SANDEE
South Asian Network for Development and Environmental Economics

POLICY Brief

Number 11-05, December 2005

CAN INDIA AFFORD TO TACKLE GLOBAL WARMING? – A PEEK AT THE YEAR 2020

Global warming is regarded by many scientists and politicians as one of the most significant challenges facing humanity. There is considerable pressure on developed and developing countries to cut their emissions of greenhouse gases, and many countries will have to start to act sooner than later. This is particularly true for India, which, on account of its size, is the fifth largest producer of carbon dioxide in the world.

A recent SANDEE study looks at how policies to reduce carbon emissions would impact poverty and economic growth in the country. In particular, the study examines the consequences of a domestic carbon tax policy and of participation in a global carbon emission trading regime. It concludes that a carbon tax policy that simply recycles carbon tax revenues back to households could reduce economic growth and increase the number of poor in the year 2020. However, participation in a tradable emission permits regime presents an opportunity for India to sell surplus permits. India would then be able to generate revenues and speed up growth by 2% in 2020 and bring about significant reductions in poverty, while keeping its per capita emissions below the 1990 per-capita global emissions level.

The study was carried out by Vijay Prakash Ojha from the Rajiv Gandhi Institute for Contemporary Studies, New Delhi, India. It was undertaken because the relationship between carbon emission reduction, economic growth and poverty alleviation is of immense relevance to India. India is vulnerable to the potential impacts of global climate change and has a real stake in a global policy regime to stabilize global carbon emissions. Indian policy makers are beginning to assess the implications for India of a Kyoto-type global emissions trading regime.

This study looks at the social and economic impacts of carbon taxes and carbon trading regimes. Carbon taxes are based on carbon emissions. A carbon tax is expected to increase the price of coal, refined oil and natural gas. The extent of the price increase of each of these fuels is determined by its carbon content. The price increase is largest for coal and smallest for natural gas. Producers respond to carbon taxes by switching from coal towards refined oil and natural gas as a source of energy. At the same time, higher energy prices force a reduction in overall energy use. Carbon emissions are reduced on account of both fuel switching and reductions in fuel use.

The tradable permit scheme of the kind envisaged in the Kyoto protocol allows countries to earn revenue from selling carbon emission permits if their overall emissions are lower than their emission allowances. Carbon emission allowances are allocated on the basis of per capita emissions. Therefore, under a carbon trading scheme, countries with high per capita emissions would purchase permits from countries with low per capita emissions, such as India.

This policy brief is based on SANDEE working paper No. 12-05, 'The Trade-Off Among Carbon Emissions, Economic Growth and Poverty Reduction in India', by Vijay Prakash Ojha from the Rajiv Gandhi Institute for Contemporary Studies (RGICS), New Delhi, India. The full report is available at www.sandeeonline.org.

Table 1: Energy consumption and carbon emission trends in India

Year	1970	1975	1980	1985	1990	2000	2005
Energy consumption (petajoules)	4923	6005	7152	9059	11636	17680	21437
Gross carbon emission (metric tons)	129.64	156.59	183.23	230.72	288.99		

Notes : Gross carbon emission includes emissions from biomass combustion.
Source: Fisher-Vanden *et al* (1997) & Marland, Gregg, Tom Boden, Robert J Andres (2003).

These approaches represent potential medium-term strategies that India could adopt to address the problem of greenhouse gas emissions. The impact of these policies on economic growth and poverty alleviation is key because for a low-income country like India, the most pressing need is achieving poverty reduction rather than controlling carbon emissions.

IMPLEMENTING A MODEL OF THE INDIAN ECONOMY

To carry out this study, Ojha develops a model of the Indian economy that allows him to understand the impact of changing taxation and revenue streams on the country's Gross Domestic Product (GDP) and on poverty. An approach known as Computable General Equilibrium (CGE) modeling is used to capture the interactions among producers, households, the government and the rest of the world and to investigate the impact of increased fossil fuel prices on the economy and on the way in which producers and consumers use and save energy.

The model breaks the Indian economy down into eleven main sectors. It incorporates factors such as projected energy-efficiency improvements, the complexities of labour markets and wage rates, and public and private investment inputs. As is usually done in a CGE modeling exercise, a business-as-usual (BAU) scenario is first analysed, and then alternative policy scenarios are assessed.

POLICY ALTERNATIVES UNDER TEST

In this study, eight alternative policy scenarios are developed, four related to carbon taxes and four to implementing a carbon trading regime. For example, for the carbon tax policy, two policy simulations investigate the impact of a 10% annual reduction in emissions during a 30-year period i.e. from 1990 to 2020. In one of these simulations carbon tax revenues are transferred back to all households. In the second, tax revenues are exclusively transferred to a target group of the lowest income households. Thus, the second is a progressive policy where there is an attempt to minimize the impact of carbon emissions reductions on the poor.

A similar investigation is carried out to understand the implications of following an international tradable permits approach. The same two revenue transfer scenarios are assessed. Thus, revenues from the sale of permits are either transferred to all households or are targeted to the poor. In the results described below, the permit price is fixed at US$ 6 (Rs 100) per tonne. The emissions quota or goal for 2020 is to bring carbon emissions to less than or equal to 1 tonne per capita (based on 1990 population figures).

Table 2: Comparing carbon reduction regimes with a no-carbon reduction (business-as-usual) scenario in 2020

	Percentage change in GDP and number of poor in 2020 relative to a business as usual scenario where there are no carbon taxes or emission trading	
Policy Scenarios	GDP (2020)	Number of poor (2020)
Carbon Taxes without targeted transfers to the poor[1]	-0.76%	5%
Carbon taxes with targeted transfers to the poor[1]	-0.88%	1%
Emission trading without targeted transfers to the poor[2]	1.83%	-19%
Emission trading with targeted transfers to the poor[2]	1.86%	-50%

[1]: Carbon targets are set such that emissions are reduced annually by 10%.
[2]: Carbon targets are set such that in 2020, emissions are less than or equal to 1 tonne per capita (1990 population figures).

HOW THE CARBON TAX PERFORMS

The results show that a carbon tax policy can impose heavy costs in terms of lower economic growth and higher poverty. In the carbon tax scenario where there is no targeted transfer of revenues and the annual reduction in emissions is set at 10%, the number of poor in 2020 increases by 5% compared to the business-as-usual (no carbon tax) scenario. However, this percentage can be considerably reduced if targeted transfers are made. In such a scenario, GDP in 2020 is approximately 0.88% less than what it would be without a carbon tax and the number of poor increases in 2020 but by less than 1%. This finding is important. Such a soft emission reduction target is what India needs to set for itself, given that the ten percent annual reduction in aggregate emissions will bring down its per capita emissions to a level far below global per capita emissions.

EMISSION TRADING SHOWS PROMISE

India gains immensely in terms of higher GDP growth and lower poverty in the tradable emission permits scenarios. In the case of the scenario in which the permit price is $ 6 per tonne, GDP increases by an average of approximately 6% per year, and the number of people in poverty in 2020 is reduced by 19% relative to a situation without an emissions regime and no targeted transfers. Moreover, with targeted transfers, poverty in 2020 is halved.

ARE THERE ANY OTHER WAYS TO REDUCE CARBON EMISSIONS IN INDIA?

Apart from carbon taxes and emission trading regimes there are a number of other approaches to reducing fossil fuel use and carbon emissions. These include energy efficiency, the development of low or zero emission energy sources and various regulatory measures. However, there are a number of barriers to the adoption of these approaches in India.

Energy inefficiency is a big problem in India. This, in turn, is the result of the energy subsidies that still are in place in the country. Energy price reforms have been instituted in India and subsidies have declined since 1991. However, the reforms are far from complete, and they have, as yet, had an insignificant impact on energy efficiency and on carbon emissions.

'Clean' energy sources such as hydro-power, wind and nuclear constitute a very small and stagnant share (about 6-7%) of the total energy consumed and are unlikely to grow significantly in coming years. Command-and-control measures are regarded as neither feasible nor desirable. It is generally felt that such measures are inefficient in comparison to market-based instruments. Secondly, because they curtail output, such measures would place an unacceptable deadweight loss on the economy.

SANDEE

The South Asian Network for Development and Environmental Economics (SANDEE) is a regional network that seeks to bring together analysts from the different countries in South Asia to address their development-environment problems. Its mission is to strengthen the capacity of individuals and institutions in South Asia to undertake research on the inter-linkages among economic development, poverty, and environmental change, and, to disseminate practical information that can be applied to development policies. SANDEE's activities cover Bangladesh, Bhutan, Nepal, India, Pakistan and Sri Lanka.

SANDEE's Policy Brief Series seek to inform a wide and general audience about research and policy findings from SANDEE studies.

Author
Vijay Prakash Ojha
Editor
Rufus Bellamy
Series Editor
Priya Shyamsundar

SANDEE SPONSORS

IDRC CRDI
IUCN The World Conservation Union
Norad
Sida
Swedish International Development Cooperation Agency

This policy brief is an output of a research project funded by SANDEE. The view's expressed here are not necessarily those of SANDEE's sponsors.

With this set-up, in 2020, per capita emissions are expected to be 0.73 tonnes. However, it should be noted that India can not perpetually expect to receive money from the developed countries through the sale of emission permits. Actual emissions increasing faster in the tradable permits scenarios than in the business-as-usual scenario and it is safe to expect that India will change from being a net seller of permits to a net buyer of permits before 2050.

A UNIQUE OPPORTUNITY FOR INDIA AND THE ENVIRONMENT

Overall these findings point to the conclusion that, on its own, India is unlikely to take the hard decision of imposing a domestic carbon tax to reduce carbon emissions. This is despite the finding that a carbon tax scheme that produces a very modest reduction in carbon emissions and in which revenues are transferred to the poor is not significantly detrimental to economic growth and poverty alleviation.

The findings point just as strongly to the conclusion that global emissions trading opens up a unique opportunity for India and other developing countries, to sidestep the trade-off among carbon emissions, economic growth and poverty reduction. Emissions' trading offers a win-win situation for both society and the environment.

SANDEE | P.O.Box 8975 EPC-1056 | Kathmandu, Nepal
Tel: 977-1-552 8761, 552 6391 | Fax: 977-1-553 6786
E-mail: info@sandeeonline.org
Website: www.sandeeonline.org