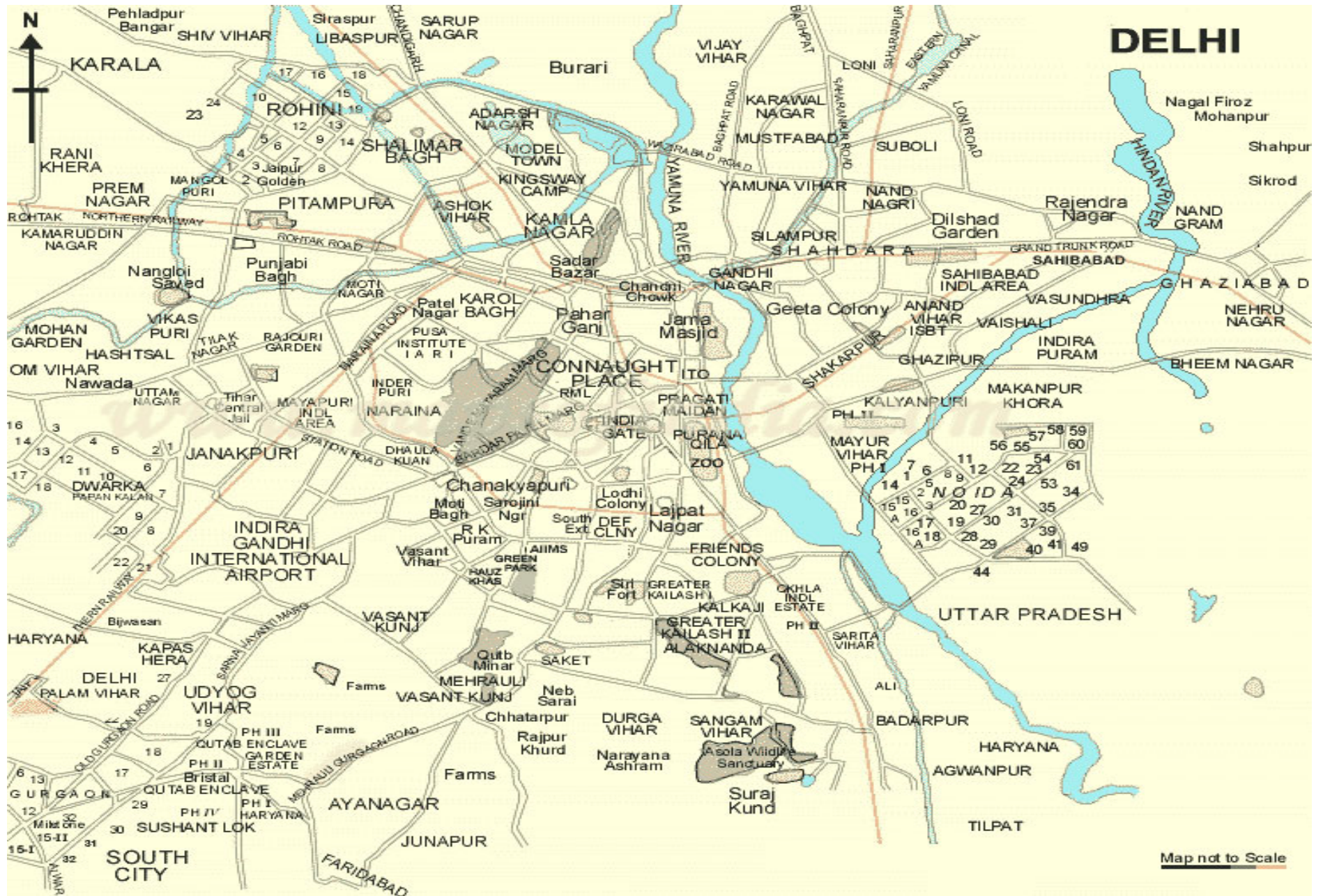




PRESENTATION
ON
WELCOMES DIGNITARIES
FOR
PRESENTATION ON
WHAT ARE THE RESULTS OF
INDIAN CNG PROGRAMME?

DELHI



Map not to Scale

RAPID GROWTH

S. NO.	DETAILS	1991	2001	DECADAL GROWTH (1991-2001)
1	POPULATION (MILLIONS)	9.41	13.78	46%
2	INCOME (USD)	253.00	547.00	116%

**DELHI IS THE FASTEST GROWING INDIAN METROPOLIS
POPULATION DENSITY IS 9294 PER SQ.KM.**

AND AN EXPLOSIVE INCREASE IN VEHICLES

Items	1990-91	2000-01	NOV' 2002
NO. OF VEHICLES	1.8 m	3.4 m	3.7 m
ANNUALIZED GROWTH (%)	10.7	3.08	8.1

LENGTH OF ROADS : 28508 KMS

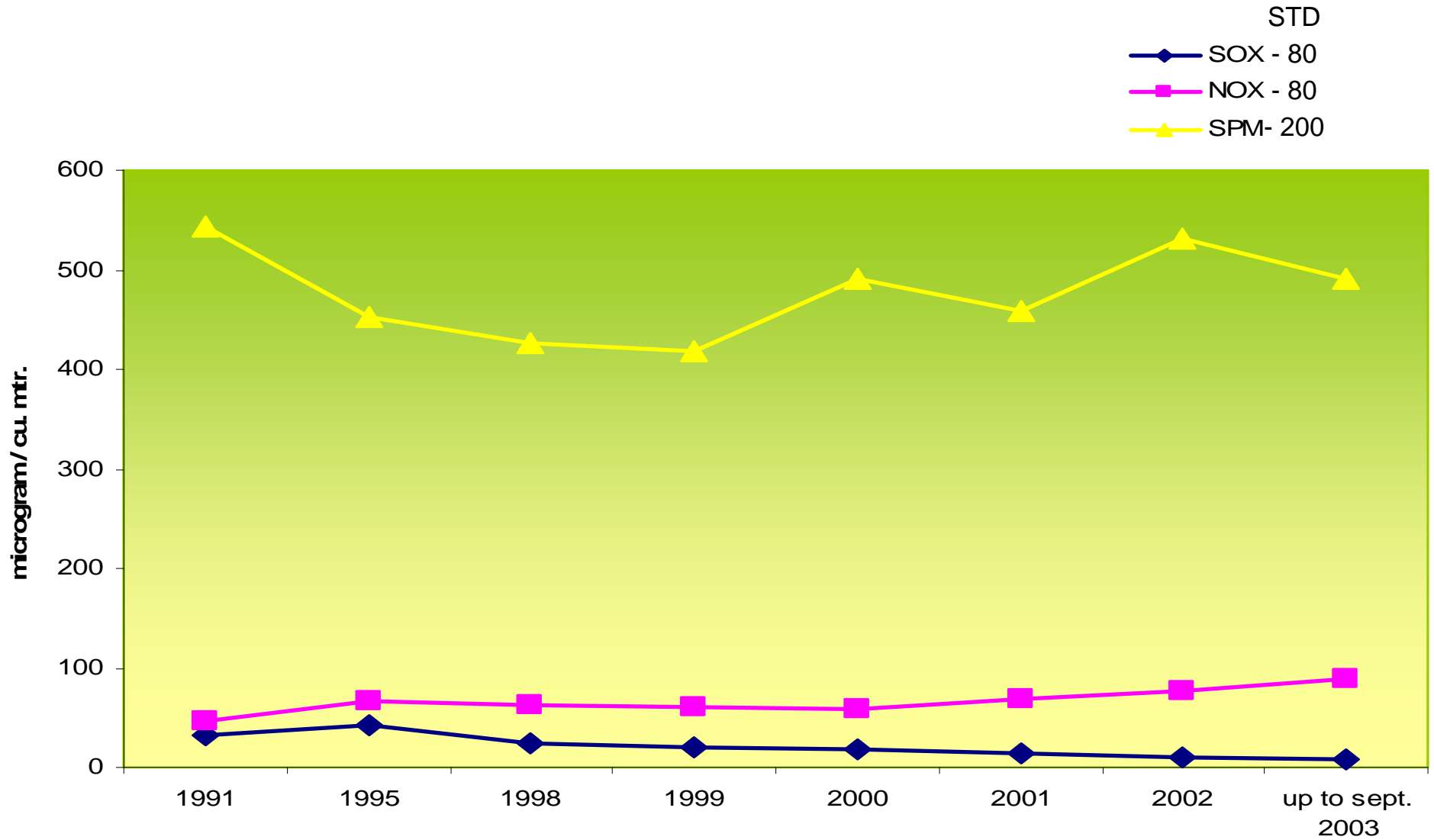
ROAD LENGTH/1000 VEHICLES : 8.54 KM

AMBIENT AIR QUALITY IN DELHI

PARAMETERS	1991	1995	1998	1999	2000	2001	2002
SO _x	33	42	25	20	18	15	10
NO _x	46	66	63	60	59	69	76
SPM	543	452	426	418	490	458	531

DELHI CONSUMES 0.7 MMT GASOLINE AND 1.2 MMT DIESEL ANNUALLY

TREND OF POLLUTION IN DELHI



DELHI

HOW THE AIR POLLUTANT AFFECTS YOU

SPM: Particle of dust and carbon coated with toxic gases, all emanating from factory and vehicle exhaust. They coat the lungs, cause respiratory infections, persistent cough and throat irritation, aggravate asthma.

CO: Colourless and odourless, it comes from petrol vehicles, mostly two and three wheelers. Reduces the ability of blood to carry oxygen. Exacerbates heart disorders.

Sulphur Dioxide: A colourless gas is a part Diesel exhaust and factory emissions affects upper respiratory tract. Causes bronchial problems.

Benzene: It is a part of unleaded petrol and is emitted from catalytic converters. A known carcinogen, linked to lung cancer and leukaemia.

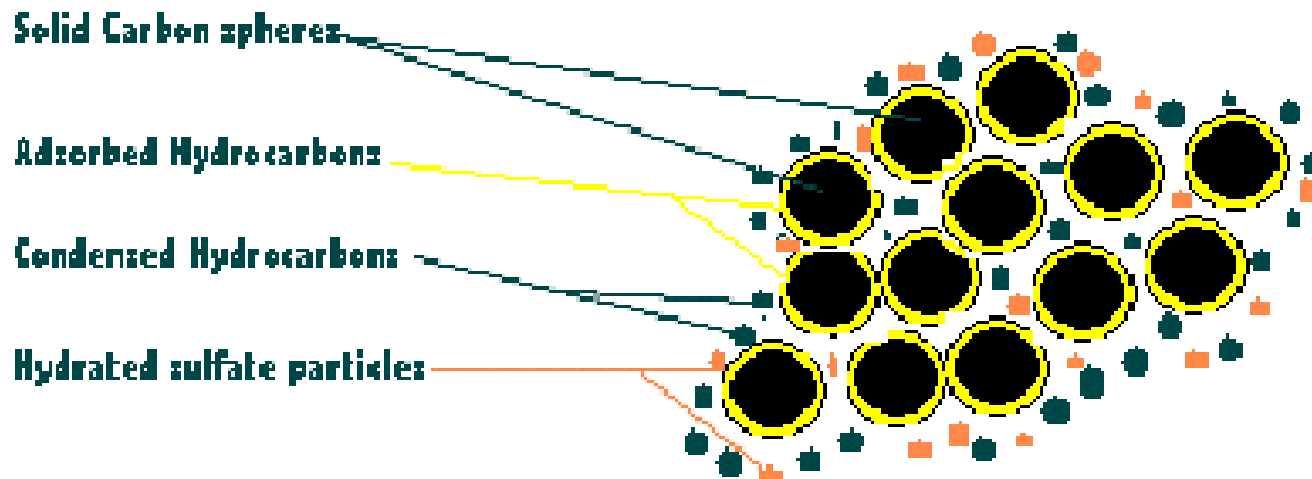
Oxides of Nitrogen: Formed during fuel combustion in motor vehicles and power stations. Convert nitrogen dioxide, which leads to bronchial infections, clods, headaches, eye irritation.

Polycyclic Aromatic Hydrocarbons: Un-burnt from diesel engines, cause drowsiness, eye irritation, cough and are suspected to be cancer causing.

HEALTH

WHY IS DIESEL EXHAUST DANGEROUS?

- Diesel exhaust is ubiquitous
- It always contains both particulate matter and a complex mixture of hundreds of gases, many of which are known or suspected to cause cancer.



US EPA FINDINGS ON THE DANGERS OF DIESEL EXHAUST

- In 2002, EPA completed its years-long comprehensive review of the potential health effects from ambient exposure to exhaust from diesel engines, and came to the following conclusion:

Available evidence indicates that there are human health hazards associated with exposure to diesel exhaust. The hazards include acute exposure-related symptoms, chronic exposure-related non cancer respiratory effects, and lung cancer.
- EPA also found that diesel exhaust “is *likely to be carcinogenic to humans* by inhalation and that this hazard applies to environmental exposure conditions.”
- EPA concluded in its National-Scale Air Toxics Assessment that “diesel exhaust ranks with the other substances that the national-scale assessment suggests pose the greatest relative risk.”

LONG-TERM (CHRONIC) EFFECTS

- **Increased susceptibility to bacterial or viral respiratory infections.**
- **Asthma.**
- **Persistent cough.**
- **Lung cancer.**
- **Lack of coordination.**
- **Blood disorders.**

SHORT-TERM EFFECTS

- **Irritation of eyes, nose and throat.**
- **Dizziness (lightheadedness).**
- **Nausea (feeling sick to stomach).**
- **Wheezing.**
- **Headache.**
- **Weakness & numbness**
- **Chest tightness**

COST OF POLLUTION

According to an estimate by the world bank study, using 1992 data, the annual health cost to India was up to about USD 1.15 bn. Due to ambient air pollution, out of this, the health cost of air pollution in Delhi alone was found to be about USD 0.21 bn.

SOURCE : ORDER OF HON'BLE SUPREME COURT DTD 5TH APRIL 2002

HEALTH

EFFECTS OF POLLUTION

DEATHS DUE TO AIR POLLUTION AS PER THE STUDY CONDUCTED IN 1991-92 BY WORLD BANK ARE 7500 IN DELHI ALONE.

AS PER STUDY CONDUCTED IN 1995 BY CENTRE FOR SCIENCE & ENVIRONMENT THE NUMBER OF DEATHS HAD GONE UP TO 10,000

THE RATE OF RESPIRATORY DISEASES IN DELHI IS MORE THAN 12% OF THE NATIONAL AVERAGE

SOURCE : WORLD BANK & CENTRE FOR SCIENCE & ENVIRONMENT

HEALTH

EFFECTS OF POLLUTION

THE POLLUTION LEVEL IN DELHI IN 1991-94, THE AVG. TSP LEVEL IN DELHI WAS 378 MICROGRAMS/CUM, WHICH IS FIVE TIMES HIGHER THAN WHO'S ANNUAL AVERAGE.

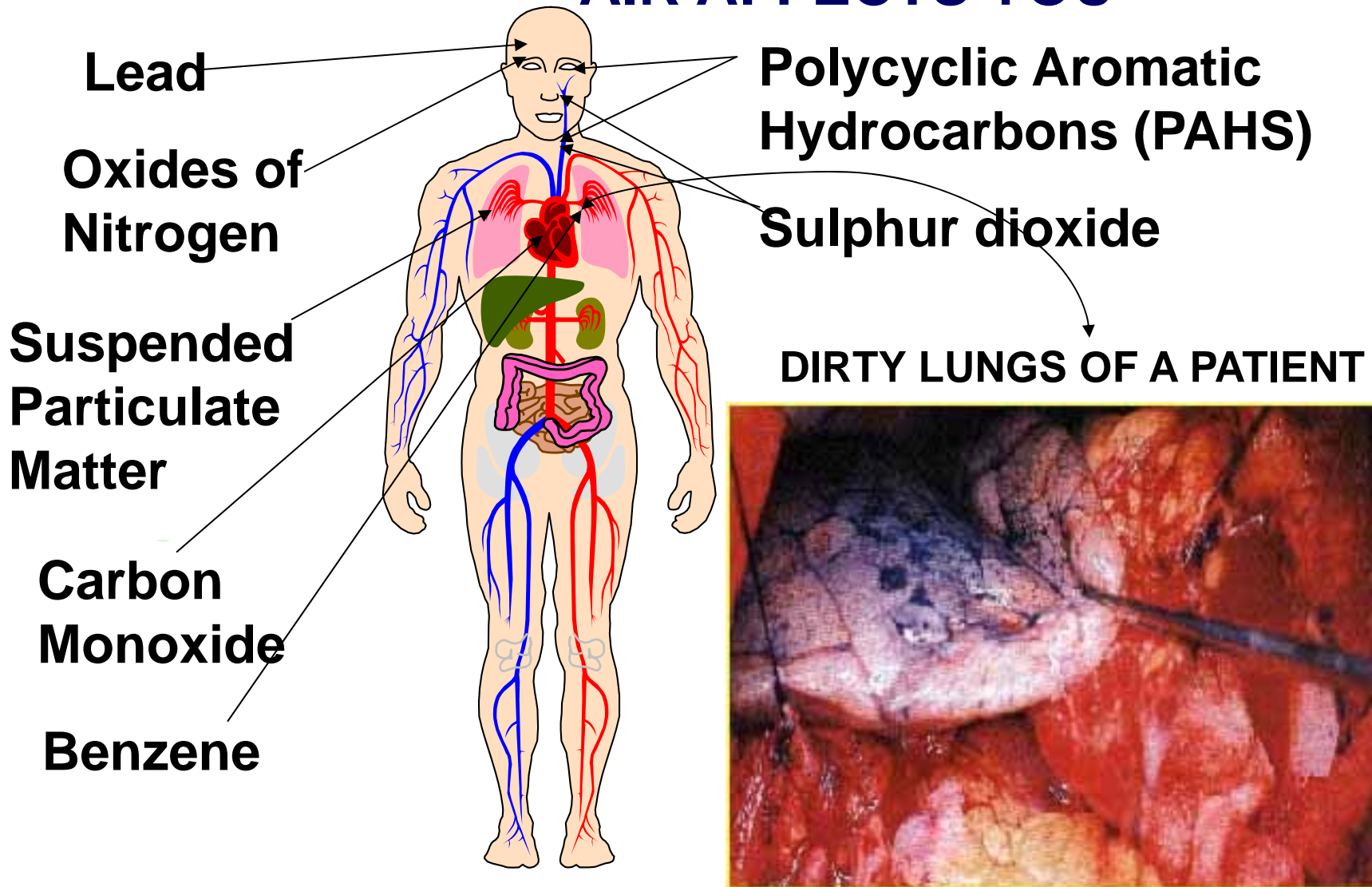
AS PER THE STUDY CONDUCTED BY WORLD BANK IN 1997 WITH EVERY INCREASE $100\mu\text{g}/\text{m}^3$ OF TSP IN AIR HAS THE FOLLOWING EFFECTS ON HEALTH:

INCREASE TOTAL DEATHS	2.3%
INCREASE CARDIO VASCULAR DISEASES	4.3%
INCREASE RESPIRATORY DISEASES	3.1%
AGE GROUP AFFECTED MOST	15 – 44 YEARS

SOURCE : WORLD BANK & CENTRE FOR SCIENCE & ENVIRONMENT

HEALTH

HOW THE POISONS IN THE AIR AFFECTS YOU



DIESEL VEHICLES EMIT LOT OF CARBON SOOT, WHICH DAMAGES LUNGS

HEALTH

SOLUTION DEVISED

- **Improvement in Fuel Quality – MS and HSD.**
- **Improvement in engine quality.**
- **Stringent emission norms – Euro II introduced**
- **Relocation of industries out of NCT OD Delhi.**

MORE SOLUTIONS

- **Phasing out 15 year old Vehicles**
- **Improvement of road quality,
construction of bridges**
- **Conversion of total Public Transport
Vehicles to CNG**

IMPROVING TRANSPORT FUEL QUALITY

● **GASOLINE**

- **Unleaded gasoline introduced in a phased manner**
- **Octane rating enhanced from 82 to 87**
- **Benzene content limited to <1% for metros**

● **DIESEL**

- **Sulphur reduction to <0.05% in metros**

CNG IS THE LEAST POLLUTING

(gm/100km)

FUEL/ EMISSIONS	CO2	UHC	CO	NOx	SOx	PM
PETROL	22,000	85	634	78	8.3	1.1
DIESEL	21,000	21	106	108	21	12.5
LPG	18,200	18	168	37	0.38	0.29
CNG	16,275	5.6	22.2	25.8	0.15	0.29

Source: US energy department

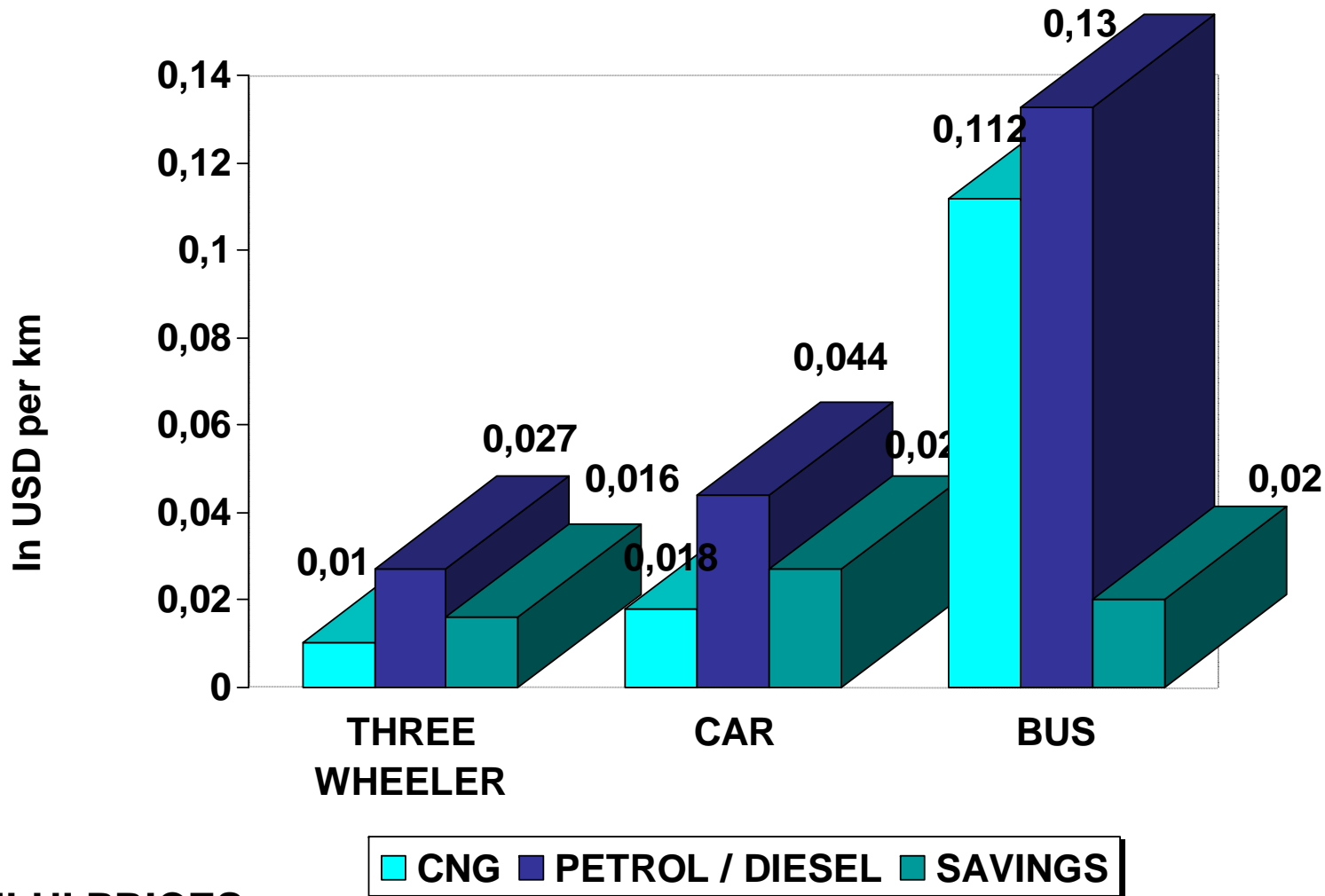
PAY BACK PERIOD

TYPE OF VEHICLE	RUNNING / DAY (KMS)	COST OF RETRO FITMENT	PAYBACK PERIOD
PRIVATE CAR	50	US \$ 800	21 MONTHS
TAXI	150	US \$ 800	07 MONTHS
BUS	280	US \$ 8670	25 MONTHS

PETROL : US \$ 0.66 / LITER DIESEL : US \$ 0.44 / LITER

CNG : US \$ 0.37 / KG

COST COMPARISON WITH ALTERNATIVE FUELS



DELHI PRICES

ECONOMICS

SAFETY ASPECTS OF CNG

- **Lighter than air in event of leak it will rise and disperse in atmosphere**
- **Unlikely to ignite due to narrow combustible range (5% - 15% concentration in air)**
- **High ignition temperature (540⁰c)**
- **CNG Cylinders structurally most sound and have passed every severe test**
- **A survey on a size of 8,000 vehicles conducted in USA, reported 34% less injury rates per Vehicular mile traveled.**

SAFETY

HOW GAIL HAD STARTED

- **Gail installed nine stations in NCT of Delhi in 1992-93 for supply of CNG to transport sector.**
- **Started Conversion of Vehicles.**
- **Did a Pilot Project for conversion of state owned Diesel Buses.**

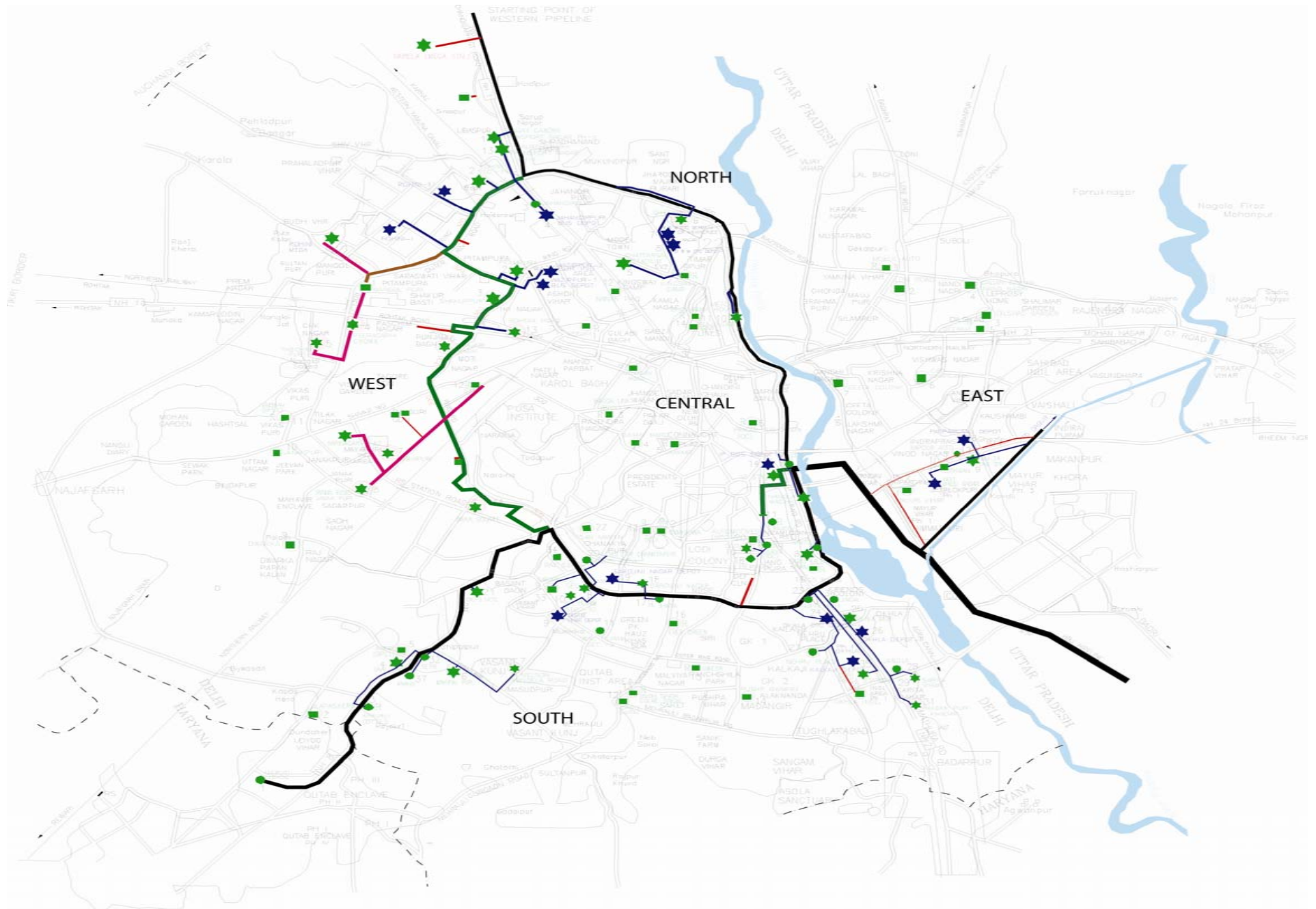
INDRAPRASTHA GAS LIMITED

- **A Joint Venture Company of**
 - **Gail (India) Limited**
 - **Bharat Petroleum Corporation Limited (BPCL)**
 - **Government of National Capital Territory of Delhi**
- **Government of India approved formation of Joint Venture Company on 17.07.1998**
- **Incorporated on 23.12.1998 for supply of natural gas to Domestic, Commercial and Automobile sectors (CNG) in the NCT of Delhi**

CNG PROGRESS IN DELHI

	1998	MAR'2003
YEAR	1998	MAR'2003
NO. OF COMPRESSOR	4	115
COMPRESSION CAPACITY (MILLION KG/DAY)	0.020	1.199
AVE. CNG SALES (MILLION KG/DAY)	0.005	0.674
NO. OF STATIONS	09	107

GAS GRID IN DELHI



CNG VEHICLE GROWTH IN DELHI

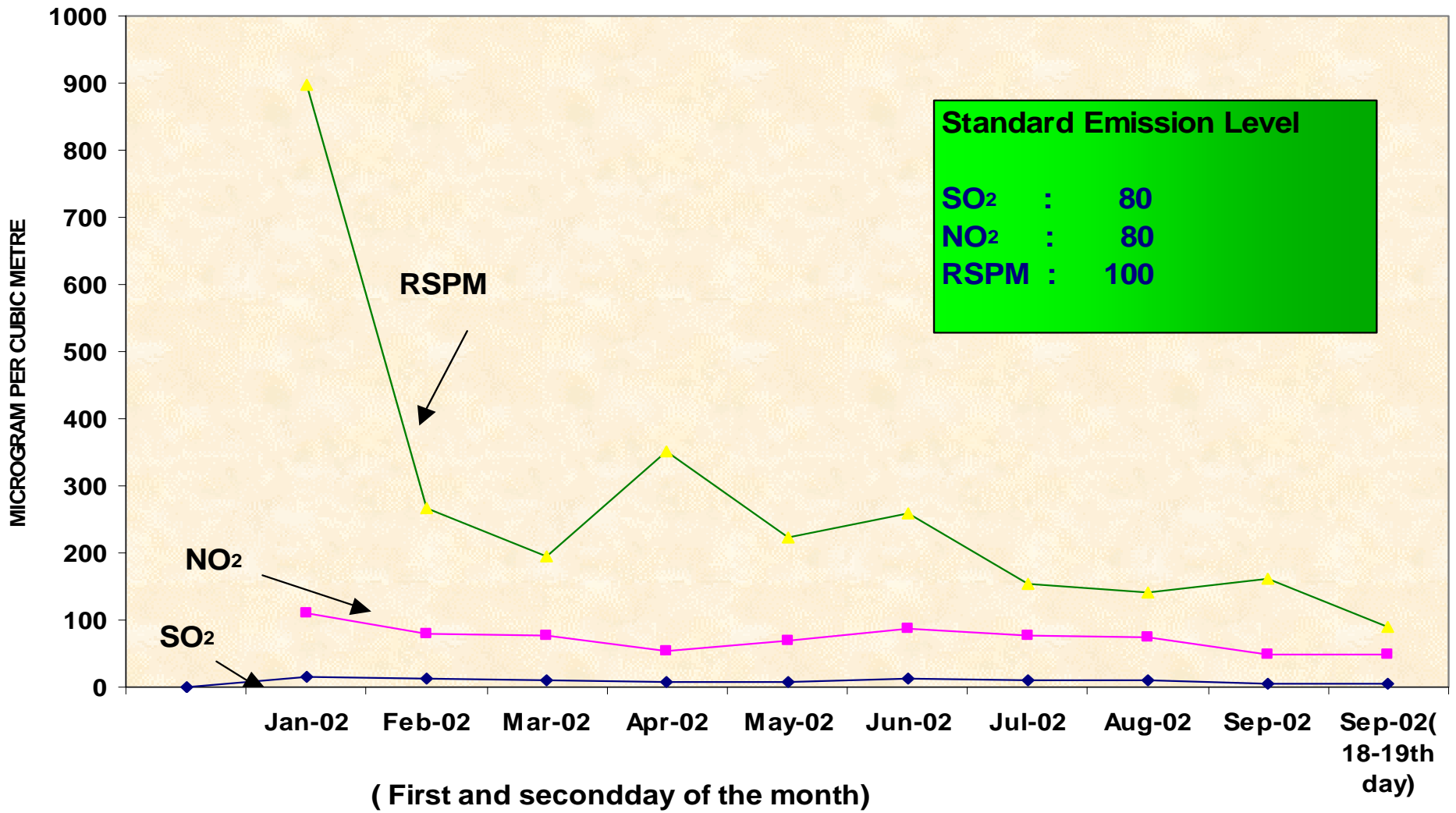
VEHICLE CATEGORY	AS ON 31.03.01	AS ON 31.03.02	AS ON 31.03.03	AS ON 31.10.03
BUS-DTC	200	2120	2523	2966
BUS	200	2111	6351	6889
THREE WHEELERS	14000	35678	49810	55101
RURAL TRANSPORT VEHICLE (RTV)	250	2165	4934	5146
TAXI	2200	4816	5155	5337
PRIVATE CAR	9500	10350	10350	10481@
TOTAL	26350	57240	79123	85920

•SOURCE: TRANSPORT DEPARTMENT

@AS PER TRANSPORT DEPT. TOTAL NO. OF PRIVATE VEHICLES IN DELHI IS 4550

DELHI

CNG IMPROVED AIR QUALITY



Source : Central Pollution Control Board

ENVIRONMENT

CNG INTRODUCING IN MORE CITIES

CITY	STATION	AS OF NOW VEHICLE
	116	86000
	57	95,000
	01	200
	03	600
	01	100
TOTAL (IN INDIA)	178	1,81,900

Delhi has the Largest CNG Bus Fleet in the World

FUTURE PLANS

- **Gail is setting up City Gas Projects in the following cities :**
 - **Lucknow**
 - **Agra**
 - **Kanpur**
 - **Pune**
 - **Faridabad**
 - **Bareilly**
 - **Vijayawada**
 - **Secundrabad**
 - **Hyderabad**