From Carbon Subsidy to Carbon Tax: India's Green Actions[1]

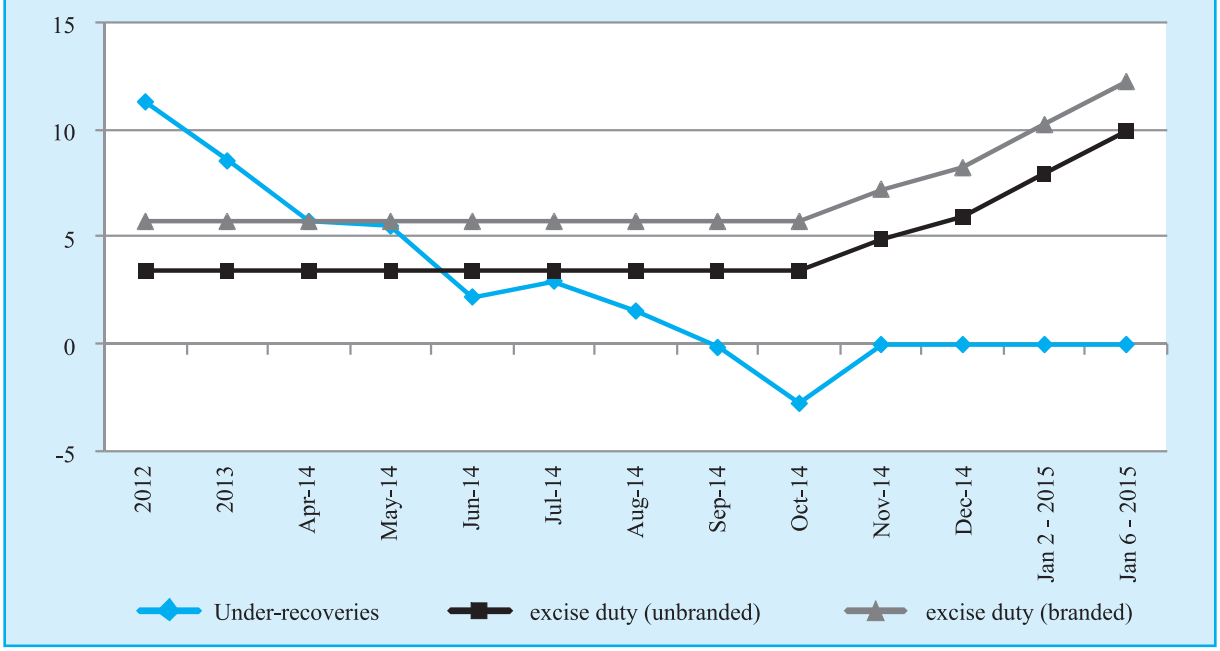
09 CHAPTER

9.1 Introduction

The recent steep decline in international oil prices is seen by many as an opportunity to rationalize the energy prices by getting rid of the distorting subsidies whilst shifting taxes towards carbon use.[2] This will not only be a fiscally prudent measure but also an opportune time to introduce measures such as carbon taxes, which are still the most potent instruments in dealing with the threats of climate change.[3]

While there are a very few countries globally that have reacted or made any efforts in this direction, the recent measures by the Government of India to decontrol diesel prices while at the same time increasing excise duty on petrol and diesel periodically to match the declining global prices

Figure 9.1: Diesel under-recoveries and excise duties, 2012 to 2015 (Rs./ litre)



***Source*: Petroleum Planning & Analysis Cell, MoP&NG.**

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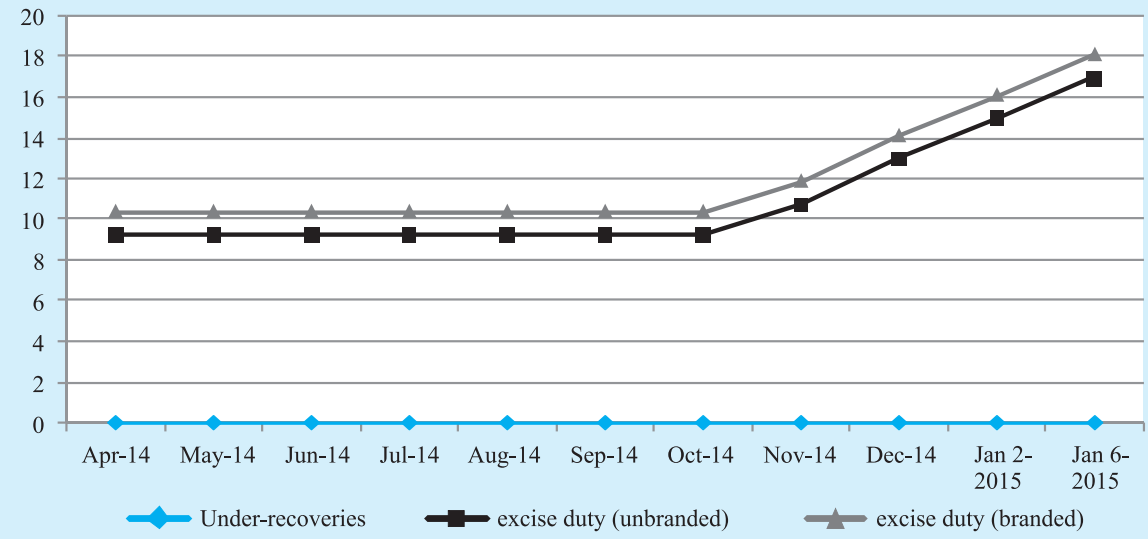
[1] Help of Muthukumara Mani and Fan Zhang, of the Office of the Chief Economist, South Asia Region, World Bank in the preparation of this chapter is gratefully acknowledged.

[2] *"Seize the Day"* The Economist, January 17, 2015.

[3] A carbon tax is a tax on the carbon content of fuels (principally coal, oil, and natural gas) that generate CO2 emissions when burned. The tax would apply at a specific rate per ton of coal, per barrel of oil, or per million cubic feet of gas, with the amounts adjusted to equalize implied taxes on carbon content. The rationale of such a tax is to reduce GHG emissions primarily responsible for climate change.

Figure 9.2: Petrol Under-recoveries and Excise duties, 2014-2015. (Rs./litre)



***Source*: Petroleum Planning & Analysis Cell, MoP&NG.**

reflects a proactive stance in this direction. As Figures 9.1 & 9.2 shows, under-recoveries—a measure of the subsidy arising from lower domestic prices compared to international prices—have been eliminated. And in a series of actions since October 2014, excise duties have been imposed on diesel and petrol. Previously, the coal cess was doubled from ₹ 50 per ton to ₹ 100 per ton, also adding to the set of green actions taken by the government.

9.2 Excise duty on petrol and diesel as an implicit carbon tax

Excise duties on petrol or diesel also act as an implicit carbon tax—by putting an effective price on emissions. For example, more fuel a car burns, and the greater the emissions, the greater the tax paid. There is a price signal to reduce fuel burnt, and hence CO_2 emissions. In addition to serving as a carbon tax, an excise on petrol and diesel may, of course, also price other externalities associated with burning petrol or diesel. This includes congestion costs (from using vehicles), noise and local air pollution (of various forms) which can be deeply damaging for health.[4] Estimated damages from carbon emissions are dwarfed by those from the other unwanted side effects. At the high end of available estimates, climate change impacts are only 7 per cent of the costs associated with congestion and air pollution.[5] One cannot off course understate their role in raising substantial revenues for social redistribution. In many countries the latter reasons have often motivated the taxation of fossil fuels than a carbon tax. In India, the recent change in direction from subsidisation to taxation of fossil fuels is of course related to revenue and macro-economic considerations but they are also consequential in their climate change impact.

[4] Hamilton (2014) suggests that in India, pollution (largely resulting from burning coal and diesel) is perhaps over 6 percent of GDP per annum ((Hamilton, K. 2014. *"Calculating PM2.5 Damages for Top Emitters: A Technical Note."* New Climate Economy background note. http://newclimateeconomy.net).

[5] Proost, Stef, and Kurt Van Dender *"What Long-term Road Transport Future? Trends and Policy Options."* 2011, Review of Environmental Economics and Policy 5(1): 44-65.

One can potentially estimate the carbon tax equivalent of excise duty increases in India and thereby calculate CO_2 emission reduction benefits. This is especially important in the context of global efforts to deal with climate change where India as the third largest emitter of GHG emission is often looked upon to contribute to the efforts by taking on a target.[6]

The carbon tax equivalent of the excise duty and subsidy removal was estimated using standard emission factors from the literature (see Table 9.1).

Utilizing the emission factors in Table 9.1, the carbon tax equivalent of net excise duty (subtracting the amount of under-recoveries from excise duty) for petrol and diesel is presented in Figure 9.3.

The striking feature is that India has moved from a carbon subsidization regime to one of significant carbon taxation regime—from a negative price to a positive price on carbon emissions. And the shift has been large. For example, the effect of the recent actions since October 2014 has increased the carbon tax by nearly US$60 per ton of CO_2 in the case of petrol and nearly US$42 per ton in the case of diesel. In absolute terms, the implicit carbon tax (US$140 for petrol and US$64 for diesel) is substantially above what is now considered a reasonable initial tax on CO_2 emissions of US$25-US$35 per ton (this will not, however, hold for coal cess as described below).[7] The recent actions alone have significantly burnished India's green and climate change credentials.

Table 9.1 : Emission Factors[1]

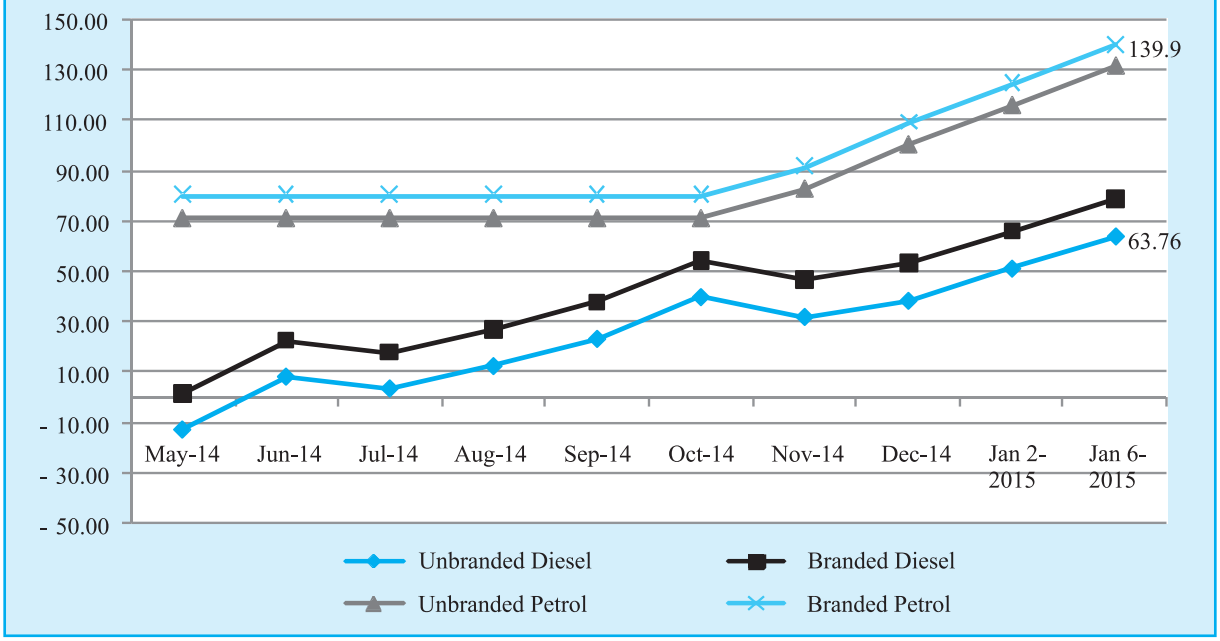
Description	Value	Unit	Source
Carbon emissions factors			
Coal	25.8	tC/TJ	IPCC[2]
Diesel	20.2	tC/TJ	IPCC[2]
Petrol	18.9	tC/TJ	IPCC[2]
Net Caloric Values			
Coal	18.8	TJ/000 t	IEA[3]
Diesel	43.3	TJ/000 t	IPCC[2]
Petrol	44.8	TJ/000 t	IPCC[2]
Oxidation rates			
Solids	100.0	per cent	IPCC[2]
Liquids	100.0	per cent	IPCC[2]
CO2 emissions factors			
Coal	1.782	tCO2 /t	
Diesel	3.210	tCO2 /t	
Petrol	3.105	tCO2 /t	

[1] *Note*: Emission factors of diesel and petro are global averages. Emission factor for coal is adjusted to reflect average heat content of coal in India. 2. 2006 IPCC Guidelines for National Greenhouse Gas Inventories. 3. International Energy Agency (IEA). 2012 Understanding Energy Challenges in India. 4.4. tC: tons of carbon TJ: terajoule, t: ton, tCO2: tons of CO2.

[6] Recently the US and China, the two largest emitters, signed an agreement on climate change whereby China agreed to peak its emissions by 2030 and the US agreed that it would emit 26 percent to 28 percent less carbon in 2025 than it did in 2005. While these efforts are not unprecedented in terms of their effect on the changing climate, nonetheless the signal for cooperation between two largest emitters has made the world look at India's future climate commitments.

[7] There is still a lot of debate in the literature around this number. For example, Stern (2013) suggests that this is an underestimate given the risks and damages from carbon (Stern, N. 2013. "The Structure of Economic Modelling of the Potential Impacts of Climate Change: Grafting Gross Underestimation of Risk onto Already Narrow Science Models" Journal of Economic Literature 51: 838-859).

Figure 9.3: Implicit Carbon Tax From Increasing Excise duty on Petrol and Diesel, May 2014- January, 2015. (US$/tCO2)



It should be noted that a full assessment of the implicit carbon tax involves estimating the gap between the total taxation of diesel and petrol and the average rate of indirect taxation. The final outcomes could be different from those presented in Figure 9.3, and will be different between states given the current system of differentiated state taxation. To some extent, the CO_2 tax estimates represent a lower bound given that states impose high indirect taxes on petroleum products.

9.3 How Does India compare with other countries?

While India has made substantial progress recently in decontrolling price of petrol and diesel and in calibrating excise duty to compensate for the declining world oil prices, it is worthwhile to ask, where does India stand globally and especially with respect to the other countries.

Figure 9.4 compares India with most non-OECD countries and with US and EU as benchmarks. It suggests that while there has been a considerable price increase between 2012 and 2015, there is still room for further reform of petroleum pricing policies.

9.4 CO_2 Emission Reductions from Petrol and Diesel Taxes and Coal Cess

Calculating the CO_2 emission reduction from the measures taken for petrol and diesel suggests that there will be net reduction of 11 million tons of CO_2 emissions in less than a year, more than the entire CO_2 emissions of Luxembourg in 2012, compared to the baseline (see Figure 9.5) or 0.6 percent India's annual emissions.[8]

9.5 Translating Coal Cess into a Carbon Tax

Recently, the Government of India revised its coal cess from ₹ 50 per ton to ₹ 100 per ton. Translating this into a carbon tax equivalent using the emission factor in Table 9.1 suggests that the carbon tax is around US$ 1 per ton (increase from US$ 0.5 per ton in 2014). While this does enable the

[8] The US-China deal is expected to avert 640 billion tons of CO2 by 2030.

Figure 9.4: Comparing Petrol Prices, 2012. (US$/liter)

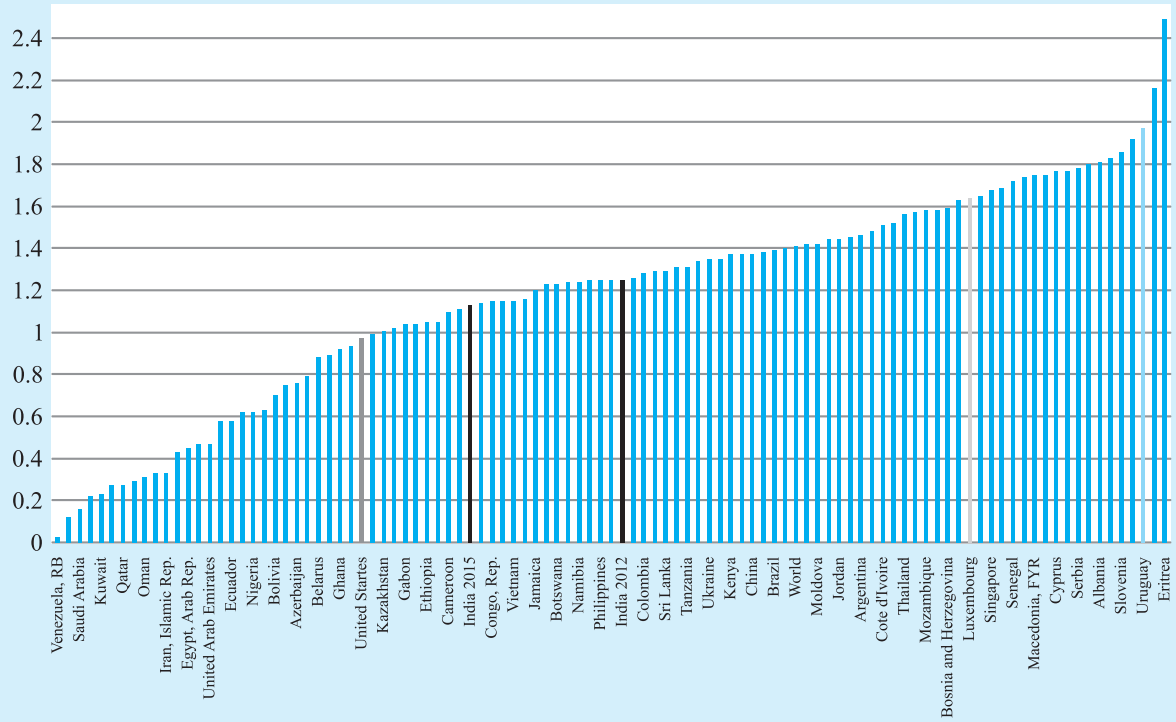
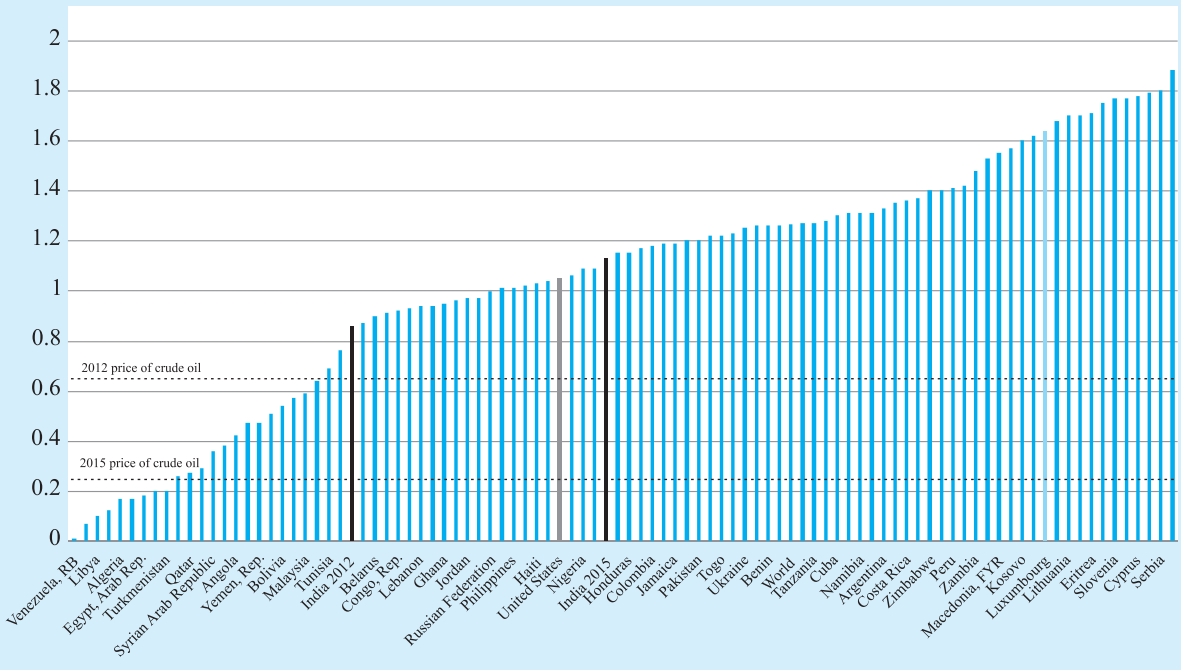
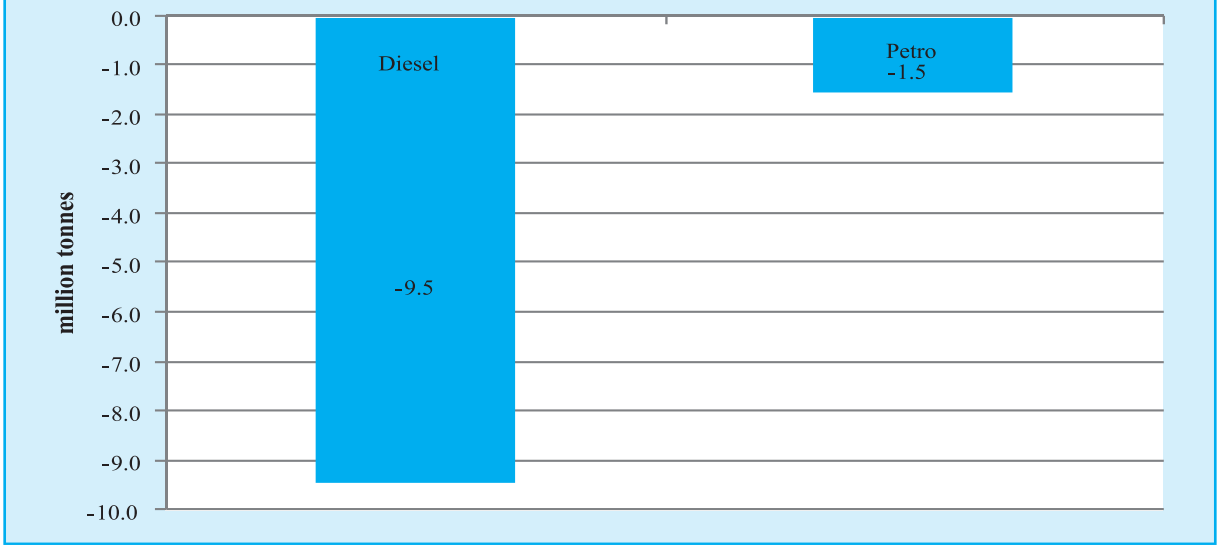


Figure 9.4: Comparing Diesel Prices, 2012. (US$/liter)



Source: **German Agency for International Cooperation (GIZ). Note: 2012 is the most recent year for which the data are available. Yellow line indicates 2012 price in the United States, an international minimum benchmark for a non-subsidized road transport policy. Green line indicates price in Luxembourg, the lowest in the EU15 which could be considered a lower bound for a social price of transport fuel. Red lines are India prices in 2012 and 2015.**

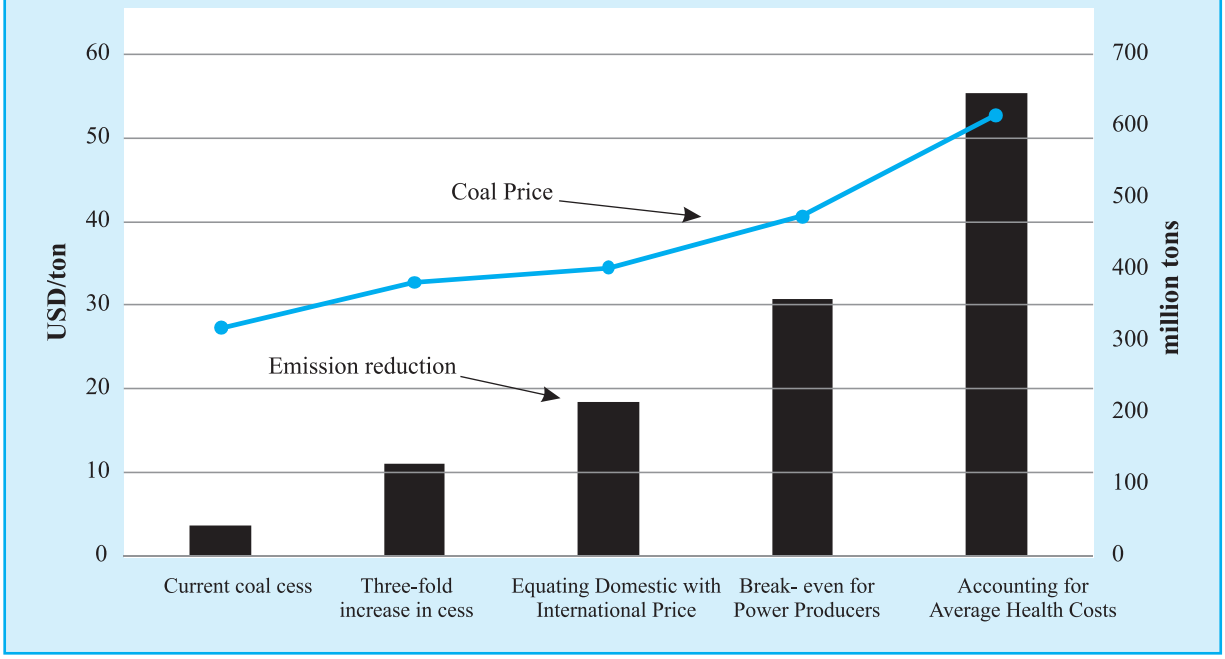
Figure 9.5: CO_2 Emission Reduction from Petrol and Diesel Pricing Measures in 2014



***Source*: World Bank estimates.**

government to mop up significant amount of revenue (₹ 17,000 crore so far), this may not reflect the externalities generated from burning of coal or any suggested global carbon tax. In light of the recent falling global coal prices and contribution of coal to both local and global pollution, there may be room for further rationalisation of coal pricing. Any rationalisation of coal pricing must take account of the implications for power prices and hence access to energy for the poorest in India which is and must remain a fundamental objective of policy.[9]

Figure 9.6: Implications of Alternative Coal Taxation; Coal Price Increase and CO_2 Reduction



***Source*: World Bank estimates.**

[9] This in addition to providing access and empowering people through renewable sources of energy which is also an area of high priority for the Government of India. This will be especially important for serving remote areas with limited access to grid.

Four hypothetical scenarios are the following (Figure 9.6):

a. A three-fold increase in the current cess;

b. An increase in cess that will equalise price of domestic coal with imported coal (adjusting for difference in heat and ash content between domestic and imported coal)[10];

c. An increase in cess necessary to internalise only domestic externalities—mainly the health costs associated with carbon pollution;

d. The maximum possible increase in cess at which the coal-based power producers could still break-even.

Calculations utilizing the emission factors given in Table 9.1 and assuming a (-) 0.5 price elasticity of demand for coal, suggest that a three-fold increase from the current cess would lead to an annual CO_2 emissions reduction of 129 million tons annually or about 7 percent of total annual emissions. To bring domestic prices on par with the international prices would require an increase of cess to US$ 9 per ton or ₹ 498 (a 5-fold increase). Coal price reform of this kind could potentially contribute to annual CO_2 emissions reduction of 214 million tons which is 11 percent of India's annual emissions, or half the entire emissions of Indonesia in 2012 compared to the baseline. This is still within the range of keeping most coal power plants profitable given the current tariff structure.

The health cost of coal for power generation in India is estimated to range from US$ 3.41 per ton to US$ 51.11/ton depending on the value of statistical life.[11] The average number is US$ 27.26 per ton. The health costs of emissions from coal fired power plants include costs associated with premature cardiopulmonary deaths and illnesses from the chronic effects of long-term exposure and the acute effects of short-term exposure. The annual emissions reduction of CO_2 corresponding to incorporating the average health cost to coal price is 644 million tons (33 percent of the total emissions) and the percent of total annual emission reduction corresponding to US$ 3.41 and US$ 51.11 per ton of cess is 4 percent and 61 percent respectively. There will be huge associated health benefits as well.

The maximum that the cess could be increased so that coal-based power producers could still break-even is US$ 15 per ton. This will keep large-scale coal power plants break even and would result in a potential CO_2 emissions reduction of 358 million tons per year, more than the entire CO_2 emissions of France. This is a hypothetical exercise since the reduction in profits of power plants would lead to calls for rationalizing power tariffs which would be highly disruptive.

9.6 Conclusions and key messages

- India has cut subsidies and increased taxes on fossil fuels (petrol and diesel) turning a carbon subsidy regime into one of carbon taxation.
- This has significantly increased petrol and diesel price while reducing annual CO_2 emissions.
- But there is still a long way to go with potential large gains still to be reaped from reform of coal pricing and further reform of petroleum pricing policies.
- On the whole, the move to substantial carbon taxation combined with India's ambitious solar power program suggests that India can make substantial contributions to the forthcoming Paris negotiations on climate change.

[10] In January 2015, while the average international price was around US$ 46/ton, the average domestic price was around US$ 25/ton without adjusting for the heat and ash content.

[11] Cropper. M. S. Gamkhar, K. Malik. A. Limonov, and I. Partridge, "The Health Effects of Coal Electricity Generation in India", 2012, RFF Working Paper.