TECHNICAL PAPER | EXECUTIVE SUMMARY

Carbon Taxes in India

Balancing Growth, Equity, and the Net-Zero Transition

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Background and Context

India has set ambitious climate goals, including a 45% reduction in the emissions intensity of its gross domestic product (GDP) by 2030 (from 2005 levels) and achieving net-zero emissions by 2070. Achieving these targets will require policy interventions, including the introduction of carbon pricing mechanisms to encourage businesses and households to reduce their emissions. This study evaluates the introduction of a theoretical carbon tax in India and assesses how to balance economic growth, equity considerations, and emissions reduction. The carbon tax framework proposed in this study is a potential alternative to the Carbon Credit Trading Scheme (CCTS) that will soon be implemented in India. The study utilises the CSEP Environmentally Extended Social Accounting Matrix (ESAM) for India 2019–2020 to assess the impacts of a proposed carbon tax on the economy, consumption inequality, and the role of revenue recycling in facilitating a just transition.

Carbon Pricing Mechanisms

Carbon pricing is a key policy tool for reducing greenhouse gas (GHG) emissions. The three main approaches—the CCTS, Emissions Trading Scheme (ETS), and a carbon tax—differ in their mechanisms, coverage, impact on emission reduction, and other parameters. India has chosen to implement the CCTS, a carbon pricing mechanism based on emissions intensity. The ETS, on the other hand, sets a fixed cap on total emissions and distributes or sells allowances accordingly. The carbon tax, which is the focus of this study, applies a fixed charge per unit of emissions.

Each of these mechanisms has different features that may make it more suitable for a given context. The carbon tax offers price certainty in emissions, but not the quantum of emissions reduction and revenue generation, which can, in turn, be used to address the distributional impacts of climate-financing needs and to achieve clearer compatibility with international carbon markets. While the CCTS may not necessarily be able to provide revenues and, as an emissions-intensity-based mechanism, does not align well with international markets, it does come with several advantages for the Indian context. It aligns better with existing domestic schemes, offers more flexibility to industries that need to grow to meet demand, and can be adjusted to meet the needs

of a particular sector. The ETS has a well-established history in the European Union (EU) context and has also proven to generate revenues when the permits are auctioned; however, it took almost a decade for the European Union Emissions Trading System (EU-ETS) to mature and generate these revenues. The ETS, if adopted, will be compatible with the European Union Carbon Border Adjustment Mechanism (EU-CBAM) framework.

Modelling Approach: ESAM Framework

The CSEP ESAM is a comprehensive economic framework of the Indian economy (Chadha, Sivamani, & Verma, 2023). It consists of 45 production sectors, 80 household categories, and 318 categories of labour, along with other economic agents (government, institutions, capital account, and rest-of-the-world account) to complete the circular flow of the economy. It includes environmental (pollution) accounts with data on GHG emissions by sector and households, allowing for the assessment of carbon tax impacts on emissions. The model captures inter-industry linkages (input–output relationships) and income flows, enabling analysis of how carbon tax propagates through output, income/employment, expenditure, and emissions. A limitation of the study is that it is based on the Leontief assumption of fixed cost structures, which also does not account for behavioural responses to price changes.

For this study, a carbon tax is applied to eight emissions-intensive (EI) sectors, selected in line with the sectors covered by the CCTS. These eight major emitting industrial sectors in the CSEP ESAM—aluminium, cement, fertilisers, iron and steel, paper and pulp, textiles, combustible petroleum products, and non-combustible petroleum products—account for roughly 27% of manufacturing output, 22% of manufacturing gross value added (GVA), 19% of industrial employment, and about 80% of direct manufacturing carbon dioxide (CO_2) emissions. The hypothetical carbon tax is levied at three rates (Rs 1,700, Rs 2,150, and Rs 2,600 per tonne of CO_2 emissions), reflecting low to moderate carbon price levels in line with the suggestion of the International Monetary Fund (IMF) for emerging market economies (EMEs). The tax is applied to the production of these sectors and also to the emissions from their use of coal-based electricity, ensuring downstream industries face higher costs in line with the carbon content of their inputs.

In this study, two scenarios are examined: (1) carbon tax only, where all new carbon tax revenue accrues to the government and is used to reduce the fiscal deficit, and (2) carbon tax with revenue recycling, where a portion of the revenue is recycled back to households through direct benefit transfers (DBTs). Revenue recycling is modelled via DBTs to households in the lower 50% of the consumption expenditure distribution in both rural and urban areas and across all social groups. The quantum of the transfer to each household group is equal to their reduction in consumption due to the carbon tax, effectively compensating poorer households for the carbon tax-induced higher prices in the economy. This design ensures that about 57% of India's population, including the most vulnerable groups, receive compensation. India's existing DBT infrastructure accounted for 182 crore transactions and disbursed Rs 2.23 lakh crore in 2024–2025, indicating that such large-scale targeted transfers are administratively feasible.

Implications of the Carbon Tax

1. Emissions and Climate Targets

Even a moderate carbon tax applied to select sectors contributes to emissions reduction. The range of reduction in total CO_2 emissions from the economy relative to the baseline is 1.02%–1.55%, with higher tax rates achieving larger reductions. Emissions from the targeted EI sectors fall by an even greater margin (1.49%–2.27%), reflecting the direct impact of the tax. These are notable impacts, given that the tax covers only part of the industrial sectors and uses modest rates for emerging market economies. In terms of India's climate pledges, the carbon tax could further lower the GDP emissions intensity by 0.8%–1.2%, on top of the approximately 37% reduction already achieved since 2005.

2. GDP and Growth

The carbon tax has a modest impact on economic output. Due to the tax, the GDP is projected to be about 0.22%–0.33% lower than the baseline. This marginal contraction reflects slight reductions in production and consumption due to higher costs. The impact is relatively small in magnitude, suggesting that a carefully designed carbon tax need not derail India's economic trajectory if phased out gradually.

3. Fiscal Outcomes

A key benefit of introducing a carbon tax is the generation of government revenue. At the Rs 2,150/tCO_2 rate, the carbon tax yields roughly Rs 1.27 lakh crore in the first year, leading to a significant improvement in India's fiscal position. In the carbon tax-only scenario, the fiscal deficit-to-GDP ratio declines from a baseline of 5.01% to about 4.40%. With the revenue recycling case, the deficit still improves, albeit to a smaller extent (approximately 4.57%). The revenue thus creates much-needed fiscal space that could help finance climate action and other development activities.

4. Sector-Specific Effects

The carbon tax raises production costs for carbon-intensive industries, leading to modest reductions in their output and emissions. Notably, the mining sector sees reduced activity due to lower demand for coal and minerals from taxed industries like steel and cement. However, services and low-emission manufacturing sectors remain largely unaffected in the short term.

5. Employment and Incomes

Across all sectors of the economy, total employment is projected to decline by 0.95%–1.44% in the carbon tax scenario, with the largest losses in secondary (manufacturing) sectors. Rural employment is more adversely impacted than urban, reflecting the concentration of industrial and mining jobs in rural areas. However, revenue recycling via DBTs helps offset these job losses, particularly in the primary sector (e.g., agriculture), as transfers increase rural household consumption. With DBTs, overall job losses are reduced to 0.67%–1.01%.

6. Household Consumption and Inequality

The carbon tax alone slightly increases consumption inequality, as poorer households spend a larger share of their income on primary- and secondary-sector goods. The national Gini coefficient rises marginally in the carbon tax case, with rural areas more affected due to their higher consumption of energy-intensive goods. However, with revenue recycling, inequality falls below baseline levels, especially in rural regions, thus demonstrating that targeted transfers can both protect vulnerable groups and stimulate the economy without undermining the tax's environmental goals.

Global Experiences in Environmental Fiscal Reform (EFR)

International experiences reinforce that well-designed environmental taxes can be compatible with equity and growth. Brazil invested oil royalty revenues in health and education, helping to reduce regional inequalities. Ireland and Canada have implemented carbon taxes with revenue recycling to support vulnerable households. India's reforms in removing fuel subsidies between 2010 and 2017 demonstrate that environmentally harmful subsidies can be phased out and redirected toward cleaner alternatives with public health and fiscal benefits. These experiences underscore the need for transparent, equitable use of environmental revenues.

Policy Recommendations

Based on this study, the following policy changes are proposed to help India meet its climate, growth, and equity goals.

1. **Adopt a Moderate, Phased Carbon Tax:** Introduce carbon pricing at modest initial rates in key emitting sectors, balancing climate targets with economic growth needs. This could begin with alignment to the CCTS framework and gradually expand over time.

2. **Implement Revenue Recycling for Equity:** A significant portion of carbon tax revenues could be used for DBTs to vulnerable households, mitigating regressivity and boosting inclusive consumption. A carbon price accompanied by employment protection, particularly in regions dependent on fossil fuels, would help attain a more just transition.

3. **Embed within a Broader EFR Strategy:** Rationalise fossil-fuel subsidies, strengthen monitoring, reporting, and verification (MRV) systems, and integrate environmental goals into fiscal policy at national and subnational levels.

India's climate transition can be fiscally prudent and socially equitable if it combines moderate carbon pricing with the redistribution and reinvestment of revenues. This integrated approach aligns with India's dual imperatives of development and decarbonisation.

About the authors

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