

# Status of pollution generated from road transport in six mega cities

## Executive summary

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### Background

During the last two decades India has seen an unprecedented economic growth. The number of urban centres in the country has increased sharply. There are now 53 million plus cities in the country, which accommodates its residents in relatively smaller regions. Higher population densities not only lead to enormous demand for resources, but also results in degradation of environmental quality.

Air pollution generated by human activities has adversely affected the lives of millions of people and caused great economic damage to ecosystems and society. Urban air pollution is a major problem across the country. Rural to urban migration, growth in mobility demands, and demands for power and industrial production has led to deterioration of air quality in urban centres. More than 80% of cities in India, where air quality is monitored, do not meet the standard of air quality prescribed by the Government of India.

Transport sector has always been a significant contributor in emission estimates of cities. The source apportionment studies conducted in the six major cities of the country have shown that transport has significant contributions in PM<sub>2.5</sub> and NO<sub>x</sub> concentrations. Moreover, the lower height of release of vehicular emissions leads to higher exposure. WHO has recently classified diesel exhausts as Class-I carcinogens (WHO, 2012).

Estimation of emission loads is an essential step to estimate the share of various sources in the total emission load in a region. It also helps in understanding the potential of various strategies in reducing the emission loads in a region. However, there has been a gap in data availability for emission loads in different Indian cities.

In this respect, CPCB intended to take up a study to know the 'status of pollution generated from road transport sector' in six cities of the country, namely Hyderabad, Kolkata, Ahmedabad, Patna, Lucknow, and Solapur. TERI has been involved in many similar activities in past and was entrusted with the responsibility of carrying out this study during 2011–14.

### Objectives

The objectives of the study were:

1. Development of emission inventory of vehicular sources in the selected six cities of Hyderabad, Kolkata, Ahmedabad, Patna, Lucknow, and Solapur.
2. Estimation of total vehicular load (both tail-pipe and evaporative emissions).



3. Estimation of contribution of different categories of the vehicles towards total vehicular emission load and identification of category contributing the most.

### **Scope of the work**

1. Collection of primary data on different type of vehicles (population count) in use/on road, average distance travelled by each type of vehicle, and their inspection and maintenance schedule/practice adopted.
2. Collection of secondary data on vehicular emissions through appropriate/authorized agencies.
3. Analysis of primary as well as secondary data using appropriate techniques as used by internationally reputed agencies, such as USEPA.
4. Estimation of vehicular emission load in terms of CO, VOC, NO<sub>x</sub>, SO<sub>x</sub>, PM<sub>2.5</sub>, 1,3 butadiene, benzene, carbonyls, ammonia, and greenhouse gases, namely CO<sub>2</sub>, N<sub>2</sub>O, and CH<sub>4</sub>.
5. Evaluation of various factors (fuel quality, vehicle technology, driving pattern, topography, etc.) affecting emission load from vehicle and development of correction factors for the realistic estimation of the emission loads.
6. Estimation of emission load from various categories of road vehicles in six cities.
7. Identification of the vehicle category contributing maximum towards total emission loads for each parameter.
8. Projection of vehicle emission load under various scenarios (different type of alternate fuel used, optimal I & M, traffic management, introduction of mass transport system, etc.).
9. Preparation of road map/action plan for reducing vehicular pollution in these cities.

### **Approach**

The study aimed at inventorization of emissions of different pollutants from vehicular sources. The sources of emissions from transport included tailpipe and evaporative sources. Emission inventory is developed using the following basic approach:-

Emission loads = Activity data x Emission factors

Inventorization process includes collection of activity data from secondary sources for different sectors, and selection of appropriate emission factors. The overall approach of the study is presented in the following figure.

