Recommended Environment Compensation Charge (ECC) for diesel cars based on fuel price differential and pollution potential

Environment Pollution (Prevention and Control) Authority for NCR

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A. Purpose for imposing ECC on diesel cars

1. The government should get same revenue from petrol and diesel cars. At present petrol cars are paying more revenue in terms of fuel taxes as compared to diesel cars for the same usage. This is a big incentive for buying a diesel car. Revenue from both petrol and car should be equalised.
2. The share of diesel cars of the total car fleet[1] in Delhi is 25% but they are responsible for 78% of the total particulate emissions contributed by cars in Delhi. Petrol is responsible for the rest 22% and contribution of CNG car is negligible. Earlier estimate of emissions factors of Bharat Stage III on-road vehicles by the ARAI shows huge difference between petrol and diesel cars[2]. Post 2005 diesel cars emit nearly 7 times more air toxics as compared to a petrol car[3].Ultra-low sulphur diesel (ULSD) with 0.001 % (10 ppm) sulphur and low PAH content will be significantly less polluting provided it is used in combination with particulate traps and catalytic converters[4].
3. The World Health Organization (WHO) and International Agency for Research on Cancer (IARC) has classified diesel exhaust as Group 1 carcinogen for definite link with lung cancer in June 2012 putting it in the same class as tobacco smoking, asbestos, and arsenic[5].

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[1] Mukesh Sharma, Onkar Dikshit 2015, Comprehensive Study on Air Pollution and Green House Gases (GHGs) in Delhi-Draft Report on Air Pollution in Delhi, Indian Institute of Technology, Kanpur

[2] ARAI 2008, Air Quality Monitoring Project-Indian Clean Air Programme (ICAP), Draft report on "Emission Factor development for Indian Vehicles " as a part of Ambient Air Quality Monitoring and Emission Source Apportionment Studies, Project Sponsored by CPCB/ MOEF et al, Project Executed by ARAI, Pune

[3] ARAI 2007, Emission Factor development for Indian Vehicles, The Automotive Research Association of India, , available in http://www.cpcb.nic.in/Emission_Factors_Vehicles.pdf , as accessed on 1 July 2016

[4] Anon 2001, Report on Clean Fuels, Environment Pollution (Prevention and Control) Authority, New Delhi, http://cpcb.nic.in/divisionsofheadoffice/pci3/02_Clean_fuels_report.pdf as accessed 1 July 2016

[5]International Agency for Research on Cancer 2012, Diesel Engine Exhaust Carcinogenic, Press Release, 12 June 2012, https://www.iarc.fr/en/media-centre/pr/2012/pdfs/pr213_E.pdf as accessed 1 July 2016

4. According to the California Air resources Board the number of excess cancer cases per million people due to lifetime exposure to diesel fume is 300 vs 29 for benzene that comes from petrol.[6] Benzene in petrol is a carcinogen but benzene content in petrol fuel now meets the global standard of 1%.
5. A new report of Health Canada of Canadian government published in March 2016 has provided evidences on both cancer and non cancer effects of diesel emissions including respiratory, heart, and immune system. It states that if people spend 6 per cent of their time in microenvironments with high traffic and high pollutant concentrations it can result in daily exposure to as much as 21 per cent of the black carbon. In California Multiple Air Toxics Exposure Study of 2015 has found that Diesel Sources are 68% of Air Toxics Risk in Los Angeles.
6. A significant study by the Health Effect Institute, Boston, published in Environmental Health Perspective[7] in December 2015, has found that particles from coal and diesel are more harmful than wind blown dust. These increase ischemic heart disease related deaths. This is dangerous as Global Burden of Diseases for India attributes half of air pollution related deaths to heart disease.
7. The Health Effect Institute[8] study on '*New Technology Diesel on Low Sulfur Fuels and New Emission Control Technologies*' has further shown that advanced emissions control systems and ultra low sulfur diesel fuel (10 ppm sulfur) that are needed to meet EURO VI standards, or the US 2007/2010 standards can reduce particulate matter by 90%, nitrogen oxide by 94% and other carcinogenic substance. But that is not possible in Euro IV and V engines. This indicates India will have to quickly move

[6] CARB 2004, California Almanac of Emissions and Air Quality, Chapter 5 Toxic Air Contaminant Emissions, Air Quality, and Health Risk

[7] George D. Thurston, Richard T. Burnett, Michelle C. Turner, Yuanli Shi, Daniel Krewski, Ramona Lall, Kazuhiko Ito, Michael Jerrett, Susan M. Gapstur, W. Ryan Diver, and C. Arden Pope III, Ischemic Heart Disease Mortality and Long-Term Exposure to Source-Related Components of U.S. Fine Particle Air Pollution, Environmental Health Perspective, http://ehp.niehs.nih.gov/wp-content/uploads/advpub/2015/12/ehp.1509777.acco.pdf as accessed on 1 July 2016

[8] Press Release 23 December 2015, Comprehensive Study finds substantial emission and health benefits from US 2007/2010 and Euro 6 diesel engines, Health Effects Institute, Boston, http://www.healtheffects.org/Pubs/ACES-Exec-Summ-Press-Release122315.pdf as accessed on 1 July 2016

out of Bharat Stage IV emissions standards, skip Euro V and move directly to Euro VI.

8. A report by London Assembly Environment Committee[9] in 2015 called "Driving away from diesel, reducing air pollution from diesel vehicles" states that gram for gram, particulate emissions from diesel vehicles can be more harmful than other particulate emissions (which come from similar sources to NOX, plus wear on vehicle tyres and brakes, industrial and construction sources, and natural dust). For example, PM2.5 emissions from diesel exhaust contain high levels of black carbon, which has been found to be four to nine times more deadly than other types of PM2.5.

B. Taxes on petrol and diesel

There are several customs, central and state taxes levied on petrol and diesel. Some taxes like basic customs duty, additional customs duty and additional excise duty are same for both petrol and diesel. Others like additional customs duty (CVD), basic cenvat duty, special additional excise duty and state sales/VAT tax are different. The central basic cenvat duty is the only component of taxes which is higher for diesel than on petrol, remaining all other taxes is higher for petrol (see Table 1).

Table 1: Central Excise and Customs Tariff Table (Updated As Of 01.03.2016)

Particulars	CUSTOMS			CENTRAL EXCISE			STATE
	Basic Customs Duty	Additional Customs Duty (CVD)	Additional Customs Duty	Basic Cenvat Duty	Special Additional Excise Duty	Additional Excise Duty	Sales tax/VAT levied in Delhi (in %)
Petrol	2.50%	Rs.9.48/ltr. + Rs.6.00/ltr SAD	Rs.6.00/ltr.	Rs.9.48/ltr	Rs.6.00/ltr	Rs.6.00/ltr.	27
Diesel	2.50%	Rs.11.33/ltr.	Rs.6.00/ltr.	Rs.11.33/ltr.	Nil	Rs.6.00/ltr.	17.41

Source: PPAC, http://ppac.org.in/content/149_1_PricesPetroleum.aspx

[9] Environment Committee, Driving away from diesel, London Assembly, London, https://www.london.gov.uk/sites/default/files/Driving%20Away%20from%20Diesel%20final%20report.pdf as accessed on 1 July 2016

C. Price difference in petrol and diesel in Delhi

The break up different taxes from basic source i.e. crude form to sellable form at the fuel pumping stations shows that retail price of petrol is higher by Rs 10.46 per litre than diesel in Delhi. Of every litre diesel sold in Delhi, the government is losing Rs 9.94. This price difference come up because of the difference in excise and VAT.

Table 2: Summary table of price difference

S. No.	Before city	Unit	Price (in Rs.)	Difference
1	Petrol C&F (Cost & Freight) Price of Gasoline (Petrol) BS III equivalent	$/bbl	58.67	Diesel costlier by Rs 0.93 per litre
	Diesel C&F (Cost & Freight) Price of Diesel III equivalent	$/bbl	59.6	
2	Average Exchange rate	Rs/$	67.04	
3	Petrol Refinery Transfer Price (RTP) on landed cost basis for BS IV Petrol (Price Paid by the Oil Marketing Companies to Refineries)	Rs/Ltr	25.35	Diesel costlier by Rs 0.46 litre
	Diesel Refinery Transfer Price (RTP) on landed cost basis for BS IV Diesel (Price Paid by the Oil Marketing Companies to Refineries)	Rs/Ltr	25.81	
	Pricing in the city			
4	Petrol Price Charged to Dealers	Rs/Ltr	27.91	Diesel costlier by Rs 0.33 per litre
	Diesel Price Charged to Dealers	Rs/Ltr	28.24	
5	Petrol Excise Duty @ Rs.21.48/Ltr	Rs/Ltr	21.48	Diesel cheaper by Rs 4.15 per liter
	Diesel Excise Duty @ Rs.17.33/Ltr	Rs/Ltr	17.33	
6	Petrol Dealer Commission	Rs/Ltr	2.3	Diesel cheaper by Rs 0.84 per litre
	Diesel Dealer Commission	Rs/Ltr	1.46	
7	Petrol VAT (including VAT on Dealer Commission) applicable for Delhi @ 27%	Rs/Ltr	13.96	Diesel cheaper by Rs 5.79/litre
	Diesel VAT (including VAT on Dealer Commission) applicable for Delhi @ 16.75% + Pollution Cess of Rs 0.25/Ltr	Rs/Ltr	8.17	
8	Diesel Retail Selling Price at Delhi- (Rounded)	Rs/Ltr	55.19	Diesel is cheaper by Rs 10.46 per litre
	Petrol Retail Selling Price at Delhi- (Rounded)	Rs/Ltr	65.65	
9	**Total retail price differential**			**Rs 10.46 per litre**
	Total excise and VAT differential			**Rs 9.94 per litre**

Source: IOCL

D. Methodology for computing the Environment Compensation Charge (ECC) for diesel cars

In our calculations, to estimate the price differential between the cost of diesel and petrol, we have considered both the tax and the retail price differential. While the retail price difference in Delhi is Rs 10.46 per litre currently, we have considered the tax differential which is roughly Rs 9.94.

To estimate the difference in operational cost between diesel and petrol cars over their lifetime, we have taken the annual average mileage of each car as12,199 kms (UNEP-2014)[10]. We have amortised this figure over a period of 15 yrs (Lifetime of the car for which the initial registration is valid).

Results

Formula used for calculating Environment Compensation Charge (ECC)

Step 1 : Annual Fuel Consumption (a)

- *Annual Fuel Consumption (a) = fuel consumption/km X kms travelled annually(12,199kms[1])*

Step 2 : Tax paid on petrol annually (b)

- *Tax paid on petrol annually (b) = Tax on petrol/ltr X annual consumption of petrol*

Step 3 : Tax paid on diesel annually (c)

- *Tax paid on diesel annually (c) = Tax on diesel/ltr X annual consumption of diesel*

Step 4: Difference on tax paid on petrol and diesel annually (d)

- *Difference on tax paid on petrol and diesel annually (d) = (b) – (c)*

Step 5: Lifetime differential cost (e) **Environment Compensation Charge (ECC)**

- *The difference on fuel tax paid on petrol and diesel was then*

[10]UNEP 2014, Promoting low carbon transport in Inida http://www.unep.org/transport/lowcarbon/PDFs/AssementMotorVehicle.pdf as accessed on 1 July 2016

estimated for the next 14 years keeping in the inflation rate of 5.72%(CPI Inflation Index-2016). = (e)

Based on this the average ECC was estimated to be 27% of the value of diesel cars.

Based on this estimate, a further calculation was done to categorise vehicles based on engine capacity. Given that heavier vehicles (SUV's and luxury) are6 times more polluting) than smaller diesel vehicles (see Graph 3 below), a differential tax from 10% to 30% is recommended to be imposed.

E. Health Cost of diesel vehicles: computing into cost of vehicle

1. Over and above the ECC for fuel, there are health costs including cancer risk assessment, which are made by countries like the US and Australia to estimate how much health damage diesel emissions cause vis-à-vis petrol emission.
2. The health cost of on-road PM and NOx emissions is one of the tools used by regulatory bodies to determine the appropriate opportunity costs.
3. The method of health damage function analysis of vehicular emissions is a comprehensive mechanism for including wide health impacts including health outcomes resulting from chronic exposure to annual average concentrations of primary and secondary $PM_{2.5}$ and NO_x emissions. These include incidents of premature mortality and morbidity.
4. The damage function values reported by the USEPA and Australia DIRD are based on the value of statistical life (VSL) used in US (USD 7.3 million) and Australia (AUD 4.2 million) respectively. In order to use these values in India, they have to be scaled down to reflect the value of statistical life (VSL) used in India – Rs 7.75 crore in year 2006, which is equivalent to Rs. 24.59 crore in 2016 when adjusted for the changes in gross national income per capita.

5. The excess health damages from a BS IV diesel compared with a petrol vehicle is calculated by multiplying the excess diesel emissions with the damage function adjusted for India.
6. There is also the added cancer risk assessment of diesel vehicles, because of the toxic nature of these emissions. Based on studies, it is estimated that the combined cancer risk of diesel exhaust in Delhi would be18.8 times that of petrol engines. If the entire population of Delhi is taken diesel vehicles will put on average 353,000 additional individuals at risk of cancer in any given year.

However, due to the unavailability of comprehensive quantifiable cost of health damage specific to the Indian context, at present the same is not being factored into the ECC. Removing the fuel price differential, through the imposition of ECC will be a step in removing the incentive for diesel vehicles.