Competitiveness and fuel poverty concerns, in particular, are more important in some regions than in others. But there are also opportunities to cut emissions, with some variation, across all sectors - power, buildings, industry transport and agriculture – in each of Northern Ireland, Scotland and Wales. National authorities have an important role to play in unlocking this potential given the balance of reserved and devolved powers.

The road ahead

The inaugural report of the CCC concludes that;

> *"deep emissions cuts in the UK are required both over the next fifteen years and in the period out to 2050 as part of a wider global emissions reduction effort. … The challenge now is for the Government to strengthen the policy framework and for individuals and businesses to respond. Meeting this challenge is vital if we are to avoid dangerous climate change and the significant consequences and costs that this would involve."*

With the Climate Change Act the UK has put in place an institutional framework through which it can begin to address this challenge. The response to the CCC's first report, both by government and the wider public, has been encouraging.

The CCC recommendations on the long-term target were adopted straight away and are part of the Climate Change Act. In spring 2009, the government adopted the CCC's 34% interim target for 2008-2022. It acknowledged that the interim target would have to be revised once there is a new international agreement, but did not endorse the CCC's intended target of 42%. Instead, the CCC will be asked for an updated recommendation once the details of the new agreement are known. The first three carbon budgets need affirmative resolutions in both houses of parliament and are expected to be approved by June 2009.

The government also followed the CCC's advice on the use of international offsets, which will be restricted to the quota the EU ETS has set for the traded sector. Consistent with the CCC's position on coal-based electricity, the government further announced that new coal-fired power stations will have to demonstrate carbon capture and storage and be retrofitted with this technology once it is proven.

However, climate change is a long-term problem and the current momentum will have to be maintained for years. This will be difficult. Inevitably, other issues will come to the fore, competing for resources and ministerial attention. We already see some of these dynamics at work in efforts to deal with the present economic crisis, although encouragingly climate change has remained on the political agenda. In fact, a powerful case has been made for low-carbon investments as an effective way to kick-start the flagging world economy (Bowen et al 2009, Edenhofer and Stern 2009).

The real test of Britain's climate change framework will be how it responds if UK emissions veer off track. The carbon targets in the Climate Change Act are legally-binding, statutory commitments. So the government could in principle be pursued through the courts if it fails to meet them. How this would work in practice is not clear, though. In a similar case, a claim for judicial review of the government's failure to meet its fuel poverty targets was dismissed in autumn 2008. Although the two pieces of legislation are worded differently this suggests that the judicial route may not be straightforward.

Perhaps the more powerful weapon will be political pressure from parliament and public opinion. Importantly, the Climate Change Act had the overwhelming support of all political parties. Only four votes were cast against it in the House of Commons, and many of the amendments tabled in fact aimed at making the act more ambitious. This will make it very difficult for future governments, of whatever persuasion, to water down its provisions. Moreover, the act is designed to make it inconvenient for the government to renege on its obligations. Performance under the carbon budgets will be monitored and discussed in an annual report by the CCC. If targets are not met, the Secretary of State will have to put before parliament detailed proposals on how to compensate for the excess emissions in the future.

The initial work of the CCC was about setting targets, both over the long term (2050)

and more immediately for the first three carbon budgets (2008-2022). Pending a recommendation on the fourth budget period due by the end of 2010, the focus of the CCC is shifting to monitoring, its second key duty.

The immediate challenge for the 2009 annual report, due in September, will be to devise a framework of indicators that reveal, with sufficient lead time, whether the UK is on track in meeting its carbon budget obligations. Such lead indicators are likely to cover policy developments (e.g. changes to the renewable energy framework), implementation issues (e.g. uptake of new incentive schemes), investment (e.g. clean generation capacity under development), innovation (e.g. progress on CCS pilots) and technological change (e.g. the carbon efficiency of new cars). Particularly salient in the current economic environment will be the need to distinguish between structural, policy-induced change and temporary effects due for example to fluctuations in the business cycle.

The CCC will also seek to deepen its understanding of sectors and mitigation options that have not been fully covered in the first report. This includes, for example, the issue of agricultural emissions, technology options in the heating sector, demand-side measures in the transport sector and the impact of a large-scale shift to low-carbon technologies on the functioning of the electricity market. There is also the question of how to tackle airline emissions and bringing international aviation and shipping into the carbon budgeting system. The role of aviation will be the subject of an aviation review carried out in 2009.

Finally, the CCC will start looking at adaptation with the creation of an adaptation sub-committee. The adaptation provisions in the Climate Change Act have received less publicity than the parts on mitigation, but there can be no doubt that mitigation and adaptation will be of equal relevance going forward. The UK is vulnerable to climate change, as weather events over the last years have shown. Adaptation is therefore important – and mitigation is as much about enlightened self-interest as it is about good global citizenship.