Table 8.1
INTERVENTIONS FOR CONTROL OF AIR POLLUTION IN DELHI

Sl. No	Years	Interventions	Major Impact
1.	1994-95	Introduction of Catalytic Converters and Unleaded Petrol	Reduction of CO, PM and Pb Emissions
2.	1996	S content in diesel reduced to 0.5 % Closure of 168 hazardous industries	Reduction in SO_2 Emissions
3.	1997	Closure or Relocation of 1160 industries	Reduction in SO_2 and PM Emissions
4.	1998	Pre-mix 2T Engine oil Mandated for 2 Stroke Engine Vehicles: Ban on Supply Loose 2T Oils. Phasing out of commercial/transport vehicles older than 15 years Start of Delhi Metro Construction	Reduction in PM, NOX, CO, HC Emissions
5.	1999	S content in diesel reduced to 0.5 % Phasing out of Taxis more than 12 years old	Reduction in SO_2 and PM Emissions
6.	2000	Bharat Stage II (Euro II Equivalent) Emission norms introduced for Private Vehicles S content in diesel and gasoline reduced to 0.5 % Replacement of all1990 three wheelers and taxis with new vehicles on CNG Buses more than 8 years old phased out or to ply on CNG, 3 coal, based power plants switch over to beneficiated coal Piped Natural gas to L imited Domestic and Commercial Establishments	Reduction in SO_2 and PM Emissions
7.	2001	Bharat Stage II (Euro II Equivalent) Emission norms introduced for all commercial vehicles Replacement of all post 1990 three wheelers and taxis with new vehicles on CNG Number of CNG Vehicles increased to 26350 Total of 2210 industries closed/ relocated between 1998-2001	Reduction in PM Emissions
8.	2002	All Diesel Buses phased Out/ Converted to CNG Number of CNG Vehicles increased to 57420 Increase supply of P NG to Domestic and Commercial Establishments	Reduction in PM Emissions
9.	2003	Number of CNG Vehicles increased to 70249	Reduction in PM Emissions
10.	2004	Number of CNG Vehicles increased to 87961	Reduction in PM Emissions

Sl. No	Years	Interventions	Major Impact
11.	2005	Euro II Emission Norms introduced for all private vehicles, city public service vehicles and commercial vehicles Bharat Stage II Emission Norms introduced for 2/3 wheelers Content in Diesel and gasoline reduced to 0.35% and 0.015% Phase I of Delhi Metro Rail Project Completed	Reduction in PM, NOX, CO, HC and SO_2Emissions
12.	2006	Number of CNG Vehicles increased to 94039 Work for Bus Rapid Transit (BRT) Project started Work on Phase II Metro Rail Started	Reduction in PM Emissions
13.	2007	Number of CNG Vehicles increased to 128979	Reduction in PM Emissions
14.	2008	Number of CNG Vehicles increased to 227957	Reduction in PM Emissions
15.	2010	Norm of 50 ppm Sulphur in diesel implemented from April 2010 Except for National Permit, all India Tourist permits and state permits, all 4 wheeler vehicles to meet Bharat Stage IV Emission norms for getting registered. Fitness certificate and Permit of Diesel driven light goods vehicles not renewed unless these are retrofitted/ converted on clean fuel mode	

Sources:- World Bank, Ministry of Petroleum and Natural Gas, Delhi Pollution Control Committee, Indraprastha Gas Limited, India Stat. com, http:// india.gov.in.

Table 8.2
STRATEGIES FOR ABATEMENT OF AIR POLLUTION IN DELHI

Sl. No	Sector	Strategy	Description	Agency Responsible	Major Benefits
1.	Transport	Better I&M Programme to Reduce Emissions from in -use transport vehicles	New strategies are designed with low emissions technologies to meet stringent Bharat II norms. However, old in use vehicles were designed as per the old relaxed emissions norms and also with the vehicles getting old er. The emissions tend to rise. Therefore, there is a need for proper inspection and maintenance practices, which could contribute considerably to reduce the emissions from in use vehicles. There is pollution under control (PUC) check system in place for a ll the in -use vehicles, to undergo various emissions tests. Traffic authorities needs to be more vigilant on the issue, and the vehicles not going for regular PUC test, should be penalised. Also there is a need to keep the record of the vehicles not conforming to the required emission tests. Moreover, the general public should be made more aware of the I& M issues and its related environmental and economical benefits.	Traffic Police, Transport Department and Delhi Pollution Control Committee	Reduction in emissions loads of SPM, NOx, CO, HC
2.	Transport	Ban on all types of old commercial vehicles	Ban should be imposed on all types of old commercial vehicles plying in the city	Traffic Police, Transport & Environment Department	Substantial reduction in emission loads of SPM, NOx and also significant reduction in CO, HC emission loads.

Sl. No	Sector	Strategy	Description	Agency Responsible	Major Benefits
3.	Transport	Improvement in public transport systems. Add more buses and enhancement of metro rail systems	Buses are just 1 % of the total vehicular fleet registered in Delhi. In view of rising demand of intra -city travel in the city, with addition of buses, enhancement of network of metro rail. Aim of the activity should be to reduce the private vehicle ownership which is growing at an alarming rate. Introduction of different classes of buses can attract people from different groups. This will not only reduce the emissions load but also increase mobility and reduce congestion. Apart from buses, metro rail is another solution to provide mass rapid transit system in Delhi. Until now six routes are functional and metro rail is presently transporting nearly 20 lakhs of people daily. Enhancement of the system will reduce the private vehicle ownership and usage and will result in reduction of air emissions.	Transport Department	Enhanced mobility, reduced congestion, and emission loads. (SPM, NOx, CO, HC)
4.	Transport	Construction of flyovers/ alternate routes, synchronisation of red light	Flyovers need to be const ructed at major red lights to enhance mobility and reduce pollution at red lights. Ring road should be made red light free for smooth movement of heavy traffic load. Red lights are to be synchronised for stop free driving at allowed speed. Also timers can be installed at all red lights to save fuel and reduce pollution.	Transport Department, PWD, Local Bodies	Enhanced mobility and reduced localised air pollution at red lights.

Sl. No	Sector	Strategy	Description	Agency Responsible	Major Benefits
5.	Transport	Research Studies	There is a need to estimate source contribution towards the particulate matter concentrations. Source Apportionment studies are going on in six cities including Delhi to ascertain the share of various sources towards particulate matter contribution. Moreover, a detailed study is required to look at contribution of diesel driven vehicles. Also common emission norms Bharat IV need to be in place for national as well as local vehicles plying in Delhi roads. Techno economic feasibility of retrofit of trucks with CNG Option should be studied.	CPCB, DPCC	Improved knowledge for decision making to abate air pollution levels.
6.	Industries	Switch to cleaner fuels like natural gas in the industrial sector	Introduction of cleaner fuel in the industrial sector is the need of hour in Delhi. With the introduction of natural gas, emissions will be reduced substantially. Though, the programme requires substantial capital inputs, but can results into considerable environmental gains in the city.	Oil & gas Companies, Environment, Indraprastha Gas Limited, Industries Department	Reduction in SPM Emissions.
7.	Power	Switch from coal to gas based power generation	Coal based power plants are the major sources of air pollution in the city. Especially, the Rajghat power station, which lies in the heart of the city ,needs to be switched coal of less than 34%ash content (as mandated) and improving the efficiency of ESPs will reduce the SPM emission load coming out of the existing plant.	Power Department (Delhi Govt.)	Reduction in SPM, NOx and SO2 emission loads

Sl. No	Sector	Strategy	Description	Agency Responsible	Major Benefits
8.	Road Dust	Regular cleaning of roads to reduce road dust emissions	Road dust emissions have the major share in the total emission loads and therefore require immediate attention. Accountability of road cleaners should be enhanced and regular checks should be made to adjudge the performance	PWD, NHAI, CPCB, Local Bodies	Reduction in SPM Loads
9.	Road Dust	Greening and landscaping to combat air pollution levels	Apart from dust on metalled surface of road, there is large amount of dust lying on both sides of major roads, which gets airborne when vehicles pass through. Therefore, both sides of the roads should be landscaped and maintained properly. This measure will not only reduce the re-suspension dust load but also improve the appearance of the city.	Horticulture Department, Local bodies, PWD	Reduction in SPM Loads
10.	General	Regular inventorisation of emission loads and carrying out source apportionment studies	Inventorisation of emission loads for all the sectors should be regularly done. Source apportionment study is being carried out for Delhi, to exactly ascertain the share of different air polluting sources towards ambient air pollution concentrations.	DPCC, CPCB	Information will be useful to derive strategies & to compare the effects of various interventions
11	General	Vigorous awareness programmes to control population, save fuels, greening, better I&M & reducing air pollution	Public participation is the key successes for any programme. There is a need to generate awareness towards the issue of air pollution and its effects. Habits like saving fuel, regular I&M, planting trees should be developed in the general public through vigorous awareness programmes.	DPCC, CPCB, NGOs	Population control, fuel savings, pollution reduction

Sl. No	Sector	Strategy	Description	Agency Responsible	Major Benefits
12.	Noise	Mitigating Noise	Implementation of legislation to include tests on noise emission from vehicles during normal service and the time of issuance of PUC check certificate. Ban on manufacturing and sale of noisy horns for private and commercial vehicles. Providing proper green belt along the road ways. By encouraging proper mass/ rapid transportation system, individual vehicles, which are having major growth, can be reduced. Noise levels from DG sets to run mobile towers and other sources need to be regulated. There is a need for putting up proper acoustic enclosures.	DPCC, Traffic Police, Transport Department, PUC centres, Local Bodies	