

Policy Options for Reducing GHG emissions: A Global Review

Suchi Misra* and Deepak Sharma*

Centre for Energy Policy (CEP), Faculty of Engineering and IT, University of Technology
Sydney, P. O. Box 123, Broadway, NSW 2007 Australia

Suchi.Misra@uts.edu.au; Deepak.Sharma@uts.edu.au

Overview

Global warming and its potential consequences for humanity have lately emerged as a significant issue of public policy interest. Countries across the world are considering a suite of measures to redress the climate change challenge. Most of these measures focus on reducing the growth of greenhouse gases (GHG), principally carbon dioxide (CO₂) emissions. This is based on the argument CO₂ is the dominant GHG, contributing more than 70 percent to the global GHG emissions. The major source of CO₂ emission is energy sector, with its overwhelming reliance on fossil fuel, especially coal.

The design of these measures is based on modelling of energy systems and analysis of energy-economy interactions. Further, it appears that there is considerable contrast in terms of such analysis and modelling across various countries. This paper develops a comparative assessment of the salient features of such modelling and analyses, with a view to identify the similarities and differences in the approaches adopted by different countries to develop their climate change policies.

This assessment will enable insights to be developed about efficacy of these policy options in readdressing the climate change challenge. At yet another level, this assessment will provide some deeper perspectives to the challenges faced by humanity to develop a global consensus on strategies to reduce GHG emissions.

Methods

The main method for developing the comparative assessment as noted above is made in this paper through review of literature on modelling and policy positions by various countries. Special emphasis is placed in this assessment on scope, structure, methodology, technology, time horizon and other modelling assumptions that underpin such modelling and analyses. Key aspects considered are, for example

- Scope of the Model: geographical scope limited to a country or global, economic implications such as cost and benefits of a transition to a low-carbon economy;
- Structure: Hybrid, Top-down, Bottom-Up;
- Methodology: Myopic, Recursive-dynamic, Forward-Looking;
- Technological Advancement: Exogenous or endogenous;
- Time horizons: Short, medium or long term, static or dynamic;
- Baseline assumptions: economic growth, population, energy use and other variables, existing policies captured in the baseline;

- Discount factors and other modelling assumptions such as coverage of GHGs and sectors and mitigation options available in the model (e.g. if, when, and at what capacity carbon capture and storage (CCS) comes into effect)

The focus in this assessment is to develop a broad understanding of the salient features of the models used and the underlying assumptions of these models. This will provide more meaningful insights for developing policy options.

Expected Results

- There are significant contrasts between the policy foci of developed and developing countries. Much of the developed countries appear to favour market based approaches for example Emissions Trading Scheme (ETS) and market mediated carbon pricing regimes. Developing world on the other hand appears to favour approaches underpinned by energy efficiency improvements and technology standard based schemes, giving more emphasis to regulatory and subsidy based mechanisms.
- Policy analysis in the developing countries seems to be not based on any modelling effort whereas in developed world there are examples of detailed and economy wide impacts models. Most of these models are based on application of computable GEM model.
- Some of the features of these macro-level models are much of their focus is of modelling in economic generally lacking in technological detail and completely neglectful of significance of institutions and political considerations.
- Also, these models appear to focus on immediate issues, and tend to have discount long-term issues. Moreover, there appears to be a considerable contrast in the drivers that define alternative future scenarios.
- There is apparently no distinctive coherence in the modelling and analyses approaches followed by various countries. This clearly militates against the development of common approach and global consensus on redressing the climate change challenge.

Key References

1. International Energy Agency (IEA) 2009, "CO₂ Emission from Fuel Combustion, 2009 Edition", OECD/IEA, 2009.
2. International Energy Agency (OECD/IEA) 2009, "National and Sectoral GHG Mitigation Potential: A Comparison across Models", OECD/IEA, 2009.
3. International Energy Agency (IEA) 2010, Publications Portal, <http://www.iea.org/publications/index.asp>.