



# The Macroeconomic Effects of the Transition to a Low-Carbon Economy

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# **About the 'Breaking the Climate Deadlock' Initiative**

'Breaking the Climate Deadlock' is an initiative of former UK Prime Minister Tony Blair and independent not-for-profit organisation, The Climate Group. Its objective is to build decisive political support for a post-2012 international climate change agreement in the lead up to the 2009 UN Climate Change Conference in Copenhagen. Its particular focus is on the political and business leaders from the world's largest economies, particularly the G8 and the major developing countries. The initiative builds on Mr Blair's international leadership and advocacy of climate change action while in office, and The Climate Group's expertise in building climate action programmes amongst business and political communities.

This briefing paper and its companions were commissioned by the Office of Tony Blair and The Climate Group to support the first Breaking the Climate Deadlock Report – 'A Global Deal for Our Low Carbon Future' – launched in Tokyo on June 27<sup>th</sup> 2008. Written by renowned international experts and widely reviewed, the papers' purpose is to inform the ongoing initiative itself and provide detailed but accessible overviews of the main issues and themes underpinning negotiations towards a comprehensive post-2012 international climate change agreement. They are an important and accessible resource for political and business leaders, climate change professionals, and anyone wanting to understand more fully, the key issues shaping the international climate change debate today.

The views expressed and information provided in this paper are the sole responsibility of the author. The Climate Group, the Office of Tony Blair and the staff of Breaking the Climate Deadlock Initiative accept no responsibility for any errors of fact or the opinions contained herein.

For further information see: [www.breakingtheclimatedeadlock.com](http://www.breakingtheclimatedeadlock.com)

# Executive Summary

- Coordinated international action on climate change has the potential to raise global incomes; provide additional rural employment, especially in areas with limited alternative opportunities in developing countries; and improve human well-being through reduced air pollution
- However, the year-to-year effects of policies are likely to be so small as to be lost in the overall fluctuations in the growth of GDP, because well-designed policies will operate slowly and gradually (unlike the sudden oil-price effects of 2007-2008), aiming to replace fossil-fuel equipment with low-carbon alternatives at the end of its working life.
- Well-designed international policies could achieve the G8 50 percent reduction target by 2050, or earlier as implied by the EU's 2°C target, with net benefit to global and national economies.
- Coordination reduces the investment costs, inducing technological change via agreements to establish global carbon prices, share new low-carbon technologies, apply standards of carbon efficiency, and open up markets to encourage economies of scale and specialisation.
- Globalisation of information and markets works in favour of rapidly reducing the costs of low-carbon processes and products through accelerated adoption, provided the market signals and incentives are favourable.
- The critical market signals and incentives come through carbon prices, created by carbon taxation and emission trading schemes ("cap and trade"). Carbon prices have to be "loud, long and legal" to be effective in influencing investment decisions.
- Low-carbon investments represent long-term benefits through reduced fuel costs and improved performance (beginning with the "no regrets" mitigation potentials identified by the IPCC) but short-term costs to those who pay for them. They also bring about a change in the structure of the economy, with reductions in value added in carbon-intensive activities and increases among the engineering and construction sectors that produce the new equipment and infrastructure.

## Recommendations

- Develop the Bali Action Plan to formulate global targets.
- Propose mandatory limits for Annex 1 parties, a "Marshall Plan" for funding low-carbon policies and measures in developing countries, and a cap-and-trade scheme for international transport.
- Fulfil the Bali action plan by developing proposals for Reducing Emissions from Deforestation and Degradation (REDD) and Multilateral Climate Change Fund (MCCF), as well as the architecture of national Clean Development Mechanism (CDM) programmes.
- Agree a global target of greenhouse gas (GHG) emission reductions below 2000 levels for 2020, 2030 and 2050.
- Agree mandatory national caps for Annex 1 parties that appear likely to meet the global target, provided there is adequate funding of CDM, REDD, MCCF and other instruments.
- Agree the funding of a "Marshall Plan" by industrialised countries to promote low-GHG policies and measures in non-Annex 1 countries, including cap-and-trade for GHG emissions, carbon taxes, feed-in tariffs, and Carbon Capture and Sequestration (CCS) with coal.



# Macroeconomic effects of the transition to a low-carbon economy

This paper reframes the debate on the macroeconomic effects of greenhouse gas (GHG) mitigation in terms of net benefits to the economy rather than net costs, drawing on the same modelling and other literature as the Intergovernmental Panel on Climate Change's Fourth Assessment Report (IPCC AR4)<sup>1</sup>. The traditional "costs" framing was more appropriate for a zero-sum approach to unilateral policy concerned with national competitiveness, especially when there was more doubt about the link between GHG emissions and climate change, as in the 1990s.

Today, with general acceptance of the scientific findings supporting the link, the issue is how to realise the potential for global macroeconomic benefits from international policy cooperation, in which all parties can benefit. A new approach is therefore more relevant, focused on the investment opportunities represented by the need to transform the world's energy system, and the potential of policies to accelerate sustainable development towards a decarbonised global economy.

The transition to a low-carbon global economy is a system-wide change. Nearly all sectors of the economy will be affected. Although the gradual and planned transition will have a minor impact on global economic growth, there will be much larger effects on a few sectors, e.g. renewable electricity generation or coal supply, and on those countries and regions with renewable resources or heavily dependent on oil and coal for exports and energy.

Good policy design and frameworks will be essential in achieving the greatest benefits from international coordination. For one thing, businesses planning future investments welcome clear signals and incentives for the transition. Further, a framework establishing a global carbon price – a price that is low at first but expected to rise sharply – will encourage innovation and rapid acceleration of investment in low-carbon technologies. There is potential for internationally coordinated policies to allow developing countries to "leapfrog" heavy polluting, industrialising technologies and instead to develop low-cost, information-intensive, less centralised economies based on zero-carbon electricity from renewables and solar heat. This is the challenge of the "carbon productivity revolution", but it requires education and training as well as access to information, funds and markets at global scale.

This paper assesses the impacts of climate policies for the global, national and sectoral economies at the macro, system-wide level, drawing on the Stern Review<sup>2</sup>, the IPCC's AR4 and later literature. The emphasis is on the benefits of international co-ordination in a world of dynamic technological change, rather than on the costs of unilateral action with static technologies and known, certain outcomes.

The paper covers the following:

- Impacts of climate policies on GDP growth
- Effects of induced technological change
- Why high and rising carbon prices are essential
- Effects on employment and wages
- Other macroeconomic aspects of the transition
- Effects on international trade and competitiveness
- Recommendations on the road to a Copenhagen agreement

### Calculating the economic costs of greenhouse gas mitigation

The economic costs of greenhouse gas (GHG) mitigation are not observable from market prices, since they involve assessment of a complex energy-environment-economy (E3) system as it responds to price signals, regulations, and changes in environmental outputs that have no market valuations. The macroeconomic costs estimated for transition to a low-carbon economy are always hypothetical because they involve a comparison of two different states of the E3 system over future years: the “with mitigation” scenario is usually compared with a reference scenario (often taken as “business as usual”, although this risks untold future extreme climate events).

In the analysis of macroeconomic costs and benefits it is important to distinguish those involving well being, as opposed to “utility” or those measured by Gross Domestic Product (GDP). *Well being* comes from friends, family, work and comparison with others after a minimum income is reached. *Utility* in the specific version used by traditional economists is aggregated self-interest. Its application can be deeply flawed, producing misleading if not meaningless conclusions for climate policy<sup>3</sup>. Results from this traditional approach assume mitigation costs (see Annex). *GDP* is the usual standard summary measure of macroeconomic effects as it covers all marketed output and is comparable across different countries’ accounts. The costs and benefits are the differences in GDP in constant prices between two scenario outcomes, and for convenience most of the discussion in this paper, unless explicitly stated otherwise is about the GDP effects, with the caveat that GDP can be a poor indication of well being, ignoring critical climate and equity effects. The changes in GDP can be expressed (1) in absolute terms, (2) as percentage of the reference case GDP or (3) as differences in growth rates:

- 1 The absolute amounts are misleading if quoted out of context, and they depend on the price base chosen
- 2 The changes as a percentage of GDP in the reference case show the scale of the costs, avoid the discount rate problem (since the costs and the level of GDP are contemporaneous) and allow easier comparison across years and countries.
- 3 Differences in growth rates are appropriate for comparing long-term mitigation costs, for example over the years to 2100. As a rule of thumb, a change in GDP is insignificant if it implies a difference from base of less than 1 percent over a 10-year forecast period<sup>4</sup>.

It is not appropriate to use the level of carbon tax or estimated permit price for CO<sub>2</sub> emissions as a summary measure of mitigation costs. The carbon tax rate is one of many policy instruments; it is always positive, whereas the costs can be positive or negative; and it is a partial measure, covering fossil-fuel use alone, whereas macroeconomic costs cover the whole economy.

### Impacts on GDP growth

#### The year to year effects of policies are likely to be so small as to be lost in the overall fluctuations in the growth of GDP

A key and repeated finding from modelling of policies for climate change mitigation is that the macroeconomic benefits and costs should be seen as having a minor impact on global economic growth, on average less than around +0.08 to – 0.12 percent of GDP growth for the G8 50 percent reduction target, based on modelling reported by the IPCC<sup>5</sup>. These differences in growth rates are negligible compared to the expected average of some 2 to 3 percent pa over the century.





























