

CHAPTER FOUR

ATMOSPHERE



4.1 Introduction

4.1.1 The atmosphere of Earth is a layer of gases surrounding the planet Earth that is retained by Earth's gravity. The atmosphere protects life on Earth by absorbing ultraviolet solar radiation, warming the surface through heat retention (greenhouse effect), and reducing temperature extremes between day and night.

Table 4.1.1 : Average gaseous composition of dry air in the troposphere

Sl. No.	Gas	Percent by Volume	Parts Per Million (ppm)
1	2	3	4
1	Nitrogen	78.080000	780840.00
2	Oxygen	20.946000	209460.00
3	Argon	0.934000	9340.00
4	Carbon dioxide	0.039000	390.00
5	Neon	0.001818	18.18
6	Helium	0.000524	5.24
7	Methane	0.000179	1.79
8	Krypton	0.000114	1.14
9	Hydrogen	0.000055	0.55
10	Xenon	0.000009	0.09
11	Ozone	Variable	~0.001- 0.3 (variable)

Source : Envis centre of Indian Institute of Tropical Meteorology, Pune.

4.2 Atmospheric Pollution

4.2.1 The atmosphere consists of a mixture of gases that completely surround the earth. It extends to an altitude of 800 to 1000 kms above the earth's surface, but is deeper at the equator and shallow at the poles. About 99.9% of the mass occurs below 50 Km and 0.0997% between 50 and 100 km altitude. Major polluting gases/ particles are confined to the lowermost layer of atmosphere known as Troposphere that extends between 8 and 16 Kms above the earth surface.

4.2.2 The main sources of atmospheric pollution may be summarized as follows:

- a) The combustion of fuels to produce energy for heating and power generation both in the domestic sector as well as in the industrial sector.
- b) The exhaust emissions from the transport vehicles that use petrol, diesel oil, etc.
- c) Waste gases, dust and heat from many industrial sites including chemical manufacturers, electrical power generating stations, etc.

4.2.3 National Air Quality Monitoring Programme: Central Pollution Control Board has laid down national air quality monitoring network with the help of State Pollution Control Boards. The network is consisting of 346 stations covering 130 Cities, 26 States and 4 Union Territories. The parameters are Sulphur Dioxide, Oxides of Nitrogen and Respirable Suspended Particulate Matter. It is expected that there will be 104 observations in a year taken twice a week, 24 hourly at uniform level.

4.2.4 The primary aim of the ambient air quality standards is to provide a basis for protecting public health from adverse effects of air pollution and for eliminating or reducing to a minimum, those contaminants of air that are known or likely to be hazardous to human being, animals, vegetation and historical monuments. The revised national ambient air quality standards (NAAQS) as per NAAQS notification dated 2009 is given in table 4.2.1

4.2.5 The state-wise concentration of major pollutants under national Ambient Air Quality Monitoring Programme (NAMP) during 2012 is presented in Table 4.2.2. A summary of the observation are as follows.

- a. With respect to Sulphur dioxide it is observed that annual average is well within the limit in all States.
- b. With respect to NO₂ Values, the annual average are well with in limit except in some cases. The maximum value indicates that of Delhi, Bihar, West Bengal, Rajasthan and Maharastra are higher.
- c. In case of Particulate Matter (PM103), annual average value indicated that except few states such as Kerala, Mizoram and Puducherry all are exceeding the limits. The maximum value indicates in Delhi followed by Uttar Pradesh, Rajasthan and Bihar. The States/UTs like Manipur, Sikkim, Dadar & Nagar Haveli and Daman & Diu where data has not been received.



Table 4.2.1 : National ambient air quality standards (NAAQS)

Sl. No.	Pollutant	Time Weighted Average	Concentration Ambient Air		Methods of Measurement
			Industrial, Residential, Rural and other Areas	Ecologically Sensitive Area (Notified by Central Government)	
1	2	3	4	5	6
1	Sulphur Dioxide (SO_2) $\mu\text{g}/\text{m}^3$	Annual* 24 Hours**	50 80	20 80	1. Improved West and Gaeke 2. Ultraviolet Fluorescence
2	Nitrogen Oxides (NO_2) $\mu\text{g}/\text{m}^3$	Annual* 24 Hours**	40 80	30 80	1. Modified Jacob & Hochheiser 2. Chemiluminescence
3	Particulate Matter (Size $<10\mu\text{m}$) or $\mu\text{g}\cdot\text{m}^{-3}$	Annual* 24 Hours**	60 100	60 100	1. Gravimetric 2. TEOM 3. Beta attenuation
4	Particulate Matter (Size $<2.5\mu\text{m}$) or PM2.5 $\mu\text{g}/\text{m}^3$	Annual* 24 Hours**	40 60	40 60	1. Gravimetric 2. TEOM 3. Beta attenuation
5	Ozone (O_3), $\mu\text{g}/\text{m}^3$	8 hours** 1 hours **	100 180	100 180	1. UV photometric 2. Chemiluminescence 3. Chemical Method
6	Lead (Pb), $\mu\text{g}/\text{m}^3$	Annual* 24 Hours**	0.5 1	0.5 1	1. AAS/ICP Method after sampling using EPM 2000 or equivalent filter paper 2. ED-XRF using Teflon filter
7	Carbon Monoxide (CO), mg/m^3	8 hours** 1 Hour**	2 4	2 4	Non dispersive Infra Red (NDIR) Spectroscopy
8	Ammonia (NH_3), $\mu\text{g}/\text{m}^3$	Annual* 24 Hours**	100 400	100 400	1. Chemiluminescence 2. Indophenol blue method
9	Benzene (C_6H_6), $\mu\text{g}/\text{m}^3$	Annual*	5	5	1. Gas chromatography based continuous analyzer 2. Adsorption and Desorption followed by GC analysis
10	Benzo(a)Pyrene(BaP)-particulate phase only, ng/m^3	Annual*	1	1	Solvent extraction followed by HPLC/GC analysis
11	Arsenic (As), ng/m^3	Annual*	6	6	AAS/ICP method after sampling on EPM 2000 or equivalent filter paper
12	Nickel (Ni), ng/m^3	Annual*	20	20	AAS/ICP method after sampling on EPM 2000 or equivalent filter paper

Source : Central Pollution Control Board

* : Annual Arithmetic Mean of minimum 104 measurements in a year taken twice a week 24-hourly at uniform interval.

** : 24-hourly /8 -hourly values should be met 98% of the time in a year. However 2% of time, it may exceed but not on two consecutive days.

μm : Micrometre

μg : Microgram

Note :

Whenever and wherever monitoring results on two consecutive days of monitoring exceed the limit specified above for the respective category, it shall be considered adequate reason to institute regular or continuous monitoring and further investigation.

Table 4.2.2 : State wise level of SO₂, NO₂ and RSPM in residential areas during 2012 and 2013

SI	Name of the State	2012												2013																										
		SO ₂ µg/m ³ (Annual)			NO ₂ µg/m ³ (Annual)			RSPM µg/m ³ (Annual)			SO ₂ µg/m ³ (Annual)			NO ₂ µg/m ³ (Annual)			RSPM µg/m ³ (Annual)			SO ₂ µg/m ³ (Annual)			NO ₂ µg/m ³ (Annual)																	
		Max	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.															
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	1	Andhra Pradesh	34	4	7	37	10	18	156	30	72	2	75	7	5	131	18	8	538	75	
2	Assam	13	4	6	21	9	13	229	28	72	3	31	7	8	29	15	12	450	124	3	Bihar	26	2	6	126	8	36	456	25	166	-	-	-	-	-	-	-	-	-	-
4	Chandigarh	3	2	2	44	6	19	314	26	110	3	18	10	8	60	23	40	373	118	5	Chhattisgarh	12	10	11	32	23	26	168	121	151	2	5	2	5	73	28	19	464	101	
6	Dadra & Nagar Haveli	9	7	8	25	18	20	@	@	@	7	9	8	18	25	21	41	48	44	7	Daman & Diu	9	7	8	23	18	20	@	@	@	7	22	8	18	23	20	37	46	44	
8	Delhi	21	3	5	101	30	59	644	59	237	2	40	4	21	199	66*	28	670	221	9	Goa	17	7	11	27	11	17	228	28	96	2	21	7	5	21	12	3	113	53	
10	Gujarat	23	12	15	37	20	26	199	72	94	7	29	12	11	33	19	36	259	84	11	Haryana	17	4	9	45	12	23	306	62	147	5	22	11	5	45	24	53	306	178	
12	Himachal Pradesh	7	2	2	42	9	15	217	56	99	0	30	2	2	240	14	6	526	91	13	Jammu & Kashmir	17	2	6	26	3	12	280	46	119	5	35	15	2	14	5	63	179	118	
14	Jharkhand	37	17	23	52	28	41	280	87	173	12	42	22	29	125	41	54	291	151	15	Karnataka	15	6	9	46	15	20	233	26	83	2	32	9	5	76	18	10	440	82	
16	Kerala	13	3	4	25	7	13	172	22	55	2	20	4	5	111	11	7	712	55	17	Madhya Pradesh	20	9	14	39	14	22	236	54	128	2	50	12	2	74	22	15	728	144	
18	Maharashtra	46	9	17	72	17	33	260	38	105	1	122	16	1	138	31	1	582	101	19	Manipur	@	@	@	@	@	@	@	@	2	45	5	5	28	10	10	181	59		
20	Meghalaya	15	6	9	19	6	11	117	42	73	2	7	2	4	55	7	1	253	48	21	Mizoram	3	2	2	32	4	7	152	20	54	-	-	-	-	-	-	-	-	-	
22	Nagaland	3	2	2	15	5	6	169	22	86	2	2	2	5	25	5	21	252	93	23	Odisha	5	3	4	25	13	17	132	51	82	2	19	4	5	74	16	7	393	82	
24	Punjab	17	7	10	40	23	27	282	113	162	4	22	10	8	48	25	50	748	153	25	Puducherry	10	5	8	20	10	14	88	23	42	2	9	6	5	28	14	24	68	43	
26	Rajasthan	22	7	8	65	31	34	373	176	173	4	20	7	14	73	30	16	707	173	27	Sikkim	@	@	@	@	@	@	@	-	-	-	-	-	-	-	-	-	-		
28	Tamil Nadu	24	6	11	48	12	21	184	32	73	2	56	12	5	118	22	3	414	69	29	Uttar Pradesh	27	8	12	52	19	29	341	99	184	2	121	10	2	203	27	12	704	182	
30	Uttarakhand	30	22	26	46	23	28	534	58	162	2	30	23	5	31	26	24	966	142	31	West Bengal	35	5	12	91	25	58	324	39	137	2	66	10	5	240	65*	13	981	162	

Source : Central Pollution Control Board

µg/m³ : Micrograms per metre cube

@ : Data not received

NB. '-' data not received, National Air Quality Standard (NAAQS) of 50 µg/m³ for SO₂, 40 µg/m³ for NO₂, and 60 µg/m³ for PM10 for Residential/ industrial / other area & 20 µg/m³ for SO₂, 30 µg/m³ for NO₂, and 60 µg/m³ for PM10 for Ecologically sensitive area. Data of monitoring stations with monitoring days ≥50 has only been considered. The data furnished in the table is as available on date.

4.3 Industries and Pollution

4.3.1 Air borne emissions emitted from various industries are a cause of major concern. These emissions are of two forms, viz. solid particles (SPM) and gaseous emissions (SO₂, NO_x, CO, etc.). Liquid effluents, generated from certain industries, containing organic and toxic pollutants are also a cause of concern. Heavily polluting industries were identified which are included under the 17 categories of highly polluting industries for the purpose of monitoring and regulating pollution from them. The Ministry of Environment and Forests has, developed standards for regulating emissions from various industries and emission standards for all the polluting industries including thermal power stations, iron and steel plants, cement plants, fertilizer plants, oil refineries, pulp and paper, petrochemicals, sugar, distilleries and tanneries have been prescribed. The industrial units in India are largely located in the States of Gujarat, Maharashtra, West Bengal. The highest concentration of sulphur dioxide and oxides of nitrogen is, therefore, often found in cities located in these states. Some other industrial estates in Delhi, Rajasthan, Andhra Pradesh, Karnataka and Tamil Nadu are also becoming critical.

The ambient air quality in major cities is presented at table 4.3.1 and 4.3.2.

Table 4.3.1: Ambient air quality in major cities 2013			
(residential/industrial/rural/other areas, annual average concentration in microgram cubic meter)			
City	SO ₂	NO _x	($\mu\text{g}/\text{m}^3$) PM ₁₀ ($\mu\text{g}/\text{m}^3$)
Ahmedabad	12.0	17	79
Bangalore	13.0	26	113
Chennai	14.0	22	75
Delhi	4.0	66	221
Hyderabad	5.0	24	90
Kolkata	11.0	70	159
Mumbai	3.0	13	117

Source: Central Pollution Control Board

PM : Particulate Matter

SO₂ : Sulphur dioxide No_x : Oxides of nitrogen

The trend in ambient air quality in major cities (pollutant wise) over time is presented in table 4.3.2

4.3.2 Industrialization and urbanization have resulted in a profound deterioration of India's air quality. Sources of air pollution, India's most severe environmental problem, come in several forms, including vehicular emissions and untreated industrial smoke. Apart from rapid industrialization, urbanization has resulted in the emergence of industrial centers without a corresponding growth in civic amenities and pollution control mechanisms.

4.3.3 There is a growth of 71.26 % in the number of registered factories in India from 1987-88 to 2011-12. The details of registered factories sector wise are in Table 4.3.3.



Table 4.3.2: Year wise ambient air quality in major cities

City	($\mu\text{g}/\text{m}^3$)												
	Sulphur dioxide (SO_2)												
1996	1997	1998	1999	2000	2001	2002	2003	2004	2008	2009	2012	2013	
Ahmedabad	25.0	15.1	-	12.2	8.4	10	12.3	16	15.7	12.3	16	12	12.0
Bangalore	20.7	27.9	20.3	38.2	20.7	20	13.4	12	8.5	15.2	14	14	13.0
Chennai	8.1	15.9	12.6	11.9	12.5	17	19.9	15	12.2	9.5	9	12	14.0
Delhi	17.3	16.3	15.4	17.5	15.2	13	11.3	10	9.89	6.6	6	5	4.0
Hyderabad	16.8	16.4	11.8	14	12.4	10	7.27	6	5.63	5.5	5	4	5.0
Kolkata	21.3	0	34.3	44.5	17.4	18	11.4	17	9.33	7.7	11	12	11.0
Mumbai	18	25.1	11.5	14.9	12.1	16	9.07	8	6.67	8.7	6	5	3.0

($\mu\text{g}/\text{m}^3$)

City	($\mu\text{g}/\text{m}^3$)												
	Oxides of Nitrogen (NO_x)												
1996	1997	1998	1999	2000	2001	2002	2003	2004	2008	2009	2012	2013	
Ahmedabad	14.8	20	-	33	28.6	39	31.8	25	24.3	20.0	21	24	17
Bangalore	28	20.4	25	27.1	40.2	23	25.5	35	51.8	40.8	37	28	26
Chennai	9	13	16.7	10.7	14.4	18	18.4	26	16.8	15.4	17	21	22
Delhi	39.7	34	33.9	35.7	39.9	37	37.3	42	46.1	56.7	19	59	66
Hyderabad	25	30.7	30.8	24.3	25.2	31	25.5	26	30.3	26.2	23	28	24
Kolkata	29.3	0	32	30.5	34.8	74	81.7	71	59.7	64.0	68	70	70
Mumbai	35.3	34.3	19.5	29.6	25.5	23	17.4	21	18.3	39.3	41	20	13

($\mu\text{g}/\text{m}^3$)

City	($\mu\text{g}/\text{m}^3$)										
	Suspended Particulate Matter (SPM)										
1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2008	
Ahmedabad	251	254	235	-	351	393	343	281	256	244	220
Bangalore	-	176	187	153	146	153	148	149	163	153	273
Chennai	127	115	107	127	88	92	98	132	155	136	142
Delhi	411	402	343	379	388	381	346	427	355	374	433
Hyderabad	178	177	144	213	209	163	157	161	164	196	225
Kolkata	354	498	0	279	308	315	251	256	251	266	225
Mumbai	210	213	298	187	221	252	231	225	224	247	260

($\mu\text{g}/\text{m}^3$)

City	($\mu\text{g}/\text{m}^3$)										
	Respirable Suspended Particulate Matter (RSPM)										
1999	2000	2001	2002	2003	2004	2008	2009	2012	2013		
Ahmedabad	161	237	198	169	154	152	88	94	83	79	
Bangalore	0	89.7	68	64.3	76	69	100	112	121	113	
Chennai	71.7	65	77.6	74.8	86	60	63	73	57	75	
Delhi	172	155	146	158	151	149	214	252	237	221	
Hyderabad	127	98	68.8	71	64	71	85	81	79	90	
Kolkata	140	145	117	128	121	134	103	126	135	159	
Mumbai	115	107	67.2	68.7	70	78	127	117	117	117	

Source: Central Pollution Control Board

SPM : Suspended particulate matter; (P) : Provisional

RSPM : Respirable suspended particulate matter

SO_2 : Sulphur dioxide

NOx : Oxides of nitrogen

$\mu\text{g}/\text{m}^3$: Micrograms per metre cube

Table 4.3.3 : Number of registered factories by manufacturing industries					
Sl. No.	Year	Manufacturing	Electricity, Gas & Water	Repair Services & Cold Storage	All Activities
1	2	3	4	5	6
1	1987-88	98379	458	3759	102596
2	1988-89	99724	481	3872	104077
3	1989-90	103373	493	4126	107992
4	1990-91	105511	518	4150	110179
5	1991-92	107454	505	4327	112286
6	1992-93	113890	961	4643	119494
7	1993-94	116227	542	4825	121594
8	1994-95	117564	554	4892	123010
9	1995-96	125281	4013	5277	134571
10	1996-97	125166	4160	5230	134556
11	1997-98	126272	3856	5423	135551
12	1998-99*	130222	143	1341	131706
13	1999-2000*	130035	158	1365	131558
14	2000-01*	127036	163	4069	131268
15	2001-02*	124099	170	4279	128548
16	2002-03*	123401	182	4374	127957
17	2003-04	124277	219	4578	129074
18	2004-05	131232	275	4846	136353
19	2005-06	134669	259	5232	140160
20	2006-07	138968	313	5429	144710
21	2007-08	140355	385	5645	146385
22	2008-09	145727	504	9090	155321
23	2009-10	149130	496	9251	158877
24	2010-11	161458	585	10134	172177
25	2011-12	164316	693	10700	175710
26	2012-13	167197	673	11233	179102

* : From 1998-99, all electricity undertakings other than Captive Units have been kept outside the purview of ASI

Summary Results of Factory Sector' for ASI 2011-12

Note: Factories registered under Factory Act 1948

Source : Economics Statistics Division, Central Statistics Office

4.4 Important industries and the effluent standards in India

4.4.1 Sugar industry: India has been known as the original home of sugar and sugarcane. India is the second largest producer of sugarcane next to Brazil. The effluent standards for sugar industry is at table 4.4.1.

Table 4.4.1 : Effluent standards for sugar industry			
Sl. No.	Parameter	Maximum Permissible Limits (mg/Litres)	
		Disposal on Land	Disposal in Surface Water
1	2	3	4
1	Biological Oxygen Demand (5 days at 20°C)	100	30
2	Suspended Solids	100	30

Source : Environment Protection Rules-1986.

4.4.2 Paper Industry: The Indian Paper Industry is among the top 15 global players today. The existing effluent for large pulp and paper industries is available at table 4.4.2.

Table 4.4.2 : Effluent standards for large pulp and paper industries		
Capacity (Tonnes a year)	Parameter	Permissible Limits
1	2	3
Above 24,000	pH Biological Oxygen Demand at 20°C Chemical Oxygen Demand Suspended solids Total organic chloride Flow (total waste water discharge) i. Large pulp and paper ^a ii. Large rayon grade newsprint	7.0-8.5 30 mg/litre 350 mg/litre 500 mg/litre 2.0 kg/tonne of paper produced 200 m ³ /tonne of paper produced 150 m ³ /tonne of paper produced

Source : Central Pollution Control Board, Pollution Control Act, Rules & Notification issued thereunder series PCLS/02/2010.

a : the standards with respect to total waste water discharge for large pulp and paper mills established from 1992 will meet the standards of 100 m³/tonne of paper produced

4.4.3 Oil Refineries: There are a total of 18 oil refineries in the country comprising 17 in the Public Sector, one in the private sector in India. The following table presents the effluent standards for oil refineries.

Table 4.4.3 : Effluent standards for oil refineries

(Mg/Litre)

Sl. No.	Parameter	Permissible Limit	Quantum (Kg/Thousand Tonnes of Crude Processed)
1	2	3	4
1	Oil and grease	10.0	7.00
2	Phenol	1.0	0.70
3	Sulphide	0.5	0.35
4	Biological Oxygen Demand (5 days at 20°C)	15.0	10.50
5	Suspended Solids	20.0	14.00
6	pH	--	6.00-8.50

Environment (Protection) rules, 1986

Source : Central Pollution Control Board

4.4.4 Aluminum Industry: Aluminum industry is one of the leading metal industries in the Indian economy. The

Table 4.4.4: Effluent standards for aluminium industry

Sl. No.	Plant	Parameters	Permissible Limits
1	2	3	4
1	Aluminium Plant		
i)	Raw material handling	Primary and secondary crusher particulate matter	150 mg/m ³
ii)	Precipitation area : calcination	Particulate matter	250 mg/m ³
		Carbon Mono-oxide	1 % maximum
		Stack Height ^a	a
2	Smelter plant	Particulate matter	150
i)	Green anode shop	Particulate matter	50 mg/Nm ³
ii)	Anode bake oven	Particulate matter	0.3kg/tonne at Aluminium
3	Potroom	Total fluoride	150 mg/m ³
		Particulate matter	
		Total fluoride for Soderberg*	
		Technology	2.8Kg/ton by 31 st December 2006
		For Pre-baked Technology	0.8 Kg/t by 31 st December 2006

Source : Central Pollution Control Board. (Environment (Protection) Rules, 1986

a is $H = 14 Q^{0.3}$, where Q is the emission rate of sulphur dioxide in Kg/hr and H is the stack height in meters.

4.4.5 Petro chemical Industry: The petrochemical industry in India has been one of the fastest growing industries in the country. This industry also has immense importance in the growth of economy of the country and the growth and development of manufacturing industry as well. It provides the foundation for manufacturing industries like construction, packaging, pharmaceuticals, agriculture, textiles etc. The effluent standards for Petro – Chemical industries in India is given below in 4.4.5.

**Table 4.4.5: Effluent standards for petro-chemical
(Basic & intermediates)Industry**

Sl. No.	Parameter	(Mg/Litre)
		Permissible Limit
1	2	3
1	pH	6.5-8.5
2	Biological Oxygen Demand (3 days at 27 °C) ^a	50.0
3	Phenol ^b	5.0
4	Sulphide (as S)	2.0
5	Chemical Oxygen Demand	250.0
6	Cyanide (as CN)	0.2
7	Fluoride (as F) ^c	15.0
8	Total Suspended Solids	100.0
9	Hexavalent Chromium	0.1
10	Total Chromium (as Cr) ^d	2.0

Source : Central Pollution Control Board, Environment (Protection) rules, 1986

- a :** The state board may prescribe the biological oxygen demand value of 30 mg/l if the receptor system so demands.
- b :** The limit for phenol shall be confirmed at the outlet of effluent treatment of phenol plant. However, at the final disposal point, the limit shall be less than 1 mg/l
- c :** The limit for fluoride shall be confirmed at the outlet of the chrome removal unit. However, at the disposal point, fluoride concentration shall be lower than 5 mg/l
- d :** The limits for total and hexavalent chromium shall be confirmed at the outlet of the chromate removal. This implies that in the final treated effluent total, and hexavalent chromium shall be lower than prescribed herein

4.4.6 The detail of Indian standards for maximum permissible limits for Industrial effluent discharges is shown in the table 4.4.6.

Sl. No.	Parameter	(mg/Litre)			
		Into Inland Surface Waters Indian Standards 2490 (1974)	Into Public Sewers Indian Standards: 3306 (1974)	On land for Irrigation Indian Standards: 3307 (1974)	Marine Coastal Area
1	2	3	4	5	6
1	pH	5.5-9.0	5.5-9.0	5.5-9.0	5.5-9.1
2	Biological oxygen demand (for 5 days at 20°C)	30.00	350.00	100.00	100.00
3	Chemical oxygen demand	250.00	-	-	250
4	Suspended solids	100.00	600.00	200.00	
5	Total dissolved solids (inorganic)	2100.00	2100.00	2100.00	-
6	Temperature (°C)	40.00	45.00	-	45.00
7	Oil and grease	10.00	20.00	10.00	20.00
8	Phenolic Compounds	1.00	5.00	-	5.00
9	Cyanides	0.20	2.00	0.20	0.20
10	Sulphides	2.00	-	-	5.00
11	Fluorides	2.00	15.00	-	15.00
12	Total residual chlorine	1.00	-	-	1.00
13	Pesticides	-	-	-	-
14	Arsenic	0.20	0.20	0.20	0.20
15	Cadmium	2.00	1.00	-	2.00
16	Chromium (hexavalent)	0.10	2.00	-	1.00
17	copper	3.00	3.00	-	3.00
18	Lead	0.10	1.00	-	1.00
19	Mercury	0.01	0.01	-	0.01
20	Nickel	3.00	3.00	-	5.00
21	Selenium	0.05	0.05	-	0.05
22	Zinc	5.00	15.00	-	15.00
23	Chlorides	1000.00	1000.00	600.00	-
24	Boron	2.00	2.00	2.00	-
25	Sulphates	1000.00	1000.00	1000.00	-
26	Sodium (%)	-	60.00	60.00	-
27	Ammoniacal nitrogen	50.00	50.00	-	50
28	Radioactive materials				
29	Alpha emitters (milli curie/millilitre)	10^{-7}	10^{-7}	10^{-8}	10^{-7}
30	Beta emitters (μ curie/millilitre)	10^{-6}	10^{-6}	10^{-7}	10^{-6}

Source : Central Pollution Control Board, Standard (1974), Agriculture Research Data Book-2002

4.5 Grossly Polluting Industries

4.5.1 In addition to air pollution, industries cause water pollution also. The table 4.5.1 shows that at all India level, 68.16% grossly polluting industries discharging their effluents into rivers and lakes are complying with the norms.

Table 4.5.1: Summary status of pollution control in grossly polluting industries discharging their effluents into rivers and lakes									
Sl. No.	Name of the State/UT	2010				2011			
		Total	Complying	Closed	Defaulting	Total	Complying	Not Complying*	Closed
1	2	3	4	5	6	7	8	9	10
1	Andhra Pradesh	17	11	6	0	17	11	0	6
2	Assam	9	9	0	0	9	4	5	0
3	Bihar	22	16	6	0	22	16	0	6
4	Chhattisgarh	1	1	0	0	1	1	0	0
5	Gujarat	17	12	4	1	3	2	1	0
6	Haryana	76	71	1	4	142	112	17	13
7	Jharkhand	38	38	0	0	5	2	3	0
8	Karnataka	10	8	1	1	10	8	1	1
9	Kerala	36	18	7	11	29	20	2	7
10	Madhya Pradesh	1	0	0	1	1	1	0	0
11	Maharashtra	214	139	2	73	214	139	73	2
12	Odisha	20	6	5	9	19	6	8	5
13	Puducherry	1	0	0	1	1	1	0	0
14	Punjab	20	9	4	7	20	14	2	4
15	Tamil Nadu	366	248	118	0	1	1	0	0
16	Uttar Pradesh	432	294	89	49	569	391	62	116
17	Uttarakhand	45	25	4	16	49	29	16	4
18	West Bengal	31	19	3	9	32	21	7	4
19	Daman Diu & Dadar Nagar Haveli	2	2	0	0	2	2	0	0
20	Himachal Pradesh	-	-	-	-	2	2	0	0
21	Tripura	-	-	-	-	12	7	3	2
22	Goa	-	-	-	-	2	2	0	0
	Total	1358	926	250	182	1162	792	200	170

Source : Ministry of Environment & Forests,(Central Pollution Control Board)

* : Not complying : industries with effluent treatment installed but found not complying with few parameter of prescribed standard at the time of monitoring.

Not : Up-dated information in respect of Maharashtra, Andhra Pradesh, Chhattisgarh and Daman are awaited. The status of these states is based on previous available data.

4.6 Measures Taken for Controlling Air Pollution from Industries

4.6.1 The measures taken for controlling air pollution from industries are as follows:

- a. Emission standards have been notified under the Environment (Protection) Act, 1986 to check pollution which are revisited from time to time.
- b. Industries have been directed to install necessary pollution control equipment in a time bound manner and legal action has been initiated against the defaulting units.
- c. 24 critically polluted areas have been identified. Action Plan has been formulated for restoration of environmental quality in these areas.
- d. Environmental guidelines have evolved for citing of industries.
- e. Environmental clearance is made compulsory for 29 categories of development projects involving public hearing/NGO participation as an important component of Environmental Impact Assessment process.
- f. Environmental audit in the form of environmental statement has been made mandatory for all polluting industries.
- g. Power plants (coal based) located beyond 1000 kms from the pit-head are required to use low ash content coal (not exceeding 34%) with effect from 1.6.2002. Power plants located in the sensitive areas are also required to use low ash coal irrespective of their distance from the pit head.
- h. Source apportionment studies for particulate matter (PM10) under taken in six cities namely Delhi, Mumbai, Chennai, Bangalore and Kanpur out came the stage is available CPCB website.

4.7. Up-coming initiatives

4.7.1 There are some up-coming initiatives that the government of India has taken up in the past few years. There are:

- a. Monitoring using automatic analysers is being initiated in 16 polluted cities identified by Hon'ble Supreme Court.
- b. Action Plan are being formulated and implemented by the Central/ States Pollution Control Boards in 16 cities identified by Hon'ble Supreme Court as polluted cities.

- c.Road map given by Auto fuel policy for vehicular pollution control is being implemented.
- d.Corporate Responsibility for Environmental protection (CREP) is being implemented by industries for controlling industrial pollution.

4.8 Road Transport

4.8.1 Road vehicles are the second major source of pollution. They emit CO, HC_s, NO_x, SO₂, and other toxic substances such as TSP and lead. Diesel engines are much less polluting than petrol engines. Both types of engines are not very efficient converters of fuel energy. However, diesel types with a conversion efficiency of around 30% must be more efficient and use less fuel than petrol types with a 15-20% conversion efficiency. Both types of engines have incomplete combustion of fuel, so the major pollutant is CO, amounting to 91% by weight of all vehicle emissions. The primary pollutants produced in vehicle emissions undergo a series of complex interrelated chemical reactions in the troposphere and lower stratosphere to form secondary products. The state-wise total registered motor vehical (Transport and Non- Transport) in India from 2006 to 2012 is given on table 4.8.1.

Table 4.8.1 : Total registered motor vehicles in India by State/Uts

Sl. No.	States/UT	Transport												Light Motor Vehicles (Goods)					
		Multi-exied/Articulated Vehicles/Trucks & Lorries							Passenger Vehicles					Light Motor Vehicles (Passenger)					
		2006	2007	2008	2009	2010	2011	2012	2013	2006	2007	2008	2009	2010	2011	2012	2013		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18		
1	Andhra Pradesh	181832	196703	218733	233415	236211	241663	253,415	253,471	85112	131782	165918	194746	219332	257147	302,124	301,439		
2	Arunachal Pradesh*	2355	2355	2355	2355	2355	.. ..	.. ..	.. ..	601	601	601	601	601	.. ..	.. ..	.. ..
3	Assam	91801	97790	105565	114485	124132	136090	144,183	2,175	19371	22587	25451	29703	32473	35788	47,296	67,167		
4	Bihar	50016	52005	54414	58012	66485	73472	83,191	89,754	0	48123	54153	62576	.. ..	.. ..	.. ..	13457
5	Chhattisgarh	51716	59112	67634	73843	78488	83674	91,068	97,515	21858	25515	29803	33948	38434	43936	50,373	58,466		
6	Goa (c)	34043	33120	33596	35495	37040	39422	42,395	42,759	0	4220	6316	7260	8218	9402	11,447	13,486		
7	Gujarat	204362	223022	239404	247772	259231	276290	301,533	319,207	253340	285858	314388	338826	367113	402514	448,958	499,277		
8	Haryana	176046	200977	220470	230858	249991	275162	292,735	307,509	74494	83921	90793	96558	102541	114384	124,897	137,511		
9	Himachal Pradesh	31803	27239	30409	47339	49582	51899	53,763	71,843	20623	21738	24097	39058	42877	47395	43,092	56,174		
10	Jammu & Kashmir	33174	35697	38977	41696	35109	35414	38,482	40,751	16843	20004	22674	24768	43238	46792	51,412	56,230		
11	Jharkhand	68915	97967	106463	116835	156196	172371	191,253	209,790	0	53866	59451	66160	160778	180934	202,638	202,638		
12	Karnataka	210432	181587	198955	205497	200316	217113	233,422	247,639	65581	130685	145809	161100	177179	198378	221,160	258,701		
13	Kerala	264262	64454	65707	66868	68777	72534	76,330	78,796	0	247799	271763	291514	251471	288447	323,891	364,323		
14	Madhya Pradesh	83293	88755	94661	99242	105025	112954	121,916	131,098	39943	46754	55057	62984	72029	82673	95,702	111,713		
15	Maharashtra	287230	316502	344267	366642	374705	389941	411,418	402,366	334741	383854	436725	478975	521692	583847	656,407	739,725		
16	Manipur	6746	7078	7216	7216	7639	8249	8,599	10,732	1854	2005	2245	2245	2871	3207	4,054	6,445		
17	Meghalaya	17060	17937	18572	19747	21372	23064	25,451	26,827	2565	3222	3781	4425	4955	6058	7,210	8,873		
18	Mizoram	4475	3000	3167	3343	3507	3844	4,285	4,630	5	2566	2981	3397	4003	4862	6,194	6,880		
19	Nagaland	47089	51466	55974	60684	65729	77968	84,008	90,225	11804	13319	14043	15068	16345	25158	17,799	19,569		
20	Odisha	74432	83093	91154	100279	109804	119145	130,030	134,990	47843	56534	66429	78370	86729	100546	109,719	132,625		
21	Punjab	68154	119630	129797	139065	149367	149367	125,898	125,898	59566	20186	20186	20186	20186	75,860	75,860			
22	Rajasthan	206381	152223	169486	179631	198089	222959	362,028	401,983	22966	116861	127937	138487	148892	162837	69,509	76,396		
23	Sikkim	1915	2270	2490	2755	3214	3457	3,930	3,051	489	585	605	750	795	823	947	1353		
24	Tamil Nadu	315564	340950	366658	387336	404652	433579	467,225	492,741	231491	243904	254321	261800	280388	311084	353,883	404,244		
25	Telangana	26	8138	8593	9000	9524	10432	10934	11,166	9,674	2535	3336	4037	4819	6199	7568	8,452	168,851	
26	Tripura	12092	14816	17014	17354	18026	19474	23,786	25,174	8336	7086	8481	10453	16393	19695	26,670	26,924		
27	Uttarakhand	106760	107559	115552	122520	137436	150670	162,813	186,404	77668	85906	100273	117913	131181	156388	176,164	213,657		
28	Uttar Pradesh	235269	256072	253389	251120	222716	248776	281,995	193,943	--	\$ \$	\$ \$	\$ \$	\$ \$	\$ \$	242896			
	Union Territory:	2875355	2841972	3061079	3240928	3395626	3649575	4,026,318	4,121,387	1399629	2062817	2308318	2546690	2756913	3110049	3,435,858	4,277,218		
1	A & N Islands	1716	2152	2303	2355	2366	2429	2,484	2,519	76	0	0	0	.. ..	.. ..	.. ..
2	Chandigarh	1766	1775	1865	1952	2210	2490	2,689	2,794	8039	8455	8725	9566	15466	21841	23,015	24,283		
3	Dadra & Nagar Haveli	6072	6537	7123	7604	8048	8591	8,935	9,355	1750	2043	2298	2496	2761	3036	3,380	3,809		
4	Daman & Diu	2223	2568	2791	2934	3112	3646	3,818	3,946	2316	2670	2854	2973	3130	3274	3,434	3,629		
5	Delhi	576862	82525	83770	84114	85384	86301	4,792	5,176	67144	91698	105331	124180	140872	156030	124,547	126,539		
6	Lakshadweep	0	0	0	0	0	0	0	0	347	419	452	452	494	590	728	879		
7	Puducherry	6965	7517	7622	7671	7745	7832	7,849	4,593	4903	5732	6407	6989	7799	8811	10,544	10,635		
	Uts	76424	103074	105474	106630	108865	111289	30,567	28,383	84575	111017	126067	146676	170522	193582	165,648	169,774		
	Total	2951779	2945046	3166553	3347558	3504491	3760864	4,056,885	4,149,770	1484204	2173834	2434385	2693366	2927435	3303631	3,601,506	4,446,992		

Source : Motor Transport Statistics of India, Transport Research Wing, Ministry of Road Transport & Highways

Included in Tractors ^ : Included other vehicles not covered in 'transport vehicles'

\$: Included in Multi-Axled/Articulated Vehicles/Trucks & Lorries

(c) : LMV (passengers) includes 6538 Motorcycles on hire also.

* : includes Motor cycles on hire

^ : included in Cars

(Note: for website:<http://morth.nic.in/writereaddata/mainlinkFile/File838.pdf>)

Table 4.8.1 : Total registered motor vehicles in India by State/Uts

Sl. No.	States/UT	Transport														Taxes						
		Buses							Road Vehicles													
		2006	2007	2008	2009	2010	2011	2012	2013	2006	2007	2008	2009	2010	2011	2012	2013	2006	2007	2008	2009	
1	2	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	
1	Andhra Pradesh	18368	45359	49480	53820	56664	60,622	70,075	73,787	113693	71559	84150	95554	103290	114923	129,322	125,962	126,999	128,277	128,277	128,277	
2	Arunachal Pradesh*	682	682	682	682	682	682	682	682	683	683	683	683	683	683	683	683	683	683	683	683	
3	Assam	11378	11936	12570	13257	13859	14,741	15,787	18,982	12671	14343	16382	19680	24088	28161	33,999	42,827	42,827	42,827	42,827	42,827	
4	Bihar	16271	17192	18533	19654	21209	22,703	24,097	25,992	22698	24024	27066	30857	38204	43623	52,218	66,564	66,564	66,564	66,564	66,564	
5	Chhattisgarh	24955	33033	36814	41098	7658	8,596	12,049	13,071	5036	5241	5811	6589	7499	8723	13,515	15,247	15,247	15,247	15,247	15,247	
6	Goa (c)	5689	6376	6770	7644	8332	8,907	9,513	9,956	9361	10241	11901	12768	13143	13306	14,338	15,427	15,427	15,427	15,427	15,427	
7	Gujarat	54446	54214	56214	58253	60023	62,386	67,546	70,615	47914	53237	58412	62915	67740	74512	83,038	92,455	92,455	92,455	92,455	92,455	
8	Haryana	19986	22101	26906	29516	33520	35,646	39,153	42,800	16344	17738	13869	14791	15081	19978	23,793	27,946	27,946	27,946	27,946	27,946	
9	Himachal Pradesh	6859	3265	3681	5398	5714	6,186	14,592	13,510	14542	14407	15718	20582	21993	23791	25,030	33,043	33,043	33,043	33,043	33,043	
10	Jammu & Kashmir	21435	22161	23149	24051	23480	25,858	25,765	26,888	13656	14715	16815	18971	15939	21307	25,577	31,285	31,285	31,285	31,285	31,285	
11	Jharkhand	10238	10792	11270	11699	12256	12,847	13,561	14,329	24693	34464	37439	41828	259542	296771	333,420	252,268	252,268	252,268	252,268	252,268	
12	Karnataka	40819	45211	49586	44308	53874	58,012	62,501	69,718	67385	85064	137064	147489	115410	129272	142,700	162,894	162,894	162,894	162,894	162,894	
13	Kerala	127574	396980	414678	430162	383229	390,430	396,826	404,153	119753	63992	75313	84792	96666	108,877	121,825	121,825	121,825	121,825	121,825		
14	Madhya Pradesh	27997	29177	30516	31520	35105	36,647	40,551	40,633	72760	77723	85295	94199	99241	110730	122,969	140,260	140,260	140,260	140,260	140,260	
15	Maharashtra	66754	71187	77042	79073	83816	89,861	100,097	110,121	122389	133309	149526	157916	168496	175,797	184,066	184,066	184,066	184,066	184,066		
16	Manipur	2570	2634	2727	2727	2769	2,776	2,868	3,732	377	407	412	412	1595	1896	2,567	2,956	2,956	2,956	2,956	2,956	
17	Meghalaya	3497	3639	3779	3905	4007	4,116	4,323	4,945	8432	9579	10385	11352	12607	14507	16,205	18,133	18,133	18,133	18,133	18,133	
18	Mizoram	704	907	954	1003	1036	1,088	1,141	1,187	4988	5323	5763	5992	6465	7246	8,183	9,225	9,225	9,225	9,225	9,225	
19	Nagaland	4060	4262	4422	4694	5041	5,573	5,542	5,750	5004	5246	5435	5921	6428	6716	6,970	7,437	7,437	7,437	7,437	7,437	
20	Odisha	15996	16951	17694	18464	19335	20,616	21,917	23,004	30426	33540	36123	38716	41828	44585	56,464	68,641	68,641	68,641	68,641	68,641	
21	Punjab	21136	22373	24457	25682	27146	27,146	30,160	30,160	9937	12940	13538	14314	15837	18,539	18,539	18,539	18,539	18,539	18,539		
22	Rajasthan	60979	63320	65605	69298	73257	77,980	83,345	88,616	42679	47701	54321	60941	67542	76317	89,053	103,690	103,690	103,690	103,690	103,690	
23	Sikkim	365	429	434	294	524	586	613	633	6052	6499	6745	7108	7569	8011	8,816	9,378	9,378	9,378	9,378	9,378	
24	Tamil Nadu	89991	97396	105897	114671	123999	134,887	144,251	156,470	134580	149774	170377	188795	209689	243425	278,005	307,079	307,079	307,079	307,079	307,079	
	Telangana						38,245										65,226					
25	Tripura	1961	2079	2182	2223	2194	2,295	2,312	2,291	1316	1370	1373	1380	3199	3468	3,530	2,286					
26	Uttarakhand	5949	2780	3745	4032	7527	8,066	8,504	8,997	16069	11458	15008	17058	18660	20896	25,415	28,536					
27	Uttar Pradesh	26549	25134	25339	26331	28124	31,922	34,428	40,501	28443	25762	39274	34107	38629	47364	59,379	89,393					
28	West Bengal	43599	42737	35924	35023	31996	34,184	35,603	51,660	68926	72702	65153	66240	73696	80012	84,591	105,542					
	Union Territory:	730807	1054307	1111050	1158482	1126376	1,184,677	1,267,120	1,390,746	1020467	1002701	1152961	1252131	1538356	1720539	1,942,310	2,148,130					
1	A & N Islands	658	757	775	811	825	846	903	958	246	439	439	489	489	489	489	489	489	489	489	489	
2	Chandigarh	2307	2141	2252	2375	3062	3,684	5,170	2,265	1771	2273	2606	2810	3017	3275	3,491	3,519					
3	Dadra & Nagar Haveli	176	214	262	278	295	314	321	352	123	126	129	133	142	146	151	154					
4	Daman & Diu	420	422	439	451	461	474	512	543	43	43	44	44	45	46	49	55					
5	Delhi	25963	38500	39622	41142	43250	45,757	20,142	19,912	15569	35041	43887	50351	55530	62839	62,335	63,082					
6	Lakshadweep	13	15	19	19	0	0	0	0	0	0	0	0	0	0	0	207	262				
7	Puducherry	1997	2066	2149	2235	2373	2,493	2,596	3,987	1626	1724	1796	1847	1892	1943	1,990	762					
Uts		31534	44115	45518	47311	50266	53,568	29,644	28,017	19378	39646	48901	55674	61220	68878	68,712	68,323					
Total		762341	1098422	1156568	1205793	1176642	1,238,245	1,296,764	1,418,763	1039845	1042347	1201862	1307805	1599576	1789417	2,011,022	2,216,453					

Source : Motor Transport Statistics of India, Transport Research Wing, Ministry of Road Transport & Highways

Included in Tractors ^ : Included other vehicles not covered in 'transport vehicles'

\$: Included in Multi-Axled/Articulated Vehicles/Trucks & Lorries

(c) : LMV (passengers) includes 6538 Motorcycles on hire also.

* includes Motor cycles on hire

^ : included in Cars

(Note: for website:<http://morth.nic.in/writereaddata/mainlinkFile/File838.pdf>)

Table 4.8.1 : Total registered motor vehicles in India by State/Uts

Sr. No.	States/UT	Transport												Total Transport			
		Light Motor Vehicles (Passengers)							Transport					Total Transport			
		2006	2007	2008	2009	2010	2011	2012	2013	2006	2007	2008	2009	2010	2011	2012	2013
1	2	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46
1	Andhra Pradesh	299776	275124	323293	381488	434448	513266	576,480	546,813	5039449	720527	841574	959023	1049945	1187621	1,331,416	1,301,472
2	Arunachal Pradesh*	1449	1449	1449	1449	1449	...	...	...	21358	5430	5430	5430	5430	...	...	...
3	Assam	34906	37691	41267	45266	51185	59742	67,921	71,633	1435630	184347	201235	222391	245737	274522	309,186	202,784
4	Bihar	45365	0	0	0	74968	92390	113,088	141,174	1221936	141344	154166	171099	200866	232188	272,594	336,941
5	Chhattisgarh	9194	10669	12245	13589	15047	17566	17,913	21,890	1159522	133570	152307	169067	147126	162495	184,918	206,189
6	Goa (c)	10035	11667	12826	14863	4238	4309	3,853	3,955	531938	65624	71409	78030	84134	90751*	100,749 *	106035*
7	Gujarat	336695	371792	396828	426616	464862	511270	561,740	605,194	6341724	988123	1065246	1134382	1218969	1326972	1,462,815	1,586,748
8	Haryana	45858	52620	63914	73134	83745	94770	103,995	114,465	3223889	377357	415952	444857	484878	539940	584,573	630,231
9	Himachal Pradesh	2825	2459	2611	2744	2771	2805	3,963	5,557	890085	69108	76516	115121	122937	132076	140,440	180,127
10	Jammu & Kashmir	15919	16562	18440	19673	10958	12420	13,759	16,407	948252	109139	120055	129159	128724	141791	154,995	171,561
11	Jharkhand	46834	0	0	0	160778	180934	202,638	227,414	3470528	197089	214623	236522	766936	863333*	965,287*	930461*
12	Karnataka	213721	214574	243034	247077	237295	259429	285,408	320,482	4678606	657121	774448	805471	887999	973110**	1,062,081 **	1180736**
13	Kerala	342527	381872	410637	448649	491879	544485	601,507	666,808	6824002	1155097	1232048	1312506	1394162	1507041**	1,622,543 **	1751514**
14	Madhya Pradesh	51049	54561	57395	60751	67488	76207	86,068	96,817	2530199	296970	322924	3488696	378888	419211	467,206	520,521
15	Maharashtra	534535	555118	574625	598013	626332	640700	640,040	655,299	9501359	1459970	1582185	1680619	1774852	1,872,845	1,983,759	2091627*
16	Manipur	2721	3787	4071	4071	7266	9954	11,854	14,030	124579	15911	16671	16671	22140	26082	29,942	37,895
17	Meghalaya	3569	4081	4433	4842	5348	6000	6,744	7,674	35123	38458	40950	44271	48290	53746*	59,934 *	66453*
18	Mizoram	1534	1758	1931	2105	2219	2477	2,955	3,554	123914	13554	14796	15840	17230	19517	22,758	25,476
19	Nagaland	9548	10408	12939	13143	13403	14284	14,429	15,328	764335	84701	92813	99510	106946	129699	128,748	138,309
20	Odisha	34360	38436	43265	49896	57456	62830	74,313	78,131	2060422	228554	254665	285725	315152	347722	392,443	437,391
21	Punjab	43280	46399	50428	53670	57879	57879	66,734	66,734	1690455	221528	238406	252917	270415	317,191	317,191	
22	Rajasthan	79576	88509	95899	103270	112986	123328	134,345	145,422	3960929	468614	513248	551627	600766	663421	738,280	816,107
23	Sikkim	0	0	0	0	0	...	...	...	93531	9783	10274	10907	12102	12967	14,306	14,415
24	Tamil Nadu	174646	186290	202995	215542	238682	291605	301,982	319,074	8373800	1018314	1100248	1168144	1257410	1414580	1,545,346	1,679,608
	Telangana									236,625						629,389	
25	Tripura	13237	14544	15829	16968	15749	18074	19,203	23,599	175491	29922	32421	34914	37773	42339	44,663	50,188
26	Uttarakhand	7906	9641	10971	12755	11622	13820	13,004	14,077	482432	45781	55219	61652	72299	81951	97,379	103,708
27	Uttar Pradesh	91346	97696	87549	105096	123706	146351	175,649	195,194	2840943	342057	367987	405967	459076	532695	608,433	725,149
28	West Bengal	40315	42195	37121	42312	48370	58633	63,424	78,452	3154135	413706	391587	394695	376778	421605	465,613	672,493
	Union Territory:	2492726	2529902	2725995	2956982	3422129	3815528	4,163,009	4,691,802	72403618	9491699	10359403	11155213	12487890	13740635	15,107,598	16,910,719
1	A & N Islands	2997	2441	2705	2884	2950	3248	3,803	4,107	31501	5789	6222	6539	6630	7012	7,679	8,073
2	Chandigarh	2000	0	0	0	..	..	0	2664	184973	14644	15448	16723	23755	31290	34,365	35,525
3	Dadra & Nagar Haveli	539	557	568	579	605	620	632	647	87699	9477	10380	11090	11851	12707	13,419	14,317
4	Daman & Diu	976	1091	1120	1151	1173	1216	1,230	1,245	54393	6794	7248	7553	7921	8668*	9,043	9457*
5	Delhi	96149	158242	168073	179640	182784	190693	68,653	11,407	2185166	406006	440683	479427	507820	541620	280,469	317963**
6	Lakshadweep	273	291	321	321	321	366	420	479	5426	725	792	920	1096	1,355	1,620	
7	Puducherry	4665	4925	5039	5062	5124	5217	5,221	6,321	157769	21964	23013	23804	24933	26296	28,200	26,298
	Uts	107599	167547	177826	189637	192957	201360	79,959	26,870	2706927	465399	503786	545928	583830	628689	374,530	413,253
	Total	2600325	2697449	2903821	3146619	3615086	4016888	4,242,968	4,718,672	75110545	9957098	10863189	11701141	13071720	14369324	15,482,128	17,323,972

Source : Motor Transport Statistics of India, Transport Research Wing, Ministry of Road Transport & Highways

Included in Tractors ^ : Included other vehicles not covered in 'transport vehicles'

\$: Included in Multi-Axled/Articulated Vehicles/Trucks & Lorries

(c) : LMV (passenger) includes 6538 Motorcycles on hire also.

* : includes Motor cycles on hire

^ : included in Cars

(Note: for website:<http://morth.nic.in/writereaddata/mainlinkFile/File838.pdf>.)

Table 4.8.1 : Total registered motor vehicles in India by State/Uts

Sl. No.	States/UT	Non-Transport													
		Two Wheelers						Cars							
		2006	2007	2008	2009	2010	2011	2012	2006	2007	2008	2009	2010	2011	2012
1	2	45	46	47	48	49	50	51	52	53	54	55	56	57	58
1	Andhra Pradesh	5707383	4686543	5262086	5851893	6514593	7488771	9,291,132	576329	535649	619092	701920	777746	880817	1,058,184
2	Arunachal Pradesh*	11112	11112	11112	11112	11112	....		2595	2595	2595	2595	2595	2595	....
3	Assam	541275	610529	667788	740420	830836	958935	1,101,265	145029	165255	184088	203000	232546	269605	311,917
4	Bihar	964594	1077579	1197875	1364757	1606613	1899017	2,230,069	76896	84305	92528	103077	188031	136845	160,340
5	Chhattisgarh	1247658	1395935	1553104	1686424	1964769	2232929	2,503,781	59591	69080	79616	92437	108326	131862	154,529
6	Goa	375571	408269	436662	467827	502042	541934	589,377	89547	99191	109215	120425	133717	149869	167,544
7	Gujarat	6352109	7003860	7579457	8087416	8716981	9507556	10,512,304	703968	784686	869808	952400	1057383	1218030	1,411,898
8	Haryana	1881174	2172669	2463672	2768197	2975418	3370426	3,755,349	373659	449285	541380	618942	720441	855596	989,519
9	Himachal Pradesh	187883	188166	200163	249994	283081	331418	384,832	58005	61928	69482	80224	95791	116176	171,382
10	Jammu & Kashmir	297656	320754	341834	363029	407928	446791	480,815	98309	112135	128398	145060	172071	198238	230,328
11	Jharkhand	1164854	1302967	1428934	1570575	1738566	1947572	1,851,060	113500	126179	139053	154803	174320	201269	227,386
12	Karnataka	4512910	3755719	4230864	4796587	6404905	7033045	7,737,366	635205	694252	791014	892160	1005291	1131201	1,269,430
13	Kerala	2099652	2056472	2367602	2612341	2900238	3294953	3,811,343	498472	533494	603842	692628	826538	985736	1,151,566
14	Madhya Pradesh	3526416	3895557	4292649	4691218	5165023	5783120	6,411,155	185700	208052	237022	272009	314464	366674	424,644
15	Maharashtra	7691856	8573679	9394869	10212360	11181762	12429011	13,921,763	1165365	1308088	1462518	1603728	1790259	2027080	2,307,841
16	Manipur	86931	93955	105465	105465	139650	145286	148,942	11233	11475	12077	12077	15113	17019	17,299
17	Meghalaya	31008	36112	40953	45747	51709	56790	65,712	22351	25268	28335	32995	37981	43901	49,728
18	Mizoram	24737	27776	30062	32267	39902	47978	60,278	6286	8061	8716	9326	10382	11583	13,839
19	Nagaland	42851	45961	48976	52119	55208	61085	61,546	37513	40574	43129	45549	47984	50249	53,074
20	Odisha	1530295	1701981	1874644	2052980	2302694	2614980	2,946,118	82686	90258	99350	112490	133529	161024	186,323
21	Punjab	2975198	3173433	3385088	3581837	3956279	3956279	4,729,594	335284	367655	406966	444465	484064	616,549	
22	Rajasthan	3393916	3833746	4261695	4715835	5230454	5859719	6,629,743	269561	310101	355122	402239	455924	520385	591,069
23	Sikkim	5282	5549	5793	5956	6308	6843	7,447	3053	3759	4226	5704	8905	12264	13,933
24	Tamil Nadu	7936778	8689876	9446469	10223233	11156048	12393788	13,846,378	840433	911752	996220	1091231	1204156	1350722	1,504,735
	Telangana														
25	Tripura	61968	69830	76952	85455	97895	117486	129,343	6656	7798	8836	9966	10095	11224	12,390
26	Uttarakhand	486734	474666	533443	570359	583927	70895	897,651	59368	74101	84706	98355	119859	147591	188,152
27	Uttar Pradesh	6083655	7138789	773237	8521198	9493677	10563850	12,410,064	615739	641939	703071	775569	873251	10563850	1,108,100
28	West Bengal	1833820	2081355	1748253	2017198	1864861	2260657	2,717,713	556230	602420	547738	560875	435352	492454	575,085
	Union Territory:	61055276	64832479	70723701	77483799	86182479	96058814	109,232,140	7628563	8329335	9228143	10236249	11436114	12956415	14,966,784
1	A & N Islands	23079	34458	37993	42386	43762	48819	54,220	2441	5803	6785	8263	10988	12863	14,632
2	Chandigarh	454308	474595	493380	511568	686316	711007	737,263	176387	188786	203052	218857	239014	265135	286,584
3	Dadra & Nagar Haveli	23607	27541	31424	35059	38635	43010	48,550	11820	13402	15728	17210	17507	19687	21,762
4	Daman & Diu	33379	38751	42373	42861	43991	47247	52,339	15007	15952	17191	18297	19332	20501	22,175
5	Delhi	2851920	3377073	3616417	3846721	4107912	4395086	4,661,714	1222706	1536897	1668880	1802251	1956574	2116107	2,172,069
6	Lakshadweep	4822	5227	5639	5639	6206	6888	7,698	38	44	48	64	87	122	
7	Puducherry	296735	338638	385090	434072	488490	553711	625,251	52593	56249	60315	64631	69813	76678	85,418
		3687850	4296283	4612316	4918306	5415312	5805768	6,187,035	1480992	1817133	1971999	2129557	2313292	2511058	2,602,762
	Total	64743126	69128762	75336017	82402105	91597791	101864582	115,419,175	9109555	10146468	11200142	12365806	13749406	15467473	17,569,546

Source : Motor Transport Statistics of India, Transport Research Wing, Ministry of Road Transport & Highways

Included in Tractors ^ : Included other vehicles not covered in 'transport vehicles'

\$: Included in Multi-Axled/Articulated Vehicles/Trucks & Lorries

(c) LMV (passengers) includes 6538 Motorcycles on hire also.

* : includes Motor cycles on hire

^ : included in Cars

(Note: for website:<http://morth.nic.in/writereaddata/mainlinkFile/File838.pdf>)

Sl. No.	States/UT	Table 4.8.1 : Total registered motor vehicles in India by State/Uts														
		Jeeps							Non-Transport							
		2006	2007	2008	2009	2010	2011	2012	2006	2007	2008	2009	2010	2011	2012	
1	2	59	60	61	62	63	64	65	66	67	68	69	70	71	72	
1	Andhra Pradesh	65377	27500	28476	29494	29587	29652	30,400	45214	38722	41959	45421	49130	53531	60,897	
2	Arunachal Pradesh*	2284	2284	2284	2284	2284	...	...	0	0	0	0	0	...	...
3	Assam	15080	15230	15347	18131	20742	20861	20,968	0	1155	1162	1203	1225	1243	1,248	
4	Bihar	41863	46293	50522	56270	66132	75878	84,949	0	0	0	0	0	...	...
5	Chhattisgarh	8575	9392	10395	11637	13277	15062	16,561	0	0	0	0	30879	33739	33,739	
6	Goa	@	357	730	1065	^	...	^	0	0	0	0	0	0	0	
7	Gujarat	122864	128247	135014	141565	152985	160800	167,991	0	0	0	0	...	...	...
8	Haryana	95450	101735	108885	111602	115852	113384	121,202	0	0	0	0	0	0	0	
9	Himachal Pradesh	9544	13497	14589	18932	20693	22756	12,704	402	201	259	262	634	949	...	
10	Jammu & Kashmir	11058	11222	11295	11402	11601	118301	24,920	219	219	219	219	1219	1818	2,687	
11	Jharkhand	30962	35762	40269	45455	52155	59892	67,139	0	0	0	0	...	...	...
12	Karnataka	41989	36739	38319	39669	40225	41229	42,179	54808	53991	60972	70708	105503	109075	113,204	
13	Kerala	73158	120300	128082	137547	137547	137,547	0	3252	3559	3712	3748	3798	3,798		
14	Madhya Pradesh	38291	37449	38181	39652	41396	49566	51,197	0	0	0	0	...	...	...
15	Maharashtra	300023	322053	341782	356986	373958	394647	423,305	0	18238	18158	18477	18752	18677	19,021	
16	Manipur	8568	8937	9146	9146	11472	11901	12,241	801	915	1250	1250	1524	1600	1,605	
17	Meghalaya	11300	12229	12917	13652	14328	15011	15,682	0	0	0	0	1	1	3	
18	Mizoram	3712	7486	7888	8233	8813	9211	4,082	0	0	0	0	0	0	0	
19	Nagaland	22481	23372	24433	25211	25888	26313	27,083	350	421	474	478	497	501	505	
20	Odisha	30547	31555	32591	34111	36726	41966	44,396	2567	2784	2989	3220	3451	3668	3,668	
21	Punjab	41670	46957	49555	52193	54798	54798	63,527	0	0	0	0	...	...	...
22	Rajasthan	147840	157574	169601	182922	203692	227910	254,840	0	0	0	0	...	...	...
23	Sikkim	3769	4177	4310	4557	4869	5251	6,086	1070	1380	1384	1389	1393	1399	1,484	
24	Tamil Nadu	55673	56461	56825	57207	57417	58080	58,718	19957	19957	19957	19957	19957	19957	19,957	
	Telangana															
25	Tripura	4358	4485	4733	4977	12340	14434	15,542	13	18	18	18	...	...	...
26	Uttarakhand	6944	4526	4269	4385	8103	8876	9,762	1629	1292	5612	1651	1289	1302	1,903	
27	Uttar Pradesh	112837	109981	122120	135149	159128	984937	200,316	19015	16982	20240	19305	18740	984937	23,473	
28	West Bengal	@	@	@	#	^	^	^	0	0	0	0	...	...	...
	Union Territory:	1306217	1375800	1462558	1553434	1676008	1889724	1,913,337	146045	159527	178212	187270	257942	272817	287,192	
1	A & N Islands	779	1948	2181	2235	^	^	^	335	0	0	0	^	...	^	
2	Chandigarh	0	0	0	0	...	...	^	51	71	104	119	130	287	..
3	Dadra & Nagar Haveli	460	471	0	447	549	561	568	6	6	0	0	20	22	0	
4	Daman & Diu	307	342	401	78884	477	499	542	38	38	38	38	42	42	51	
5	Delhi	65028	77847	78711	94	79418	79488	68,648	80277	89320	89345	89367	89367	89368	89,373	
6	Lakshadweep	88	90	94	3881	95	99	121	73	87	87	87	0	0	0	
7	Puducherry	3865	3866	3880	3881	3882	3,882	2918	2784	2867	2931	2958	3045	3,123		
		70527	84564	85267	85541	84420	84529	73,761	83698	92306	92441	92542	92517	92764	92,547	
	Total	1376744	1460364	1547825	1638975	1760428	1974253	1,987,098	229743	251833	270653	279812	350459	365581	379,739	

Source : Motor Transport Statistics of India, Transport Research Wing, Ministry of Road Transport & Highways

Included in Tractors ^ : Included other vehicles not covered in 'transport vehicles'

\$: Included in Multi-Axled/Articulated Vehicles/Trucks & Lorries

(c) LMV (passengers) includes 6538 Motorcycles on hire also.

* : includes Motor cycles on hire

^ : included in Cars

\$\$ Includes Omni Buses

(Note: for website:<http://morth.nic.in/writereaddata/mainlinkFile/File838.pdf>)

Table 4.8.1 : Total registered motor vehicles in India by State/Uts

Sr. No	States/UT	Non- Transport													
		Tractors							Trailers						
		2006	2007	2008	2009	2010	2011	2012	2006	2007	2008	2009	2010	2011	2012
1	2	73	74	75	76	77	78	79	80	81	82	83	84	85	86
1	Andhra Pradesh	66613	184441	212904	242305	261509	292427	342,416	51881	167206	193524	218860	229149	242270	289,422
2	Arunachal Pradesh*	345	345	345	345	345	345	...	..	155	155	155	155	155	...
3	Assam	11270	12231	13170	14586	16177	18714	19,655	9050	9386	9830	10307	10805	11620	15,290
4	Bihar	130477	136637	144801	156004	175500	196555	219,509	75594	80875	86233	93743	104272	115214	126,618
5	Chhattisgarh	58733	66077	73489	82175	91621	102699	115,524	50684	56248	61412	67077	72839	78940	85,129
6	Goa	..	0	0	20	2562	2890	3,114	..	0	0	0	..	..	#
7	Gujarat	311385	336986	362799	386951	410516	442737	495,136	217790	232509	248751	263807	278921	294885	317,509
8	Haryana	382581	405605	430365	473438	490828	487321	516,658	0	0	0	0	0	0	0
9	Himachal Pradesh	0	7424	8197	9039	9292	9576	20,916	0	1423	1689	1834	1836	1853	220
10	Jammu & Kashmir	12818	14109	15615	16640	11640	13538	15,574	587	610	622	633	2861	3242	3,289
11	Jharkhand	20968	23977	26785	30665	35431	41116	47,114	16819	0	0	0	..	..	..
12	Karnataka	166685	132142	142521	152964	318844	341559	363,993	167622	122749	138919	143629	215575	233297	251,553
13	Kerala	15162	9644	10207	10641	10665	11209	11,602	2264	3196	3503	3653	3653	3,656	3,656
14	Madhya Pradesh	376771	394356	411424	432618	458445	498997	545,115	192742	200719	206640	210903	215333	219731	224,033
15	Maharashtra	229362	250950	276438	302249	331694	371075	419,291	204733	220284	238080	252409	270078	293576	324,824
16	Manipur	1446	1604	1686	1686	3155	3185	3,326	612	626	664	664	680	715	394
17	Meghalaya	487	516	525	567	609	665	751	2607	2613	2649	2680	2713	2765	2,794
18	Mizoram	246	199	209	216	227	252	274	264	70	70	86	90	92	79
19	Nagaland	1891	1998	2073	2163	2260	2340	2,482	772	786	821	943	1020	1023	1,072
20	Odisha	42189	47327	52070	57384	64354	74439	83,079	34679	39577	44318	48771	55370	65016	73,110
21	Punjab	472873	478057	485044	491358	497551	497551	517,743	481	564	737	862	966	966	1,172
22	Rajasthan	464443	504002	537735	569807	605539	644305	699,881	59564	62086	65088	67134	69287	70525	71,665
23	Sikkim	24	34	38	38	49	59	76	..	0	0	0	0	0	2
24	Tamil Nadu	102744	115260	126358	137829	150432	167066	186,670	44015	49607	54652	58175	62260	66269	71,403
	Telangana														
25	Tripura	89	97	127	189	976	1010	1,015	100	101	102	103	326	349	357
26	Uttarakhand	34155	29215	30934	32271	42921	46164	41,847	1401	2710	3228	3536	1508	839	5,883
27	Uttar Pradesh	791411	797990	847329	893683	953959	176398	1,064,284	14579	9549	10245	10696	15373	176398	15,278
28	West Bengal	58828	#	#	@	51233	57505	70,980	#	63430	59298	54516	...	#	...
	Union Territory:	3753996	3951223	4213188	4497831	4998334	5303581	5,808,025	1148995	1327079	1431230	1515176	1615070	1721969	1,884,752
	1 A & N Islands	229	0	0	0	^	...	^	22	0	0	0	^	...	^
	2 Chandigarh	0	0	0	0	149	173	196	0	0	0	0	0	0	#
	3 Dadra & Nagar Haveli	57	86	0	0	152	177	36	46	46	0	0	77	77	186
	4 Daman & Diu	224	248	273	287	300	313	352	138	165	176	186	195	205	213
	5 Delhi	4706	5027	5091	5206	5294	5384	1,343	99	99	99	99	99	99	99
	6 Lakshadweep	63	72	78	78	72	84	102	0	0	0	0	0	0	0
	7 Puducherry	478	567	705	793	900	993	1,077	1655	1683	1702	1722	1732	1759	1,781
		5757	6000	6147	6364	6867	7124	3,106	1960	1993	1977	2007	2103	2140	2,180
	Total	3759753	3957223	4219335	4504195	5005201	5310705	5,811,131	1150955	1329072	1433207	1517183	1617173	1724109	1,886,932

Source : Motor Transport Statistics of India, Transport Research Wing, Ministry of Road Transport & Highways

Included in Tractors ^ : Included other vehicles not covered in 'transport vehicles'

\$: Included in Multi-Axled/Articulated Vehicles/Trucks & Lorries

(c) LMV (passengers) includes 6538 Motorcycles on hire also.

* : includes Motor cycles on hire

\$\$ Includes Omni Buses

^ : included in Cars

(Note: for website:<http://morth.nic.in/writereaddata/mainlinkFile/File838.pdf>)

Table 4.8.1 : Total registered motor vehicles in India by State/Uts

Sr. No.	States/UT	Non- Transport						
		Others						
		2006	2007	2008	2009	2010	2011	2012
1	2	87	88	89	90	91	92	93
1	Andhra Pradesh	6617	6268	8331	10032	11480	14258	20,461
2	Arunachal Pradesh*	180	180	180	180	180	...	..
3	Assam	22192	22903	23802	24713	25653	26628	27,591
4	Bihar	8569	10350	13015	14603	15572	17512	18,801
5	Chhattisgarh	2849	3507	4548	5772	6936	8311	9,857
6	Goa	4773	5310	5943	6542	4587	4631	4,825
7	Gujarat	17417	22926	27981	32130	36818	42155	46,064
8	Haryana	21434	21646	13030	8185	4408	10336	10,809
9	Himachal Pradesh	1042	0	0	18992	4077	6910	6,110
10	Jammu & Kashmir	1869	2114	2209	2303	2861	3242	4,290
11	Jharkhand	7268	0	0	0	...	...	...
12	Karnataka	43213	33343	40318	51363	65634	67967	69,795
13	Kerala	15880	75837	81386	86890	121101	128079	151,259
14	Madhya Pradesh	13665	13990	14618	15595	17027	18403	20,809
15	Maharashtra	29446	17729	21331	24080	27066	27188	32,557
16	Manipur	270	423	435	435	718	714	774
17	Meghalaya	1240	1339	1660	1965	2482	2858	3,234
18	Mizoram	4925	3758	3914	3914	3812	4015	520
19	Nagaland	353	12273	13044	13900	929	1443	1,908
20	Odisha	5975	6278	9805	12680	20556	29223	29,393
21	Punjab	7581	5662	6783	7899	10181	10181	17,163
22	Rajasthan	5822	0	0	0	...	...	...
23	Sikkim	...	0	0	0	...	...	...
24	Tamil Nadu	108041	119441	128814	135221	153853	167783	179,041
	Telangana							
25	Tripura	5397	7310	7723	8201	714	831	908
26	Uttarakhand	2802	10910	13440	15143	1536	1843	1,465
27	Uttar Pradesh	21132	28412	17902	17245	15145	21559	15,326
28	West Bengal	34812	37391	15008	16335	18914	28403	31,350
	Union Territory:	394764	469300	475220	534318	572240	636954	704,310
1	A & N Islands	8237	97	107	306	394	406	532
2	Chandigarh	0	0	0	0	...	...	...
3	Dadra & Nagar Haveli	0	0	0	0	41	116	0
4	Daman & Diu	31	31	31	69	84	113	141
5	Delhi	169	187	195	212	364	519	76,504
6	Lakshadweep	546	495	497	497	498	499	499
7	Puducherry	5850	6330	6427	6414	6422	6439	6,544
	Total	409597	476440	482477	541816	580043	645046	788,530

Source : Motor Transport Statistics of India, Transport Research Wing, Ministry of Road Transport & Highways

Included in Tractors

^ : Included other vehicles not covered in 'transport vehicles'

\$: Included in Multi-Axled/Articulated Vehicles/Trucks & Lorries

(c) : LMV (passengers) includes 6538 Motorcycles on hire also.

* : includes Motor cycles on hire

^ : included in Cars

\$\$ Includes Omni Buses

(Note: for website:<http://morth.nic.in/writereaddata/mainlinkFile/File838.pdf.>)

Table 4.8.1 : Total registered motor vehicles in India by State/Uts

Sr. No.	States	Total Non- Tpt.								Grand Total (Transport +Non- Tpt.)							
		2006	2007	2008	2009	2010	2011	2012	2013	2006	2007	2008	2009	2010	2011	2012	2013
1	2	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109
1	Andhra Pradesh	53529045	5646329	6366372	7099925	7873194	9001726	11092912	11386231	58568494	6366856	7207946	8058948	8923139	10189347	12424328	12687703
2	Arunachal Pradesh*	82641	16671	16671	16671	16671	16671	16671	16671	103999	22101	22101	22101	22101	144534	151279	151279
3	Assam	7300375	836689	915187	1012360	1137984	1307606	1497934	1674738	8736005	1021036	1116422	1234751	1383721	1582128	1807120	1877522
4	Bihar	13455046	1436039	1584974	1788454	2156120	2441021	2840286	3280286	14676982	1577383	1739140	1959553	2356986	2673209	3112880	3617227
5	Chhattisgarh	14528808	1600239	1782564	1945522	2288647	2603542	2919120	3231053	15688330	1733809	1934871	2114589	2435773	2766037	3104038	3437242
6	Goa	469891	513127	552550	595879	642908	699324	764860	832337	1001829	578751	623959	673909	727042	790075	865609	938372
7	Gujarat	70385442	8509214	9223810	9864269	10653604	11666163	12950902	14185705	76727166	9497337	10289056	10998651	11872573	12993135	14413717	15772453
8	Haryana	27912091	3150940	3557332	3980364	4306947	4837063	5393537	5969363	31135980	3528297	3973284	4425221	4791825	5377003	5978110	6599594
9	Himachal Pradesh	2668315	272639	294379	379277	415404	489638	596164	695934	3558400	341747	370895	494398	538341	621714	736604	876061
10	Jammu & Kashmir	4063422	461163	500192	539286	610181	785170	761903	849225	5011674	570302	620247	668445	738905	926961	916898	1020786
11	Jharkhand	12722848	1488885	1635041	1801498	2000472	2249849	2192699	2486316	16193376	1685974	1849664	2038020	2767408	3113182	3157986	3416777
12	Karnataka	48673860	4828935	5442927	6147080	8155977	8957373	9847520	10882950	53352466	5486056	6217375	6952551	9043976	9930483	10909601	12063686
13	Kerala	25447102	2802195	3198181	3547412	4003490	4564978	5270771	6106308	32276104	3957292	4430229	4859918	5397652	6072019	6893314	7857822
14	Madhya Pradesh	40670969	4750123	5200534	5661995	6211688	6936491	7676953	8239518	43201168	5047093	5523458	6010691	6590576	7355702	8144159	8760039
15	Maharashtra	91708790	10711021	11753176	12770289	13993569	15561254	17448602	19396525	101210149	12170991	13335361	14450908	15768421	17434099	19432361	21488152
16	Manipur	1022744	117575	130723	130723	172312	180420	184581	258032	1147323	133486	147394	147394	194452	206502	214523	295927
17	Meghalaya	687946	78077	87039	97606	109823	121991	137904	153568	723069	116535	127989	141877	158113	175737	197838	220021
18	Mizoram	387971	47350	50859	54042	63226	73131	79072	95860	511885	60904	65655	69882	80456	92648	101830	121336
19	Nagaland	885879	125385	132950	140363	133786	142954	147670	157566	1650214	210086	225763	239873	254483	272653	2914388	311231&
20	Odisha	1728938	1919760	2115767	2321636	2616680	2990316	3366087	3778149	3789360	2148314	2370432	2607361	2931832	3338038	3758530	4215540
21	Punjab	32713822	4072328	4334173	4578614	5003839	5003839	5945748	5945748	34404277	4293856	4572579	4831531	5274254	6262939	6262939	6262939
22	Rajasthan	4341446	4867509	5389241	5937937	6564896	7322844	8247198	9255838	8302375	5336123	5902489	6489564	7165662	7986265	8985478	10071945
23	Sikkim	137929	14899	15751	17644	21524	25816	29028	21862	231460	24682	26025	28551	33626	38783	43334	36277
24	Tamil Nadu	83632752	9962354	10829295	11722853	12804123	14223665	15866902	17552453	92006552	10980668	11929543	12890997	14061533	15638245	17412248	19232061
25	Telangana								5747088							6376477	
26	Tripura	777243	89639	98491	108909	122346	145334	159555	194734	952734	119561	130912	143823	160119	187673	204218	244922
27	Uttarakhand	5368542	597420	675632	725700	759143	915210	1146663	1356428	5850974	643201	730851	787352	831372	997161	1244042	1460136
28	Uttar Pradesh	85955534	8743642	9458144	10372845	11529273	21559	14836841	16323035	88796477	90856999	9826131	10778812	11988349	978627	15445274	17048184
29	West Bengal	18744697	2784596	2370297	2648924	2370360	2839019	3395128	5438241	21898832	3198302	2761884	3043619	2747138	3260624	3860741	6110734
30	Union Territory:	650004088	80444743	87712252	96008077	106738187	118840274	134796540	155495091	721702654	89936442	98071655	107163290	119239828	132725443	150070437	172572445
1	A & N Islands	362461	42306	47066	53190	55144	62088	69384	77369	393962	48095	53288	59729	61774	69100	77063	85442
2	Chandigarh	5647538	663452	696536	730544	925609	976602	1024043	1070824	5832511	678096	711984	747267	949364	1007892	1058408	1106349
3	Dadra & Nagar Haveli	369001	41552	47152	52716	56981	63650	71102	79129	456700	51029	57532	63806	68832	76357	84521	93446
4	Daman & Diu	514453	55527	60483	140622	64421	68920	75813	82088	568846	62321	67731	148175	72342	77588	84856	91545
5	Delhi	40430807	5086450	5458738	5743950	6239028	6686051	7069651	7467320	42615973	5492456	5899421	6223377	6746848	7227671	7350120	7785283
6	Lakshadweep	48485	6015	6443	10230	6935	7657	8542	9485	53911	6740	7235	11022	7855	8753	9897	11105
7	Puducherry	3654984	410117	460986	510563	574196	646507	727076	673316	3812753	432081	483999	534367	599129	672803	755276	699614
	Total	701031817	86750162	94489656	103249892	114660501	127351749	143842151	164954622	775437310	105352845	114951033	127745972	141865607	159490578	182445229	

nt Research Wing, Ministry of Road Transport & Highways

Included in Tractors ^ : Included other vehicles not covered in 'transport vehicles'

\$: Included in Multi-Axled/Articulated Vehicles/Trucks & Lorries

(c) : LMV (passengers) includes 6538 Motorcycles on hire also.

Motor cycles on hire ^ : included in Cars

: Category wise break up not reported

& : Includes 15020 Government Vehicles (for which category wise break up is not available)

4.8.2 The Total number of registered motor vehicle in India is increasing year by years. Table 4.8.2 shows

- (i) Poor quality of vehicles creating more particulates and burning fuels inefficiently.
- (ii) Lower quality of fuel being used leads to far greater quantities of pollutants.
- (iii) Concentration of motor vehicles in a few large cities.
- (iv) Exposure of a larger percentage of population that lives and moves in the open.

Table 4.8.2 : Total number of registered motor vehicles in india (1992-2013)

Sl. No.	Year	All Vehicles	Two-Wheelers*	Car, Jeeps and Taxis	Buses#	(in thousand)	
						4	5	6	7	8
1	2	3	4	5	6	7	8
1	1992	23507	15661	3205	358	1514	2769
2	1993	25346	17060	3344	380	1592	2970
3	1994	27660	18899	3569	392	1691	3109
4	1995	30295	20831	3841	423	1794	3406
5	1996	33786	23252	4204	449	2031	3850
6	1997	37332	25729	4672	484	2343	4104
7	1998	41368	28642	5138	538	2536	4514
8	1999	44875	31328	5556	540	2554	4897
9	2000	48857	34118	6143	562	2715	5319
10	2001	54991	38556	7058	634	2948	5795
11	2002	58924	41581	7613	635	2974	6121
12	2003	67007	47519	8599	721	3492	6676
13	2004	72718	51922	9451	768	3749	6828
14	2005	81449	58799	10320	892	4031	7457
15	2006	89618	64743	11526	992	4436	7921
16	2007	96707	69129	12649	1350	5119	8460
17	2008	105353	75336	13950	1427	2601	9039
18	2009	114951	82402	15313	1486	6041	9710
19	2010	127746	91598	17109	1527	6432	11080
20	2011	141866	101865	19231	1604	7064	12102
21	2012	159491	115419	21568	1677	7658	13169
22	2013	182445	132550	24853	1894	8597	14551

Source: Transport Research Wing, Ministry of Road Transport & Highways .Road transport year book-2011-12

* Two wheelers include auto-rickshaws for the years ending 31st March 1959,1960,1962,1963,1964, 1965,1967, 1968

** Others include tractors, trailers, three wheelers (passenger vehicles _LML and other miscellaneous vehicles which

Includes Omni buses since 2001.

Totals may not tally due to rounding off of data

4.8.3 With the increasing urbanization and industrialization, the transport demand has also increased consequently. This has increased the vehicular pollution in manifold. The different factors of the pollution are the types of engines used, the age of the vehicles, poor road conditions and congested traffic. The principal vehicular pollutants are Carbon Monoxide, Oxides of Nitrogen, Hydrocarbons, suspended and particulate matters, a varying amount of Sulphur Dioxide depending on the Sulphur content of the fuel and lead compounds.

Table 4.8.3: Total registered motor vehicles (category -wise) in Million plus cities of India

Sl. No.	Name of City	2011			2012			2013		
		Transport	Non-Transport	Total	Transport	Non-Transport	Total	Transport	Non-Transport	Total
1	2	6	7	8	9	10	11	12	13	14
1	Agra	29994	610064	640058	32,528	671,233	703,761	32,984	719210	752,194
2	Ahmedabad							195,712	1599936	1,795,648
3	Allahabad	23711	659303	683014	28,211	709,529	737,740	31805	714863	746,668
4	Aurangabad	27317	225482	252799	28,918	251,697	280,615	32621	276891	309,512
5	Bengaluru#	368953	3422365	3791318	398,939 ^	3,757,193	4,156,132	447040^	4144136	4,591,176
6	Bhopal	51714	703369	755083	56,612	771,957	828,569	61923	814757	876,680
	Chandigarh							35525	1070824	1,106,349
7	Chennai	382592	3073197	3455789	405,421	3,361,873	3,767,294	428244	3643735	4,071,979
8	Coimbatore	52470	1188626	1241096	61,065	1,325,064	1,386,129	70212	1457830	1,528,042
9	Delhi	541620	6686051	7227671	280,469	7,069,651	7,350,120	317963^	7467320	7,785,283
10	Dhanbad*	25100	15812	40912	118,468 *	343,455	461,923	118478*	371945	490,423
	Durg Bhilai							21531	468196	489,727
11	Ghaziabad	37673	432408	470081	42,790	482,181	524,971	38341	589438	627,779
12	Greater Mumbai	232766	1637545	1870311	238,730	1,789,770	2,028,500	244713	1942685	2,187,398
13	Gwalior	35666	413591	449257	38,975	450,541	489,516	41470	488283	529,753
14	Hyderabad	347143	2685596	3032739	403,448	2,983,127	3,386,575	181483	1858475	2,039,958
15	Indore	122399	1090566	1212965	135,057	1,202,899	1,337,956	148271	1342498	1,490,769
16	Jabalpur	37914	521242	559156	41,975	563,513	605,488	45771	600709	646,480
17	Jaipur	143346	1550626	1693972	160,299	1,710,750	1,871,049	157305	1804322	1,961,627
18	Jamshedpur*	43423	23465	66888	154,921 *	527,156	682,077	155115*	527156	682,271
19	Jodhpur	70645	565496	636141	103,868	764,583	868,451	87337	705662	792,999
20	Kanpur	37693	964091	1001784	28,069	1,039,371	1,067,440	31286	1112114	1,143,400
21	Kochi	58633	349889	408522	68,798	411,540	480,338	78963	468191	547,154
22	Kolkata**	67670	377048	444718	70,787	425,519	496,306	178773	1099585	1,278,358
23	Kota	32406	440743	473149	53,281	899,250	952,531	37477	516396	553,873
24	Lucknow	35401	1175488	1210889	37,623	1,277,082	1,314,705	40598	1383880	1,424,478
25	Madurai	53950	548902	602852	59,241	620,269	679,510	76504	691235	767,739
26	Meerut	11177	411965	423142	13,817	406,124	419,941	27655	384755	412,410
27	Nagpur	58830	1098204	1157034	62,700	1,174,399	1,237,099	61023	1208654	1,269,677
28	Nasik	35623	362202	397825	37,809	406,580	444,389	40635	448963	489,598
29	Patna	97758	559898	657656	82,469	660,420	742,889	93573	735148	828,721
30	Pune	183313	1910577	2093890	151,581	2,115,542	2,267,123	158040	2188843	2,346,883
31	Raipur	46058	481249	527307	50,292	528,227	578,519	56057	582758	638,815
32	Rajkot							61324	765376	826,700
33	Ranchi							209041*	475413	684,454
34	Srinagar	43438	140334	183772	45,740	155,266	201,006	48475	169932	218,407
35	Surat							102724	1138129	1,240,853
36	Tiruchirapalli	35632	421111	456743	39,910	481,468	521,378	44479	548566	593,045
37	Varanasi	39234	498782	538016	44,710	542,823	587,533	49661	583418	633,079
38	Vijayawada	70394	395890	466284	29,379	524,034	553,413	69484	447435	516,919
39	Vadodara							85193	828730	913,923
40	Visakhapatnam	63085	553553	616638	72,533	610,822	683,355	55968	586553	642,521
	Total	3544741	36194700	39739441	75934141	115673582	191607723	4500777	48972945	53,473,722

Source: Transport Research Wing, Ministry of Road Transport & Highways, (Transport year book-2012-13)

Includes other vehicles which are not covered in

* Includes motor cycles on hire

Table 4.8.4 : Total registered motor vehicle in million plus cities of India

as on 31st March 2013

(In thousands)

SI No.	Million Plus Cities	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
1	Agra	.	.	.	.	.	.	.	.	580	640	704	752
2	Ahmedabad	899	978	1075	1632	1780	1451	1586	1691	-	-	1682	1796
3	Allahabad	-	-	-	-	-	-	-	-	-	-	738	747
4	Amritsar	-	-	-	-	-	-	-	-	-	-	803	-
5	Aurangabad	-	-	-	-	-	-	-	-	-	253	281	310
6	Bengaluru	1680	1771	1891	2232	2617	2179	2640	3016	3491	3791	4156	4591
7	Bhopal	333	361	392	428	476	524	571	617	674	755	829	877
8	Chandigarh	-	-	-	-	-	-	-	-	-	-	1058	1106
9	Chennai	1356	1895	2015	2167	2338	2518	2701	2919	3149	3456	3767	4072
10	Coimbatore	448	578	630	682	750	827	910	1002	1110	1241	1386	1528
11	Delhi	3699	3971	4237	4186	4487	5792	5899	6302	6747	7228	7350	7785
12	Dhanbad	-	-	-	-	-	-	-	-	-	31	41	462
13	Durg Bhilai	-	-	-	-	-	-	-	-	-	-	445	490
14	Ghaziabad	-	-	-	-	-	-	-	-	-	409	470	525
15	Greater Mumbai	1069	1124	1199	1295	1394	1503	1605	1674	1768	1870	2029	2187
16	Gwalior	-	-	-	-	-	-	-	-	-	412	449	490
17	Hyderabad	1241	1319	1356	1433	1522	2181	2444	2682	2728	3033	3387	2040
18	Indore	550	592	645	705	771	844	929	1007	1098	1213	1338	1491
19	Jabalpur	-	-	-	-	-	-	-	-	516	559	605	646
20	Jaipur	693	753	824	923	1051	1177	1289	1387	1549	1694	1871	1962
21	Jamshedpur	-	-	-	-	-	-	-	-	-	56	67	682
22	Jodhpur	-	-	-	-	-	-	-	-	-	577	636	868
23	Kanpur	385	425	425^	425^	425^	553	598	642	940	1002	1067	1143
24	Kochi	152	166	166^	166^	166^	257	247	303	322	409	480	547
25	Kolkata**	801	842	875	911	948	987	573	581	411	445	496	1278
26	Kota	-	-	-	-	-	-	-	-	440	473	953	554
27	Lucknow	556	615	615^	615^	615^	801	962	1025	1107	1211	1315	1424
28	Ludhiana	-	-	-	-	-	-	-	-	-	-	1337	-
29	Madurai	240	281	304	330	364	402	440	478	530	603	680	768
30	Meerut	-	-	-	-	-	-	-	-	387	423	420	412
31	Nagpur	459	503	543	770	824	884	946	1009	1079	1157	1237	1270
32	Nashik	-	-	-	-	-	-	-	-	358	398	444	490
33	Patna	313	336	336^	378	405	437	471	516	581	658	743	829
34	Pune	658	697	755	827	874	930	1141	1153	1908	2094	2267	2347
35	Raipur	-	-	-	-	-	-	-	-	469	527	579	639
36	Rajkot	-	-	-	-	-	-	-	-	-	-	760	827
37	Ranchi	-	-	-	-	-	-	-	-	-	-	729	684
38	Srinagar	-	-	-	-	-	-	-	-	172	184	201	218
39	Surat	575	633	692	692*	692*	912	982	1036	-	-	1145	1241
40	Tiruchirapalli	-	-	-	-	-	-	-	-	400	457	521	593
41	Varanasi	339	366	366^	366^	366^	456	482	522	497	538	588	633
42	Vijayawada	-	-	-	-	-	-	-	-	523	466	553	517
43	Vadodara	506	546	586	586	586*	861	934	1009	-	-	839	914
44	Visakhapatnam	365	393	412	435	462	472	515	559	586	617	683	643
		17317	19145	20339	22184	23913	26948	28865	31130	35605	39058	53493	53474

Source: Office of State Transport Commissioner/UT Administrations

- Not report

[^] : Data relates to the year 2003

* : Data relates to the year 2004

4.8.4 The quantum of road transport is an indicator of pollution caused by vehicles. The detail registered motor vehicle in million plus cities from 2002- to 2012 presented in the table 4.8.4 and category wise details of registered motor vehicle in major metropoiliton cities from 2010 to 2012 is presented in the table 4.8.5

The category wise details of motor vehicles in major metropolitan cities of India is available in table 4.7.4

Sl. No.	Name of City	Transport						Contd. (Number)
		Multi- axled/Articulat- ed Vehicles Trucks & Lorries	Light Motor Vehicles (Goods)	Buses	Taxies	Light Motor Vehicles (Passenger s-Auto)	Total Transport	
1	2	3	4	5	6	7	8	
1	Agra	3803	11116	1620	2899	8024	27462	
2	Allahabad	7942	6388	1159	440	7510	23439	
3	Augangabad	3219	9300	2661	895	9736	25811	
4	Bengaluru#	68401	63782	26283	40407	110578	342584	
5	Bhopal	6149	9563	3387	15810	11867	46776	
6	Chennai	92054	72326	36205	63738	83162	347485	
7	Coimbatore	7055	10505	4932	11718	10252	44462	
8	Delhi	85384	140872	43250	55530	182784	507820	
9	Dhanbad*	3752	4446	246	4464	3593	18674	
10	Ghaziabad	4584	10305	1664	2522	13735	32810	
11	Greater Mumbai	16877	52261	13281	60278	107853	250550	
12	Gwalior	7268	4585	5962	6726	8179	32720	
13	Hyderabad	106968	76137	22602	26351	85035	317093	
14	Indore	40227	20397	6919	29029	12879	109451	
15	Jabalpur	9106	8650	1512	8759	6169	34196	
16	Jaipur	57549	13361	20714	17589	20491	129704	
17	Jamshedpur*	4380	5676	246	17862	6528	36865	
18	Jodhpur	33301	6758	5935	7189	12000	65183	
19	Kanpur	20079	6738	283	240	6749	34089	
20	Kochi	3393	15954	5160	7592	14588	46687	
21	Kolkata**	14210	0	4009	27914	17740	63873	
22	Kota	15687	801	2926	2384	8745	30543	
23	Lucknow	6666	12333	2930	5055	7410	34394	
24	Madurai	10177	6939	4875	11632	11704	45327	
25	Meerut	4067	1979	1296	490	2213	10045	
26	Nagpur	15077	17542	4583	2388	16058	55648	
27	Nasik	4366	9508	950	1800	16904	33528	
28	Patna	22643	0	5366	7911	51157	87077	
29	Pune	35132	46433	14030	14331	61531	171457	
30	Raipur	24599	9918	1586	1877	4810	42790	
31	Srinagar	12022	7247	6701	5587	9888	41445	
32	Tiruchirapalli	8233	10079	2463	4526	5184	30485	
33	Varanasi	8008	10105	2252	2904	10955	34224	
34	Vijayawada	25818	10920	2760	5266	16810	61574	
35	Visakhapatnam	12267	7890	1434	7119	25716	54426	
	Total	800463	700814	262182	481223	988537	3270698	

Source : Motor Transport Statistics of India, Transport Research Wing, M/o Road Transport & Highways

Includes other vehicles which are not covered in 'Transport Vehicles'

* Includes motor cycles on hire

** Live vehicles after cancellation of vehicles registered prior to 1.1.1993

**Table 4.8.5 : Total registered motor vehicle in million plus cities of India
(as on 31st March, 2011) Contd.**

(Number)

Sl. No.	Name of City	Transport					
		Multi- axled/Articulat- ed Vehicles Trucks & Lorries	Light Motor Vehicles (Goods)	Buses	Taxies	Light Motor Vehicles (Passenger s-Auto)	Total Transport
1	2	3	4	5	6	7	8
1	Agra	3895	12476	1752	3370	8501	29994
2	Allahabad	8316	5847	1404	679	7465	23711
3	Augangabad	3311	10500	2921	768	9817	27317
4	Bengaluru#	71983	69758	28261	41190	121241	368953
5	Bhopal	6707	10742	3627	17945	12693	51714
6	Chennai	94395	76678	37205	72446	101868	382592
7	Coimbatore	8483	12303	5744	14220	11720	52470
8	Delhi	86301	156030	45757	62839	190693	541620
9	Dhanbad*	4174	6383	514	6816	4779	25100
10	Ghaziabad	4851	11083	1831	2872	17036	37673
11	Greater Mumbai	8079	52217	12841	50914	108715	232766
12	Gwalior	8013	5166	6056	7440	8991	35666
13	Hyderabad	114544	84736	25311	29548	93004	347143
14	Indore	43230	24096	7215	32215	15643	122399
15	Jabalpur	9834	9865	1537	9938	6740	37914
16	Jaipur	64809	13733	22143	20421	22240	143346
17	Jamshedpur*	4900	6383	386	22249	7071	43423
18	Jodhpur	37184	7184	6304	7778	12195	70645
19	Kanpur	21703	8044	464	270	7212	37693
20	Kochi	4375	20264	6105	9445	18444	58633
21	Kolkata**	13773	0	4249	30840	18808	67670
22	Kota	16204	1027	2979	2580	9616	32406
23	Lucknow	6869	12825	3035	5354	7318	35401
24	Madurai	11186	8401	5214	12799	16350	53950
25	Meerut	4071	2355	1456	535	2760	11177
26	Nagpur	15829	19040	4883	2661	16417	58830
27	Nasik	4731	10920	1110	1925	16937	35623
28	Patna	25525	0	5668	9092	57473	97758
29	Pune	38863	50664	15008	15911	62867	183313
30	Raipur	25424	11177	1714	2148	5595	46058
31	Srinagar	12334	7989	6822	6311	9982	43438
32	Tiruchirapalli	9288	11181	3021	5854	6278	35622
33	Varanasi	8564	11676	2347	3561	13086	39234
34	Vijayawada	28416	12854	3135	5845	20144	70394
35	Visakhapatnam	13661	9083	1536	7954	30851	63085
	Total	843825	772680	279560	526739	1080557	3544741

Source : Motor Transport Statistics of India, Transport Research Wing, Ministry of Road Transport & Highways

Includes other vehicles which are not covered in 'Transport Vehicles'

* Includes motor cycles on hire

** Live vehicles after cancellation of vehicles registered prior to 1.1.1993

**Table 4.8.5 : Total registered motor vehicle in million plus cities of India
(as on 31st March, 2012) Contd.**

Sl. No.	Name of City	Transport					
		Multi- axled/Articulat- ed Vehicles Trucks & Lorries	Light Motor Vehicles (Goods)	Buses	Taxies	Light Motor Vehicles (Passenger s-Auto)	Total Transport
1	2	3	4	5	6	7	8
1	Agra	3,866	14,294	1,791	3,853	8,724	32,528
2	Ahmedabad	22,741	43,408	25,961	8,261	83,752	184,123
3	Allahabad	8,929	8,010	1,344	976	8,952	28,211
4	Amritsar	11,200	7,715	2,850	1,198	19,626	42,589
5	Aurangabad	3,572	11,733	2,930	845	9,838	28,918
6	Bengaluru	76,843	73,888	29,160	46,235	134,343	398,939 ^
7	Bhopal	7,390	11,795	3,849	20,032	13,546	56,612
8	Chandigarh	2,689	23,015	5,170	3,491	...	34,365
9	Chennai	97,996	82,457	38,107	82,473	104,388	405,421
10	Coimbatore	10,632	15,406	6,281	16,654	12,092	61,065
11	Delhi	4,792	124,547	20,142	62,335	68,653	280,469
12	Dhanbad	28,664	28,731	1,396	27,654	28,731	118,468 *
13	Durg Bhilai	8,395	6,587	815	2,674	1,150	19,621
14	Ghaziabad	5,243	11,982	1,949	3,667	19,949	42,790
15	Greater Mumbai	8,160	53,969	12,958	54,148	109,495	238,730
16	Gwalior	8,633	5,945	11,993	2,266	10,138	38,975
17	Hyderabad	120,718	96,642	27,686	32,917	125,485	403,448
18	Indore	46,760	27,741	7,541	35,366	17,649	135,057
19	Jabalpur	10,637	11,236	10,135	2,627	7,340	41,975
20	Jaipur	75,359	14,116	23,294	23,349	24,181	160,299
21	Jamshedpur	20,005	50,420	1,766	27,389	50,420	154,921 *
22	Jodhpur	56,454	8,901	8,164	13,511	16,838	103,868
23	Kanpur	18,135	2,102	696	386	6,750	28,069
24	Kochi	5,290	24,635	7,005	10,346	21,522	68,798
25	Kolkata**	15,235	\$	4,316	31,807	19,429	70,787
26	Kota	27,431	2,565	5,398	5,351	12,536	53,281
27	Lucknow	6,683	14,452	3,098	6,195	7,195	37,623
28	Ludhiana	24,741	26,855	3,045	3,139	16,092	73,872
29	Madurai	12,070	9,983	5,547	13,899	17,742	59,241
30	Meerut	4,231	3,125	1,661	600	4,200	13,817
31	Nagpur	16,481	21,027	5,136	2,907	17,149	62,700
32	Nashik	5,215	12,348	1,260	2,044	16,942	37,809
33	Patna	28,776	\$	6,020	10,666	37,007	82,469
34	Pune	24,877	53,002	17,825	11,904	43,973	151,581
35	Raipur	27,039	12,354	1,788	2,532	6,579	50,292
36	Rajkot	15,100	23,018	3,227	3,302	12,124	56,771
37	Ranchi	42,192	57,276	4,376	36,694	63,090	208,398
38	Srinagar	12,627	8,937	6,846	7,160	10,170	45,740
39	Surat	15,342	26,435	2,380	1,926	50,459	96,542
40	Tiruchirapalli	10,439	12,478	3,446	6,952	6,595	39,910
41	Varanasi	9,381	13,869	2,703	4,626	14,131	44,710
42	Vijayawada	3,397	2,398	366	559	22,659	29,379
43	Vadodara	17,029	20,574	1,816	5,961	31,519	76,899
44	Visakhapatnam	14,586	10,348	1,931	8,958	36,710	72,533
TOTAL		995,975	1,090,319	335,168	649,835	1,349,863	4,472,613

... : not reported \$: Included in Multiaxled/Articulated vehicles ^ : Included in cars

^^ : Includes other vehicles which are not covered in 'Transport Vehicles' # : Included in Trailers

* Includes motor cycles on hire

**:Live vehicles after cancellation of vehicles registered prior to
1.1.1993

**Table 4.8.5 : Total registered motor vehicle in million plus cities of India
(as on 31st March, 2013) Contd.**

Sl. No.	Name of City	Transport					
		Multi- axled/Articulat- ed Vehicles Trucks & Lorries	Light Motor Vehicles (Goods)	Buses	Taxies	Light Motor Vehicles (Passenger s-Auto)	Total Transport
1	2	3	4	5	6	7	8
1	Agra	4,329	15,540	1,619	3,691	7,805	32,984
2	Ahmedabad	23,389	47,749	26,328	9,210	89,036	195,712
3	Allahabad	9,768	9,314	1,623	1,450	9,650	31,805
4	Aurangabad	4,969	13,617	3,355	714	9,966	32,621
5	Bengaluru	81,992	84,296	31,974	56,890	151,011	447040 ^{^^}
6	Bhopal	7,398	13,356	4,123	22,551	14,495	61,923
7	Chandigarh	2,794	24,283	2,265	3,519	2664	35,525
8	Chennai	100,938	89,225	39,330	91,234	107,517	428,244
9	Coimbatore	12,058	19,343	7,136	18,465	13,210	70,212
10	Delhi	5,176	126,539	19,912	63,082	11,407	317963 ^{^^}
11	Dhanbad	28,674	28,731	1,396	27,654	28,731	118478*
12	Durg Bhilai	9,209	7,725	888	2,796	913	21,531
13	Ghaziabad	5,237	9,930	2,645	3,888	16,641	38,341
14	Greater Mumbai	7,553	55,161	13,313	57,095	111,591	244,713
15	Gwalior	9,121	6,714	6,295	8,494	10,846	41,470
16	Hyderabad	25,697	54,807	8,982	20,157	71,840	181,483
17	Indore	49,376	32,380	8,388	38,657	19,470	148,271
18	Jabalpur	10,833	12,594	1,620	12,812	7,912	45,771
19	Jaipur	66,364	18,098	22,252	24,663	25,928	157,305
20	Jamshedpur	20,199	50,420	1,766	27,389	50,420	155115*
21	Jodhpur	46,193	10,989	7,174	9,439	13,542	87,337
22	Kanpur	19,737	3,167	751	497	7,134	31,286
23	Kochi	6,205	29,006	7,905	11,247	24,600	78,963
24	Kolkata**	8,347	74,786	13,251	55,465	26,924	178,773
25	Kota	17,582	2,477	3,347	3,374	10,697	37,477
26	Lucknow	6,797	16,285	3,181	7,089	7,246	40,598
27	Ludhiana	12,671	24,390	5,933	15,045	18,465	76,504
28	Madurai	8,768	7,479	2,421	2,010	6,977	27,655
29	Meerut	13,950	22,073	5,222	3035	16,743	61,023
30	Nagpur	5,211	14,878	1,305	2,194	17,047	40,635
31	Nashik	30,762	2,027	6,264	12,154	42,366	93,573
32	Patna	25,809	57,436	18,336	12,759	43,700	158,040
33	Pune	29,240	13,985	1,961	3,182	7,689	56,057
34	Raipur	15,725	25,172	3,434	3,597	13,396	61,324
35	Rajkot	42,622	57,489	4,376	36,694	63,090	209041*
36	Ranchi	12,880	10,017	7,090	8,075	10,413	48,475
37	Srinagar	16,407	29,378	2,617	2,120	52,202	102,724
38	Surat	11,168	13,914	3,880	7,882	7,635	44,479
39	Varanasi	10,119	16,171	3,306	5,329	14,736	49,661
40	Vijayawada	22,739	14,283	3,481	6,371	22,610	69,484
41	Vadodara	17,916	23,051	3,847	6,714	33,665	85,193
42	Visakhapatnam	10,769	9,016	2,675	6,144	27,364	55,968
TOTAL		876,691	1,197,291	316,967	714,827	1,249,294	4,500,777

Source: Transport year book- 2012-13

... : not reported

\$: Included in Multiaxled/Articulated vehicles

[^] : Included in cars

^{^^} : Includes other vehicles which are not covered in 'Transport Vehicles'

: Included in Trailers

* Includes motor cycles on hire

**Table 4.8.5 : Total registered motor vehicle in million plus cities of India
(as on 31st March, 2010)**

Contd.

(Number)

Sl. No.	Name of City	Non-Transport								Grand Total (Transport +Non Transport)
		Two Wheelers	Cars	Jeeps	Omni Buses	Tractors	Trailers	Others	Total Non- Transport	
1	2	9	10	11	12	13	14	15	16	17
1	Agra	466981	44581	2744	2837	34056	113	1622	552934	580396
2	Allahabad	444551	49431	6094	3	7299	59	2477	509914	533353
3	Augangabad	177593	11595	6649	294	6095	4085	994	207305	233116
4	Bengaluru#	2431372	634730	7114	45557	6887	5284	17037	3147981	3490565
5	Bhopal	540622	68564	1482	0	11047	4516	1049	627280	674056
6	Chennai	2182794	543999	12236	8769	2459	11709	39249	2801215	3148700
7	Coimbatore	920489	119543	5290	303	7330	486	11862	1065303	1109765
8	Delhi	4107912	1956574	79418	89367	5294	99	364	6239028	6746848
9	Dhanbad*	7824	3486	522	0	531	-	0	12363	31037
10	Ghaziabad	289248	67515	1075	1866	16063	0	0	375767	408577
11	Greater Mumbai	967479	514591	23840	3931	1362	985	5235	1517423	1767973
12	Gwalior	323885	25301	4784	0	15913	6503	2527	378913	411633
13	Hyderabad	1928897	436641	8551	22982	6194	1472	6349	2411086	2728179
14	Indore	845528	112422	4383	0	15088	8974	2346	988741	1098192
15	Jabalpur	428862	33093	2080	0	11304	2967	3561	481867	516063
16	Jaipur	1144561	185762	46316	0	39166	3028	55	1418888	1548592
17	Jamshedpur*	11735	5230	1565	0	354	0	0	18884	55749
18	Jodhpur	404487	40309	16097	0	42240	7875	1227	512235	577418
19	Kanpur	802414	88245	6060	3497	5521	0	0	905737	939826
20	Kochi	170326	90673	5832	5346	176	8	3218	275579	322266
21	Kolkata**	165799	180644	0	0	0	81	628	347152	411025
22	Kota	341885	29250	8730	0	20218	8363	647	409093	439636
23	Lucknow	390442	145996	14910	667	16464	1182	3400	573061	607455
24	Madurai	435924	32406	1542	77	5245	1836	7487	484517	529844
25	Meerut	275668	40773	645	485	57958	0	1925	377454	387499
26	Nagpur	905327	79641	26183	842	5292	5166	1102	1023553	1079201
27	Nasik	272293	29791	7978	44	8448	5464	635	324653	358181
28	Patna	397187	72127	0	0	12277	8475	4170	494236	581313
29	Pune	1418582	246215	39520	950	17234	9831	3922	1736254	1907711
30	Raipur	365943	30202	710	5084	6205	15979	2546	426669	469459
31	Srinagar	74974	48286	3772	0	1748	0	1331	130111	171556
32	Tiruchirapalli	331333	29315	990	70	3387	1241	3351	369687	400172
33	Varanasi	397458	36179	6423	336	13060	9322	363	463141	497365
34	Vijayawada	413323	34144	1187	1547	6062	4823	626	461712	523286
35	Visakhapatnam	461552	54923	3387	2073	2942	4908	1566	531351	585777
	Total	25245259	6122180	358109	196927	410919	134834	132871	33101087	36371785

Source : Motor Transport Statistics of India, Transport Research Wing, Ministry of Road Transport & Highways

Includes other vehicles which are not covered in 'Transport Vehicles'

* Includes motor cycles on hire

** Live vehicles after cancellation of vehicles registered prior to 1.1.1993

**Table 4.8.5 : Total registered motor vehicle in million plus cities of India
(as on 31st March, 2011)**

Sl. No.	Name of City	Non-Transport								Contd (Number)
		Two Wheelers	Cars	Jeeps	Omni Buses	Tractors	Trailers	Others	Total Non-Transport	
1	2	9	10	11	12	13	14	15	16	17
1	Agra	515154	51168	3103	3219	35616	120	1654	610034	640028
2	Allahabad	584248	56027	7653	18	8682	64	2611	659303	683014
3	Augangabad	193878	12494	7168	134	6494	4294	1022	225484	252801
4	Bengaluru#	2624707	710852	7254	46344	7424	5738	20046	3422365	3791318
5	Bhopal	602793	81360	1482	0	12001	4527	1206	703369	755083
6	Chennai	2398366	598708	12358	8769	2526	11727	40743	3073197	3455789
7	Coimbatore	1023414	137728	5379	303	7709	663	13430	1188626	1241096
8	Delhi	4395086	2116107	79488	89368	5384	99	519	6686051	7227671
9	Dhanbad*	8765	5327	898	0	822	0	0	15812	40912
10	Ghaziabad	332101	79822	1270	2067	17148	0	0	432408	470081
11	Greater Mumbai	1044829	562526	23892	3943	639	204	1512	1637545	1870311
12	Gwalior	353490	29102	5208	0	16636	6576	2579	413591	449257
13	Hyderabad	2144410	491361	8746	25904	6704	1579	6892	2685596	3032739
14	Indore	930223	127644	4397	0	16390	9316	2596	1090566	1212965
15	Jabalpur	462632	37955	2081	0	11923	2996	3655	521242	559156
16	Jaipur	1248076	208475	49668	0	41324	3028	55	1550626	1693972
17	Jamshedpur*	13145	7102	2396	0	822	0	0	23465	66888
18	Jodhpur	446131	47803	17333	0	44886	7884	1459	565496	636141
19	Kanpur	849098	98194	6310	3856	6630	0	3	964091	1001784
20	Kochi	221157	113269	5832	5353	249	8	4021	349889	408522
21	Kolkata**	182087	194178	0	0	0	82	701	377048	444718
22	Kota	367900	33276	9595	0	20855	8391	726	440743	473149
23	Lucknow	970897	165589	15513	850	17809	1318	3512	1175488	1210889
24	Madurai	493575	38412	1550	77	5652	1953	7683	548902	602852
25	Meerut	306202	45940	639	494	58690	0	0	411965	423142
26	Nagpur	967838	89479	28244	842	5385	5263	1153	1098204	1157034
27	Nasik	300877	34151	8132	44	11406	6835	757	362202	397825
28	Patna	448104	84620	0	0	13660	9314	4200	559898	657656
29	Pune	1551968	285235	40192	950	17883	9887	4462	1910577	2093890
30	Raipur	412707	35894	710	5318	6705	17075	2840	481249	527307
31	Srinagar	79146	54196	3827	0	1753	0	1412	140334	183772
32	Tiruchirapalli	376887	34431	991	70	3898	1306	3528	421111	456733
33	Varanasi	426522	40132	8411	357	13631	9329	400	498782	538016
34	Vijayawada	340614	39764	1204	1731	6745	5108	724	395890	466284
35	Visakhapatnam	469784	63137	3434	2268	2960	10016	1954	553553	616638
	Total	28086811	6811458	374358	202279	437041	144698	138055	36194700	39739441

Source : Motor Transport Statistics of India, Transport Research Wing, Ministry of Road Transport & Highways

Includes other vehicles which are not covered in 'Transport Vehicles'

* Includes motor cycles on hire

** Live vehicles after cancellation of vehicles registered prior to 1.1.1993

Table 4.8.5 : Total registered motor vehicle in million plus cities of India

(as on 31st March, 2012)

Conld.

Sl. No.	Name of City	Non-Transport									Grand Total (Transport +Non Transport)
		Two Wheelers	Cars	Jeeps	Omni Buses	Tractors	Trailers	Others	Total Non-Transport		
1	2	9	10	11	12	13	14	15	16	17	
1	Agra	568,470	56,817	3,647	3,503	36,987	134	1,675	671,233	703,761	
2	Ahmedabad	1,213,454	239,558	18,254	...	13,073	7,694	5,955	1,497,988	1,682,111	
3	Allahabad	626,716	61,057	8,878	29	10,198	66	2,585	709,529	737,740	
4	Amritsar	623,329	92,108	3,745	...	39,945	9	1,282	760,418	803,007	
5	Aurangabad	217,410	13,869	7,988	...	6,685	4,507	1,238	251,697	280,615	
6	Bengaluru	2,867,646	800,866	7,313	46,888	7,875	6,151	20,454	3,757,193	4,156,132	
7	Bhopal	657,590	94,389	1,232	...	12,771	4,531	1,444	771,957	828,569	
8	Chandigarh	737,263	286,584			196			1,024,043	1,058,408	
9	Chennai	2,630,752	653,270	12,420	8,769	2,584	11,739	42,339	3,361,873	3,767,294	
10	Coimbatore	1,137,785	157,977	5,443	303	8,104	880	14,572	1,325,064	1,386,129	
11	Delhi	4,661,714	2,172,069	68,648	89,373	1,343	...	76,504	7,069,651	7,350,120	
12	Dhanbad	279,839	46,440	7,485	1,328	2,710	2,481	3,172	343,455	461,923	
13	Durg Bhilai	385,079	29,748	1,469	7,179	325	175	1,089	425,064	444,685	
14	Ghaziabad	367,327	93,934	1,366	1,914	17,630	0	10	482,181	524,971	
15	Greater Mumbai	1,139,363	617,556	26,496	3,957	680	206	1,512	1,789,770	2,028,500	
16	Gwalior	385,142	32,722	5,676		17,773	6,600	2,628	450,541	489,516	
17	Hyderabad	2,370,955	558,081	8,975	28,855	7,019	1,691	7,551	2,983,127	3,386,575	
18	Indore	1,021,757	146,433	4,379	...	17,870	9,634	2,826	1,202,899	1,337,956	
19	Jabalpur	499,044	43,000	2,055	...	12,570	3,014	3,830	563,513	605,488	
20	Jaipur	1,374,316	235,310	53,496	...	44,594	3,034	...	1,710,750	1,871,049	
21	Jamshedpur	438,285	56,429	13,787	1,628	3,408	2,646	10,973	527,156	682,077	
22	Jodhpur	607,449	60,747	24,808	...	62,954	8,625	...	764,583	868,451	
23	Kanpur	907,649	112,445	6,658	4,432	8,185	2	0	1,039,371	1,067,440	
24	Kochi	262,258	132,628	6,228	5,456	276	27	4,667	411,540	480,338	
25	Kolkata**	202,602	222,069	^	...	#	46	802	425,519	496,306	
26	Kota	744,548	50,313	20,518	...	67,499	16,372	...	899,250	952,531	
27	Lucknow	1,052,717	183,288	16,932	181	19,012	1,361	3,591	1,277,082	1,314,705	
28	Ludhiana	1,017,038	181,023	12,772	...	49,996	368	1,797	1,262,994	1,336,866	
29	Madurai	557,828	44,802	1,551	77	6,095	2,044	7,872	620,269	679,510	
30	Meerut	294,357	51,578	630	0	59,559	0	0	406,124	419,941	
31	Nagpur	1,032,607	99,233	29,727	842	5,402	5,348	1,240	1,174,399	1,237,099	
32	Nashik	335,145	39,818	9,184	73	14,163	7,462	735	406,580	444,389	
33	Patna	505,940	98,425	26,604	...	15,070	10,160	4,221	660,420	742,889	
34	Pune	1,705,573	332,293	41,327	877	18,213	11,514	5,745	2,115,542	2,267,123	
35	Raipur	452,257	42,262	712	5,758	7,095	17,115	3,028	528,227	578,519	
36	Rajkot	613,766	63,613	2,932	...	9,902	9,374	3,215	702,802	759,573	
37	Ranchi	405,459	69,794	22,393	4,376	11,001	6,135	1,590	520,748	729,146	
38	Srinagar	85,752	62,423	3,850	0	1,755	0	1,486	155,266	201,006	
39	Surat	897,366	132,559	8,985	...	5,129	3,169	1,742	1,048,950	1,145,492	
40	Tiruchirapalli	431,016	39,557	992	70	4,547	1,396	3,890	481,468	521,378	
41	Varanasi	463,952	43,953	9,921	382	14,332	9,341	942	542,823	587,533	
42	Vijayawada	462,507	43,964	1,221	1,873	7,634	5,760	1,075	524,034	553,413	
43	Vadodara	644,069	92,057	9,737	...	8,331	4,877	2,780	761,851	838,750	
44	Visakhapatnam	516,577	72,939	3,471	2,443	2,960	10,478	1,954	610,822	683,355	
TOTAL		38,401,668	8,760,000	523,905	220,566	663,450	196,166	254,011	49,019,766	53,492,379	

Source: Transport year book- 2011-12

... : not reported \$: Included in Multiaxled/Articulated vehicles ^ : Included in cars

^^ : Includes other vehicles which are not covered in 'Transport Vehicles' # : Included in Trailers

* Includes motor cycles on hire

**Live vehicles after cancellation of vehicles registered prior to 1.1.1993

**Table 4.8.5 : Total registered motor vehicle in million plus cities of India
(as on 31st March, 2013)**

Conld.

Sl. No.	Name of City	Non-Transport									Grand Total (Transport +Non Transport)
		Two Wheelers	Cars	Jeeps	Omni Buses	Tractors	Trailers	Others	Total Non-Transport		
1	2	9	10	11	12	13	14	15	16	17	
1	Agra	611,502	60,840	3,796	2,655	38,796	125	1,496	719,210	752,194	
2	Ahmedabad	1,290,032	263,695	18,419	..	13,455	8,013	6,322	1,599,936	1,795,648	
3	Allahabad	631,163	61,523	9,060	29	10,434	66	2,588	714,863	746,668	
4	Aurangabad	241,325	15,395	8,867	151	4,715	162	6,276	276,891	309,512	
5	Bengaluru	3,158,133	894,865	7,343	47,373	8,450	6,635	21,337	4,144,136	4,591,176	
6	Bhopal	685,967	107,984	1,195	.	13,474	4,534	1,603	814,757	876,680	
7	Chandigarh	760,327	310,273	^	.	224	.	.	1,070,824	1,106,349	
8	Chennai	2,856,248	708,522	12,481	8,769	2,616	11,745	43,354	3,643,735	4,071,979	
9	Coimbatore	1,248,759	178,533	5,493	303	8,490	1048	15,204	1,457,830	1,528,042	
10	Delhi	4,980,507	2,416,974	67,821	5	1,630	.	383	7,467,320	7,785,283	
11	Dhanbad	302,884	50,295	8,693	1,328	3,061	2,512	3,172	371,945	490,423	
12	Durg Bhilai	424,426	33,350	1,505	7,205	329	204	1,177	468,196	489,727	
13	Ghaziabad	449,119	120,554	1,762	798	17,190	0	15	589,438	627,779	
14	Greater Mumbai	1,235,282	672,223	29,490	3,839	201	95	1,555	1,942,685	2,187,398	
15	Gwalior	416,406	36,347	6,316	.	19,743	6,761	2,710	488,283	529,753	
16	Hyderabad	1,459,184	348,157	6,988	20,144	1,262	25	22,715	1,858,475	2,039,958	
17	Indore	1,136,652	169,665	4,384	.	19,025	9,793	2,979	1,342,498	1,490,769	
18	Jabalpur	530,262	48,301	1,915	.	13,154	3,034	4,043	600,709	646,480	
19	Jaipur	1,449,265	253,982	56,420	.	41,744	2,911	.	1,804,322	1,961,627	
20	Jamshedpur	438,285	56,429	13,787	1,628	3,408	2,646	10,973	527,156	682,271	
21	Jodhpur	557,013	61,785	22,148	.	56,444	8,272	.	705,662	792,999	
22	Kanpur	965,398	124,636	7,345	5,180	9,554	0	1	1,112,114	1,143,400	
23	Kochi	303,359	151,987	6,624	559	303	46	5,313	468,191	547,154	
24	Kolkata**	543,352	489,377	512	39689	4607	259	21789	1,099,585	1,278,358	
25	Kota	431,413	41,526	11,406	.	23,526	8,525	0	516,396	553,873	
26	Lucknow	1,136,822	201,628	19,612	275	20,417	1,421	3,705	1,383,880	1,424,478	
27	Ludhiana	621,530	51,398	1,575	77	6,462	2105	8,088	691,235	767,739	
28	Madurai	320,717	32,668	289	0	8,367	0	22,714	384,755	412,410	
29	Meerut	1,057,682	104,745	30746	842	5,430	5399	3810	1,208,654	1,269,677	
30	Nagpur	368,878	45,923	9,825	73	15,764	7,257	1,243	448,963	489,598	
31	Nashik	564,074	110,962	28,344	0	16,689	10,853	4226	735,148	828,721	
32	Patna	1,767,498	340,564	41,429	877	18,250	11,491	8,734	2,188,843	2,346,883	
33	Pune	497,337	49,330	860	6335	7,145	18,127	3,624	582,758	638,815	
34	Raipur	665,555	73,174	2932	.	10,481	9,576	3,658	765,376	826,700	
35	Rajkot	381,609	51,122	19,194	4376	11,492	6,030	1,590	475,413	684,454	
36	Ranchi	93,087	69,561	3,870	0	1,755	0	1,659	169,932	218,407	
37	Srinagar	969,817	148,370	9,401	.	5,346	3227	1,968	1,138,129	1,240,853	
38	Surat	492,208	44,385	993	70	5,308	1,461	4,141	548,566	593,045	
39	Varanasi	498,572	47,452	11,515	409	15,100	9,353	1017	583,418	633,079	
40	Vijayawada	390,772	43,384	1,026	1,572	6,006	4,675	.	447,435	516,919	
41	Vadodara	698,852	103,133	10,424	.	8,504	4,956	2,861	828,730	913,923	
42	Visakhapatnam	508,933	68,114	1,384	1,935	1,143	39	5,005	586,553	642,521	
TOTAL		38,140,206	9,263,131	507,189	156,496	479,494	173,381	253,048	48,972,945	53,473,722	

Source: Transport year book- 2012-13

... : not reported \$: Included in Multiaxled/Articulated vehicles ^ : Included in cars

^ : Includes other vehicles which are not covered in 'Transport Vehicles' # : Included in Trailers

* Includes motor cycles on hire

4.8.5 The physical performance of State Road Transport Undertaking (STRUs) during 2010-11 to 2013-14 is presented in table 4.8.6

4.8.6 The lightening of exhaust emission standards for Indian Automobiles is presented in table 4.8.7.

Table: 4.8.6 : Working of States Transport Undertaking

Name of State Road Transport Undertaking (SRTU)	Fuel Efficiency(km/litre)				Passenger kms performed(Lakh)				Passenger carried (Lakhs)			
	2010-11	2011-12	2012-13	2013-14	2010-11	2011-12	2012-13	2013-14	2010-11	2011-12	2012-13	2013-14
Ahmedabad MTS	3.5	3.3	3.2	3.1	21021	21288	19023	15352	2904	2935	2396	2023
Andhra Pradesh SRTC	5.2	5.1	5.2	5.2	973944	1001924	1017163	882441	46388	50014	51675	50381
Andaman & Nicobar ST		26.2	3.5	3.8	-	-	-	100	-	117	133	102
Assam STC		3.8	4.0		-	5928	7128	-	-	45	55	-
BEST Undertaking	2.9	2.9	2.9	2.8	123071	123353	144458	98432	15352	14395	14096	13068
Bangalore Metropolitan TC	4.0	4.0	3.8	3.8	197604	232759	214586	198797	15603	15920	17112	17938
Bihar SRTC	4.2	4.3	4.3	4.3	4317	4075	3575	2678	55	53	53	27
Calcutta STC	3.4	3.0	3.0	3.0	12108	11996	12175	10120	1686	1164	1077	865
Chandigarh TU	4.1	3.8	3.6	3.4	20216	19614	17165	15419	788	794	672	612
Delhi TC		2.5	2.8	2.8	138011	90237	180220	155144	11066	16177	17072	15868
Gujarat SRTC	5.5	5.5	5.5	5.5	325907	351240	351521	336104	8053	8559	8411	8050
Haryana ST	4.8	4.8	4.8	4.7	134796	139868	164849	152849	4183	4028	4527	4466
Himachal RTC		3.6	3.6	3.6	72840	71619	72111	74419	39044	40413	-	-
J&K SRTC		4.2	4.2	4.3	-	-	6929	6436	-	57	51	52
Kadamba TC Ltd.		4.4	4.5	4.3	-	1150	7902	7782	-	306	301	317
Karnataka SRTC	4.9	4.9	4.8	4.8	329638	351240	368679	354625	8476	8867	9391	9566
Kerala SRTC	4.3	4.2	4.3	4.2	6331	6558	-	--		12579	12156	11634
Maharashtra SRTC	4.9	4.9	4.9	4.8	543987	556295	536151	528386	25380	26004	26064	25630
Meghalaya STC	4.0	4.5	3.6	4.6	514	352	275	394	6	4	3	4
Metro TC (Chennai) Limited	4.4	4.4	4.3	4.3	217963	213249	187962	192169	20145	19769	17544	18068
Mizoram ST	3.5	3.5	3.2	3.0	204	176	-	-	2	1	1	1
Nagaland ST	3.8	3.7	3.8	3.8	1715	2560	-	-	0	18	15	15
Navi Mumbai MT		3.0	3.0	2.8	232	-	-	-	812	856	858	746
North Bengal STC	4.2	4.1	4.0	3.9	13951	13427	15614	14560	575	589	672	645
North Eastern Karnataka RTC	5.3	5.3	5.2	5.1	137650	153477	154908	153732	4563	4745	4836	4873
North Western Karnataka RTC	5.0	5.1	5.1	5.1	167753	151141	171826	172959	6753	7686	8213	8395
Odisha SRTC Odisha SRTC	4.5	4.6	4.6	4.7	10588	11161	-	-	48	57	57	55
Pune Mahamandal	3.4	3.3	3.3	3.2	36395	38690	43985	47931	4500	4497	4352	4249
Rajasthan SRTC	5.1	5.0	4.9	4.9	222004	303312	211371	222145	3391	3308	3129	3466
South Bengal STC	4.1	4.1	4.1	4.1	14916	14875	16040	16734	927	944	948	9575
State Exp.TC TN Ltd.	5.0	5.1	5.1	5.1	67286	61070	67143	75716	270	235	242	270
TN STC (Coimbatore) Ltd.	2.7	5.1	5.2	5.2	249006	233316	223705	227784	10656	9963	9142	9023
TN STC (Kumbakonam) Ltd.	5.0	5.5	5.6	5.6	303226	296609	264658	268500	11822	11528	10617	10750
TN STC (Madurai) Ltd.	5.5	5.4	5.4	5.4	306149	222214	188091	190221	12289	7696	6797	6714
TN STC (Salem) Ltd.	5.5	5.4	5.4	5.5	178818	169389	167153	165293	6966	6941	5880	5655
TN STC (Villupuram) Ltd.	5.5	5.5	5.6	5.6	322239	309167	280069	284794	10746	9718	8568	8498
Tripura RTC	5.5	4.1	5.0	5.0	501	464	393	354	-	9	9	7
Uttar Pradesh SRTC	5.3	5.2	5.2	5.2	337453	372918	384369	365953	4705	4911	5265	5356
Uttarakhand TC			4.7	4.7	-	-	1298	1377	-	-	359	351
Total					5494355	5556712	5528951	5298052	278154	295902	255206	2511119

Source: Ministry of Road Transport and Highways (Review of the performance of State Road Transport undertakings (Passenger services) for April 2013 -March 2014)

- Not reported

Table 4.8.7: Exhaust emission standards for Indian Automobiles

Emission norms for passenger cars		
Norms	CO(g/km)	HC+ NOx(g/km)
1991Norms	14.3-27.1	2.0(Only HC)
1996 Norms	8.68-12.40	3.00-4.36
1998Norms	4.34-6.20	1.50-2.18
India stage 2000 norms	2.72	0.97
Bharat stage-II	2.2	0.5
Bharat Stage-III	2.3	0.35(combined)
Bharat Stage-IV	1	0.18(combined)

Emission norms for Heavy Diesel vehicles				
Norms	CO(g/kmhr)	HC (g/kmhr)	NOx (g/kmhr)	PM(g/kwhr)
1991Norms	14	3.5	18	-
1996 Norms	11.2	2.4	14.4	-
India stage 2000 norms	4.5	1.1	8	0.36
Bharat stage-II	4	1.1	7	0.15
Bharat Stage-III	2.1	1.6	5	0.1
Bharat Stage-IV	1.5	0.96	3.5	0.02

Emission Norms for 2/3 wheeler		
Norms	CO(g/km)	HC+ NOx)(g/km)
1991Norms	12-30	8-12 (only HC)
1996 Norms	4.5	3.6
India stage 2000 norms	2	2
Bharat stage-II	1.6	1.5
Bharat Stage-III	1	1

Source: Central Pollution Control Board

4.9 Harmful Effects of Emissions

4.9.1 The high concentration of particulates in the atmosphere over large urban and industrial areas can produce a number of general effects. Smoke and fumes can increase the atmospheric turbidity and reduce the amount of solar radiation reaching the ground. The overall effect of air pollution upon the biosphere and the built environment can be broadly considered under 3 headings: The effect upon-

- (i) buildings and materials,
- (ii) soil, vegetation, crops and animal life,
- (iii) human beings.

i) **Buildings and Materials:** The fabric of buildings that are surrounded by heavily polluted air for years undergo chemical changes. Gradual erosion takes place and this is only too evident when grimy upper surface is removed. A good example is that of the famous historical monument 'Taj Mahal' at Agra, which, on account of reaction of Sulphur-dioxide emitted from neighbouring industries, has had limestone slowly turning yellow. As a result, on Court's directives, a number of measures have been taken to protect our national heritage monument, e.g. closure of neighbouring heavy polluting industries, operation of only non-polluting vehicles like battery buses, tonga, in the vicinity of Taj Mahal.

ii) **Soil, vegetation and Animal Life:** The presence of gaseous pollutants in the air and deposition of particulates to the soil can effect plants. It can effect the cattle and animals too as they have been found to develop breathing difficulties and suffer from low yield of milk, lameness and joint stiffness in a polluted environment.

iii) **Human beings:** Smoke and SO₂ cause the general and most widespread effects of air pollution on people. Atmospheric smoke contains potentially carcinogenic organic compounds similar to those that occur in cigarette tobacco smoke. The CO affects the cardiovascular system, NO_xs affect the respiratory system, Ozone causes increased sensitivity to infections, lung diseases, irritation in eyes, nose and throat, etc.

4.10 Areas of Concern

4.10.1 a) Air pollution is existed in major cities where vehicles are the major sources.

b) There are 24 critically polluted areas where industrial pollution is predominant. Action plan have been formulated and implemented by the Central/ States Pollution Control Board in these problem areas.

4.11 Non-attainment Cities

CPCB has identified list of polluted cities in which the prescribed National Ambient Air Quality Standards (NAAQS) are violated. Action plans are being formulated and implemented to control air pollution in non-attainment cities by respective states.

4.12 Measures taken for Control of Air Pollution from Vehicles

A) Vehicular Emission Norms

The vehicle emission norms in India are detailed below.

a) During 1990-91 India for the first time notified mass emission norms for the vehicles at the manufacturing stage as well as for in-use vehicles. These norms were notified under EPA, more vehicles rules and Air Act.

b) The emission norms introduced in 1996 have been crucial in controlling vehicular pollution because of stringency of emission norms along with specifications on fuel quality in 1996. for the first time crankcase emission norms and evaporative emission norms were introduced.

c) From April 1995 passenger cars were allowed to register only if they are fitted with a catalytic converter in four metros-Delhi, Mumbai, Kolkata and Chennai. Emission norms for such vehicles were stricter by 50 percent compared to 1996 norms.

- d) The testing method for passenger car norms were changed from hot start to cold start, which is also a stringent measure, compared to the earlier one.
- e) More stringent norms were introduced for the year 2000. These norms were notified under Motor Vehicle Rules during 1997. Automobile manufacturers have to undergo major modification to meet these norms.
- f) The expert committee on Auto Oil Policy was constituted during September 2001. The interim report of the committee was submitted to Govt. on 1.1.2000, recommending Bharat Stage-III emission norms for all category of 4-wheelers in 7 mega cities from 2005 and rest of the country by 2010. Final report of the committee has been submitted in September 2002 which includes road map for control of vehicular pollution up to 2010.
- g) Final report of the inter-Ministerial Task Force constituted by Ministry of Petroleum & Natural Gases at the instance of the Committee of Secretaries to evolve a long term policy for vehicular emission and auto fuel policy has been submitted which recommended introduction of Bharat Stage-II norms for 4-wheelers and next stage emission norms for 2/3 wheelers throughout the country from 2005 and introduction of Bharat stage III norms for four wheelers in 7-mega cities from 2005.

B) Fuel Quality Specifications

For the first time diesel and gasoline fuel quality with respect to environment related parameters has been notified under EPA during April 1996.

C) Lubricants Quality:

Specifications of 2T oil for two stroke engine with respect to smoke has been notified under EPA during September 1998 for implementation from 1.4.1999 throughout the country. Pre-mix 2T oil dispenser has been installed at all petrol filling stations in Delhi so that excessive oil is not being used by the vehicle owners. Sale of loose 2T oil has been banned from December 1998 in Delhi.

D) Alternate Fuels:

- a) Custom duty on CNG kit has been exempted for promotion of CNG vehicles.
- b) Emission norms for CNG vehicles have been notified under Motor Vehicles Rule Vide GSR 853 (E) dated 19.11.2001.
- c) LPG is now being used as alternate fuel for motor vehicles after making amendments in CMVR. Emission norms for LPG vehicles have been notified vide GSR 284 (E) dated 24.4.2001.
- d) Battery driven vehicles have been introduced in few corridors in Delhi

E) Restriction of Grossly polluting Vehicles

- a. Registration of new auto rickshaws with conventional engine has been banned from May 1996 and registration of Defense Service and Govt. auctioned vehicles has been banned from April 1994 in Delhi.
- b. 20 years old commercial vehicles were phased out from October 1998, 17 year old commercial vehicles has been phased out from November 1998 and 15 year old commercial vehicle from December 1998 in Delhi.
- c. Registration on alternation of vehicles by replacing petrol engine with diesel has been banned from 1.4.1998 in Delhi.

F) Traffic Management

- a. Restriction has been imposed on goods vehicles during day time from August 1999 in Delhi.
- b. Left lane has been made exclusive to buses and other HMV in Delhi.
- c. Time clocks have been installed in important red lights to enable the drivers to switch off their vehicles depending on the time left in the time clocks.

d. More fly over and subways have been constructed and T-Junctions have been closed for better traffic flow.

G) Public Transport Systems:

a. Number of buses has been increased to discourage use of individual vehicles by allowing private sectors for operation.

b. A number of Metro Rail Projects for Delhi –NCR have been commissioned.

H) Technology

a. Fitment of catalytic converter for new petrol passenger cars has been made compulsory from 1.4.1995 in four metros and 45 cities from 1.9.1998.

b. Two wheeler scooters with four stroke engine are being introduced in the market from October 1998.

c. Registration of only rear engine auto rickshaws is being allowed from May 1996 onwards.

d. More four stroke two wheelers are being registered in Delhi.

I) Mass Awareness

a. Messages/articles related to vehicular emissions are disseminated through newsletters, pamphlets, newspapers, magazines, Television, Radio, internet, Workshops and Summer Exhibitions.

b. Display of ambient air quality data through display system near ITO, Newspapers, daily news and internet.

c. NGOs working on vehicular pollution control are being encouraged for mass awareness companies.

4.13 Environment Pollution due to fossil fuels- Coal, Lignite, Petroleum and Natural Gas

4.13.1 A considerable amount of air pollution results from burning of fossil fuels. Fuels are primarily derived from fossilized plant material and consist mainly of carbon and/or its compounds. The household sector is the largest consumer of energy in India. More than 60 percent of Indian households depend on traditional sources of energy like fuel wood, dung and crop residue for meeting their cooking and heating needs. Out of total rural energy consumption about 65 per cent is met from fuel wood. Fuel wood consumption during 2001-02 was estimated at 223 million tones, 180 millions tones of which is for household consumption and the balance for cottage industry, big hotels etc. Burning of traditional fuels introduces large quantities of CO₂ when the combustion is complete, but if there is incomplete combustion and oxidation then Carbon monoxide (CO) is produced, in addition to hydrocarbons. Incomplete combustion of coal produces smoke consisting of particles of soot or carbon, tarry droplets of unburnt hydrocarbons and CO. Fossil fuels also contain 0.5–4.0% of sulphur which is oxidized to SO₂ during combustion.

4.13.2 The environmental effects of various fuels, namely, coal, oil, nuclear etc. are of growing concern owing to increasing consumption levels. The combustion of these fuels in industries and vehicles has been a major source of pollution. Coal production through opencast mining, its supply to and consumption in power stations, and industrial boilers leads to particulate and gaseous pollution which can cause pneumoconiosis, bronchitis, and respiratory diseases. Another major impact of coal mining is land degradation, especially of forest areas.

4.13.3 In India, Lignite production is mainly in Tamil nadu, Gujrat and Rajasthan. Coal is the most abundant source of commercial energy in India. Coal resources are continually assessed by the Geological Survey of India through regional mapping and exploratory drilling. The State wise Lignite and Coal production over the years is presented in table 4.13.1 (a) to 4.13.1 (c).

4.12.4 The State wise production of raw coal and by types (coking, non - coking) over the years is depicted in table 4.13.2(a) and 4.13.2(b) .

4.13.5 Coal production increased rapidly after the nationalisation of coal mines. From about 296.7 million ton in 1997-98, it raised to 565.77 million ton in 2013-14 making India, one of the major coal producers of the world. The increase is predominantly in non-coking coal production.

4.13.6 One of the major constraints on the profitability of the coal sector is the low productivity levels in underground mines. The productivity in Coal mines during 2007 to 2012 can be viewed in Table 4.13.3

4.13.7 Since the nationalisation of the coal industry, India's mine planners have chosen opencast mining over underground methods, to enhance productivity and meet production targets. The drawback of extracting the majority of the coal with opencast methods is that its quality is unavoidably affected by contamination of overburden mixes into the coal. The detail of production of Coal and Lignite from opencast working by mechanization and overburden removed during the year 2007 is presented in table 4.13.4

4.13.8 The consumption of petroleum products in vehicles, industries and domestic cooking activities results in the emission of pollutants in large quantities. The domestic production of Petroleum Products in India from 1970-71 is in table 4.13.5

Table 4.13.1(a) : Statewise production of coal and lignite														
Sl. No.	States	(Million tonnes)												
		2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
I.	Coal	327.8	341.2	361.2	382.6	407	430.8	457	492.8	532.1	532.7	539.907	556.402	565.766
1	Andhra Pradesh	30.8	33.2	33.9	35.3	36.1	37.7	40.6	44.5	50.4	51.3	52.21	53.190	50.479
2	Arunachal Pradesh	—	—	—	—	—	—	—	0.1	0.2	0.3	0.22	0.073	0.000
3	Assam	0.6	0.6	0.7	0.6	1.1	1.1	1.1	1.2	1.1	1.1	0.6	0.605	0.664
4	Chhattisgarh	53.6	56.8	61.5	69.3	76.4	83	90.2	101.9	110	113.8	113.95	117.830	127.095
5	Jharkhand	76.8	78.6	79.5	78	85.4	88.8	90.9	96.3	105.9	108.9	109.56	111.274	113.094
6	Meghalaya	5.1	4.4	5.4	5.3	5.6	5.8	6.5	5.7	5.8	7	7.206	5.640	5.732
7	Madhya Pradesh	44.2	45.7	49.8	52.5	55.6	60	67.8	71.3	74.07	71.1	71.123	75.948	75.59
8	Maharashtra	30.8	31.4	32.9	34.5	36.1	36.2	36.4	38.7	41	39.3	39.158	39.134	37.223
9	Odisha	47.8	52.2	60.1	66.6	70.5	81.2	89.5	98.4	106.4	102.6	105.475	110.132	112.917
10	Uttar Pradesh	16.5	17.8	15.8	16.8	15.7	12.2	11.4	12	14	15.5	16.178	16.090	14.721
11	West Bengal	21.4	20.5	21.5	23.6	24.5	24.9	22.5	22.9	23.1	21.7	24.227	26.467	28.242
II.	Lignite	24.8	26	28	30.5	30.1	31.1	34	32.4	34.1	37.7	43.105	46.453	44.271
1	Gujarat	6.2	6.9	6.7	8.3	8.9	9.7	11.8	10.1	10.5	13.1	14.779	14.528	11.594
2	Rajasthan	0.3	0.5	0.7	0.5	0.7	0.5	0.6	1	1.2	1.5	3.735	7.081	7.621
3	Tamil Nadu	18.4	18.6	20.6	21.6	20.4	21	21.6	21.3	22.3	23.1	24.591	24.844	25.056

Source : Coal Directory of India, Office of Coal Controller, Kolkata

(P): Provisional

Year	State										(in Million Tonnes)	
	Tamil Nadu			Gujarat			Rajasthan					
	Quantity	Share(%)	Growth %	Quantity	Share(%)	Growth %	Quantity	Share(%)	Growth %	Quantity	Growth %	
1	2	3	4	5	6	7	8	9	10	11	12	
2000-01	18.172	74.90	3.50	5.858	24.20	24.60	0.217	0.90	-2.30	24.247	7.90	
2001-02	18.369	74.00	1.10	6.167	24.90	5.30	0.277	1.10	27.60	24.813	2.30	
2002-03	18.624	71.60	1.40	6.921	26.60	12.20	0.473	1.80	70.80	26.018	4.90	
2003-04	20.556	73.50	10.40	6.724	24.10	-2.80	0.678	2.40	43.30	27.958	7.50	
2004-05	21.567	71.10	4.90	8.222	27.10	22.30	0.548	1.80	-19.20	30.337	8.50	
2005-06	20.435	68.00	-5.20	8.944	29.70	8.80	0.687	2.30	25.40	30.066	-0.90	
2006-07	21.014	67.20	2.80	9.808	31.40	9.70	0.463	1.50	-32.60	31.285	4.10	
2007-08	21.586	63.50	2.70	11.788	34.70	20.20	0.606	1.80	30.90	33.980	8.60	
2008-09	21.308	65.70	-1.30	10.114	31.20	-14.20	0.999	3.10	64.90	32.421	-4.60	
2009-10	22.338	65.60	4.80	10.526	30.90	4.10	1.207	3.50	20.80	34.071	5.10	
2010-11	23.144	61.30	3.60	13.064	34.60	24.10	1.525	4.10	26.30	37.733	10.70	
2011-12	24.590	58.09	6.25	14.779	34.90	13.10	2.963	7.00	94.30	42.332	12.19	
2012-13	24.844	53.50	1.03	14.528	31.30	-1.70	7.081	15.24	138.98	46.453	9.73	
2013-14	25.056	56.60	0.85	11.588	26.20	-20.24	7.621	17.20	7.63	44.271	-4.70	

Source : Office of the Coal Controller, Kolkata, Ministry of Coal



State	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	(in Million Tonnes)
	1	2	3	4	5	6	7	8	9	10
Coking										
Chattisgarh	0.150	0.157	0.159	0.146	0.150	0.163	0.189	0.157	0.125	
Jharkhand	30.295	31.098	33.566	33.877	43.666	48.945	51.108	51.065	55.088	
Madhya Pradesh	0.932	0.775	0.676	0.730	0.545	0.403	0.319	0.330	0.249	
West Bengal	0.134	0.067	0.054	0.056	0.052	0.036	0.044	0.030	1.356	
Total Coking	31.511	32.097	34.455	34.809	44.413	49.547	51.660	51.582	56.818	
Non-Coking										
Andhra Pradesh	36.138	37.707	40.604	44.546	50.429	51.333	52.211	53.190	50.469	
Arunachal Pradesh			0.079	0.142	0.251	0.299	0.221	0.073	0.000	
Assam	1.101	1.050	1.101	1.009	1.113	1.101	0.602	0.605	0.664	
Chhattisgarh	76.208	83.084	90.013	101.776	109.803	113.661	113.769	117.673	126.970	
Jammu & Kashmir	0.019	0.016	0.017	0.011	0.023	0.024	0.020	0.019	0.019	
Jharkhand	55.128	57.666	57.329	62.395	62.251	60.004	58.458	60.209	58.003	
Madhya Pradesh	54.647	58.951	67.165	70.595	73.529	70.701	70.804	75.618	75.341	
Maharashtra	36.119	36.215	36.403	38.705	41.005	39.336	39.159	39.134	37.223	
Meghalaya	5.566	5.787	6.541	5.489	5.767	6.974	7.206	5.640	5.732	
Odisha	70.540	81.160	89.482	98.402	106.409	102.565	105.476	110.132	112.917	
Uttar Pradesh	15.721	12.228	11.426	12.029	13.968	15.526	16.178	16.090	14.721	
West Bengal	24.341	24.871	22.467	22.849	23.081	21.623	24.186	26.437	26.888	
Total Non-Coking	375.528	398.735	422.627	457.948	487.629	483.147	488.290	504.820	508.947	

Source : Office of the Coal Controller, Kolkata, Ministry of Coal

Table 4.13.2 (a) : Statewise inventory of geological reserves of coal

(Million tonnes)

SI No.	State	As on	Proved	Indicated	Inferred	Total
1	2	3	4	5	6	7
1	Andhra Pradesh (Gondawana)	1-4-2008	9007	6711	2979	18697
		1-4-2009	9194	6748	2985	18927
		1-4-2010	9257	9730	3029	22016
		1-4-2011	9297	9728	3029	22054
		1-4-2012	9567	9554	3034	22155
		1-4-2013	9604	9554	3049	22207
		1-4-2014	9729	9670	3068	22468
2	Arunachal Pradesh (Tertiary)	1-4-2008	31	40	19	90
		1-4-2009	31	40	19	90
		1-4-2010	31	40	19	90
		1-4-2011	31	40	19	90
		1-4-2012	31	40	19	90
		1-4-2013	31	40	19	90
		1-4-2014	31	40	19	90
3	Assam (Tertiary)	1-4-2008	315	24	34	373
		1-4-2009	349	33	3	385
		1-4-2010	349	33	3	385
		1-4-2011	465	43	3	511
		1-4-2012	465	43	3	511
		1-4-2013	465	43	3	511
		1-4-2014	465	43	3	511
4	Assam (Gondawana)	1-4-2008	0	3	0	3
		1-4-2009	0	3	0	3
		1-4-2010	0	3	0	3
		1-4-2011	0	3	0	3
		1-4-2012	0	3	0	3
		1-4-2013	0	3	0	3
		1-4-2014	0	4	0	4
5	Jharkhand (Gondawana)	1-4-2008	37493	31629	6338	75460
		1-4-2009	39479	30894	6338	76711
		1-4-2010	39633	30992	6338	76963
		1-4-2011	39761	32592	6584	78937
		1-4-2012	40163	33609	6584	80356
		1-4-2013	41155	32986	6559	80701
		1-4-2014	41377	32780	6559	80716
6	Bihar (Gondawana)	1-4-2008	0	0	160	160
		1-4-2009	0	0	160	160
		1-4-2010	0	0	160	160
		1-4-2011	0	0	160	160
		1-4-2012	0	0	160	160
		1-4-2013	0	0	160	160
		1-4-2014	0	0	160	160

Sl No.	State	As on	Proved	Indicated	Inferred	Total
1	2	3	4	5	6	7
7	Madhya Pradesh (Gondawana)	1-4-2008	7896	9882	2782	20560
		1-4-2009	8041	10295	2645	20981
		1-4-2010	8505	11267	2216	21988
		1-4-2011	8871	12192	2063	23126
		1-4-2012	9309	12291	2777	24377
		1-4-2013	9818	12355	2889	25061
		1-4-2014	10411	12382	2879	25673
8	Chhattisgarh (Gondawana)	1-4-2008	10419	29272	4443	44134
		1-4-2009	10911	29192	4381	44484
		1-4-2010	12441	30230	4011	46682
		1-4-2011	12789	32390	4011	49190
		1-4-2012	13988	33448	3410	50846
		1-4-2013	14779	34107	3283	52169
		1-4-2014	16052	33253	3228	52533
9	Maharashtra (Gondawana)	1-4-2008	5004	2822	1992	9818
		1-4-2009	5255	2907	1992	10154
		1-4-2010	5360	2984	1965	10309
		1-4-2011	5490	3094	1950	10534
		1-4-2012	5667	3104	2110	10881
		1-4-2013	5667	3186	2110	10964
		1-4-2014	5667	3186	2110	10964
10	Meghalaya (Tertiary)	1-4-2008	89	70	301	460
		1-4-2009	89	17	471	577
		1-4-2010	89	17	471	577
		1-4-2011	89	17	471	577
		1-4-2012	89	17	471	576
		1-4-2013	89	17	471	576
		1-4-2014	89	17	471	576
11	Nagaland (Tertiary)	1-4-2008	3	1	15	19
		1-4-2009	9	0	13	22
		1-4-2010	9	0	307	316
		1-4-2011	9	0	307	316
		1-4-2012	9	0	307	315
		1-4-2013	9	0	307	315
		1-4-2014	9	0	307	315
12	Odisha (Gondawana)	1-4-2009	19944	31484	13799	65227
		1-4-2010	21507	32074	12726	66307
		1-4-2011	24492	33987	10680	69159
		1-4-2012	25548	36466	9434	71448
		1-4-2013	27284	37110	9316	73710
		1-4-2014	27791	37873	9408	75073
13	Sikkim (Gondawana)	1-4-2008	0	58	43	101
		1-4-2009	0	58	43	101
		1-4-2010	0	58	43	101
		1-4-2011	0	58	43	101
		1-4-2012	0	58	43	101
		1-4-2013	0	58	43	101
		1-4-2014	0	58	43	101

Sl No.	State	As on	Proved	Indicated	Inferred	Total
1	2	3	4	5	6	7
14	Uttar Pradesh (Gondawana)	1-4-2008	766	296	0	1062
		1-4-2009	766	296	0	1062
		1-4-2010	866	196	0	1062
		1-4-2011	866	196	0	1062
		1-4-2012	884	178	0	1062
		1-4-2013	884	178	0	1062
		1-4-2014	884	178	0	1062
15	West Bengal (Gondawana)	1-4-2008	11584	11680	5071	28335
		1-4-2009	11653	11603	5071	28327
		1-4-2010	11753	13030	5071	29854
		1-4-2011	11753	13132	5071	29956
		1-4-2012	12425	13358	4832	30615
		1-4-2013	13396	12995	4892	31283
		1-4-2014	13403	13022	4893	31318
16	Gondawana	1-4-2008	101391	124081	38121	263593
		1-4-2009	105243	123480	37415	266138
		1-4-2010	109320	130564	35559	275443
		1-4-2011	114002	137471	34390	285863
		1-4-2012	117551	142070	32384	292005
		1-4-2013	122588	142532	32301	297421
		1-4-2014	125315	142407	32350	300072
17	Tertiary Coalfields	1-4-2008	438	135	369	942
		1-4-2009	478	90	506	1074
		1-4-2010	478	90	799	1367
		1-4-2011	594	99	799	1492
		1-4-2012	594	99	799	1493
		1-4-2013	594	99	799	1493
		1-4-2014	594	99	799	1493
India (Total)		1-4-2008	101829	124216	38490	264535
		1-4-2009	105720	123570	37921	267211
		1-4-2010	109798	130654	36359	276811
		1-4-2011	114002	137471	34390	285863
		1-4-2012	118145	142169	33183	293497
		1-4-2013	123182	142632	33100	298914
		1-4-2014	125909	142506	33149	301564

Note: (i) Data may not add up to respective total due to rounding off.

(ii) Singrimari coalfield of Assam (Non- coking) is included in Gondawana coalfield, not considered in Tertiary coalfields.

Source : Geological Survey of India

Table 4.13.2 (b) : Inventory of geological reserves of coal by type
(Million tonnes)

Sl. No.	Types of Coal	As on	Proved	Indicated	Inferred	Total
1	2	3	4	5	6	7
1	Coking					
	I. Prime coking	1-4-2008	4614	699	0	5313
		1-4-2009	4614	699	0	5313
		1-4-2010	4614	699	0	5313
		1-4-2011	4614	699	0	5313
		1-4-2012	4614	699	0	5313
		1-4-2013	4614	699	0	5313
		1-4-2014	4614	699	0	5313
	II. Medium coking	1-4-2008	12308	12136	1880	26324
		1-4-2009	12448	12064	1880	26393
		1-4-2010	12573	11940	1880	26393
		1-4-2011	12573	12001	1880	26454
		1-4-2012	12837	11951	1800	26669
		1-4-2013	13269	11893	1879	27041
		1-4-2014	13303	11867	1879	27049
	III. Blendable/semi-coking	1-4-2008	482	1003	222	1707
		1-4-2009	482	1003	222	1707
		1-4-2010	482	1003	222	1707
		1-4-2011	482	1003	222	1707
		1-4-2012	482	1003	222	1707
		1-4-2013	482	1003	222	1707
		1-4-2014	482	1004	222	1708
2	Non-coking (Including High Sulphur)	1-4-2008	84425	110378	36388	231191
		1-4-2009	88175	109804	35819	233798
		1-4-2010	92129	117012	34257	243398
		1-4-2011	96333	123768	32287	252388
		1-4-2012	100211	128515	31082	259808
		1-4-2013	104816	129037	30999	264852
		1-4-2014	107509	128937	31047	267494
		1-4-2008*	101829	124216	38490	264535
		1-4-2009 *	105720	123570	37921	267211
		1-4-2010*	109798	130654	36359	276811
		1-4-2011 *	114002	137471	34389	285862
		1-4-2012*	118145	142169	33183	293497
		1-4-2013*	123182	142632	33100	298914
		1-4-2014*	125909	142506	33148	301564

Source : Office of the Coal Controller, Kolkata

* Including Sikkim

Table 4.13.3 :Productivity in coal mines

(Tonnes)

Sl. No.	State	2007						2008						2009					
		Output Per Man Year			Output Per Manshift			Output Per Man Year			Output Per Manshift			Output Per Man Year			Output Per Manshift		
		Below ground	Open cast	Overall	Below ground	Open cast	Overall	Below ground	Open cast	Overall	Below ground	Open cast	Overall	Below ground	Open cast	Overall	Below ground	Open cast	Overall
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
I	COAL	331	5409	1219	1.05	16.31	3.8	355	5861	1328	1.12	17.54	4.12	359	6358	1459	1.15	19.25	4.55
1	Andhra Pradesh	363	4404	818	1.19	13.54	2.66	370	4023.00	835.00	1.21	12.20	2.69	378	3873	976	1.26	12.75	3.24
2	Assam	87	1170	363	0.27	3.82	1.15	66	1258.00	400.00	0.21	4.10	1.29	x	1324	578	x	4.19	1.85
3	Chhattisgarh	538	12735	2578	1.57	37.06	7.53	622	16087.00	2920.00	1.82	46.43	8.52	615	16522	3237	1.80	48.05	9.50
4	Jharkhand	200	2882	776	0.66	8.80	2.48	329	3647.00	980.00	0.79	11.07	3.11	257	4091	1089	0.85	12.35	3.45
5	Jammu & Kashmir	28	2	21	0.09	0.01	0.07	25	x	19.00	0.08	x	0.06	35	x	28	0.12	x	0.09
6	Madhya Pradesh	505	4938	1149	1.54	14.43	3.47	516	5107.00	1291.00	1.56	14.88	3.86	523	6003	1296	1.60	17.50	3.91
7	Maharashtra	422	4691	1286	1.26	14.38	3.87	428	4926.00	1262.00	1.27	14.62	3.75	376	5279	1323	1.11	15.37	3.86
8	Odisha	486	12844	5068	1.51	36.43	14.83	535	12283.00	5227.00	1.68	35.80	15.64	530	12113	5447	1.66	35.08	16.22
9	Uttar Pradesh	x	5241	3421	x	16.59	10.79	x	5920.00	3906.00	x	18.08	11.99	x	7472	4128	x	23.48	12.73
10	West Bengal	216	3297	339	0.68	10.08	1.06	212	3222.00	351.00	0.67	9.86	1.10	219	3664	369	0.70	11.36	1.18
11	Meghalaya	x	13067	11876	x	36.6	33.27	x	x	x	x	x	x	x	x	x	x	x	x
II	LIGNITE	x	3700	2658	x	11.49	8.30	x	4236	2575	x	13.28	7.94	x	3988	2470	x	13.00	7.83
1	Gujarat	x	9838	5949	x	33.85	20.62	x	11047	6292	x	35.44	20.37	x	7994	4869	x	25.56	15.70
2	Rajasthan	x	2991	1795	x	9.91	5.95	x	4561	3176	x	14.81	10.32	x	4097	2842	x	13.34	9.82
3	Tamil Nadu	x	2829	2098	x	8.66	6.43	x	3187	1947	x	9.94	5.95	x	3222	1994	x	10.54	6.28

Source : Directorate General of Mines Safety, Dhanbad, Ministry of Labour & Employment

Table 4.13.3 :Productivity in coal mines

(Tonnes)

Sl. No.	State	2010												2011												2012														
		Output Per Man Year			Output Per Manshift			Output Per Man Year			Output Per Manshift			Output Per Man Year			Output Per Manshift			Output Per Man Year			Output Per Manshift																	
		Below ground	Open cast	Overall																																				
1	2	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50									
I	COAL	385	6702	1592	1.21	20.29	4.94	388	6535	1607	1.23	19.74	4.99	374	6443	1656	1.18	19.42	5.14	475	4146	1074	1.57	12.91	3.49	487	4614	1192	1.67	14.28	3.96	511	4514	1197	1.7	14.02	3.9			
1	Andhra Pradesh	1	1231	503	0.00	3.95	1.61	7	913	363	0.02	2.87	1.16	7	751	350	0.02	2.38	1.12	475	4146	1074	1.57	12.91	3.49	487	4614	1192	1.67	14.28	3.96	511	4514	1197	1.7	14.02	3.9			
2	Assam	656	20285	3835	1.89	59.74	11.14	588	20971	3786	1.63	67.22	10.87	544	17458	3624	1.53	52.72	10.41	656	20285	3835	1.89	59.74	11.14	588	20971	3786	1.63	67.22	10.87	544	17458	3624	1.53	52.72	10.41			
3	Chhattisgarh	215	4515	1213	0.71	13.71	3.84	255	4374	1193	0.83	13.15	3.75	199	4403	1308	0.65	13.09	4.11	215	4515	1213	0.71	13.71	3.84	255	4374	1193	0.83	13.15	3.75	199	4403	1308	0.65	13.09	4.11			
4	Jharkhand	40	x	32	0.13	x	0.14	42	x	33	0.14	x	0.11	45	x	34	0.15	x	0.12	40	x	32	0.13	x	0.14	42	x	33	0.14	x	0.11	45	x	34	0.15	x	0.12			
5	Jammu & Kashmir	532	6094	1353	1.61	18.04	4.09	515	5784	1277	1.55	17.25	3.85	516	3803	1039	1.53	11.57	3.12	532	6094	1353	1.61	18.04	4.09	515	5784	1277	1.55	17.25	3.85	516	3803	1039	1.53	11.57	3.12			
6	Madhya Pradesh	391	5643	1491	1.17	16.65	4.39	366	5455	1534	1.11	16.3	4.58	354	5230	1479	1.04	15.89	4.45	391	5643	1491	1.17	16.65	4.39	366	5455	1534	1.11	16.3	4.58	354	5230	1479	1.04	15.89	4.45			
7	Maharashtra	549	11986	5502	1.68	35.31	16.42	577	11029	5242	1.75	31.25	15.31	490	12075	5475	1.49	34.55	16.13	549	11986	5502	1.68	35.31	16.42	577	11029	5242	1.75	31.25	15.31	490	12075	5475	1.49	34.55	16.13			
8	Odisha	x	5822	3630	x	18.14	11.27	x	4626	3337	x	14.22	10.26	x	5640	3448	x	17.68	10.75	5822	3630	x	18.14	11.27	x	4626	3337	x	14.22	10.26	x	5640	3448	x	17.68	10.75				
9	Uttar Pradesh	214	3287	369	0.67	10.23	1.16	231	3368	389	0.67	10.52	1.22	202	5122	497	0.66	15.84	1.6	214	3287	369	0.67	10.23	1.16	231	3368	389	0.67	10.52	1.22	202	5122	497	0.66	15.84	1.6			
10	West Bengal	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	5122	497	0.66	15.84	1.6	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
11	Meghalaya	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			
II	LIGNITE	x	4201	2592	x	13.35	8.04	x	4187	3066	x	13.17	9.69	x	4941	3501	x	15.5	11	4201	2592	x	13.35	8.04	x	4187	3066	x	13.17	9.69	x	4941	3501	x	15.5	11				
1	Gujarat	x	6178	4810	x	19.33	15.08	x	6647	5049	x	20.75	15.89	x	8232	6040	x	25.51	18.91	6178	4810	x	19.33	15.08	x	6647	5049	x	20.75	15.89	x	8232	6040	x	25.51	18.91				
2	Rajasthan	x	3769	3035	x	11.03	9.07	x	2134	1705	x	6.15	4.97	x	5935	3778	x	16.94	10.84	3769	3035	x	11.03	9.07	x	2134	1705	x	6.15	4.97	x	5935	3778	x	16.94	10.84				
3	Tamil Nadu	x	3535	2005	x	11.35	6.22	x	3679	2628	x	11.77	8.41	x	3834	2739	x	12.26	8.76	3535	2005	x	11.35	6.22	x	3679	2628	x	11.77	8.41	x	3834	2739	x	12.26	8.76				

(concluded)

Table 4.13.4 : Production of coal from opencast working by mechanisation and overburden removed

(Tonnes)

Sl. No.	States	2007				2010			
		Total Opencast Output	Output by Mechanisation		Overburden Removed (in '000 Cubic metres)	Total Opencast Output	Output by Mechanisation		Overburden Removed (in '000 Cubic metres)
			Fully Mechanised	Manual/ Semi Mechanised			Fully Mechanised	Manual/ Semi Mechanised	
1	2	3	4	5	6	7	8	9	10
I	COAL	384811855	384433804	378051	4417028	494324349	494324349	c	984529
1	Andhra Pradesh	30619998	30619998	x	905890	52367817	52367817	x	263924
2	Assam	892569	892569	x	640634	1063456	1063456	x	10587
3	Chhattisgarh	75723917	75723917	x	55692	109416349	109416349	x	91162
4	Jharkhand	78441157	78441157	x	965546	105490071	105490071	x	224933
5	Jammu & Kashmir	101	x	101	x	x	x	x	x
6	Madhya Pradesh	39614889	39512889	102000	119826	46683235	46683235	x	135354
7	Maharashtra	31234651	30958701	275950	404209	35480221	35480221	x	82989
8	Odisha	82072022	82072022	x	55692	101553878	101553878	x	65088
9	Uttar Pradesh	23040000	23040000	x	65672	28405000	28405000	x	80784
10	West Bengal	13137283	13137283	x	1197407	13864322	13864322	x	29708
11	Meghalaya	10035268	10035268	x	6460	x	x	x	x
II	LIGNITE	34009726	34009726	x	200746	37333796	37333796	x	220789
1	Gujarat	11195637	11195637	x	43664	13611067	13611067	x	56878
2	Rajasthan	493509	493509	x	8494	1496274	1496274	x	11218
3	Tamilnadu	22320580	22320580	x	148588	22226455	22226455	x	152693

Source : Directorate General of Mines Safety, Dhanbad

Table 4.13.5 : Domestic production of petroleum products in India

('000 Tonne)

Sl. No.	Year	Light Distillates			Middle Distillates			
		Liquified Petroleum Gas @	Motor Gasoline (Petrol)	Naphtha	Kerosene	Aviation Turbine Fuel	High Speed Diesel oil	Light Diesel Oil
1	2	3	4	5	6	7	8	9
1	1970-71		169	1526	1205	2896	710	3840 986
2	1971-72		195	1615	1217	2995	808	4356 1065
3	1972-73		227	1581	1330	2813	801	4598 1010
4	1973-74		259	1647	1438	2613	875	5039 1079
5	1974-75		278	1298	1720	2052	837	6034 1084
6	1975-76		331	1275	1910	2439	925	6285 946
7	1976-77		363	1340	1986	2581	1001	6399 1047
8	1977-78		383	1423	2120	2450	1077	7129 1224
9	1978-79		403	1515	2262	2514	1177	7350 1227
10	1979-80		406	1512	2415	2539	1104	7975 1230
11	1980-81		366	1519	2115	2396	1001	7371 1108
12	1981-82		410	1614	3004	2907	1009	9042 949
13	1982-83		406	1797	2986	3393	1137	9761 1121
14	1983-84		514	1937	3578	3528	1195	10862 1081
15	1984-85		596	2144	3470	3364	1297	11086 1253
16	1985-86		867	2309	4955	4030	1519	14624 1177
17	1986-87		995	2515	5437	4912	1553	15450 1172
18	1987-88		1026	2662	5462	5104	1695	16296 1259
19	1988-89		1034	2822	5378	5201	1753	16656 1468
20	1989-90		1179	3328	5227	5700	1575	17737 1540
21	1990-91		1221	3552	4859	5471	1801	17185 1509
22	1991-92		1250	3420	4546	5339	1539	17404 1482
23	1992-93		1249	3709	4586	5199	1636	18289 1453
24	1993-94		1314	3843	4666	5270	1788	18809 1474
25	1994-95		1432	4129	5662	5261	1968	19593 1364
26	1995-96		1539	4462	5975	5267	2127	20661 1351
27	1996-97		1598	4704	6123	6236	2119	22202 1286
28	1997-98		1666	4849	6103	6701	2147	23354 1246
29	1998-99		1724	5573	6081	5341	2289	26716 1336
30	1999-00		2487	6232	8170	5735	2292	34793 1624
31	2000-01		4088	8070	9908	8714	2513	39052 1481
32	2001-02		4778	9699	9180	9681	2595	39899 1703
33	2002-03		4903	10361	9650	10028	3053	40207 2079
34	2003-04		5348	10999	11317	10187	4289	43316 1659
35	2004-05		5570	11057	14100	9298	5201	45903 1546
36	2005-06		7710	10502	16087	9242	6196	47586 923
37	2006-07		8408	12539	18145	8634	7805	53476 803
38	2007-08*		8792	14167	17964	7970	9107	58376 671
39	2008-09		9158	16020	16452	8391	8071	62905 606
40	2009-10		10334	22537	18788	8703	9304	73298 472
41	2010-11		9708	26138	19196	7809	9589	78057 590
42	2011-12		9547	27186	18825	7861	10065	82880 502
43	2012-13		9825	30118	19018	7971	10088	91103 400
44	2013-14		10030	30275	18505	7418	11220	93759 423
45	2014-15 (P)		9840	32325	17391	7559	11103	94428 358

@ : Excludes LPG production from natural gas.

(contd...)

Source : Ministry of Petroleum & Natural Gas. Basic statistics on Indian petroleum & natural gas

* : Estimated from calendar year figures

(P) : Provisional

Table 4.13.5 : Domestic production of petroleum products in India - concluded

Sl. No.	Year	Heavy Ends				Others**	Total ('000 Tonne)
		Fuel Oil	Lubricants	Petroleum	Bitumen		
1	2	10	11	12	13	14	15
1	1970-71	4090	231	151	805	501	17110
2	1971-72	4098	140	142	1009	999	18639
3	1972-73	3688	304	132	1109	267	17860
4	1973-74	3931	318	131	1093	1072	19495
5	1974-75	4243	387	137	873	668	19611
6	1975-76	5083	342	160	697	436	20829
7	1976-77	4728	368	163	945	511	21432
8	1977-78	5332	413	155	992	521	23219
9	1978-79	5644	490	122	962	527	24193
10	1979-80	6351	487	99	1103	573	25794
11	1980-81	6120	426	86	1082	533	24123
12	1981-82	6908	407	141	1298	493	28182
13	1982-83	7964	434	149	1397	528	31073
14	1983-84	8000	470	136	1069	556	32926
15	1984-85	7886	414	181	944	601	33236
16	1985-86	7955	501	192	1107	645	39881
17	1986-87	8011	491	264	1224	737	42761
18	1987-88	8466	478	257	1370	653	44728
19	1988-89	8171	497	275	1548	896	45699
20	1989-90	8952	547	275	1671	959	48690
21	1990-91	9429	561	229	1603	1142	48562
22	1991-92	9637	390	216	1710	1416	48349
23	1992-93	10403	533	221	1862	1219	50359
24	1993-94	10304	489	233	1874	1020	51084
25	1994-95	9822	504	259	1845	1088	52927
26	1995-96	9579	633	256	2032	1199	55081
27	1996-97	10298	619	246	2283	1291	59005
28	1997-98	11080	593	282	2158	1129	61308
29	1998-99	11030	586	286	2419	1163	64544
30	1999-00	11352	728	465	2485	3048	79411
31	2000-01	11392	684	2473	2721	4518	95614
32	2001-02	12227	651	2784	2561	4246	100004
33	2002-03	12167	684	2659	2941	5408	104140
34	2003-04	13372	666	2743	3397	6170	113463
35	2004-05	14970	646	3162	3349	3777	118579
36	2005-06	14305	677	3576	3182	4419	124405
37	2006-07	15697	825	3891	3779	5746	139748
38	2007-08*	15804	881	4507	4129	7104	149472
39	2008-09	17684	874	4713	4241	6033	155148
40	2009-10	18346	950	4889	3709	13279	184610
41	2010-11	20519	884	4478	2711	15142	194821
42	2011-12	18433	1028	4610	7837	14429	203202
43	2012-13	15054	896	4670	10943	17650	217736
44	2013-14	13405	941	4785	12068	17927	220756
45	2014-15(P)	11919	946	4632	12448	18188	221136

Source : Ministry of Petroleum & Natural Gas.

* : Estimated from calendar year figures

** : Includes those of light distillates, middle distillates and heavy ends.

(P) : Provisional

Table 4.13.6: Availability of crude oil and petroleum products in India

('000 Tonne)

Sl. No.	Year	Crude Oil			Petroleum Products		
		Production	Net Imports	Gross Availability	Production @	Net Imports	Gross Availability
1	2	3	4	5	6	7	8
1	1970-71	6822	11683	18505	17110	752	17862
2	1971-72	7299	12951	20250	18639	2011	20650
3	1972-73	7321	12084	19405	17830	3399	21229
4	1973-74	7189	13855	21044	19495	3387	22882
5	1974-75	7684	14016	21700	19603	2473	22076
6	1975-76	8448	13624	22072	20829	2048	22877
7	1976-77	8898	14048	22946	21432	2550	23982
8	1977-78	10763	14507	25270	23219	2832	26051
9	1978-79	11633	14657	26290	24193	3834	28027
10	1979-80	11766	16121	27887	25794	4636	30430
11	1980-81	10507	16248	26755	24123	7253	31376
12	1981-82	16194	14460	30654	28182	4829	33011
13	1982-83	21063	12397	33460	31073	4233	35306
14	1983-84	26020	10445	36465	32926	2856	35782
15	1984-85	28990	7164	36154	33236	5159	38395
16	1985-86	30168	14616	44784	39881	1902	41783
17	1986-87	30480	15476	45956	42761	556	43317
18	1987-88	30357	17734	48091	44728	739	45467
19	1988-89	32040	17815	49855	45699	4200	49899
20	1989-90	34087	19490	53577	48690	3971	52661
21	1990-91	32160	20699	52859	48562	6012	54574
22	1991-92	30345	23994	54339	48349	6509	54858
23	1992-93	26950	29247	56197	50359	7564	57923
24	1993-94	27026	30822	57848	51084	8042	59126
25	1994-95	32494	27349	59843	52927	10697	63624
26	1995-96	35168	27342	62510	55081	16900	71981
27	1996-97	32900	33906	66806	59005	17103	76108
28	1997-98	33858	34493	68351	61308	20589	81897
29	1998-99	32722	39808	72530	64544	23052	87596
30	1999-00	31949	57805	89754	79411	15862	95273
31	2000-01	32426	74097	106523	95614	902	96516
32	2001-02	32032	78706	110738	100004	-3056	96948
33	2002-03	33044	81989	115033	104140	-3061	101079
34	2003-04	33373	90434	123807	113463	-6619	106844
35	2004-05	33981	95861	129842	118579	-9383	109196
36	2005-06	32190	99409	131599	124405	-10020	114385
37	2006-07	33988	111502	145490	139748	-15964	123784
38	2007-08	34118	121672	155790	149472	-18317	131155
39	2008-09	33508	132775	166283	155148	-20358	134789
40	2009-10	33690	159259	192949	184610	-36490	148120
41	2010-11	37684	163595	201279	194821	-41698	153123
42	2011-12	38090	171729	209819	203202	-44988	158214
43	2012-13	37862	184795	222657	217736	-47634	170103
44	2013-14	37788	189238	227027	220756	-51146	169610
45	2014-15(P)	37460	189432	226892	221136	-43505	177630

Source : Ministry of Petroleum & Natural Gas.

(P) : Provisional

@ :Excludes LPG production from natural gas.



4.13.9 The details of production and utilization of Natural Gas in India from 1970-71 to 2013-14 is depicted in Table 4.13.7
Natural gas is also an important fuel in India as evident from the following table 4.13.7

The time series data of Industry wise off –take of Natural gas in India is available in table 4.13.8

Sl. No.	Year	Gross Production	Re-injected	Flarred	(Million cubic metres)	
					4	5
1	2	3				6
1	1970-71	1445	36	744		667
2	1971-72	1535	49	768		718
3	1972-73	1565	141	653		771
4	1973-74	1713	115	836		762
5	1974-75	2041	139	951		951
6	1975-76	2368	160	1084		1124
7	1976-77	2428	190	857		1381
8	1977-78	2839	184	1191		1464
9	1978-79	2812	148	953		1711
10	1979-80	2767	127	964		1676
11	1980-81	2358	43	793		1522
12	1981-82	3851	110	1519		2222
13	1982-83	4936	91	1888		2957
14	1983-84	5961	45	2515		3401
15	1984-85	7241	48	3052		4141
16	1985-86	8134	66	3118		4950
17	1986-87	9853	63	2715		7075
18	1987-88	11467	54	3445		7968
19	1988-89	13217	84	3883		9250
20	1989-90	16988	96	5720		11172
21	1990-91	17998	102	5131		12765
22	1991-92	18644	132	4072		14410
23	1992-93	18061	90	1854		16117
24	1993-94	18336	71	1924		16341

Continued...

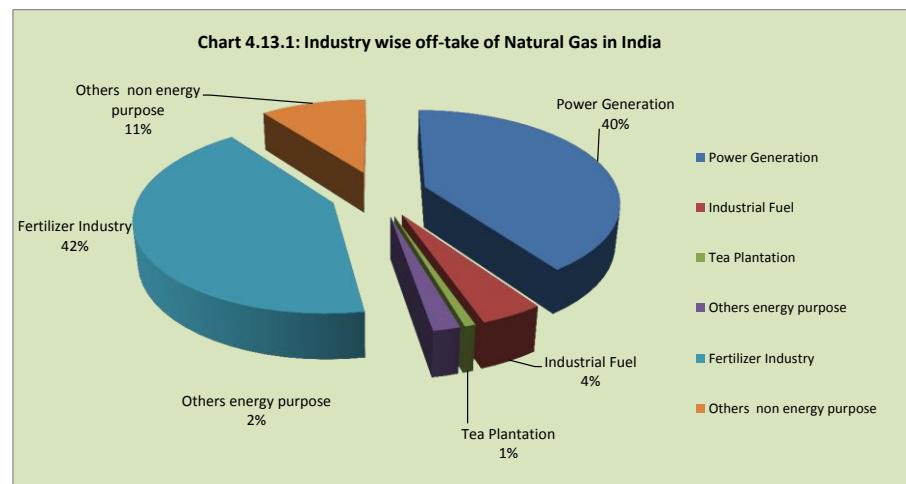
Table 4.13.7 Gross and net production (utilisation) of natural gas in India (Million cubic metres)					
Sl. No.	Year	Gross Production	Re-injected	Flared	Net Production (Utilisation)
1	2	3	4	5	6
25	1994-95	19468	23	2108	17337
26	1995-96	22642	0	1710	20932
27	1996-97	23256	0	1932	21354
28	1997-98	26401	0	1856	24545
29	1998-99	27428	0	1722	25706
30	1999-00	28446	0	1561	26886
31	2000-01	29477	0	1617	27860
32	2001-02	29714	0	1677	28037
33	2002-03	31389	0	1426	29963
34	2003-04	31962	0	1056	30906
35	2004-05	31763	0	988	30775
36	2005-06	32202	4467	877	26858
37	2006-07	31747	4372	956	26419
38	2007-08	32417	4499	938	26981
39	2008-09	32845	4680	1099	27066
40	2009-10	47496	5660	975	40874
41	2010-11	52219	5214	968	46040
42	2011-12	47559	5313	1077	41168
43	2012-13	40679	5429	902	34348
44	2013-14	35407	5590	769	28984
45	2014-15(P)	33656	5904	873	26781

Source : Ministry of Petroleum & Natural Gas.

concluded

Note: Reinjected's (internal use) figures for the year 1995-96 to 2004-05 is not available.

(P) : Provisional



As evident from the chart 4.12.1 in India, 32.89% of natural gas is being utilized by fertiliser industry sector followed by power generation (31.33), Captive use/LPG shrinkage(13.90)and Domestic fuel (8.34) during 2013-14(P).

Table 4.13.8 : Industry-wise off-take of natural gas in India

Sl No.	Year	Energy Purposes							Non-Energy Purposes		Grand Total
		Power Generation	Industrial Fuel	Tea Plantation	Domes tic fuel ^	Captive Use/LPG shrinkag e	Others*	Total	Fertilizer Industry	Others **	
1	2	3	4	5	6	7	8	9	10	11	12
1	1970-71	261	116	15	-	68	-	460	187	-	647
2	1971-72	313	129	19	-	61	-	522	196	-	718
3	1972-73	339	148	20	Neg	63	-	570	201	-	771
4	1973-74	323	157	22	Neg	81	-	583	179	-	762
5	1974-75	354	164	29	6	80	-	633	318	-	951
6	1975-76	368	143	33	13	104	-	661	463	2	1126
7	1976-77	344	155	38	15	142	-	694	663	24	1381
8	1977-78	372	165	39	13	171	-	760	673	31	1464
9	1978-79	560	175	43	13	176	-	967	721	23	1711
10	1979-80	514	158	39	16	174	-	901	755	25	1681
11	1980-81	492	163	45	14	176	-	890	611	21	1522
12	1981-82	612	166	47	15	364	-	1204	991	27	2222
13	1982-83	1025	185	51	14	499	-	1774	1155	28	2957
14	1983-84	1209	230	58	16	572	-	2085	1283	33	3401
15	1984-85	1454	250	62	18	721	-	2505	1603	33	4141
16	1985-86	1299	223	78	21	795	-	2416	2500	34	4950
17	1986-87	2041	257	96	25	1295	-	3714	3335	26	7075
18	1987-88	2721	281	99	34	1313	-	4448	3490	30	7968
19	1988-89	1823	526	87	42	1329	-	3807	5334	109	9250
20	1989-90	2140	695	78	41	1526	-	4480	6578	114	11172
21	1990-91	3634	827	89	50	1775	-	6375	5612	779	12766
22	1991-92	4774	766	108	72	2165	-	7885	5509	1048	14442
23	1992-93	4967	1450	105	187	1916	-	8625	6672	819	16116
24	1993-94	4785	1794	121	189	2277	-	9166	6499	675	16340
25	1994-95	5229	1927	134	190	2230	-	9710	6936	691	17337
26	1995-96 \$	6836	2301	111	178	589	-	10015	7602	474	18091
27	1996-97 \$	6935	2631	130	184	618	-	10498	7625	509	18632
28	1997-98 \$	8114	3106	117	206	569	-	12112	8752	649	21513
29	1998-99 \$	8714	3005	147	193	911	-	12970	8869	650	22489
30	1999-00	8829	2329	140	250	4840	36	16424	8592	1869	26885
31	2000-01	8801	2870	151	335	5004	38	17199	8480	2181	27860
32	2001-02	9214	2979	147	485	5339	70	18234	7957	1846	28037
33	2002-03	10510	2939	119	654	5409	136	19767	7955	2242	29964
34	2003-04	11478	3099	142	93	4865	1263	20940	7889	2077	30906
35	2004-05	12099	3569	142	343	4944	231	21328	8173	1274	30775
36	2005-06	11878	3780	151	75	5048	1120	22052	7762	1211	31025
37	2006-07	11963	3205	170	443	5034	40	20855	8497	2016	31368
38	2007-08	12037	3323	160	38	1804	1324	18686	9823	2070	30579
39	2008-09	12603	5912	154	102	1885	1535	22191	9082	1716	32989
40	2009-10	21365	2322	167	246	5433	1838	31371	13168	1967	46506
41	2010-11	25787	903	193	2525	6781	765	36954	11464	2838	51256
42	2011-12	22628	1694	175	4189	1068	1333	31087	14003	15593	60683
43	2012-13	16078	1059	182	4990	1027	1106	24442	14733	14739	53914
44	2013-14	11284	1077	196	4983	982	274	18796	15869	14330	48995
45	2014-15(P)	10720	NA	NA	5810	1005	154	17689	15190	14076	49845

Source : Ministry of Petroleum & Natural Gas.

\$: Sales of City Gas Distribution Companies like IGL, MGL, Bhagyanagar Gas, TNGCL, BMC Green Gas, CUGL & GGCL . Includes Industrial sale, domestic sale and CNG sale.

^ Incudes total off-take by CGD entities for Domestic (PNG), Transport (CNGo and Industial & commercial sector

Neg: Negligible

* Sponge iron use.

** Includes refineries, Heavy Water Plants

(P) :Provisional

4. 14 Power Sector

4.14.1 Though electricity is a major factor of development in all sectors, the role of power generating plants on environmental pollution can not be ignored at all. In the following sections, data depicting the growth of power generation sector in India are discussed.

4.14.2 The State /UT wise installed capacity of power utilities (thermal, nuclear, hydro renewable, Renewable Energy Sources) in India during 2015 is given in the table 4.14.1

Table 4.14.1 All India gross electrical energy generation capacity of electricity departments, Govt. Undertakings, Central Sector, Municipalities and Private Sector modewise -31.03.2015								
State/U.Ts.	Hydro	Thermal Steam	Diesel	Gas	Total Thermal	Nuclear	R E S	Total
1	2	3	4	5	6	7	8	9
PUBLIC SECTOR								
Haryana	884.51	3160	3.92	25	3188.92	0	59.3	4132.73
Himachal Pradesh	393.6	0	0.13	0	0.13	0	245.61	639.34
Punjab	2230.23	2630	0	25	2655	0	127.8	5013.03
Rajasthan	987.96	4715	0	603.8	5318.8	0	23.85	6330.61
Jammu & Kashmir	780	0	8.94	175	183.94	0	106.53	1070.47
Uttar Pradesh	524.1	4923	0	0	4923	0	25.1	5472.2
Uttarakhand	1252.15	0	0	0	0	0	62.87	1315.02
Delhi	0	135	0	2050.4	2185.4	0	0	2185.4
Chandigarh	0	0	0	0	0	0	0	0
Central Sector (NR)	7866.22	10765	0	2344.06	13109.06	1620	0	22595.3
Sub Total (NR)	14918.77	26328	12.99	5223.26	31564.25	1620	651.06	48754.1
Gujarat	772	4720	17.28	2321.82	7059.1	0	8	7839.1
Madhya Pradesh	1703.66	4195	0	0	4195	0	83.96	5982.62
Chhattisgarh	120	2780	0	0	2780	0	11.05	2911.05
Maharashtra	2884.84	9560	0	672	10232	0	208.13	13325
Goa	0	0	0	0	0	0	0.05	0.05
Central Sector (WR)	1520	11340	0	3533.59	14873.59	1840	0	18233.6
Sub Total (WR)	7000.5	32595	17.28	6527.41	39139.69	1840	311.19	48291.4
Andhra Pradesh	1237.92	4410	0	0	2348.15	0	89.5	4172.06
Telangana	2496.6	2282.5	0	0	2744.35	0	0	4875.99
Karnataka	3599.8	2720	127.92	0	2847.92	0	137.33	6585.05
Kerala	1881.5	0	234.6	0	234.6	0	123.92	2240.02
Tamil Nadu	2182.2	4770	0	523.2	5293.2	0	122.7	7598.1
Lakshadweep	0	0	9.97	0	9.97	0	0	9.97
Puducherry	0	0	0	32.5	32.5	0	0	32.5
Central Sector (SR)	0	9590	0	359.58	9949.58	2320	0	12269.6
Sub Total (SR)	11398.02	23772.5	372.49	915.28	23460.27	2320	473.45	37651.7
Bihar	0	210	0	0	210	0	70.7	280.7
Jharkhand	130	1190	0	0	1190	0	4.05	1324.05
Odisha	2061.93	420	0	0	420	0	6.3	2488.23
West Bengal	977	5220	12.06	100	5332.06	0	91.95	6401.01
Sikkim	0	0	5	0	5	0	52.11	57.11
D.V.C.	143.2	6200	0	90	6290	0	0	6433.2
A. & N. Islands	0	0	40.05	0	40.05	0	5.25	45.3
Central Sector (ER)	702	10235	0	0	10235	0	0	10937
Sub Total (ER)	4014.13	23475	57.11	190	23722.11	0	230.36	27966.6
Assam	100	60	20.69	276.2	356.89	0	30.01	486.9
Manipur	0	0	45.41	0	45.41	0	5.45	50.86
Meghalaya	282		2.05		2.05		31.03	315.08
Nagaland	0	0	2	0	2	0	29.67	31.67
Tripura	0	0	4.85	169.5	174.35	0	16.01	190.36
Arunachal Pradesh	0	0	15.88	0	15.88	0	104.61	120.49
Mizoram	0	0	51.86	0	51.86	0	36.47	88.33
Central Sector (NER)	860	0	0	1192.5	1192.5	0	0	2052.5
Sub Total (NER)	1242	60	142.74	1638.2	1840.94	0	253.25	3336.19
Total-I, (All India)	38573.42	106230.5	602.6	14494.15	119727.25	5780	1919.31	166000

(Contd.)

Table 4.14.1 All India gross electrical energy generation capacity of electricity departments, Govt. Undertakings,Central Sector,Municipalities and Private Sector modewise -31.03.2015

State/U.Ts.	Hydro	Thermal Steam	Diesel	Gas	Total Thermal	Nuclear	R E S	Total
1	2	3	4	5	6	7	8	9
PRIVATE SECTOR								
Haryana	0	1720	0	0	1720	0	77.3	1797.3
Himachal Pradesh	1748	0	0	0	0	0	478.3	2226.3
Jammu & Kashmir	0	0	0	0	0	0	50	50
Punjab	0	2560	0	0	2560	0	365.62	2925.62
Rajasthan	0	2800	0	0	2800	0	4362.4	7162.4
Uttar Pradesh	0	2850	0	0	2850	0	964.76	3814.76
Uttarakhand	400	0	0	0	0	0	181.45	581.45
Delhi	0	0	0	108	108	0	21.47	129.47
Chandigarh	0	0	0	0	0	0	4.5	4.5
Gujarat	0	8620	0.2	4160	12780.2	0	4709.55	17489.75
Madhya Pradesh	0	6425	0	0	6425	0	1480.68	7905.68
Chhattisgarh	0	8323	0	0	8323	0	313.45	8636.45
Maharashtra	447	11796	0	180	11976	0	5980.17	18403.17
Goa	0	0	0	48	48	0	0	48
Andhra Pradesh	0	1560	36.8	3370.4	4967.2	0	1856.5	6823.7
Telangana	0	0	0	0	0	0	61.25	61.25
Karnataka	0	2060	106.5	0	2166.5	0	4372.9	6539.4
Kerala	0	0	21.84	174	195.84	0	80.03	275.87
TamilNadu	0	1150	411.659	503.1	2064.759	0	8273.04	10337.8
Lakshadweep	0	0	0	0	0	0	0.75	0.75
Puducherry	0	0	0	0	0	0	0.03	0.03
Bihar	0	0	0	0	0	0	43.42	43.42
Jharkhand	0	900	0	0	900	0	16	916
Odisha	0	4650	0	0	4650	0	110.09	4760.09
DVC	0	1050	0	0	1050	0	0	1050
West Bengal	0	1941.38	0.14	0	1941.52	0	39.76	1981.28
A&N Islands	0	0	20	0	20	0	5.1	25.1
Sikkim	99	0	0	0	0	0	0	99
Assam	0	0	0	24.5	24.5	0	4.1	28.6
Tripura	0	0	0	0	0	0	5	5
Arunachal Pradesh	0	0	0	0	0	0	0.03	0.03
Total-II, (All India)	2694	58405.38	597.14	8568	67570.52	0	33857.65	104122.2
All India Total (I+II)	41267.42	164635.9	1199.74	23062.15	188897.77	5780	35776.96	271722.2

Source : Central Electricity Authority

Table 4.14.2 : All India gross electrical energy generation by electricity departments, Govt. Undertakings, Central Sector, Municipalities and Private Sector modewise 2014-15

State/U.Ts.	Hydro	Thermal Steam	Diesel	Gas	Total Thermal	Nuclear	(GWh)	
							R E S	Total
1	2	3	4	5	6	7	8	9
PUBLIC SECTOR								
Chandigarh	0	0	0	0	0	0	0	0
Delhi	0	423.54	0	4571.06	4994.6	0	0	4994.6
Haryana	3304.43	13616.77	0	223.51	13840.28	0	164.75	17309.46
Himachal Pradesh	1735.3	0	0	0	0	0	687.71	2423.01
Jammu & Kashmir	4216.66	0	0	0	0	0	298.28	4514.94
Punjab	8537.78	11671.82	0	223.51	11895.33	0	311.94	20745.05
Rajasthan	2999.05	25250.66	0	2097.26	27347.92	0	43.53	30390.5
Uttar Pradesh	1288.95	25098.49	0	0	25098.49	0	72.76	26460.2
Uttarakhand	4199.36	0	0	0	0	0	176.23	4375.59
Central Sector (NR)	30748.9	70530.6	0	7419.16	77949.76	10612.93	0	119311.59
Sub Total (NR)	57030.43	146591.88	0	14534.5	161126.38	10612.93	1755.2	230524.94
Chhattisgarh	258.18	15592.41	0	0	15592.41	0	32.47	15883.06
Gujarat	1367.67	21466.24	0	501.29	21967.53	0	14.46	23349.66
Madhya Pradesh	4318.68	17074.22	0	0	17074.22	0	156.56	21549.46
Maharashtra	4696.55	40707.46	0	3567.16	44274.62	0	426.99	49398.16
Goa	0	0	0	0	0	0	0.14	0.14
Central Sector (WR)	3670.83	76959.57	0	3349.75	80309.32	13799.29	0	97779.44
Sub Total (WR)	14311.91	171799.9	0	7418.2	179218.1	13799.29	630.62	207959.92
Andhra Pradesh	2372.43	21034.57	0	0	21034.57	0	192.18	23599.18
Telangana	4400.92	16059.87	0	0	16059.87	0	0	20460.79
Karnataka	13014.22	16786.45	0	0	16786.45	0	305.75	30106.42
Kerala	6852.65	0	207.69	0	207.69	0	325.69	7386.03
Tamil Nadu	5058.96	27378.22	0	1982.88	29361.1	0	234.16	34654.22
Puducherry	0	0	0	102.14	102.14	0	0	102.14
Lakshadweep	0	0	45.75	0	45.75	0	0	45.75
Central Sector (SR)	0	59713.99	0	819.12	60533.11	11689.32	0	72222.43
Sub Total (SR)	31699.18	140973.1	253.44	2904.14	144130.68	11689.32	1057.78	188576.96
Bihar	0	0	0	0	0	0	203.34	203.34
D.V.C.	267.3	25283.81	0	0	25283.81	0	0	25551.11
Jharkhand	33.73	3153.95	0	0	3153.95	0	7.95	3195.63
Odisha	6555.63	2798.93	0	0	2798.93	0	16.05	9370.61
West Bengal	1755.62	25261.11	0	0	25261.11	0	255.81	27272.54
Sikkim	0	0	0	0	0	0	145.91	145.91
A. & N. Islands	0	0	181.45	0	181.45	0	11.98	193.43
Central Sector (ER)	3308.62	59133.73	0	0	59133.73	0	0	62442.35
Sub Total (ER)	11920.9	115631.53	181.45	0	115812.98	0	641.03	128374.91
Arunachal Pradesh	0	0	0	0	0	0	292.88	292.88
Assam	402.43	0	0	1526.91	1526.91	0	84.03	2013.37
Manipur	0	0	0	0	0	0	15.26	15.26
Meghalaya	775.29	0	0	0	0	0	86.88	862.17
Mizoram	0	0	0	0	0	0	102.12	102.12
Nagaland	0	0	0	0	0	0	83.08	83.08
Tripura	0	0	0	726.46	726.46	0	40.83	767.29
Central Sector (NER)	2364.39	0	0	4839.02	4839.02	0	0	7203.41
Sub Total (NER)	3542.11	0	0	7092.39	7092.39	0	705.07	11339.57
Total-I, (All India)	118504.5	574996.41	434.89	31949.23	607380.53	36101.54	4789.71	766776.31

Table 4.14.2 : All India gross electrical energy generation by electricity departments, Govt. Undertakings, Central Sector, Municipalities and Private Sector modewise 2014-15

State/U.Ts.	Hydro	Thermal Steam	Diesel	Gas	Total Thermal	Nuclear	(GWh)	
							R E S	Total
1	2	3	4	5	6	7	8	9
PRIVATE SECTOR								
Chandigarh	0	0	0	0	0	0	7.88	7.88
Delhi	0	0	0	0	0	0	37.57	37.57
Haryana	0	9195.24	0	0	9195.24	0	214.75	9409.99
Himachal Pradesh	6985.46	0	0	0	0	0	1339.24	8324.7
Jammu & Kashmir	0	0	0	0	0	0	140	140
Punjab	0	10572.21	0	0	10572.21	0	892.44	11464.65
Rajasthan	0	17875.93	0	0	17875.93	0	7962.03	25837.96
Uttar Pradesh	0	19624.94	0	0	19624.94	0	2796.48	22421.42
Uttarakhand	1815.94	0	0	0	0	0	508.62	2324.56
Chhattisgarh	0	18785.05	0	0	18785.05	0	921.13	19706.18
Gujarat	0	55807.09	0	3119.95	58927.04	0	8510.81	67437.85
Madhya Pradesh	0	22264.77	0	0	22264.77	0	2761.03	25025.8
Maharashtra	1506.9	49332.93	0	1148.5	50481.43	0	12268.78	64257.11
Goa	0	0	0	12.61	12.61	0	0	12.61
Andhra Pradesh	0	4761.77	0	2561.07	7322.84	0	3986.49	11309.33
Telangana	0	0	0	0	0	0	107.19	107.19
Karnataka	0	13754.38	0	0	13754.38	0	9735.62	23490
Kerala	0	0	0	154.71	154.71	0	210.34	365.05
TamilNadu	0	4348.98	1045.97	2128.98	7523.93	0	15788.4	23312.33
Puducherry	0	0	0	0	0	0	0.05	0.05
Lakshadweep	0	0	0	0	0	0	1.31	1.31
Bihar	0	0	0	0	0	0	124.88	124.88
DVC	0	6684.08	0	0	6684.08	0	0	6684.08
Jharkhand	0	4750.12	0	0	4750.12	0	31.39	4781.51
Odisha	0	13584.71	0	0	13584.71	0	280.49	13865.2
West Bengal	0	8952.17	0	0	8952.17	0	110.61	9062.78
Sikkim	430.86	0	0	0	0	0	0	430.86
A.& N. Islands	0	0	94.8	0	94.8	0	11.64	106.44
Arunachal Pradesh	0	0	0	0	0	0	0.08	0.08
Assam	0	0	0	0	0	0	11.48	11.48
Tripura	0	0	0	0	0	0	12.75	12.75
Total-II, (All India)	10739.16	260294.37	1140.77	9125.82	270560.96	0	68773.49	350073.61
All India Total (I+II)	129243.7	835290.78	1575.66	41075.05	877941.49	36101.54	73563.2	1116849.92

Source : Central Electricity Authority

Table 4.14.3 : Growth of installed generating capacity in India								
Sr. No.	As on	Hydro	Thermal				Nuclear	(Megawatt) Total
			Coal \$	Gas	Diesel	Total		
1	31.12.47	508	756	0	98	854	0	0 1362
2	31.12.50	560	1004	0	149	1153	0	0 1713
3	31.03.56	1061	1597	0	228	1825	0	0 2886
4	31.03.61	1917	2436	0	300	2736	0	0 4653
5	31.03.66	4124	4417	134	352	4903	0	0 9027
6	31.03.69	5907	6640	134	276	7050	0	0 12957
7	31.03.74	6966	8652	165	241	9058	640	0 16664
8	31.03.79	10833	14875	168	164	15207	640	0 26680
9	31.03.80	11384	15991	268	165	16424	640	0 28448
10	31.03.85	14460	26311	542	177	27030	1095	0 42585
11	31.03.90	18307	41236	2343	165	43744	1565	0 63616
12	31.03.92	19194	44791	3095	168	48054	1785	32 69065
13	31.03.97	21658	54154	6562	2947	63663	2225	902 88448
14	31.03.02	26269	62131	11163	1135	74429	2720	1628 105046
15	31.03.03	26767	63951	11633	1178	76762	2720	1628 107877
16	31.03.04	29507	64957	11840	1172	77969	2720	2488 112684
17	31.03.05	30942	67791	11910	1202	80903	2770	3811 118426
18	31.03.06	32326	68518	12690	1202	82410	3360	6191 124287
19	31.03.07	34654	71121	13692	1202	86015	3900	7760 132329
20	31.03.08	35909	76049	14656	1202	91907	4120	11125 143061
21	31.03.09	36846	77649	14876	1200	93725	4120	13242 147933
22	31.03.10 *	36863	84198	17056	1200	102454	4560	15521 159398
23	31.03.12	38990	112022	18381	1200	131603	4780	24504 199877
24	31.03.13	39491	130221	20110	1200	151531	4780	27542 223344
25	31.03.14	40532	145273	21782	1200	168255	4780	31692 245259
26	31.03.15	41267	164636	23062	1200	188898	5780	35777 271722

Source: Central Electricity Authority

: RES:- Renewable Energy Sources includes Hydro capacity of 25.00 MW and below

The Plan wise growth of installed capacity of power plants in India is exhibited in Chart 4.13.2.

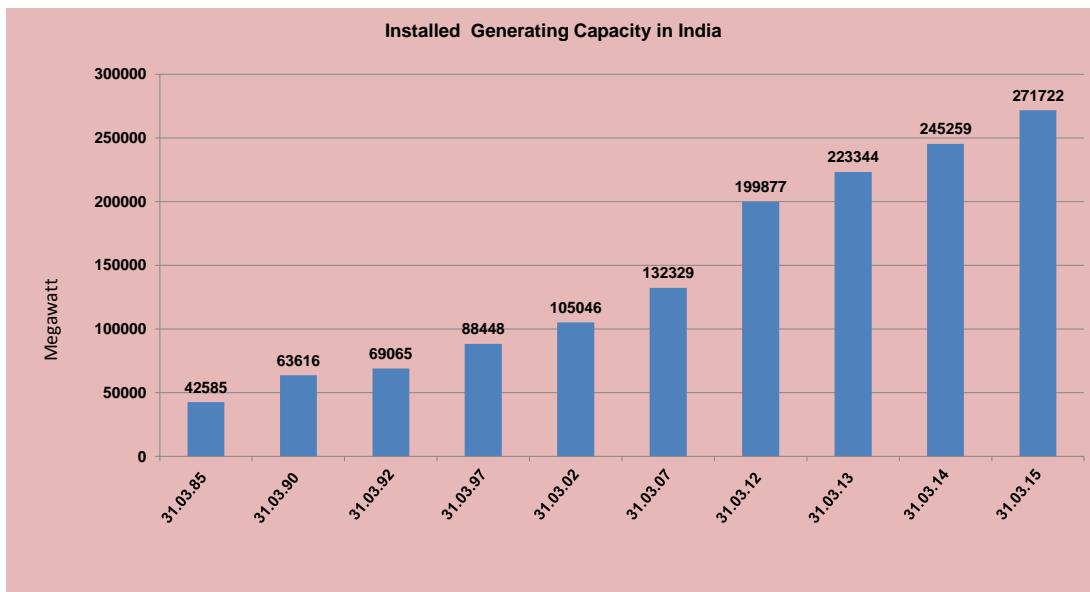


Table 4.14.4 Cumulative comparison of power supply position

Region/State/U.Ts.	Peak Demand (MW)	Peak Met (MW)	Surplus(+)/Deficit(-)	
			(MW)	%
NORTHERN REGION				
Chandigarh	367	367	0	0
Delhi	6,006	5,925	-81	-1.35
Haryana	9,152	9,152	0	0
Himachal Pradesh	1,422	1,422	0	0
Jammu & Kashmir	2,554	2,043	-511	-20.01
Punjab	11,534	10,023	-1511	-13.1
Rajasthan	10,642	10,642	0	0
Uttar Pradesh	15,670	13,003	-2667	-17.02
Uttarakhand	1,930	1,930	0	0
NORTHERN REGION	51,977	47,642	-4,335	-8.34
Chhattisgarh	3,817	3,638	-179	-4.69
Gujarat	13,603	13,499	-104	-0.76
Madhya Pradesh	9,755	9,717	-38	-0.39
Maharashtra	20,147	19,804	-343	-1.7
Daman & Diu	301	301	0	0
Dadra & Nagar Haveli	714	714	0	0
Goa	501	489	-12	-2.4
WESTERN REGION	44,166	43,145	-1021	-2.31
Andhra Pradesh	7,144	6,784	-360	-5.04
Telangana	7,884	6,755	-1129	-14.32
Karnataka	10,001	9,549	-452	-4.52
Kerala	3,760	3,594	-166	-4.41
Tamil Nadu	13,707	13,498	-209	-1.52
Puducherry	389	348	-41	-10.54
Lakshadweep #	8	8	0	0
SOUTHERN REGION	39,094	37,047	-2,047	-5.24
Bihar	2,994	2,874	-120	-4.01
DVC	2,653	2,590	-63	-2.37
Jharkhand	1,075	1,055	-20	-1.86
Orissa	3,920	3,892	-28	-0.71
West Bengal	7,544	7,524	-20	-0.27
Sikkim	83	83	0	0
Andaman Nicobar #	40	32	-8	-20
EASTERN REGION	17,040	16,932	-108	-0.63
Arunachal Pradesh	139	126	-13	-9.35
Assam	1,450	1,257	-193	-13.31
Manipur	150	146	-4	-2.67
Meghalaya	370	367	-3	-0.81
Mizoram	90	88	-2	-2.22
Nagaland	140	128	-12	-8.57
Tripura	310	266	-44	-14.19
NORTH EAST REGION	2,528	2,202	-326	-12.9
ALL INDIA	148,166	141,160	-7006	-4.73

Lakshadweep & A & N Islands are stand-alone systems, power supply position of these does not form part of regional requirement and availability.

Source : Central Electricity Authority 2015

Table 4.14.5 Annual gross generation of power by source

Sl. No.	Year	Hydro	Steam	Diesel &	Gas	Nuclear	Thermal*	(in MU units)
		**	@	Wind @	\$			Total
1	2	3	4	5	6	7	8	9
1	1980-81	46541.8	60713.8	61.5	522.0	3001.3	-	110840.4
2	1985-86	51020.6	112540.1	50.6	1756.9	4981.9	-	170350.1
3	1990-91	71641.3	178321.7	111.3	8113.2	6141.1	-	264328.6
4	1991-92	72757.1	197163.2	134.0	11450.0	5524.4	-	287028.7
5	1992-93	69869.2	211123.5	162.3	13480.4	6726.3	-	301361.7
6	1993-94	70462.7	233150.7	310.9	14727.6	5397.7	-	324049.6
7	1994-95	82712.0	243110.2	545.2	18474.8	5648.2	-	350490.4
8	1995-96	72759.2	273743.5	714.4	24858.4	7981.7	-	380057.2
9	1996-97	68900.8	289378.3	1554.3	26984.9	9071.1	-	395889.4
10	1997-98	74581.7	300730.5	1929.3	34423.2	10082.6	-	421747.3
11	1998-99	82690.0	308056.0	2136.0	43480.0	12015.0	353662.0	448367.0
12	1999-00	80637.0	377814.0	3989.0	49773.0	13267.0	386776.0	480680.0
13	2000-01	74481.0	357006.0	3822.0	48311.0	16928.0	408139.0	499548.0
14	2001-02	73579.9	370883.5	6402.7	47098.6	19474.6	424385.8	517439.2
15	2002-03	64014.0	389550.3	7052.4	52686.6	19390.0	449289.3	532693.3
16	2003-04	75242.5	407283.8	6867.0	57928.4	17780.0	472079.2	565101.7
17	2004-05	84495.3	424083.2	2518.7	59473.6	16845.3	486075.5	587416.1
18	2005-06	103057.3	435096.6	1987.7	60128.0	17238.9	497214.3	617510.4
19	2006-07	116368.9	461340.0	2488.8	63718.6	18606.8	527547.4	662523.0
20	2007-08	128702.1	486763.2	3297.3	68930.6	16776.9	558990.1	704469.0
21	2008-09	118980.7	512527.1	4708.6	72865.1	14712.6	590100.8	723793.6
22	2009-10	112038.2	539982.4	4243.4	96650.6	18636.4	640876.5	771551.1
23	2010-11	119868.3	561757.0	2993.9	100257.2	26266.4	665008.1	811142.8
24	2011-12	135794.0	612880.2	2461.3	93464.4	32286.6	708805.9	876886.5
25	2012-13	118514.7	691555.1	2284.7	66835.9	32866.1	760715.8	912056.7
26	2013-14	140445.4	746086.7	1868.2	44522.2	34227.8	792477.1	967150.3
27	2014-15	129243.7	835290.8	1576.7	41075.5	36101.5	73563.2	1116849.9

Source: Monthly Generation Report of Central Electricity Authority

* : Including Coal, Lignite, Diesel & Gas based stations

@' : CEA is not monitoring Captive Power Plants, Wind & Generation of small mini stations & micro Hydel stations and thermal stations of less than 25 MW capacity.

\$: Includes generation from liquid fired Gas Turbine stations.

MU : Million Units

** : Includes imports from Bhutan

P : Provisional

Table 4.14.6 : Plan wise growth of electricity sector in India

Sr. No.	As on during financial year ending with	Installed capacity (MW)	No. of Villages electrified +	Length of T & D lines (Ckt. Kms)@	Annual Per capita consumption \$ (KWh)
1	2	3	4	5	6
1	31.12.47	1,362	NA	23,238	16.3
2	31.12.50	1,713	3,061	29,271	18.2
3	31.03.56 (End of the 1st Plan)	2,886	7,294	85,427	30.9
4	31.03.61 (End of the 2nd Plan)	4,653	21,754	157,887	45.9
5	31.03.66 (End of the 3rd Plan)	9,027	45,148	541,704	73.9
6	31.03.69 (End of the 3rd Annual Plans)	12,957	73,739	886,301	97.9
7	31.03.74(End of the 4th Plan)	16,664	156,729	1,518,884	126.2
8	31.03.79(End of the 5th Plan)	26,680	232,770	2,145,919	171.6
9	31.03.80 (End of the Annual Plan)	28,448	249,799	2,351,609	172.4
10	31.03.85 (End of the 6th Plan)	42,585	370,332	3,211,956	228.7
11	31.03.90 (End of the 7th Plan)	63,636	470,838	4,407,501	329.2
12	31.03.92(End of the 2nd Annual PlanPlans)	69,065	487,170	4,574,200	347.5
13	31.03.97(End of the 8th Plan)	85,795	498,836	5,141,413	464.6
14	31.03.02(End of the 9th Plan)	105,046	512,153	6,030,148	559.2
15	31.03.03 (End of 1st year of the 10th Plan)	107,877	492,325	6,551,737	566.7
16	31.03.04 (End of 2st year of the 10th Plan)	112,684	495,031	6,345,421	592.0
17	31.03.05 (End of 3st year of the 10th Plan)	118,426	439,800	6,570,823	612.5
18	31.03.06 (End of 4st year of the 10th Plan)	124,287	441,347	6,778,359	631.4
19	31.03.07 (End of 10th Plan)	132,329	482,864	6,939,529	671.9
20	31.03.08 (1 year of 11th Plan)	143,061	487,347	7,287,413	717.1
21	31.03.2009(2nd year Of 11th Plan)	147,965	497,236	7,487,977 ^	733.3
22	31.03.2010 (3rd year Of 11th Plan)	159,398	500,920	7,846,496 *	778.7
23	31.03.2011(4th year of 11th Plan)	173,626	537,947	7,951,486 *	813.3*
24	31.03.2012 (End of 11th Plan)	199,877	556,633	8,726,092	883.6
25	31.03.2013 (End of Ist year of 12th Plan)	223,344	593,132*	8,970,112 *	917.2*
26	31.03.2014 (End of IInd year of 12th Plan)	245,259	572,414^	9,534,584 *	956.77*
27	31.03.2015	267,637	580934		

.Source: Central Electricity Authority , 2014

* Provisional

N.A. : Not available.

+ Figures 10th Plan onwards are as per revised definition of village electrification.

\$ As per UN methodology (Gross Electrical Energy Availability/Population)

@: Includes 440 Volts Distribution Lines ^ Figure have been reconciled

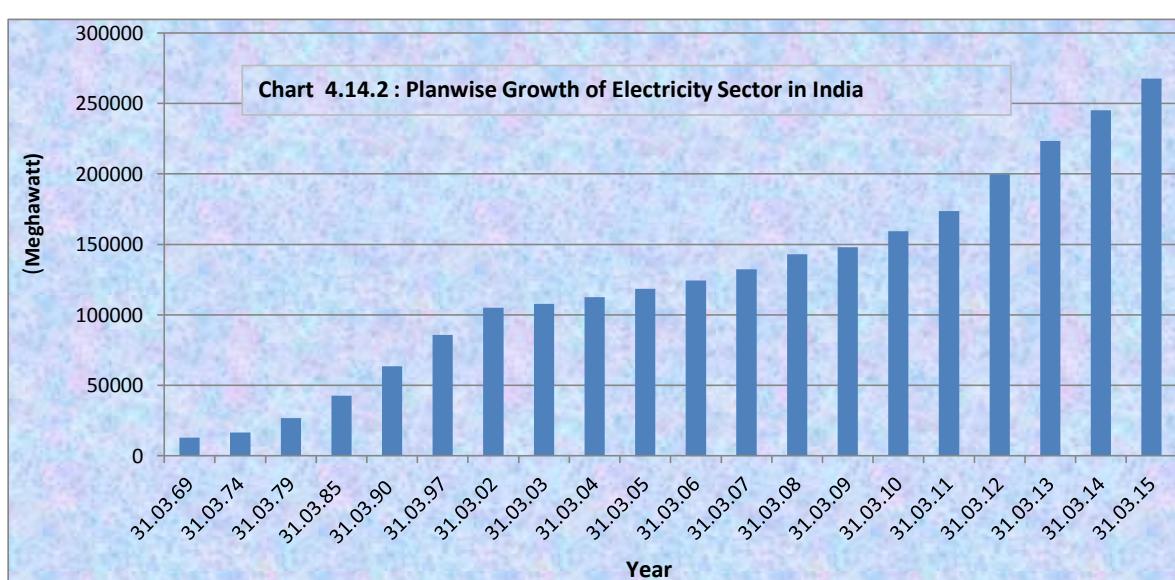


Table 4.14.7 (a) : Plan wise progress of village electrification	
Period	No of villages electrified upto the period ending
Upto August 1947	1500
Upto August 1951	3061
First Plan (1951-56)	7294
Second Plan (1956-61)	21754
Third Plan (1961-66)	45148
Annual Plan (1996-69)	73739
Fourth Plan (1969-74)	156729
Fifth Plan (1974-78)	216863
Annual Plan (1978-80)	249799
Sixth Plan (1980-85)	370332
Seventh Plan (1985-90)	470838
Annual Plan (1990-91)	481124
Annual Plan (1991-92)	487170
Eight Plan (1992-97)	498836\$
Ninth Plan (1997-2002)	489699*
Tenth Plan (2002-2007)	482864#
Eleventh Plan (2007-12)	556633
31.3.2013 (1st year or the 12th Plan)	560552
31.3.2014(11nd year or the 12th Plan)	572414^
31.3.2015	580934

Source : Central Electricity Authority

* : Cumulative achievement were recast as per definition of village electrification notified by Govt. of India in October,1997. As a result there has been a downward revision from the earlier figure of 512245 (Which was based on old definition)to 489699

: Cumulative achievement of villages electrified has been revised as per list of villages as per 2001 census and new definition.

\$: Cumulative achievement of villages electrified has been revised as per list of villages as per 1991 census from the earliar figure of 505674 to 498836

^ As per revised definition of village electrification and 2001 census.

Table 4.14.7(b) : Number of towns and villages electrified in India

(As on 31.03.2014) P

Sl. No.	State/Union Territory	Towns		Villages	
		Total (as per 2011 Census)	Electrified 2013-14	Total (as per 2011 Census)	Electrified as on 31.03.2014*
1	2	3	4	5	6
I.	Northern Region	1470	1470	199959	194220
1	Haryana	106	106	6642	6642
2	Himachal Pradesh	57	57	17882	17880
3	Jammu & Kashmir	75	75	6337	6224
4	Punjab	157	157	12168	12168
5	Rajasthan	222	222	43264	39045
6	Uttar Pradesh	704	704	97813	96515
7	Uttarakhand	86	86	15745	15638
8	Chandigarh	1	1	5	5
9	Delhi	62	62	103	103
II.	Western Region	1159	1159	130699	128696
1	Gujarat	242	242	17843	17843
2	Madhya Pradesh	394	394	51929	50437
3	Chhattisgarh	97	97	19567	19092
4	Maharashtra	378	378	40956	40920
5	Goa	44	44	320	320
6	Daman & Diu	2	2	19	19
7	Dadra & Nagar Haveli	2	2	65	65
III.	Southern Region	1480	1480	69845	69152
1	Andhra Pradesh	210	210	26286	26286
2	Karnataka	270	270	27397	26704
3	Kerala	159	159	1017	1017
4	Tamil Nadu	832	832	15049	15049
5	Puducherry	6	6	90	90
6	Lakshadweep	3	3	6	6
IV.	Eastern Region	807	807	154526	141598
1	Bihar	130	130	39073	37316
2	Jharkhand	152	152	29492	27167
3	Odisha	138	138	47677	38921
4	West Bengal	375	375	37463	37461
5	A & N Islands	3	3	396	308
6	Sikkim	9	9	425	425
V.	North-Eastern Region	245	245	42435	38046
1	Assam	125	125	25372	24546
2	Manipur	33	33	2379	2061
3	Meghalaya	16	16	6459	5146
4	Nagaland	9	9	1400	1261
5	Tripura	23	23	863	837
6	Arunachal Pradesh	17	17	5258	3596
7	Mizoram	22	22	704	599
	Total (All India)	5161	5161	597464	571712

Source : Central Electricity Authority

P - Provisional

* Based on information furnished by State Government/Discoms

4.14.7 The generation of electric power produces more pollution than any other single industry. The energy sources most commonly used for electricity production – fossil fuels such as coal, oil and natural gas –are known as non-renewable resources. They take millions of years to be formed in the crust of the earth by natural processes. Once burned to produce electricity, they are gone forever. Burning fossil fuels such as coal or oil creates unwelcome by-products that pollute when released into our environment, changing the planet's climate and harming ecosystems.

The table 4.14.8(a), (b) & (c) depict the enormous situation of harmful emissions by power sector.

Table 4.14.8 a: Total absolute emissions of CO₂ from the power sector by region for the year 2005-06 to 2012-13								
Grid	(Million tonne CO ₂)							
	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
NEWNE	368.2	385.7	406.9	430.7	453.2	468.4	491.9	539.5
Southern	101.6	109	113.6	117.9	126.8	129.1	145.4	156.8
India	469.7	494.7	520.5	548.6	580.0	597.5	637.3	696.3

Table 4.14.8 (b): Emission factors of CO₂								
Grid	2011-12				2012-13			
	Average	OM	BM	CM	Average	OM	BM	CM
NEWNE	0.78	0.97	0.92	0.94	0.83	1.00	0.97	0.98
Southern	0.76	0.96	0.85	0.91	0.85	1.00	0.95	0.97
India	0.78	0.97	0.9	0.93	0.83	1.00	0.96	0.98

CM is a weighted average of the OM and BM (here weighted 50:50)

OM: (operating margin) is the average emission from all stations excluding the low cost/must run sources.

BM: (build margin) is the average emission of the 20% (by net generation) most recent capacity addition in the grid.

CM:(combined margin) is a weighted average of the OM and BM (here weighted 50:50)

Note: Average is the average emission of all stations in the grid, weighted by net generation.

Table 4.14.8 (c): Specific emissions (weighted average) of CO₂ for fossil fuel -fired stations											
Grid	2011-12						2012-13				
	Coal	Diesel	Gas	Lignite	Naphtha	Oil	Coal	Diesel	Gas	Lignite	Naphtha
NEWNE	1.06	1.07	0.45	1.42	0.38	0.65	1.05	-	0.47	1.36	0.4
Southern	1.0	0.58	0.43	1.43	0.72	0.62	1.01	0.59	0.46	1.41	0.56
India	1.05	0.59	0.45	1.42	0.38	0.64	1.04	0.59	0.47	1.4	0.4

Source : Central Electricity Authority

CO/MWh: Carbon Dioxide/meghawatt horss.

Note: NEWNE Grid : Integrated Grid of Northern, Eastern, Western and North Eastern Region.

4.15 Renewable energy

4.15.1 Renewable energy sources are important to tackle the pollution as well the exhaustion problems of other energy sources. Radioactive emissions from nuclear power plants are of grave concern as they can cause serious impact both in terms of spatial and inter-generational concerns. In addition, two key problems are long-term waste disposal and the eventual decommissioning of plants. Due to limited reserves of petroleum, main emphasis needs to be given to non-conventional energy sources such as wind energy, solar energy and ocean energy. The estimated potential and cumulative achievements of various renewable energy programmes in India is depicted in table 4.15.1

Table 4.15.1 : Estimated potential and cumulative achievements - Renewable Energy programmes

Sl. No.	Renewable Energy Programmes/Systems	Achivements 31.3.2013	Achivements 31.3.2014	Achivements 31.3.2015
A. A. Grid-interactive renewable power (Capacities in MW)				
1	Wind Power	19051.5	21136.3	23444
2	Small Hydro Power (up to 25 MW)	3632.3	3803.7	4055.36
3	Biomass Power (Agro-wastes/ residues)	1264.8	1365.2	1410.2
4	Bagasse Cogeneration	2337.4	2648.4	3008.35
5	Waste to Power	96.1	106.6	115.08
6	Solar Power	1686.4	2647	3743.97
	Total	28068.5	31707.2	35776.96
B Off-grid/ Distributed renewable power (including captive/CHP plants)				
7	Biomass Power / Cogen.(non-bagasse)	471.2	531.8	591.87
8	Biomass Gasifier			
	Bio gas based energy system	3.22	3.77	4.07
	Rural	16.8	17.5	17.95
	Urban/Industries	141.6	147.2	152.05
9	Waste-to- Energy	115.6	132.7	154.47
10	Solar PV Power Plants and Street Lights (>1kW)			
	SVP Systems	124.7	174.4	234.35
11	Aero-generator /Hybrid Systems	2.1	2.3	2.43
12	Water mills/micro hydel	10.6 (2131 nos)	13.21 (2643 nos)	17.21
	Total	885.8	1022.8	1174.4
C Others Renewable Energy Systems				
13	Family Type Biogas Plants	46.7	47.4	48.35
	Solar Water Heating-collector area (Million m ²)	7.0	8.1	8.82

Source: Ministry of New and Renewable Energy,

Note: MWe = Megawatt equivalent;

MW = Megawatt; kW = kilowatt;

kW_p = kilowatt peak;

sq. m. = square meter

1. Although the potential is based on surplus agro-residues, in practice biomass power generation units prefer to use fuelwood for techno-economic reasons. A potential of 45,000 MW_e from around 20 mha of wastelands assumed to be yielding 10 MT /ha/annum of woody biomass having 4000 k-cal/kg with system efficiency of 30% and 75% PLF has not been taken into account. In order to realize this potential a major inter-Ministerial initiative involving, among others, Environment & Forests, Agriculture, Rural Development, and Panchayati Raj would be required. Further, a Biomass Atlas is under preparation which is expected to more accurately assess states-wise renewable energy potential from agro-residues.

2. Potential based on areas having wind power density (wpd) greater than 200 W/m² assuming land availability in potential areas @ 1 per cent and requirement of wind farms @ 12 ha/MW, all of which may not be technically feasible or economically viable for grid-interactive wind power. This economically viable potential could get enhanced with higher level of land availability than what has been assumed. Areas having lower wpds might be suitable for off-grid applications. Further, preliminary surveys do not at this juncture suggest a sizeable grid-interactive off-shore wind power potential.

3. Technically feasible hydro potential of all sites upto 25 MW station capacity, all of which may not be economically viable. Technically feasible potential of identified sites is placed at around 10,500 MW.
4. With new sugar mills and modernization of existing ones, technically feasible potential is assessed at 5000 MW furthermore, several sugar companies/cooperatives are unable to develop bankable projects on account of their financial and liquidity positions.
5. Technically feasible municipal waste-to energy potential is assessed at 2700 MW _e, all of which may not be economically viable. However, subsidy disbursement under the Municipal Solid Waste (MSW) programme has been kept in abeyance on the orders of the Supreme Court until final disposal of a PIL seeking composting as the preferred route for MSW disposal.
6. Not all of this renewable energy potential may be suitable for grid-interactive power for technical and /or economic reasons. Further, estimate excludes potential for solar power which is dependent on future developments that might make solar technology cost-competitive for grid-interactive power generation applications. However, insolation in the country varies between 4- 7 kWh/m²/day.

4.15.2 Wind Power: The development of wind power in India began in the 1990s, and has significantly increased in the last few years. Although a relative newcomer to the wind industry, India has the fifth largest installed wind power capacity in the world. A wind power capacity of 2079MW has been added during 2013-14 taking the cumulative installed capacity of 21132 MW mainly in Tamil Nadu, Gujarat, Maharashtra, Madhya Pradesh, Andhra Pradesh, Karnataka and Rajasthan. Though it was feared that wind installation in the country will decline significantly in current year due to absence of accelerated depreciation and take announcement of continuation of generation based incentive the progress has been modest. The short gestation periods for installing wind turbines, and the increasing reliability and performance of wind energy machines has made wind power a favored choice for capacity addition in India, wind power plants are mainly spread in 7 States.

The State wise wind power installed capacity (upto 31.3.2014) is presented in table 4.15.2.

Table 4.15.2 : State wise wind power installed capacity (MW)

SI No.	State	upto 31-12-14
1	Andhra Pradesh	913
2	Gujarat	3581
3	Karnataka	2549
4	Kerala	35
5	Madhya Pradesh	567
6	Maharashtra	4369
7	Rajasthan	3053
8	Tamil Nadu	7394
9	Others	4
Total		22465

Source : Ministry of New And Renewable Energy, Annual Report 2014-15

4.15.3 Biomass Power and Bagasse Co-generation Project: The project aims at efficient utilization of biomass such as agro residue in the form of stalks tems and straw " agro industrial residues such as shells, husks, deoiled cakes and wood from dedicated energy plantation for power generation. At present in India, Biomass Power, Bagasse Cogeneration Projects are installed in 15 states. The state-wise cumulative commissioned Biomass Power and Bagasse Cogeneration Projects is given in the Table 4.15.3(a) and Cumulative Development of various Renewable Energy System/Devices in the country is given in Table 4.15.3(b).

Table 4.15.3 : State wise cumulative connisioned Biomass Power and Bagasse cogeneration Projects.

Sr. No	State	Cumulative Capacity (MW)
1	Andhra Pradesh	380.75
2	Bihar	43.42
3	Chattisgarh	264.90
4	Gujarat	43.90
5	Haryana	45.30
6	Karnataka	603.28
7	Madhya Pradesh	26.00
8	Maharashtra	940.40
9	Odisha	20.00
10	Punjab	140.50
11	Rajasthan	101.30
12	Tamil Nadu	571.30
13	Uttar Pradesh	30.00
14	Uttrtakhand	776.50
15	West Bengal	26.00
Total		4013.55

Source: Ministry of New and Renewable Energy, Annual Report-2014-15.

4.15.4 Small Hydro power Projects: as on 31.3.2014 In India, nearly 997 small hydro power projects (capacity upto 25 MW) have been already set up and 254 are under implementation. The total capacity of the existing power plants is nearly 3803.68.15 MW and the total capacity of the projects under implementation is 985.40 MW. The State wise details of small hydro power projects set up and under implementation are shown in table 4.15.4

4.15.5 The total capacity of all the grid interactive renewable power projects (small hydro power, wind power, bio power and solar power) installed in India is approximately 31692.14 MW till 31.03.2013. The State- wise details of cumulative installed capacity of grid interactive renewable power projects in India during 2013 and 2014 is depicted in table 4.15.5 (a) and 4.15.5(b).

The details of decentralized / off –grid renewable systems devices installed in various States of India is depicted in table 4.15.6

4.15.6 Bio –gas plants: Bio gas plants are a very viable and suitable fuel generating technology for households in Indian villages. The bio gas plants are cost effective and reduce the indoor pollution in households.

The distribution of family –type biogas plants in various States of India are exhibited in Table 4.15.7

Table 4.15.4 : State wise numbers and Aggregate Capacity of Installed and under implementation Small Hydro Power projects

Sr. No	States	Projects set-up (31.3.2014)		Project under Implementation (31.3.2014)		Projects set-up (31.12.2015)		Project under Implementation (31.12.2015)	
		No.s	Capacity (MW)	No.s	Capacity (MW)	No.s	Capacity (MW)	No.s	Capacity (MW)
1	Andhra Pradesh	68	221.030	13	32.04	68	221.030	13	32.040
2	Arunachal Pradesh	149	103.905	44	22.23	149	103.905	44	22.230
3	Assam	6	34.110	3	12.00	6	34.110	3	12.000
4	Bihar	29	70.700	5	17.70	29	70.700	5	17.700
5	Chhattisgarh	9	52.000	4	115.25	9	52.000	4	115.250
6	Goa	1	0.050	-	-	1	0.050	-	-
7	Gujarat	5	15.600	-	-	6	16.600	-	-
8	Haryana	7	70.100	2	3.35	7	70.100	2	3.350
9	Himachal Pradesh	158	638.905	33	76.20	165	696.105	26	59.000
10	Jammu & Kashmir	37	147.530	7	17.65	38	149.030	6	16.150
11	Jharkhand	6	4.050	8	34.85	6	4.050	8	34.850
12	Karnataka	147	1031.658	23	173.09	154	1104.980	16	99.750
13	Kerala	25	158.420	11	52.75	27	168.920	8	39.250
14	Madhya Pradesh	11	86.160	3	4.90	11	86.160	3	4.900
15	Maharashtra	58	327.425	9	43.70	59	335.425	8	35.700
16	Manipur	8	5.450	3	2.75	8	5.450	3	2.750
17	Meghalaya	4	31.030	3	1.70	4	31.030	3	1.700
18	Mizoram	18	36.470	1	0.50	18	36.470	1	0.500
19	Nagaland	11	29.670	3	3.20	11	29.670	3	3.200
20	Odisha	10	64.625	4	3.60	10	64.625	4	3.600
21	Punjab	47	156.200	11	19.45	48	157.400	10	18.250
22	Rajasthan	10	23.850	-	-	10	23.850	-	-
23	Sikkim	17	52.110	1	0.20	17	52.110	1	0.200
24	Tamil Nadu	21	123.050	-	-	21	123.050	-	-
25	Tripura	3	16.010	-	-	3	16.010	-	-
26	Uttar Pradesh	9	25.100	-	-	9	25.100	1	10.500
27	Utrakhand	99	174.820	46	174.04	101	209.320	44	139.540
28	West Bengal	23	98.400	17	84.25	23	98.400	17	84.250
29	Andaman and Nicobar Islands	1	5.250	-	-	1	5.250	-	-
	Total	997	3803.678	254	895.400	1019	3990.900	233	756.660

Source: Ministry of New And Renewable Energy

Table 4.15.5(a): State wise and source wise installed capacity of grid interactive renewable power as on 31.03.2013

Sr. No.	State/UT	Small Hydro power (MW)	Wind Power (MW)	Bio-Power		Solar Power (MWp)	Total Capacity (MW)
				Biomass Power (MW)	Waste to Energy (MW)		
1	2	3	4	5	6	7	8
1	Andhra Pradesh	219.03	447.65	380.75	43.16	23.35	1113.94
2	Arunachal Pradesh	103.91				0.03	103.94
3	Assam	31.11					31.11
4	Bihar	70.70		43.30			114.00
5	Chhattisgarh	52.00		249.90		4.00	305.90
6	Goa	0.05					0.05
7	Gujarat	15.60	3174.58	30.50		857.90	4078.58
8	Haryana	70.10		45.30		7.80	123.20
9	Himachal Pradesh	587.91					587.91
10	Jammu & Kashmir	130.53					130.53
11	Jharkhand	4.05				16.00	20.05
12	Karnataka	963.76	2135.15	491.38	1.00	14.00	3605.29
13	Kerala	158.42	35.10			0.03	193.55
14	Madhya Pradesh	86.16	386.00	16.00	3.90	37.30	529.36
15	Maharashtra	299.93	3021.85	756.90	9.72	100.00	4188.40
16	Manipur	5.45					5.45
17	Meghalaya	31.03					31.03
18	Mizoram	36.47					36.47
19	Nagaland	28.67					28.67
20	Odisha	64.30		20.00		13.00	97.30
21	Punjab	154.50		124.50	9.25	9.33	297.58
22	Rajasthan	23.85	2684.65	91.30		552.90	3352.70
23	Sikkim	52.11					52.11
24	Tamil Nadu	123.05	7162.18	538.70	8.05	17.11	7849.09
25	Tripura	16.01					16.01
26	Uttar Pradesh	25.10		776.50	5.00	17.38	823.98
27	Uttarakhand	174.82		10.00		5.05	189.87
28	West Bengal	98.40		26.00		2.05	126.45
29	Andaman and Nicobar Islands	5.25				5.10	10.35
30	Chandigarh						0.00
31	Dadar & Nagar Haveli						0.00
32	Daman & Diu						0.00
33	Delhi				16.00	2.56	18.56
34	Lakshwadeep					0.75	0.75
35	Puducherry					0.03	0.03
36	Others		4.30			0.79	5.09
	Total	3632.25	19051.46	3601.03	96.08	1686.44	28067.26

Source : Planning & Coordination Division, Ministry of New and Renewable Energy
MW - Megawatt MWp - Megawatt peak;

Table 4.15.5 (b): State wise and source wise installed capacity of grid interactive renewable power as on 31.03.2014

Sr. No.	State/UT	Small Hydro power	Wind Power	Bio-Power		Solar Power	Total Capacity
		(MW)	(MW)	Biomass Power (MW)	Waste to Energy (MW)		
1	2	3	4	5	6	7	8
1	Andhra Pradesh	221.03	746.20	380.75	50.66	131.84	1530.48
2	Arunachal Pradesh	103.91				0.03	103.94
3	Assam	34.11				0.00	34.11
4	Bihar	70.70		43.42		0.00	114.12
5	Chhattisgarh	52.00		264.90		7.10	324.00
6	Goa	0.05				0.00	0.05
7	Gujarat	15.60	3454.30	43.90		916.40	4430.20
8	Haryana	70.10		45.30		10.30	125.70
9	Himachal Pradesh	638.91				0.00	638.91
10	Jammu & Kashmir	147.53				0.00	147.53
11	Jharkhand	4.05				16.00	20.05
12	Karnataka	1031.66	2318.20	603.28	1.00	31.00	3985.14
13	Kerala	158.42	35.20			0.03	193.65
14	Madhya Pradesh	86.16	423.40	26.00	3.90	347.17	886.63
15	Maharashtra	327.43	4100.40	940.40	12.72	249.25	5630.20
16	Manipur	5.45				0.00	5.45
17	Meghalaya	31.03				0.00	31.03
18	Mizoram	36.47				0.00	36.47
19	Nagaland	29.67				0.00	29.67
20	Odisha	64.63		20.00		30.50	115.13
21	Punjab	156.20		140.50	9.25	16.85	322.80
22	Rajasthan	23.85	2784.90	101.30		730.10	3640.15
23	Sikkim	52.11				0.00	52.11
24	Tamil Nadu	123.05	7269.50	571.30	8.05	98.36	8070.26
25	Tripura	16.01				0.00	16.01
26	Uttar Pradesh	25.10		776.50	5.00	21.08	827.68
27	Uttarakhand	174.82		30.00		5.05	209.87
28	West Bengal	98.40		26.00		7.05	131.45
29	Andaman and Nicobar Islands	5.25				5.10	10.35
30	Chandigarh					2.00	2.00
31	Dadar & Nagar Haveli					0.00	0.00
32	Daman & Diu					0.00	0.00
33	Delhi				16.00	5.15	21.15
34	Lakshwadeep					0.75	0.75
35	Puducherry					0.03	0.03
36	Others		4.30			0.82	5.12
	Total	3803.68	21136.40	4013.55	106.58	2631.93	31692.14

Source : Planning & Coordination Division, Ministry of New and Renewable Energy
MW - Megawatt MWp - Megawatt peak:

Table 4.15.5 (c): State wise and source wise installed capacity of grid interactive renewable power as on 31.03.2015							
Sr. No.	State/UT	Small Hydro power	Wind Power	Bio-Power		Solar Power	Total Capacity
				Biomass Power	Waste to Energy		
		(MW)	(MW)	(MW)	(MW)	(MWp)	(MW)
1	2	3	4	5	6	7	8
1	Andhra Pradesh	223.23	1032.00	389.75	58.16	242.86	1946.00
2	Arunachal Pradesh	104.61				0.03	104.64
3	Assam	34.11				0.00	34.11
4	Bihar	70.70		43.42		0.00	114.12
5	Chhattisgarh	52.00		264.90		7.60	324.50
6	Goa	0.05				0.00	0.05
7	Gujarat	16.60	3645.00	55.90		1000.05	4717.55
8	Haryana	71.50		52.30		12.80	136.60
9	Himachal Pradesh	723.91				0.00	723.91
10	Jammu & Kashmir	156.53				0.00	156.53
11	Jharkhand	4.05				16.00	20.05
12	Karnataka	1129.73	2638.00	664.28	1.00	77.22	4510.23
13	Kerala	168.92	35.00			0.03	203.95
14	Madhya Pradesh	86.16	880.00	36.00	3.90	558.58	1564.64
15	Maharashtra	335.43	4446.00	1033.40	12.72	360.75	6188.30
16	Manipur	5.45				0.00	5.45
17	Meghalaya	31.03				0.00	31.03
18	Mizoram	36.47				0.00	36.47
19	Nagaland	29.67				0.00	29.67
20	Odisha	64.63		20.00		31.76	116.39
21	Punjab	157.40		140.50	10.25	185.27	493.42
22	Rajasthan	23.85	3309.00	111.30		942.10	4386.25
23	Sikkim	52.11				0.00	52.11
24	Tamil Nadu	123.05	7455.00	662.30	8.05	142.58	8390.98
25	Telangana					61.25	61.25
26	Tripura	16.01				5.00	21.01
27	Uttar Pradesh	25.10		888.50	5.00	71.26	989.86
28	Uttarakhand	209.32		30.00		5.00	244.32
29	West Bengal	98.50		26.00		7.21	131.71
30	Andaman and Nicobar Islands	5.25				5.10	10.35
31	Chandigarh					4.50	4.50
32	Dadar & Nagar Haveli					0.00	0.00
33	Daman & Diu					0.00	0.00
34	Delhi				16.00	5.47	21.47
35	Lakshwadeep					0.75	0.75
36	Puducherry					0.03	0.03
	Others					0.79	4.79
	Total	4055.36	23440.00	4418.55	115.08	3743.97	35772.96

Source : Planning & Coordination Division, Ministry of New and Renewable Energy

MW - Megawatt MWp - Megawatt peak;

Table 4.15.6:Decentralised/off-grid renewable energy systems devices

(as on 31.03.2015)

Sl. No.	State/UT	Biogas Plants	Biomass-Gasifiers		Biomass (non- bagasse)	Waste to Energy	Solar Photovoltaic (SPV) Systems				SPV Pumps	Aerogen/ hybrid System	Remote Village Electrification	
			Industrial	Rural			SLS	HLS	SL	PP			Village	Hamlet
			(Nos.)	(kw)	(kw)	(MW)	(MW)	(nos.)	(nos.)	(kWp.)	(kWp)	(Nos.)	(kW)	(nos)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Andhra Pradesh	5.323	22914		78.59	23.01	0.065	0.356	0.414	1870.60	613	16.00	0	13
2	Arunachal Pradesh	0.035		750			0.011	0.189	0.144	217.10	18	6.80	297	
3	Assam	1.141	2933				0.001	0.071	0.012	910.00	45	6.00	1953	
4	Bihar	1.298	6264	5394	8.20	1.00	0.010	0.084	0.501	775.60	139		0	
5	Chhattisgarh	0.512	1210		2.50	0.33	0.020	0.073	0.033	18116.72	240		568	
6	Goa	0.041					0.007	0.004	0.011	1.72	15	193.80	0	19
7	Gujarat	4.300	20080	1450		15.83	0.020	0.093	0.316	9512.60	85	20.00	38	
8	Haryana	0.608	3503		57.56	4.00	0.220	0.578	0.939	1024.25	469	10.00	0	286
9	Himachal Pradesh	0.474			7.20	1.00	0.241	0.226	0.339	1208.50	6		21	
10	Jammu & Kashmir	0.031	200				0.058	0.844	0.592	4288.85	39	46.40	334	15
11	Jharkhand	0.073	500		4.30		0.006	0.111	0.234	480.90	0		700	
12	Karnataka	4.790	6297	1150	15.20	9.63	0.027	0.531	0.073	1596.41	551	39.20	16	14
13	Kerala	1.444			0.72		0.017	0.340	0.544	6714.39	810	8.00	0	607
14	Madhya Pradesh	3.535	10497	761	12.35	0.47	0.092	0.042	0.094	1983.00	87	24.00	577	
15	Maharashtra	8.715	7150		16.40	22.05	0.084	0.049	0.687	943.70	239	1498.50	340	
16	Manipur	0.021					0.009	0.041	0.048	456.00	40	140.00	237	3
17	Meghalaya	0.100	250		13.80		0.013	0.078	0.249	323.50	19	191.50	149	
18	Mizoram	0.050		250			0.004	0.068	0.096	290.00	37		20	
19	Nagaland	0.079		2100			0.003	0.010	0.068	1050.00	3	20.00	11	
20	Odisha	2.660	270		8.22	0.02	0.058	0.054	0.099	84.52	56		1600	14
21	Punjab	1.718			117.10	7.98	0.054	0.086	0.175	1058.00	1857	50.00	0	
22	Rajasthan	0.701	2431	261	2.00	3.70	0.069	1.446	0.047	8625.00	11603	14.00	292	90
23	Sikkim	0.089					0.005	0.151	0.233	795.00	0	15.50	0	13
24	Tamil Nadu	2.223	14090	2172	24.05	13.10	0.252	0.795	0.168	4079.60	829	24.50	0	131
25	Telangana	0.000					0.000	0.000	0.000	0.00	0		0	
26	Tripura	0.034		1050			0.012	0.327	0.643	365.00	151	2.00	60	782
27	Uttar Pradesh	4.388	24040	912	156.26	46.18	1.763	2.672	0.620	4278.46	1348		113	22
28	Utrakhand	0.185	2150		47.50	5.02	0.086	0.914	0.840	280.03	26	24.00	476	118
29	West Bengal	3.666	27268	1450	19.92	1.16	0.087	1.464	0.177	889.00	48	74.00	1177	2
30	Andaman and Nicobar	0.001					0.004	0.005	0.063	167.00	5			
31	Chandigarh	0.001					0.009	0.003	0.017	730.00	12			
32	Dadar & Nagar Haveli	0.002					0.000	0.000	0.000	0.00	0			
33	Daman & Diu	0.000					0.000	0.000	0.000	0.00	0			
34	Delhi	0.007					0.003	0.000	0.048	332.00	90			
35	Lakshwadeep	0.000		250			0.017	0.000	0.053	1090.00	0			
36	Puducherry	0.006					0.004	0.000	0.016	0.00	21	5.00		
37	Others*	0.000					0.098	0.240	1.258	35215.60	0			
	Total	48.349	152047	17950	591.87	154.48	3.428	11.943	9.850	109753.05	19501	2429.20	8979	2129

Source: Ministry of New and Renewable Energy (Planning & Coordination Division)

SLS : Street Lighting System

SL: Solar Lanterns

kWp: Kilowatt peak

HLS : Home Lighting System

MW : Mega Watt

PP: Power plants

Table 4.15.7 :State -wise estimated potential and cumulative achievements of family type biogas plants

Sl. No.	State/UT	Estimated Potential(Plants in number)	Cumulative Achievement as on (31-03-2014)	(in numbers)	
				Target	Achievements up to 01.12.2014)*
1	2	3	4	5	6
1	Andhra Pradesh	1065000	521756	10440	5448
2	Arunachal Pradesh	7500	3472	50	2
3	Assam	307000	108302	7500	4927
4	Bihar	733000	129825	-	-
5	Chhattisgarh	400000	48505	4000	1107
6	Delhi	12900	681	-	-
7	Goa	8000	4093	100	22
8	Gujarat	554000	428676	4000	522
9	Haryana	300000	59909	1700	629
10	Himachal Pradesh	125000	472270	250	81
11	Jammu & Kashmir	128000	3044	100	-
12	Jharkhand	100000	7237	100	-
13	Karnataka	680000	469760	15500	4526
14	Kerala	150000	141425	4000	1002
15	Madhya Pradesh	1491000	345829	10400	4130
16	Maharashtra	897000	856669	14400	7357
17	Manipur	38000	2128	-	-
18	Meghalaya	24000	9996	250	-
19	Mizoram	5000	4770	500	250
20	Nagaland	6700	7653	300	194
21	Odisha	605000	261830	5100	1308
22	Punjab	411000	164689	10250	5132
23	Puducherry	4300	578	-	-
24	Rajasthan	915000	69405	1100	333
25	Sikkim	7300	8735	200	76
26	Tamil Nadu	615000	221704	500	158
27	Telangana	990	-	9900	5302
28	Tripura	28000	3328	400	30
29	Uttar Pradesh	1938000	437556	1800	571
30	Uttarakhand	83000	17541	900	434
31	West Bengal	695000	366316	-	-
32	Andaman and Nicobar Islands	2200	137	-	-
33	Chandigarh	1400	97	-	-
34	Dadra and Nagar Haveli	2000	169	-	-
35	KVIC and others	-	-	6260	1605
Total		12340290	4753085	110000	45146*

Source : Annual Report 2014-15, Ministry of New and Renewable Energy

KVIC : Khadi and Village Industries Commission

* Figure are being firmed up

4.15.7 Energy Parks: Energy parks are set up under the Special Area Demonstration Project Scheme with aims to create publicity of the renewable energy technologies' system also to disseminate information on technological developments and popularise the renewable energy system sand devices to greater awareness in the area of New & Renewable Energy. The state wise number of SLEPs and SADP projects supported under special area demonstration project. (SADP) scheme is given

4.15.8 Renewable energy clubs are set up in India to create awareness about new and renewable sources of energy among students especially Engineering students. There are 554 renewable energy clubs functioning in all over India.

Table 4.15.8 : State -wise number of SLEP and SADP Projects supported under special area demonstration projects (SADP scheme (as on 15.01.2015)break-up of the energy parks as on 31.03.2012

Sl. No.	State/UT	State level energy park (SLEPs)	SADP project
1	Andhra Pradesh	-	1
2	Arunachal Pradesh	1	1
3	Assam	1	1
4	Chandigarh	1	1
5	Chhattisgarh	2	19
6	Delhi	1	5
7	Goa	-	1
8	Gujarat	1	3
9	Haryana	1	11
10	Himachal Pradesh	2	15
11	Jammu & Kashmir	2	7
12	Jharkhand	1	1
13	Karnataka	1	3
14	Kerala	1	-
15	Maharashtra	1	7
16	Madhya Pradesh	-	5
17	Manipur	-	1
18	Meghalaya	1	1
19	Mizoram	1	-
20	Nagaland	1	1
21	Odisha	1	5
22	Punjab	1	8
23	Puducherry	1	-
24	Rajasthan	-	4
25	Sikkim	1	1
26	Tamil Nadu	1	2
27	Tripura	1	1
28	Uttarakhand	1	4
29	Uttar Pradesh	1	13
30	West Bengal	1	5
31	A&N Islands	1	1
Total		29	128

Source : Annual Report 2014-15 , Ministry of New and Renewable Energy

4.16 Noise Pollution

4.16.1 Of late, noise has been recognized as a pollutant which until recently was considered only as a nuisance. According to study on occupational hazards, even short exposures to intense noise can shift upward the hearing threshold while prolonged exposure or intermittent exposure over a long period produces a damaging effect on hearing resulting in a permanent threshold shift. Accordingly, the Central Pollution Control Board (CPCB) has notified the ambient noise standards in 1987 under section 20 of the Air (Prevention and Control of Pollution) Act, 1981.

4.16.2 The noise standards are specified separately for Industrial Commercial, Residential and Silent zones for Day and Night time. Table 4.16.1 shows the ambient air quality standards in respects of noise.

Table 4.16.1 : Ambient air quality standards in respect of noise

Sl. No.	Area 2	Limits in dB(A) L_{eq} *	
		Day Time 3	Night Time 4
1	Industrial Area	75	70
2	Commercial Area	65	55
3	Residential Area	55	45
4	Silence Zone	50	40

Source : Central Pollution Control Board

Notes :

- 1 Day Time -- 06.00 hour to 22.00 hour (16 hours)
- 2 Night time --22.00 hour to 06.00 hour (08 hours)
- 3 Areas upto 100 metres around certain premises like hospitals, educational institutions and courts, religious places or any other area which is declared as silence zones by the competent authority.
- 4 Mixed categories of areas may be declared as one of four aforesaid categories by the competent Authority.

- * dB (A) L_{eq} denotes the time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.
- A "decibel" is a unit in which noise is measured.
- "A", in dB (A) L_{eq} denotes the frequency weighting in the measurement of noise and corresponds to frequency response characteristics of the human ear.
- L_{eq} : It is an energy mean of the noise level over a specified period.

4.16.3 The increasing noise pollution may be attributed to increase in no. of vehicles, urbanization and industrialization. The noise pollution has already reached at a high level in most of the metropolitan cities in all the residential, commercial, industrial and silence zones as evident from table 4.16.2. and effect of noise pollution on human health is given in table 4.16.3

Table 4.16.2 : Average noise levels in various metropolitan cities

Sl. No.	Metropolitan Cities	Day/ Night	Industrial	Commercial	Residential	Silence Area	(dB[A])
			Area	Area	Area	Area	
1	2	3	4	5	6	7	
1	Kolkata	Day Night	78 67	82 75	79 65	79 65	
2	Mumbai	Day Night	76 65	75 66	70 62	66 52	
3	Chennai	Day Night	71 66	78 71	66 48	63 49	
4	Bangalore	Day Night	78 53	76 57	67 50	67 --	
5	Hardwar*	Day Night	- -	77 75	66 58	71 66	
6	Kanpur*	Day Night	- -	79 78	75 72	75 66	

Source : Central Pollution Control Board

* : 2003 Figures

Table 4.16.3 : Effects of noise pollution on human health

A. Noise Hazards	
Stage : I Threat to Survival (a) Communication interference (b) Permanent hearing loss	Stage : II Causing Injury (a) Neural -humoral stress response (b) Temporary hearing loss (c) Permanent hearing loss
B. Noise Nuisances	
Stage III Curbing Efficient Performance (a) Mental Stress (b) Task Interference (c) Sleep Interference	Stage IV Diluting Comfort and Enjoyment (a) Invasion of Privacy (b) Disruption of Social Interaction (c) Hearing Loss

Source: West Bengal Pollution Control Board

4.17 Green House Gases and Their Effects

4.17.1 The greenhouse effect plays a crucial role in regulating the heat balance of the earth. It allows the incoming short-wave solar radiation to pass through the atmosphere relatively unimpeded; but the long-wave terrestrial radiation emitted by the earth's surface is partially absorbed and then re-emitted by a number of trace gases in the atmosphere. These gases known as Greenhouse Gases (GHGs) are: water vapour, carbon dioxide, methane, nitrous oxide and ozone in the troposphere and in the stratosphere. This natural greenhouse effect warms the lower atmosphere.

4.17.2 If the atmosphere were transparent to the outgoing long wave radiation emanating from the earth's surface, the equilibrium mean temperature of the earth's surface would be considerably lower and probably below the freezing point of water. Mere incidence of GHG's in the atmosphere, by itself, is no concern. What is more important is that their concentration should stay within reasonable limits so that global ecosystem is not unduly affected. However, by increasing the concentrations of natural GHG's and by adding new GHG's like chloro-fluoro carbons, the global average and the annual mean surface-air temperature (referred to as the global temperature) can be raised, although the rate at which it will occur is uncertain. This is the enhanced greenhouse effect, which is over and above that occurring due to natural greenhouse concentration. Such a rise in the atmospheric concentration of GHG's has led to an upward trend in global temperature.

4.17.3 While it is required to follow the general commitments under the Framework Convention on Climate Change, India is not required to adopt any GHG reduction targets. Irrespective of international commitments, it seems prudent to be ready with

- Inventory of sinks and sources of GHG emission
- Predict the cumulative impact of national and international GHG emissions to plan for temperature and sea level rise
- Devise land use plans for the coastal areas likely to be affected
- Devise water and land management strategies especially agricultural sector.

4.18 Ozone Depletion

4.18.1 Ozone depletion describes two distinct, but related observations: a slow, steady decline of about 4% per decade in the total volume of ozone in Earth's stratosphere (the ozone layer) since the late 1970s, and a much larger, but seasonal, decrease in stratospheric ozone over Earth's polar regions during the same period. The latter phenomenon is commonly referred to as the ozone hole. CFCs and other contributory substances are commonly referred to as ozone-depleting substances (ODS). Since the ozone layer prevents most harmful UVB wavelengths (280–315 nm) of ultraviolet light (UV light) from passing through the Earth's atmosphere, observed and projected decreases in ozone have generated worldwide concern leading to adoption of the Montreal Protocol that bans the production of CFCs and halons as well as related ozone depleting chemicals such as carbon tetrachloride and trichloroethane. It is suspected that a variety of biological consequences such as increases in skin cancer, cataracts, damage to plants, and reduction of plankton populations in the ocean's photic zone may result from the increased UV exposure due to ozone depletion.

4.18.2 Table 4.18.1 at depicts the production of Ozone depleting substances in India and 4.18.2 presents the total consumption of Ozone depleting substances over the years.

Table 4.18.1: Production of ozone depleting substances in India															
Sl. No.	ODS	(MT: Metric tons)													
		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	CFC-11 Trichlorofluoromethane (CFC13)	5634.0	4514.0	3689.0	2609.0	2429.0	1543.4	785.1	424.8	117.6	-	83.5	0.0	0.0	
2	CFC-12 Dichlorodifluoromethane (CF2Cl2)	14777.0	14164.0	13167.0	12373.0	10611.0	9702.2	6104.7	1869.9	549.6	-	234.8	0.0	0.0	
3	CFC-113 Trichlorotrifluoroethane (C2F3Cl3)	5.0	14.0	35.0	32.0	30.0	18.0	373.5	72.6	79.1	-	Nil	-	0.0	
4	H-1211 Bromochlorodifluoromethane CF2BrC	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	H-1301 Bromotrifluoromethane (CF3Br)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	CTC Carbon tetrachloride	17509.0	16459.0	18957.0	18239.0	16631.0	17433.3	13877.8	9538.0	12035.7	11248.5	15222.8	17741.0	15412.0	17663.8
7	MCF Methyl chloroform	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	HCFC-22 Dichlorodifluoromethane (CHF2Cl2)	14061	14868	14606	19216	25592.0	24789.2	30386.4	41213.6	45558.2	47657.1	47613.3	48476.6	47613.3	40650.6
9	MBr Methyl bromide	107	85	37914.0	-	-	-	-	-	-	-	-	0.0	0.0	
Total		52093.0	50104.0	88368.0	52469.0	55293.0	53486.1	51527.5	53118.9	58340.2	58905.7	63154.4	66217.6	63025.3	58414.3

Source : Ozone cell, Ministry of Environment and Forests

ODS: Ozone Depleting Substances

CFC :Chloro-Floro-Carbon

* : For Essential Use Nominations (EUN)

CTC : Carbon Terachloride

HCFC : Hydro Chloro Fluoro Carbon

: Recovered and recycled

Table 4.18.2: Total consumption of Ozone Depleting Substances															
(MT: Metric tons)															
Sl. No.	ODS	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
1	2	3	4	5	6	7	8	9	10	11	11	12	13	14	15
1	CFC-11 Trichlorofluoromethane (CFC13)	3002.0	2196	1680.0	829	426	337.3	514.9	274.9	101.6	43.5	78.616	0	0	0
2	CFC-12 Dichlorodifluoromethane (CF2 Cl2)	2612.0	2315	2210.0	1777	1808	1609	3017.9	723.6	109.7	158.7	212.117	0	0	0
3	CFC-113 Trichlorotrifluoroethane (C2F3Cl3)	-	5	29.0	4	10	14.3	-	-	6.6	..	Nil	0	0	0
4	CTC Carbon tetrachloride	11043.0	8471	9510.0	9798	6781	1494.5	3636.8	634	1563.7	34.7	Nil	0	0	0
5	HCF-22 Dichlorodifluoromethane (CHF2Cl2)	3583.0	2973	3207.0	3648	7228	8854.3	6137	14576.6	10831.7	9386.4	12503	10266.39	15645.511	8029.435
6	HCF-123	20.0	25	25.0	0	60	15.3	-	27.2	101	238	115.085	0	136	196.952
7	HCF-141b	483.0	359	1401.0	952	1357	2155.9	-	4711.9	12588.9	7900	7836.8	7924	6400	4568.216
8	MBr Methyl bromide	-	27	9510.0	-	-	-	-	-	-	..	...	0	0	0
Total		20743	16371	27572.0	17008	17670	14480.6	13306.5	20948.2	25303.2	17761.3	20745.6	18190.39	22181.511	12794.603

Source : Ozone cell, Ministry of Environment and Forests

ODS: Ozone Depleting Substances

4.19 Action Plan to combat Air Pollution

A brief of the action plans implemented in major cities of India is discussed in the following session.

4.19.1 Major City Specific Action Plan in Delhi

A) Vehicular Pollution Control

- a. Public transport (buses, auto, taxis) in Delhi has been converted to CNG mode.
- b. Sulphur content in diesel has been reduced in a phased manner.
- c. The lead content in petrol has been progressively reduced to make it unleaded.
- d. Bharat Stage-III norms have been implemented in Delhi.
- e. Pre-mix 2T oil dispensers have been installed at all petrol filling stations.
- f. Grossly polluting old commercial vehicles have been phased out .
- g. Restriction has been made on plying of goods commercial vehicles during day time.
- h. Metro rail has been introduced to have a more efficient public transport system.

(B) Industrial Pollution Control

- (i) Directions under Section 5 of E(P)A, 1986 have been issued on April 1996 and July 1996 to all the three power plants located in Delhi for completing the following in a time bound manner.
 - Ø Comply with emission and liquid effluent standard.
 - Ø Submission of action plan for switching over the beneficiated coal with an ash content of not more than 34%.
 - Ø Submission of action plan to achieve 20% utilization of fly-ash by Dec. 1997.
 - Ø Installation of opacity meter in all units to ensure compliance with the standards.
 - Ø Coverage of abandoned ash ponds with top soil.
- (ii) All stone crushers have been closed down in Delhi and shifted to Pali in Rajasthan.
- (iii) All the hot mix plants have been closed down and shifted to other states.
- (iv) As per the directions of Hon'ble Supreme Court, 168 hazardous industries have been closed down in Delhi.

4.19.2 Major City Specific Action Plan in Mumbai

- Ø Bharat Stage-III norms have been implemented in Mumbai.
- Ø Unleaded gasoline and low sulphur diesel are being supplied in Mumbai.
- Ø Visits are made to petrol pump as per guidelines prescribed to check/inspect adulteration/malpractices in diesel and petrol under Central Govt. vide order The Motor Spirit and High Diesel (Regulation of Supply and Distribution and Prevention of Malpractices), 1998. Defaulter petrol pumps are legally prosecuted under Essential Commodities Act, 1955.
- Ø Licence and 'End Use Certificate' is made compulsory to persons who store Naptha and Solvents which are also used as adulterants in petrol and diesel.
- Ø Implementation of rigorous inspection and maintenance measures periodically for all types of vehicles, involving vehicle manufacturers.
- Ø From 15.10.99 'No Pollution Under Certificate- No Petrol' scheme is launched in Mumbai Metropolitan Region (MMR)
- Ø Buses, taxis, autos are on CNG mode.
- Ø Mass awareness Programme are being organized for creating awareness in public.
- Ø The Transport Commissioner's Office has increased vigilance in checking polluting vehicles in Mumbai by increasing number of exhaust monitors for petrol and diesel driven vehicles.
- Ø Auto exhaust checking are also done at entry points to Maharashtra State to check compliance to norms fixed under Central Motor Vehicles Act, 1989.

4.19.3 Major City Specific Action Plan in Ahmedabad

A) Vehicular Pollution Control

The measures include following

- (i) Banning of old buses of more than 15 years old
- (ii) Bharat Stage- III norms have been introduced in Ahmedabad.
- (iii) Banning of diesel run rickshaw within city limits.
- (iv) Diversion of heavy vehicles such as trucks/luxury buses/trailers/tankers/tractors/lorries, etc. away from the city.
- (v) Improvement of road condition and making the roads pucca upto the footpath not leaving any uncovered space on either sides of the roads.

Strict enforcement of smoke test/vehicle test protocol

- (vii) Surveillance of vehicles with higher black smoke emission
- (viii) Third party audits of PUC Centres including calibration audits
- (ix) To launch a drive to stop usage of kerosene in vehicles particularly three wheelers and commercial vehicles.

(B) Industrial Pollution Control

The measures include following

- (i) Intensifying monitoring by special vigilance squad under the Air Act, 1981.
- (ii) Determining efficacy of APC system & taking remedial action(s) including upgradation of existing Air Pollution Control Measures wherever needed.
- (iii) Implementation of CREP Action Plan for highly pollution industries as decided by MOEF.
- (iv) Ban on burning of off specification materials/wastes by scrap traders.

4.18.4 Major City Specific Action plan in Bangalore

- Ø To reduce traffic congestion, 108 roads have been converted to one way, 5 flyovers completed, 3 railway under pass on Outer ring road (ORR) limit completed, 2 railway over bridges completed and 206 Km of road has been asphalted.
- Ø Low sulphur diesel (Green Diesel) and Green Petrol (Sulphur 0.05%)is being supplied in Bangalore ORR area from 1.4.2003.
- Ø Bharat Stage – III norms have been introduced in Bangalore.
- Ø Out of 70,131 (as on 31.07.2003) auto rickshaws registered in Bangalore city, 35000 auto rickshaws are running on LPG
- Ø 6 Auto LPG dispensing stations (ALDS) are operating
- Ø Transport department has approved Bajaj 4 stroke (rear engine) LPG auto rickshaw in Bi- fuel mode
- Ø 5% ethanol blended petrol is being supplied in all districts from 01.10.2003.
- Ø Regular check on adulteration of fuel is being conducted by Food and Civil Supplies Department.
- Ø Goods vehicles carrying construction materials are allowed within ORR only during 10 PM to 6AM for unloading.
- Ø Modernization of Emission testing Centers for issue of “Pollution Under Control” Certificate bearing photograph of the tested vehicle using Web camera by the Transport Department.
- Ø Karnataka State Pollution Control Board to take action to promote use of cleaner fuels used by major industries in Generator sets and boilers.

4.18.5 Major City Specific Action Plan in Chennai

- Ø Bharat Stage – III norms have been introduced in Chennai.
- Ø Unleaded gasoline and low sulphur diesel are being supplied in Chennai.
- Ø Pollution Under Control Certificate has been made mandatory.
- Ø Pre mixed 2T oil dispensers have been installed in most of the retail outlets in Chennai City.
- Ø The Motor Spirit and High Speed Diesel (Regulation & Supply and Distribution and Prevention of malpractices) order 1998 has been republished by the Government of Tamilnadu with the intention to curb malpractices such as adulteration etc.,
- Ø LPG supply is being implemented by oil companies, Oil companies have promised to setup 28 Auto ALP dispensing station (ALDS). Presently five ALDS are functioning.
- Ø Mass Rapid Transit System (MRTS) and electric trains are operated by Southern Railways.

- Ø Power plants have been insisted to provide scrubber for the control of emissions
- Ø For all the process emission sources and boiler of higher capacity air pollution control measures such as dust collectors and wet scrubbers are insisted by Tamil Nadu Pollution Control Board.
- Ø The industrial units are also insisted to switch over to cleaner fuels such as LSHS, LDO etc., to control the SO₂ emission.

4.18.6 Major City Specific Action Plan in Kolkata

A) Vehicular Pollution Control

- i.Bharat Stage –III norms have been introduced in Kolkata
- ii. Supply, Distribution and Selling of Loose 2T oil in Kolkata Metropolitan Area (KMA) has been Banned from 01.10.2001
- iii. Unleaded Petrol and Low Sulphur Petrol and Diesel made available within Kolkata and Howrah and adjoining agglomeration.
- iv. Availability of Cleaner Automotive Fuel like LPG ensured in Kolkata.
- v. Introduced Upgraded Auto Emission Testing Centre (PUC Centre)

B) Industrial Pollution Control

- i. Stricter Locational Policy for New Industrial Units
- ii. Ensuring Regulatory Compliance by Grossly Polluting Industries
- iii. Introduction of Stricter Emission Standard for Boilers, Ceramic, Kilns, Foundries and Rolling Mills operating within Kolkata Metropolitan Areas.
- iv. Mandatory Use of Cleaner Fuel in Small Boilers, Ceramic Kilns and Rolling Mills operating within Kolkata Metropolitan Area.
- v. Discontinuance of Coal Supply to the industries which have been ordered to discontinue the use of coal.
- vi. Environmental compliance by Cluster of Small Scale Industries is also ensured

4.18.7 Major City Specific Action Plan in Hyderabad

The measures include following

- o Upgradation of existing Pollution under Control (PUC) centers with computer testing facility
- o Unleaded gasoline and low sulphur diesel are being supplied in Hyderabad
- o Introduction of mobile task forces to monitor the visibly polluting vehicles.
- o Bharat Stage-III norms have been introduced in Hyderabad
- o Ban on sale of loose 2T oil. Shall be dispensed through premixed dispensing stations
- o Establishment of LPG dispensing stations
- o Constitution of task forces to check the adulteration of oil and fuel
- o Introduction of multi model transport system
- o Urban Greening by Hyderabad Urban Development Authority (HUDA) is being carried out
- o Open space plantation by Municipal Corporation of Hyderabad (MCH) is being carried out