

Principles for a Global Deal for Limiting the Risks from Climate Change

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Climate change is a global problem unparalleled in scale requiring international collaboration across sectors, countries and disciplines. The world has only a few years to establish a strong and credible global deal for action to reduce emissions if it is to avoid large risks of severe damage to the planet and to the prospects for sustained growth and development. The challenge cannot be underestimated and marginal changes are simply not sufficient to stabilise temperatures so that substantial risks from climate change can be reduced. It requires radically transformed development paths on the back of a technological revolution. The strategy for a global deal needs to be one of strong, effective and timely action to protect growth, support poverty reduction and create new economic opportunities. Delayed and piecemeal actions, relying on old technologies, will only exacerbate poverty, reduce growth and curtail market choice.

The UNFCCC 15th Conference of the Parties in Copenhagen at the end of 2009 will be crucial in designing the architecture for a post-2012 successor policy framework to Kyoto. The recent document “*Key Elements of a Global Deal on Climate Change*” (Stern 2008) builds on the principles of effectiveness, efficiency and equity to suggest what the key elements are likely to be. The purpose is not to prescribe specific instruments or technologies; different technologies and different policy instruments can be applied to different sectors and countries. However, it is important that all the different initiatives add up to delivering the overall objective.

Emissions Targets

The starting point for a global deal needs to be an agreement on the appropriate stabilisation target for the stock of atmospheric greenhouse gases (GHGs). The IPCC Fourth Assessment Report (AR4 2007) suggests that a target to stabilise GHG concentrations at between 450 and 500 ppmv CO₂e (rather than 450–550 ppmv CO₂e given in the Stern Review) would

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balance the projected global benefits and costs and limit risks. Stabilising below 450 ppmv CO₂e would require emissions to peak within the next few years, with annual declines of 6–10% thereafter. This would be very expensive, requiring new technologies to be introduced before they have matured. Stabilisation at 550 ppmv CO₂e would seem, given current scientific understanding, to be unduly risky. A target of 500 ppmv CO₂e with yearly cuts of GHGs of 3–4% is achievable at reasonable cost, if policy frameworks are efficient in delivery, and early and coordinated action is taken forward.

The challenge of achieving a target of 500 ppmv CO₂e should not be understated: it requires a halving of GHG emissions by 2050 relative to 1990 levels (as discussed at the G8+5 summit in Heiligendamm) from around 40 gigatonnes (GT) CO₂e to 20 GT CO₂e. By comparison, business as usual would see global emissions rise above 80 GT CO₂e by 2050. To achieve the goal of a 50% emissions cut relative to 1990 levels by 2050, most electricity production would need to be decarbonised, while emissions from transport, land-use, buildings and industry would need to be cut sharply. Globally, per capita emissions would need to fall, as a matter of simple arithmetic, to around 2 T per capita CO₂e as a world average from around 7 T per capita now.

Most developed countries (referred to as “Annex I”) currently emit around 10–12 T CO₂e per capita, with a cluster (including the USA) at nearly double that. These economies would therefore need to cut their physical emissions by *at least* 80% by 2050, implying that stringent emissions targets need to be taken on immediately, including interim emissions targets of 20–40% by 2020. The implications for GHG intensity of output are even stronger. Developed economies are expected to grow two- or three fold over this time period. To reduce their total emissions by a factor of 5, they would need to reduce emissions per unit of output by a factor of 10–15 from 1990 levels.

The Role of Developing Countries

Developing countries will have a central role to play in a global deal. By 2050, eight billion out of the world’s nine billion population will live in what is currently the developing world. Hence the role of developing countries will need to be at the heart of the process of designing a global deal. Indeed, a reduction of global emissions of 50% relative to 1990 levels by 2050 simply cannot be achieved without *actual* per capita emissions in developing and developed countries averaging near 2 T CO₂e. However, unlike *actual* emissions discussed above, developing and developed country *allowances* need not converge on 2 T CO₂e, indeed there is a strong ethical case for developed countries taking on much lower per-capita allowances, perhaps at or below zero, taking account of historic emissions into the stock of GHGs.

Achieving the necessary reduction in emissions requires developing countries formulating credible action plans, committing to binding national targets to be adopted by 2020, and meanwhile participating actively in carbon markets and in their further development. Before developing countries can commit, developed countries must be able to demonstrate to the developing world that low-carbon, high economic growth is possible, that financial flows to countries with cheap opportunities to abate GHGs can be substantial and that low-carbon technologies will be affordable, available and shared.

Countries with strong emissions growth such as China and India will need to plan to limit and reduce emissions within the next 10–20 years. For this they will require global cooperation, and they are unlikely to be able or willing to achieve these ambitious reductions without substantial technological and financial support and opportunities to innovate, and ultimately export, low-carbon technologies.

Until developing countries are ready to take on binding national targets, we propose a one-sided trading regime which rewards developing countries for reducing emissions, but does not punish them for failing to do so. In the absence of binding caps this is likely to happen through an expansion of existing baseline-and-credit schemes such as the Clean Development Mechanism (CDM). However, the CDM in its current form is not able to generate the financial and technological flows needed. Internal UK Government estimates using the global carbon finance model (GLOCAF 2008) suggest that climate stabilisation undertaken at lowest cost would imply annual carbon flows of US \$20–75 billion by 2020 and up to US \$100 billion by 2030. By comparison, the capacity of the current project-by-project CDM is about 400 project registrations per year, with costly validation and verification procedures (see Ellis and Kamel 2007) limiting new financial flows to perhaps US \$6 billion at current carbon prices.

A move from a project-based system to a wholesale approach, on the other hand, can reduce transaction costs by alleviating regulatory complexity and scrutiny inherent in a project-based system such as the CDM. This could take the form of sector targets, or programmatic emission reduction objectives. These would probably be based on efficiency targets, rather than sector caps, although sector caps may be possible for globalised industries such as steel. For example, for each tonne of cement produced using less than an agreed amount of carbon, producers would be eligible to sell the difference as credits.

The combination of opportunities to benefit from one-sided trading, scope to co-develop new technologies in collaboration with governments and businesses in developing countries, and the ability to exploit growing markets in low-carbon products and services afford substantial potential benefits to developing countries that commit to early action on tackling climate change.

International Emissions Trading: Cap-and-Trade

Putting a price on GHG emissions and enabling international emissions trading would be a critical factor underpinning the principles of effectiveness, efficiency and equity in a post-2012 policy framework. A cap-and-trade system is appropriate to manage the risks of climate change by imposing an absolute limit on emissions, consistent with the scientific conclusions of the risk of catastrophic climate change (effectiveness). International emissions trading would also reduce the cost of mitigation by allowing emission reductions to occur in whatever sector or country would be least costly (efficiency).

The benefits of carbon trading could be high, generating private sector financial flows to developing countries which could be used for low-carbon development (equity). According to GLOCAF, flows of \$20–75 billion a year would be plausible if developed countries cut emissions by 20–40% on 1990 levels by 2020, even if only 30% of this was purchased from an international emissions trading scheme. Key beneficiaries would be large developing countries, such as China and India, although significant flows could also go to Africa, Latin America and Southeast Asia, especially if forestry is included in the market.

Financing Emissions Reductions from Avoided Deforestation

Addressing forestry in a global climate change deal, and in particular deforestation and forest degradation in tropical rainforests, is essential if overall targets for stabilisation of carbon emissions are to be met. According to the International Panel on Climate Change (IPCC),

“forestry” currently contributes 17.4% of global annual GHG emissions, the main proportion of which comes from burning or decomposition of tropical rain forests. Tropical deforestation is therefore an international problem, needing urgent international action. A global deal would need to put in place a framework to mobilise international support, building on national and local governments’ existing efforts and experience.

National forest protection policy should be consistent with broader national development strategies. An estimated 1.6 billion people depend on forests for their livelihoods. Finance to reduce deforestation could therefore have a significant impact on poor rainforest nations and forest communities. However, until now developing countries have not received funding from the international community on a scale sufficient to address the drivers of deforestation. In the near term, support through existing multilateral funding channels such as the World Bank’s Forest Carbon Partnership Facility (FCPF) can be scaled up with the private sector playing a role through commercialising benefits that standing forests provide. In the longer term, forests should be integrated into global carbon trading. A global compliance carbon market could be worth \$100 billion in 2030, which would constitute a new source of finance.

Technology

The single most important aim of policy must be to create a market for clean technologies. Demand for such technologies can be brought about through credible long-term carbon pricing, product and process standards, regulations and public procurement. In order for existing technologies to be fully diffused and adopted, and for new innovations to occur, critical market failures must be overcome. These include agency problems and information asymmetries precluding the take up of efficiency gains and also those related to the private sector’s ability to capture rent from risky technologies prone to large knowledge spillovers. Such failures restrict the deployment of many existing energy efficiency technologies, many of which are economically viable. In the near term, policies must help diffuse *existing* low carbon technologies that are currently only partly dispersed throughout the global economy by applying new standards and regulations and through public procurement. It is estimated that bringing global industries up to today’s best technological practice can save up to 10GT of CO₂e by 2030, almost a third of the required reduction.

In the medium term, policies are required to develop and scale-up near commercial technologies such as carbon capture and storage (CCS), second-generation bio-fuels and various forms of solar power. This set of technologies may be some 5–15 years away from economic viability and together have the potential to reduce emissions by a further 10GT of CO₂e by 2030. Beyond 2030, the required cuts in carbon emissions will be achieved only through more radical shifts in technology (e.g. zero emissions power supply and towards zero emissions transport). These have huge potential, but are more speculative and with greater risks associated. As a result they will require substantial public investment in research and development to cover long-term risks the private sector is unlikely to take on.

Adaptation

As global temperatures increase, all countries will need to adapt to limit the human, economic and social impacts of climate change. Basic development is critical for building adaptive capacity, but climate change will make it more costly to deliver and sustain the Millennium Development Goals beyond 2015. Any global deal will need to commit developed countries

to help developing countries adapt to the consequences of the already inflated stock of atmospheric GHGs. This support must be additional to existing development commitments and also to support for mitigation. Estimates of *additional* costs of adapting to climate change vary and are highly uncertain—but UNFCCC and UNDP estimates suggest between \$25 billion and \$100 billion a year may be required over the next 20 years. Allocation of funding between countries will need to reflect a number of factors including the impact of climate change, the country's vulnerability to those impacts, and the capacity of governments to deliver appropriate outcomes. In addition to funding, there is a need for better access for poorer countries to markets, technology and information to ensure that development is climate resilient.

Implementation and Institutions

Copenhagen in 2009, or shortly thereafter, will determine international targets, establish developed country caps, and set developing country responsibilities. 2010–2020 should include a phase of building effective and cooperative institutions for finance and technology as a basis for eventually establishing developing country caps. It will also be the time to prove that low-carbon growth is possible, with substantial financial flows linked to carbon markets and collaboration over developing and deploying technology. Post-2020 all countries should form part of an international cap-and-trade system and adhere to technological agreements.

Successful policy implementation requires an effective institutional structure to develop and distribute emissions targets, establish carbon trading, support technological collaboration, monitor and verify reductions and resolve disputes. In the short run, the international community will need to build on the expertise of existing institutions, working through existing channels of international dialogue. Longer term, successful implementation rests on a new flexible institutional framework, capable of drawing all parties into a single common process.

Finally, the next few years present a great opportunity to lay the foundations of a new form of growth that can transform our economies and societies. As capital, input and raw material costs fall in the current economic slowdown, publicly supported low-carbon development can both create jobs, reduce risks for our planet and spark off a wave of new investment which will create a more secure, cleaner and attractive economy for all of us. In so doing, the developed world can demonstrate to the developing world that low-carbon growth is not only possible, but that it can also be a productive and efficient route to advance technological capacities and overcome world poverty.

References

- Ellis J, Kamel S (2007) Overcoming barriers to Clean Development Mechanism projects. OECD and UNEP/RISOE, Paris, May 2007
- Fourth Assessment Report of the Intergovernmental Panel on Climate Change CUP (2007) Cambridge
- Preliminary Results from the GLOCAF Model, Office of Climate (2008) See also, 'Paying for mitigation, The GLOCAF Model', Office of Climate Change
- Stern N (2008) Key elements of a global deal on climate change. The London School of Economics, London, 30 Apr 2008