सत्यमेव जयते

Report of the Comptroller and Auditor General of India on Performance Audit of 'Prevention and Mitigation of Vehicular Air Pollution in Delhi' for the year ended 31 March 2021

भारतीय लेखापरीक्षा और लेखा विभाग ✦ INDIAN AUDIT AND ACCOUNTS DEPARTMENT

लोकहितार्थ सत्यनिष्ठा
Dedicated to Truth in Public Interest

Government of National Capital Territory of Delhi

Report No. 2 of the year 2022

Report of the
Comptroller and Auditor General of India

on

Performance Audit of

‘Prevention and Mitigation of Vehicular Air Pollution in Delhi’

for the year ended 31 March 2021

Government of National Capital Territory of Delhi

Report No. 2 of the year 2022

Contents

PREFACE

Preface

This Report of the Comptroller and Auditor General of India has been prepared for submission to the Lieutenant Governor of National Capital Territory of Delhi under Section 48 of the Government of National Capital Territory of Delhi Act, 1991 for being laid before the Legislative Assembly of the National Capital Territory of Delhi.

Delhi, with a population of more than two crores, is one of the most densely populated cities of the world which leads to increased demand for vehicles, construction activities and energy, which in turn affects its air quality. Air quality in Delhi was categorised as 'Poor' to 'Severe' for 1195 out of 2137 days (56 *per cent)* in the last five years which has adverse impact on human health. Air quality in Delhi is impacted by activities in different sectors such as transport, residential, solvents, power plants, road dust and others. This report covers pollution caused by transport sector, i.e., vehicular emission only. Vehicular emission was the major source of pollution with its origins in Delhi, and thus, potentially controllable by the Government of National Capital Territory of Delhi (GNCTD). Improvement in the urban transport system, changes in transportation modes through infrastructure investment, and strengthening of enforcement system for checking emission and ensuring fitness of motor vehicles, etc., are different strategies to reduce vehicular emission.

This Report has pointed out various shortcomings in the effort made by the Government in controlling vehicular emission such as lack of information regarding the type and number of vehicles plying on Delhi roads and assessment of their emission load, shortage of public transport buses and public transport for last mile connectivity so as to reduce use of personal vehicles, not implementing of less polluting alternatives viz. 'Monorail and Light Rail Transit' and 'Electronic Trolley Buses', etc. There were significant discrepancies in Pollution Under Control (PUC) certification system and a large number of vehicle users were not getting their vehicles checked as per norms. The system for issuing 'fitness' certificate' to commercial vehicles was dysfunctional and prone to misuse. Audit also observed that the Government did not take any action to implement "Delhi Management and Parking Places Rules" aimed at avoiding stagnation of vehicles and traffic congestion due to haphazardly parked vehicles.

EXECUTIVE SUMMARY

Executive Summary

Clean air is a basic necessity for human health and well-being. NCT of Delhi with an area of 1483 km^2 supports a population of more than two crore, making it one of the most densely populated cities of the world. Such high population density leads to increased demand for vehicles, construction activities and energy, which in turn affects air quality. Vehicular emission has been the major source of pollution with its origins in Delhi, and thus, potentially controllable by the Government of National Capital Territory of Delhi (GNCTD). Hence, this Performance Audit focused on vehicular pollution with a view to assess whether GNCTD has taken adequate steps to prevent and mitigate vehicular emission affecting air quality in Delhi. Major findings of the Performance Audit are as given below:

Air Quality Monitoring System

The location of Continuous Ambient Air Quality Monitoring Stations (CAAQMS) did not fulfill the requirements laid down by the Central Pollution Control Board, indicating possible inaccuracies in the data generated by them, rendering the Air Quality Index values unreliable.

(Paragraph 2.1)

Requisite data of concentration of pollutants in air for minimum of 16 hours in a day were not available with DPCC for proper air quality monitoring. DPCC was also not measuring levels of Lead in Delhi's ambient air.

(Paragraph 2.2)

GNCTD did not have any real-time information regarding sources of pollutants as it did not conduct any study in this regard.

(Paragraph 2.3)

In the absence of any information regarding the type and number of vehicles plying on Delhi roads and assessment of their emission load, GNCTD was not in a position to identify emission from different types of vehicles that are generating significant concentration of pollutants for framing source-wise strategies.

(Paragraph 2.4)

GNCTD neither monitored Benzene levels at the fuel stations (major source), nor followed-up on the installation of Vapour Recovery System at fuel stations to reduce Benzene emission though benzene levels remained higher than permissible limits at 10 out of 24 CAAQMSs.

(Paragraph 2.5)

Public Transport System

Adoption of public transport reduces vehicular emission per passenger-kilometer travelled. However, it was observed that there was shortage of public transport

buses with only 6,750 buses available against a re-assessed requirement of 9,000 buses. The public bus transport system also suffered from a significant number of DTC buses remaining off-road, short coverage of bus routes and not rationalising bus routes.

(Paragraph 3.1)

Though there was an estimated increase of 17 *per cent* in the population of Delhi since the year 2011, the number of registered Gramin-Sewa Vehicles which provide last mile connectivity remained the same at 6,153 since May 2011. Even these Gramin-Sewa vehicles were 10 years old which may have poor fuel efficiency and higher potency to cause pollution.

(Paragraph 3.2)

In spite of shortage of public transport buses, GNCTD did not take any action for implementation of its alternatives viz. 'Monorail and Light Rail Transit' and 'Electronic Trolley Buses' even after keeping budget provision for the last seven years.

(Paragraph 3.3)

Cleaner Transport-Prevention and Enforcement Strategies

Public transport buses were not being subjected to emission tests twice a month as required under the directions of the National Green Tribunal. Similarly, out of 6153 Gramin-Sewa vehicles, only 3476 vehicles got the testing done, that too, only once during April 2019 to March 2020 against four required during this period.

(Paragraph 4.1.3)

There were irregularities in issuing Pollution Under Control Certificates (PUCCs) to vehicles such as –

- In respect of 22.14 lakh diesel vehicles checked at Pollution Checking Centres (PCCs) during the period 10 August 2015 to 31 August 2020, test values were not recorded in respect of 24 *per cent* vehicles.
- In 4,007 cases, even though the test values were beyond the permissible range, these diesel vehicles were declared 'Pass' and issued PUCCs.
- As per the PUC database for 10 August 2015 to 31 August 2020, 65.36 lakh Petrol/CNG/LPG vehicles were issued PUCCs. However, 1.08 lakh vehicles were declared 'Pass' and issued PUCC despite emitting CO/HC beyond the permissible limits.
- In 7,643 cases, more than one vehicle was shown to have been checked for emission limits at the same time at the same center.
- 76,865 cases were noticed in same test center wherein only one minute lapsed in checking of vehicle along with issuance of PUC certificate which may not be practically possible.

- In the absence of linkage of PUCC data with VAHAN database, PCCs manually select the BS Category of the vehicle leaving scope for manipulation of emission standards as well as validity of PUCC.

(Paragraph 4.1.4)

There was no inspection of PCCs by the Government or third-party audit to ensure quality control in PCCs. Even those PCCs which issued PUCCs to vehicles later found emitting visible smoke were not inspected to ensure proper working of the instruments. Further, the Government also did not have a mechanism to ensure calibration of the pollution checking instruments regularly.

(Paragraph 4.1.5)

Modern technology for checking vehicular pollution through Remote Sensing Devices was also not adopted though the same was under consideration from the year 2009 and Supreme Court emphasized the same time and again.

(Paragraph 4.2)

Automated fitness testing centres accounted for only 12 *per cent* of the total capacity of 4.1 lakh vehicles per annum in Delhi whereas 95 per cent of the fitness tests were conducted at the manual testing centres during 2020-21, where only visual inspection of the vehicle was being done and declaring commercial vehicles as 'fit' was at discretion of the inspecting officer.

(Paragraph 4.3.1)

During 2014-15 to 2018-19, there was steep increase in percentage of vehicles due for testing not even turning up for fitness tests with as much as 64 *per cent* of the vehicles not turning up in 2018-19.

(Paragraph 4.3.2)

The automated Vehicle Inspection Unit (VIU) at Jhuljhuli was grossly underutilized with only 24 vehicles being tested daily on average during 2020-21 against a capacity of 167 vehicles per day. Further, 60 *per cent* of fitness certificates were issued without putting the vehicles through emission tests.

(Paragraph 4.3.3)

More than 90 *per cent* of fitness tests were conducted at VIU, Burari, which was solely done based on visual inspection. None of the key tests were conducted, which rendered fitness testing irrelevant.

(Paragraph 4.3.4)

Department of Transport registered 382 new BS-III compliant vehicles sold after 31 March 2017 and 1672 BS-IV compliant vehicles sold between 2 January 2020 to 20 April 2020 were registered in April 2020 in violation of Supreme Court orders.

(Paragraph 4.5)

Only 2.98 lakh out of 47.51 lakh End of Life Vehicles were de-registered during 2018-19 to 2020-21.

(Paragraph 4.6.1)

None of the 347 End of Life Vehicles impounded was scrapped till March 2021. The capacity of impounding pits for keeping the impounded vehicles was also of only 4000 vehicles compared to more than 41 lakh vehicles due for impounding and scrapping.

(Paragraph 4.6.2)

Enforcement Branch of the Department of Transport neither had adequate staff nor vehicles mounted with PUC equipment for effective enforcement of various provisions of Motor Vehicle Rules and other order/directions.

(Paragraph 4.7)

Cleaner Transport - Mitigation and Promotion Strategies

In spite of providing financial and other incentives to encourage adoption of Electric Vehicles, there was insignificant increase in the number of Electric Vehicles registered in Delhi. Further, availability of charging facilities was also limited and not evenly distributed.

(Paragraph 5.1)

There was lack of concerted efforts by the Government to promote and facilitate non-motorised transport in Delhi.

(Paragraph 5.2)

The Graded Response Action Plan, consisting of Odd-Even Scheme and restricting entry of trucks into Delhi, aimed at bringing down pollution when high levels of pollution persist for extended periods, was not implemented by the Government on majority of occasions when the pollution levels were high. The Government also failed to take steps to reduce air pollution by developing ISBTs at entry points of Delhi to keep inter-state diesel propelled buses at the periphery of Delhi, preventing Delhi becoming a trans-shipment zone for other states and shifting of Inland Container Depots to outside Delhi.

(Paragraph 5.3)

The Government did not take any action to implement 'Delhi Management and Parking Places Rules, 2019' aimed at avoiding stagnation of vehicles and traffic congestion due to haphazardly parked vehicles. It also did not link granting/renewal of transport permit to vehicles with availability of parking space as envisaged under the Rules.

(Paragraph 5.4)

There were undue delays in removal of stalled public transport buses from roads causing traffic congestion and higher emission from vehicles due to such congestion.

(Paragraph 5.5)

CHAPTER–1

INTRODUCTION

1. Introduction

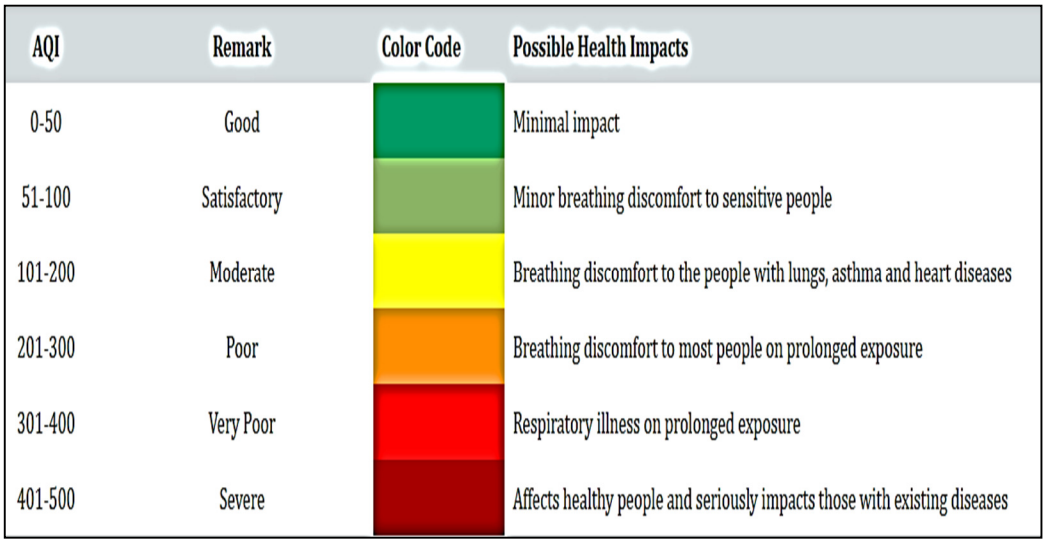
1.1. Pollution in Delhi

Clean air is a basic necessity for human health and well-being. Mega-cities including National Capital Territory (NCT) of Delhi have been experiencing deterioration of air quality for many years. The air quality gets affected through emission of natural as well as anthropogenic (man-made) sources.

NCT of Delhi with an area of 1483 km^2 supports a population of more than two crore, making it one of the most densely populated cities of the world. Such high population density leads to increased demand for vehicles, construction activities and energy, which in turn affects air quality.

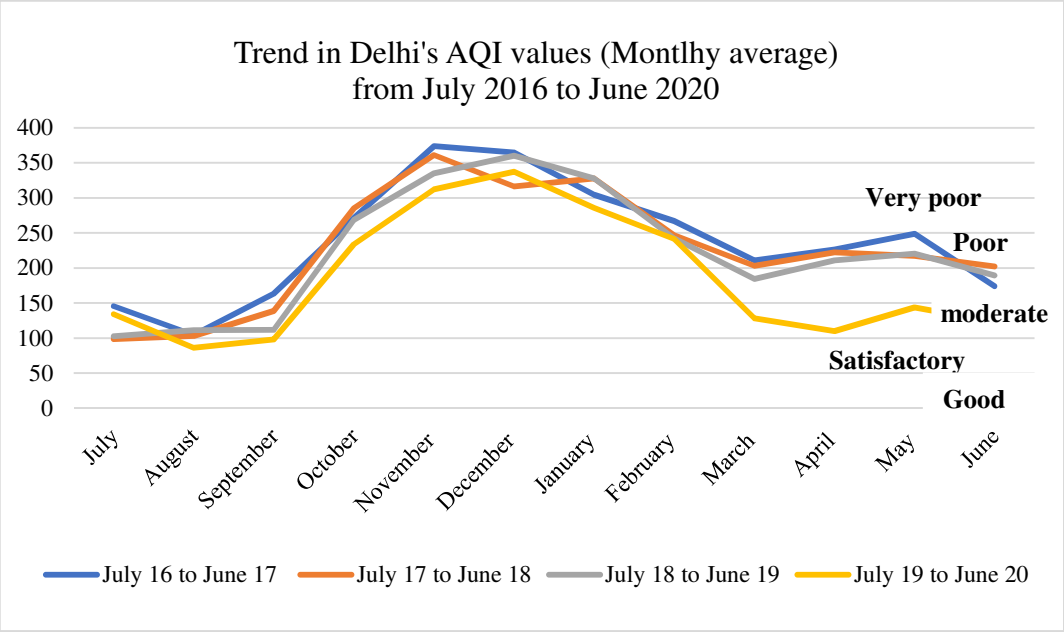
Air Quality Index (AQI) is a tool for effective communication of air quality status in easy to understand terms. It transforms weighted values of eight air pollutants, viz. Particulate Matters[1] ($PM_{2.5}$ and PM_{10}), Nitrogen Dioxide (NO_2), Sulphur Dioxide (SO_2), Carbon Monoxide (CO), Ozone (O_3), Ammonia (NH_3), and Lead (Pb) into a single number. Further, it categorizes air quality into six broad categories, viz. good, satisfactory, moderate, poor, very poor and severe with different colour codes as shown in **Figure 1.1**.

Figure 1.1: Categorization of Air Quality Index



[1] Particulate matter are tiny pieces of particles which may include dust, dirt, soot, smoke and drops of liquid. PM $_{2.5}$ and PM_{10} consist of pollution particle of diameter less than 2.5 and 10 micrometers respectively.

Chart 1.1: Trends in Delhi's AQI values



Source: CPCB data of AQI for Delhi

From the chart above, it can be seen that, in NCT of Delhi, AQI (monthly average) values has been in the categories of 'Poor' to 'Very Poor' for the period from October to February during 2016 to 2020. Poor AQI has adverse impact on human health and causes cardio vascular diseases, pulmonary diseases, lung infection, leukemia, etc.

The above chart also shows that there has been no significant reduction in the pollution level from 2016 to 2020 except in the period of lockdown in 2020. Thus, the impact of any steps taken by the GNCTD to control air pollution in Delhi did not lead to any significant abatement of air pollution.

Central Pollution Control Board (CPCB) had notified (November 2009) National Ambient Air Quality Standards (NAAQS) for 12 identified pollutants. These standards are milder[2], compared to World Health Organisation's (WHO) 2005 norms. WHO has further lowered[3] the recommended levels of pollutants that can be considered safe for human health, achievement of which will be challenging for Delhi.

The pollutant wise data for $PM_{2.5}$, PM_{10}, SO_2, NO_x, O_3, CO, NH_3 and Benzene received from Department of Environment, GNCTD in respect of 24 monitoring stations of DPCC for the period 2018-2020 was analyzed. During analysis, the annual baseline data of number of vehicles (with annual addition and deletion) was assumed as constant. Audit noted that out of these eight pollutants, concentration

[2] For example, the recommended $PM_{2.5}$ concentration over a 24-hour period is 60 micrograms per cubic metre, compared to 25 micrograms advised by WHO's 2005 guidelines.

[3] While a $PM_{2.5}$ concentration of 25 micrograms per cubic metre in a 24-hour period was considered safe earlier, the WHO has now said that a concentration of over 15 micrograms is not safe.

of four pollutants viz. $PM_{2.5}$, PM_{10}, NO_x, and Benzene largely remained above the NAAQ Standards. The related health effects of these four pollutants on human health are given in **Table 1.1**.

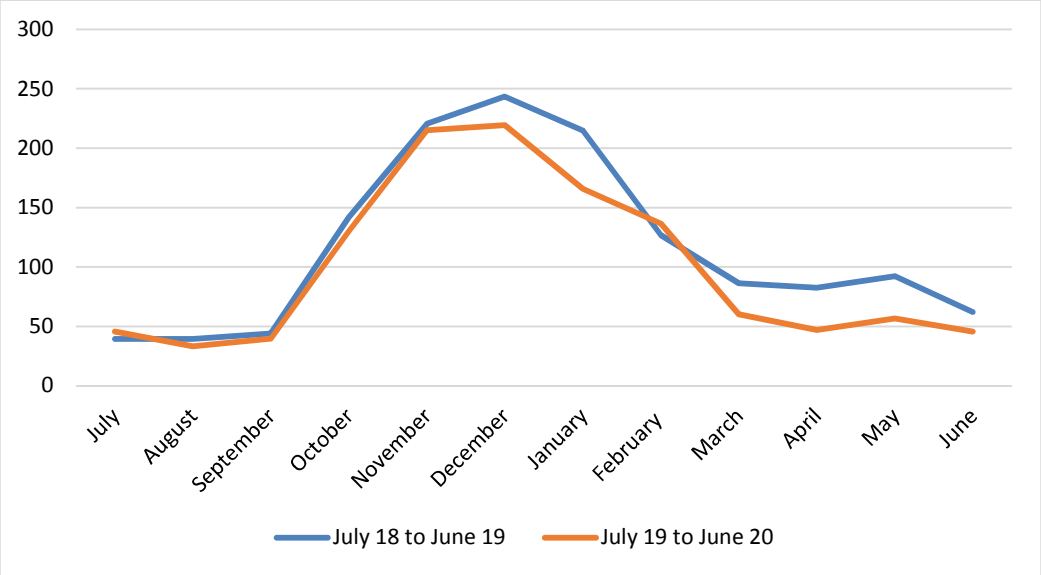
Table 1.1: Effects of pollutants on Human health

Pollutant	Effect of human health
$PM_{2.5}$ and PM_{10}	Particles with a diameter of 10 microns or less, ($\leq PM_{10}$) can penetrate and lodge deep inside the lungs, while particles with diameter of 2.5 microns or less, ($\leq PM_{2.5}$) can penetrate the lung barrier and enter the blood system. Chronic exposure to particles contributes to the risk of developing cardiovascular and respiratory diseases, as well as of lung cancer.
NO_X	NO_2 exposure can cause decrement in lung function and chronic lung disease.
Benzene	Short term exposure to benzene may cause narcosis, headache, dizziness, drowsiness, confusion, tremors and loss of consciousness.

Trends in concentration of these pollutants in the ambient air are discussed in succeeding paragraphs.

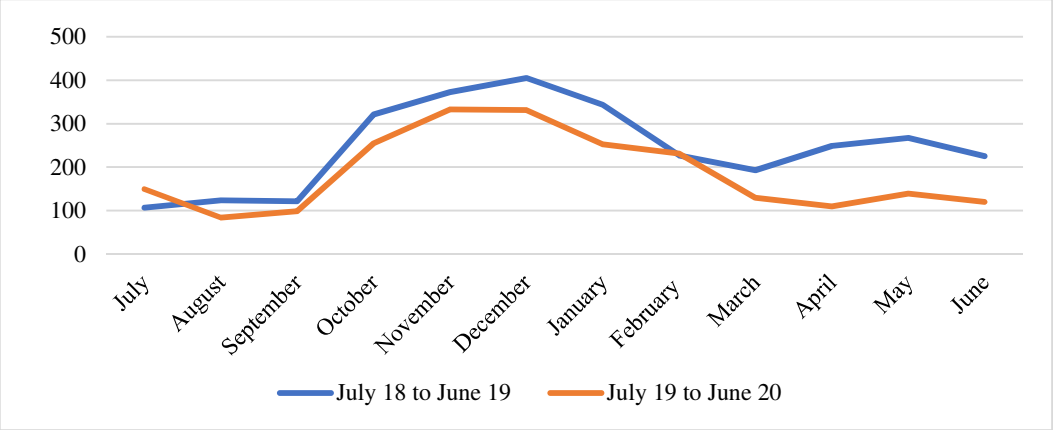
$PM_{2.5}$ and PM_{10}: National Ambient Air Quality Standards stipulates the permissible annual concentration of $PM_{2.5}$ and PM_{10} as 40 and 60 respectively. High $PM_{2.5}$ and PM_{10} can be seen during the period October – January in **Chart 1.2** and **Chart 1.3**.

Chart 1.2: Trends in concentration of $PM_{2.5}$ in Delhi



Source: Data provided by Department of Environment

Chart 1.3: Trends in concentration of PM_{10} in Delhi



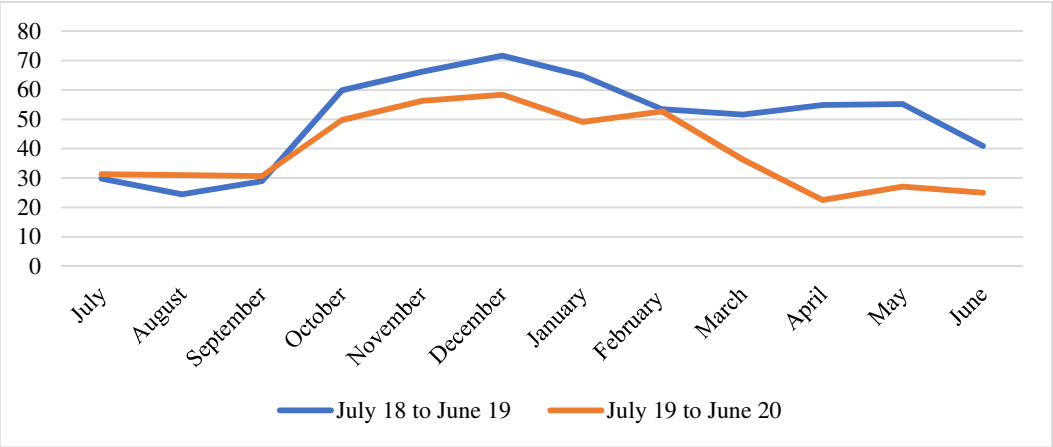
Source: Data provided by Department of Environment

Peaking of $PM_{2.5}$ and PM_{10} during winter season may indicate factors other than transport sector such as biomass/solid waste burning/construction activities contributing towards increase in $PM_{2.5}$ and PM_{10} concentration which require detailed examination by GNCTD.

Besides, it was reported[4], based on the analysis of composition of $PM_{2.5}$ during October 2019 to January 2020, that post-monsoon (end of October to around mid-November) haze was largely affected by biomass burning particles likely from "agricultural residue burning emissions in the upwind states of Delhi", whereas haze in the winter (end of November to early January) was also affected by biomass burning, but "likely from the local burning of wood, coal and/or roadside trash for heating and/or cooking purposes.

NO_2: NAAQS stipulates the permissible annual concentration of NO_2 as 40. High NO_2 can be seen during the period October – January in the **Chart 1.4**.

Chart 1.4: Trends in concentration of NO_2 in Delhi



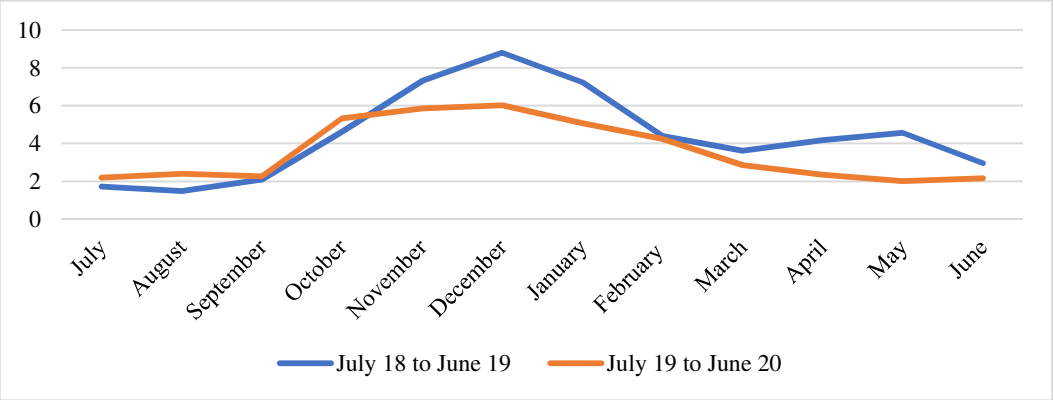
Source: Data provided by Department of Environment

[4] Study conducted by scientists from IIT-Kanpur, IIT-Delhi, Indian Institute of Tropical Meteorology, Central Pollution Control Board (CPCB) and others

Peaking of NO_2 may indicate factors other than transport sector such as burning of biomass contributing towards increase in concentration of NO_2 which require detailed examination by GNCTD.

Benzene: NAAQS stipulates the permissible annual concentration of Benzene as five. High concentration of Benzene can be seen during the period October – January in the **Chart 1.5**.

Chart 1.5: Trends in concentration of Benzene in Delhi



Source: Data provided by Department of Environment

Peaking of benzene concentration during winter season may be attributed to non-dispersal of benzene emanating from fuel pump as discussed in Para 2.5.

As per the CPCB data for the period 2015-16 to 2020-21, particulate matter (PM) was prominent pollutant responsible for deteriorating Delhi AQI. As per the Berkley Earth Study on Equivalence of Air Pollution and Cigarette, $PM_{2.5}$ concentrations of 200 µg/m^3 is equal to consuming nine-ten cigarettes per day on an average. It has also been reported[5] that children growing up in the polluted environs of Delhi suffer from reduced lung growth, as compared to children growing up in developed countries. Another scientific report[6] has suggested that residents in the Delhi could add 10 years more to their lives if air pollution was reduced to meet the World Health Organisation (WHO) guideline of 10 µg/m³. As per another study[7], the per capita economic loss due to lost output from premature deaths and morbidity attributable to air pollution in India was $26·5 (₹ 1,866[8]) and was highest in Delhi $62·0 (₹ 4,365). These and other reports highlight extremely adverse effects of air pollution in Delhi on its residents.

5 Another study on children in Delhi, led by pulmonologist Prof. S.K. Chhabra, former Director-Professor, Department of Pulmonary Medicine at Vallabhbhai Patel Chest Institute, Delhi.

6 The Air Quality Life Index report by EPIC (Energy Policy Institute of the University of Chicago).

7 Health and economic impact of air pollution in the states of India: the Global burden of disease study 2019 published in Lancet Planetary Health in January 2021.

8 Average Rate of Exchange (2019) USD to INR = ₹ 70.40.

The air quality in Delhi is impacted by activities in different sectors such as transport, residential, solvents, power plants, road dust and others.

An analysis of contribution of major pollutants in Delhi's air has been done to arrive at the role of vehicular emission on its air quality. As per the report[9], vehicles are one of the major local contributors ($PM_{2.5}$ - 39 *per cent,* PM_{10} – 19 *per cent,* NO_x – 81 *per cent,* CO – 84 *per cent* and Non-Methane Volatile Organic Compounds - 80 *per cent)* to Delhi's poor air quality.

Similar trend was also observed in the Special Scientific Report by Indian Institute of Tropical Meteorology, Pune on 'High Resolution Emission Inventory of Major Air Pollutants of Mega City DELHI for 2018' and 'Comprehensive Study on Air Pollution and Green House Gases (GHGs) in Delhi' conducted by IIT Kanpur.

Vehicular emission was the major source of pollution with its origins in Delhi, and thus, potentially controllable by the Government of National Capital Territory of Delhi (GNCTD). Emission from other sources i.e., Industry and Power sectors have their origins mostly outside Delhi. Hence, this Performance Audit is targeted at vehicular emission.

1.2. Pollution from Transport sector

This report focuses on pollution from 'Transport' sector from burning of fuel which releases Particulate Matter (PM), NOx, CO and Non-Methane Volatile Organic Compounds (NMVOC) into the atmosphere. These emissions have damaging effects on human health causing cardio vascular disease, pulmonary disease, lung infection, leukemia, etc.

PM is a common proxy indicator for air pollution and effects more people than any other pollutant.

For management of pollution from 'Transport' sector, it is important to understand the problem and adverse impacts of vehicular emission and identify possible solutions. The first step is to be aware of the severity of air pollution which requires a reliable air quality monitoring system.

Vehicular emission can be reduced by improvements in the urban transport system, changes in transportation modes through infrastructure investment, restraining vehicle movements through location and time-specific bans on certain categories of vehicles, setting up of monitoring and enforcement system for checking emission and ensuring fitness of motor vehicles.

1.3. Departments concerned

The Department of Environment (DoE), GNCTD is responsible for improving environmental quality (including air quality) of Delhi by engaging itself in

[9] Source Apportionment of PM2.5 & PM10 of Delhi NCR for Identification of Major Sources' prepared (August 2018) for Department of Heavy Industry, Ministry of Heavy Industries and Public Enterprises, Government of India, different sources affecting Delhi's air quality for the year 2016.

environmental assessment, monitoring, protection and raising awareness amongst people of Delhi.

The responsibility of monitoring of air pollution levels in Delhi and laying down the standards for automobile emission under Section 17(1) of the Air (Prevention and Control of Pollution) Act 1981, is with the Delhi Pollution Control Committee (DPCC). DPCC has been delegated (March 1991) with all the powers and functions of the State Pollution Control Board in relation to NCT of Delhi by the Central Pollution Control Board (CPCB) under the provisions of Section 4 (4) of the Water (Prevention and Control of Pollution) Act, 1974 and Section 6 of the Air (Prevention and Control of Pollution) Act, 1981 (Air Act). DPCC acts as a regulatory body for various Pollution Control Acts, Rules and Notifications in NCT of Delhi. The Secretary (Environment), GNCTD is the Chairperson and Special Secretary (Environment) is the Member Secretary of DPCC.

The responsibility of controlling vehicular emission lies with the Department of Transport (DoT) under Central Motor Vehicles Act, 1988 and Central Motor Vehicles Rules, 1989, framed thereunder. DoT has also been entrusted with the policy making, co-ordination, implementation, and monitoring functions of all the transport related aspects of NCT of Delhi. It is headed by the Principal Secretary-cum-Commissioner (Transport) and assisted by two Special Commissioners. In accordance with Section 20 of the Air Act, 1981, GNCTD, in consultation with DPCC, is to instruct DoT to ensure compliance with the standards laid down in connection with vehicular emission.

It is the overall responsibility of GNCTD to devise and implement strategies for prevention and mitigation of vehicular emission. Considering the importance of clean air and impact of vehicular emission on it, the Performance Audit on 'Prevention and Mitigation of Vehicular Air Pollution in Delhi' was undertaken during May 2019 to July 2021.

1.4. Audit Objectives

This Performance Audit on 'Prevention and Mitigation Vehicular Air Pollution in Delhi' has been conducted to assess whether:

- The air quality monitoring system was adequate and effective, in order to provide accurate and reliable information;
- The Government of NCTD took adequate and effective steps to prevent and mitigate vehicular emission affecting air quality; and
- Adequate and effective steps were undertaken for adoption of cleaner transportation in Delhi.

1.5. Audit Criteria

The audit criteria were derived from the following:

- Air (Prevention and Control of Pollution) Act, 1981 of Government of India (GoI) and Rules framed thereunder;
- The Central Motor Vehicles Rules, 1989 notified under the Motor Vehicle Act, 1988 and Delhi Motor Vehicles Rules, 1993;
- Notifications, circulars and orders issued by the Government of India, Government of NCT of Delhi, Central Pollution Control Board and Delhi Pollution Control Committee (DPCC); and
- Recommendations/orders issued by various Courts/Authorities/Commissions including World Health Organisation (WHO).

1.6. Audit scope and methodology

This audit examined data, different policies and their implementation for the period of seven years from April 2014 to March 2021. Audit methodology involved test check of records at various units of DoT, DoE, Delhi Pollution Control Committee and Delhi Transport Corporation. Joint physical verifications, wherever required, were also conducted.

The audit scope, objectives, criteria and methodology were discussed with the Government during the Entry Conference held in January 2020. Thereafter, the draft audit report was discussed with the Government during Exit Conference in October 2021. The replies of the Government, wherever received, have been suitably incorporated in the Report.

1.7. Structure of the Report

Chapter-1 gives a brief background of the sources impacting air quality in Delhi, and the contribution of transport sector as the primary source affecting Delhi's Air quality.

Chapter-2 includes the issues related to air quality monitoring in Delhi.

Chapter-3 discusses the adequacy and effectiveness of public transport system.

Chapter-4 covers the preventive and enforcement strategies of GNCTD to regulate vehicular emission. These include effectiveness of emission and fitness testing systems in Delhi, and robustness of mechanism to enforce the same.

Chapter-5 examines the mitigation and promotion strategies, which includes promotion of zero-emission transportation, management of congestion and increasing public awareness about air quality issues.

CHAPTER–2

AIR QUALITY MONITORING SYSTEM

2. Air Quality Monitoring System

In order to ensure optimal air quality, it is necessary to identify the pollutants and their acceptable levels in ambient air; and measure their actual concentration in ambient air. Defining Air quality is a complex process as there are multiple pollutants with different acceptable levels[10]. In order to simplify the complex air quality data, Central Pollution Control Board launched (April 2015) National Air Quality Index.

The Comprehensive Action Plan (CAP)[11] prepared by Environmental Pollution (Prevention and Control) Authority (EPCA) to mitigate air pollution had stipulated (April 2017) setting up of 20 more real time air quality monitoring stations, in addition to 18 existing real time monitoring stations in Delhi, to make it representative of population distribution and land use. Accordingly, DPCC had set up 20 additional monitoring stations during 2017-18 making available 38[12] Continuous Ambient Air Quality Monitoring Stations (CAAQMS) in Delhi (as of March 2021).

Audit examined the appropriateness of location of CAAQMSs, adequacy of air quality data generated to calculate AQI and identification of sources of pollution by the Government. Audit observations on these issues are discussed in subsequent paragraphs.

2.1. Inappropriate location of Air Quality Monitoring Stations

The CPCB Guidelines for Air Quality Monitoring Stations specified *inter alia*, the following requirements regarding location of CAAQMSs:

- All sides should be open, i.e., the intake should not be in a confined space
- Height of the inlet must be 3-10 meters above the ground
- More than 20 meters away from nearby trees
- More than 200 meters from unpaved roads/ streets
- No nearby furnace or incinerator fumes

The location of CAAQMS should be representative of average exposure over a geographic area. If the location of the instrument is such that it does not satisfy the physical requirements of monitoring stations, the data generated may be incorrect and thus, not be of much use in determining status and trends of level of pollutants.

---

[10] These air quality standards were notified by CPCB in 2009. The standards levels for 24 hours weighted average for pollutant $PM_{2.5}$, PM_{10}, NOx, SO_2, Lead and Ammonia are 60 ug/m^3,100 ug/m^3, 80 ug/m^3, 80 ug/m^3, 1.0 ug/m^3 and 400 ug/m^3 respectively and eight hours weighted average for pollutants CO and Ozone are 2 mg/m^3 and 100 ug/m^3 respectively.

[11] A Comprehensive Action Plan (CAP) was submitted by EPCA to Supreme Court in April 2017 with the objective to present a pollution source wise action plan to be implemented in a time bound manner in Delhi and NCR by agencies concerned with adequately stringent monitoring and compliance system to meet the clean air targets.

[12] Out of these 24 belonged to DPCC and remaining 14 were with central agencies (six with CPCB and eight with Indian Metrological Department)

Audit conducted (September 2020) joint physical verification of 13 CAAQMSs (out of total 24 CAAQMSs of DPCC) and observed that though the height of the inlet was approximately four meter in all these stations, there were issues relating to parameters such as proximity to trees, major roads, obstacles, high rise buildings, unpaved roads, etc.

Incorrect location might result in incorrect observations by these monitoring stations and generation of unreliable data. Status of these 13 stations against the CAAQMS requirements noticed during joint physical verification is given in **Annexure-I**.

Illustrative cases are discussed below:

- All the 13 CAAQMSs had proximity to trees on multiple sides. As per the CPCB guidelines, trees may also be sources of particulate matter in the form of detritus, pollen or insect parts.
- CAAQMSs at Anand Vihar and Wazirpur were located adjacent to roads catering to heavy vehicular traffic.
- CAAQMSs at Civil Lines, Wazirpur, and Okhla had proximity to high rise buildings and construction sites.

Figure 2.1: CAAQMS Wazirpur

Figure 2.2: CAAQMS R.K. Puram, surrounded by trees on three sides

Thus, Audit observed that the location of CAAQMSs did not fulfill the requirements laid down by the CPCB, indicating possible inaccuracies in the data generated by these CAAQMSs, rendering the AQI values unreliable.

DoE stated (October 2021) that necessary action shall be taken to comply with the CPCB norms.

2.2. Calculation of AQI on the basis of inadequate data

CPCB had notified (November 2009) National Ambient Air Quality Standards (NAAQS) for 12 identified pollutants[13]. Subsequently, a national AQI was launched (April 2015) based on eight pollutants[14] to monitor air quality in major urban cities on a real time basis and to enhance public awareness by disseminating air quality information in simple terms easily understood by common person. A minimum of 16 hours (sixty-four observations as CAAQM stations are required to generate 15-minute average values on real time basis) data in a day should be available for minimum three pollutants, out of which one should necessarily be either $PM_{2.5}$ or PM_{10} for generating daily AQI.

Audit observed that despite having the capacity to generate 16 hours' data, these were not available on all the days during 2019-20 for all the seven pollutants (except Pb which was not measured at all). Thus, AQI was calculated without considering adequate data for all the seven pollutants. Details are given in **Annexure-II**.

Further, CPCB had categorized the station-wise availability of monthly air quality data into three categories[15]. Audit noted that in respect of 24 DPCC stations the monthly AQI data for less than 21 days was available for 12 *per cent* months during the period April 2014 to January 2021.

Lead (Pb) is a toxic metal and its exposure results in increased Lead levels in blood. Depending on the level of exposure, Pb may adversely affect the central nervous system, kidney function, immunity, reproductive, cardiovascular and respiratory systems. Audit observed that none of the 24 air quality monitoring stations of DPCC were measuring Pb levels.

DoE replied (October 2021) that requisite mechanism to measure Lead (Pb) at all monitoring stations shall be considered. As regards lack of sufficient data, DoE stated that 20 new stations installed in October 2017 started functioning between February 2018 and November 2018 onwards and since stations were under calibration and stabilization, stations were not connected for generation of AQI.

---

13 Sulphur Dioxide (SO_2), Nitrogen Dioxide (NO_2), PM_{10}, $PM_{2.5}$, Ozone, Lead (Pb), Carbon Monoxide (CO), Ammonia (NH_3), Benzene, Benzo (a) Pyrene, Arsenic and Nickel.

14 PM_{10}, $PM_{2.5}$, NO_2, CO, SO_2, O_3, NH_3 and Pb.

15 (i) data available for more than 21 days in a month (Green), (ii) data available for more than 11 days but less than 21 days in a month (Orange) and (iii) data available for less than 10 days in a month (Red).

The fact remains that lack of adequate data resulted in deficient air quality monitoring by DPCC.

2.3. Lack of real-time information regarding sources of pollutants

AQI values only indicate the total concentration of pollutants in an area. The source of each pollutant is measured by source apportionment/emission inventory study. Emission inventory is a comprehensive listing by sources of air pollutants and amount of air pollutants released into air because of a specific anthropogenic process in a particular geographic region during a specific time period. Thus, a real-time emission inventory helps to effectively plan appropriate mitigation strategies to minimize emission and improve the air quality. GNCTD considered (July 2018) to carry out a real-time emission inventory study essential for effective planning to improve the air quality.

Audit noted that GNCTD had not taken-up/finalised any study till March 2021. An agreement was however, signed in December 2018 with a foreign university which was terminated in December 2020 on technical ground by DPCC as the report had not addressed/fulfilled the overall requirements. However, the payment of ₹ 87.60 lakh was made to the university for the project, which remained unfruitful.

DoE while admitting (September 2021) the fact stated that real time source study is a new field for dynamic systems like Ambient Air and it is in the process to awarding real time source apportionment study for Delhi through IIT Kanpur led team.

In absence of real-time emission inventory study, strategies adopted to minimize emission are not based on scientific analysis of real-time data.

2.4. Lack of information on vehicular emission load

The last two emission source apportionment studies[16] conducted (2018) for NCT of Delhi revealed that vehicles are one of the major local contributors ($PM_{2.5}$ – 39 *per cent,* PM_{10} – 19 *per cent,* NO_x – 81 *per cent,* CO – 84 *per cent* and NMVOC-80 *per cent)* to Delhi's poor air quality. This necessitates that GNCTD should maintain information regarding vehicular traffic and vehicular emission[17] load in Delhi, in order to devise appropriate strategies to control vehicular traffic and/or emission from these vehicles plying in Delhi. Guidelines for Ambient Air Quality Monitoring, issued by CPCB in 2003, also prescribed obtaining of information on type and number of vehicles and estimation of emission load.

---

16 Source Apportionment of $PM_{2.5}$ & PM_{10} of Delhi NCR for Identification of Major Sources by TERI and High-Resolution Emission Inventory of Major Air Pollutants of Mega City Delhi by System of Air Quality and Weather Forecasting and Research (SAFAR).

17 The major pollutants in vehicular emission are carbon monoxide, nitrogen oxides, photochemical oxidants, air toxics namely benzene, aldehydes, 1-3 butadiene, Lead, particulate matter, hydrocarbons, oxides of sulphur and polycyclic aromatic hydrocarbons. While the predominant pollutants in petrol/gasoline driven vehicles are hydrocarbons and carbon monoxide (the predominant pollutants), these are oxides of nitrogen and particulates from diesel-based vehicles.

Audit observed that information regarding type and number of vehicles plying on Delhi roads and assessment of their emission load was not available with DoE/ DoT.

As a result, the GNCTD was not in a position to identify the emission from different types of vehicles that are generating significant concentration of pollutants for framing source-wise strategies for specific type of vehicle or particular area, to mitigate vehicular air pollution in Delhi.

DoE stated (October 2021) that quantification of emission load on normative basis shall be explored. DoT stated (November 2021) that an MoU has been signed with IIT Delhi for assessment of vehicular emission load in Delhi, report of which is expected in January 2022.

2.5. Benzene emission not measured at source

Benzene, which is one of the pollutants, emanates mainly from evaporation at fuel stations during loading and dispensation, making fuel stations high emission areas. As per the World Health Organization, acute (short term) occupational exposure to benzene may cause narcosis, headache, dizziness, drowsiness, confusion, tremors and loss of consciousness. Escape of benzene can be controlled through Vapour Recovery Systems (VRS) which sucks back the fumes that escapes from a pipe when fuel is being pumped into a vehicle or an outlet.

The National Ambient Air Quality Standards (NAAQS) specified the permissible levels for Benzene as 5µg/m^3.

In order to reduce Benzene emission, Comprehensive Action Plan (CAP) stipulated (April 2017) installation of Vapour Recovery System (VRS) at all the fuel outlets[18] in Delhi by May 2018. DoT, DoE and DPCC were also responsible for its implementation, apart from Union Ministry of Petroleum and Natural Gas (MoPNG).

Analysis of monthly average data of Benzene levels monitored at DPCC's 24 CAAQMSs revealed that the Benzene levels were in excess of permissible limits during 26.94 *per cent* for the period from January 2018 to March 2021. The ten most affected AQI monitoring locations where Benzene levels were reported high during this period are shown in **Table 2.1**.

Table 2.1: Benzene levels at various monitoring locations

Sl. No.	AQI Station	Range of Benzene level monitored beyond 5 ug/ m^3
1	Punjabi Bagh	5.56 to 26.04 ug/m^3
2	Anand Vihar	5.05 to 14.82 ug/m^3
3	R.K. Puram	5.01 to 13.90 ug/m^3
4	National stadium	6.31 to 13.45 ug/m^3
5	Mundka	5.08 to 11.39 ug/m^3
6	Nehru Nagar	5.22 to 10.67 ug/m^3
7	Jahangir Puri	5.16 to 10.46 ug/m^3
8	Pusa	5.27 to 11.89 ug/m^3
9	Ashok Vihar	5.13 to 13.54 ug/m^3
10	Wazirpur	5.14 to 9.53 ug/m^3

Source: AQI Data provided by DPCC

[18] With capacity of 300 KLM and more.

Despite the overall high Benzene levels, GNCTD was not monitoring benzene level at fuel stations/petrol pumps, i.e., the key source of benzene emission. Further, it was observed that DoT, DoE, and DPCC were not aware of the status of installation of VRS in fuel stations in Delhi.

Thus, the GNCTD neither monitored Benzene levels at the fuel stations (major source), nor followed-up on the installation of VRS at fuel stations to reduce Benzene emission. Meanwhile, benzene levels remained higher than permissible limits at ten out of 24 CAAQMSs.

DoE stated (October 2021) that the possibility of installation of monitoring sensors at fuel stations shall be deliberated upon.

2.6. Conclusion

Air quality monitoring by DPCC was deficient as CAAQMSs were located at sites not fulfilling the norms. Further, Lead (Pb) was not measured at any CAAQMSs of DPCC and the remaining seven pollutants were also not measured regularly. This resulted in unavailability of AQI values on several days.

GNCTD did not collect any information on vehicular traffic and emission load in Delhi, without which targeted approach for emission control to tackle air quality problem could not be adopted. Besides, GNCTD did not undertake real-time emission inventory study.

Despite high Benzene concentrations reported at CAAQMSs, GNCTD neither monitored Benzene concentrations at fuel stations, nor ensured installation of vapor recovery device at fuel stations to control these emissions. Thus, GNTCD was in no position to analyse the impact of its strategies to bring down pollution.

2.7. Recommendations

Recommendation #1: The Government should ensure that the CAAQMSs are relocated at suitable places or obstacles are removed. If equipment is not fit to monitor all pollutants like Lead, they should be suitably augmented or replaced.

Recommendation #2: Government should ensure sufficient data for all pollutants is generated by every monitoring station, so that air quality at various locations in Delhi is known on all days. Government needs to monitor benzene level at fuel stations and follow up installation of Vapour Recovery System at fuel stations to reduce Benzene emission.

Recommendation #3: Government needs to maintain information regarding type and number of vehicles and their emission load for devising appropriate strategies to control vehicular traffic and/or emission. Without this information, impact and success of any measure to control pollution cannot be assessed.

CHAPTER–3

PUBLIC TRANSPORT SYSTEM

3. Public Transport System

Adoption of public transport means shifting to mass transportation mode, which involves consumption of less fuel per passenger- kilometer travelled, thereby lesser emission per passenger-kilometer travelled.

As of March 2021, there were 1.30 crore vehicles registered in Delhi. Further, as per a report by the Ministry of Earth Sciences, Government of India, 2018, everyday vehicle load from other states in eight major entry points of Delhi was nearly 11 lakh. To mitigate vehicular emission, Governments take steps which motivate commuters to prefer public transport. As public transport carries many passengers on a single vehicle, it can reduce the cumulative amount of tailpipe emission compared to the multiple vehicles, which it substitutes. By reducing the concentration of emission from transportation in dense urban areas, public transportation can help cities to meet air quality standards, and thus decrease the health risks of poor air quality to its residents. Audit examined the adequacy and effectiveness of such measures taken by the GNCTD.

In NCT of Delhi, public transport comprises of buses (DTC and Cluster Scheme) and Delhi Metro. These are complemented by last-mile connectivity provided largely by Gramin-Sewa and Auto-rickshaws, which are privately owned but regulated by the Government.

3.1. Public Transport Buses

In NCT of Delhi, public transport buses are run by Delhi Transport Corporation (DTC), GNCTD and private entities under Cluster[19] Scheme buses. Audit observed the following issues in management of public transport buses in Delhi.

3.1.1. Shortage of Buses

As per the GNCTD's assessment (July 2012) 11,000 buses were required for NCT of Delhi and 50 *per cent* each were to be run by DTC and private entities under cluster scheme. Actual present requirement may be different, considering this assessment was done in 2012 and considering floating daily population entering Delhi.

As of April 2014, DTC was operating 5,223 buses which was reduced to 3,760 buses in March 2021. Meanwhile, the availability of buses run by private entities under cluster scheme increased from 1,292 (March 2015) to 2,990 (March 2021). Thus, only 6,750 buses were available vis-à-vis the estimated requirement of 11,000 buses for public in Delhi.

Despite the issue of delay in procurement of buses due to frequent changes in the proposal and cancellation of tender by DTC being pointed out in CAG report of 2016, no follow up action was taken by GNCTD/DTC to conclude the procurement process. Audit noted that no new buses were procured by DTC in last ten years (2011-12 to 2020-21), while some of the existing buses went off-road due to ageing/accidents/fires. It is noteworthy to mention that number of two wheelers increased from 43 lakh (March 2011) to 81 lakh (March 2021) and total number of registered vehicles increased from 69 lakh to 1.30 crore during the same period.

[19] 657 routes of Delhi were divided into 17 clusters, each serviced by a private entity and DTC. The private entities are awarded the cluster through a competitive bidding process, and required to provide a scheduled bus service according to a Unified Time Table.

Shortage of public transport may have contributed to such large increase in private vehicles. After almost ten years of induction of last bus in DTC fleet, orders for supply of 1000 CNG buses and 300 electric buses were placed (January 2021 and March 2021 respectively) by DTC. DoT stated (October 2021) that buses (CNG and Electric) are likely to inducted by November 2021 and March 2022 respectively.

Further, despite initiative taken (March 2018) by GNCTD for induction of 1000 electric buses under cluster scheme, tenders for 385 Electric Buses issued in March 2019 were not finalized on technical grounds (June 2021).

DoT stated (September/October 2021) that it was in the process of floating fresh tender for induction of Electric Buses with delivery schedule in sync with the completion of electric bus depot with requisite power load. These buses were expected to be operational in the cluster fleet during January-June 2023.

It further stated that 350 AC low floor CNG buses under Cluster fleet were expected to be operational by June 2022. It also stated that current requirement of buses is estimated to be 9,000 as the Delhi Metro network has expanded in recent years.

The fact remains that, only 6,750 buses were available in Delhi, i.e., shortage of 25 *per cent* against reassessed requirement of 9,000 buses.

3.1.2. Significant number of DTC Buses remaining off-road

Audit noted that out of a fleet of 4,712 (March 2015), on an average only 4,180 (89 *per cent)* DTC buses were actually on roads during 2014-15 which decreased to 3,222 (68 *per cent)* buses during 2019-20. Further, percentage of DTC buses remaining off-road for repair and maintenance ranged between 14 *per cent* to 16 *per cent* of total available fleet. Audit noted that 93 buses were off road for period between five to 11 months (June 2019) due to failure of DTC to timely extend Annual Maintenance Contract.

Less availability of number of operational buses adversely affected the reliability of public transport. With its bus fleet already short of requirement, DTC was expected to do proper upkeep and maintenance of the existing fleet.

Audit also observed that DTC was completely dependent on vehicle manufacturers for providing maintenance services of buses despite availability of 1,094 repair and maintenance (R&M) staff[20] at its disposal. The existing repair and maintenance staff were however, utilized only for record keeping and verification of AMC/repair bill submitted by the contractor. No mechanism was evolved till date (June 2021) by the DTC to train and upgrade the skill of existing R&M staff for maintenance of low floor buses.

Thus, more than 14 *per cent* of buses remained off-road worsening the availability of buses for public services. Moreover, DTC was completely dependent on manufacturers for repair and maintenance of buses in spite of having 1094 personnel for the purpose.

[20] As per Operational Statistics (March 2021) of DTC, 1094 repair and maintenance staff were available against requirement of 940 personnel.

DoT while accepting the fact stated (October 2021) that maintenance contract has been signed with original equipment manufacturers.

3.1.3. Short-coverage of Bus Routes

As of March 2021, there were total 657 notified bus routes in NCT of Delhi, to be covered by DTC and Cluster Scheme Buses. However, due to reduction in fleet size of DTC, 238 routes (36 *per cent*) were not being covered at all by either DTC or Cluster Scheme Buses.

There is large influx and outflux of public on daily basis from Delhi to NCR towns and vice versa. This necessitates comprehensive NCR connectivity to be provided by the public transport. Audit, however, observed that as on March 2021, no DTC buses were providing NCR connectivity.

DoT stated (September 2021) that as of August 2021, there were 310 routes under Unified Time Table and the rest of the Cluster routes would be implemented in sync with the new buses under Cluster Scheme in a phased manner.

3.1.4. Rationalisation of Bus Routes

Bus transport system in Delhi requires capacity expansion to cope up with the growing mass transport demand especially during peak hours as well as demand for providing new services to unconnected areas. For this route rationalization study is required to satisfy the changing mobility needs of citizens as well as to maximise utilization of the transport infrastructure of the city.

A study was submitted (June 2013) by Delhi Integrated Multi-Modal Transit System Ltd. (DIMTS) to GNCTD. The recommendations of the report were, however, not implemented by DoT. The issue of not implementing route rationalization was also flagged in the CAG's Audit Report for the year ended March 2015.

Subsequently, the Cabinet approved (December 2017) a proposal to conduct another route rationalization study by DIMTS at a fee of ₹ 2.97 crore. The Comprehensive Action Plan[21] (CAP) for air pollution control in Delhi required DoT, DTC and DIMTS to implement the recommendations of this Route Rationalization Report (RRR) by June 2018.

DIMTS submitted (September 2019) the final study report with recommendations for new routes, route modifications, frequency enhancement, additional routes and buses for NCR connectivity, etc. Audit, however observed that the Study report submitted by DIMTS in September 2019 was yet to be approved for implementation (April 2021). In order to achieve the intended objectives the recommendations proposed in Study Report should have been implemented in a time bound manner. However, Government failed to act upon either of two route

[21] CAP stipulated source-wise clean air action plan and compliance strategy for Delhi and NCR to meet clean air standards.

rationalization studies. This implies that DTC and Cluster buses were operating on routes not optimised, for more than eight years.

DoT stated (September 2021) that it had identified three prime constraints for implementation of RRR, viz. fleet availability, Covid pandemic and change of ridership data, however, it was working on implementation of RRR. It was further stated (November 2021) that DoT has taken up a pilot study for rationalization of bus routes from October 2021 and implementation of RRR is expected in 2022-23.

3.2. Last-mile connectivity

Last-mile connectivity refers to the commute from home to transport hubs, i.e., Bus stops, metro stations, railway stations, etc. Last-mile connectivity enables greater integration and accessibility of public transport system to commuters. In NCT of Delhi, last-mile connectivity was provided largely by Gramin-Sewa and Auto-rickshaws.

3.2.1. Gramin-Sewa Vehicles

In the year 2010, DoT, GNCTD introduced a new para-transit scheme namely Gramin-Sewa, wherein high-capacity three-wheelers and similar other vehicles with capacity of six passengers, were given permits to operate on specified routes allocated in rural areas, unauthorized colonies, resettlement colonies and J.J. Clusters of Delhi. The Gramin-Sewa vehicles ply only on CNG fuel.

Audit observed that though there was an estimated increase of 17 *per cent* in the population of Delhi since the year 2011, the number of registered Gramin-Sewa Vehicles remained the same at 6,153 since May 2011. Thus, there was deficiency in availability of last-mile connectivity through Gramin-Sewa. Even the vehicles for Gramin-Sewa are same as those inducted in the year 2011 indicating their old age and resultant poor fuel efficiency and higher potency to cause pollution.

DoT informed (November 2021) that, to ensure providing of last mile connectivity, it was tying up with DTIDC and DMRC for deployment of e-rickshaws.

3.3. Alternatives to public transport buses

Light Rail Transit (LRT) is a medium capacity mode of mass rapid transport which is a low cost, eco-friendly, electrically propelled system with no pollution. Since 2014-15, GNCTD has been allocating budget for implementation of 'Monorail and Light Rail Transit' and 'Electronic Trolley Buses' every year.

Audit, however, observed that despite allocating budget for providing alternate mode of transport in Delhi, GNCTD did not take any action and no plans/schemes for implementation of monorail project and electronic trolley bus system was made.

Though availability of public transport buses was far less than the requirement, GNCTD did not take any action for implementation of its alternatives even after keeping budget provision for the last seven years.

DoT confirmed (September 2021) that at present no plan/scheme for implementation of monorail and electronic trolley buses were under consideration, however, by allocating budget of ₹ 1.00 lakh, these schemes have been kept active for future.

3.4. Conclusion

In Delhi, mass public transport basically comprises of Buses and Delhi Metro along with last-mile connectivity provided largely by Gramin-Sewa and Auto-rickshaws.

As of March 2021, Delhi Transport Corporation (DTC) and Cluster Scheme buses which provide public transport buses in Delhi, had only 6,750 buses available *vis-à-vis* the estimated requirement of 9,000 buses, since no new buses were procured in the last 10 years by DTC. Significant number of these buses too remained off-road

As a result, 238 out of 657 notified bus routes were completely unserved. DTC buses had altogether stopped providing NCR connectivity. Further, the number of Gramin-Sewa Vehicles has remained the same since May 2011. No action was taken on alternatives like eco-friendly LRT and Monorail. Acute shortage of buses and absence of last mile connectivity options has led to a situation where public is forced to use personal vehicles including two wheelers resulting into doubling of number of vehicles during the last decade. This had adverse impact on air quality in Delhi.

3.5. Recommendations

Recommendation #4: To arrest the deteriorating air quality due to vehicular emission, the Government should immediately address the issue of shortage of 2250 public transport buses and complement it with last-mile connectivity options.

Recommendation #5: The skill of existing R&M staff needs to be matched to the operational buses by training them and applying their services suitably for proper upkeep and maintenance of the buses.

Recommendation #6: GNCTD should do route rationalization on priority to use the existing fleet optimally.

Recommendation #7: GNCTD should actively consider and finalise schemes to provide suitable alternatives to public transport buses so that earmarked budget for same is used fruitfully.

CHAPTER–4

CLEANER TRANSPORT-PREVENTION AND ENFORCEMENT STRATEGIES

4. Cleaner Transport-Prevention and Enforcement Strategies

The primary source of pollution from 'Transport' sector is from burning of fuel, i.e., Diesel, Petrol, CNG and LNG in the Internal Combustion Engine (ICE) Vehicles.

In order to prevent the output of excessive tail-pipe emission from motor vehicles running on Petrol/CNG/Diesel/LNG, Government of India instituted Bharat Stage Emission Standards[22] (BS Emission Standards). The BS emission standards were first introduced in the year 2000 and progressively stringent norms have been implemented since then. All new vehicles manufactured after the implementation of the norms have to be compliant with these regulations. Currently, BS-VI emission standards are applicable throughout the country. Emission from in-use vehicles also depend on the maintenance and upkeep of vehicles. A small number of ill-maintained and unfit vehicles may contribute significantly to deterioration of air quality.

Hence, an effective emission testing regime for proper testing of all vehicles and issue of reliable Pollution Under Control Certificate (PUCCs)[23] is vital to check emission from vehicles. To prevent excessive tail-pipe emission from vehicles, emission testing regime needs to be complemented by an effective vehicle fitness testing program.

The responsibility of enforcing the provisions of the Motor Vehicles Act, 1988 and Rules framed thereunder, such as against vehicles found without valid PUCC, emitting visible smoke, impounding End of Life Vehicles[24] (ELVs), etc., is assigned to the Enforcement Branch of DoT.

Audit examined these preventive strategies i.e., emission and fitness testing system in Delhi, and also examined the adequacy and effectiveness of enforcement strategies to ensure reduction of vehicular emission. Audit observations are discussed in subsequent paragraphs.

4.1. Emission testing of motor vehicles

In terms of Rule 115(7) of Central Motor Vehicles Rule, 1989, all vehicles[25] on Indian roads are mandated to carry valid PUCC, which indicates that the vehicles' emission are in alignment with BS emission standards applicable and are not excessively harmful to the environment.

---

22 The standards and the timeline for implementation are set by the Central Pollution Control Board under the Ministry of Environment, Forests and Climate Change, Government of India.

23 indicates that the vehicle's emission is in alignment with applicable BS emission standards.

24 petrol vehicles more than 15 years old and diesel vehicles more than 10 years old.

25 After the expiry of a period of one year from the date on which the motor vehicle was first registered.

Pollution Checking Centers (PCCs) authorized by the state government issue PUCC if the vehicle is found meeting the prescribed emission norms. PCCs carry[26] out the PUC checks by inserting the sampling probe in the exhaust pipe of the vehicle for measuring emission. In case the vehicle is found emitting beyond norms, necessary repairs/ tuning in the vehicle are required. In NCT of Delhi as on June 2021, there were 969 PCCs (596 Petrol & CNG and 373 Diesel based). All these PCCs have been networked for automatic recording of all emission tests results in the central server.

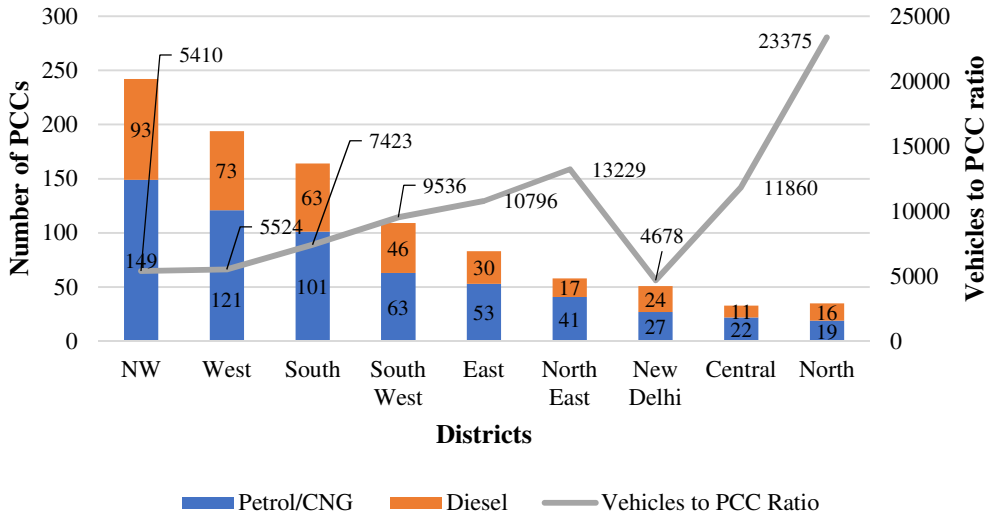
Audit assessed the availability of PCCs, adequacy of PUC checks, reliability of PUC checks conducted by PCCs and oversight mechanism of DoT over these PCCs. The observations are as follows.

4.1.1. Adequacy of Pollution Checking Centres (PCCs)

Audit noted that out of the 969 PCCs in Delhi (June 2021), 664 were situated at fuel stations, 47 at Bus Depots and 258 at Service centers, Workshops, etc. Thus, 31 *per cent* PCCs situated at bus depots and service centers/workshops catered to specific category of vehicles only and were not accessible to general public. Moreover, these PCCs (bus depots and workshop) had conducted only an average of seven PUC check per day during the period 2019-20.

Moreover, there was skewed distribution in location of PCCs across Delhi, as 62 *per cent* of the PCCs were located in only three out of nine zones as shown in **Chart 4.1**.

Chart 4.1: Skewed zone-wise distribution of PCCs



Source: PUCC Portal of DoT

[26] In petrol vehicles, carbon monoxide and hydrocarbon concentration is measured at two speed idle tests (along with Lambda measurement in four wheelers fitted with three-way catalytic converters). In Diesel vehicles, free acceleration smoke test or snap acceleration test that measures smoke emission is conducted.

DoT stated (September 2021) that vehicle owners prefer to get their vehicles checked for PUC levels from petrol pump where they regularly visit for getting fuel in comparison to a PUC Centre located at dealer's workshop where they only visit for service and repairs and that visit may not coincide with the date of expiry of their PUCC.

It further stated (September 2021) that skewed zone-wise distribution of PCCs to zonal inconsistencies was due to less number of vehicles in the smaller zones.

Reply is not tenable as analysis of Zone wise number of vehicles registered and PCCs revealed that though on an average 8,000 vehicles were registered in Delhi for each PCC, the ratio varied from less than 5000 vehicles registered per PCC in New Delhi zone to more than 23,000 vehicles registered per PCC in North zone (**Annexure-III**).

The Department may like to examine reasons for such skewed zone-wise availability of PCCs in Delhi, especially in North zone. The department could also explore providing automated pollution check centers in public accessible places like resident colonies etc. enlisting cooperation of registered Resident Welfare Associations (RWA), etc., in Delhi.

4.1.1.1. PCCs at DTC/Cluster Bus Depots

The National Green Tribunal (NGT) directed (December 2014) that the DTC shall ensure that every bus belonging to DTC or operating under its directions (cluster buses) will be subjected to check for PUC at least twice a month.

In order to properly adhere to the directions of NGT, PCCs were setup at DTC Depots from February 2016 onwards whereas for cluster buses, the same were set up only from July 2016 onwards.

DTC was having PCCs[27] on all of its Depots as of March 2021 whereas, out of 10 Cluster Bus Operators, only six operators have set up PCCs[28] as of 31 March 2021. Thus, four Cluster Bus Operators[29] were dependent on general PCCs.

DoT stated (November 2021) that it shall ensure frequency of PUC check of cluster buses at par with DTC as per NGT directions.

4.1.1.2. PCCs at Showrooms/Workshops

As per DoT order (January 2015), all the vehicle dealers to whom trade certificates were already issued were to apply for setting up PCCs in their showrooms/workshops. Likewise, no trade certificate was to be renewed unless the dealer submitted an undertaking that he had applied for PCC at his workshop/showroom along with a copy of application thereof.

---

[27] 41 PCCs Set up between February 2016 and December 2016.

[28] Five PCCs set up between July 2016 and November 2017 and one PCC in July 2020.

[29] M/s Young Optimistic Transport solution, M/s Uniworld Transerev Pvt Ltd, M/s Intact Transport Pvt Ltd and M/s Great Value fuel Pvt Ltd.

Audit, however, observed that as of January 2021, PCCs were not available in 272 (60 *per cent*) out of 448 vehicle dealers' showrooms/workshops in Delhi.

DoT stated (September 2021) that many vehicle dealers' showrooms/workshops in Delhi have more than one showroom/workshop but do not have PCC at all showrooms/workshops.

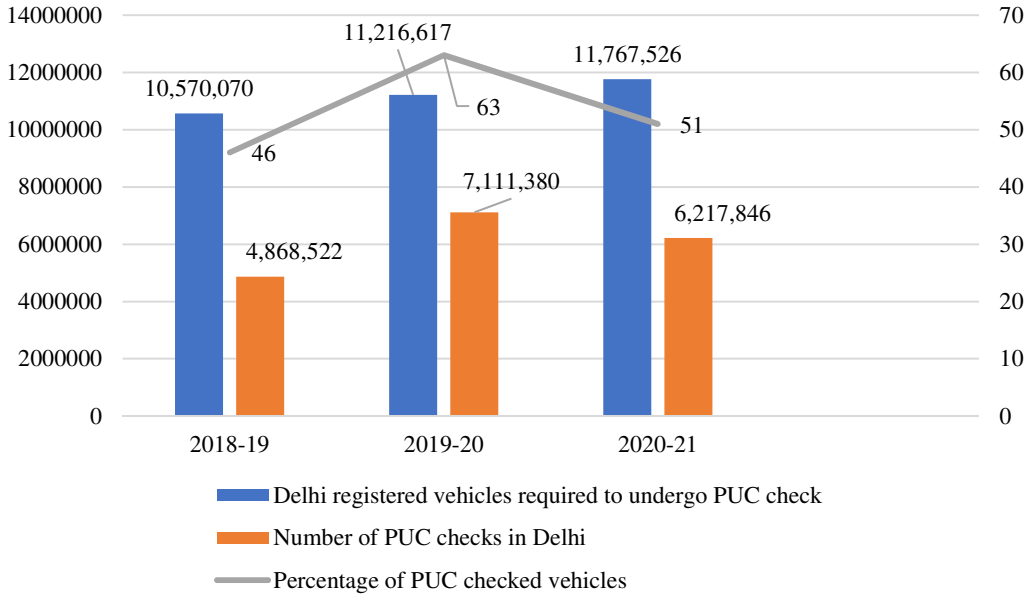
Reply of the Department was general in nature and indicates laxity in implementing its own orders as all workshops/showroom were to establish PCCs irrespective of number of showroom/showroom owned by same dealer.

4.1.2. Shortfall in number of vehicles put to emission testing

As per CMV Rules 1989, every motor vehicle (including those conforming to BS-I/BS-II/BS-III/BS-IV/VI as well as vehicles plying on CNG/LPG) was required to carry a valid PUCC after the expiry of a period of one year from the date of its first registration. The validity of PUCC for four wheeled BS-IV and BS-VI compliant vehicles is one year and for the other vehicles, it was three months.

The NGT directed (18 December 2017) for regular checking of vehicles to ensure maintenance of emissions within the prescribed values. The number of vehicles put to PUC check during 2018-19, 2019-20 and 2020-21 were as given in **Chart 4.2** below:

Chart 4.2: PUC checks in Delhi



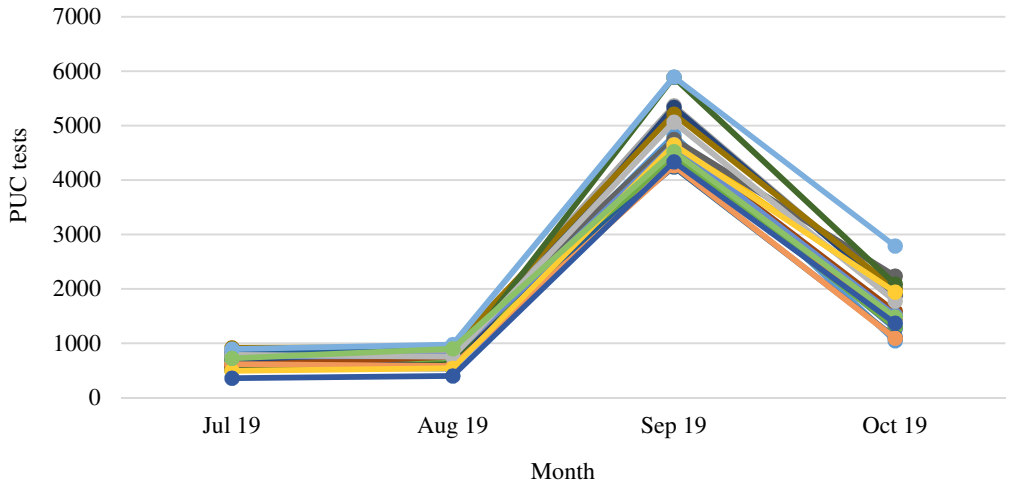
Source: VAHAN Dashboard and data furnished by DoT

It could be seen from **Chart 4.2** that the number of Delhi registered vehicles actually tested for PUC in Delhi ranged between 46 to 63 *per cent* of the vehicles due for PUC checks during 2018-19 to 2020-21. It is pertinent to mention that vehicles of pre-BS-IV norms require quarterly PUC checks, i.e., four PUC checks in a year.

Thus, it can be deduced that substantial number of the vehicles registered in Delhi were not undergoing emission testing.

In September 2019, enhanced penalty[30] provisions were introduced for plying of vehicles without a valid PUCC. Audit analysed the trend of PUC checks during the period of four months from July to October 2019. In 19 test-checked PCCs, audit observed that 12,901 and 13,798 PUC tests were conducted in July and August 2019 respectively, which sharply increased to 91,914 PUC tests in September 2019 and thereafter declined to 31,717 tests in October 2019.

Chart 4.3: Sharp increase in PUC tests after enhanced penalty provisions, at test-checked 19 PCCs



Source: PUCC Portal of DoT

It is evident from this trend that these vehicles were plying without a valid PUCC till August 2019, and got tested in September 2019 due to the enhanced penalty provisions only. DoT did not clarify on Audit contention which evidently indicated that these vehicles were plying without a PUCC prior to this period.

Audit noted that the PCCs in Delhi were networked with VAHAN[31] portal however, no mechanism was evolved to impose automated challans to Delhi registered vehicles which were overdue for PUC checks nor any disincentive was imposed for obtaining a PUC certificate beyond prescribed period. Likewise, no mechanism was evolved by DoT to verify compliance of obtaining PUCC of vehicles which were earlier issued challan for not having a valid PUCC.

[30] As per the Motor Vehicles (Amendment) Act, 2019, the fine for offence relating to plying of vehicle without a valid PUC certificate was increased from Rupees one thousand to Rupees ten thousand under Section 190(2) of the Act, along with provision for imprisonment for a term which may extend to three months.

[31] Maintains vehicle related data.

Government may devise a mechanism wherein the issue of SMS reminders/challans for not obtaining a PUCC is automated, with due checks[32] in place. In cases where a vehicle is issued challan for not having valid PUCC, a follow-up mechanism should be evolved to ensure that PUCC was obtained by the vehicle subsequently. GNCTD may consider conducting survey to ascertain the reason for shortfalls in PUC check and increase the number of PCCs. The cost and periodicity of obtaining PUCC could be reviewed to make it more reasonable and acceptable to public with incentives for compliance. Categories for PUCC for Public/Private and Petrol/Diesel vehicle could also be separately contemplated.

DoT replied (November 2021) that substantial efforts have been made from August 2021 onwards, which includes issuing public notices, bulk reminder SMSs, and heavy deployment of enforcement teams. Further, as recommended by Audit, issuing of e-challans to the PUC defaulters was under contemplation by taking legal opinion on the matter.

4.1.3. Shortfall in emission tests of Public Transport Vehicles regulated by GNCTD

Audit examined the process of emission testing of public transport vehicles running under the aegis of GNCTD. During the analysis, the following issues were observed.

4.1.3.1. Public Transport Buses

DTC and Cluster scheme buses were required to undergo emission testing twice[33] a month. Audit observed shortfall of emission testing in respect of DTC and cluster scheme buses.

None of the cluster buses had obtained PUCC at prescribed intervals. Audit noted that during April 2018 to August 2019 only 2,980 PUCCs (five *per cent)* were obtained by 1,734 cluster scheme buses against the requirement of 58,956 checks during the same period. Further, 13 cluster scheme buses were never subjected to PUC checks during 2019-20.

In respect of DTC buses, 345 buses (nine *per cent*) were never subjected to emission tests during September 2015 to March 2019. During April 2019 to March 2020, no DTC bus obtained PUCC at the prescribed intervals.

Audit observed that despite significant shortfall in PUC checks by cluster scheme and DTC buses, DoT failed to impose penalty on them. Evidently, only four challans were issued to DTC and no challans were issued to cluster buses during November 2018 to October 2020, reflecting deficient enforcement by DoT to prevent vehicular emission in Delhi. This indicates a lackadaisical approach by the

[32] As an illustration, if a vehicle obtains PUCC from other state which is not linked to VAHAN, the owner may be given option to upload that PUCC and the challan may be cancelled.

[33] As per the NGT's instructions of December 2014.

GNCTD. A punitive mechanism may be enforced to ensure periodical PUC checks of all the buses.

DoT stated (October/November 2021) that it shall ensure frequency of PUC check of cluster buses at par with DTC as per NGT directions.

4.1.3.2. Gramin-Sewa vehicles

Since 2010-11, 6,153 Gramin-Sewa vehicles (GSV) plying in Delhi were required to obtain PUCC quarterly. Audit noted a shortfall of 91 *per cent*[34] in subjecting the GSVs to emission tests during April 2015 to March 2019. During the period from April 2019 to March 2020, only 3,476 out of 6,153 GSVs got PUC testing done. Moreover, instead of quarterly tests, these 3,476 vehicles obtained the PUCC only once during this period.

DoT stated (September 2021) that Enforcement teams regularly check GSVs and prosecute in case of any violation.

The Department's reply is vague and does not respond to the issues raised by Audit.

While the Government was expected to subject these vehicles to regular PUC checks to lead from the front and showcase its sincerity towards reducing vehicular emission, it was noted that there was severe shortfall in emission testing of public transport buses and GSVs, which were operating under the regulations of DoT.

4.1.4. Irregularities in conduct of PUC checks by PCCs

4.1.4.1. PUCCs to diesel vehicles failing emission test

MoRTH Notification No. GSR 103 (E) dated 23 February 2012 under Rule 115 of CMVR 1989 had stipulated free acceleration test for pre BS-IV and BS-IV diesel vehicles.

As per the PUC database furnished by DoT for the period 10 August 2015 to 31 August 2020, 22.14 lakh diesel vehicles were checked at PCCs. Audit observed the following deficiencies in these tests.

- Test values were not recorded in respect of 24 *per cent* vehicles, i.e., 5.38 lakh out of these 22.14 lakh vehicles. However, these were declared 'Pass' and issued a PUCC. This raised doubts about genuineness of PUCCs for these vehicles.
- In 4,007 cases, even though the test values[35] were beyond the permissible range, these diesel vehicles were declared 'Pass' and issued PUCC.

As regards not depicting of emission values in the database, DoT replied (November 2021) that 50 sample cases (out of 5.38 lakh) shared by audit were five

[34] Gramin Sewa Veicles were tested for PUC checks on 8,632 occasions against requirement of 98,448 PUC tests during April 2015 to March 2019.

[35] As per free acceleration test for BS-IV norms the maximum smoke density should be 1.62 light absorption coefficient and 50 Hartridge units against which the test values varied between 1.63 and 2.44 and between 52 and 65 respectively.

years old and there was possibility of bugs in the system. DoT further stated that it is in the process of handing over the PUC management system to NIC in place of Delhi eGoverance Society (DeGS[36]) software which may have some bugs.

The reply is not acceptable since the 5.38 lakh cases of incomplete PUCCs pointed out in audit were extracted from the data provided by DoT and these cases pertained to period from August 2015 to August 2020. Thus, the contention of DoT that the data is old is devoid of merit. Moreover, the DoT need to fix bugs in the system to make PUC system credible.

4.1.4.2. PUCCs to petrol vehicles failing the emission test

Every motor vehicle operating on Petrol/CNG/LPG, manufactured as per BS-IV norms is required to comply with idling and high idling applicable emission standards for Carbon Monoxide (CO), Hydro Carbon (HC) and Lambda[37] notified by MoRTH, GoI vide Notification No. GSR 103 (E) dated 23 February 2012 under Rule 115 of CMVR, 1989.

Audit observed the following deficiencies in emission tests of petrol vehicles:

- As per the PUC database for 10 August 2015 to 31 August 2020, 65.36 lakh Petrol/CNG/LPG vehicles were issued PUCCs. However, 1.08 lakh vehicles were declared 'Pass' and issued PUCC despite emitting CO/HC beyond the permissible limits.
- During 18 August 2017 to 31 August 2020, 10.61 lakh BS-IV petrol driven vehicles were put to lambda test[38]. Out of these, 9.89 lakh vehicles were declared 'Pass' and issued PUCCs.
    - 5661 vehicles were declared 'Pass' despite the fact that the Lambda values were beyond permissible range of 0.97 to 1.03.
    - Lambda value was not found recorded in 52,555 cases (five *per cent)* out of the total cases. Thus, Audit could not confirm whether these vehicles really passed the Lambda test.

Hence, there were discrepancies in emission testing of Petrol/CNG/LPG vehicles as vehicles were declared 'Pass' despite failing the test. Moreover, test values were not recorded in several cases due to which correctness of PUCCs cannot be ensured.

DoT replied (November 2021) that it is in the process of handing over the PUC management system to NIC in place of Delhi eGoverance Society (DeGS) software which may have some bugs.

---

[36] Provides consultancy and software development services to various departments of GNCTD.

[37] The Lambda is a dimensionless value representative of the burning efficiency of an engine in terms of the air/fuel ratio in the exhaust gases. The Lambda testing for petrol driven BS-IV motor vehicles was mandatory.

[38] Lambda test was integrated with the online PUCC portal from 18 August 2017.

4.1.4.3. Multiple PUCCs within unreasonably short time

Before issuing a valid PUCC, the PCC has to carry out a specified procedure for each vehicle, which in turn requires reasonable time before the next vehicle can be checked at the test centers.

Test check of PUC database (September 2019) revealed that in 7,643 cases, more than one vehicle was shown to have been checked for emission limits at the same time at the same center. Likewise, 76,865 cases were noticed in same test center wherein only one minute lapsed in checking of vehicle along with issuance of PUC certificate. Since neither a PUCC can be issued simultaneously to two vehicles at a PCC nor it is possible to carry out the entire procedure in one minute, it is suspected that the specified procedure for emission testing of each vehicle was not followed in these cases. Despite linkage of all PCCs with central server, DoT failed to analyze the captured data to figure out suspected unscrupulous practices adopted by PCCs during emission checking of vehicles.

DoT informed (October/November 2021) that PCCs are now being issued show cause notices for irregularities in testing procedures, initially targeting with PCCs having only one to two *per cent* failure rate. It was also stated that 211 PCCs were inspected and 53 were issued show cause notices till 8 October 2021. Also, a minimum time-gap between consecutive PUC checks is being implemented.

In addition to issuing show cause notices for irregularities, GNCTD needs to identify the lapses on part of the DoT and appropriate punitive actions may be initiated.

4.1.4.4. Manual selection of BS Emission standards category

As per the directions of the Supreme Court, the Ministry of Road Transport and Highways, GoI issued (June 2018) a notification for linking of PUCC data with VAHAN database. In terms of the notification, the following schedule/timeline for linking of emission data with VAHAN database was notified:

Table 4.1: Timeline for linking of emission data with VAHAN database

Sl. No.	List of States	Date of implementation
1	National Capital Territory of Delhi	01.06.2018
2	Haryana, Rajasthan, Uttar Pradesh	01.10.2018
3	All other states except those mentioned above	01.04.2019

Source: GoI Notification

Audit, however observed that PCCs in Delhi were still permitted to manually select the emission standards in case of vehicles whose details were not fetched from the VAHAN Database. This provides the scope for manipulation to compromise with stringent checking of emission limits as well as with validity of the PUCC.

DoT stated (September 2021) that manual selection of BS category was allowed in cases of old vehicles and in some cases where norms were not available in VAHAN database. The reply is not tenable as it did not furnish specific reasons for

incomplete linking of emission data and VAHAN database. Issuing of PUC certificates on the basis of manual selection reflects lack of seriousness in enforcing directions of Supreme Court.

Thus reliability of PUCCs issued was compromised as vehicles were declared 'Pass' despite emitting excess emission, without recording the test values, and PUC checks were conducted in unreasonably short time. Government needs to ensure strict adherence to prescribed procedure for PUC testing of vehicles for arriving at reliable test values before issuing a 'Pass' certificate. Government should also review the test results periodically to ensure integrity of the emission testing system. Emission data (PUCC) needs to be linked to VAHAN database at the earliest.

4.1.5. Deficient monitoring of PCCs by DoT, GNCTD

4.1.5.1. Inspection and Third-party audit of PCCs

The EPCA assessed (February – March 2017) the PUC programme in Delhi NCR and besides recommending various mitigating measures, it emphasized (April 2017) on inspection of PCCs for quality control and introduction of annual third-party audit of the PCCs. These measures are also important to ensure credible and real-time testing of vehicles to bring the operators within a strong accountability framework. DPCC was to do coordination as per CPCB guidelines.

Audit, however, observed that neither the periodicity for inspection of PCCs was fixed by DoT nor the inspection of PCCs was undertaken on a regular basis.

DoT attributed the lack of inspection to shortage of inspecting staff and assignment of additional duties to the existing Pollution Control Officers.

Delhi Budget Speech 2018-19 also envisaged a third-party audit programme for PCCs. Audit observed that the system of third-party programme was not finalised as of March 2021. The proposal of DoT to conduct third-party audit was pending for approval of competent authority for more than two years.

Thus, neither DoT inspected PCCs on its own, nor instituted third-party audit of PCCs. This not only resulted in a weak accountability framework for PCCs, it also encouraged issuing of wrong PUCCs without checking vehicles as per PUC norms, as mentioned in the preceding paragraphs.

DoT informed (October 2021) that it would consider the third-party audits and for inspection of PCCs, action has been initiated recently. DoE stated (October 2021) that necessary follow-up with the agencies concerned shall be done.

4.1.5.2. Inspection not done of PCCs issuing valid PUCCs to vehicles later found polluting

During November 2018 to October 2020, DoT had issued 53,655 challans for vehicle emitting visible smoke. Audit observed that out of the issued challans, 52,711 challans (more than 90 *per cent*) were issued to vehicles carrying a valid PUCC. This casts doubt over the reliability and veracity of PUC centers who had issued these PUCCs. DoT however had not setup any mechanism of internal inspection of such PCCs.

DoT stated (September 2021) that visible smoke from vehicles mainly depends on factors like adulterated fuel, malfunctioning of injectors, poor maintenance of vehicle, overloading of the vehicles and improper setting of engine of a vehicle. Further, the PUCC is issued to a vehicle with a validity from three months to one year in which period a commercial vehicle covers around 20,000-80,000 kms, therefore, the possibilities of emitting visible smoke in a vehicle due to the above reasons is quite high. It was further stated that the efficacy of pollution equipment depends on its calibration and that the software does not permit issuance of PUCC from any uncalibrated equipment, thus the inspection of the testing equipment at PCC is not required.

The reply questions reliability of PUCC mechanism which is the responsibility of DoT and therefore is not acceptable. Despite advisory (August 2017) of MoRTH, the Department did not implement calibration of PUC equipment by third party agencies, critical to get authentic results.

4.1.5.3. Reliability of equipment not ensured

In order to keep a check on the production quality of the instrument, the Conformity of Production (COP) testing for instruments manufactured / supplied in India was introduced. The Automotive Research Association of India (ARAI), Pune, issues the above-mentioned COP to certify the production quality of the testing equipment. Audit observed that DoT had no mechanism to ensure that the testing equipment installed at PCCs were part of the quantity produced/ approved as per the COP certificate issued by ARAI.

The MoRTH, vide an advisory to State Governments conveyed (29 August 2017) the directions of the Supreme Court, which required calibration of PUC machines at regular periodicity by third-party agencies, duly authorised by DoT.

Audit observed that DoT had not authorised any third-party agencies for calibration of the PUC equipment and only the manufacturers/authorized dealers were certifying the calibration.

Audit also observed that DoT had not devised any mechanism to ensure that Gas Analyzer, Smoke Meter, Computer and related infrastructure installed at PCCs were under Annual Maintenance Contract (AMC) for efficient working of PCCs.

DoT stated (September 2021) that the calibration of PUC machine is carried out by third party, i.e. machine manufacturer or its authorised dealer in compliance with the Type Approval Procedure (TAP) which interalia includes Code of Practice by ARAI which is also part of the CMVR. Thus, primarily the responsibility for ensuring that the field equipment of PCCs are in properly calibrated condition is entrusted to the manufacturer/suppliers of the PUC equipment. The above facts were sent to MoRTH and there were no further query and matter was closed/accepted. Further, the Department has modified its software for the issuance of PUCCs to incorporate the uploading facility in respect of calibration certificates

of the PUC equipment by the PCCs. The PUC activity is automatically stopped by the software whenever the calibration of machine gets expired.

Reply is not acceptable due the following reasons:

- Checking of PUC equipment by the manufacturers/dealers themselves cannot be treated to be as undertaken by a third party for deriving independent assurance.
- Mere sending comments to MoRTH for not complying with directives of Supreme Court does not qualify as consent of any authority.
- Moreover, the Code of Practice as referred to by the Department was issued by MoRTH in March 2010 and does not restrict third-party calibration of PUC equipment as mentioned in advisory issued by MoRTH in August 2017 and the contention in this regard indicates reluctance of the Department in implementation of initiatives for improving systems of PUC checking.

Thus, DoT was not in a position to ensure reliability of the equipment installed and used for emission testing by PCCs.

4.1.5.4. Not ensuring compliance with own directions to PCCs regarding Malfunction Indicator Lamp (MIL)

Malfunction Indicator Lamp (MIL) found on instrument panel of most automobiles is a computerized engine management system to indicate malfunction. After start of vehicle engine if no monitored faults exist, indicator lamp turns off.

DoT had directed (August 2014) all the PCCs to perform a visual check of MIL at the instrument panel of all gasoline or diesel driven BS-IV four wheeled vehicles up to 3.5 tons GVW, before emission testing. PCCs were directed not to carry out the PUC check if the 'MIL' remains 'ON' after the engine of the vehicle has been started. The PCCs were also required to submit a monthly report of vehicles that were not checked because 'MIL' remained 'ON' after the engine of the vehicle had started.

Audit, however, observed that requisite periodical reports were not submitted by PCCs and DoT left the onus of ensuring compliance on PCCs. Thus, DoT failed to ensure compliance of its own directions of August 2014.

DoT informed that no report is submitted by PCCs. A feature was incorporated in the software where PCC operator has to ensure that MIL of vehicle does not remain 'ON' before start of PUC test. Apart from this, DoT had also issued a circular in August 2014 to ensure compliance.

Since DoT did not ensure that the emission tests were conducted only after checking the 'MIL' status, the reliability of PUCCs issued was not ensured. Further, DoT also failed to provide requisite software generated reports to Audit.

DoT reiterated (September 2021) the facts already mentioned in the para, but failed to produce software generated reports in support of its reply.

4.1.5.5. Conclusion

Thus, Emission testing system in Delhi was marred by skewed zone-wise distribution of PCCs, negligible test conducted by PCCs at bus depots and showrooms/workshops, overall shortfall in PUCC tests conducted, irregularities in tests conducted by PCCs, absence of mechanism to automate the issue of SMS reminders/challans to vehicles for not obtaining a PUCC after due date and absence of supervision of PCCs by DoT. Regarding irregularities in tests conducted by PCCs, responsibility needs to be fixed and appropriate punitive actions may be initiated.

Given the large number of vehicles that ply on Delhi roads, risk of vehicle owners not getting PUC checks done remains high. This can be prevented by the Government by taking advantage of the central database available for vehicles, through which automatic SMS reminders/ challans can be issued if vehicle doesn't renew the PUCC by due date. Measures should be taken to incentivize carrying out the PUC checks. These need to be supplemented with adequate number of PCCs and a robust oversight mechanism on the functioning of PCCs to ensure integrity and reliability of the PUCCs issued. The Department should also ensure installation of PCCs at places which are not crowded and easily accessible to public.

4.2. Technological alternatives to conventional emission testing

Considering the heavy influx of vehicular traffic on daily basis, unreliable PUC system, and a weak monitoring and enforcement mechanism to identify polluting vehicles, it is paramount that technological solutions are adopted, which can detect polluting vehicles without affecting the regular traffic flow. Also, measurement of tail-pipe emission from vehicles during normal on-road operation is key to any effective system of emission checking, as it detects discrepancies between certification-test-performance and actual vehicle emission.

Remote Sensing Technology is a quick and effective method for screening of vehicles for identification of high pollution emitters on roads as the vehicles drive through ultraviolet and infrared beams cast across a roadway.

In January 2009, DoT had deliberated upon Remote Sensing Devices (RSD) for on-road pollution checking of vehicles and decided to procure requisite equipment for strengthening pollution control infrastructure. It also conducted (August 2009) a trial exercise through on-road demonstration of RSD equipment in collaboration with Automotive Research Association of India (ARAI) and an RSD supplier. Thereafter, a Notice Inviting Tender (NIT) was issued (May 2011) by DoT for 19 RSDs to be installed at entry points[39] of Delhi. Tendering Committee recommended (January 2012) procurement of these RSDs. However, the recommendations of committee were not approved and matter remained under

[39] (1) GT Karnal Road, (2) Rajhokari, (3) Badarpur, (4) Shahadra, (5) Kalinidi Kunj, (6) Gazipur, (7) Mohan Nagar, (8) Tikri, (9) Aya Nagar, (10) Kapashera, (11) Noida Major, (12) New Mandoli, (13). Loni Road-1, (14) Prahaldpur, (15) New Kondli, (16) Chander Nagar, (17) Noida Bridge, (18) Dhansa and (19) Jharoda.

discussion in DoT. Since the tender validity had already expired, the Department annulled (March 2013) the tender.

The issue of exploring the RSD based PUC checking in Delhi was again flagged by Ministry of Environment, Forests and Climate Change, GoI in April 2015. A study was conducted (June 2017 to February 2019) by International Centre for Automotive Technology (ICAT) in Delhi using RSD, which concluded that the RSD technology was found to be effective and helpful in checking emission. The EPCA recommended (April 2018) introduction of road-side remote sensing screening of emission in Delhi. As per directions (May 2018) of the Supreme Court, EPCA submitted (July 2019) the timelines for action by MoRTH and DoT, GNCTD for implementation of RSD technology. DoT, GNCTD was to issue global tender for procurement of five RSD machines and finalise site and sampling plan within three months. Further, ten additional units were to be procured after the first five units become operational for a full year.

DoT, however, filed an affidavit (August 2019) pleading for considering procurement of one or two RSD for the time being and remaining activities to be undertaken by DoT to be initiated only after the activities to be undertaken by the MoRTH were completed. The Supreme Court however, found (August 2019) the objections raised by DoT baseless and directed MoRTH and Ministry of Law to take a final decision and report to the Court within two months. Audit noted that Automotive Industry Standard Committee (AISC)[40] prepared a draft[41] on Product Specifications and Programme Guidelines for RSD in September 2020.

The fact remains that as of March 2021, the RSD technology for pollution monitoring and controlling was not being used in Delhi.

DoT replied (November 2021) that it shall explore the possibilities to use the technology.

4.3. Fitness testing of motor vehicles

As per Section 56 of Motor Vehicle Act, 1988, a commercial (transport) vehicle shall not be deemed to be validly registered, unless it carries a certificate of fitness in such form as may be prescribed by the GoI. Non-commercial vehicles are not required to obtain fitness certificate for the first fifteen years of their life. The CMVR stipulates specified checks and tests (**Annexure-IV**) to be carried out by Inspecting Officer or authorized testing stations, before renewing the annual fitness certificate of vehicle.

In NCT of Delhi, there were two dedicated Vehicle Inspection Units (VIU), viz. VIU Burari and VIU Jhuljhuli for checking the fitness of vehicles and issuing certificates of fitness. Of these two VIUs, one at Jhuljhuli is an automated testing centre while VIU Burari is not automated. The non-automated system of checking fitness of vehicles is not supported with any instrumentation or equipment and

[40] Formed by MoRTH to review the safety in the design, construction, operation and maintenance of motor vehicles.

[41] Draft AIS/170/DF by AISC.

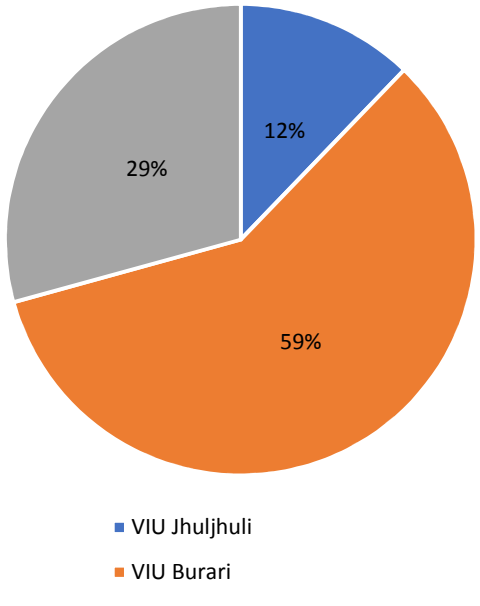
involves visual inspection wherein decision for declaring the fitness of vehicle is based on the judgement and discretion of vehicle inspector. On the other hand, inspection of vehicles at automated testing centre is based on automated testing lanes with limited human interference.

Audit examined the records relating to fitness testing by GNCTD and observed the following.

4.3.1. Limited capacity for automated fitness testing of vehicles

The capacity of fitness testing centers in Delhi was 4.1 lakh[42] vehicles per annum. However, automated fitness testing centers accounts for only 12 *per cent* of the total capacity. The remaining 88 *per cent* capacity is at manual testing centers.

Chart 4.4: Annual Capacity (in terms of vehicles can be tested)



Source: Information provided by DoT

Moreover, it was observed that out of a total of 1.44 lakh fitness test conducted during 2020-21, only five *per cent* (7,177 tests) were conducted at the automated VIU, Jhuljhuli. Thus, 95 *per cent* of the fitness tests were conducted at the manual testing centres, where only visual inspection of the vehicle was being done and declaring commercial vehicles as 'fit' was at discretion of the inspecting officer and prone to misuse.

Similarly, during the years 2018-19 and 2019-20, manual testing accounted for 95 and 91 *per cent* respectively of the total vehicles inspected for fitness. Deficiencies in the testing at fitness testing centres are discussed in subsequent paragraphs.

4.3.2. Shortfall in vehicles undergoing fitness tests

In terms of the Central Motor Vehicles (Fourteenth Amendment) Rules, 2018, till 1 November 2018, all commercial vehicles were to obtain fitness certificate on annual basis. From 2 November 2018, Commercial vehicles up to the age of eight years were allowed to obtain fitness certificate on biennial basis. Apart from this,

[42] As per DoT's reply (February 2020), the capacity of VIU Jhuljhuli taken as 50,000 annually or 167 per day (50,000 vehicles/300 working days). As per minutes dated 28 February 2017, the capacity of VIU Burari is 800 vehicles per day and the capacity of Auto Rickshaw Unit/Taxi Unit Burari is 300-400 vehicles per day.

validity of fitness of vehicles whose fitness expired during COVID-19 pandemic and lockdown, between 1 February 2020 and 30 September 2021, was extended till 30 September 2021.

Audit examined vehicle registration data and fitness tests data to analyse the shortfall in vehicles passed in the fitness tests, as shown in **Table 4.2**.

Table 4.2: Shortfall in vehicles undergoing fitness tests

Year	Vehicles due for Fitness Tests	Vehicles Tested			Number of vehicles not turned up for fitness tests. (*percentage of total vehicles due for testing*)
		Number of vehicles tested. (*percentage of total vehicles due for testing*)	Number of vehicle passed. (*percentage of total vehicles tested*)	Number of vehicles failed (*percentage of total vehicles tested*)	
2014-15	1,97,715	1,56,906 *(79.36)*	1,30,820 *(83.37)*	26,086 *(16.63)*	40,809 *(20.64)*
2015-16	2,16,852	1,22,211 *(56.36)*	1,04,847 *(85.79)*	17,364 *(14.21)*	94,641 *(43.64)*
2016-17	2,39,898	1,67,892 *(69.98)*	1,59,483 *(94.99)*	8,409 *(5.01)*	72,006 *(30.02)*
2017-18	2,84,444	1,89,815 *(66.73)*	1,81,060 *(95.39)*	8,755 *(4.61)*	94,629 *(33.27)*
2018-19	3,13,828	1,10,463 *(35.20)*	1,03,238 *(93.46)*	7,225 *(6.54)*	2,03,365 *(64.80)*

Source: Parivahan data

It can be seen that during 2014-15 to 2018-19[43], there was steep increase in percentage of vehicles not even turning up for fitness tests. In the year 2018-19, as much as 64 *per cent* of the vehicles due for fitness tests did not turn up for the tests. Out of the vehicles that turned up for tests, percentage of vehicles failing the tests had reduced from 17 *per cent* in 2014-15 to less than 7 *per cent* in 2018-19. Low failure rates may convey improvement in general maintenance of vehicles; however, it needs to be seen together with the fact that almost 2/3rd of vehicles were not turning up for tests at all.

Despite the huge shortfall in fitness testing, DoT did not devise any system to remind the vehicle owners for renewal of vehicle fitness certificate. The issue of vehicles plying without valid certificate of fitness was also pointed out in Para No.1.4.3 of the CAG's Report for the year ended 31 March 2014.

Box 4.1.: Fitness testing of Gramin Sewa Vehicles (GSVs)

During 2015-16 to 2018-19, percentage of GSVs turning up for annual fitness tests remained in the range of only 34 to 48 *per cent*. Further, 956 GSVs never obtained a fitness certificate during period of 2014-15 to 2018-19. During 2019-20 and 2020-21, 47 *per cent* and 32 *per cent* GSVs respectively had valid fitness certificates. However, the unfit and polluting GSVs continued to ply on Delhi roads.

[43] Vehicles due for fitness test on yearly basis till 1.11.2018.

DoT replied (October 2021) that the lapses/irregularities pointed out shall be examined in detail.

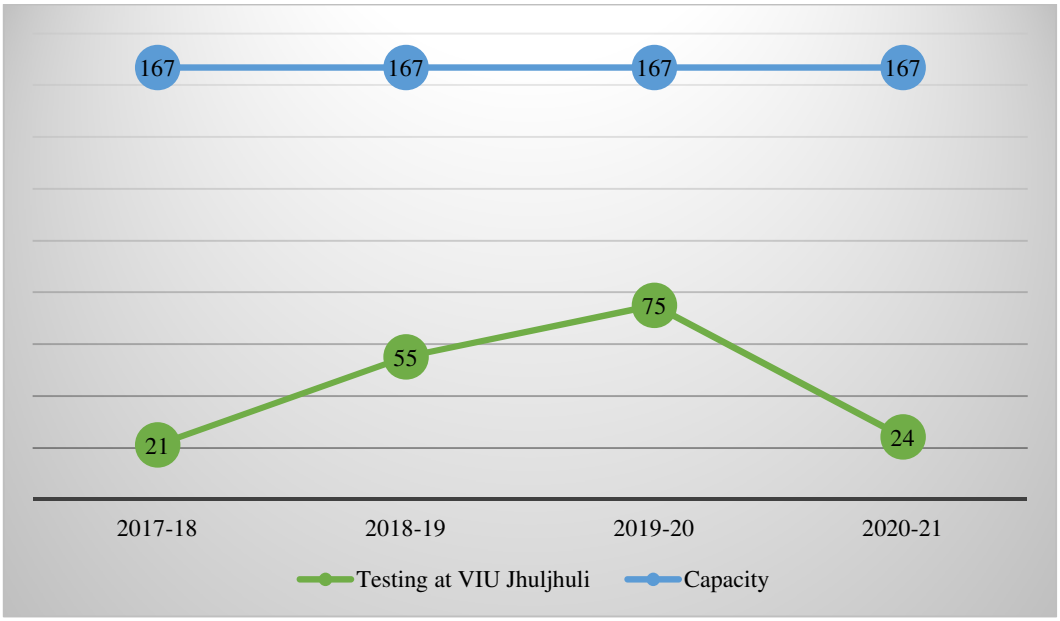
4.3.3. Lapses in functioning of Vehicle Inspection Unit Jhuljhuli

4.3.3.1. Under-utilisation of capacity at the only automated VIU in Delhi

VIU Jhuljhuli started functioning from September 2017. The capacity of VIU Jhuljhuli was 167 vehicles per day (50000 vehicles/300 days).

Audit, however, observed that, VIU Jhuljhuli tested only 21 vehicles per day on an average during October 2017 to March 2018. The daily average tests increased to 56 vehicles in 2018-19 and 75 vehicles in 2019-20 but again reduced to 24 vehicles in 2020-21.

Chart 4.5: Under-utilisation of capacity at VIU, Jhuljhuli



Source: Information provided by DoT and Vahan Dashboard

Thus, the capacity at VIU Jhuljhuli, i.e., the only automated fitness testing centre in Delhi, was grossly under-utilised. This may be due to the fact that vehicle owners had option to get their vehicles tested at either VIU Burari or VIU Jhuljhuli and the fail rate during 2018-19 was 32.47 *per cent* at VIU Jhuljhuli against a mere 6.80 *per cent* at VIU Burari and manual testing was based on visual inspection which was prone to misuse.

DoT informed (October 2021) it has issued instructions for mandating fitness checking of vehicles at automated VIUs only. No supporting document was furnished in support of their reply.

On verification (November 2021) on VAHAN dashboard it was found that out of 22,385 fitness certificate issued during October 2021 only 1,449 (6.47 *per cent*) were issued at VIU Jhuljhuli.

4.3.3.2. Discrepancies in the tests conducted

The Operations and Maintenance agency for the automated VIU Jhuljhuli was M/s Rosemerta Technologies Ltd. Audit analysed the data maintained by M/s Rosemerta relating to vehicles inspected at the automated VIU Jhuljhuli.

As per this database, 38,807 vehicles were inspected at VIU Jhuljhuli during 8 September 2017 to 21 March 2020. The fuel-wise classification of vehicles inspected at the VIU Jhuljhuli is shown in **Table 4.3**.

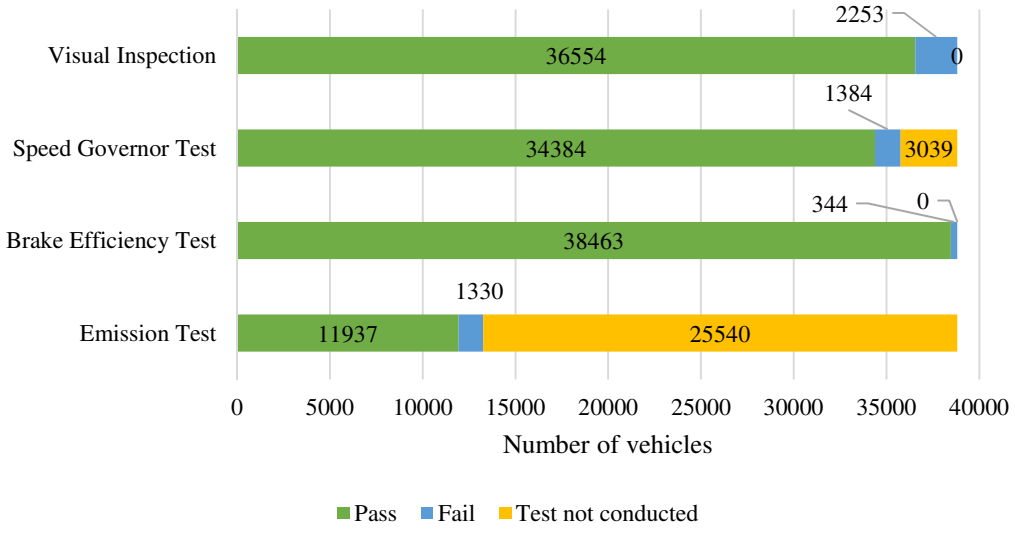
Table 4.3: Details of Vehicles tested at VIU Jhuljhuli

Fuel category of vehicles tested	Number of vehicles tested at VIU Jhuljhuli during September 2017 to March 2020		
	Passed	Failed	Total
Petrol	413	109	522
Diesel	16124	2039	18163
CNG	17643	2479	20122
Total	**34180**	**4627**	**38807**

Source: Information provided by DoT

There were four categories of inspection viz. Emission Test, Service Break efficiency, Speed Governor Test, Visual Inspection. If the vehicle failed in any of the four categories, the Vehicle was declared as failed in the inspection.

Chart 4.6: Tests conducted at VIU Jhuljhuli during September 2017 to March 2020



Audit observed:

- 1078 vehicles failed in fitness tests during 8 September 2017 to 7 February 2019, due to failure in Emission Test. These vehicles did not appear for re-test. However, DoT's database indicated that 1068 of these vehicles were re-tested and issued fitness certificates at VIU Jhuljhuli itself. It is suspected that DoT issued fitness certificates to these 1068 vehicles,

without actually subjecting these vehicles to a re-test. Government may investigate these cases and plug the loopholes so that such cases do not recur.

- Out of 38,807 vehicles inspected at VIU Jhuljhuli, 25,540 vehicles were not even put to Emission Test. However, 23,431 of these 25,540 vehicles were declared 'Pass' and issued Fitness Certificate. Audit further observed that out of these reportedly 'passed' vehicles, 45 *per cent* were Diesel run vehicles which contribute to significant share of emissions.
- Audit observed 25 cases where the vehicle was issued Fitness Certificate without conducting the Emission Test, despite the fact that the same vehicle had failed the Emission Test in its previous visit within three months. Vehicles which fail emission tests should be inspected thoroughly during the re-tests. Hence, issuing fitness certificate to vehicles which failed emission tests earlier without conducting emission tests, was a serious lapse.
- Analysis of database further revealed that there were 552 cases where the vehicles were passed in all the four test categories, however, the vehicle was shown as failed in overall fitness check for providing fitness certificate.

Thus, providing fitness certificate to 60 *per cent* of the inspected vehicles without putting these vehicles to emission tests rendered the automated facilities irrelevant and puts a question mark on reliability of its testing system. Emission tests which were mandatory were not conducted even for the vehicles which failed emission tests in their previous tests. Apart from this, the instances of vehicles being issued fitness certificate without appearing on automated centre's system indicates fraudulent practices, which merits detailed investigation. Based on detailed investigation, accountability may be fixed and appropriate deterrent mechanism may be put in place. Further, failing vehicles in fitness test despite passing in all four tests casts doubt on the reliability of the system.

DoT replied (October 2021) that the lapses/irregularities pointed out shall be examined in detail.

4.3.3.3. Tests not conducted as per the CMVR, 1989– VIU Jhuljhuli

Pass and fail of the vehicle in fitness tests should be based strictly as per provisions of Rule 62 of Central Motor Vehicle Rules, 1989 (CMVR) **(Annexure-IV)**. The measured value of each test was to be provided to the vehicle owner in the test report along with permissible range.

Fitness test is combination of visual check and equipment based testing. Besides, MoRTH had issued (April 2018) guidelines for setting up of automated Inspection and Certification Center prescribing five CMVR items, viz. service brakes, parking brakes, speedometer, headlight specifically to be tested with automated equipment and emission inspection through opacity meter and 4 gas analyzer besides visual inspection. At VIU Jhuljhuli, the test results were shown under three categories, viz. mandatory, visual and advisory.

Under mandatory category, service brake test was done regularly whereas headlamp beam test and emission test were not done on regular basis. The remaining two tests, viz. speedometer and parking brakes were done as advisory tests.

The other prescribed CVMR items to be checked, were either not checked[44], or relied upon on the basis of self-declaration[45] given by the vehicle owners or done as 'Advisory' tests[46].Thus, fitness tests were not conducted as per CMVR at VIU Jhuljhuli.

The reply of Government was awaited (December 2021).

4.3.4. Lapses in functioning of VIU Burari

4.3.4.1. Capacity of VIU Burari

VIU Burari caters to more than 90 *per cent* of fitness tests conducted by GNCTD. Against the capacity of 800 vehicles per day at VIU Burari, the working capacity (February 2020) was 100-140 vehicles per day per inspector, which translated to maximum capacity of 420[47] vehicles per day. Thus, testing of 100-140 vehicles per day by one Inspector translates to continuous testing for eight hours at less than five minutes per vehicle.

Thus, VIU Burari, which was reliant solely on visual inspection of the vehicles by Inspectors, with just three inspectors on its payroll was marred with shortage of Inspectors as well. As a result, vehicles were issued fitness certificates on the basis of visual inspection for even less than five minutes.

This raises doubts about reliability of testing systems at VIU Burari.

DoT informed (October 2021), it has issued instructions for mandating fitness checking of vehicles at automated VIU only.

4.3.4.2. Tests not conducted as per the CMVR, 1989-VIU Burari

During scrutiny of the records and physical inspection of VIU Burari, Audit observed the following:

i. Only visual inspection was performed along with checking of online documents[48] for issuing the fitness certificate of commercial vehicles. No other tests as required by CMVR were conducted at VIU Burari.

ii. About two to three minutes were spent on the visual inspection of each vehicle. Besides checking the outward appearance/condition of the vehicle,

---

44 Sparkplug/suppressor cap/high tension cable, other lights, silencer and dashboard equipment.

45 Reflectors, bulbs, rear view minor, safety glass, windshield wiper, steering gear, rear under run protecting device and lateral side protection device.

46 Horn tests.

47 Three Inspectors available at VIU Burari.

48 Copies of updated quarterly CNG logbook, road tax clearance, permit, PUC certificate, valid AMC of speed governor, registration certificate and fitness fee.

the driver of vehicle was asked to switch on the parking lights, head light and indicators and blow horn. Checking of gear box, foot brake, parking brakes/emergency brakes, radiator, steering, suspension and CNG cylinder/leakage was done on the basis of 'application cum direction[49]' letter submitted by the applicants. Besides, checking of dashboard and speedometer were not even part of 'application cum direction letter'.

iii. It was further observed that VIU did not conduct checking of effectiveness of speed governors. Instead, complete dependency was on the certificate of speed governor issued by the vehicle/speed governor manufacturers. As no dedicated track/facility for checking the effectiveness of speed governors installed in vehicles was available at VIU, the speed governors were checked on random basis by using 'Jack' on a single tyre in stationary position of vehicle, which is neither scientific nor a safe method for checking vehicle.

iv. No system was put in place for issuing gate pass/entry details of vehicles visiting VIU for inspection, in the absence of which it could not be verified as to how many vehicles were actually checked for issuing the fitness renewal certificate.

Thus, vehicles were being put to only visual inspection and none of the other key tests were being conducted at VIU Burari. This rendered the fitness testing irrelevant, almost perfunctory at VIU Burari.

DoT replied (November 2021) that 100 *per cent* inspection was carried out as per provisions of CMVR and other tests and vehicles were declared pass or fail on merits.

The reply is general in nature and does not address the specific issues raised by Audit in the report, based on inspection.

As regards system for recording details of vehicles visiting VIU for inspection, DoT stated that entrance gate is under construction for systematic entry of vehicles.

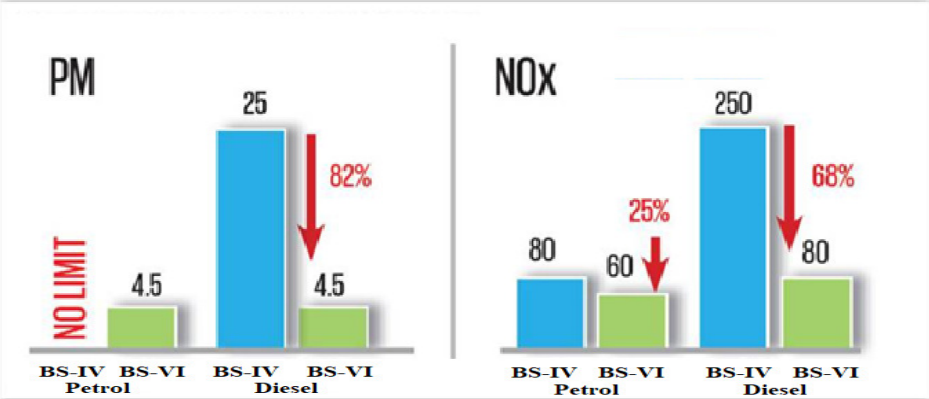
4.4. Retro fitment of old Diesel vehicles (BS-IV) to reduce emission

Diesel engines emit significant amounts of particulate matter (PM) and oxides of nitrogen (NOx) into the atmosphere, which causes adverse health problems. BS-VI norms implemented from April 2020 introduced significant reduction in permissible emission from diesel-operated vehicles as shown in **Chart 4.7**.

To meet BS-VI standards, the BS-IV engines need a DPF (Diesel Particulate Filter) and NOx treatment.

[49] Application submitted by the owner of the vehicle for fitness test.

Chart 4.7: Comparison between BS-IV and BS-VI emission norms



Though BS-VI norms were introduced from April 2020, earlier models of diesel vehicles based on BS-IV norms will still be plying in NCT of Delhi till March 2030. As of March 2020,[50] there were about 4.64 lakh diesel vehicles registered in Delhi which are based on BS-IV or earlier standards.

Viable retrofitted emission control technologies exist to reduce exhaust emission from these pre-BS-VI diesel vehicles as well. Diesel retrofit technologies[51] have demonstrated their ability to significantly reduce unwanted emission at reasonable cost without jeopardizing vehicle performance.

A Comprehensive Study on Air Pollution and Green House Gases (GHGs) in Delhi conducted by IIT Kanpur suggested (2016) Retro-fitment of Diesel Particulate Filter (DPF) in older diesel vehicles as these filters have PM emission reduction efficiency of 60-90 *per cent*. The study emphasized that if the diesel vehicles entering in the city are equipped with DPF, there will be reduction of 40 *per cent* emission and this reduction in emission will reduce the ambient air concentration by 10 µg/m3.

Audit noted that CPCB issued (December 2015) statutory directions to take steps for mandatory Retrofitting of Diesel vehicles with Diesel Particulate Filters in diesel vehicles. Thereafter, DoT approached (February 2017) the MoRTH with the request to make necessary provision in the Motor Vehicle Act and Rules in this regard.

Audit observed that in pursuance of DoT's request, neither the Central Motor Vehicle Rules were amended nor any reply was sent to GNCTD. Further, no diesel particulate filter was approved by any agency mentioned under Rule 126 of CMVR 1989.

---

50 From April 2020 only BS-VI vehicles were to be registered.

51 The Document on Retrofitting Emission Controls for Diesel-Powered Vehicles published by the Manufacturers of Emission Controls Association (MESA), Washington DC in November 2014 concluded that diesel oxidation catalysts, diesel particulate filters, exhaust gas recirculation, lean NOx catalysts, lean NOx traps, selective catalytic reduction, and crankcase emission control, have been successfully retrofitted on 'on-road' and 'off-road' vehicles. These technologies offer opportunities to reduce large amounts of particulate and NOx emission and other pollutants as well, including toxic HCs.

In the absence of any action after the request to MoRTH, suggestions provided by IIT Kanpur and endorsed by DPCC/CPCB for retrofitting the Diesel Particulate Filter in Diesel Vehicles to mitigate vehicular air pollution in Delhi remained un-implemented despite lapse of more than four years.

DoE stated (October/November 2021) that necessary follow-up with the agencies concerned shall be done, whereas DoT informed (November 2021) that a meeting was held by the Commissioner (Transport) with Automotive Research Association of India (ARAI) regarding retro fitment of older vehicles with DPF and electric kits.

4.5. Irregular registration of BS-III and BS-IV vehicles

With a view to mitigate vehicular emission, the Supreme Court of India had ordered (March 2017) that BS-III compliant vehicles sold after 31 March 2017 should not be permitted to be registered by the State Transport Authorities, and further ordered (October 2018) that no motor vehicle conforming to emission standard Bharat Stage-IV shall be sold or registered in the entire country with effect from 1 April 2020.

Audit, however, observed that DoT registered 382 new (sold after 31 March 2017) BS-III compliant vehicles during 1 April 2017 to 31 March 2019. Similarly, it registered 1672 BS-IV compliant vehicles on 29 April 2020 and 30 April 2020 which were purchased during 2 January 2020 to 20 April 2020.

Thus, 2,054 vehicles were registered in Delhi beyond the deadline prescribed by the Supreme Court. Not complying with Supreme Court's orders by DoT, besides having the risk of contempt of court, may also lead to rescinding the efforts made to mitigate vehicular air pollution in Delhi.

DoT stated (September 2021) that it might have registered these BS-III vehicles during 1 April 2017 to 31 March 2019 in accordance to Delhi High Court's Order of 8 May 2017 which states that for exemption, sale of vehicle had to be completed before 31 March 2017 and/or issuance of an online insurance policy in favour of purchaser on or before 31 March 2017. The Department's contention is not acceptable as Audit has considered only those BS-III vehicles which were shown as purchased during 1 April 2017 to 16 October 2018.

With regard to registration of BS-IV vehicles beyond 31 March 2020, DoT stated that it registered BS-IV vehicles in accordance to the decision taken by Minister (Transport) for vehicles sold up to 26 March 2020 details of which were provided to the Supreme Court during the course of hearing on 27 March 2020. Audit noted that the Supreme Court, vide its order dated 8 July 2020 directed to make verification regarding genuineness of transactions done during lockdown period to ascertain that vehicle were actually put on the E-Vahan portal of the Government and that they were not back dated. However, the Department has not furnished any compliance report filed by it in the Supreme Court and the decision taken by the

Apex court, in the absence of which Audit is not in a position to ascertain the genuineness of DoT's claim.

DoT stated (November 2021) that matter is being looked into.

4.6. Deregistration, impounding and scrapping of ELVs

As per the directions[52] of the National Green Tribunal (NGT), petrol vehicles more than 15 years old and diesel vehicles more than ten years old are not permitted to ply on roads in Delhi and were required to be deregistered and impounded. Subsequently, Supreme Court directed (29 October 2018) DoT, GNCTD to immediately ban all diesel vehicles more than 10 years old and petrol vehicles 15 years old. These vehicles are termed as 'End of Life Vehicles' (ELVs). In compliance to Supreme court direction, DoT issued the order on 30 October 2018.

Audit examined the adequacy and effectiveness of steps taken by GNCTD in this regard and observed the following.

4.6.1. Negligible deregistration of ELVs

The details regarding deregistration of ELVs in Delhi is given in **Table 4.4**.

Table 4.4: Poor progress in deregistration of ELVs

(Figures in Lakhs)

Year	ELVs with Active Registration at the beginning of the year	ELVs deregistered during the year	*Percentage* of ELV deregistered to total ELVs at the beginning of year
2018-19	36.11	2.26	0.06
2019-20	38.69	0.50	0.01
2020-21	41.55	0.22	0.01

Source: VAHAN database

Audit observed that out of 47.51 lakh ELVs required to be deregistered during the years 2018-19 to 2020-21, GNCTD had deregistered only 2.98 lakh ELVs constituting only a small fraction (6.27 *per cent*) of the ELVs, and majority 93.73 *per cent* (44.53 lakh) of the ELVs had 'active' registration status as of March 2021. This indicated that these ELVs were still plying on Delhi roads.

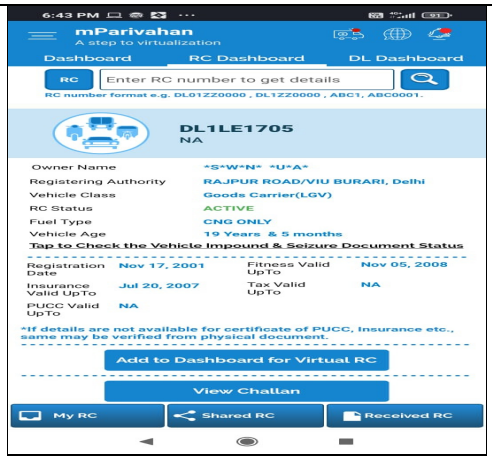
The Supreme Court also directed (October 2018) to put the list of all ELVs (Petrol and Diesel vehicles) on the website of DoT. In its compliance, list of ELVs was uploaded once on DoT's website in October 2018. However, the list has not been updated since then (as of August 2021).

It was also observed that DoT itself issued challans to ELVs (November 2018 to October 2020) for various offences (visible smoke, overloading, absence of Pollution checking and fitness certificates, etc.). These challans make it abundantly clear that the ELVs were actually plying on Delhi roads and with impunity as DoT itself did not take action to impound the vehicle even after intercepting them.

[52] 26 November 2014, 7 April 2015, 20 July 2016 and 18 December 2017.

Audit also cross-checked the details of few old and derelict vehicles seen on roads and observed several instances of ELVs plying on roads. Few illustrative pictures are given in **Picture 4.1**.

Picture 4.1: ELVs plying on road

<table>
<tr>
<td>  </td>
<td> 
</td>
</tr>
<tr>
<td colspan="2">Vehicle no. DL1LE1705 seen on road (plying) verified as ELV on mParivahan portal</td>
</tr>
<tr>
<td>  </td>
<td> 
</td>
</tr>
<tr>
<td colspan="2">Vehicle no. DL1C7045 seen on road (parked) verified as ELV on mParivahan portal</td>
</tr>
</table>

Further, audit analysis of vehicle registration data provided by DoT revealed that validity of registration and fitness of diesel vehicles was still being shown to be 15 years instead of 10 years. This makes it difficult for enforcement agencies to keep track of diesel vehicles crossing the permissible age of 10 years as of April 2021.

Thus, Government did not take adequate steps to deregister ELVs, resulting in plying of ELVs on Delhi roads and contributing to adverse air quality.

DoT stated (September 2021) that it advised ELV owners not to ply these vehicles on Delhi /NCR roads and get these vehicles scrapped through authorized scrappers. From 2018-19, deregistration of diesel vehicle was being done online and data updated on Vahan database. Further, as on 10 September 2021 total 3.06 lakh ELVs

have been deregistered by DoT. It further stated that deregistration of vehicle does not ensure stopping of plying of these vehicles on Delhi roads.

Fact remains that as on 1 April 2021 more than 44 lakh ELVs were yet to be deregistered by DoT and helplessness of DoT to stop these ELVs plying on Delhi roads and continuing to pollute ambient air, is a cause of concern.

4.6.2. Impounding and scrapping of ELVs

NGT's directions (November 2014, April 2015 and December 2017) prohibited plying or parking of ELVs on Delhi roads and required seizure of such vehicles by the enforcement agencies in case of violations. To enable proper disposal of large number of vehicles found abandoned or ELVs seized, DoT formulated (August 2018) guidelines 'Scrapping of Motor Vehicles in Delhi-2018' to offer an authorized place to get these vehicles scrapped. In this regard, Audit observed the following.

4.6.2.1. Not scrapping of impounded ELVs

A total of four scrappers were authorized[53] to scrap ELVs in Delhi as of March 2021. Audit observed that from the date of framing of scrapping guidelines (August 2018), only 347 ELVs were impounded in Delhi up to 30 September 2020.

Further, out of 347 ELVs impounded by DoT, only five vehicles were handed over to the scrappers by DoT as of September 2020. DoT informed (July 2021) that no vehicle was scrapped till March 2021 and process for handing over impounded vehicles was under process.

DoT stated (September 2021) that vehicles impounded by DoT will be scrapped after completion of prescribed process.

4.6.2.2. Inadequate capacity of impounding pits

Considering the vast number of ELVs required to be deregistered as per NGT orders, impounding pits need to have adequate space to keep the seized vehicles. Audit observed that there were only three impounding pits in Delhi, with a capacity to park only 4,000 vehicles which seems negligible when compared to more than 41 lakh ELVs, which are required to be impounded and scrapped.

DoT stated (October 2021) that it has decided to send the impounded vehicles directly to scrappers now.

4.6.2.3. Lack of monitoring of authorised scrappers

Audit noted that as per scrapping guidelines, the authorized scrappers were required to submit monthly reports and annual reports to DoT containing details of vehicles scrapped. However, DoT did not make available copies of monthly and annual reports received from the authorized scrappers to Audit.

---

[53] Licenses issued on 21 December 2018, 11 February 2020, 27 May 2020 and 02 July 2020 valid for 5 years.

DoT stated (September 2021) that it was receiving yearly report from authorized scrappers and during 2018-21, total 2628 vehicles have been scrapped. DoT however, again failed to provide the copies of annual reports submitted by scrappers in support of its contention.

4.6.2.4. Lack of coordination between various enforcement agencies

As per Delhi Maintenance and Management of Parking Places Rules 2019, various agencies viz. DoT, Delhi Traffic Police, Municipal Corporations, NDMC and Cantonment Board were to impound any ELV found operational or parked in a public place or discarded as junk. Audit, however, observed that no coordination mechanism amongst various enforcement agencies for impounding of ELVs, was in place in DoT. Due to lack of any coordination among various enforcement agencies, DoT did not have the details of ELVs impounded by other agencies and as such there was no mechanism in DoT to ensure that all the impounded ELVs are handed over to authorized scrappers.

Thus, the initiatives of GNCTD to impound ELVs and get them scrapped were insufficient and ineffective.

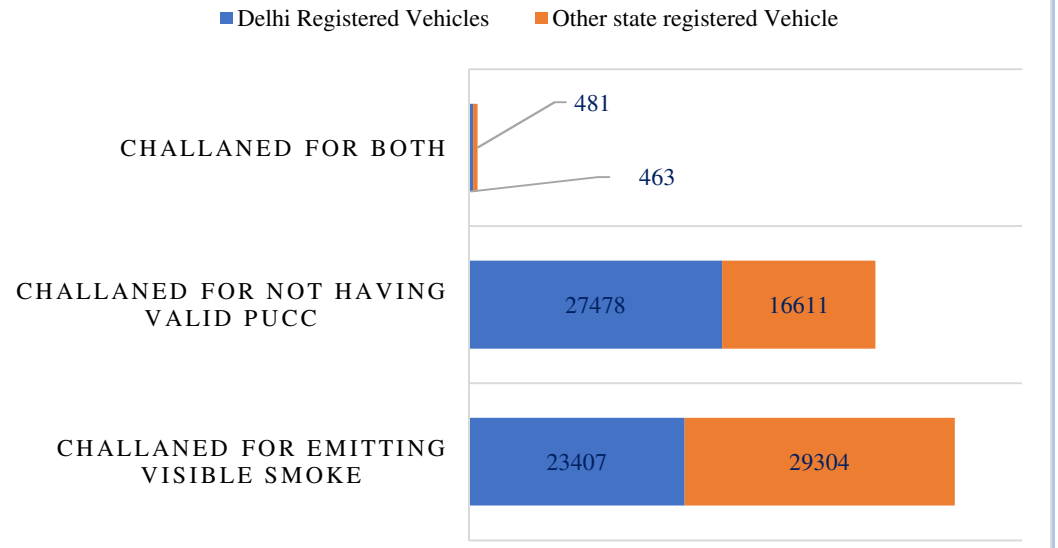
DoT stated (October/November 2021) that periodical meetings are now being held with Traffic Police for impounding of ELVs and a decision has been taken to directly send the impounded vehicles to scrappers now.

4.7. Functioning of Enforcement Branch, DoT

Enforcement Branch of DoT is responsible for deployment of teams in the field for prosecution of vehicles violating the provisions of the Motor Vehicles Act and Rules framed thereunder.

Audit noted that Department neither had the category-wise details of the number of vehicles entering Delhi from neighboring NCR towns and other parts of the country nor it monitored emission of such vehicles. During November 2018 to October 2020, DoT issued 52,711 challans for emitting visible smoke and 44,089 challans for not carrying a valid PUCC. The details are given in **Chart 4.8**.

CHART 4.8: CHALLANS ISSUED TO VEHICLES REGISTERED IN DELHI AND OUTSIDE DELHI



Source: Information provided by DoT

It may be seen that other states registered vehicles constituted 47 *per* cent of challans for PUC norms violation. Since vehicles registered outside Delhi accounted significant proportion of challans, stricter enforcement and checking on roads is required to enforce plying of only pollution norms compliant vehicles on Delhi roads.

It is imperative for the Department to identify and maintain a database of places which cater to heavy traffic inflow from outside Delhi or are more prone to violation w.r.t. pollution, overload, visible pollution, etc., to strategize its action plan to control vehicular pollution from outstation vehicles by rationally deploying its enforcement teams. The Department should also establish PCCs at such points to issue certificate to pollution compliant vehicles and address issue of non compliant ones.

Despite the fact that all PCCs are networked wherein all the test values and results are recorded in a central database, Government did not exploit this to arrive at meaningful patterns, insights and actionable items. Such tool could also give an idea about actual pollution performance of different genres of vehicles under prevailing emission norms. Department had no mechanism to analyze actual emission data from PUC testing reports to check the actual pollution performance of different kinds of vehicles on roads and compare them with PUC norms. Thus, it was completely dependent on traditional modes of enforcement, i.e., interception of vehicles on roads by the Enforcement teams.

DoT stated (September 2021) that as per reports, more than six lakh vehicles enter in Delhi from other States for which enforcement teams are deployed at borders and in the city in three shifts. The reply of the Department reiterates Audit

apprehension about DoT not maintaining category-wise details of the number of vehicles entering Delhi from NCR for monitoring their emissions.

4.7.1. Inadequate manpower in Enforcement Branch

The Enforcement Branch was working with 292 personnel against a sanctioned strength of 819 as of January 2021. Moreover, the sanctioned strength of 819 was fixed in year 2008, when the number of registered vehicles in Delhi was around 51 lakhs, *vis-à-vis* around 130 lakh vehicles registered as on March 2021. Despite acute shortage of staff, 43 personnel of the Enforcement Branch, including 6 inspectors, 9 sub-inspectors, 13 Assistant Sub-Inspectors and 15 Head Constables have been deployed to other branches/wings of DoT. Thus, enforcement wing had a significant shortage of manpower.

DoT had assessed (January 2020) requirement of 1134 additional posts, to be able to deploy enforcement teams at 25 major entry points and 33 locations within Delhi, round the clock. DoT stated (September 2021) the matter to be under process.

While admitting that there was shortage of man power in enforcement branch, DoT replied (November 2021) that 56 teams had been deployed at various parts of Delhi.

4.7.2. Inadequate coverage of entry points in Delhi

There are 128 entry points from where vehicles can enter into Delhi. Out of these 80 *per cent* of the commercial vehicles enter Delhi from 13 entry points. Audit, however, observed that enforcement teams were being deployed at only seven entry points.

Besides shortage of staff, the Enforcement teams did not have vehicles mounted PUC equipment to check visible polluting vehicles. This resulted in inadequate coverage of entry points of Delhi, ultimately indicating a weak enforcement regime. In absence of input data regarding location-wise vehicular load, deployment of the few ill-equipped enforcement teams was also bound to be sub-optimal.

The reply of Government was awaited (December 2021).

4.8. Conclusion

Regarding the emission testing of motor vehicles, Pollution Checking Centres were issuing unrealistically high number of certificates with reference to time consumed for checking the emission rendering the PUC checking of vehicles doubtful. Vehicles were issued PUCC, though these were not meeting the emission norms. There were also cases where emission values were not recorded in the database. In the absence of linkage between emission data and VAHAN database as directed by the Supreme Court, PCCs were still permitted to manually select the BS emission standard category for vehicles, leaving scope for manipulation to increase the permissible range or validity of the PUCC.

There was also no mechanism in place to co-relate the number of vehicles registered in Delhi with the number of PUCCs issued. A comparison between the number of vehicles registered and number of PUC tests conducted revealed that vehicles are turning up for testing much less regularly than they should be. DoT had also not authorised any mechanism for calibration of the PUC equipment and efficient working of PCCs or to inspect the testing equipment at the PCCs which issued PUCCs to vehicles challanned for emitting visible smoke.

Modern technology for checking vehicular pollution through Remote Sensing Devices was also not adopted though the same was under consideration from the year 2009 and Supreme Court emphasized the same time and again.

Proper maintenance of vehicles would ensure that the emission is within the prescribed norms and stringent fitness tests would ensure proper maintenance of vehicles. During 2018-19 to 2020-21, the only automated Vehicle Inspection Unit at Jhuljhuli was grossly underutilized as 91 to 95 *per cent* of the fitness tests were conducted at the manual testing centre at VIU, Burari. The credibility of VIU Burari was suspect as only visual inspection was being done there, while inspections carried out at VIU, Jhuljhuli also lacked credibility as there were cases where the vehicles were passed without putting to Emission Test and/or other fitness tests.

In spite of heavy shortfall in number of vehicles turning up for fitness tests during 2014-15 to 2018-19, ranging from about 20 *per cent* to 64 *per cent*, DoT had not devised any system to remind the vehicle owners for renewal of vehicle fitness certificate.

Viable retrofitted emission control technologies exist to reduce exhaust emission from pre-BS-VI diesel vehicles as well. CPCB issued statutory directions to take steps for mandatory retrofitting of Diesel vehicles with Diesel Particulate Filters. Though DoT approached (February 2017) the MoRTH, GoI for making necessary provision in the Motor Vehicle Act and Rules in this regard and pursued for it, the same was not finalised.

Instances of registration of older vehicles beyond the deadline prescribed by Supreme Court were also observed. These cases merit examination by DoT.

In spite of directions from National Green Tribunal (NGT) in this regard, only 6.27 *per cent* of vehicles which have completed their life were deregistered during 2018-21. Moreover, only 357 vehicles were impounded even though there were more than 41 lakh ELVs in Delhi. There were instances where challans were issued to these ELVs for visible pollution but still these were not impounded. There was lack of space to keep impounded vehicles. Hence, action taken by Government to manage ELVs was inadequate and ineffective.

Emission of vehicles entering Delhi from neighboring NCR towns and other parts of the country were not monitored as enforcement teams were being deployed at only seven out of total 128 entry points. Enforcement Branch was working with a

strength of only 292 personnel as against an assessed total requirement (January 2020) of 1134.

4.9. Recommendations

Recommendation #8: Government should ensure adequate PCCs are available for general public on priority and they are evenly distributed as per Vehicle – PCC ratio. Government may devise a mechanism to issue automated reminders / e-challans to vehicles not obtaining a PUCC by due date, while incentivizing compliance. Strategy for obtaining PUCC for different category of vehicles should be based on scientific analysis of vehicular emission load.

Recommendation #9: Government needs to establish a mechanism to ensure regular calibration and efficiency of equipment at PCCs.

Recommendation #10: Government need to provide linkage between emission data and VAHAN data base so that there is no room for manipulation in selection of a particular Bharat Stage category.

Recommendation #11: Government may consider checking of vehicular pollution through remote sensing devices in view of the severe shortage of enforcement personnel.

Recommendation #12: Government may take adequate steps to increase coverage of fitness tests of vehicles at automated testing centers to ensure strict adherence to prescribed norms.

Recommendation #13: Government may take steps to make retrofitting of diesel vehicles with diesel particulate filters mandatory to reduce emission.

Recommendation #14: GNCTD should fix responsibility and put appropriate deterrent mechanism where instances of vehicle caught for visible pollution have been found inspite of having PUC certificate or where failed vehicles in fitness testing have been issued PUC certificate.

Recommendation #15: Regular check of PCCs needs to be carried out by the Government.

CHAPTER–5

CLEANER TRANSPORT-MITIGATION AND PROMOTION STRATEGIES

5. Cleaner Transport-Mitigation and Promotion Strategies

The preventive and enforcement strategies of GNCTD towards cleaner transportation were discussed in the previous Chapter. Government also implements strategies which promote transportation modes with lesser emission and mitigate the vehicular emission through its affirmative actions.

Given the traffic congestion and pollution levels of Delhi, a sustainable environment friendly transportation infrastructure system centered on Electric Vehicles (EVs) is essential. Electric Vehicles, which release zero tailpipe emission are seen as a viable alternative to vehicles running on Petrol/CNG/Diesel/LPG. Adoption of EVs therefore becomes an important strategy for improvement of ambient air quality in mega cities.

Reduction in emission of pollutants can be achieved by minimizing the flow of traffic transiting through Delhi. Obstruction in free flow of traffic results in traffic congestion which leads to idling of vehicles and release of higher concentrations of tail-pipe emission. Facilitating free flow of traffic by removing obstructions reduces vehicular emission. These steps may include restrictions on entry of diesel propelled buses and/or heavy goods vehicles in Delhi, regulating parking of vehicles on roads, quick removal of broken-down buses from roads, etc.

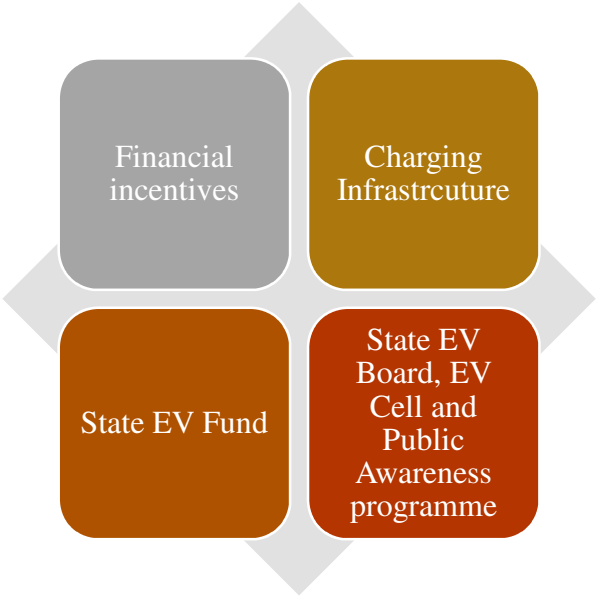
Creating awareness among the people regarding adverse effects of vehicular emission on air quality also helps in effective implementation of strategies for mitigation of vehicular emission in Delhi and also to encourage lesser usage of personal vehicles and promote environment friendly modes of transport.

Audit examined the adequacy and effectiveness of these promotion strategies taken by Government. Related observations are discussed in subsequent paragraphs.

5.1. Electric Vehicles

To encourage adoption of EVs DoT notified (August 2020) the 'Delhi Electric Vehicle Policy 2020' (EV Policy). The EV Policy targeted adoption of Battery Electric Vehicles (BEVs) so that these contribute to 25 *per cent* of all new vehicles registrations by the year 2024. DoT was nominated as Nodal Department for implementation of Delhi State EV Policy.

The policy was to be implemented through various verticals as depicted below:



- Financial incentives included purchase incentive, interest subvention on loans, waiver of road tax and registration fees.
- Charging infrastructure included establishment of wide network of charging stations and swappable battery stations.
- Creation of an umbrella, non-lapsable 'State EV fund' through levy of additional taxes, cess, fee, etc., on inefficient or polluting vehicles.
- Establishment of State electric vehicle board, electric vehicle cell and development of intensive public outreach programme focused on creating awareness about benefits of EVs.

DoT notified (October 2020) purchase incentives and exemption from levy of registration fee and road tax for battery operated vehicles in Delhi under the Delhi Electric Vehicle Policy, 2020.

DoT also started an Electric Vehicle Portal namely *https://ev.delhi.gov.in*, wherein the list of approved EV models, dealers and charging stations in Delhi were uploaded. There were 346 models, 133 dealers and 72 charging station for electric vehicles in NCT of Delhi. Audit, however, observed (September 2021) that details regarding 'dealers and approved model' were last updated in March 2021 and charging stations were last updated in October 2020.

This indicates that either no charging stations were setup for almost a year of notifying the EV Policy, or if setup, their details were not updated on the portal. Either way, it reflects lack of seriousness in implementation of EV policy.

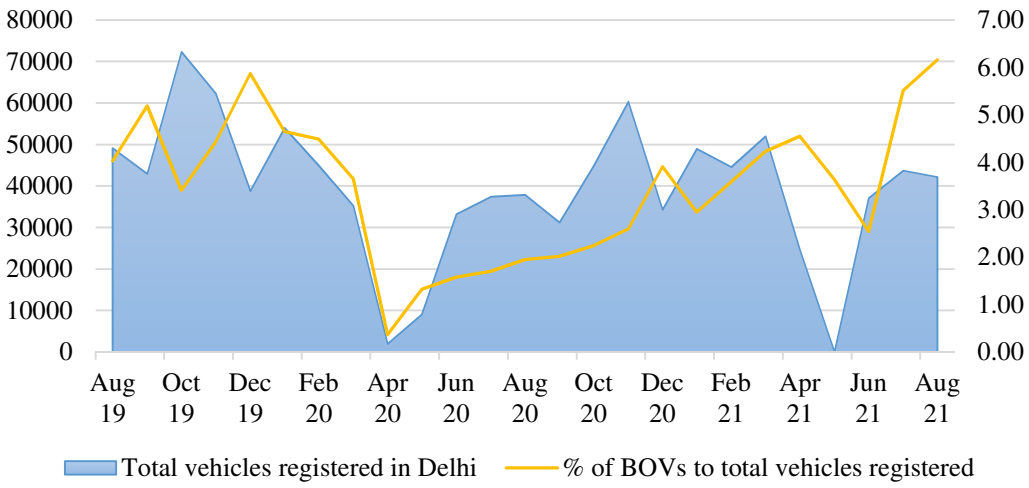
Audit observed the following other issues regarding implementation of the EV Policy.

5.1.1. Insignificant increase in registration of EVs

Audit examined the data related to registration of EVs during the period of August 2019-August 2021, i.e., one year prior to and one year after introduction of EV policy as shown in **Chart 5.1**.

The share of EVs in new vehicle registrations was miniscule at 5.87 *per cent* in December 2019, i.e., before the notification of EV Policy, which marginally breached that level only in August 2021. In absolute numbers, maximum registration (2763) of EVs was recorded in November 2019, which is yet to be surpassed after one year of announcement of EV Policy. As on September 2021, only 1.17 lakh EVs were registered in Delhi. Thus, so far EV policy is not having any major impact on increase in ratio of EVs to total number of vehicles.

Chart 5.1: Percentage of EVs in new registrations



Source: VAHAN Dashboard

DoT stated (September 2021) that Delhi EV policy aims to promote EVs to achieve the targets by 2024 and share of electric vehicles has increased in total contribution of vehicles in Delhi. Audit does not agree with response as the share of EVs in new registrations has not increased.

5.1.2. Charging Infrastructure

The EV Policy stipulated providing accessible public charging facilities within 3 Km travel from anywhere in Delhi as a key objective of the EV policy.

The location and zone wise details of charging stations in Delhi is shown in **Figure 5.1** and **Chart 5.2** respectively.

Figure 5.1: Charging stations across Delhi

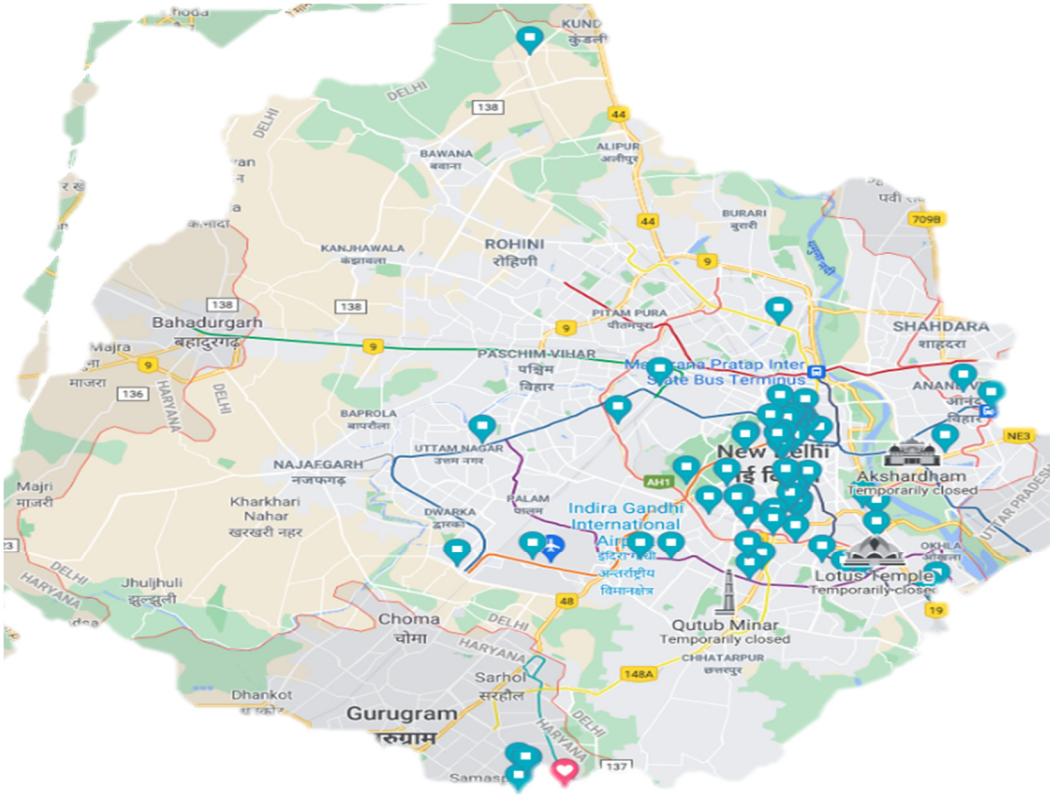
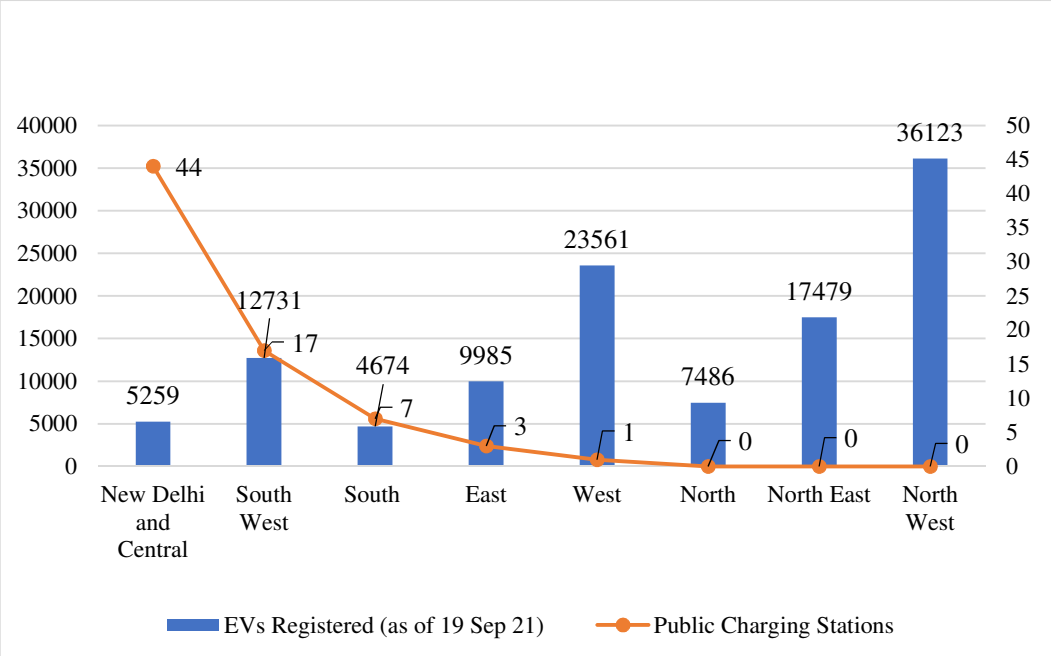


Chart 5.2: Zone-wise Public charging stations and electric vehicles registered in Delhi



Source: VAHAN Dashboard

Audit observed that out of total 72 public charging stations, 61 *per cent* stations i.e. 44 stations were located in New Delhi and Central zone alone, whereas 24 *per cent* were in South West zone, 10 *per cent* in South zone, four *per cent* in East zone and one *per cent* in West zone. Besides, rest of the zones viz. North Zone, North West Zone and North East Zone did not have any Public Charging Station even though these accounted for 52 *per cent* of the EVs registered in Delhi.

Thus, there was limited charging infrastructure available in Delhi and these were not evenly distributed.

DoT while admitting the fact stated (September 2021) that Delhi Transco Limited has proposed 100 more charging stations across Delhi.

DoT needs to ensure providing of sufficient number of fast charging stations for electric vehicles in Delhi at public accessible places.

5.1.3. Constitution of EV Board, EV Cell and EV Fund

EV Policy envisaged constitution of an EV Board for its effective implementation, a dedicated EV Cell for day-to-day implementation and a State EV Fund for funding the incentives offered in the policy.

Audit observed that the EV Board and EV Cell were not constituted. Besides this, an amount of ₹ 50.00 crore was allocated in Budget Estimates for State Electric Vehicle Fund in 2020-21, however, in the Revised Estimates for 2020-21, the allocation was substantially reduced to ₹ 3.74 crore. Audit observed that the reduced allocation was also not utilized during 2020-21. Thus, none of the three i.e., EV Board, EV Cell and EV Fund were established.

DoT replied (October 2021) that it was under process of setting up of EV Board and EV Cell in DoT and Recruitment Rules for EV cell were being finalised. DoT also stated that the EV portal shall be updated at frequent intervals, to ensure that the latest status of approved models, and charging stations is available on portal for public use.

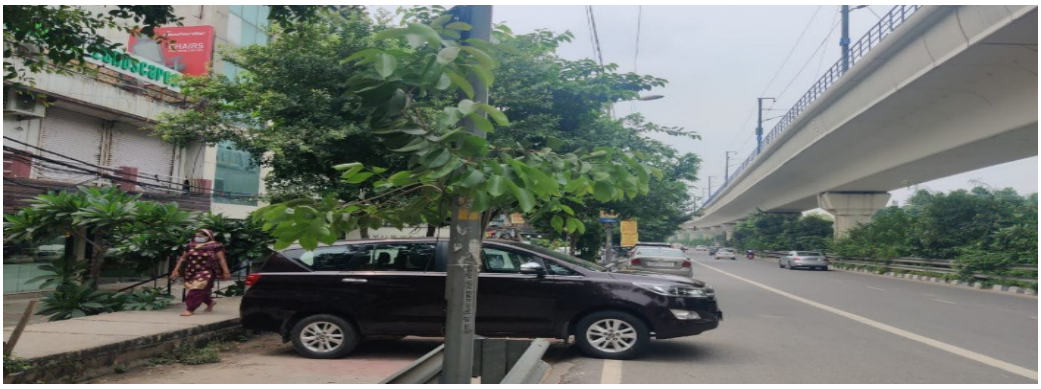
5.2. Non-Motorised Transport

The Master Plan for Delhi - 2021 stipulates provision for non-motorised transport including provision of segregated cycle/NMT tracks and cycle sharing /rental system. Road owning agencies and concerned local bodies are responsible for implementation of these provisions. The Delhi Maintenance and Management of Parking Places Rules, 2019 stipulates preparation of the parking area management plans as per MPD 2021. It *inter-alia* stipulates utilization of on-street spaces for pedestrians/cyclists as top priority for general convenience of users.

Audit observed that non-motorised vehicle (NMV) lane was available only in New Delhi Municipal Council (NDMC) area and on Mehrauli Gurgaon road. However, cycle tracks at Mehrouli Gurgaon road were encroached and full of obstacles as shown in **Picture 5.1**.

Considering the fact that NDMC covers only 42.7 km^2 out of 1483 km^2 area of NCT of Delhi (i.e. less than 3 *per cent*), the provisions for non-motorised transport by the road-owning agencies were grossly inadequate.

Picture 5.1: Showing encroachment on NMT at Mehrouli Gurgaon Road



Near Sultanpur (MG Road)

Near Chattarpur (MG Road)

Near Ghitorni (MG Road)

Further, Audit noted that DoT allocated budget for 'Encouragement of Pedestrian and Non-Motorised Vehicles' every year during 2014-2021. However, it never utilised the same.

Thus, there was lack of concerted efforts by Government to promote and facilitate not-motorised transport in Delhi.

The reply of Government was awaited (December 2021).

5.3. Congestion management

Obstruction in free flow of traffic results in traffic congestion which leads to higher emission of pollutants in air. In this regard Audit observed the following:

5.3.1. Lack of compliance to Graded Response Action Plan (GRAP) to restrict plying of specified vehicles

Pursuant to Supreme Court's order (December 2016) regarding air quality in National Capital Region, the Ministry of Environment, Forests and Climate Change notified (January 2017) a Graded Response Action Plan (GRAP)[54] for implementation by EPCA in NCT of Delhi and NCR towns.

GRAP stipulated various steps to be implemented during events of high pollution levels persisting for extended periods. Regarding the vehicles, GRAP stipulated implementation of Odd-Even Scheme[55] with minimal exemptions and restricting entry of trucks[56] into Delhi, whenever $PM_{2.5}$ or PM_{10} concentration values persisted above 300 mg/m^3 or 500 mg/m^3 respectively for 48 hours or more.

Audit observed that during January 2017 to March 2020, there were 95 occasions where these restrictions were to be put in place. It was, however, observed that DoT issued notifications implementing Odd-Even Scheme and restricting entry of trucks on five and eight occasions respectively during the said period.

Further, two-wheelers were exempted from the ambit and scope of Odd Even scheme on all five occasions. Audit observed that DoT/GNCTD did not obtain any expert opinion to assess the impact of providing exemptions to 75.56 lakh[57] two wheelers (66 *per cent* of total registered vehicles) during odd even scheme before allowing such exemptions.

Thus, on majority of the occasions of high episodic pollution which warranted DoT to take mitigation measures as per GRAP, required action was not taken by GNCTD, defeating the objectives of GRAP.

DoT stated (October 2021) that audit observations have been noted for compliance, however, for implementing of odd even scheme, inadequacy of public transport was a constraint.

---

54 To be implemented under different Air Quality Index (AQI) categories namely, Moderate, Poor, Very Poor, Severe and Severe+ or Emergency.

55 A prohibitory measure wherein plying of non-transport four wheeled vehicles (motors cars, etc.) having registration number ending with odd digits (1,3,5,7,9) were prohibited on even dates of the month and plying of the non-transport four wheeled vehicles having registration number ending with even digits (0,2,4,6,8) were prohibited on odd dates of the month.

56 except those carrying essential commodities.

57 registered in Delhi as on 31 March 2019.

5.3.2. Development of ISBTs at entry points.

The CAG Report for the year ended 31 March 2018 had highlighted that Supreme Court's directions (1998) to GNCTD for setting up of two ISBTs at south-west and north entry points of Delhi to prevent entry of diesel propelled inter-state buses beyond periphery of Delhi, were not complied with.

GNCTD did not establish the two new ISBTs at Dwarka and Narela despite lapse of more than 23 years of Supreme Court's directions.

In the absence of ISBTs at entry points, diesel operated inter-state buses were forced to traverse the city to reach the existing ISBTs (Sarai Kale Khan and Kashmiri Gate).

DoT stated (November 2021) that the proposals for development of two new ISBTs were being worked out and it has been decided that Dwarka ISBT would be developed by PWD.

5.3.3. Steps to prevent Delhi becoming a trans-shipment zone for other states

A High-Power Committee (HPC) on Air and Water pollution was set up as per direction of Lieutenant Governor on 13 May 2014 under the chairmanship of Chief Secretary, GNCTD to look in to the pollution level created by vehicles plying in Delhi. Audit noted that HPC had decided (May-July 2014) the following actions to mitigate air pollution in Delhi.

5.3.3.1. Development of Transport Nagars at entry points

HPC directed the DoT to take action for coordinating with National Capital Region Planning Board (NCRBP) for development of Transport Nagars at entry points and framing of a freight management policy to prevent entry of goods vehicles beyond Delhi's periphery.

However, DoT did not take any action stating that development of Transport Nagars pertained to NCRPB, whereas the freight management policy was under the domain of Ministry of Road Transport and Highways (MoRTH), Ministry of Railways and State Transport Department.

The Comprehensive Action Plan (CAP) prepared by EPCA for NCR also required DoT to submit plans to improve rail-based freight traffic to reduce dependence on trucks by February 2018, wherein DoT was required to coordinate with NCRPB and Ministry of Railways.

However, DoT had not taken any initiative to coordinate with other concerned agencies for setting up of Transport Nagars and freight management policy to reduce dependence on trucks.

The reply of Government was awaited (December 2021).

5.3.3.2. Shifting of Inland Container Depots (ICDs) to outside Delhi

An Inland Container Depot (ICD) is a container storage facility situated in the hinterlands, away from any major port. ICDs at Tuglaqabad / Patparganj contribute in major way for traffic which is not destined to Delhi. High-Power Committee recommended that DoT/DoE should take action for shifting of ICDs at Tuglaqabad and Patparganj to outside Delhi to avoid movement of trucks from ICDs to other states.

Audit observed that in this regard, DoT issued letters to ICD Tuglaqabad, DoE and Ministry of Finance, GoI in June/July 2014 after which no further action has been taken for last seven years. Similarly, DoE once sought (January 2015) views/inputs of Delhi Traffic Police on the matter, however, no follow up was done in this regard. Thus, DoE as well as DoT distanced themselves from taking proactive action in the matter.

DoE confirmed (September 2021) the facts and stated that no response was received from Delhi Traffic Police and thereafter shifting of ICD for decongestion of Mehrauli Badarpur road was taken up by PWD, GNCTD.

Thus, lackluster approach of the Departments kept important issues relating to decongestion on backburner and the directions of the High-Power Committee to mitigate the vehicular air pollution in Delhi remained not implemented.

DoE and DoT assured (October 2021) that necessary action will be taken by coordinating with Departments concerned.

5.4. Parking management

As of March 2021, more than 1.30 crore vehicles were registered in Delhi. While such high number of vehicles increase the vehicular traffic on roads, they also reduce the effective carriageway width and traffic flow speed because of unauthorized/excess parking on roadside/ kerb. To mitigate the vehicular emission arising out of congestion caused due to haphazardly parked vehicles, a comprehensive parking policy is imperative.

The NGT had also directed[58] the Government to ensure that stagnation of vehicles and traffic congestion is avoided, particularly by prohibiting parking on main roads or metaled roads.

The Parking policy facilitates optimal utilization of available space. As per Point 2.5.1 of the CAP (April 2017), GNCTD, Local Bodies and Delhi Traffic Police were made responsible for preparation and finalization of parking policy and enforcement measures for implementation in Delhi. The CAP further described that policy would include enforcement strategies, parking pricing policy and parking

[58] On 4 December 2014 and 19 January 2015, in the matter of Vardhaman Kaushik Vs Union of India and Others.

management strategies and three months' timeline was provided for its implementation (i.e., by July 2017).

However, Audit observed that these provisions of CAP were not complied with. Audit observations are detailed in subsequent paragraphs.

5.4.1. Inaction in implementation of Parking Rules

Though the parking rules were to be finalized by July 2017, Government notified the 'Delhi Management and Parking Places Rules (Parking Rules)' in September 2019.

Audit observed that after notification of Parking Rules, no further action was taken to implement these Rules, as detailed below.

5.4.2. Meetings of Apex Monitoring Committee not conducted

The Delhi Maintenance and Management of Parking Places Rules-2019 stipulated that there shall be an Apex Committee headed by the Minister (Transport) GNCTD as chairperson and 15 members of various Departments/Agencies. This Committee was to review proper implementation of the policy and the Committee was to meet once in every three months.

Audit, however, observed that no meeting of Apex Monitoring Committee, was held as on June 2021.

DoT stated (November 2021) that meetings were held with stakeholders at Commissioner (Transport) level for parking management. However, no documents in support of the reply was provided to audit.

5.4.3. Base Parking fees and Parking Plans not finalised

Apex Monitoring Committee was also required to fix base parking fees on basis of recommendations of Base Parking Fee Committee.

Audit observed that though the Base Parking Fee Committee submitted its recommendations in October 2019, however, these were not acted upon by the Apex Monitoring Committee.

Parking plans were also required to be prepared within four months from the date of issuance of the notification. However, no parking plans were on record.

The reply of Government was awaited (December 2021).

5.4.4. Grant/Renewal of transport permit not linked with proof of parking space

Rule 9 of Parking Rules, 2019 stipulated that permits of transport vehicles shall be granted or renewed only upon submission of proof of parking space for a period of at least one year from an authorized contractor of civic agencies w.e.f. three months after issuing a notification in this regard. However, this was not implemented.

The reply of Government was awaited (December 2021).

5.4.5. Utilisation of parking charges

In compliance of notification[59] issued (July 2006) by Urban Development Department, GNCTD, DoT collects one-time parking fees at the time of registration of new vehicles and annual charges from commercial vehicles at the time of issuance of fitness certificates and remits it to Municipal Corporations of Delhi.

DoT, after retaining five *per cent* of the collected amount, remitted the amount to three Municipal Corporations viz. South Delhi Municipal Corporation (SDMC), East Delhi Municipal Corporation (EDMC) and North Delhi Municipal Corporation (North DMC). Such amount was to be utilized exclusively for construction of modern parking system in Delhi by Municipal corporation.

DoT collected ₹ 673.60 crore during 2014-15 to 2020-21, out of which ₹ 639.92 crore were remitted to three Municipal Corporations of Delhi and remaining ₹ 33.68 crore was retained by DoT.

Audit observed that DoT did not have any details of utilisation of funds collected by it from general public for the purpose of creation of parking facilities in Delhi despite regular remittances of the same to three Municipal Corporations. There was no correspondence on record between DoT and three Municipal Corporations with regard to utilisation of funds reflecting lack of coordination among DoT and Municipal Corporations of Delhi, in the absence of which, the actual utilisation of funds for creation of parking facilities in Delhi could not be ascertained.

The EDMC informed (September 2021) that it collected ₹122.55 crore from DoT during 2014-21 for construction of modern parking system and it had allotted only ₹27.58[60] crore for construction of multilevel car parking and commercial complex with modern parking facility in January 2015. It further stated that no other construction work is in pipeline.

Thus, GNCT of Delhi inspite of collecting parking fees at the time of registration of new vehicles and annual charges from commercial vehicles at the time of fitness, neither had details of parking facilities created by Municipal Corporations nor could it provide any document to show follow-up made with Municipal Corporations. Besides, EDMC has spent only 23 *per cent* of total funds received by it on creation of parking facilities. The SDMC and North DMC did not provide similar details on utilization of funds.

Although parking rules were notified by GNCTD, no follow-up action to fix base parking fees, prepare parking plans and linkage of transport permits with proof of parking space was taken by GNCTD. This rendered the notification of Parking Rules ineffective and pose risk of on street parking leading to congestion.

The reply of Government was awaited (December 2021).

---

[59] Delhi Street Charges (Vehicle Fund) Regulations 2006 for levy of parking charges at the rates decided by Municipal Corporations.

[60] Besides ₹4 lakh for development of walking street in Krishna Nagar market area.

5.5. Removal of stalled Buses on roads

Congestion on Delhi roads is also caused by broken-down buses on roads which is further aggravated due to time taken for their removal from the roads.

5.5.1. DTC buses

DTC informed that a mechanism for removal of broken-down DTC buses from roads was in place and circulated to all concerned in September 2017. Depot Managers have been made responsible for ensuring that response recovery time for broken down buses is quick and must not exceed 30 minutes in any case.

Audit analysed the data of broken-down buses on roads vis-a-vis response time taken to remove the same from spots in respect of buses at 26[61] out of 35 DTC Depots for the period 2014-2021. It was observed that there was a total of 3.57 lakh instances of break-down of buses on roads, i.e., 139 instances of break-down of buses on daily average basis. In 70 *per cent* (2.51 lakh) of these 3.57 lakh instances, it took more than 30 minutes to remove the buses.

Further analysis of data revealed that out these 2.51 lakh cases, the response time ranged between 31 minutes and two hours in 54 *per cent* cases, more than two hours up to four hours in 29 *per cent* cases and more than four hours in 17 *per cent* cases.

This reflects that the response recovery mechanism was not efficient to ensure quick removal of broken-down buses from roads. Broken-down buses on roads not only leads to denial of transport facilities to public but also causes congestion on roads.

DTC informed (March 2021) that for any delay in response time beyond four hours, fine equivalent to 50 *per cent* of average ticketed earning per bus per day during the month is imposed each time on the maintenance contractor.

The reply indicates that there was no penal provision for not removing broken down buses from roads for less than four hours.

5.5.2. Cluster Buses

Prior to May 2017, the broken-down buses were attended to by the respective concessionaires as per their obligation in terms of cluster wise concession agreements. During April 2015 to March 2017, the response time was beyond 30 minutes in 71 *per cent* (415 out of 581) instances of break-down of buses.

After June 2017, DIMTS developed a system of Unified Emergency Response Mechanism for attending broken-down Cluster buses on roads with Traffic alert by

[61] Data in respect of nine Depots was not in proper form and as such could not be analysed -(i) Wazirpur (NR) (ii) Kanjhawala (ER) (iii) SND(SR) (iv) SNPD(SR), (v) SBPLD(NR), (vi) Rohini1(NR), (vii) Rohini-II(NR), (viii) Narela (NR) and (ix) Nandnagri.

Traffic Control Room of Delhi Police, wherein recovery vans were to be deployed on 10 locations for prompt recovery.

Analysis of data, furnished by DoT, however, revealed that the response time did not improve during April 2017 to 17 December 2020[62] as the response time was beyond 30 minutes in 79 *per cent* (774 out of 981) instances of break-down of buses.

Further analysis of data revealed that of these 1189 cases of broken down buses (415 during 2014-17 and 774 during 2017-21), the response recovery time ranged between 31 minutes to two hours in 97 *per cent* cases, two to four hours in two *per cent* cases and more than four hours in one *per cent* cases.

Hence, the response time to remove the stalled buses from road remained high. This causes congestion and idling of vehicles for longer duration, causing higher emission.

DoT stated (November 2021) that to improve response recovery time, it had recently directed for removal of stalled buses by the nearest bus depot. Further, to facilitate timely removal of stalled buses, a Data Centre has been opened where buses are tracked in real time.

5.6. Restriction on number of registration of Vehicles under the same name

The NGT had directed (December 2017) the GNCTD to put a cap on the number of vehicles of all kinds that could ply in NCT of Delhi. Accordingly, the GNCTD was to formulate a policy of putting higher registration fee and road tax on purchase of second vehicle by the same person, body, company, society or trust.

However, the Government was yet to act upon the NGT's directions as relevant details such as person, body, company, society or trust having second vehicle in the same name, were not maintained.

DoT stated (September 2021) that no action could be taken with regard to restriction on registration of vehicles as capping/limiting registration of vehicles under MVA, 1988 was beyond the power of DoT, GNCTD.

The reply may be seen from the perspective that DoT failed to even refer the issue to Ministry of Environment, Forest and Climate Change (MoEFCC) or Ministry of Road Transport & Highways (MoRTH), GoI or to show any study or assessment done to exhibit compliance to directives of NGT for imposing limit on vehicles on road for mitigating vehicular emission in Delhi.

[62] Information was provided up to this date.

5.7. Public Awareness

5.7.1. Inadequate campaigns

The HPC directed (June-July 2014) DoT to conduct public awareness campaigns for mitigation of air/vehicular pollution. The Ministry of Environment, Forests and Climate Change, GoI had also recommended (February 2015) that DoT and DoE take up public awareness campaigns to inform the public that pollution checks and proper operation and maintenance of vehicles reduces fuel consumption, improves life of vehicles and ambient air quality. DPCC also directed (February 2016) DoT to launch extensive awareness drives against polluting vehicles.

Audit, however, observed that DoT released advertisements/ public notices in print media only 11 days during 2015-16 to 2019-20.

Thus, public awareness campaign regarding adverse effects of vehicular pollution and its mitigation was inadequate.

DoT agreed (November 2021) to the audit contention that consistent public awareness campaigns are the need of the hour to achieve the intended benefits.

5.7.2. Car-free days

Every year on or around 22 September, cities across the globe celebrate World Car-free Day to encourage motorists to give up their cars for a day and to use either public transport or non-motorized transport like cycle. The event highlights numerous benefits of going car-free including reduced air pollution and the promotion of walking and cycling in a safer environment.

On similar lines, GNCTD organised a car-free day on 22 October 2015 on the stretch of roads between the historic Red Fort and India Gate, followed by another car-free day on 22 November 2015 in Dwarka. Thereafter, GNCTD decided (December 2015) to organize a car free day in Delhi on 22nd of every month.

The Centre for Science and Environment (CSE) monitored the complete stretch dedicated to the first car-free campaign and found a drop of 60 *per cent* in PM 2.5 levels compared to that observed on the previous day that was neither a holiday nor a car-free day.

It was, however, observed that car-free days were organised only up to March 2016, and discontinued thereafter. The campaign was discontinued without any impact assessment, despite the fact that preliminary analysis of AQI data indicated positive impact of the campaign.

DoT stated (November 2021) that at present there were no plans to organize car free days.

5.7.3. Countdown timers at traffic signals

The countdown timers installed at Traffic Signals assist drivers in taking an informed decision, as to whether the vehicle ignition can be switched off, which ultimately helps in reducing emission when engine is idling at traffic signals.

As per the information provided by Delhi Police, there were total 1029 traffic signals and 1018 countdown timers installed at these traffic signals across Delhi, as of March 2020. Audit test checked (September-October 2020) 115 (11 *per cent* of total) traffic signals and countdown timers at signals covering various T-points/crossings across Delhi by conducting physical inspection. It was observed that timers were not installed on seven signals and were installed but not working at 39 signals. Thus, 40 *per cent* countdown timers were not functional. Audit also noted that no specific advisory exists for switching off vehicle engines at traffic signals considering idle waiting time.

Improper functioning of traffic signals, countdown timers and absence of advisory on signals lead to lack of information about wait time for drivers, resulting in indecision to switch off/on engines to conserve fuel and prevent avoidable idling of vehicles. The reply of Delhi Traffic Police was awaited (December 2021).

DoT agreed (November 2021) to the audit point and stressed the need for an intelligent traffic system and also informed that it is in the process of collaboration with Google (R&D) for this purpose.

5.8. Conclusion

Adoption of Electric Vehicles would go a long way in reducing the emission from vehicles. Lack of adequate charging facilities may have contributed to low share of EVs among the new registrations. There was a lack of regular and concerted efforts by Government to promote non-motorised transport through segregated lanes alongside roads.

Various steps can be taken to reduce vehicular traffic on Delhi roads, especially those running on diesel fuel and/or not destined for Delhi. GRAP mandated implementation of Odd-Even scheme and restricting entry to trucks during episodes of high pollution levels. However, requisite action was not taken by GNCTD on most of such occasions. Even when Odd-Even scheme was

implemented, exemption to two-wheelers was given, which defeated the objective of scheme.

Two new ISBTs at Dwarka and Narela, aimed at avoiding the necessity of traversing Delhi for inter-state buses, were yet to be established (July 2021) even after more than 23 years of Supreme Court's directions in this regard.

GNCTD's High-Power Committee deliberated upon steps to prevent Delhi becoming a trans-shipment zone for other states. However, these deliberations were not followed up by actual efforts thereafter.

Vehicular emission can further be reduced by ensuring smooth flow of traffic which will reduce the running time and idling time of vehicles. In Delhi, flow of vehicular traffic was found to be impeded by unauthorized parking of vehicles on road, delay in removal of broken-down buses, etc.

NGT had also suggested a cap on plying of vehicles in Delhi, on which no assessment was done by GNCTD. Thus, only some half-hearted efforts such as Odd-Even scheme were made by GNCTD to reduce vehicular load on Delhi roads.

Public awareness campaign regarding adverse effects of vehicular pollution and its mitigation was inadequate. Well-meaning initiatives such as car-free days were discontinued without any justification, despite significant positive impact observed.

Proper functioning of traffic signals, countdown timers and advisory on signals facilitate drivers in taking an informed decision and set a way forward in mitigation of vehicular emission in Delhi. However, timers were not installed or were not functioning at several traffic signals.

5.9. Recommendations

Recommendation #16: Government needs to take continuous and sincere initiatives to encourage adoption of electric vehicles, especially setting up more and quicker public charging stations and regular updating of the EV Portal.

Recommendation #17: ISBTs at Dwarka and Narela may be established on priority so as to avoid the necessity for inter-state buses to traverse Delhi. Shifting of Inland Container Depots to outside Delhi needs to be expedited.

Recommendation #18: Car-free days, Vehicle free Green zones, increase in parking fee, pedestrian & bicycle lanes require more frequent imposition and implementation with accessible and pollution-free public transport. Clean energy plan should be promoted for suitable adoption by the public.

New Delhi **(SAMAR KANT THAKUR)**
Dated: 18 August 2022 **Principal Accountant General (Audit), Delhi**

Countersigned

New Delhi **(GIRISH CHANDRA MURMU)**
Dated: 26 August 2022 **Comptroller and Auditor General of India**

ANNEXURES

Annexure-I

Physical Inspection of Continuous Air Ambient Quality Monitoring Stations of DPCC.

(Referred to in para 2.1)

SL.	Particulars of AQI monitoring stations	Inspection Remarks												
		Major Dhyan Chand Stadium India Gate	**JLN Stadium**	**Anand Vihar Metro Parking**	**DITE Okhla**	**Dr. Karni Singh Shooting Range Asola**	**National TB Institute, Arbindo Marg**	**PGDAV College Sriniwaspuri**	**Kendriya Vidhyalaya R.K. Puram**	**N.P. Boys School, Mandir Marg**	**Satyawati college, Ashok Vihar**	**DITE Wazirpur**	**Shaheed Sukhdeve college, Rohini**	**Vikas Bhawan-II, Civil Lines**
1	**Accessibility to the monitoring site**	Accessible	Accessible	Accessible	Accessible	Accessible	Accessible	Accessible	Accessible	Accessible	Accessible	Accessible	Accessible	Accessible
2	**Height of the inlet from the ground level.**	3-4 Meter approx	3-4 Meter approx	3-4 Meter approx	3-4 Meter approx	3-4 Meter approx	3-4 Meter approx	3-4 Meter approx	3-4 Meter approx	3-4 Meter approx	3-4 Meter approx	3-4 Meter approx	3-4 Meter approx	3-4 Meter approx
3	**Distance (in meters) of the sampler from trees.**	Proximity to trees on three sides	Proximity to trees on two sides	Proximity to trees on one side	Surrounded by trees from three sides	Proximity to trees distance less than 20 meters	Proximity to trees on one side	Proximity to trees from two sides	Surrounded by trees from three sides	Proximity to trees on three sides	Proximity to trees on one side	Proximity to trees on one side	Proximity to trees on two sides	Proximity to thick tree on two sides
4	**Distance of the sampler/site to any air flow obstacle i.e. buildings/absorbing building material.**	No obstacles except trees	No obstacles except trees	No obstacles except trees	Proximity to high Building. Proximity to under construction high rise building in the DITE Campus	No obstacles	No obstacles except trees	No obstacles except trees	No obstacles except trees	No obstacles except trees	No obstacles	Proximity to high Building. Proximity to under construction high rise building in the DITE Campus	No obstacles except trees	Proximity to high Building
5	**Proximity of furnace or incinerator fumes or major pollution sources near site.**	No	No.	Proximity to Interstate bus stand and Metro station	No	No	No	Jhuggis units close to Monitoring station causing fumes	No	No	Proximity to Residential area	Industrial Area	Jhuggis units close to Monitoring station causing fumes	Proximity to Canteen/Catering place in the adjacent building.
6	**Proximity of Samplers to unpaved roads and streets.**	Proximity to unpaved area	Proximity to unpaved area	No	Proximity to unpaved area	Proximity to unpaved area	Proximity to unpaved area	Proximity to unpaved area	Proximity to unpaved area	Proximity to unpaved area	Proximity to unpaved area	No	Proximity to unpaved area	No

SL.	Particulars of AQI monitoring stations	Inspection Remarks												
		Major Dhyan Chand Stadium India Gate	**JLN Stadium**	**Anand Vihar Metro Parking**	**DITE Okhla**	**Dr. Karni Singh Shooting Range Asola**	**National TB Institute, Arbindo Marg**	**PGDAV College Sriniwaspuri**	**Kendriya Vidhyalaya R.K. Puram**	**N.P. Boys School, Mandir Marg**	**Satyawati college, Ashok Vihar**	**DITE Wazirpur**	**Shaheed Sukhdeve college, Rohini**	**Vikas Bhawan-II, Civil Lines**
7	**Distance of Streets catering to heavy vehicular load from the monitoring station.**	No	No	Proximity to road catering to Heavy vehicular traffic on one side of the Monitoring station	No	Proximity to vehicular traffic on one side	No	No	No	No	No	Proximity to two roads catering to Heavy vehicular traffic & proximity to car parking	No	Proximity to road catering to heavy vehicular traffic
8	**Number of quadrants having unrestricted airflow to the instrument**	Unrestricted air flow to samplers	Unrestricted air flow to samplers	Trees on one side and Display Board on opposite side of the samplers.	Restricted air flow due to proximity of high building and trees	Unrestricted air flow to samplers	Restricted air flow due to trees	Restricted air flow due to trees on two side	Restricted air flow due to surrounding by heavy trees from three sides	Restricted air flow due to surrounding by trees from three sides.	Restricted air flow due to Proximity to buildings	Restricted air flow due to trees on one side of the samplers	Restricted air flow due to Trees on two Sides of samplers	Restricted air flow due to proximity to Thick Tree on two sides.
9	**Availability of Infrastructure (porta cabin, uninterrupted power supply, telephone connection etc.)**	Infrastructure available	Infrastructure available	Infrastructure available	Infrastructure available	Infrastructure available	Infrastructure available	Infrastructure available	Infrastructure available	Infrastructure available	Infrastructure available	Infrastructure available	Infrastructure available	Inadequate Infrastructure. No equipment working. No internet connection. computer not working
10	**Calibration dates and periodicity of AQI Equipment**	Automatic calibration by system and Manual calibration on monthly basis	Automatic calibration by system and Manual calibration on monthly basis	Automatic calibration by system and Manual calibration on monthly basis	Automatic calibration by system and Manual calibration on monthly basis	Automatic calibration by system and Manual calibration on monthly basis	Automatic calibration by system and Manual calibration on monthly basis	Automatic calibration by system and Manual calibration on monthly basis	Automatic calibration by system and Manual calibration on monthly basis	Automatic calibration by system and Manual calibration on monthly basis	Automatic calibration by system and Manual calibration on monthly basis	Automatic calibration by system and Manual calibration on monthly basis	Automatic calibration by system and Manual calibration on monthly basis	The CAAQM was not working since 29 August 2020. Last calibration of equipment was done on 10 December 2019.

Photographs of monitoring stations
(Referred to in para 2.1)

CAAQM : Okhla

CAAQM: Anand Vihar ISBT

CAAQM : Sriniwas Puri

CAAQM : Civil Line

Annexure-II

(Referred to in para 2.2)

Details of number of days in which the monitoring observations were available for less than 16 hours (i.e. 64 numbers) in 24 hours[63] in DPCC's monitoring stations during 1st April 2019 to 31st March 2020 (365 days).

(in days)

Sl. No.	Location of AQI monitoring stations of DPCC	PM_{10}	$PM_{2.5}$	SO_2	NO_2	CO	O_3	NH_3
1	Alipur	23	26	26	24	60	43	40
2	Anand Vihar	45	42	42	52	59	64	59
3	Ashok Vihar	6	9	15	4	11	18	17
4	Bawana	34	12	26	21	34	17	19
5	Dr.Karni Singh Shooting Range	8	8	10	12	33	22	33
6	Dwarka Sec-8	18	6	14	12	15	15	18
7	Jahangirpuri	5	9	8	6	9	7	33
8	JLN Stadium	12	12	17	23	19	14	16
9	Major Dhyan Chand Stadium	7	9	12	12	24	9	34
10	Mandir Marg	25	30	46	37	48	24	49
11	Mundka	24	21	26	18	33	26	26
12	Najafgarh	45	32	37	34	47	46	36
13	Narela	18	11	41	19	24	18	25
14	Nehru Nagar	7	4	10	20	10	13	7
15	Okhla Phase-2	10	17	13	14	20	16	41
16	Patparganj	20	10	16	8	7	22	8
17	Punjabi Bagh	20	14	25	32	16	19	30
18	Pusa	15	13	15	27	31	21	36
19	RK Puram	14	99	20	22	49	9	22
20	Rohini	9	5	13	6	9	13	33
21	Sonia Vihar	12	12	13	13	57	20	36
22	Sri Aurobindo Marg	5	5	5	7	23	17	22
23	Vivek Vihar	37	12	14	21	28	37	33
24	Wazirpur	13	13	29	19	32	28	71

[63] Reading should be available for at least 16 hours out of 24 hours mandatorily.

Annexure-III
(Referred to in para 4.1.1)

Statement on shortfall in Pollution control centers vis-à-vis registered vehicles in respective zones of Delhi.

Name of Zone	Total vehicle registered in zone	Number of PCC in zone	Vehicles registered per PCC (*in per cent*) in each zone	Percentage of vehicles registered in each zone	Percentage of PCC in each zone
	Col. 1	Col. 2	Col. 3=Col.1/Col.2	Col. 4	Col. 5
North	818132	35	23375	10.56	3.61
New Delhi	238603	51	4678	3.08	5.26
South	1217357	164	7423	15.71	16.92
West	1071685	194	5524	13.83	20.02
North East	767253	58	13229	9.9	5.99
Centre	391378	33	11860	5.05	3.41
East	896097	83	10796	11.56	8.57
North West	1309248	242	5410	16.9	24.97
South West	1039435	109	9536	13.41	11.25
	7749188	969	7997		

Annexure-IV
(Referred to in para 4.3)

Tests to be conducted as per Central Motor Vehicle Rules, for renewing the annual fitness certificate of Commercial vehicles.

Item	Check fitment	Check make/type/rating etc. as per original equipment recommendations	Check conditions	Check functioning	Test
1	2	3	4	5	6
Sparkplug/suppressor cap/high tension cable	Yes	Yes	Yes	No	No
Head lamp beams	Yes	No	Yes	Yes	Check
Other lights	Yes	No	Yes	Yes	No
Reflectors	Yes	No	Yes	No	No
Bulbs	Yes	Yes	Yes	No	No
Rear view mirror	Yes	No	Yes	No	No
Safety glass	Yes	Yes	Yes	No	No
Horn	Yes	No	Yes	Yes	No
Silencer	Yes	No	Yes	Yes	No
Dashboard equipment	Yes	No	Yes	Yes	No
Windshield wiper	Yes	No	Yes	Yes	No
Exhaust emission	No	No	No	No	Yes
Braking system	Yes	No	Yes	Yes	Yes
Speedometer	Yes	No	Yes	Yes	No
Steering gear	Yes	No	Yes	Yes	Check free play
Rear Under run Protecting Device For N2, N3, T3 and T4	Yes	No	Yes	No	No
Lateral Side Protection Device for N2, N3, T3 and T4	Yes	No	Yes	No	No

https://cag.gov.in

https://cag.gov.in/ag/new-delhi/en