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Impact of control measures on vehicular emissions - A case study

Jagdev Singh

Rayat Bahra Institute of Engineering and Nanotechnology, India

The paper presents a case study, on the assessment of likely impacts of various vehicular pollution prevention and control measures, for the capital city of Delhi. The measures include phasing out of 15- year old commercial vehicles; phasing out of leaded petrol; use of CNG as alternate fuel for buses, taxis and three wheelers; and retrofitting of catalytic converters in two and three wheelers. The major pollutants emitted through vehicular sources viz. carbon monoxide (CO), hydrocarbons (HC), oxides of nitrogen (NO_x), particulate matter (PM) and lead (Pb) have been considered. The emissions of these pollutants are calculated using number of registered vehicles, average vehicle utilization and corresponding emission factors for different categories of vehicles. A total quantity of about 2945 T/day of the four pollutants (excluding PM) is expected to be emitted, wherein CO (1450.0 T/day) has the maximum contribution of about 49% of the total pollution load. NO_x, HC and Pb follow this with daily emissions of 1038.0 T, 458.0 T and 0.85 T respectively. In addition, 134.0 T/day of PM is emitted from heavy-duty diesel driven vehicles. Two wheelers are the major source for HC emissions (39.0%) followed by three wheelers (22.6%), heavy-duty vehicles (19.4%) and passenger cars (17.5%). NO_x is emitted mainly from the heavy-duty diesel driven vehicles (almost 95% of the total emissions). These vehicles, along with passenger cars, also account for major share of CO emissions. Cars followed by two and three wheelers are the main sources for Pb emissions. The study reveals that phasing out of leaded petrol should reduce the Pb emissions by 85%. Phasing out of 15-year old commercial vehicles is another good step taken for reducing vehicular emissions in Delhi. This will have sizable reduction in PM and NO_x emissions, while retrofitting of catalytic converters in two and three wheelers will have significant reduction in HC emissions. Use of CNG as alternate fuel for buses, taxis and three wheelers appears to be one of the most promising options capable of reducing HC emissions by about 32%. This will also reduce emissions of PM and CO by about 16% and 14% respectively.

er.sjagdev@gmail.com