Climate Change 2007: Mitigation of Climate Change

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There is increasing consensus within the scientific community, governments, and the general population that coordinated actions are needed to avert the impacts of greenhouse gas (GHG)-driven climate change. The transition from a world economy that is dependent on fossil fuels and fertilizers to one that considers carbon dioxide, methane, and nitrous oxide as potentially dangerous pollutants may well be the most transformative development since the industrial revolution. However, despite the recognition of the importance of this action, there is little consensus regarding how to get there. The central challenge is the adoption of technologies that reduce GHG emissions while not diminishing economic prosperity and while human population continues to increase. *Climate Change 2007: Mitigation of Climate Change* is a comprehensive analysis of the current options for reducing GHG emissions, and as such is the best available roadmap for achieving this end.

This book is one of three volumes comprising the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), representing the efforts of over 200 authors from around the globe. Like all IPCC reports, it is a well organized and thoroughly researched reference text that synthesizes a wealth of primary information across a wide range of science and policy studies.

Mitigation alternatives for each of seven economic sectors are evaluated: energy supply, transportation, buildings, industry, agriculture, forestry, and waste management. Chapters for each sector begin with a review of current status and future trends in GHG emissions attributable to the sector, followed by description of technologically feasible mitigation practices, which are then evaluated in terms of their "mitigation potential." The analysis takes account of economic and policy factors that will ultimately determine the selection of mitigation alternatives. Thus, for those of us grounded primarily in the physical sciences, much of the analysis and terminology may be quite unfamiliar.

The analysis is centered on the concept of "mitigation potential," which is defined in several ways. At the upper limit is the "physical potential," which is the maximum amount of GHG reduction achievable from a strictly thermodynamic perspective, without regard to economic or policy considerations. At the lower limit is the "market potential" which assumes market and policy conditions currently in place. Much of the analysis is done with regard to a third, intermediate measure, the "economic potential." This is defined as "the amount of mitigation that is cost-effective for a given carbon price" where that price takes into account all of the "social costs" of GHG emissions.

The basic idea is that if all of the consequences (e.g., sea level rise, drought effects, increased disease, etc.) of GHG emissions are accounted for in its price, and this price is then paid to power generators, farmers, etc., in return for their adoption of GHG-reducing practices, the resulting mitigation achieved for a given practice is its "economic potential." Since there is no commonly agreed on price that accounts for all social costs, the analysis is done by assuming different price ranges, i.e., $0 to $20, $20 to $50, and $50 to $100 per ton carbon dioxide equivalent (t^{-1} CO_2–eq). Assuming a price of up to $100 t^{-1} CO_2–eq, the worldwide economic mitigation potential of the agriculture sector in 2030 is estimated at 4.3 Gt CO_2–eq yr^{-1}, compared to 3.6, 2.0, 6.0, 4.0, 2.8, and 0.7 Gt CO_2–eq yr^{-1} for the energy supply, transportation, buildings, industry, forestry, and waste management sectors, respectively. The largest component within the agriculture sector is restoration of cultivated organic soils, with an economic mitigation potential of 1.25 Gt CO_2–eq yr^{-1}, which compares to reductions of 0.93, 1.22, and 1.88 Gt CO_2–eq yr^{-1} for transition to electrical power generated by wind, bio-energy, and nuclear sources, respectively.

In addition to deriving practice-specific mitigation potentials in many cases segregated by geographic region, the volume also addresses ancillary benefits and costs and GHG mitigation in the broader contexts of sustainable development and "cross-sector" considerations. Thus, the scope and ambition of this report are huge, and therefore it appears quite challenging to penetrate coming from any particular discipline. While considerable background material, a comprehensive glossary, and concise and well-referenced executive summaries of each section facilitate interpretation, the enormity and complexity of the analyses are daunting. Just as intimidating, however, is the prospect of inaction on climate change. Thus, for anyone seriously concerned with mitigating climate change, this volume is a required reference.

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