

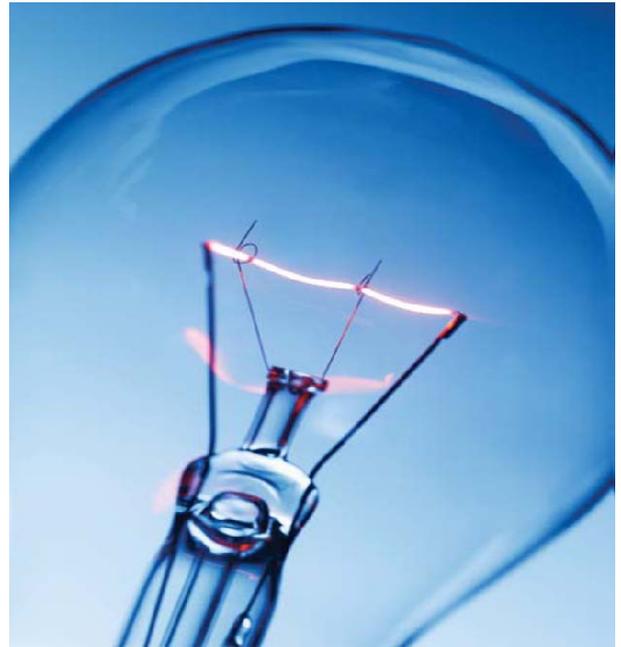


ENERGY STATISTICS

2011



CENTRAL STATISTICS OFFICE
NATIONAL STATISTICAL ORGANISATION
MINISTRY OF STATISTICS AND PROGRAMME IMPLEMENTATION
GOVERNMENT OF INDIA
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**CSO, SARDAR PATEL BHAVAN,
SANSAD MARG, NEW DELHI - 110 001**

ENERGY STATISTICS

2011

(Eighteenth Issue)

**CENTRAL STATISTICS OFFICE
MINISTRY OF STATISTICS AND PROGRAMME
IMPLEMENTATION
GOVERNMENT OF INDIA
NEW DELHI**

FOREWORD

The publication titled “Energy Statistics 2011”, is brought out every year by Central Statistics Office (CSO) and the present one is 18th in the series. The publication contains the latest data available in respect of different energy sources, with different agencies/organizations and a brief analysis of the data on reserves, installed capacity, potential for generation, production, consumption, import, export and wholesale price of different energy commodities as available from the concerned line Ministries of the Government of India. This publication is an attempt to cater to the needs of the planners, policy makers and researchers by making available the entire energy data at a single place.

Like in the past, “Energy Statistics 2011” has been divided into nine parts. Part ‘One’ is on Reserves and potential for Generation. Part ‘Two’ presents Installed capacity and Capacity Utilisation. Part ‘Three’ is on production of Primary Sources of Conventional Energy. Part ‘Four’ gives the picture of Foreign Trade of Energy Commodities. Part ‘Five’ is on Availability of Energy Resources. In Part ‘Six’ consumption of various Energy resources is given. Part ‘Seven’ is on Energy Commodity Balance of few energy commodities. Part ‘Eight’ gives trends of Wholesale Price Index of Energy Commodities in India. In part ‘Nine’, for ease of referencing about the international scenario, comparison of World production & consumption of Crude Oil and Natural Gas vis-à-vis India is given.

Analytical indicators viz. Growth Rates, Compound Annual Growth Rates (CAGR), Percentage Distributions, have been provided in relevant tables to increase the utility of the publication.

It may be noted that the statistics provided in the report is provisional as the actual data is reported with a considerable time lag. In view of this, the information based on provisional data for certain years may undergo some modification as and when the actual data is made available.

I convey my thanks to the officers in Ministry of Petroleum and Natural Gas, Central Electricity Authority, Office of Coal Controller, Ministry of New and Renewable Energy and Office of the Economic Advisor, who have co-operated in the compilation and supply of data for this publication. I also convey my thanks to the team of officers in the Economic Statistics Division for their dedicated services in bringing out this publication in time.

It has been the continuous endeavor of the Central Statistics Office to make this report more useful as a source of reference to planners, policy makers and researchers in the field of energy sector. Any suggestions for further improvement in the contents and presentation of this report are therefore welcome.

(S.K.DAS)
DIRECTOR GENERAL (CSO)

New Delhi
April 2011.

Officers associated with the publication:

Mr. H.K.Sharma,	Additional Director General
Mr. G.C.Manna,	Deputy Director General
Mr. Sunil Jain,	Deputy Director General
Ms. Geeta Singh Rathore,	Director
Mr. Sushil Kumar,	Senior Statistical Officer

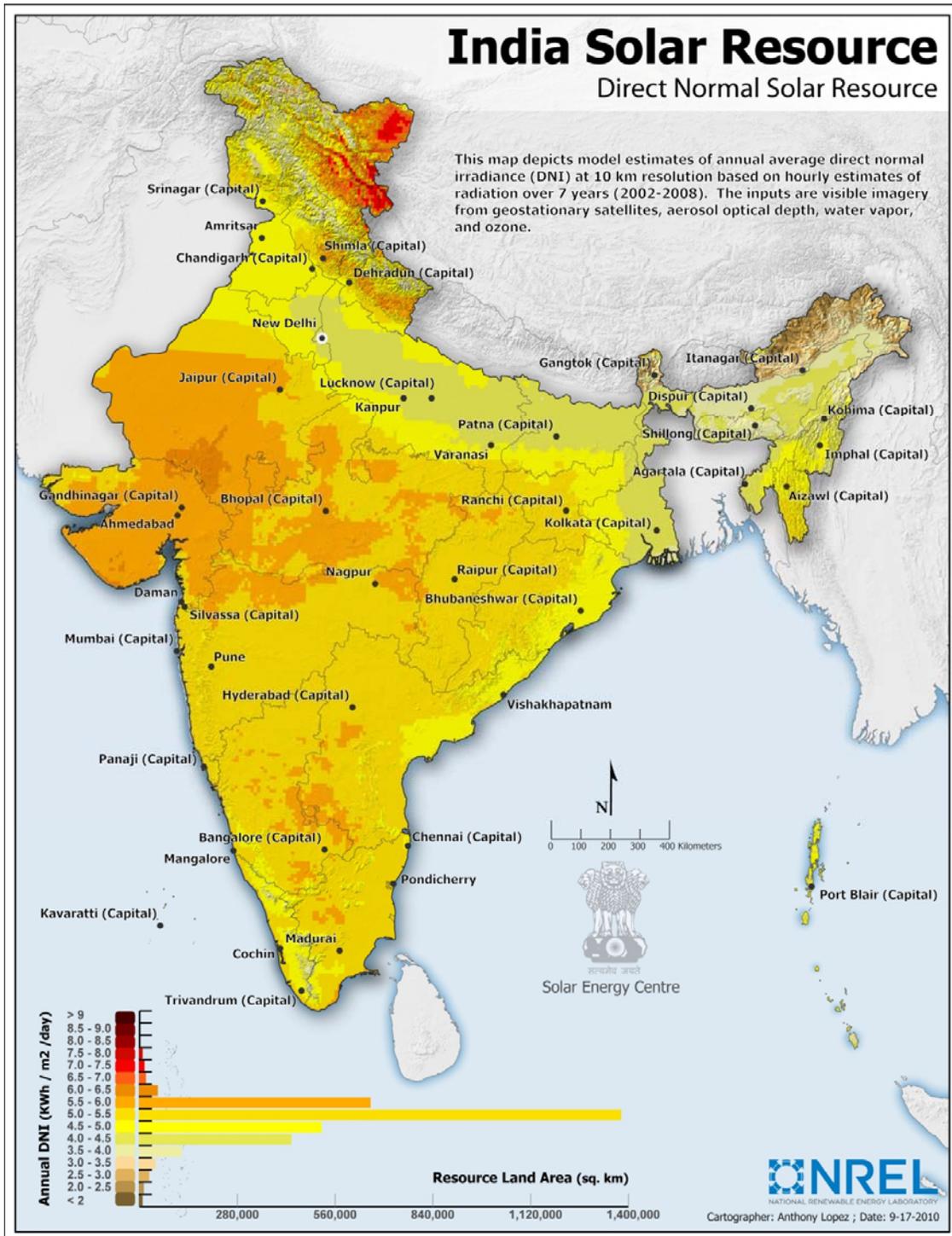
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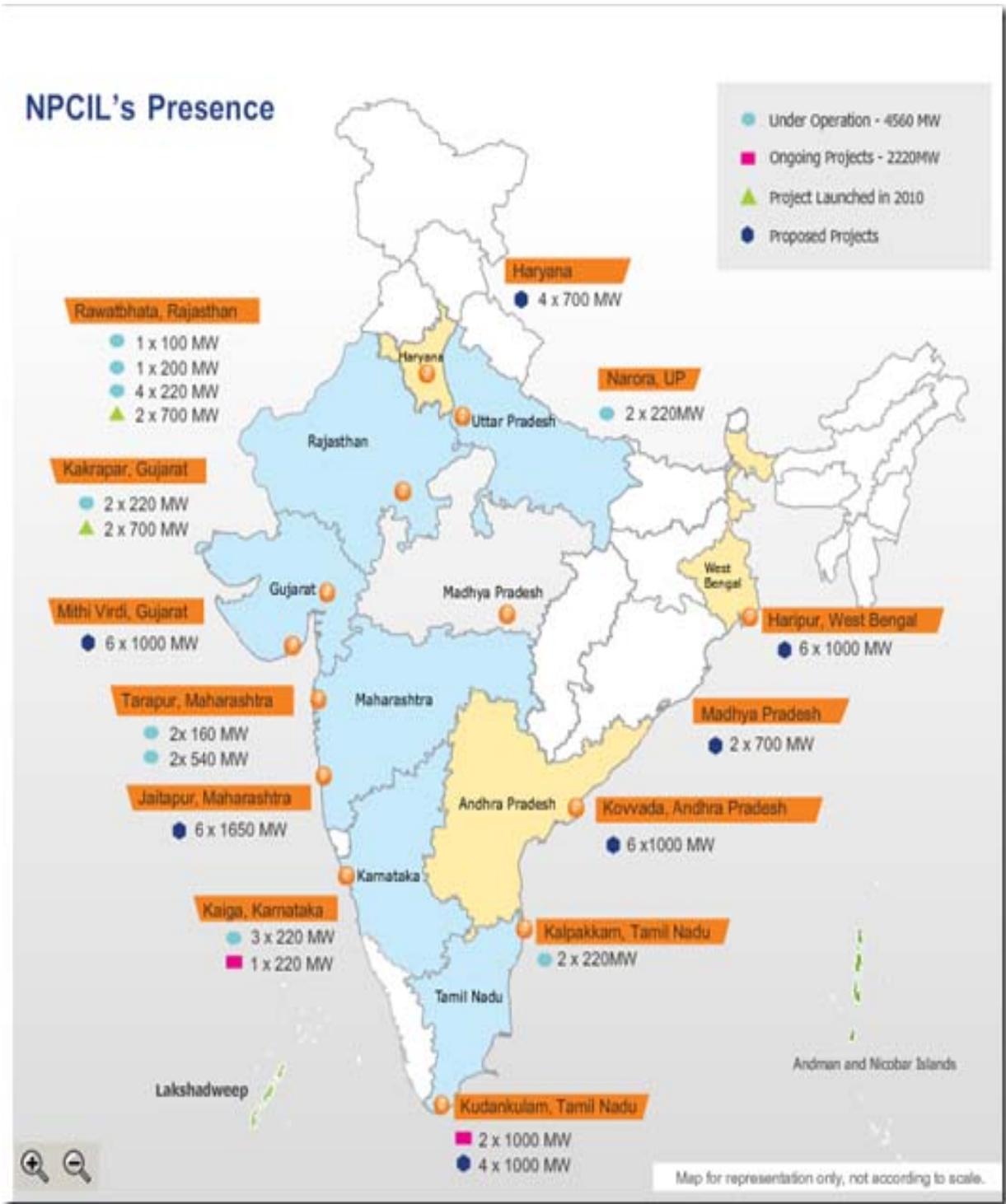
Energy Map of India

Solar Resources



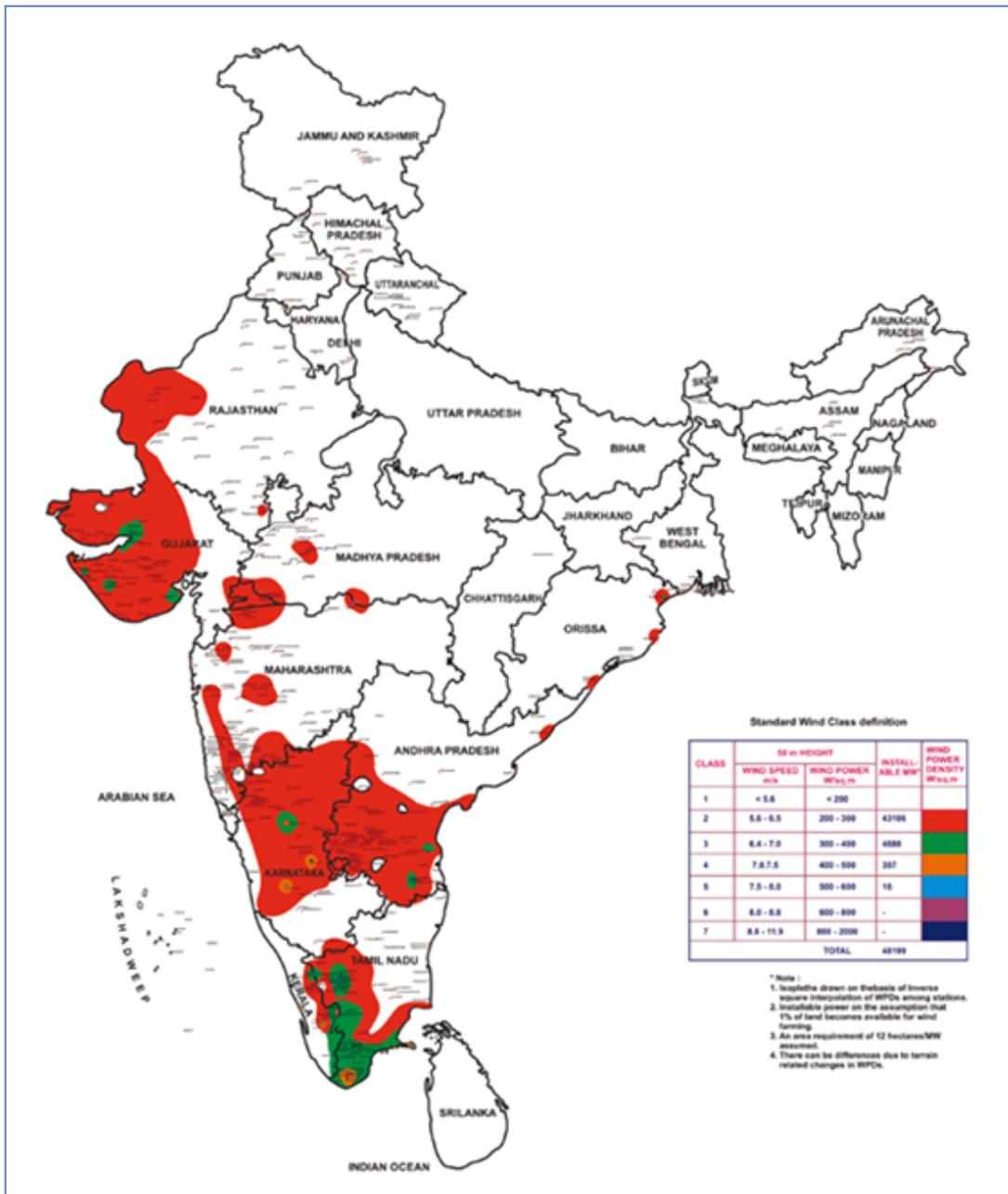
http://www.nrel.gov/international/ra_india.html

Nuclear Power Plants



<http://www.npcil.nic.in/main/Maps.aspx>

Wind Power Density



Standard Wind Class definition

CLASS	10 m HEIGHT		INSTALLABLE MW	WIND POWER DENSITY (W/m ²)
	WIND SPEED (m/s)	WIND POWER (W/m ²)		
1	< 5.6	< 200		
2	5.6 - 6.5	200 - 300	43166	Red
3	6.6 - 7.0	300 - 400	4880	Green
4	7.0 - 7.5	400 - 500	387	Orange
5	7.5 - 8.0	500 - 600	16	Blue
6	8.0 - 8.8	600 - 800	-	Purple
7	8.8 - 11.9	800 - 2000	-	Dark Blue
TOTAL			48199	

* Note :
 1. Isopeaks drawn on the basis of Inverse square interpolation of WPDs among stations.
 2. Installable power on the assumption that 1% of land becomes available for wind farming.
 3. An area requirement of 12 hectares/MW assumed.
 4. There can be differences due to terrain related changes in WPDs.

HIGHLIGHTS

1. Reserves and Potential for Generation

India's energy-mix comprises both non-renewable (coal, lignite, petroleum and natural gas) and renewable energy sources (wind, solar, small hydro, biomass, cogeneration bagasse etc.).

Information on reserves of non-renewable sources of energy like coal, lignite, petroleum, natural gas and the potential for generation of renewable energy sources is a pre-requisite for assessing the country's potential for meeting its future energy needs. The changes in the reserves over time indicate the research and development going into the discovery of new reserves and the pace of their exploitation. They also facilitate in devising effective conservation and management strategies for optimal utilization of these resources.

1.1 Coal and Lignite

India has a good reserve of coal and lignite. As on 31.03.10 the estimated reserves of coal was around 277 billion tones, an addition of 10 billion over the last year. Coal deposits are mainly confined to eastern and south central parts of the country. The states of Jharkhand, Orissa, Chhattisgarh, West Bengal, Andhra Pradesh, Maharashtra and Madhya Pradesh account for more than 99% of the total coal reserves in the country. The total estimated reserve of coal in India as on 31.03.2009 was around 267 billion tonnes. There has been an increase of 3.6% in the estimated coal reserves during the year 2009-10 with Andhra Pradesh accounting for the maximum increase of 16 %. This indicates that the geological explorations in the country during the year have led to the discovery of about 10 billion tonnes coal (9.6 billion tonnes increase in reserve plus 0.5 billion tonnes production) (Tables 1.1 and 3.1).

The estimated reserve of lignite as on 31.03.2010 was 40 billion tonnes, of which 80 % was in the southern State of Tamil Nadu. The increase in the estimated reserve of lignite during the year 2009-10 was 2.1%, Rajasthan accounting for the maximum increase of 5.5% (Table 1.1(A)).

1.2 Petroleum and Natural gas

The estimated reserves of crude oil and natural gas in India as on 31.03.2010 stood at 1206 million metric tonnes (MMT) and 1453 billion cubic meters (BCM), respectively (Table 1.2). Geographical distribution of Crude oil indicates that the maximum reserves are in the Western Offshore (46%) followed by Assam (23%), whereas the maximum reserves of Natural Gas are in the Western Offshore (40%) followed by Eastern offshore (29%). The increase in the estimated reserve of crude

oil during 2009-10 was 56%, with Tamilnadu accounting for the highest increase of 85.3% FOLLOWED BY Gujarat (73.3%). In case of Natural Gas, the increase in the estimated reserves over the last year was 30%. The maximum contribution to this increase has been from Tamilnadu (139%), followed by Andhra Pradesh (75%) (Table 1.2)

1.3 Renewable energy sources

There is high potential for generation of renewable energy from various sources- wind, solar, biomass, small hydro and cogeneration bagasse. The total potential for renewable power generation in the country as on 31.03.2010 is estimated at 90,313 MW (Table 1.3). This includes an estimated wind power potential of 48,561 MW (54%), SHP (small-hydro power) potential of 15,385 MW (17%) and 22,536 MW (25%) from bagasse-based cogeneration in sugar mills. The geographic distribution of the estimated potential across States reveals that Karnataka has the highest share of about 14% (12,948 MW) followed by Gujarat with 13% (11,364 MW) and Andhra Pradesh 10,015 MW (11.1%), mainly on account of wind power potential. The estimates of Ministry of New and Renewable Energy for solar energy potential are estimated at 20-30 MW per Sq.km. for most parts of the country.

Table 1.1 :Statewise Estimated Reserves of Coal in India as on 31.03.2009 and 31.03.2010

(In billion tonnes)

States/ UTs	Proved		Indicated		Inferred		Total		Distribution (%)	
	31.03.2009	31.03.2010	31.03.2009	31.03.2010	31.03.2009	31.03.2010	31.03.2009	31.03.2010	31.03.2009	31.03.2010
Andhra Pradesh	9.19	9.26	6.75	9.73	2.99	3.03	18.93	22.02	7.08	7.95
Arunachal Pradesh	0.03	0.03	0.04	0.04	0.02	0.02	0.09	0.09	0.03	0.03
Assam	0.35	0.35	0.04	0.04	0.00	0.00	0.39	0.39	0.15	0.14
Bihar	0.00	0.00	0.00	0.00	0.16	0.16	0.16	0.16	0.06	0.06
Chhattisgarh	10.91	12.44	29.19	30.23	4.38	4.01	44.48	46.68	16.65	16.86
Jharkhand	39.48	39.63	30.89	30.99	6.34	6.34	76.71	76.96	28.71	27.80
Madhya Pradesh	8.04	8.51	10.30	11.27	2.65	2.22	20.98	21.99	7.85	7.94
Maharashtra	5.26	5.36	2.91	2.98	1.99	1.97	10.15	10.31	3.80	3.72
Meghalaya	0.09	0.09	0.02	0.02	0.47	0.47	0.58	0.58	0.22	0.21
Nagaland	0.01	0.01	0.00	0.00	0.01	0.31	0.02	0.32	0.01	0.11
Orissa	19.94	21.51	31.48	32.07	13.80	12.73	65.23	66.31	24.41	23.95
Sikkim	0.00	0.00	0.06	0.06	0.04	0.04	0.10	0.10	0.04	0.04
Uttar Pradesh	0.87	0.87	0.20	0.20	0.00	0.00	1.06	1.06	0.40	0.38
West Bengal	11.65	11.75	11.60	13.03	5.07	5.07	28.33	29.85	10.60	10.78
All India Total	105.82	109.80	123.47	130.65	37.92	36.36	267.21	276.81	100.00	100.00
Distribution (%)	39.60	39.67	46.21	47.20	14.19	13.13	100.00	100.00		

Table 1.1(A) :Statewise Estimated Reserves of Lignite in India as on 31.03.2009 and 31.03.2010

(In billion tonnes)

States/ UTs	Proved		Indicated		Inferred		Total		Distribution (%)	
	31.03.2009	31.03.2010	31.03.2009	31.03.2010	31.03.2009	31.03.2010	31.03.2009	31.03.2010	31.03.2009	31.03.2010
Gujarat	0.79	1.24	0.26	0.26	1.62	1.16	2.66	2.66	6.81	6.67
Jammu & Kashmir	0.00	0.00	0.02	0.02	0.01	0.01	0.03	0.03	0.07	0.07
Kerala	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.03	0.02
Pondicherry	0.00	0.00	0.41	0.41	0.01	0.01	0.42	0.42	1.07	1.04
Rajasthan	0.84	1.17	2.33	2.14	1.38	1.50	4.55	4.80	11.66	12.04
TamilNadu	3.74	3.74	22.52	22.52	5.15	5.72	31.40	31.98	80.37	80.15
India	5.36	6.15	25.54	25.34	8.18	8.41	39.07	39.90	100.00	100.00
Distribution (%)	13.72	15.40	65.35	63.52	20.92	21.07	100.00	100.00		

Source:Office of Coal Controller, Ministry of Coal

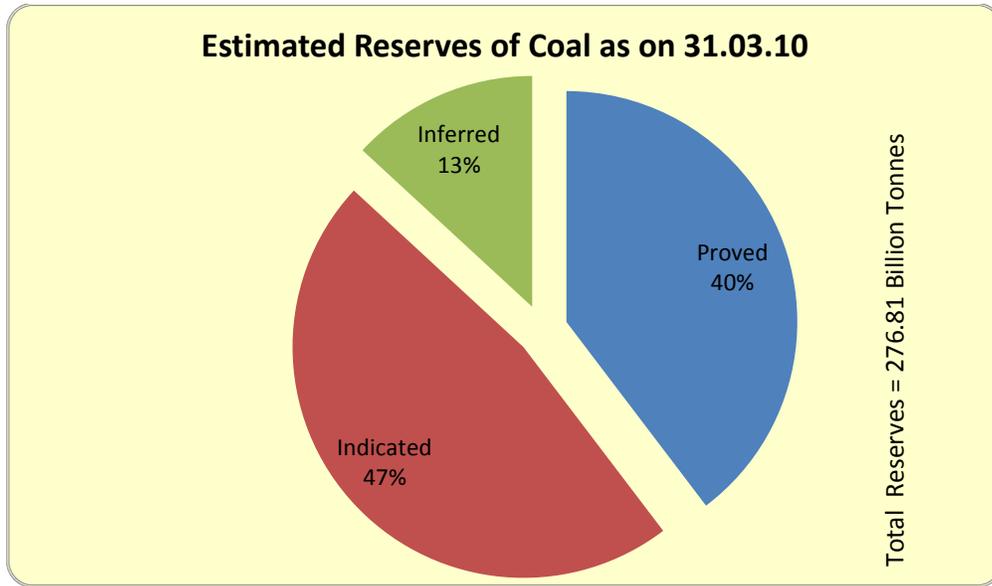


Figure 1.1

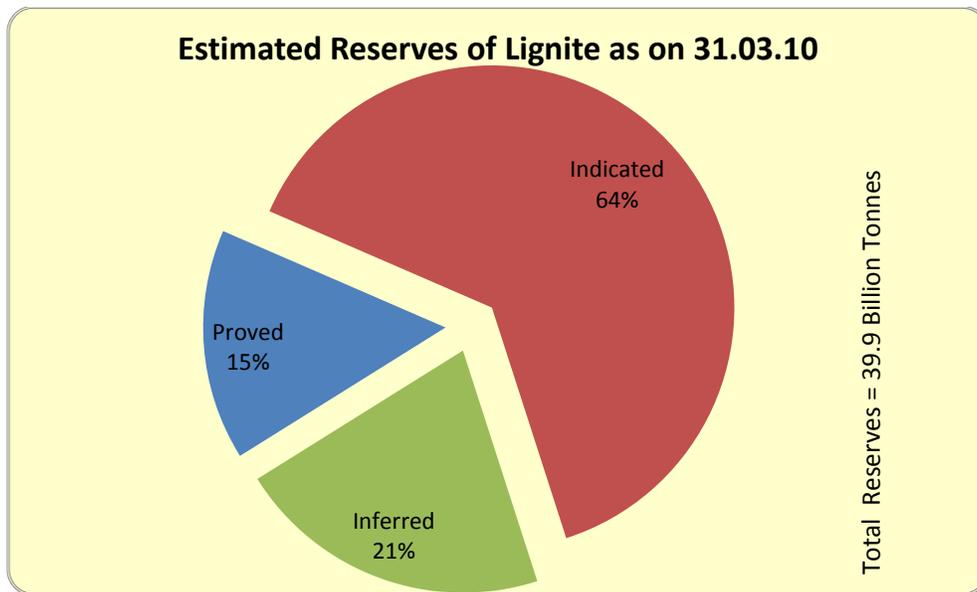


Figure 1.1(A)

Table 1.2 :Statewise Estimated Reserves[@] of Crude Oil and Natural Gas in India as on in 31.03.2009 and 31.03.2010

States/ UTs	Crude Petroleum (million tonnes)				Natural Gas (billion cubic metres)			
	31.03.2009		31.03.2010		31.03.2009		31.03.2010	
	Estimated Reserves	Distribution (%)	Estimated Reserves	Distribution (%)	Estimated Reserves	Distribution (%)	Estimated Reserves	Distribution (%)
Andhra Pradesh	4.21	0.54	7.16	0.59	39.59	3.55	69.36	4.77
Arunachal Pradesh	3.65	0.47	4.01	0.33	1.12	0.10	1.10	0.08
Assam	167.32	21.64	274.07	22.72	97.71	8.76	116.74	8.03
Eastern Offshore ¹	22.50	2.91	28.05	2.33	425.42	38.14	426.23	29.33
Gujarat	134.97	17.45	233.84	19.39	77.22	6.92	127.66	8.79
Nagaland	2.69	0.35	4.99	0.41	0.12	0.01	0.18	0.01
Rajasthan	84.68	10.95	80.48	6.67	12.71	1.14	13.49	0.93
Tamil Nadu	7.97	1.03	14.77	1.22	26.95	2.42	64.46	4.44
Tripura	0.08	0.01	0.15	0.01	32.50	2.91	51.39	3.54
Western Offshore ²	345.28	44.65	558.63	46.32	401.95	36.04	582.42	40.08
Total	773.34	100.00	1206.15	100.00	1115.29	100.00	1453.03	100.00

CBM : Cold Bed Methane

@ Proved and indicated Balance Recoverable Reserves.

1 Includes JVC/Pvt. Parties for Crude Oil and includes West Bengal for Natural Gas

2 Includes Bombay High offshore, Rajasthan and JVC for Crude Oil and Bombay High offshore, Rajasthan and Madhya Pradesh (Coal Bed Methane) for Natural Gas

Source: Ministry of Petroleum & Natural Gas

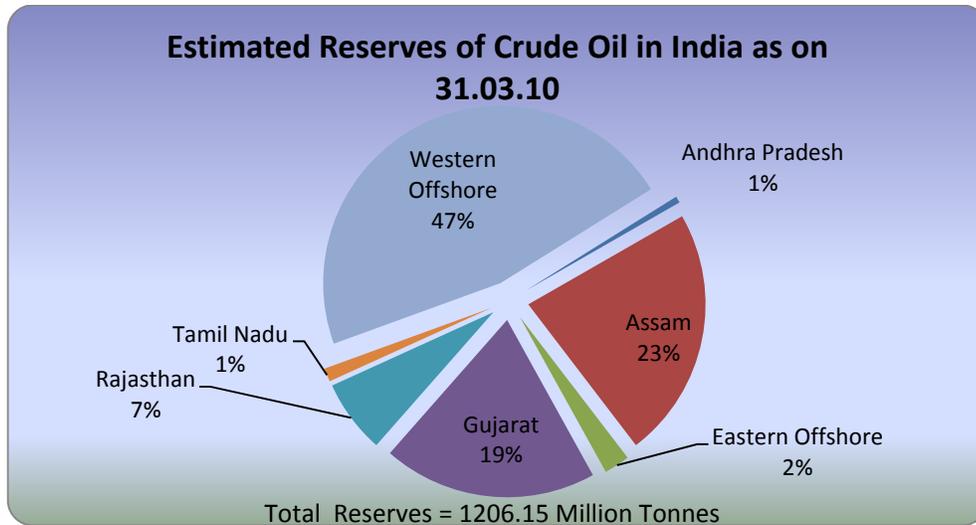


Figure 1.2

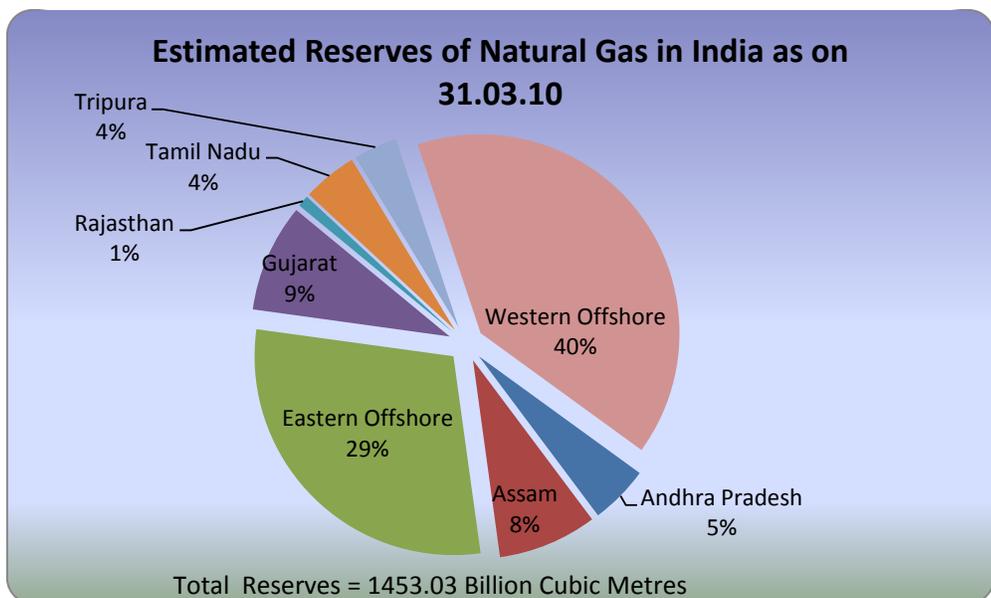


Figure 1.2(A)

Table 1.3 :Sourcewise and Statewise Estimated Potential of Renewable Power in India as on 31.03.2010

States/ UTs	Wind Power	Small Hydro Power	Cogeneration-bagasse	Waste to Energy	(in MW)	
					Total	
					Estimated Reverses	Distribution (%)
1	2	3	4	5	6	7
Andhra Pradesh	8968	560	300	187	10015	11.09
Arunachal Pradesh	0	1329	0	0	1329	1.47
Assam	0	239	0	11	250	0.28
Bihar	0	213	300	117	630	0.70
Chhattisgarh	0	993	0	39	1032	1.14
Goa	0	7	0	0	7	0.01
Gujarat	10645	197	350	172	11364	12.58
Haryana	0	110	350	32	492	0.54
Himachal Pradesh	0	2268	0	2	2270	2.51
Jammu & Kashmir	0	1418	0		1418	1.57
Jharkhand	0	209	0	14	223	0.25
Karnataka	11531	748	450	219	12948	14.34
Kerala	1171	704	0	56	1931	2.14
Madhya Pradesh	1019	804	0	119	1942	2.15
Maharashtra	4584	733	1250	438	7005	7.76
Manipur	0	109	0	3	112	0.12
Meghalaya	0	229	0	3	232	0.26
Mizoram	0	167	0	2	169	0.19
Nagaland	0	189	0	0	189	0.21
Orissa	255	295	0	33	583	0.65
Punjab	0	393	300	68	761	0.84
Rajasthan	4858	57	0	93	5008	5.54
Sikkim	0	266	0	0	266	0.29
Tamil Nadu	5530	660	450	240	6880	7.62
Tripura	0	47	0	2	49	0.05
Uttar Pradesh	0	461	1250	270	1981	2.19
Uttaranchal	0	1577	0	7	1584	1.75
West Bengal	0	396	0	221	617	0.68
Andaman & Nicobar	0	7	0	0	7	0.01
Chandigarh	0	0	0	9	9	0.01
Dadar & Nagar Haveli	0	0	0	0	0	0.00
Daman & Diu	0	0	0	0	0	0.00
Delhi	0	0	0	194	194	0.22
Lakshadweep	0	0	0	0	0	0.00
Pondicherry	0	0	0	4	4	0.00
Others*	0	0	17536	1281	18817	20.84
All India Total	48561	15385	22536	3831	90313	100.00
Distribution (%)	53.77	17.04	24.95	4.24	100.00	

* Industrial waste

Source: Ministry of New and Renewable Energy

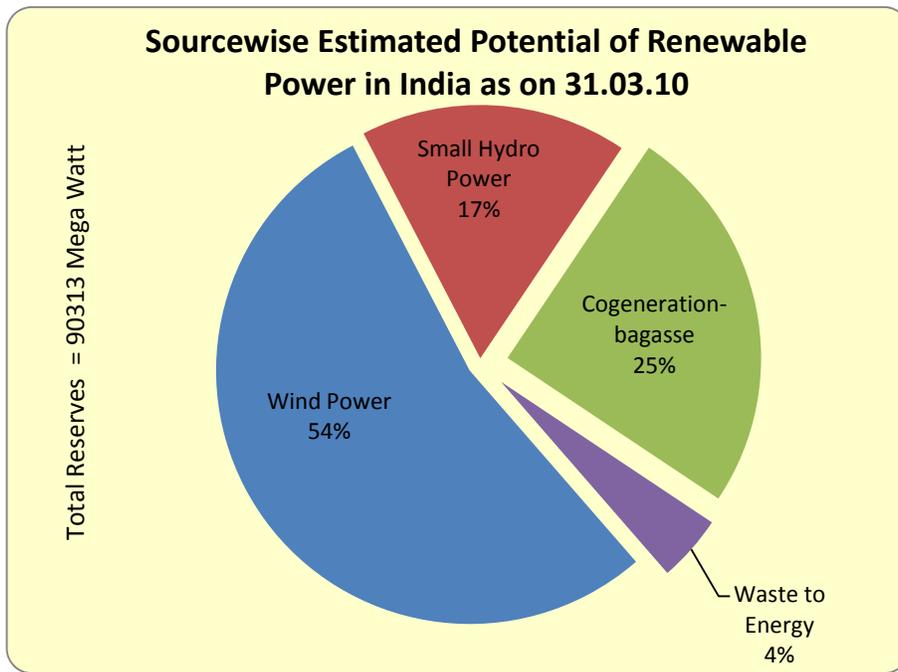


Figure 1.3

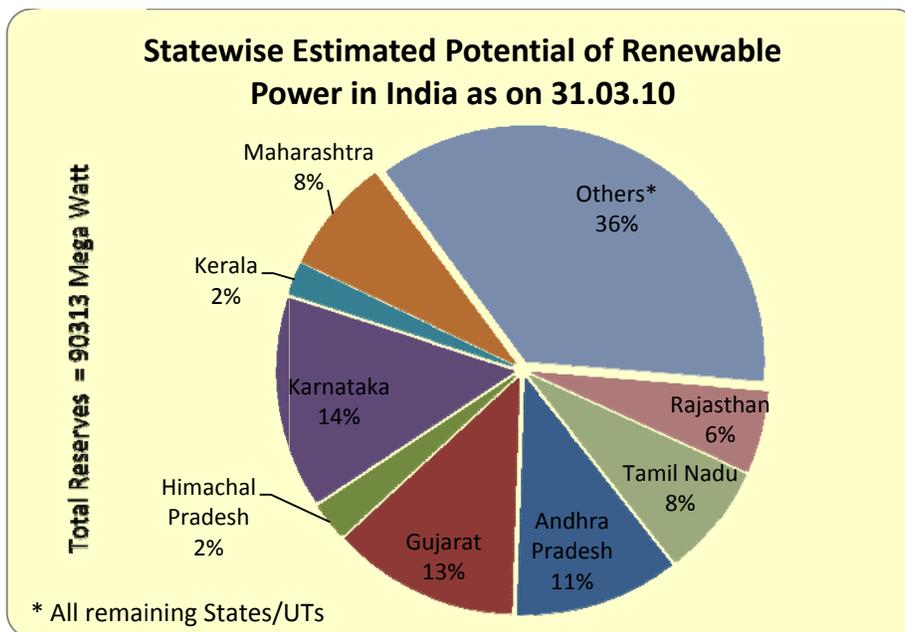


Figure 1.3(A)

HIGHLIGHTS

2. Installed Capacity and Capacity Utilization

Indicators of installed capacity and capacity utilization throw light on the state of preparedness of the country for generation of the energy it requires and the quality or efficiency of the technology used in the generation, respectively. The dynamics of these indicators prompts the planners and policy makers to take appropriate steps for improvement.

2.1 Coal washeries

Coal washing is an integral part of a coal production. Raw coal coming from mines is washed to remove the ash contents to make them fit for feeding into boilers, particularly those of steel plants. Barring a few instances, a coal washery does not form part of a coal mine in India. Total installed capacity of washeries in the country decreased from 131.9 Million tonne per year (MTY) during 2008-09 to 126 MTY during 2009-10 (Table 2.1). As on 31.03.10, a total of 52 washeries, both PSUs and Private, were operating in the country. The total installed washing capacity was 126 million tonnes (MT) per annum, for both Coking (29.69 MTY) and Non-Coking Coal (96.32 MTY). Dipak, Aryan Coal Beneficiation Pvt Ltd, Chattisgarh, Piparwar, CIL, Jharkhand and Tamnar, Jindal Steel & Power limited Chattisgarh accounted for 19.4% of the total installed capacity of all the Coal washeries in India.

2.2 Refineries of crude oil

As on 31.03.2010 there were a total of 20 refineries in the country (Table 2.2), 17 in the Public Sector and 3 in the private sector. Public sector refineries are located at Guwahati, Barauni, Koyali, Haldia, Mathura, Digboi, Panipat, Vishakapatnam, Chennai, Nagapatinam, Kochi, Bongaigaon, Numaligarh, Mangalore, Tatipaka, and two refineries in Mumbai. The private sector refineries built by Reliance Petroleum Ltd and Essar Oil are in Jamnagar and Vadinar respectively.

Total installed crude oil refining capacity in the country at the end of March 2010 was 178 million tonnes per annum. There was an addition of 29 million tonnes per annum to the installed refining capacity due to RPL(SEZ), Jamnagar, Gujarat refinery.

Total processing of crude oil in the country decreased from 1,60,772 thousand metric tonnes (TMT) during 2008-09 to 1,60,003 TMT during 2009-10 registering a decline of -0.5 %. Capacity utilization of the refineries was 90.34% during 2008-09 and 89.92 % during 2009-10. The maximum increase (12.3%) was at NRL refinery at

Numalgarh and the highest decrease (-37.2 %) in capacity utilization was at ONGC refinery at Tatipaka. Except RPL(SEZ), Jamnagar, Gujarat (for which production figures are not available), out of 19 remaining refineries there was a decrease in the capacity utilization at 9 refineries.

Indian oil corporation, the state owned corporation had highest refining capacity of 49,700 TMTY. All units of IOC processed 50,696 TMT during 2009-10 as compared to 51,367 TMT during 2008-09. The capacity utilization of these refineries was 103.4% during 2008-09 and 102% during 2009-10. All the private refineries taken together processed 48,549 TMT during 2008-09 as compared to 47,916 TMT during 2009-10. The capacity utilization of these refineries during 2008-09 and 2009-10 stood at 67% and 66% respectively.

2.3 Installed generating capacity of electricity

The total installed capacity for electricity generation in the country has increased from 16,271 MW as on 31.03.1971 to 1,87,872 MW as on 31.03.2010, registering a compound annual growth rate (CAGR) of 6.1% (Table 2.3). There has been an increase in generating capacity of 12,926 MW over the last one year, which is 7.4% more than the capacity of last year. The highest rate of annual growth (10.7%) from 2008-09 to 2009-10 in installed capacity was for nuclear power followed by thermal power(10.3%).

The total Installed capacity of power utilities in the country increased from 14,709 MW in 1970-71 to 1,59,398 MW as on 31.3.2010, with a CAGR of 5.9 % over the period. The highest CAGR (6.7%) was in case of thermal utilities followed by nuclear (5.87%) and hydro (4.48%).

At the end of March 2010, thermal power plants accounted for an overwhelming 63% of the total installed capacity in the country, with an installed capacity of 117.9 thousand MW. Hydro power plants come next with an installed capacity of 36.9 thousand MW, accounting for 19.6% of the total installed Capacity. Besides, non-utilities accounted for 15.2% (28.5 Thousand MW) of the total installed generation capacity. The share of Nuclear energy was only 2.43% (4.56 MW).

The geographical distribution of Installed generating capacity of electricity as on 31.03.2010(Table 2.4) indicates that Western Region (both central and state sector) accounted for the highest share (30.81%) followed by Southern Region (26.57%), Northern Region (25.88%), Eastern Region (15.35%) and North Eastern Region (1.4%). Region wise growth in the installed capacity during 2009-10 reveals that Southern Region registered the highest growth of about 11%, followed by Western Region(8 %) and Eastern region (6.5%). Among the States in the Southern Region that accounted for the highest growth of 11%, Andhra Pradesh registered the highest(17.3%) closely followed by Karnataka (12.8%). Among all the states

Arunachal Pradesh registered highest growth (36%) in the installed capacity followed by Rajasthan and Chhattisgarh (about 24% each).

2.4 Grid Interactive Renewable Power

The total installed capacity of grid interactive renewable power, which was 14,486 MW as on 31.03.2009 had gone up to 16,817 MW as on 31.03.2010 indicating growth of 16.1% during the period (Table 2.5). Out of the total installed generation capacity of renewable power as on 31-03-2010, wind power accounted for about 70%, followed by small hydro power(16.3%) and Biomass power (13%). Tamil Nadu had the highest installed capacity of grid connected renewable power (5398 MW) followed by Maharashtra (2547 MW) and Karnataka (2456 MW), mainly on account of wind power.

During 2009-10 out of total Biogas plants installed (42.5 lakh) (Table 2.6), maximum number of plants were installed in Maharashtra (7.8 lakh) followed by Andhra Pradesh, Uttar Pradesh, Karnataka and Gujarat each with about 4 lakh biogas plants. Out of about 6.6 lakh Solar Cookers installed in 2009-10, 1.7 lakh were installed in Gujarat and 1.4 lakh were installed in Madhya Pradesh. Further, during 2009-10, 1352 water pumping systems were installed and 5348 remote village and 1408 hamlets were electrified.

Table 2.1: Installed Capacity of Coal Washeries in India as on 31.3.09 and 31.03.10

Sl. No.	Washery & Operator	State of Location	Capacity (MTY)	
			31.03.2009	31.03.2010
<u>COKING COAL :</u>				
1	Dudga-II, CIL	Jharkhand	2.00	2.00
2	Bhojudih, CIL	West Bengal	1.70	1.70
3	Patherdih, CIL	Jharkhand	1.60	1.60
4	Moonidih, CIL	Jharkhand	1.60	1.60
5	Sudamdih, CIL	Jharkhand	1.60	1.60
6	Mahuda, CIL	Jharkhand	0.63	0.63
7	Kathara, CIL	Jharkhand	3.00	3.00
8	Swang, CIL	Jharkhand	0.75	0.75
9	Rajrappa, CIL	Jharkhand	3.00	3.00
10	Kedla, CIL	Jharkhand	2.60	2.60
11	Nandan, CIL	Madhya Pradesh	1.20	1.20
	(A) CIL		19.68	19.68
12	Durgapur, SAIL	West Bengal	1.50	1.50
13	DCOP, DPL	West Bengal	1.35	1.35
14	Chasnala, IISCO	Jharkhand	2.04	1.50
15	Jamadoba, TISCO	Jharkhand	0.90	0.90
16	West Bokaro-II, TISCO	Jharkhand	1.80	1.80
17	West Boakaro-III, TISCO	Jharkhand	2.10	2.10
18	Bhelatand	Jharkhand	0.86	0.86
	(B) PSU & Private		10.55	10.01
	TOTAL (A + B)		30.23	29.69
<u>NON-COKING COAL</u>				
1	Dugda-I, CIL	Jharkhand	2.50	2.50
2	Madhuban, CIL	Jharkhand	2.50	2.50
3	Gidi, CIL	Jharkhand	2.50	2.50
4	Piparwar, CIL	Jharkhand	6.50	6.50
5	Kargali, CIL	Jharkhand	2.72	2.72
6	Bina, CIL	Uttar Pradesh	4.50	4.50
	(A) CIL		21.22	21.22
7	Dipka, Aryan coal beneficiation pvt.	Chattisgarh	12.00	12.00
8	Gevra, -do-	Chattisgarh	5.00	5.00
9	Panderpauni, -do-	Maharashtra	3.00	3.00
10	Chakabuwa, Aryan Energy private ltd.	Chattisgarh	6.00	4.00
11	Indaram, Aryan Coal Benefication Pvt.Ltd.	Andhra Pradesh	0.60	0.60
12	Talcher, Aryan Energy Pvt. Ltd.	Orissa	2.00	2.00

**Table 2.1(Contd.): Installed Capacity of Coal Washeries in India
as on 31.3.09 and 31.03.10**

Sl. No.	Washery & Operator	State of Location	Capacity (MTY)	
			31.03.2009	31.03.2010
13	Wani, Kartikay Coal washeries pvt. ltd.(Aryan)	Maharashtra	2.50	2.50
14	Korba, ST-CLI Coal washeries ltd.	Chattisgarh	5.20	1.10
15	Ramagundam, Gupta coalfield & washeries ltd.	Andhra Pradesh	2.40	2.40
16	Sasti, Gupta coalfield & washeries ltd.	Maharashtra	2.40	2.40
17	Wani, Gupta coalfield & washeries ltd.	Maharashtra	1.92	1.92
18	Umrer, Gupta coalfield & washeries ltd.	Maharashtra	0.75	0.75
19	Bhandara, Gupta coalfield & washeries ltd.	Maharashtra	0.75	0.75
20	Gondegaon, Gupta coalfield & washeries ltd.	Maharashtra	2.40	2.40
21	Majri, Gupta coalfield & washeries ltd.	Maharashtra	2.40	2.40
22	Bilaspur, Gupta coalfield & washeries ltd.	Chattisgarh	3.50	3.50
23	Ghugus, Gupta coalfield & washeries ltd.	Maharashtra	2.40	2.40
24	Talcher, Global coal Mining (P) Ltd.	Orissa	2.50	2.50
25	Ib Valley, Global coal Mining (P) Ltd.	Orissa	1.50	3.25
26	Ramagundam, Global coal Mining (P) Ltd.	Andhra Pradesh	1.00	1.00
27	Wani, Bhatia International Ltd.	Maharashtra	3.00	2.00
28	Ghugus, Bhatia International Ltd.	Maharashtra	4.00	4.00
29	Jharsuguda, Bhatia International Ltd.	Orissa	1.50	1.50
30	Tamnar, Jindal Steel & Power Ltd.	Chattisgarh	6.00	6.00
31	Wani, Indo Unique Flame Ltd.	Maharashtra	2.40	2.40
32	Nagpur, Indo Unique Flame Ltd.	Maharashtra	0.60	0.60
33	Punwat, Indo Unique Flame Ltd.	Maharashtra	2.40	2.40
34	Dharamsthal, BLA Industries	Madhya Pradesh	0.33	0.33
	(B) Private		80.45	75.10
	TOTAL (A+B)		101.67	96.32
	Gross Total (Coking+Non-Coking)		131.90	126.01

Source: Office of Coal Controller, Ministry of Coal

Table 2.2: Installed Capacity and Capacity Utilization of Refineries of Crude Oil during 2008-09 and 2009-10

Sl. No	Refinery	Installed Capacity as on 31.03.2010 (TMTPA)	Refinery Crude Throughput (TMT)		Capacity Utilisation (%)		
			2008-09	2009-10	2008-09	2009-10	Change in utilisation
A	Public Sector Refineries	105468	112223	112117	106.4	106.3	-0.1
I	IOC REFINERIES	49700	51367	50696	103.4	102.0	-1.4
	IOC, Digboi	650	623	600	95.8	92.3	-3.5
	IOC, Guwahati	1000	1076	1078	107.6	107.8	0.2
	IOC, Barauni	6000	5940	6184	99.0	103.1	4.1
	IOC, Koyali	13700	13852	13206	101.1	96.4	-4.7
	IOC, Haldia	6000	6042	5686	100.7	94.8	-5.9
	IOC, Mathura	8000	8601	8107	107.5	101.3	-6.2
	IOC, Panipat	12000	13070	13615	108.9	113.5	4.5
	IOC, Bongaigaon	2350	2163	2220	92.0	94.5	2.4
II	BPCL REFINERIES	19500	20001	20391	102.6	104.6	2.0
	BPCL, Mumbai	12000	12262	12516	102.2	104.3	2.1
	BPCL, Kochi	7500	7739	7875	103.2	105.0	1.8
III	HPCL REFINERIES	13000	15807	15761	121.6	121.2	-0.4
	HPCL, Mumbai	5500	6652	6965	120.9	126.6	5.7
	HPCL, Visakh	7500	9155	8796	122.1	117.3	-4.8
IV	CPCL REFINERIES	10500	10136	10097	96.5	96.2	-0.4
	CPCL, Manali	9500	9718	9580	102.3	100.8	-1.5
	CPCL, Narimanam	1000	418	517	41.8	51.7	9.9
V	NRL, Numaligarh	3000	2251	2619	75.0	87.3	12.3
VI	ONGC, Tatipaka	78	84	55	107.7	70.5	-37.2
VII	MRPL, Mangalore	9690	12577	12498	129.8	129.0	-0.8
B	PRIVATE REFINERIES	72500	48549	47916	67.0	66.1	-0.9
I	RPL, Jamnagar	33000	35636	34415	108.0	104.3	-3.7
II	RPL(SEZ), Jamnagar, Gujarat	29000	-	-	-	-	-
III	Essar Oil Ltd., Vadinar	10500	12913	13501	123.0	128.6	5.6
Total (A+B)		177968	160772	160033	90.34	89.92	-0.97

TMTPA Thousand Metric Tonnes Per Annum

TMT Thousand Metric Tonnes

\$ RPL(SEZ), Jamnagar, Gujarat Commissioned on 25.12.2008 and started production from January, 2009 but not reported

Source: Ministry of Petroleum and Natural Gas

**Table 2.3 : Trends in Installed Generating Capacity of Electricity
Non-utilities in India from 1970-71 to 2009-10**

(Mega Watt) = (10³ x Kilo Watt)

As on	Utilities				Non-utilities			Grand Total
	Thermal *	Hydro	Nuclear	Total	Railways	Self- ** Generating Industries	Total	
1	2	3	4	5	6	7	8	9
31.03.1971	7,906	6,383	420	14,709	45	1,517	1,562	16,271
31.03.1976	11,013	8,464	640	20,117	61	2,071	2,132	22,249
31.03.1981	17,563	11,791	860	30,214	60	3,041	3,101	33,315
31.03.1986	29,967	15,472	1,330	46,769	85	5,419	5,504	52,273
31.03.1991	45,768	18,753	1,565	66,086	111	8,502	8,613	74,699
31.03.1996	60,083	20,986	2,225	83,294	158	11,629	11,787	95,081
31.03.2001	73,613	25,153	2,860	1,01,626	0	16,157	16,157	1,17,783
31.03.2006	88,601	32,326	3,360	1,24,287	0	21,468	21,468	1,45,755
31.03.2007	93,775	34,654	3,900	1,32,329	-	22,335	22,335	1,54,664
31.03.2008	1,03,032	35,909	4,120	1,43,061	-	24,986	24,986	1,68,047
31.03.2009	1,06,968	36,878	4,120	1,47,966	-	26,980	26,980	1,74,946
31.03.2010(P)	1,17,975	36,863	4,560	1,59,398	-	28,474	28,474	1,87,872
Growth rate of 2009-10 over 2008-09(%)	10.29	-0.04	10.68	7.73	-	5.54	5.54	7.39
CAGR 1970-71 to 2009-10(%)	6.73	4.48	5.87	5.94	-	7.46	7.38	6.12

* From 1995-96 onwards, Thermal includes Renewable Energy Resources.

** Capacity in respect of Self Generating Industries includes units of capacity 1 MW and above.

CAGR: Compound Annual Growth Rate = $\left(\frac{\text{Current Value}}{\text{Base Value}}\right)^{\frac{1}{\text{nos. of years}}}-1 \times 100$

Source : Central Electricity Authority.

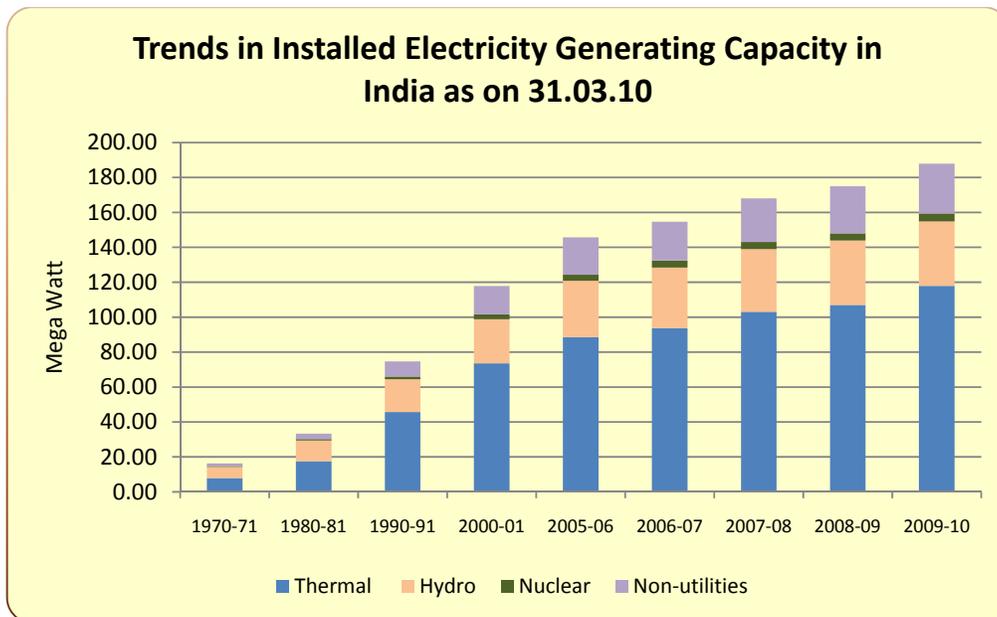


Figure 2.3

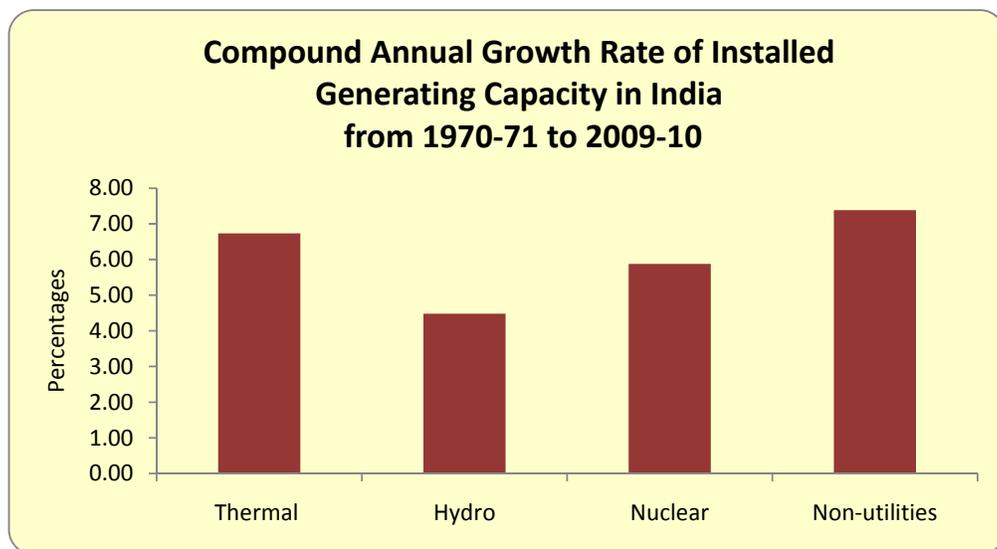


Figure 2.3(A)

Table 2.4 : Regionwise and Statewise Installed Generating Capacity of Electricity (Utilities) in India as on 31.03.2009 and 31.03.2010

States/UTs	(In GW)										Growth* Rate(2008- 09 to 2009- 10)
	Hydro		Thermal		Nuclear		New & Renewable		Total		
	31.03.09	31.03.10	31.03.09	31.03.10	31.03.09	31.03.10	31.03.09	31.03.10	31.03.09	31.03.10	
Delhi	0.00	0.00	0.92	0.74	0.00	0.00	0.00	0.00	0.92	0.74	-20.10
Haryana	0.88	0.88	2.15	2.62	0.00	0.00	0.07	0.08	3.10	3.58	15.51
Himachal Prd.	0.78	0.78	0.00	0.00	0.00	0.00	0.19	0.28	0.96	1.06	9.40
Jammu & Kashmir	0.78	0.78	0.18	0.18	0.00	0.00	0.11	0.13	1.08	1.09	1.63
Punjab	2.32	2.23	2.63	2.63	0.00	0.00	0.16	0.28	5.11	5.14	0.54
Rajasthan	0.99	0.99	2.99	3.94	0.00	0.00	0.73	0.93	4.70	5.86	24.56
Uttar Pradesh	0.53	0.52	4.12	4.37	0.00	0.00	0.40	0.59	5.05	5.48	8.58
Uttrakhand	1.65	1.65	0.00	0.00	0.00	0.00	0.11	0.13	1.76	1.79	1.53
Central Sector NR	5.59	5.47	10.46	10.37	1.18	1.62	0.00	0.00	17.23	17.46	1.34
Sub-Total (NR)	13.52	13.31	23.45	24.85	1.18	1.62	1.77	2.41	39.91	42.19	5.71
Chhatisgarh	0.12	0.12	2.92	3.66	0.00	0.00	0.17	0.22	3.21	4.00	24.42
D & N Haveli	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daman & Diu	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Goa	0.00	0.00	0.05	0.05	0.00	0.00	0.03	0.03	0.08	0.08	0.00
Gujarat	0.77	0.77	7.36	8.99	0.00	0.00	1.40	1.66	9.53	11.42	19.82
Madhya Pradesh	1.70	1.70	2.81	2.81	0.00	0.00	0.26	0.29	4.77	4.80	0.53
Maharashtra	3.33	3.33	9.54	10.29	0.00	0.00	2.16	2.44	15.03	16.06	6.86
Central Sector WR	1.55	1.52	10.47	10.51	1.84	1.84	0.00	0.00	13.86	13.87	0.11
Sub-Total (WR)	7.47	7.45	33.14	36.31	1.84	1.84	4.02	4.63	46.48	50.22	8.06
Andhra Pradesh	3.57	3.62	4.98	6.50	0.00	0.00	0.67	0.70	9.22	10.82	17.27
Karnataka	3.52	3.60	2.68	3.28	0.00	0.00	1.88	2.23	8.08	9.12	12.81
Kerala	1.77	1.78	0.43	0.43	0.00	0.00	0.12	0.14	2.32	2.35	1.39
Lakshadweep	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.01	-7.08
Puducherry	0.00	0.00	0.03	0.03	0.00	0.00	0.00	0.00	0.03	0.03	-0.06
Tamil Nadu	2.09	2.11	4.66	4.66	0.00	0.00	4.38	4.87	11.13	11.63	4.49
Central Sector SR	0.00	0.00	7.19	8.25	1.10	1.10	0.00	0.00	8.29	9.35	12.73
Sub-Total (SR)	10.95	11.11	19.99	23.16	1.10	1.10	7.05	7.94	39.09	43.31	10.78
A & N Island	0.00	0.00	0.06	0.06	0.00	0.00	0.01	0.01	0.07	0.07	-0.15
Bihar	0.00	0.00	0.54	0.53	0.00	0.00	0.05	0.05	0.59	0.58	-0.98
Jharkhand	0.13	0.13	1.62	1.19	0.00	0.00	0.00	0.00	1.75	1.32	-24.51
Orissa	2.07	2.06	0.42	0.42	0.00	0.00	0.03	0.06	2.52	2.55	1.03
Sikkim	0.00	0.00	0.01	0.01	0.00	0.00	0.04	0.05	0.05	0.05	13.01
West Bengal	1.02	0.98	5.77	4.89	0.00	0.00	0.10	0.16	6.89	6.03	-12.43
Central Sector ER	0.58	0.71	7.72	8.36	0.00	0.00	0.00	0.00	8.30	9.07	9.29
Sub-Total (ER)	3.80	3.88	16.13	15.46	0.00	0.00	0.23	0.34	20.16	19.68	-2.43
Arunachal Prd.	0.00	0.00	0.02	0.02	0.00	0.00	0.05	0.07	0.06	0.08	36.24
Assam	0.10	0.10	0.34	0.32	0.00	0.00	0.03	0.03	0.47	0.45	-5.20
Manipur	0.00	0.00	0.05	0.05	0.00	0.00	0.01	0.01	0.05	0.05	0.00
Meghalaya	0.16	0.16	0.00	0.00	0.00	0.00	0.03	0.03	0.19	0.19	0.00
Mizoram	0.00	0.00	0.05	0.05	0.00	0.00	0.02	0.03	0.07	0.08	15.87
Nagaland	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.03	0.03	0.00
Tripura	0.00	0.00	0.13	0.13	0.00	0.00	0.02	0.02	0.15	0.15	0.00
Central Sector NER	0.87	0.86	0.42	0.45	0.00	0.00	0.00	0.00	1.29	1.31	1.65
Sub-Total (NER)	1.13	1.12	1.01	1.02	0.00	0.00	0.17	0.20	2.31	2.34	1.30
Total States	28.29	28.30	57.47	62.86	0.00	0.00	13.24	15.52	98.99	108.33	9.43
Total Central	8.59	8.56	36.26	37.94	4.12	4.56	0.00	0.00	48.97	51.06	4.28
Total All India	36.88	36.86	93.73	100.81	4.12	4.56	13.24	15.52	147.97	159.39	7.72

* Growth rate of total installed electricity generating capacity of India
 Sub-totals/Totals may not tally due to conversion to Gw and rounding off.
 Source : Central Electricity Authority.

Table 2.5: Statewise and Sourcewise Installed Capacity of Grid Interactive Renewable Power as on 31.03.2009 and 30.03.2010

(In MW)

States/ Uts	Biomass Power		Waste to Energy		Wind Power	
	31.03.2009	31.03.2010	31.03.2009	31.03.2010	31.03.2009	31.03.2010
Andhra Pradesh	343.55	363.25	35.25	35.66	122.50	136.10
Arunachal Pradesh	-	-	-	-	-	-
Assam	-	-	-	-	-	-
Bihar	-	-	-	-	-	-
Chhattisgarh	156.10	199.90	-	-	-	-
Goa	-	-	-	-	-	-
Gujarat	0.50	0.50	0.50	-	1566.50	1863.63
Haryana	6.00	7.80	-	-	-	-
Himachal Pradesh	-	-	-	-	-	-
Jammu & Kashmir	-	-	-	-	-	-
Jharkhand	-	-	-	-	-	-
Karnataka	294.18	336.18	1.00	1	1327.40	1472.80
Kerala	-	-	-	-	27.00	27.75
Madhya Pradesh	1.00	1.00	2.75	2.7	212.80	229.40
Maharashtra	185.50	218.50	1.00	5.7	1938.90	2077.75
Manipur	-	-	-	-	-	-
Meghalaya	-	-	-	-	-	-
Mizoram	-	-	-	-	-	-
Nagaland	-	-	-	-	-	-
Orissa	-	-	-	-	3.20	-
Punjab	28.00	62.50	9.25	9.25	-	-
Rajasthan	31.30	31.30	-	-	738.40	1088.30
Sikkim	-	-	-	-	-	-
Tamil Nadu	333.70	395.70	4.25	5.65	4304.50	4906.72
Tripura	-	-	-	-	-	-
Uttar Pradesh	372.50	567.00	5.00	5	-	-
Uttaranchal	-	-	-	-	-	-
West Bengal	-	16.00	-	-	-	4.30
Andaman & Nicobar	-	-	-	-	1.10	-
Chandigarh	-	-	-	-	-	-
Dadar & Nagar Haveli	-	-	-	-	-	-
Daman & Diu	-	-	-	-	-	-
Delhi	-	-	-	-	-	-
Lakshadweep	-	-	-	-	-	-
Pondicherry	-	-	-	-	-	-
All India Total	1752.33	2199.63	59.00	64.96	10242.30	11806.75
Distribution (%)	10.42	13.08	0.35	0.39	60.90	70.21

Source: Ministry of New and Renewable Energy

Table 2.5 (contd): Statewise and Sourcewise Installed Capacity of Grid Interactive Renewable Power as on 31.03.2009 and 30.03.2010

States/ Uts	(In MW)						Growth* Rate (2008-09 to 2009-10)
	Small Hydro Power		Solar Power		Total		
	31.03.2009	31.03.2010	31.03.2009	31.03.2010	31.03.2009	31.03.2010	
Andhra Pradesh	180.83	186.83	0.10	0.10	682.23	721.94	5.82
Arunachal Pradesh	45.24	73.42	0.02	0.03	61.34	73.45	19.73
Assam	27.11	27.11	-	-	27.11	27.11	0.00
Bihar	50.40	54.60	-	-	54.60	54.60	0.00
Chhattisgarh	18.05	19.05	-	-	174.15	218.95	25.72
Goa	0.05	0.05	-	-	0.05	0.05	0.00
Gujarat	7.00	12.60	-	-	1574.50	1876.73	19.20
Haryana	62.70	70.10	-	-	68.70	77.90	13.39
Himachal Pradesh	162.62	330.32	-	-	230.92	330.32	43.04
Jammu & Kashmir	111.83	129.33	-	-	111.83	129.33	15.65
Jharkhand	4.05	4.05	-	-	4.05	4.05	0.00
Karnataka	464.00	640.45	-	6.00	2186.03	2456.43	12.37
Kerala	123.12	133.87	0.02	0.03	160.89	161.65	0.47
Madhya Pradesh	71.16	71.16	0.10	0.10	287.81	304.36	5.75
Maharashtra	211.33	245.33	-	-	2336.73	2547.28	9.01
Manipur	5.45	5.45	-	-	5.45	5.45	0.00
Meghalaya	31.03	31.03	-	-	31.03	31.03	0.00
Mizoram	17.47	36.47	-	-	24.47	36.47	49.04
Nagaland	28.67	28.67	-	-	28.67	28.67	0.00
Orissa	32.30	64.30	-	-	47.50	64.30	35.37
Punjab	123.90	132.55	0.32	1.33	161.74	205.63	27.13
Rajasthan	23.85	23.85	0.15	0.15	793.70	1143.60	44.08
Sikkim	39.11	47.11	-	-	47.11	47.11	0.00
Tamil Nadu	89.70	90.05	0.05	0.05	4732.55	5398.17	14.06
Tripura	16.01	16.01	-	-	16.01	16.01	0.00
Uttar Pradesh	25.10	25.10	0.38	0.38	402.98	597.48	48.26
Uttaranchal	105.12	132.92	0.05	0.05	127.97	132.97	3.91
West Bengal	98.40	98.40	0.05	1.15	98.45	119.85	21.74
Andaman & Nicobar	5.25	5.25	0.10	0.10	6.45	5.35	-17.05
Chandigarh	-	-	-	-	0.76	-	-
Dadar & Nagar Haveli	-	-	-	-	0.02	-	-
Daman & Diu	-	-	-	-	-	-	-
Delhi	-	-	-	0.05	-	0.05	-
Lakshadweep	-	-	0.76	0.75	0.76	0.75	-1.32
Pondichery	-	-	0.02	0.03	0.02	0.03	25.00
All India Total	2180.85	2735.42	2.12	10.28	14486.58	16817.04	16.09
Distribution (%)	12.97	16.27	0.01	0.06	100.00	100.00	

Source: Ministry of New and Renewable Energy

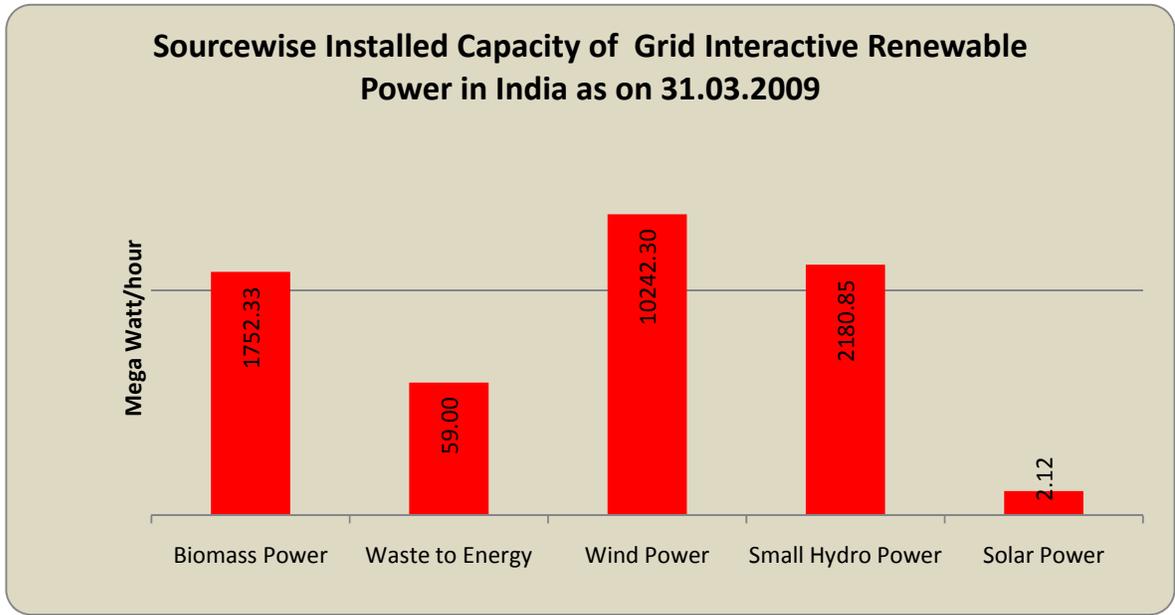


Figure 2.5

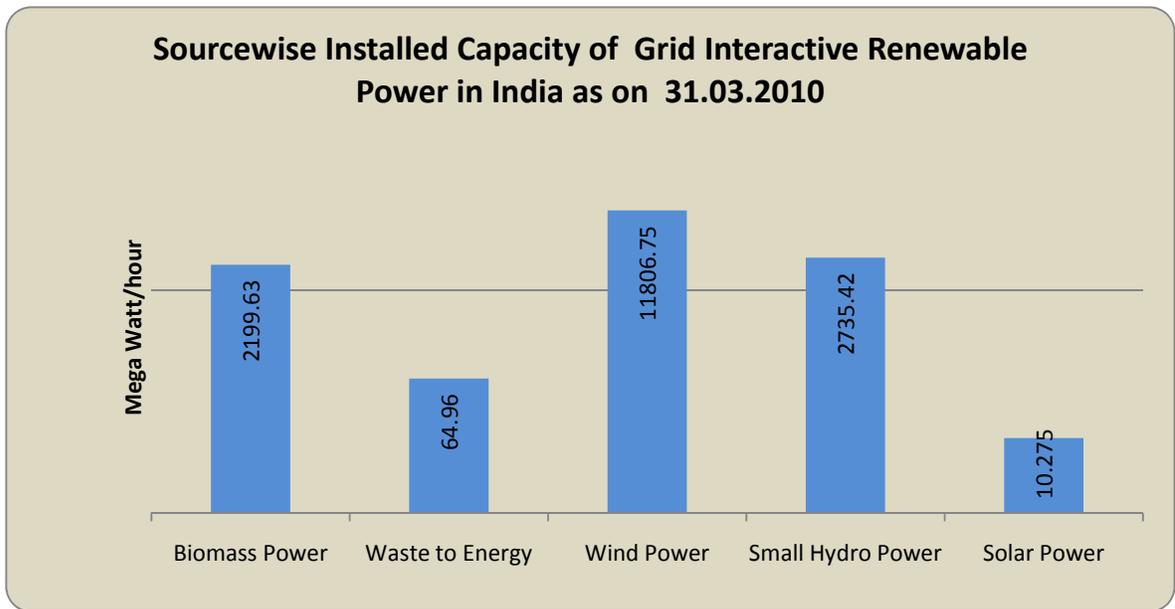


Figure 2.5(A)

Table 2.6 : Installation of Off-grid / Decentralised Renewable Energy Systems/ Devices during 2009-10

Sl. No.	State/UT	Biogas Plants (Nos.)	Water Pumping (Nos.)	SPV Pumps (Nos.)	Solar Photovoltaic			
					SLS	HLS	SL	PP
					(Nos.)	(Nos.)	(Nos.)	(KWP)
1	2	3	4	5	6	7	8	9
1	Andhra Pradesh	4,57,938	6	613	35,799	1,957	3,914	213.30
2	Arunachal Pradesh	2,957	-	15	13,937	7,120	1,071	17.10
3	Assam	81,592	3	45	1,211	5,870	98	7.50
4	Bihar	1,25,888	46	139	50,117	3,170	690	-
5	Chhattisgarh	32,050	1	166	3,192	7,211	1,889	100
6	Goa	3,893	-	15	1,027	362	463	1.72
7	Gujarat	4,11,950	879	85	31,603	9,231	2,004	100.50
8	Haryana	54,083	-	469	71,646	28,213	9,878	434.40
9	Himachal Pradesh	45,716	-	6	22,970	16,840	2,994	1.50
10	Jammu & Kashmir	2,489	-	39	28,672	23,083	5,596	175.60
11	Jharkhand	4,933	-	-	16,374	4,314	620	-
12	Karnataka	4,18,759	28	551	7,334	28,128	2,271	29.41
13	Kerala	1,26,463	79	810	41,181	32,326	1,090	44.70
14	Madhya Pradesh	2,95,580	-	87	9,444	2,651	6,054	22.40
15	Maharashtra	7,80,527	26	228	68,683	1,972	5,471	6.44
16	Manipur	2,128	-	12	3,883	2,850	370	28.00
17	Meghalaya	6,661	-	19	24,875	7,840	1,273	50.50
18	Mizoram	3,820	-	37	5,812	3,045	431	109.00
19	Nagaland	4,153	-	3	6,317	720	271	6.00
20	Orissa	2,39,818	-	56	9,882	5,156	5,819	74.52
21	Punjab	1,05,289	-	1,850	17,495	8,620	4,337	121.00
22	Rajasthan	67,348	222	283	4,716	67,305	6,632	25.80
23	Sikkim	7,333	-	-	2,470	3,890	212	14.70
24	Tamil Nadu	2,16,516	60	829	16,818	1,557	5,885	39.50
25	Tripura	2,793	-	25	42,360	26,066	773	24.57
26	Uttar Pradesh	4,22,269	-	751	51,683	92,124	4,117	129.20
27	Uttaranchal	10,508	-	26	64,023	91,307	7,673	80.03
28	West Bengal	3,18,510	-	48	3,662	1,11,090	27,512	675.00
29	Andaman & Nicobar	137	2	5	6,296	405	358	167.00
30	Chandigarh	97	-	12	1,675	275	-	-
31	Dadar & Nagar Haveli	169	-	-	-	-	-	-
32	Daman & Diu	-	-	-	-	-	-	-
33	Delhi	679	-	89	4,753	-	301	80.00
34	Lakshadweep	-	-	-	-	-	-	85.00
35	Pondicherry	578	-	21	1,637	25	417	-
36	Others*	-	-	-	1,25,797	8,584	9,150	58.00
Total		42,53,624	1,352	7,334	7,97,344	6,03,307	1,19,634	2,922

Source : Ministry of New and Renewable Energy

* Others includes installations through NGOs/IREDA in different states

SLS = Street Lighting System; HLS = Home Lighting System; SL = Solar Lantern; PP = Power Plants; SPV = Solar Photovoltaic; SHP = Small Hydro Power; MW = Mega Watt; KWP = Kilowatt peak; BOV = Battery Operated Vehicles

Table 2.6(contd..) : Installation of Off-grid / Decentralised Renewable Energy Systems/ Devices during 2009-10

Sl. No.	State/UT	Aerogen. Hybrid System	Solar Cooker	Biomass Gasifiers (Rural+ Industrial)	Waste to Energy	Remote Village Electrification Villages	
						Villages	Hamlets
		(KW)	(Nos.)	(Nos.)	(MW)	(Nos.)	(Nos.)
1	2	3	4	5	6	7	8
1	Andhra Pradesh	16.00	13395	16681	4.95	-	-
2	Arunachal Pradesh	7	530	1800	-	246	-
3	Assam	6.00	80	-	-	866	-
4	Bihar	-	475	5090	-	-	-
5	Chhattisgarh	-	37464	1710	-	399	-
6	Goa	164.00	1500	-	-	-	-
7	Gujarat	10.00	170675	20230	8.40	38	-
8	Haryana	10	27115	2263	-	-	286
9	Himachal Pradesh	-	28837	-	-	1	-
10	Jammu & Kashmir	-	868	-	-	167	-
11	Jharkhand	-	280	430	-	449	-
12	Karnataka	39.15	253	7454	3	16	14
13	Kerala	8.00	236	-	-	-	558
14	Madhya Pradesh	-	141618	7748	-	188	-
15	Maharashtra	607.70	58044	6,950	5	347	-
16	Manipur	70	365	-	-	191	-
17	Meghalaya	5	1165	250	-	97	-
18	Mizoram	-	110	200	-	20	-
19	Nagaland	-	-	1,480	-	3	-
20	Orissa	-	3437	270	-	223	-
21	Punjab	30	22050	-	2	-	-
22	Rajasthan	14.00	36682	2104	-	315	-
23	Sikkim	16.00	20	-	-	-	13
24	Tamil Nadu	25.00	1536	8766	4.73	-	101
25	Tripura	2	80	1000	-	60	400
26	Uttar Pradesh	-	50494	18810	17.31	79	-
27	Uttaranchal	-	10534	250	2	472	34
28	West Bengal	38.00	7959	17150	-	1,171	2
29	Andaman & Nicobar	-	60	-	-	-	-
30	Chandigarh	-	1529	-	-	-	-
31	Dadar & Nagar Haveli	-	80	-	-	-	-
32	Daman & Diu	-	-	-	-	-	-
33	Delhi	-	27990	-	-	-	-
34	Lakshadweep	-	-	-	-	-	-
35	Pondicherry	5.00	90	600	-	-	-
36	Others*	-	17950	-	-	-	-
	Total	1072.65	663501	121236	46.60	5348	1408

* Others includes installations through NGOs/IREDA in different states

SLS = Street Lighting System; HLS = Home Lighting System; SL = Solar Lantern; PP = Power Plants;

SPV = Solar Photovoltaic; MW = Mega Watt; KWP = Kilowatt peak; MWe=Mega Watt electric

Source : Ministry of New and Renewable Energy

HIGHLIGHTS

3. Production of Primary sources of Conventional Energy.

3.1 Production of Coal, lignite, crude petroleum, natural gas, & electricity

Coal production in the country during the year 2009-10 was 532 million tones(MTs) as compared to 493 MTs during 2008-09, registering a growth of 8%(Table 3.1). The Lignite production during the same period increased by 5%. Considering the trend of production from 1970-71 to 2009-10, it is observed that coal production in India was about 73 MTs during 1970-71, which increased to 532 MTs during 2009-10, with a CAGR of 5%. During the same period the CAGR of Lignite was about 6%, with production increasing from 3.39 MTs in 1970-71 to 34.07 MTs in 2009-10. Production of crude petroleum increased from 6.82 MTs during 1970-71 to 33.69 MTs during 2009-10, a CAGR of about 4%. The CAGRs for natural gas and electricity were 9.12% and 3.85%, respectively. Natural gas has experienced the highest CAGR among all the conventional sources of energy.

For more meaningful comparison in the trends and patterns of growth of different energy resources, it is desirable to convert all the resources to their energy equivalents by applying appropriate conversion factors and express them in energy units (Joules/peta Joules/ Terra joules). The production of energy in peta Joules by primary sources (Table 3.2) shows that Coal and Lignite were the major sources of energy, accounting for about 62% of the total production during 2009-10. Electricity was second (27%), while Natural Gas (11%) was third. The total production of energy from conventional sources increased from 16,046 peta joules during 2008-09 to 16,640 peta joules during 2009-10, showing an increase of 3.7%.

3.2 Production of petroleum products

In the year 2009-10, the production of Petroleum Products in the country was 149.65 MTs as against 150.52 MTs during 2008-09, a decline of about 0.6% (Table 3.5). Out of the total domestic production of 149.65 MTs of all types of petroleum products, high speed diesel oil accounted for the maximum share (41%), followed by Fuel Oil (12%), Motor Gasoline (11%), Naphtha (10%). Kerosene (6%) and Aviation Turbine Fuel (5%).

Production of Natural Gas increased from 31.75 billion cubic meters (BCM) in 2008-09 to 46.49 BCM in 2009-10 registering a growth of 46.4% and a CAGR of 11.3% from 1970-71 to 2009-10 (Table 3.6).

3.3 Generation of electricity

The all India gross electricity generation from utilities, excluding that from the captive generating plants, was 55,828 Giga Watt-Hours (GWh) during 1970-71 (Table 3.7). It rose to 1,10,844 GWh during 1980-81, to 2,64,329 GWh during 1990-91 and to 7,96,281 during 2009-10. The CAGR during the period from 1970-71 to 2009-10, has been an impressive 6.9%. The production of electricity from utilities has increased from 7,45,626 MWh during 2008-09 to 7,96,281 MWh during 2009-10, registering an annual growth rate of about 6.8%.

Total Electricity generation in the country, from utilities and non-utilities, during 2009-10 was 9,05,974 GWh. Out of this 6,70,965 GWh was generated from thermal and 1,06,680 GWh was from hydro and 18,636 GWh was generated from nuclear sources. Total output from non-utilities was 1,09,693 GWh.

**Table 3.1 : Trends in Production of Primary Sources of
Conventional Energy in India**

Year	Coal (million tonnes)	Lignite (million tonnes)	Crude Petroleum (million tonnes)	Natural Gas (Billion Cubic Metres)	Electricity* Hydro & Nuclear (GWh)
1	2		3	4	5
1970-71	72.95	3.39	6.82	1.45	27,666
1975-76	99.63	3.03	8.45	2.37	35,928
1980-81	113.91	5.11	10.51	2.36	49,543
1985-86	154.30	8.04	30.17	8.13	56,003
1990-91	214.06	14.07	33.02	18.00	77,782
1995-96	273.42	22.15	35.17	22.64	80,561
2000-01	313.70	24.25	32.43	29.48	91,264
2005-06	407.01	30.23	32.19	32.20	1,18,818
2006-07	430.83	31.29	33.99	31.75	1,32,304
2007-08	457.08	33.98	34.12	32.40	1,37,344
2008-09	492.76	32.42	33.51	32.85	1,42,576
2009-10(p)	532.06	34.07	33.69	47.51	1,25,316
Growth rate of 2009-10 over 2008-09(%)	7.98	5.09	0.55	44.63	-12.11
CAGR 1970-71 to 2009-10(%)	5.09	5.94	4.07	9.12	3.85

GWh = Giga Watt hour = 10^9 x Kilo Watt hour

* Thermal electricity is not a primary source of energy

Sources: 1. Ministry of Coal
2. Ministry of Petroleum & Natural Gas.
3. Central Electricity Authority.

Table 3.2 : Trends in Production of Energy in India by Primary Sources

(in Peta Joules) @

Year	Coal & Lignite	Crude Petroleum	Natural Gas	Electricity (Hydro & Nuclear) *	Total
1	2	3	4	5	6= 2 to 5
1970-71	1,598	286	56	996	2,936
1975-76	2,150	354	91	1,293	3,888
1980-81	2,493	440	91	1,784	4,808
1985-86	3,185	1,263	313	2,016	6,777
1990-91	4,063	1,383	693	2,800	8,939
1995-96	5,264	1,472	872	2,900	10,508
2000-01	5,727	1,358	1,135	3,286	11,506
2005-06	7,009	1,348	1,240	4,277	13,874
2006-07	7,459	1,423	1,223	4,763	14,868
2007-08	7,813	1,429	1,248	4,944	15,434
2008-09	8,245	1,403	1,265	5,133	16,046
2009-10(p)	8,888	1,411	1,830	4,511	16,640
Growth rate of 2009-10 over 2008-09(%)	7.80	0.55	44.63	-12.11	3.70
CAGR 1970-71 to 2009-10(%)	4.38	4.07	9.11	3.85	4.43

* Thermal electricity is not a primary source of energy

@ Conversion factors have been applied to convert production of primary

Sources: 1. Office of Coal Controller, Ministry of Coal

2. Ministry of Petroleum & Natural Gas.

3. Central Electricity Authority.

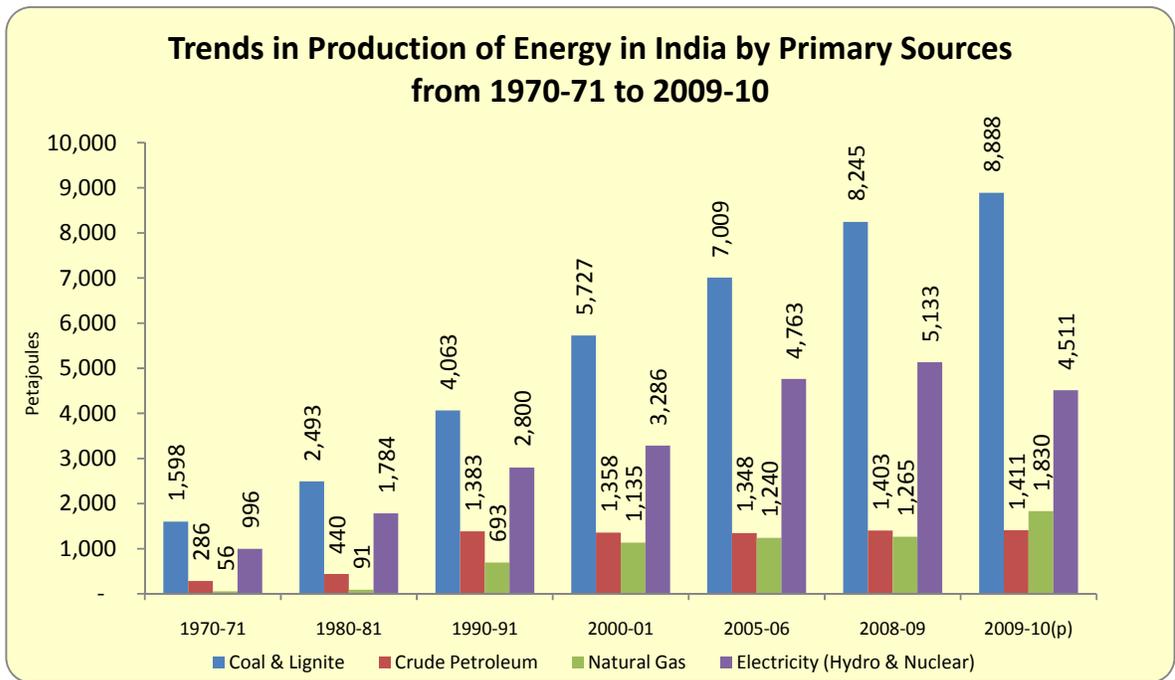


Figure 3.2

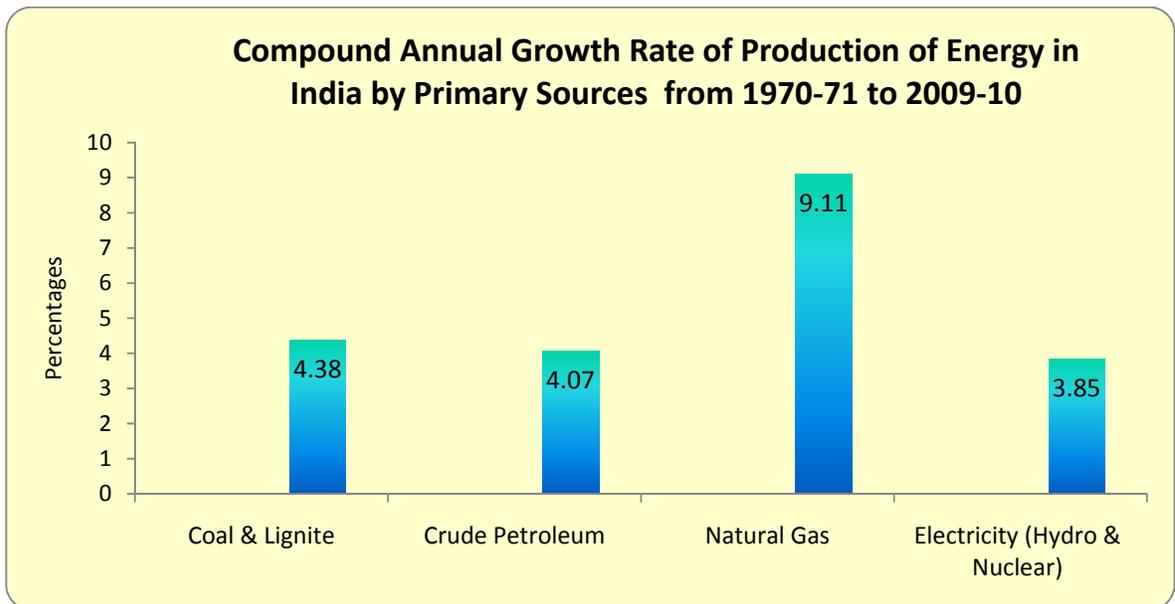


Figure 3.2(A)

Table 3.3 : Trends in Production of Coal and Lignite in India.

(million tonnes)

Year	Coal			Lignite	Grand Total
	Coking	Non-coking	Total		
1	2	3	4=(2)+(3)	5	6=(4)+(5)
1970-71	17.82	55.13	72.95	3.39	76.34
1975-76	30.12	69.51	99.63	3.03	102.66
1980-81	32.62	81.29	113.91	5.11	119.02
1985-86	35.16	119.14	154.30	8.04	162.34
1990-91	44.77	169.29	214.06	14.07	228.13
1995-96	39.91	233.50	273.42	22.15	295.56
2000-01	30.90	282.80	313.70	22.95	336.64
2005-06	31.51	375.50	407.01	30.07	437.08
2006-07	32.10	398.74	430.83	31.29	462.12
2007-08	34.46	422.63	457.08	33.98	491.06
2008-09	34.81	457.95	492.76	32.42	525.18
2009-10(p)	44.26	487.81	532.06	34.07	566.13
Growth rate of 2009-10 over 2008-09(%)	27.14	6.52	7.98	5.09	7.80
CAGR 1970-71 to 2009-10(%)	2.30	5.60	5.09	5.94	5.14

Source : Ministry of Coal.Office of Coal Controller

Table 3.4 : Trends in Production of Coal Derivatives and Coal by-products in India.

(million tonnes)

Year	Soft Coke	Hard Coke			Washed Coke	Grand Total
		Beehive	By-products	Total		
1	2	3	4	5	6	7=(2)+(3)+(4)+(5)+(6)
1970-71	2.71	0.93	9.15	10.07	7.64	20.43
1975-76	2.74	0.93	10.07	11.00	11.38	25.13
1980-81	2.26	0.60	10.67	11.26	11.57	25.10
1985-86	1.71	0.33	10.53	10.86	11.86	24.43
1990-91	0.91	0.15	11.48	11.63	11.42	23.96
1995-96	0.17	0.06	12.80	12.86	11.92	24.94
2000-01	-	-	11.70	11.70	8.64	20.34
2005-06	-	-	13.38	13.38	8.38	21.75
2006-07	-	-	12.57	12.57	7.03	19.59
2007-08	-	-	12.54	12.54	7.17	19.71
2008-09	-	-	13.68	13.68	7.18	19.15
2009-10(p)	-	-	12.56	12.56	-	12.56
Growth rate of 2009-10 over 2008-09(%)	*	*	-8.17	-8.17	*	-34.42
CAGR 1970-71 to 2009-10(%)	*	*	0.80	0.55	*	-1.21

* No Production after 1999-2000

Source : Office of the Coal Controller, Ministry of Coal

Table 3.5 : Trends in Domestic Production of Petroleum Products In India

(million tonnes)

Year	Light distillates			Middle distillates			
	Liquified Petroleum Gas @	Motor Gasoline	Naphtha\$	Kerosene	Aviation Turbine Fuel	High Speed Diesel Oil	Light Diesel Oil
1	2	3	4	5	6	7	8
1970-71	0.17	1.53	1.21	2.90	0.71	3.84	0.99
1975-76	0.33	1.28	1.91	2.44	0.93	6.29	0.95
1980-81	0.37	1.52	2.12	2.40	1.00	7.37	1.11
1985-86	0.87	2.31	4.96	4.03	1.52	14.62	1.18
1990-91	1.22	3.55	4.86	5.47	1.80	17.19	1.51
1995-96	1.54	4.46	5.98	5.27	2.13	20.66	1.35
2000-01	4.09	8.07	9.91	8.71	2.51	39.05	1.48
2005-06	5.53	10.50	14.51	9.08	6.20	47.57	0.92
2006-07	6.32	12.54	16.66	8.49	7.81	53.47	0.80
2007-08	6.73	14.17	16.44	7.79	9.11	58.36	0.67
2008-09	7.00	16.02	14.83	8.22	8.07	62.89	0.61
2009-10(p)	6.52	15.97	14.81	8.55	8.08	61.17	0.47
Growth rate of 2009-10 over 2008-09(%)	-6.88	-0.32	-0.09	3.92	0.05	-2.73	-23.10
CAGR 1970-71 to 2009-10(%)	9.56	6.05	6.47	2.74	6.27	7.17	-1.86

(p) : Provisional

\$: includes other Light distillates from 2005-06

@: Excludes LPG production from natural gas.

*: Estimated from calendar year figures.

Source : Ministry of Petroleum & Natural Gas.

Table 3.5 (Contd.): Trends in Domestic Production of Petroleum Products in India

Year	Heavy ends				Others*	Total
	Fuel oil	Lubricants	Petroleum Coke	Bitumen		
1	9	10	11	12	13	14= 2 to 13
1970-71	4.09	0.23	0.15	0.81	0.50	17.11
1975-76	5.08	0.34	0.16	0.70	0.44	20.83
1980-81	6.12	0.43	0.09	1.08	0.53	24.12
1985-86	7.96	0.50	0.19	1.11	0.65	39.88
1990-91	9.43	0.56	0.23	1.60	1.14	48.56
1995-96	9.58	0.63	0.26	2.03	1.20	55.08
2000-01	11.39	0.68	2.47	2.72	4.52	95.61
2005-06	14.31	0.68	3.18	3.58	3.71	119.75
2006-07	15.70	0.83	3.78	3.89	4.99	135.26
2007-08	15.81	0.88	4.13	4.51	6.34	144.93
2008-09	17.68	0.87	4.24	4.71	5.37	150.52
2009-10(p)	17.54	0.95	3.71	4.89	7.02	149.65
Growth rate of 2009-10 over 2008-09(%)	-0.84	8.70	-12.54	3.73	30.63	-0.57
CAGR 1970-71 to 2009-10(%)	3.71	3.60	8.33	4.61	6.82	5.57

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

Source : Ministry of Petroleum & Natural Gas.

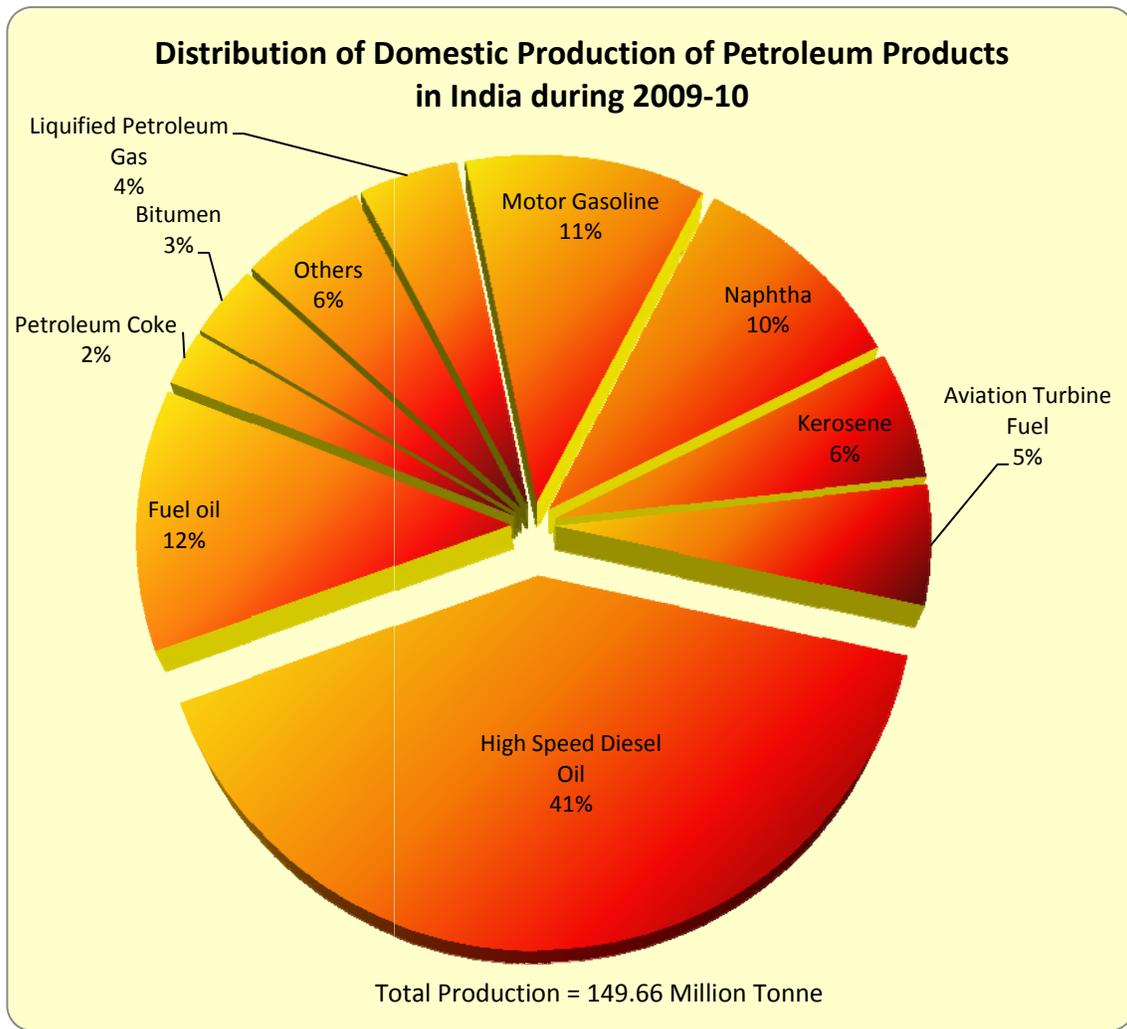


Figure 3.5

Table 3.6 : Trends in Gross and Net Production of Natural Gas in India

(Billion Cubic Metres)

Year	Gross Production	Reinjected	Flared	Net Production
1	2	3	4	5=2-3-4
1970-71	1.45	0.04	0.76	0.65
1975-76	2.37	0.16	1.08	1.12
1980-81	2.36	0.07	0.77	1.52
1985-86	8.13	0.07	3.12	4.95
1990-91	18.00	0.10	5.13	12.77
1995-96	22.64	0.00	1.71	20.93
2000-01	29.48	0.00	1.62	27.86
2005-06	32.20	0.00	0.88	31.33
2006-07	31.75	0.00	0.96	30.79
2007-08	32.42	0.00	0.94	31.48
2008-09	32.85	0.00	1.10	31.75
2009-10(p)	47.51	0.00	0.99	46.49
Growth rate of 2009-10 over 2008-09(%)	44.65	-	-9.65	46.43
CAGR 1970-71 to 2009-10(%)	9.12	-	0.66	11.28

(P) : Provisional

Source : Ministry of Petroleum & Natural Gas.

**Table 3.7 : Trends in Gross Generation of Electricity in Utilities
and Non-utilities in India**

(Giga Watt hour) = (10⁶ x Kilo Watt hour)

Year	Utilities				Non-utilities			Grand
	Thermal *	Hydro	Nuclear	Total	Railways	Others	Total	Total
1	2	3	4	5 = 2 to 4	6	7	8=6+7	9=5+8
1970-71	28,162	25,248	2,418	55,828	37	5,347	5,384	61,212
1975-76	43,303	33,302	2,626	79,231	38	6,657	6,695	85,926
1980-81	61,301	46,542	3,001	1,10,844	42	8,374	8,416	1,19,260
1985-86	1,14,347	51,021	4,982	1,70,350	43	12,997	13,040	1,83,390
1990-91	1,86,547	71,641	6,141	2,64,329	29	25,082	25,111	2,89,440
1995-96	2,99,316	72,579	7,982	3,79,877	24	38,142	38,166	4,18,043
2000-01	4,09,940	74,362	16,902	5,01,204	-	59,638	59,638	5,60,842
2005-06	5,05,001	1,01,494	17,324	6,23,819	-	73,640	73,640	6,97,459
2006-07	5,38,350	1,13,502	18,802	6,70,654	-	81,800	81,800	7,52,454
2007-08	5,85,282	1,20,387	16,957	7,22,626	-	90,477	90,477	8,13,102
2008-09	6,17,832	1,13,081	14,713	7,45,626	-	95,905	95,905	8,42,531
2009-10(p)	6,70,965	1,06,680	18,636	7,96,281	-	1,09,693	1,09,693	9,05,974
Growth rate of 2009-10 over 2008-09(%)	8.60	-5.66	26.67	6.79	-	14.38	14.38	7.53
CAGR 1970-71 to 2008-09(%)	8.24	3.92	4.74	6.87	-	7.68	7.66	6.95

* From 1995-96 onwards, Thermal includes Renewable Energy Sources also.

Source : Central Electricity Authority.

HIGHLIGHTS

4. Foreign Trade in Conventional sources of Energy

4.1 Import and export of coal

Coal is the most abundant conventional source of energy in the country. However, the average quality of the Indian coal is not very high compared to those available in Australia or Canada. Further, the coal washing capacity in the country has not increased sufficiently, due to various reasons, to generate the required quantity of washed coal for consumption, particularly in steel plants. This necessitates the import of high quality coal to meet the requirements of steel plants. There has been an increasing trend in the import of coal. This is evident from the fact that the gross import of coal has steadily increased from 20.93 MTs during 2000-01 to 73.26 MTs during 2009-10 (Table 4.1). The quantum of coal exported, which was 1.29 MTs during 2000-01, increased to 2.45 MTs during 2009-10. However, the net import of coal during the same period has continuously increased from 19.64 MTs to 70.81 MTs. Therefore, increase in gross import, export and net imports of coal in 2009-10 over the previous year was 25%, 13% and 25% respectively.

4.2 Crude oil and petroleum products

India is highly dependent on import for crude oil. Oil import has been steadily rising over the years. There is hardly any export of crude oil from India. Therefore, both gross and net import of crude oil have increased from 11.68 MTs during 1970-71 to 159.26 MTs during 2009-10. There has been an annual increase of 19.9% during 2009-10 over 2008-09, as the net import increased from 132.78 MTs to 159.26 MTs (Table 4.1).

Although more than 70% of its crude oil requirements and part of the petroleum products is met from imports, India has developed sufficient processing capacity over the years to produce different petroleum products so as to become a net exporter of petroleum products. The export of petroleum product has increased from a mere 0.33 MT during 1970-71, to 8.37MTs during 2000-01 and to 40.78 MTs during 2007-08. However, during 2009-10, exports stood at 50.97 MTs, recording an increase of 32% from previous year (Table 4.1). The import of petroleum products witnessed a decline of 27.8 % during 2009-10 over 2008-09 to 14.66 MTs, after continually increasing from 13.44 MTs during 2005-06 to 22.46 MTs during 2007-08.

Table 4.1: Trends of Foreign Trade in Coal, Crude Oil and Petroleum Products in India

(Million Tonnes)

Year	Coal			Crude Oil			Petroleum Products		
	Gross Imports	Exports	Net Imports	Gross Imports	Exports	Net Imports	Gross Imports	Exports	Net Imports
1	2	3	4=(2)-(3)	5	6	7=(5)-(6)	8	9	10=(8)-(9)
1970-71	0.00	0.47	-0.47	11.68	0.00	11.68	1.08	0.33	0.75
1975-76	0.00	0.44	-0.44	13.62	0.00	13.62	2.22	0.17	2.05
1980-81	0.55	0.11	0.44	16.25	0.00	16.25	7.29	0.04	7.25
1985-86	2.03	0.21	1.82	15.14	0.53	14.62	3.87	1.96	1.90
1990-91	4.90	0.10	4.80	20.70	0.00	20.70	8.66	2.65	6.01
1995-96	8.87	0.09	8.78	27.34	0.00	27.34	20.34	3.44	16.90
2000-01	20.93	1.29	19.64	74.10	0.00	74.10	9.27	8.37	0.90
2005-06	38.59	1.99	36.60	99.41	0.00	99.41	13.44	23.46	-10.02
2006-07	43.08	1.55	41.53	111.50	0.00	111.50	17.76	33.62	-15.86
2007-08	49.79	1.63	48.17	121.67	0.00	121.67	22.46	40.78	-18.32
2008-09(p)	59.00	2.17	56.83	132.78	0.00	132.78	20.33	38.57	-18.25
2009-10(p)	73.26	2.45	70.81	159.26	0.00	159.26	14.66	50.97	-36.31
Growth rate of 2009-10 over 2008-09(%)	24.16	12.90	24.60	19.95	*	19.95	-27.87	32.15	99.02

(p): Provisional.

Note: Figures in brackets are in negative.

Sources: 1. Office of Coal Controller, Ministry of Coal
2. Ministry of Petroleum & Natural Gas.

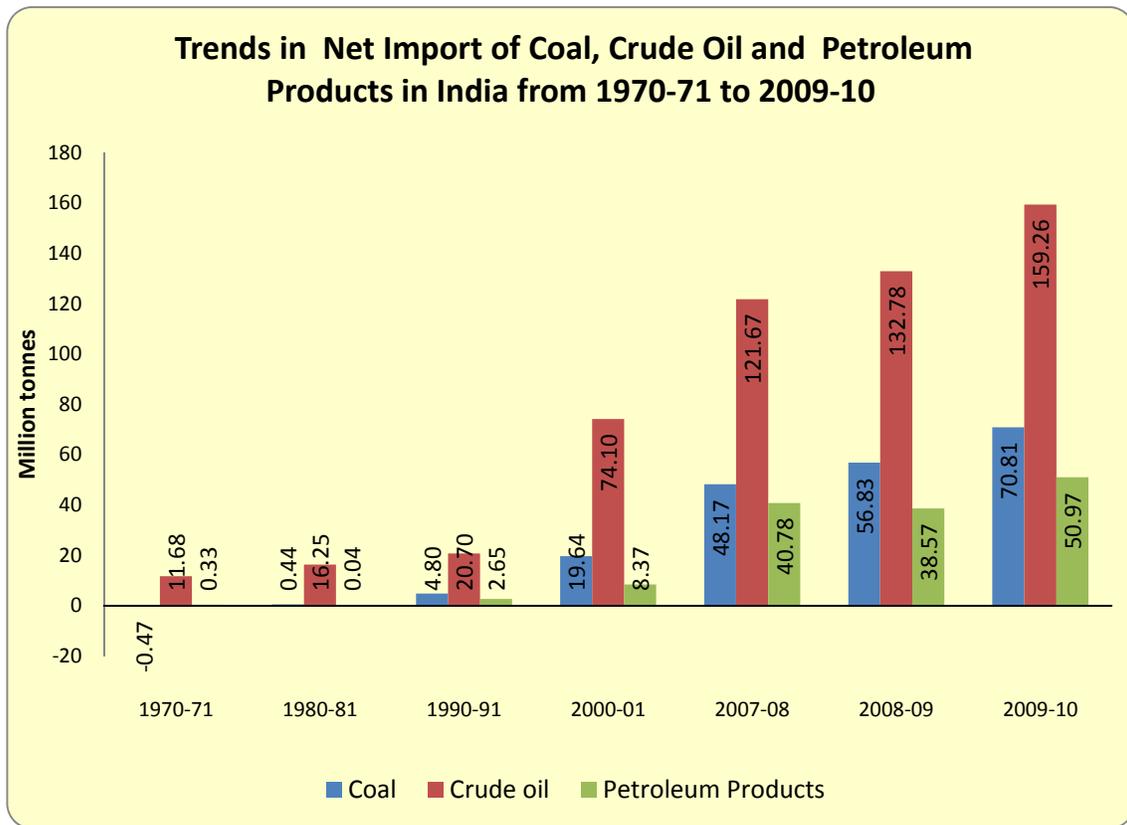


Figure 4.1

HIGHLIGHTS

5. Availability

5.1 Availability of coal and lignite

The total availability of raw coal in India during 2009-10 stood at 586.07 MTs and that of lignite at 33.96 MTs (Table 5.1). The availability of coal in the year 2009-10 increased by 6.6% compared to 2008-09, the availability of lignite also increased by 6.6% during the same period. The availability of coal has increased at a CAGR of about 5.4% during the period from 1970-71 to 2009-10. This increased availability might be attributed to the secular increase in the coal production (72.95MTs during 1970-71 to 532.06 MTs during 2009-10) supplemented by imports.(Table 5.2).

The availability of lignite during 2009-10 increased by 6.6% compared to 2008-09(Table 5.3). The availability of lignite has increased at a CAGR of about 3.17% during the period from 1998-99 to 2009-10.

5.2 Availability of Natural Gas

The availability of natural gas has steadily increased from a mere 0.65 BCMs during 1970-71 to 46.49 BCMs during 2009-10, registering a CAGR of 11.3%. Most of this increase in the indigenous production is due to discovery of new reserves. (Table 5.1)

5.3 Availability of Electricity

Since thermal electricity is not a primary source of energy, being produced either from coal or natural gas in India, electricity availability is considered only for that electricity which is generated from Hydro and Nuclear sources. Without taking into account the transmission and distribution losses, the total availability is equal to the total generation, and this figure increased from 27,666 GWh during 1970-71 to 1,42,576 GWh during 2008-09 and then decreased to 1,25,316 GWh during 2009-10, registering a CAGR of 3.9% over the period (Table 5.1).

5.4 Availability of Crude Oil and Petroleum Products

The availability crude oil in the country increased from 18.51MTs during 1970-71 to 106.52 MTs during 2000-01 and then to 192.95 MTs during 2009-10(Table 5.4). During this period crude oil production increased from 6.82MTs to 33.69 MTs and the net import increased from 11.68 MTs to 159.26 MTs. There was 16% increase in availability of crude oil during 2009-10 over 2008-09

Table 5.1 : Trends in Availability of Primary Sources of Conventional Energy in India

Year	Coal	Lignite	Crude Petroleum	Natural Gas	Electricity
	(Million Tonnes)	(Million Tonnes)	(Million Tonnes)	(Billion Cubic Metres)	Hydro & Nuclear (GWh)*
1	2		3	4	5
1970-71	71.24	-	18.51	0.65	27,666
1975-76	92.17	-	22.07	1.12	35,928
1980-81	109.32	-	26.76	1.52	49,543
1985-86	155.54	-	44.78	4.95	56,003
1990-91	214.99	-	53.72	12.77	77,782
1995-96	284.04	-	62.51	20.93	80,561
2000-01	325.45	24.59	106.52	27.86	91,264
2005-06	432.27	30.24	131.60	31.33	1,18,818
2006-07	462.35	30.81	145.49	30.79	1,32,304
2007-08	502.82	34.65	155.79	31.48	1,37,344
2008-09	549.57	31.85	166.28	31.77	1,42,576
2009-10(p)	586.07	33.96	192.95	46.49	1,25,316
Growth rate of 2009-10 over 2008-09(%)	6.64	6.64	16.04	46.32	-12.11
CAGR 1970-71 to 2009-10(%)	5.41	-	6.04	11.28	3.85

(p) - Provisional

GWh = Giga Watt hour = 10^6 x Kilo Watt hour

* Thermal electricity is not a primary source of energy

- Sources:
1. Office of Coal Controller, Ministry of Coal
 2. Ministry of Petroleum & Natural Gas.
 3. Central Electricity Authority.

Table 5.2 : Trends in Availability of Raw Coal for Consumption in India

(Million tonnes)

Year	Production (Coking + Non-coking)	Changes in Stock at Pit-heads (Closing - Opening)	Change in Industrial Stock	Imports	Exports	Availability for Consumption
1	2	3	4	5	6	7=2-3+4+5-6
1970-71	72.95	2.48	1.24	0.00	0.47	71.24
1975-76	99.63	4.28	-2.74	0.00	0.44	92.17
1980-81	113.91	4.25	-0.78	0.55	0.11	109.32
1985-86	154.30	-1.25	-1.83	2.03	0.21	155.54
1990-91	214.06	4.83	0.96	4.90	0.10	214.99
1995-96	273.42	-1.85	-	8.87	0.09	284.04
2000-01	313.70	7.89	-	20.93	1.29	325.45
2005-06	407.01	10.28	-	36.87	1.33	432.27
2006-07	430.83	10.01	-	43.08	1.55	462.35
2007-08	457.08	34.65	-	49.79	1.63	502.82
2008-09	492.76	0.54	-	59.00	1.66	549.57
2009-10(p)	532.06	16.80	-	73.26	2.45	586.07
Growth rate of 2009-10 over 2008-09(%)	7.98	3023.42	-	24.16	48.04	6.64

Note: Figures in brackets are in negative.

Source : Office of the Coal Controller, Ministry of Coal

Table 5.3 : Trends in Availability of Lignite for Consumption in India

(Million tonnes)						
Year	Production	Changes in Stock at Pit-heads (Closing - Opening)	Change in Industrial Stock	Imports	Exports	Availability for Consumption
1	2	3	4	5	6	7=2-3+4+5-6
1998-99	23.42	0.14	-	-	-	23.28
1999-00	22.48	0.44	-	-	-	22.03
2000-01	24.25	-0.34	-	-	-	24.59
2001-02	24.81	0.00	-	-	-	24.81
2002-03	26.02	-0.01	-	-	-	26.03
2003-04	27.96	-0.52	-	-	-	28.48
2004-05	30.41	0.32	-	-	-	30.09
2005-06	30.23	-0.01	-	-	-	30.24
2006-07	31.29	0.48	-	-	-	30.81
2007-08	33.98	-0.67	-	-	-	34.65
2008-09	32.42	0.57	-	-	-	31.85
2009-10(p)	34.07	0.11	-	-	-	33.96
Growth rate of 2009-10 over 2008-09(%)	5.09	-80.70	-	-	-	6.64
CAGR 1998-99 to 2009-10(%)	3.17	-2.22	-	-	-	3.20

Source : Office of the Coal Controller, Ministry of Coal

Table 5.4 : Trends in Availability of Crude Oil and Petroleum Products in India

(Million tonnes)

Year	Crude Oil			Petroleum Products		
	Production	Net Imports	Gross Availability	Production @	Net Imports	Gross Availability
1	2	3	4=2+3	5	6	7=5+6
1970-71	6.82	11.68	18.51	17.11	0.75	17.86
1975-76	8.45	13.62	22.07	20.83	2.05	22.88
1980-81	10.51	16.25	26.76	24.12	7.25	31.38
1985-86	30.17	14.62	44.78	39.88	1.90	41.78
1990-91	33.02	20.70	53.72	48.56	6.01	54.57
1995-96	35.17	27.34	62.51	55.08	16.90	71.98
2000-01	32.43	74.10	106.52	95.61	0.90	96.52
2005-06	32.19	99.41	131.60	119.75	-10.02	109.73
2006-07	33.99	111.50	145.49	135.26	-15.96	119.30
2007-08	34.12	121.67	155.79	144.93	-18.32	126.61
2008-09	33.51	132.78	166.28	150.52	-18.25	132.27
2009-10(p)	33.69	159.26	192.95	149.65	-36.31	113.34
Growth rate of 2009-10 over 2008-09(%)	0.55	19.95	16.04	-0.57	-99.02	-14.31

.@ Excludes LPG Production from Natural Gas

Source : Ministry of Petroleum & Natural Gas.

HIGHLIGHTS

6. Consumption of Energy Resources

6.1 Consumption of coal and lignite

The estimated total consumption of raw coal by industry has increased from 71.2 MTs during 1970-71 to 586.07 MTs during 2009-10, with a CAGR of 5.4% (Table 6.1). The annual growth rate from 2008-09 to 2009-10 was 6.6%. Consumption of Lignite increased from 3.39 MTs in 1970-71 to 34.42 MTs in 2009-10 registering a compound growth of 5.9%. Consumption of Lignite is highest in Electricity Generation sector, accounting for about 80% of the total lignite consumption.

Industry-wise estimates of consumption of coal (Table 6.4) shows that during 1970-71 railways were the major consumer of coal (15.58 MTs), followed by steel and washery industries (13.53 MTs), electricity generation(13.21 MT) and cement (3.52 MTs). Gradually railways upgraded their technology and reduced the direct consumption of coal, which declined to an estimated 0.27 MT in 1995-96 and to zero afterwards. From the year 1975-76 electricity generation is the biggest consumer of coal, followed by steel industries. Estimated coal consumption for electricity generation increased from 23 MTs during 1975-76 to 411 MTs during 2009-10. Similarly, the estimated consumption of coal by steel & washery increased from 19 MTs to 41 MTs, a two times increase, during the same period.

6.2 Consumption of Crude Oil and Natural Gas

The estimated consumption of crude oil has a secular increase, from 18.38 MTs during 1970-71 to 160 MTs during 2009-10 with CAGR of 5.6%. It decreased from 160.8 MTs in 2008-09 to 160 MTs in 2009-10 (Table 6.1).

The estimated consumption of natural gas has shown a remarkable increase, from 0.7 BCM in 1970-71 to 47.2 BCM in 2009-10, with CAGR of 11.32% over the period(Table 6.1). Industry wise off-take of natural gas shows that natural gas has been used both for Energy (68 %) and Non-energy (32%) purposes(Table 6.8) and the maximum use of Natural Gas is in power generation (45.2%) followed by fertilizers industry (27.9%) and 11.5% natural gas was used for captive use/LPG shrinkage.

6.3 Consumption of Petroleum Products

High speed diesel oil accounted for 37.6% of total consumption of all types of petroleum products in 2009-10. This was followed by LPG (8.8%), Petro (8.6%), Fuel

Oil (8.5%) and refinery fuel (7.8%). Consumption of Light Diesel oil continually decreased from 1970-71 (1.1 MTS) to 2008-09 (0.5MTS) (Tables 6.6 & 6.7).

Sector-wise consumption of different petroleum products reveals that transport sector accounts for the lion's share (59%) of the total consumption of high speed diesel oil. Highest consumption of furnace oil (34.6%) is by industrial sector, whereas 'Low Sulphur oil' consumption was also highest (49%) in industrial sector, (Tables 6.6 & 6.7).

6.4 Consumption of Electricity

The estimated electricity consumption increased from 43,724 GWh during 1970-71 to 6,12,645 GWh during 2009-10, showing a CAGR of 6.8%(Table 6.9). The increase in electricity consumption was 10.59% from 2008-09 (5,53,995 GWh) to 2009-10 (6,12,645 GWh). Of the total electricity sales in 2009-10, industry sector accounted for the largest share (39%), followed by domestic (24%), agriculture (20%) and commercial sector (10%). However, it is seen that electricity consumption in domestic sector and agriculture sector has increased at a much faster pace compared to other sectors during 1970-71 to 2009-10, with CAGRs of 9.5% and 8.6% respectively.

Loss of electricity due to transmission has increased from 17.55% during 1970-71 to 32.86% during 2000-01 and declined to 28.86% during 2009-10 (Table 6.10).

6.5 Per- Capita Energy Consumption & Energy Intensity

Per-capita Energy Consumption (PEC) during a year is computed as the ratio of the estimate of total energy consumption during the year to the estimated mid-year population of that year. Energy Intensity is defined as the amount of energy consumed for generating one unit of Gross Domestic Product (At constant prices). PEC and Energy intensity are the most used policy indicators, both at national and international levels. In the absence of data on consumption of non-conventional energy from various sources, particularly in rural areas in the developing countries, including India, these two indicators are generally computed on the basis of consumption of conventional energy.

The estimated PEC has increased from 1204 KWh in 1970-71 to 4646 KWh in 2009-10, a CAGR of 3%(Table 6.2). The annual increase in PEC from 2008-09 to 2009-10 was 11%. The Energy Intensity (at 1999-2000 prices) increased from 0.128 KWh in 1970-71 to 0.165 KWh in 1985-86, but it has again come down to 0.122 KWh(at 2004-05 prices) in 2009-10.

Like in production of energy, for more meaningful comparison in the trends and patterns of growth of consumption of different energy resources, it is desirable to convert all the resources to their energy equivalents by applying appropriate conversion factors and express them in energy units (Joules/peta Joules/ Terra joules). The consumption of energy in peta Joules by primary sources is given in Table 6.3. It is seen that the major source of energy consumed was Electricity accounting for about 53% of the total consumption during 2009-10. Coal and Lignite were second (25%), while Crude Petroleum (17%) was third. The total consumption of energy from conventional sources increased from 36,233 peta joules during 2008-09 to 38823 peta joules during 2009-10, showing an increase of 7.15%.

Table 6.1: Trends in Consumption of Conventional Sources of Energy in India

Year	Coal #	Lignite	Crude Oil**	Natural Gas (Billion Cubic Metres)	Electricity* (GWh)
	(Million Tonnes)				
1	2	3	4	5	6
1970-71	71.23	3.39	18.38	0.65	43,724
1975-76	92.16	3.03	22.28	1.13	60,246
1980-81	109.31	5.10	25.84	1.52	82,367
1985-86	155.53	7.68	42.91	4.95	1,23,099
1990-91	213.36	14.20	51.77	12.77	1,90,357
1995-96	284.04	22.30	58.74	18.09	2,77,029
2000-01	339.31	24.82	103.44	27.86	3,16,600
2005-06	433.26	30.34	130.11	31.03	4,11,887
2006-07	462.32	30.80	146.55	31.37	4,55,748
2007-08	502.83	34.65	156.10	30.87	5,00,774
2008-09	549.57	31.75	160.77	32.73	5,27,564
2009-10(p)	586.07	34.42	160.03	47.25	5,68,000
Growth rate of 2009-10 over 2008-09(%)	6.64	8.42	-0.46	44.34	7.66
CAGR 1970-71 to 2009-10(%)	5.41	5.97	5.56	11.32	6.62

(p): Provisional

GWh = Giga Watt hour = 10^6 x Kilo Watt hour

* Includes thermal, hydro & nuclear electricity from utilities.

** Crude oil in terms of refinery crude throughput.

Does not include Lignite.

Sources: 1. Office of Coal Controller, Ministry of Coal
2. Ministry of Petroleum & Natural Gas.
3. Central Electricity Authority.

Table 6.2 : Trends in Per-Capita Energy Consumption (PEC) and Energy intensity in India

Year	Energy Consumption in billion KWH	Mid year population in '000 numbers	GDP (Rs. crore) (1999-2000 prices)	Per Capita Energy Consumption (KWH)	Energy Intensity (KWH)* per rupee
1970-71	663.99	551311	517148	1204.39	0.1284
1975-76	840.53	617248	596428	1361.74	0.1409
1980-81	1012.58	688320	695361	1471.09	0.1456
1985-86	1477.50	766135	894041	1928.51	0.1653
1990-91	1902.75	852297	1193650	2232.50	0.1594
1995-96	2436.77	939540	1529453	2593.58	0.1593
2000-01	3154.28	1034931	2030710	3047.81	0.1553
2005-06	3909.37	1117734	2844942	3497.59	0.1374
2006-07	4226.78	1134023	3120029	3727.24	0.1355
2007-08	4508.26	1147677	3402716	3928.16	0.1325
2008-09**	4845.25	1161495	4154973	4171.56	0.1166
2009-10(p)	5462.31	1175480	4464081	4646.87	0.1224
Growth rate of 2009-10 over 2008-09(%)	12.74	1.20	7.44	11.39	4.93
CAGR 1970-71 to 2009-10(%)	5.09	1.88	5.35	3.15	-0.24

* Estimated value based on sourcewise availability of Coal, Crude Petroleum, Natural Gas and Electricity(Hydro & Nuclear) as given in table 5.1 and by applying fuel specific conversion factors as given in annex II

Energy Intensity=Amount of energy consumed for producing one unit of Gross Domestic Product.

** from 2008-09 GDP estimates are with 2004-05 base year

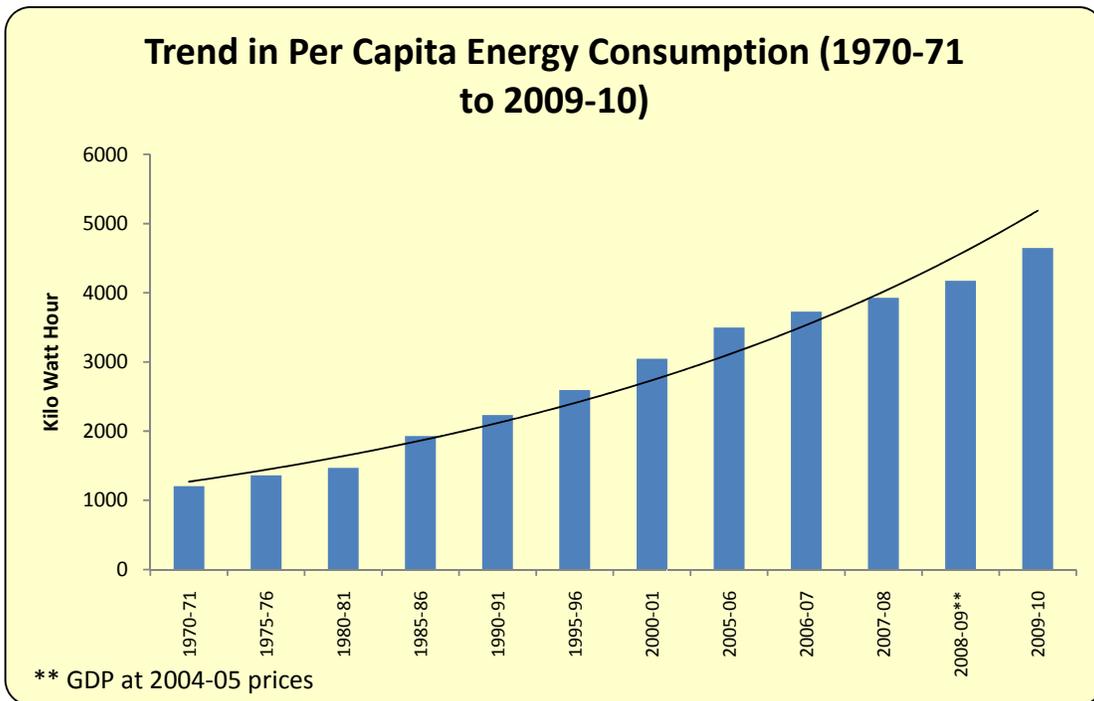


Figure 6.2

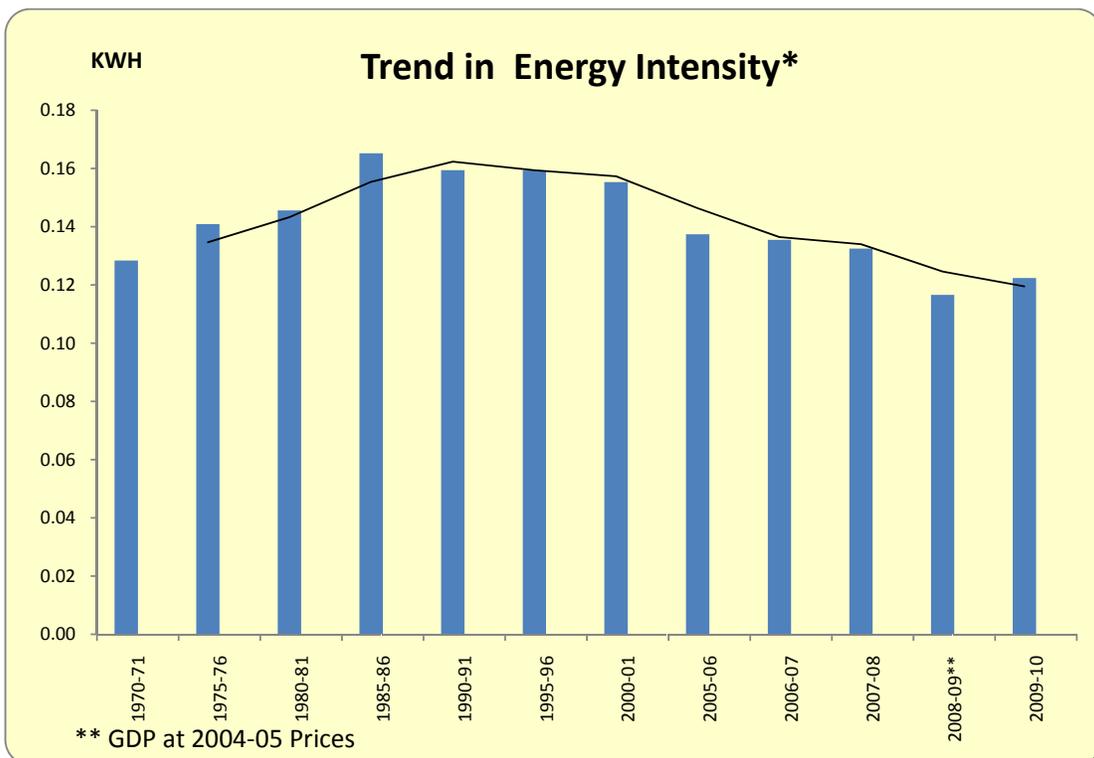


Figure 6.2

Table 6.3 : Trends in Consumption of Conventional Energy in India (Peta Joules)

(in Peta Joules) @

Year	Coal & Lignite	Crude Petroleum **	Natural Gas	Electricity *	Total
1	2	3	4	5	6= 2 to 5
1970-71	1,491	770	25	1,574	3,859
1975-76	1,929	933	43	2,169	5,074
1980-81	2,288	1,082	59	2,965	6,393
1985-86	3,051	1,797	191	4,432	9,470
1990-91	3,800	2,168	492	6,853	13,312
1995-96	5,059	2,459	697	9,973	18,188
2000-01	5,396	4,331	1,073	11,398	22,198
2005-06	6,828	5,448	1,195	14,828	28,298
2006-07	7,289	6,136	1,208	16,407	31,040
2007-08	8,551	6,536	1,189	18,028	34,304
2008-09	9,249	6,732	1,261	18,992	36,233
2009-10(p)	9,854	6,701	1,820	20,448	38,823
Growth rate of 2009-10 over 2008-09(%)	6.55	-0.46	44.34	7.66	7.15
CAGR 1970-71 to 2009-10(%)	4.83	5.56	11.32	6.62	5.94

* Includes thermal, hydro & nuclear electricity from utilities.

** Crude oil in terms of refinery crude throughput.

Sources: 1. Office of Coal Controller, Ministry of Coal
2. Ministry of Petroleum & Natural Gas.
3. Central Electricity Authority.

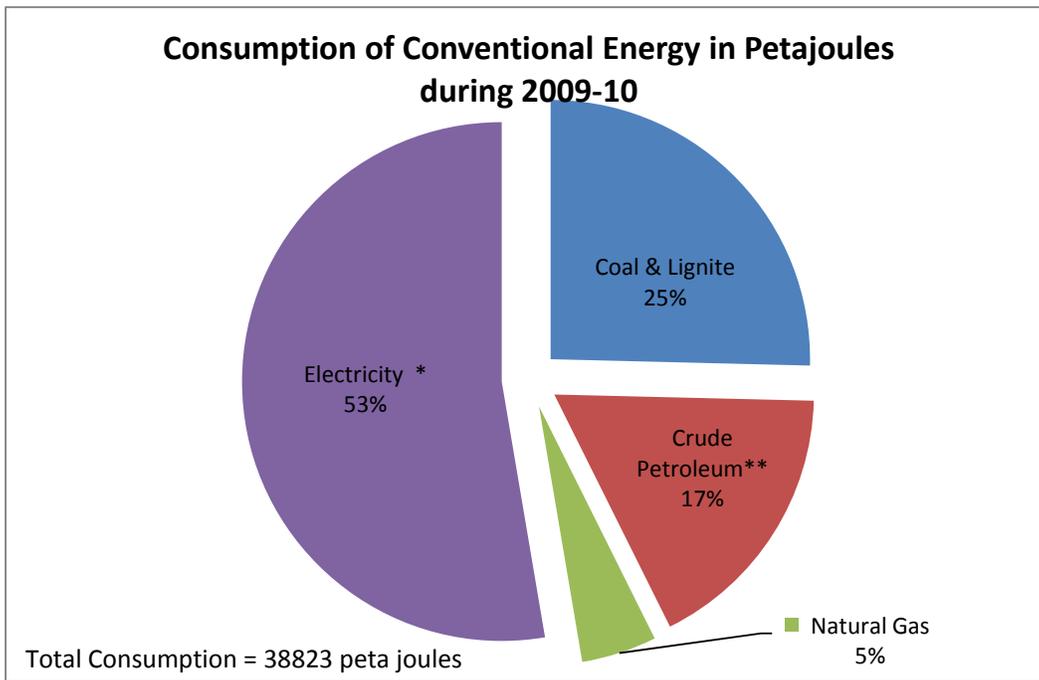


Figure 6.3

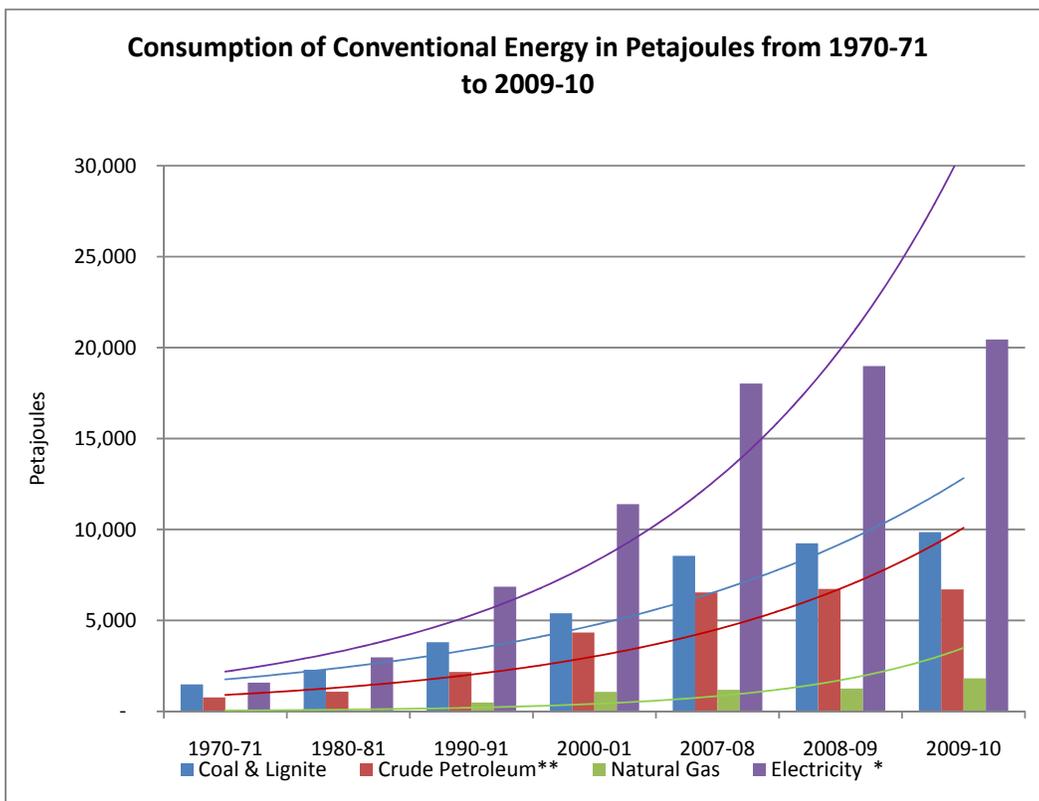


Figure 6.3(A)

Table 6.4 : Trends in Industrywise Consumption of Raw Coal in India

(Million tonnes)

Year	Electricity	Steel & Washery	Cement	Railways	Paper	Cotton @	Others *	Total
1	2	3	4	5	6	7	8	9=2 to 8
1970-71	13.21	13.53	3.52	15.58	0.27	1.45	23.67	71.23
1975-76	23.04	18.88	4.44	14.30	1.26	2.23	28.01	92.16
1980-81	38.15	21.01	4.75	11.81	2.14	1.97	29.48	109.31
1985-86	68.64	24.82	8.04	9.61	2.66	2.36	39.40	155.53
1990-91	113.71	30.91	10.43	5.24	2.81	2.58	47.68	213.36
1995-96	184.49	39.08	11.06	0.27	3.22	1.18	44.73	284.04
2000-01	252.94	30.73	15.33	0.00	2.71	1.04	36.56	339.31
2005-06	316.49	32.42	18.08	0.00	2.77	0.29	63.21	433.26
2006-07	331.58	34.90	19.67	0.00	2.50	0.30	73.25	462.32
2007-08	360.74	39.02	21.35	0.00	2.64	0.37	78.55	502.66
2008-09	381.06	38.85	19.85	0.00	2.16	0.21	105.24	547.37
2009-10(p)	411.06	41.11	21.34	0.00	3.50	0.27	110.20	587.48
Growth rate of 2009-10 over 2008-09(%)	7.87	5.82	7.51	-	62.19	28.57	4.71	7.33
CAGR 1970-71 to 2009-10(%)	8.97	2.82	4.61	-	6.61	-4.12	3.92	5.42

* Includes jute, bricks, coal for soft coke, colliery, fertilisers & other industries consumption.

@ From 1996-97 and onwards Cotton includes 'Rayon' also.

Source : Office of the Coal Controller, Ministry of Coal

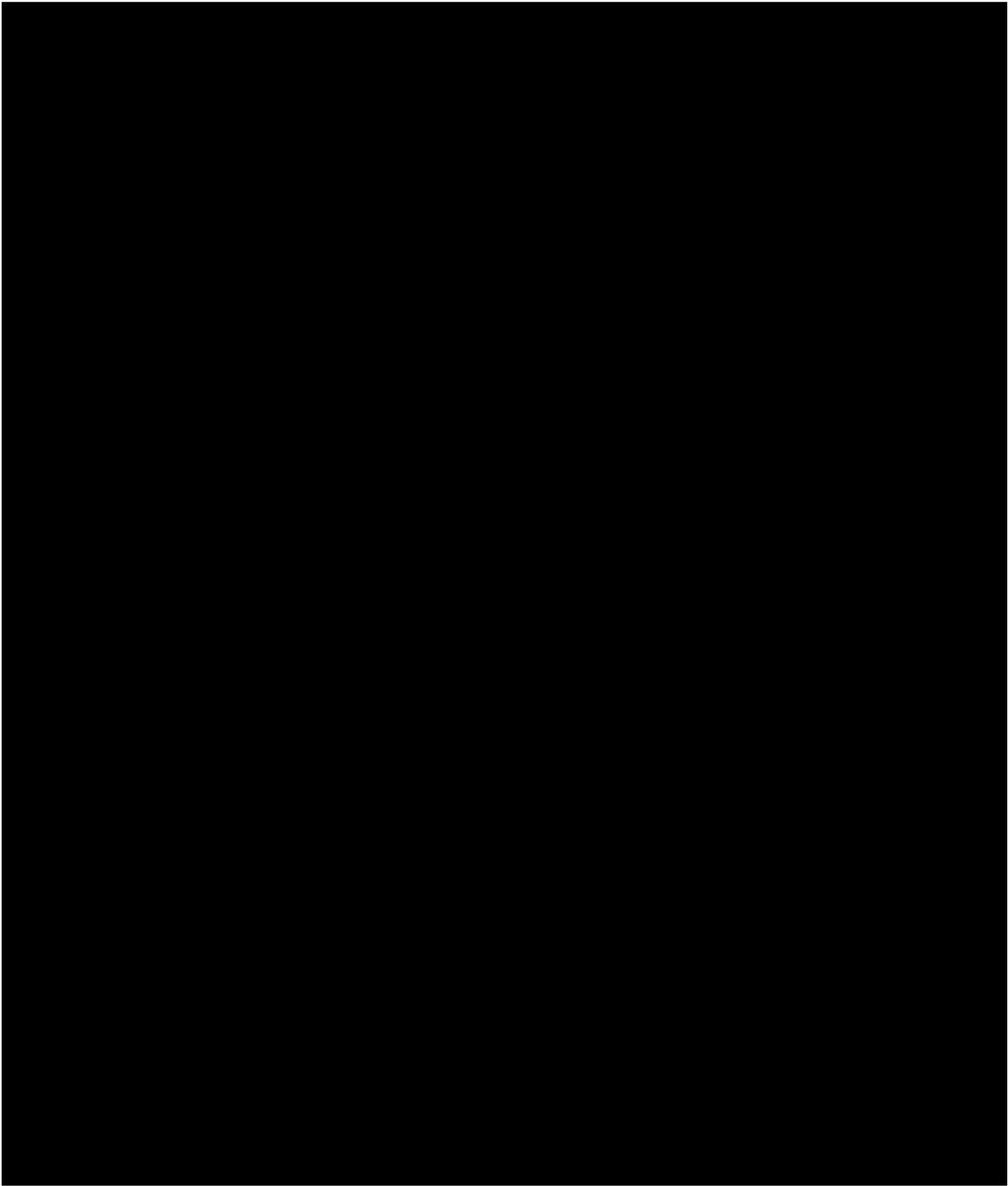


Table 6.6 : Trends in Consumption of Petroleum Products in India

(Million Tonnes)

Year	Light Distillates			Middle Distillates			
	LPG	Petrol	Naphtha	Kerosene	ATF	HSDO	LDO
1	2	3	4	5	6	7	8
1970-71	0.18	1.45	0.90	3.28	0.69	3.84	1.09
1975-76	0.34	1.28	1.84	3.10	0.90	6.60	0.88
1980-81	0.41	1.52	2.33	4.23	1.13	10.35	1.12
1985-86	1.24	2.28	3.11	6.23	1.45	14.89	1.12
1990-91	2.42	3.55	3.45	8.42	1.68	21.14	1.51
1995-96	3.92	4.68	4.15	9.93	2.08	32.26	1.31
2000-01	7.02	6.61	11.67	11.31	2.25	37.96	1.40
2005-06	10.46	8.65	12.19	9.54	3.30	40.19	0.88
2006-07	10.85	9.29	13.89	9.51	3.98	42.90	0.72
2007-08	12.17	10.33	13.29	9.37	4.54	47.67	0.67
2008-09	12.19	11.26	13.88	9.30	4.46	51.67	0.55
2009-10(p)	13.12	12.82	10.24	9.30	4.63	56.32	0.46
Growth rate of 2009-10 over 2008-09(%)	7.61	13.86	-26.21	0.01	3.86	9.00	-17.21
CAGR 1970-71 to 2009-10(%)	11.38	5.59	6.26	2.64	4.88	6.95	-2.15

(p) : Provisional

Contd...

Table 6.6 (Contd.) : Trends in Consumption of Petroleum Products in India

Year	Heavy Ends				Refinery Fuel	Others*	Total
	Fuel Oils	Lubricants	Bitumen	Petroleum Coke			
	9	10	11	12			
1	9	10	11	12	13	14	15=2 to 14
1970-71	4.66	0.55	0.78	0.11	1.22	0.39	19.14
1975-76	5.78	0.44	0.69	0.15	1.23	0.46	23.67
1980-81	7.47	0.59	1.06	0.14	1.37	0.56	32.26
1985-86	7.90	0.70	1.13	0.16	2.49	0.67	43.36
1990-91	8.99	0.89	1.58	0.29	2.71	1.14	57.75
1995-96	11.16	0.96	2.01	0.32	3.24	2.05	78.07
2000-01	12.65	1.12	2.77	0.45	6.90	4.87	106.97
2005-06	12.83	2.08	3.51	4.93	9.14	4.66	122.35
2006-07	12.62	1.90	3.83	5.44	10.92	5.83	131.67
2007-08	12.72	2.29	4.51	5.95	11.75	5.45	140.70
2008-09	12.44	2.15	4.71	5.87	11.91	4.94	145.31
2009-10(p)	11.59	2.66	4.92	6.75	11.61	5.40	149.80
Growth rate of 2009-10 over 2008-09(%)	-6.82	23.64	4.55	14.99	-2.56	9.30	3.09
CAGR 1970-71 to 2009-10(%)	2.30	4.04	4.72	10.92	5.79	6.82	5.28

(p) : Provisional

* : Includes those of light & middle distillates and heavy ends and sales through private parties.

Source: Ministry of Petroleum & Natural Gas.

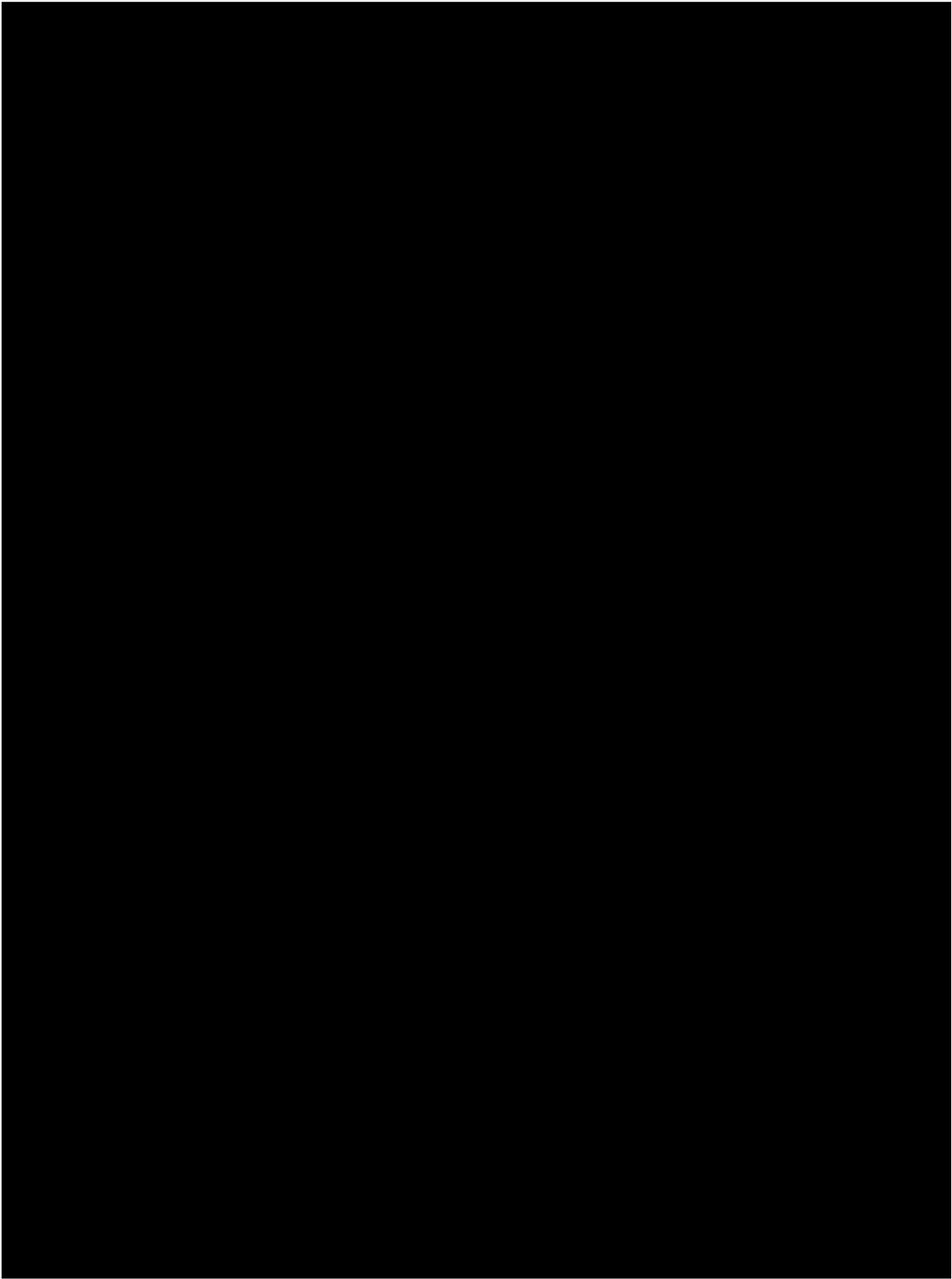


Table 6.7 (Contd.) : Sector-wise (End Use) Consumption of Selected Petroleum Products in India

('000 tonnes)

Petroleum Product	Year	Transport	Plantation	Power Generation	Industry	Misce. Services	Private Sales	Total
1	2	3	4	5	6	7	8	9=3 to 8
Furnace Oil	1985-86	290	132	804	2,337	243	0	3,806
	1990-91	447	136	531	3,150	198	0	4,462
	1995-96	321	214	720	4,836	405	475	6,971
	2000-01	318	276	481	4,543	753	1,293	7,664
	2005-06	478	**	302	1,828	5,613	700	8,921
	2006-07	502	**	254	1,830	5,600	1,083	9,269
	2007-08	315	**	281	1,635	6,400	839	9,470
	2008-09	778	172	788	2,858	3,909	913	9,418
	2009-10(p)	881	190	729	3,150	3,656	499	9,105
Growth rate of 2009-10 over 2008-09(%)		13.24	10.47	-7.49	10.22	-6.47	-45.35	-3.32
CAGR 1985-86 to 2009-10(%)		7.69	2.46	-0.65	2.01	19.81	-	5.99

('000 tonnes)

Petroleum Product	Year	Transport	Plantation	Power Generation	Industry	Misce. Services	Private Sales	Total
1	2	3	4	5	6	7	8	9=3 to 8
Low Sulphur Heavy Stock	1985-86	4	34	1,526	2,365	165	-	4,094
	1990-91	13	49	1,835	2,605	22	-	4,524
	1995-96	3	32	1,747	2,246	161	@	4,189
	2000-01	1	22	1,657	2,948	361	@	4,989
	2005-06	0	0	560	1,390	1,957	@	3,907
	2006-07	0	0	298	1,358	1,705	@	3,361
	2007-08	0	0	344	1,304	1,600	@	3,248
	2008-09	46	19	1,353	1,295	456	0	3,169
	2009-10(p)	70	962	9	1,228	215	0	2,484
Growth rate of 2009-10 over 2008-09(%)		52.17	4,963.16	-99.33	-5.17	-52.85	-	-21.62
CAGR 1985-86 to 2009-10(%)		21.02	24.96	-28.98	-4.28	1.78	-	-3.28

(p) : Provisional, @ : LSHS sales through pvt. parties included in FO sales. Break-up not available.

** : Included in Miscellaneous services. Break-up is not available.

Source: Ministry of Petroleum & Natural Gas.

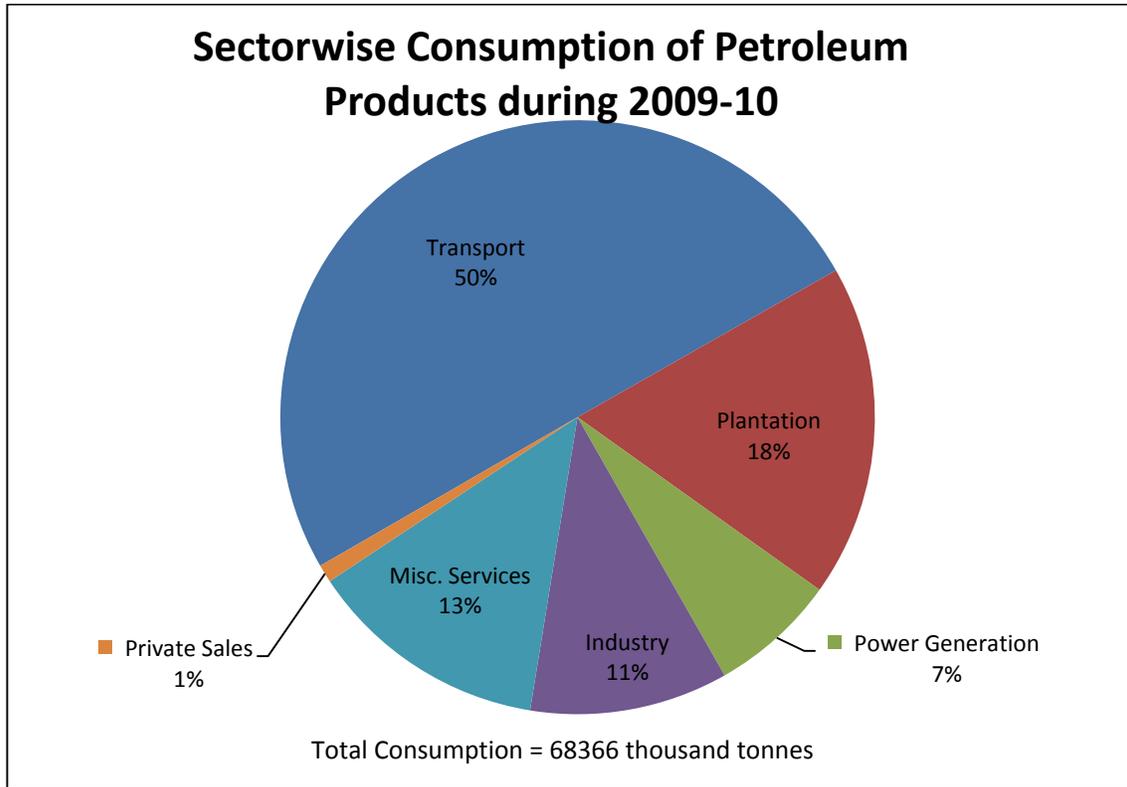


Figure 6.7

Table 6.8 : Industry-wise Off-take of Natural Gas in India

(Billion Cubic Metres)

Year	Energy Purposes							Non-energy Purposes				Grand Total
	Power Generation	Industrial Fuel	Tea Plantation	Domestic Fuel	Captive Use/ LPG Shrinkage	Others	Total	Fertilizer Industry	Petro Chemicals	Others @	Total	
1	2	3	4	5	6	7	8=2 to 7	9	10	11	12=9 to 11	13=8+12
1970-71	0.26	0.12	0.02	-	0.07	-	0.46	0.19	-	-	0.19	0.65
1975-76	0.37	0.14	0.03	0.01	0.10	-	0.66	0.46	-	0.00	0.47	1.13
1980-81	0.49	0.16	0.05	0.01	0.18	-	0.89	0.61	0.01	0.02	0.63	1.52
1985-86	1.30	0.22	0.08	0.02	0.80	-	2.42	2.50	0.01	0.02	2.53	4.95
1990-91	3.63	0.83	0.09	0.05	1.78	-	6.38	5.61	0.41	0.37	6.39	12.77
1995-96	6.84	2.30	0.11	0.18	0.59	-	10.02	7.60	0.47	-	8.08	18.09
2000-01	8.80	2.87	0.15	0.34	5.00	0.04	17.20	8.48	0.78	1.40	10.66	27.86
2005-06	11.88	3.78	0.15	0.08	5.05	1.12	22.05	7.76	1.18	0.04	8.97	31.03
2006-07	11.96	3.21	0.17	0.44	5.03	0.04	20.86	8.50	1.38	0.64	10.51	31.37
2007-08	12.04	3.32	0.16	0.04	2.16	1.26	18.98	9.82	1.43	0.64	11.89	30.87
2008-09	12.60	5.91	0.15	0.10	1.89	1.54	22.19	9.08	1.11	0.35	10.54	32.73
2009-10(p)	21.37	0.46	0.17	0.03	5.43	4.66	32.11	13.17	1.26	0.70	15.14	47.25
Growth rate of 2009-10 over 2008-09(%)	69.52	-92.19	8.44	-73.53	188.22	203.32	44.70	44.99	14.39	98.59	43.58	44.34
CAGR 1970-71 to 2009-10(%)	11.64	3.52	6.21	-	11.57	-	11.20	11.22	-	-	11.61	11.32

@ : Excludes offtakes of natural gas by ONGC.

\$: 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.

**: Sponge iron use.

Source : Ministry of Petroleum & Natural Gas.

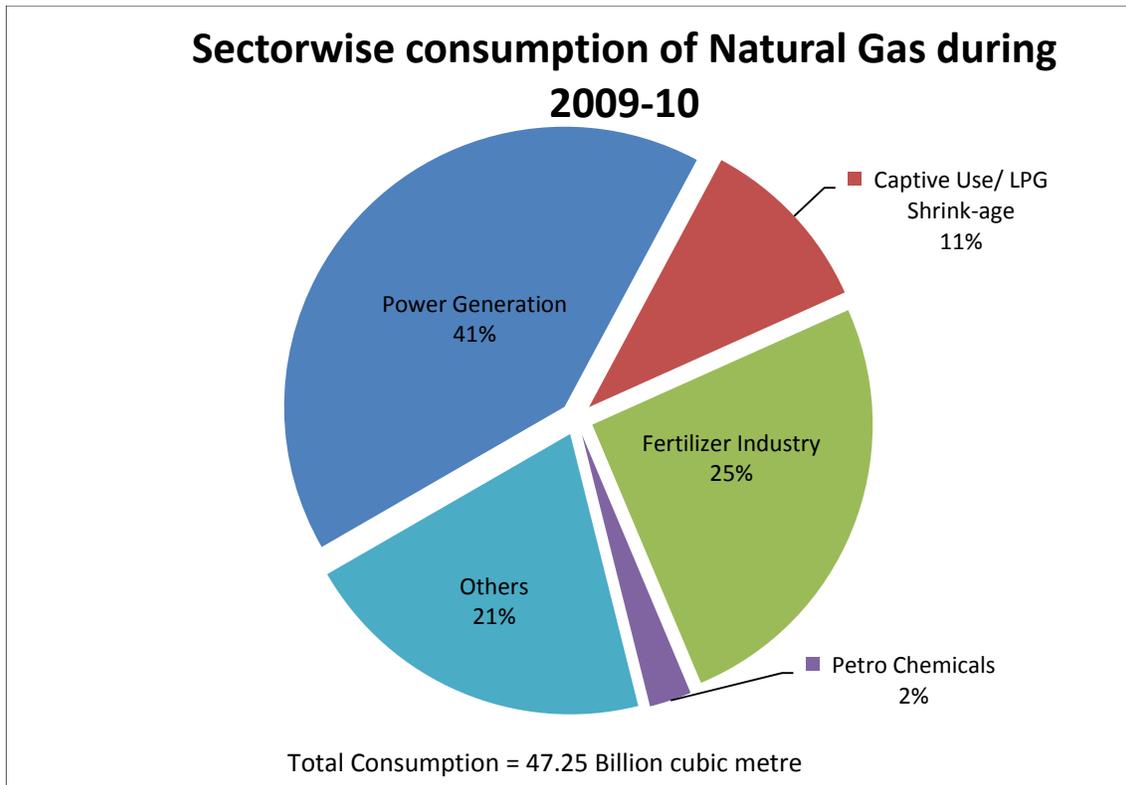


Figure 6.8

Table 6.9: Consumption of Electricity (from utilities) by Sectors in India

(Giga Watt hour) = (10⁶ x Kilo Watt hour)

Year	Industry	Agriculture	Domestic	Commercial	Traction & Railways	Others	Total Electricity Consumed
1	2	3	4	5	6	7	8=2 to 7
1970-71	29,579	4,470	3,840	2,573	1,364	1,898	43,724
1975-76	37,568	8,721	5,821	3,507	1,855	2,774	60,246
1980-81	48,069	14,489	9,246	4,682	2,266	3,615	82,367
1985-86	66,980	23,422	17,258	7,290	3,182	4,967	1,23,099
1990-91	84,209	50,321	31,982	11,181	4,112	8,552	1,90,357
1995-96	1,04,693	85,732	51,733	16,996	6,223	11,652	2,77,029
2000-01	1,07,622	84,729	75,629	22,545	8,213	17,862	3,16,600
2005-06	1,51,557	90,292	1,00,090	35,965	9,944	24,039	4,11,887
2006-07	1,71,293	99,023	1,11,002	40,220	10,800	23,411	4,55,749
2007-08	1,89,424	1,04,182	1,20,918	46,685	11,108	29,660	5,01,977
2008-09	2,09,474	1,09,610	1,31,720	54,189	11,425	37,577	5,53,995
2009-10(p)	2,36,752	1,20,209	1,46,080	60,600	12,408	36,595	6,12,645
Growth rate of 2009-10 over 2008-09(%)	13.02	9.67	10.90	11.83	8.61	-2.61	10.59
CAGR 1970-71 to 2009-10(%)	5.34	8.58	9.52	8.22	5.68	7.68	6.82

Source : Central Electricity Authority.

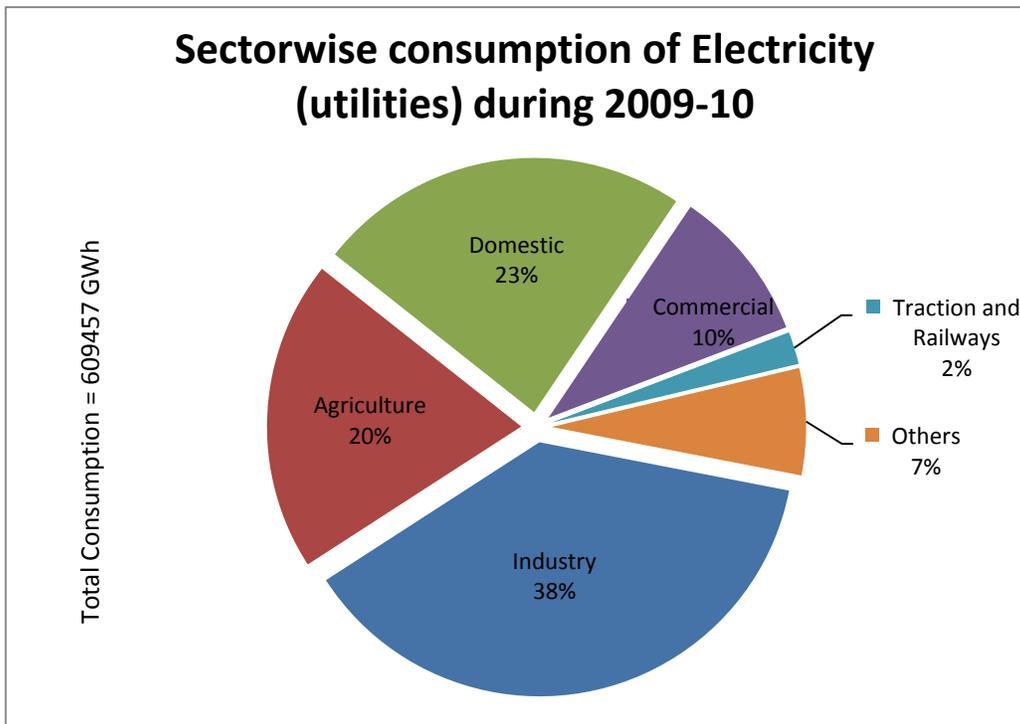


Figure 6.9

Table 6.10 : Electricity Generated(from Utilities), Distributed, Sold and Lost in India

(Giga Watt hour) = (10⁹ x Kilo Watt hour)

Year	Gross Electricity Generated from Utilities	Consumption in Power Station Auxiliaries	Net Electricity Generated from Utilities	Purchases from Non-Utilities + Imported from Other Countries	Net Electricity Available for Supply	Sold to Ultimate Consumers & Other Countries	Loss in transmission	Loss in transmission (%)
1	2	3	4=2-3	5	6=4+5	7	8=6-7	9
1970-71	55,828	2,863	52,965	66	53,031	43,724	9,307	17.55
1975-76	79,231	4,556	74,675	121	74,796	60,246	14,550	19.45
1980-81	1,10,844	7,230	1,03,614	120	1,03,734	82,367	21,367	20.60
1985-86	1,70,350	13,157	1,57,193	107	1,57,300	1,23,106	34,194	21.74
1990-91	2,64,329	19,604	2,44,725	2,216	2,46,941	1,90,420	56,521	22.89
1995-96	3,79,877	27,220	3,52,657	3,784	3,56,441	2,77,078	79,363	22.27
2000-01	5,01,204	34,932	4,66,272	5,596	4,71,868	3,16,795	1,55,073	32.86
2005-06	6,23,819	41,970	5,81,849	10,345	5,92,194	4,12,096	1,80,098	30.41
2006-07	6,70,654	43,577	6,27,077	11,931	6,39,008	4,55,964	1,83,043	28.64
2007-08	7,22,626	45,531	6,77,095	12,685	6,89,780	5,02,267	1,87,513	27.18
2008-09	7,46,626	47,573	6,99,053	13,487	7,12,540	5,53,272	1,80,322	25.31
2009-10(p)	7,96,281	49,706	7,46,576	15,359	7,61,934	6,09,457	2,19,866	28.86
Growth rate of 2009-10 over 2008-09(%)	6.65	4.48	6.80	13.88	6.93	10.15	21.93	14.03
CAGR 1970-71 to 2009-10(%)	6.87	7.40	6.84	14.60	6.89	6.81	8.23	1.25

Source : Central Electricity Authority.

HIGHLIGHTS

7. Energy Commodity Balance

7.1 Definition

The major sources for commercial energy in India are coal, oil products, natural gas and electricity. Non-energy producing sectors derive energy from the resources available in primary form such as coal, crude oil, natural gas, hydro-power and nuclear power. Some of the energy resources are converted into other (final) energy products that are used for purposes other than energy generation.

Coal is also used as a final product or intermediate for power generation. Similarly, natural gas is also used directly or as an intermediate in power generation. Many petroleum products, such as HSDO, Naphtha etc. are used as a final product by the non-energy producing sectors and also used for power generation.

This indicates that the same energy source can be used in various forms at various stages of consumption. This creates a possibility of over-estimation or under-estimation of energy consumption in totality as well as for different sources.

The Energy Commodity Balance Statistics provide a crystal clear picture of usage of each form of energy commodity at each stage of consumption and therefore are the most authentic estimate of energy usage.

7.2 Components

Two major components of the energy balance statistics are Total Primary Energy Supply and Total Final Consumption of energy commodity.

Total Primary Energy Supply consists of total supply of coal, crude oil, natural gas, nuclear energy and renewable energies including imports, net of exports and stock changes. Some part of these resources is used directly and the rest converted into electricity or other forms of energy resources. Final consumption refers to quantities of coal, petroleum products, natural gas and electricity used for consumption as the final product by the non-energy producing sectors. The Energy Commodity Balances further provide information on final consumption by various sectors.

Energy balances can be calculated on the basis of external energy used per kilogram of product, or raw material processed, or on dry solids or some key component. The energy consumed in food production includes direct energy which is fuel and electricity used on the farm, and in transport and in factories, and in storage, selling, etc.; and indirect energy which is used to actually build the machines, to make the packaging, to produce the electricity and the oil and so on. Food itself is a major energy source, and energy balances can be determined for animal or human

feeding; food energy input can be balanced against outputs in heat and mechanical energy and chemical synthesis.

This energy commodity balance need is to be converted to energy balance in which the production and consumption is given in *thousand tonnes of oil equivalent (ktoe) on a net calorific value basis*. Non-availability of data for all types of fuel that are being used in India- both purchased and free- is the main bottle neck in arriving at a balanced energy balance.

Table 7.1(contd) : Energy Commodity Balance for the years 2008-09 and 2009-10(P)

Supply	Kerosene (000 tonnes)		Gas/ diesel (000 tonnes)		Heavy fuel oil (000 tonnes)		Electricity (GWH)	
	2008-09	2009-10	2008-09	2009-10	2008-09	2009-10	2008-09	2009-10
Production	8223	8545	63495	77605	17684	17535	746626	796281
From Other Sources	-	-	-	-	-	-	95905	109693
Imports	1423	985	2788	2531	1637	762	5899	5359
Exports	3701	46	77	18460	6118	5173	37577	41339
Intl. marine bunkers	-	-	-	-	-	-	-	-
Stock changes			-9600	-9600		-9568		
Domestic Supply	9569	9484	61193	71276	13203	22692	810853	869994
Transfer								
Statistical difference	266	180	-3852	1681	1529	-504	257581	260537
Transformation			3513	3857	4535	4572	47573	49706
Electricity plants			3513	3857	4535	4572	47573	49706
CHP plants								
Heat plants								
Blast furnaces/ gas works								
Coke/pat.fuel/BKB plants								
Petroleum refineries								
Petrochemical industry								
Liquefaction plants								
Other Transform. sector								
Energy Sector			953	1375			17180	31568
Fuel mining and extraction			953	1375				
Petroleum refineries								
Elec., CHP and heat plants								
Pumped storage (elec.)								
Other energy sector								
Distribution losses							180322	219866
Final Consumption	9303	9304	63477	69595	24349	23196	553272	609457
Industry Sector	43	43	14421	16979	9377	9497	209474	230445
Iron and steel			217	491	2316	2354		
Chemical and petroleum			133	393	3175	3291		
Non-ferrous metals			-	-				
Non-metallic minerals			-	-				
Transport equipment			11947	13328				
Machinery			-	-				
Mining & Quarrying			1030	1187	998	1009		
Food and tobacco								
Paper, pulp and print								
Wood and wood products								
Construction								
Textile and leather			94	149	176	98		
Non-specified	43	43	1000	1431	2712	2745	209474	230445
Transport Sector			30681	32124	2360	1576	60356	89725
International aviation			-	-				
Domestic aviation			2	10				
Road			27553	28753	500	521		
Rail			2168	2713	27	36	11425	12569
Pipeline transport			-	-				
Domestic navigation			758	648	847	658		
Non-specified					986	361	48931	77156
Other Sectors	9260	9261	13909	15260	8077	7551	399011	427880
Residential	9131	9131	-	-			131720	144907
Comm. And public services			-	-			54189	59614
Agriculture/forestry			10144	11245	529	674	109610	120583
Fishing			-	-				
Non-specified	129	130	3765	4015	7548	6877	103492	102776
Non-Energy Use								
in industry/transf./energy of								
which : feedstock								
in transport								
in other sectors								

BKB- Brown Coal/ Peat Briquettes

CHP- Combined Heat and Power Plants

Statistical Difference= Estimated Production - Estimated Consumption

Final consumption = Transformation+Energy sector+Total Industrial Consumption+Consumption by Other sectors+Non energy Use

HIGHLIGHTS

8. Whole Sale Price Index of Energy Commodities

8.1 The Wholesale Price Index of Petroleum Products

The Wholesale Price Index of Petroleum Products except lubricants recorded a decrease ranging from 2% to 30% from 2008-09 to 2009-10. The maximum decrease was observed in Aviation Turbine Fuel (30%). The wholesale price index for increased for Lubricants, Coking Coal and Electricity only recorded a modest increase during this period. The WPI of Kerosene and Coke recorded no growth during the period. Stability in prices of the Energy Commodities had a sobering effect on the inflation rate, despite the hike in administered prices of energy products.

8.2 Intra-Year Movement of WPI

The yearly movement of index shows that from 2005-06, the WPI of Kerosene has not changed mainly due to administered prices, whereas for Electricity and Lubricants the WPI has increased continuously from 2005-06 in almost all other products also till last year there was hardly any negative trend, almost throughout the period.

Table 8.1 : Wholesale Price Index of Energy Commodities in India

(1993-94=100)												
Year	Petroleum Products							Liquified Petrol- eum Gas	Coking Coal	Coke	Lignite	Elect- ricity
	Petrol	Kero- sene	Aviation Turbine Fuel	High Speed Diesel Oil	Light Diesel Oil	Furn- ance Oil	Lubri- cants					
1	2	3	4	5	6	7	8	9	10	11	12	13
1981-82	36.2	68.2	34.4	46.2	45.0	48.1	30.3	46.8	28.9	39.6	34.7	31.4
1985-86	43.7	83.0	44.2	54.1	56.0	58.4	36.6	55.8	45.9	61.4	65.7	43.9
1990-91	67.9	98.4	66.7	71.7	62.6	64.8	55.2	61.8	67.1	64.2	84.4	63.1
1995-96	106.5	100.0	99.7	108.8	109.4	99.4	105.0	109.5	106.2	105.2	111.7	127.8
2000-01	154.2	270.2	144.2	228.8	232.2	203.5	142.6	248.2	158.9	134.2	229.0	200.0
2005-06	231.1	357.6	228.7	430.4	445.3	347.4	194.5	334.8	239.0	364.1	184.0	263.4
2006-07	254.8	357.6	262.6	468.2	491.1	393.2	248.8	334.8	239.0	364.1	184.0	271.7
2007-08	242.3	357.6	272.7	451.6	491.2	438.4	275.0	334.8	246.4	364.1	184.0	273.0
2008-09	260.8	357.6	337.1	488.5	655.5	523.8	323.2	370.0	263.7	475.8	199.1	275.9
2009-10	242.7	357.6	237.2	478.1	631.2	495.8	328.8	353.1	273.5	475.8	169.9	277.7
Increase in 2009-10 over 2008-09(%)	-6.94	0.00	-29.64	-2.13	-3.71	-5.35	1.73	-4.57	3.72	0.00	-14.67	0.65

Source :Office of the Economic Advisor, Ministry of Commerce & Industry.

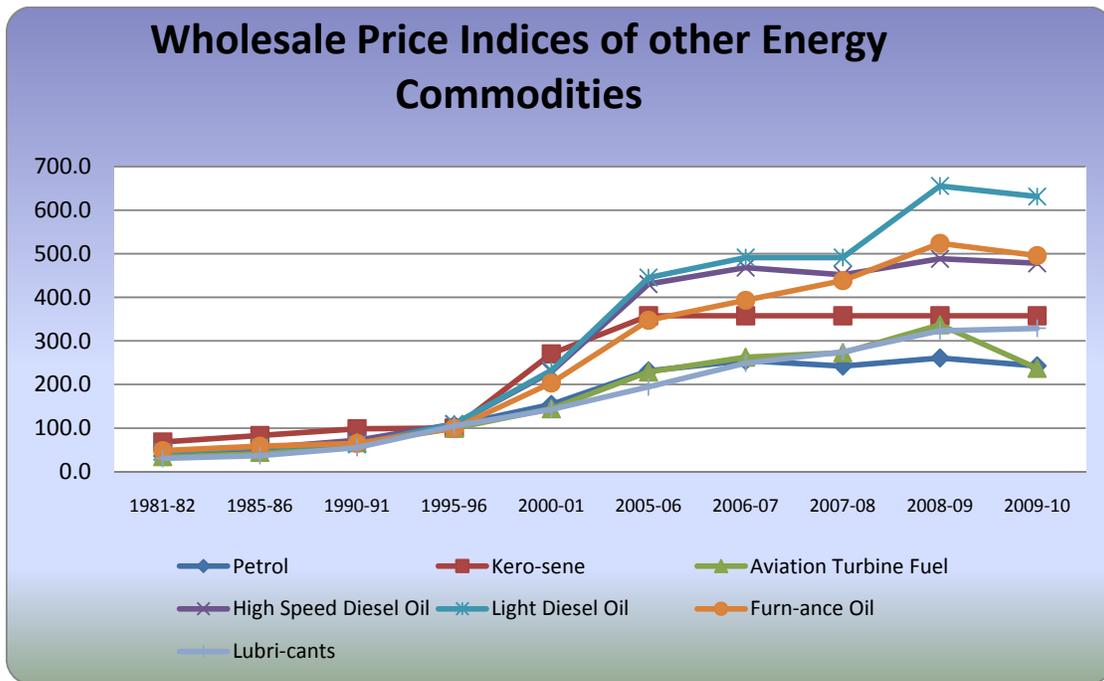


Figure 8.1

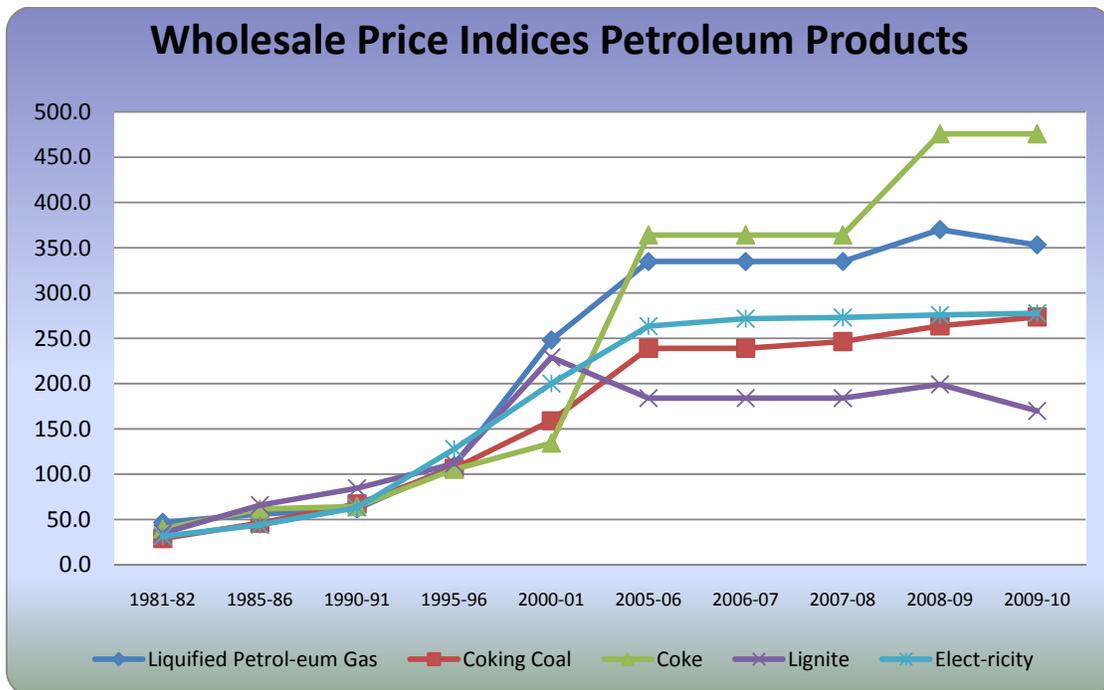


Figure 8.1(A)

HIGHLIGHTS

9. World Production and Consumption of Crude Oil & Natural Gas

9.1 Production and consumption of crude oil

The total estimated production of crude oil in the world has increased from about 3870 MT in 2004-05 to about 3935 MT during 2008-09, and decreased to 3820 MT during 2009-10 (Table 9.1). The production decreased by 2.9% from 2008-09 to 2009-10. Geographical distribution of total world production during 2009-10 across major regions reveals that Middle East accounted for the highest share (30.3%), followed by Europe & Eurasia (22%), North America (16%), Africa (12%), Asia Pacific (10%) and South & Central America (9%). Distribution of total world production according to countries shows that Russian Federation and Saudi Arabia were the first and second highest producers with 12.9% and 12%, respectively. They were followed by USA (8.5%), Iran (5.3%), China (4.9%), Canada (4.1%), Mexico (3.9%), Venezuela (3.3%), United Arab Emirates, Kuwait and Iran (3.2% each). India accounted for only 0.9% of the world production.

A notable feature of world production of crude oil during 2009-10 is that three regions (Middle East, Africa and Asia Pacific) experienced negative growth rates and three other regions experienced positive growth rates over 2008-09. The production increased by 1.3% in North America, by 0.5% in Europe and Eurasia and by 0.9% in South and Central America. Decrease in growth rate was maximum in Middle East (7.6%), followed by Africa (5.4%) and Asia Pacific (2.1%). The decrease of growth in these three regions reflects the decrease in the total world production of crude oil by 2.9%.

The growth rate of Crude oil consumption from 2008-09 to 2009-10 increased in the Middle East (3.5%), followed by African countries (0.8%) and Asia Pacific (0.7%). Only there was a decrease in consumption in other regions of the world.

Major region-wise consumption shows that Asia Pacific accounted for the highest share (31%) of total world consumption, followed by North America (26%), and Europe & Eurasia (24%). African countries accounted for the lowest share in the world consumption (3.7%). Country-wise distribution of consumption reveals that the United States was the largest consumer of crude oil, consuming 21.7% of the world consumption during 2009-10. China was the second largest consumer (10.4%), followed by Japan (5.1%), India (3.8%) and Russian federation (3.2%). India was, thus, the fourth largest consumer of crude oil in the world and the third largest crude oil consumer in the Asia-Pacific region after China and Japan.

9.2 Production and Consumption of Natural Gas

The total world production of Natural Gas increased from 2431 million tone oil equivalent(Mtoe) in 2004-05 to 2696 Mtoe in 2009-10. The production has decreased by 2.4% from 2008-09 to 2009-10(Table 9.3). Distribution of production of natural gas over major regions shows that Europe & Eurasia (33%) and North America (27%) are the highest and the second highest producers, together accounting for 60% of the total world production. Country-wise, USA was the largest producer of natural gas (20%) in the world during 2009-10, followed by the Russian Federation (17.6%) and Canada (5.4%). India's share in the total world production of natural gas during 2008-09 was only 1.3% (35.3 Mtoe).

The growth in production of natural gas from 2008-09 to 2009-10 was highest in Middle East (6.2%), followed by Asia Pacific (4.9%), North America (1.3%). Other regions showed a decline in growth rates highest decline was in Europe & Eurasia (10.4%), Africa (4.9%) and South and Central America (3.5%).

The total world consumption of natural gas has increased from 2420 Mtoe in 2004-05 to 2653 Mtoe in 2009-10 (Table 9.4). The world consumption of natural gas decreased by 2.4% from 2008-09 to 2009-10.

While United States was the largest consumer of natural gas, consuming 22% of the world consumption during 2009-10, Europe & Eurasia accounted for 35.9% of the total world consumption. Country-wise distribution of consumption of natural gas indicates that USA was the largest consumer (22%), followed by Russian federation (13.2%). India with a consumption of 46.7 Mtoe accounted for only 1.8% of total world consumption.

The growth rate of consumption from 2008-09 to 2009-10 was the highest in the Middle East (4.1%), followed by Asia Pacific (3.2%). However, there was a decrease in the consumption for Europe & Eurasia (7.0%), South and Central America (4.5%), Africa (2.2%) and North America (1.4%) from 2008-09 to 2009-10.

Table 9.1:Country-wise Estimates of Production of Crude Oil*

(Million tonnes)

Country/ Region	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	Change 2009-10 over 2008-09	2009-10 % Share of World's Total Production
North America								
USA	329.2	313.3	310.2	309.8	304.9	325.3	6.7	8.5
Canada	147.6	144.9	153.4	159.5	157.7	155.7	-1.3	4.1
Mexico	190.7	187.1	183.1	172.7	157.7	147.5	-6.5	3.9
Total North America	667.4	645.3	646.7	642.0	620.4	628.5	1.3	16.4
South and Central America								
Argentina	37.8	36.2	35.8	34.9	34.1	33.8	-1.0	0.9
Brazil	76.5	84.6	89.2	90.4	93.9	100.4	6.8	2.6
Colombia	27.3	27.3	27.5	27.6	30.5	34.1	11.9	0.9
Ecuador	27.3	27.6	27.7	26.5	26.2	25.2	-3.9	0.7
Peru	4.4	5.0	5.1	5.1	5.3	6.4	20.7	0.2
Trinidad & Tobago	7.3	8.3	8.3	7.2	6.9	6.8	-0.9	0.2
Venezuela	150.0	151.0	144.2	133.9	131.5	124.8	-5.1	3.3
Other S. & Cent. America	7.3	7.2	7.1	7.2	7.1	7.1	0.2	0.2
Total S. & Cent. America	337.9	347.1	345.0	332.7	335.5	338.5	0.9	8.9
Europe and Eurasia								
Azerbaijan	15.6	22.4	32.5	42.8	44.7	50.6	13.2	1.3
Denmark	19.1	18.4	16.7	15.2	14.0	12.9	-8.2	0.3
Italy	5.5	6.1	5.8	5.9	5.2	4.6	-12.7	0.1
Kazakhstan	60.6	62.6	66.1	68.4	72.0	78.0	8.2	2.0
Norway	149.9	138.2	128.7	118.6	114.1	108.3	-5.0	2.8
Romania	5.7	5.4	5.0	4.7	4.7	4.5	-5.7	0.1
Russian Federation	458.8	470.0	480.5	491.3	488.5	494.2	1.2	12.9
Turkmenistan	9.6	9.5	9.2	9.8	10.2	10.2	0.0	0.3
United Kingdom	95.4	84.7	76.6	76.8	71.7	68.0	-5.1	1.8
Uzbekistan	6.6	5.4	5.4	4.9	4.8	4.5	-6.8	0.1
Other Europe & Eurasia	23.4	21.9	21.5	21.3	20.2	19.0	-5.9	0.5
Total Europe & Eurasia	850.1	844.8	847.9	859.7	850.2	854.8	0.5	22.4
Middle East								
Iran	207.8	206.3	208.2	209.7	209.9	202.4	-3.6	5.3
Iraq	100.0	90.0	98.1	105.2	119.3	121.8	2.1	3.2
Kuwait	122.3	129.3	132.7	129.9	137.2	121.3	-11.6	3.2
Oman	38.1	37.4	35.7	34.5	35.9	38.5	7.1	1.0
Qatar	46.0	47.3	50.9	53.6	60.8	57.9	-4.9	1.5
Saudi Arabia	506.0	526.8	514.3	494.2	515.3	459.5	-10.8	12.0
Syria	24.7	22.4	21.6	20.6	19.8	18.7	-5.8	0.5
United Arab Emirates	125.1	129.0	139.0	135.1	137.3	120.6	-12.2	3.2
Yemen	19.9	19.6	17.9	16.3	14.4	14.0	-2.2	0.4
Other Middle East	2.2	1.6	1.4	1.6	1.5	1.7	13.4	^
Total Middle East	1192.3	1209.6	1220.0	1200.8	1251.5	1156.4	-7.6	30.3

Contd....

Table 9.1(Contd.):Country-wise Estimates of Production of Crude Oil*

Country/ Region							(Million tonnes)	
	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	Change 2009-10 over 2008-09	2009-10 % Share of World's Total Production
Africa								
Algeria	83.6	86.5	86.2	86.5	85.5	77.7	-9.1	2.0
Angola	54.5	69.0	69.6	82.5	92.2	87.4	-5.2	2.3
Cameroon	4.5	4.2	4.4	4.2	4.3	3.7	-13.1	0.1
Chad	8.8	9.1	8.0	7.5	6.7	6.2	-7.5	0.2
Rep. of Congo (Brazzaville)	11.2	12.7	13.5	11.5	12.9	14.1	9.7	0.4
Egypt	35.4	33.9	33.7	34.1	34.6	35.3	1.8	0.9
Equatorial Guinea	17.2	18.6	18.0	18.6	17.4	15.2	-12.5	0.4
Gabon	11.8	11.7	11.7	11.5	11.8	11.4	-2.8	0.3
Libya	76.5	81.9	84.9	85.0	85.3	77.1	-9.6	2.0
Nigeria	119.0	122.1	117.8	112.1	103.1	99.1	-3.9	2.6
Sudan	14.9	15.0	16.3	23.1	23.7	24.1	1.8	0.6
Tunisia	3.4	3.4	3.3	4.6	4.2	4.1	-3.7	0.1
Other Africa	3.6	3.5	3.2	4.2	3.9	3.9	-0.3	0.1
Total Africa	444.3	471.6	470.7	485.3	485.6	459.3	-5.4	12.0
Asia Pacific								
Australia	24.8	24.5	23.4	24.1	23.8	23.6	-0.6	0.6
Brunei	10.3	10.1	10.8	9.5	8.5	8.2	-4.1	0.2
China	174.1	180.8	183.7	186.7	195.1	189.0	-3.1	4.9
India	36.3	34.6	35.8	36.1	36.1	35.4	-2.1	0.9
Indonesia	55.2	53.0	49.9	47.4	49.9	49.0	-1.9	1.3
Malaysia	36.5	34.4	33.5	34.2	34.6	33.2	-4.0	0.9
Thailand	9.1	10.8	11.8	12.5	13.3	13.6	2.9	0.4
Vietnam	20.8	19.4	17.8	16.4	15.4	16.8	8.7	0.4
Other Asia Pacific	10.5	12.5	13.2	13.9	14.7	14.2	-3.4	0.4
Total Asia Pacific	377.6	380.1	379.8	380.8	391.5	383.1	-2.1	10.2
TOTAL WORLD	3869.7	3898.6	3910.0	3901.4	3934.7	3820.5	-2.9	100.0
OPEC	1039.5	1174.6	1274.5	1371.2	1556.2	1544.5	13.5	40.7
Non-OPEC	774.6	829.0	842.9	867.1	883.8	873.7	1.9	23.1
Former Soviet Union	328.3	353.0	377.0	400.4	429.0	458.9	7.1	11.2

* Includes crude oil, shale oil, oil sands and NGLs (the liquid content of natural gas where this is recovered separately). Excludes liquid fuels from other sources such as biomass & coal derivatives.

^ Less than 0.05.

Note: Annual changes and shares of total are calculated using million tonnes per annum figures.

Source : Ministry of Petroleum & Natural Gas.

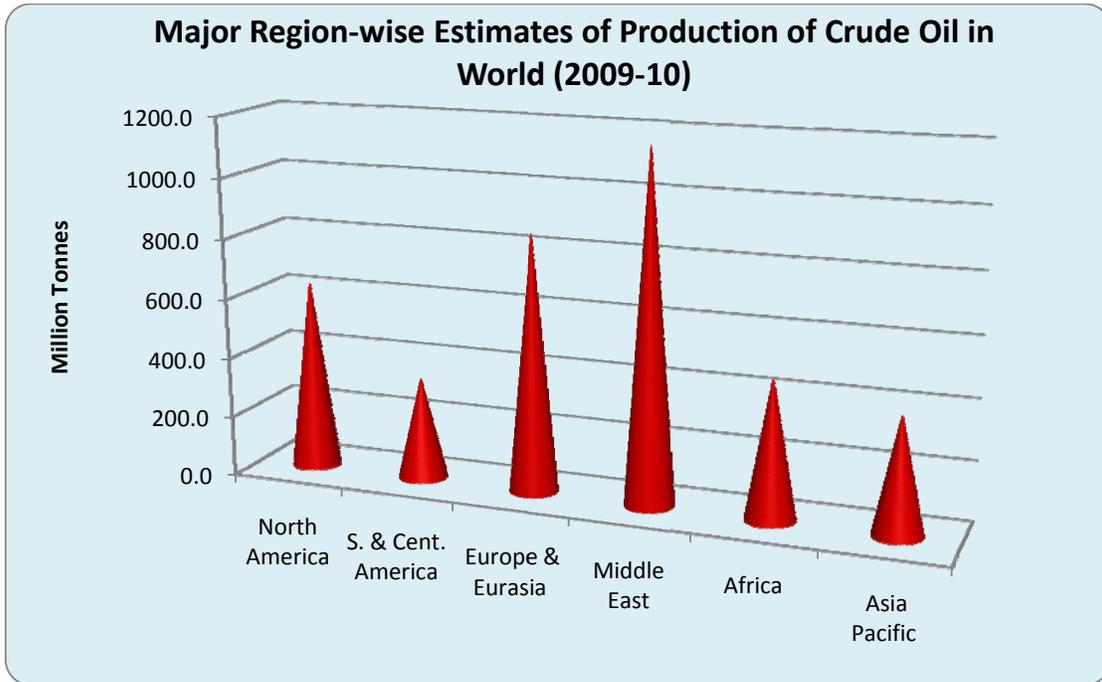


Figure 9.1

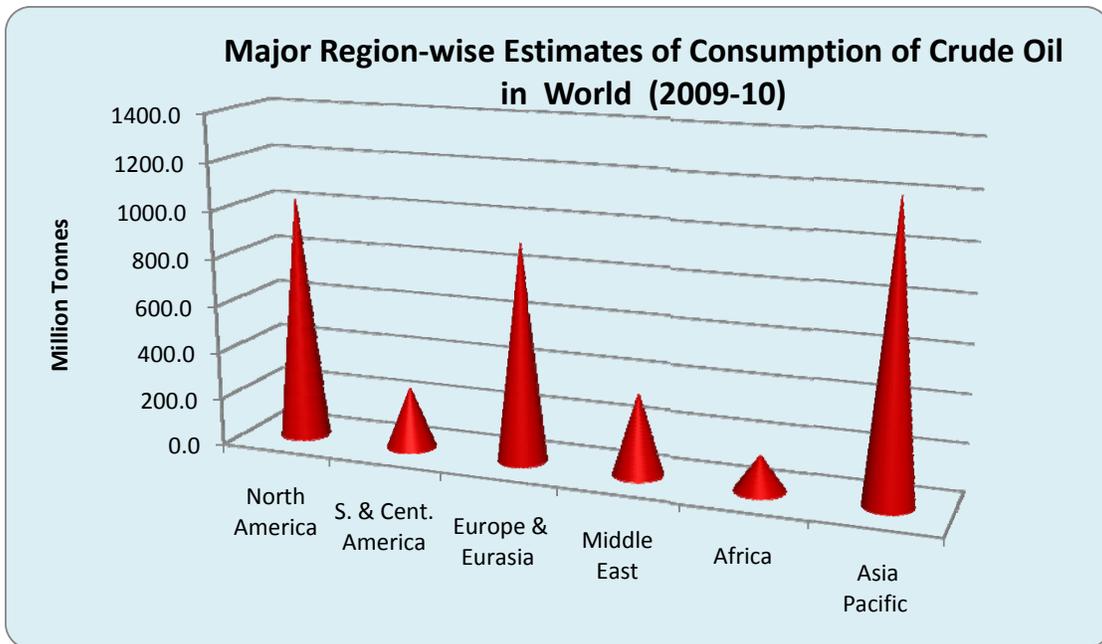


Figure 9.2

Table 9.2 : COUNTRY-WISE ESTIMATES OF CONSUMPTION OF CRUDE OIL*

Country/ Region	(Million tonnes)						Change 2009-10 over 2008-09	2009-10 % Share of World's Total Consumption
	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10		
North America								
US	948.8	951.4	943.8	942.3	888.5	842.9	-5.1	21.7
Canada	100.6	100.3	99.6	102.8	101.7	97.0	-4.6	2.5
Mexico	85.2	87.7	86.8	89.4	88.9	85.6	-3.7	2.2
Total North America	1134.6	1139.4	1130.2	1134.5	1079.0	1025.5	-5.0	26.4
South and Central America								
Argentina	18.4	19.7	20.5	23.0	23.8	22.3	-6.3	0.6
Brazil	88.4	89.5	92.1	99.0	104.8	104.3	-0.5	2.7
Chile	11.1	11.7	12.3	16.1	16.7	15.4	-7.8	0.4
Colombia	9.7	10.3	10.7	10.4	9.1	8.8	-3.3	0.2
Ecuador	6.3	7.5	8.2	8.9	9.4	9.9	5.3	0.3
Peru	7.2	7.0	6.8	7.1	7.9	8.5	7.6	0.2
Venezuela	24.2	25.9	27.4	26.7	27.2	27.4	0.7	0.7
Other S. & Cent. America	58.7	58.8	60.4	61.2	60.0	59.4	-1.0	1.5
Total S. & Cent. America	223.9	230.5	238.3	252.4	258.8	256.0	-1.1	6.6
Europe and Eurasia								
Austria	13.8	14.2	14.2	13.4	13.5	13.0	-3.7	0.3
Azerbaijan	4.6	5.3	4.8	4.5	3.5	2.8	-20.0	0.1
Belarus	7.4	7.1	8.0	7.3	8.4	9.3	10.7	0.2
Belgium & Luxembourg	38.4	39.9	41.1	41.0	40.1	38.5	-4.0	1.0
Bulgaria	4.7	4.9	5.2	5.1	4.6	4.4	-4.3	0.1
Czech Republic	9.5	9.9	9.8	9.7	9.9	9.7	-2.0	0.2
Denmark	9.1	9.2	9.3	9.3	8.9	8.2	-7.9	0.2
Finland	10.6	11.0	10.6	10.6	10.5	9.9	-5.7	0.3
France	94.0	93.1	93.0	91.4	90.8	87.5	-3.6	2.3
Germany	124.0	122.4	123.6	112.5	118.9	113.9	-4.2	2.9
Greece	21.4	21.2	22.2	21.7	21.4	20.2	-5.6	0.5
Hungary	6.5	7.5	7.8	7.7	7.5	7.3	-2.7	0.2
Iceland	1.0	1.0	1.0	1.2	1.0	1.0	0.0	^
Republic of Ireland	8.9	9.3	9.3	9.4	9.0	8.0	-11.1	0.2
Italy	89.7	86.7	86.7	84.0	80.4	75.1	-6.6	1.9
Kazakhstan	10.8	11.0	11.4	11.5	12.4	12.0	-3.2	0.3
Lithuania	2.6	2.8	2.8	2.8	3.1	2.9	-6.5	0.1
Netherlands	47.3	50.8	52.2	53.8	51.4	49.4	-3.9	1.3
Norway	9.6	9.7	10.0	10.2	9.9	9.7	-2.0	0.2
Poland	21.1	21.9	23.3	24.2	25.3	25.5	0.8	0.7
Portugal	15.4	16.0	14.4	14.4	13.6	12.9	-5.1	0.3
Romania	10.9	10.5	10.3	10.3	10.4	9.9	-4.8	0.3
Russian Federation	123.3	121.9	127.1	126.3	131.6	124.9	-5.1	3.2
Slovakia	3.2	3.8	4.0	4.1	4.3	3.9	-9.3	0.1
Spain	77.6	78.8	78.1	78.8	77.1	72.9	-5.4	1.9
Sweden	15.3	15.1	15.5	14.7	14.5	13.7	-5.5	0.4
Switzerland	12.0	12.2	12.6	11.3	12.1	12.3	1.7	0.3
Turkey	31.0	30.2	29.5	30.5	30.9	28.8	-6.8	0.7
Turkmenistan	4.2	4.4	5.3	5.0	5.2	5.2	0.0	0.1
Ukraine	14.2	13.5	14.1	15.5	15.3	14.1	-7.8	0.4
United Kingdom	81.7	83.0	82.3	79.2	77.9	74.4	-4.5	1.9
Uzbekistan	6.5	5.3	5.0	4.8	4.9	4.9	0.0	0.1
Other Europe & Eurasia	24.1	25.8	26.3	27.7	28.3	27.6	-2.5	0.7
Total Europe & Eurasia	954.5	959.6	970.4	954.0	956.7	913.9	-4.5	23.5

contd.....

Table 9.2(Contd.) : COUNTRY-WISE ESTIMATES OF CONSUMPTION OF CRUDE OIL

Country/ Region	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	(Million tonnes)	
							Change 2009-10 over 2008-09	2009-10 % Share of World's Total Consumption
Middle East								
Iran	73.7	77.3	80.8	80.9	84.9	83.6	-1.5	2.2
Kuwait	15.7	17.3	15.8	16.0	17.5	19.2	9.7	0.5
Qatar	4.6	5.5	6.1	6.9	7.8	8.2	5.1	0.2
Saudi Arabia	87.0	91.4	95.6	102.5	111.3	121.8	9.4	3.1
United Arab Emirates	17.7	19.0	20.3	21.6	23.0	21.8	-5.2	0.6
Other Middle East	69.7	71.8	75.6	77.4	80.2	81.7	1.9	2.1
Total Middle East	268.4	282.3	294.2	305.3	324.8	336.3	3.5	8.7
Africa								
Algeria	10.6	11.0	11.5	12.9	14.0	14.9	6.4	0.4
Egypt	26.8	29.8	28.7	30.6	32.6	33.7	3.4	0.9
South Africa	24.4	24.3	24.9	25.9	25.1	24.3	-3.2	0.6
Other Africa	64.5	66.2	65.4	67.9	71.2	71.2	0.0	1.8
Total Africa	126.3	131.4	130.5	137.3	143.0	144.2	0.8	3.7
Asia Pacific								
Australia	38.8	39.8	41.4	41.7	42.5	42.7	0.5	1.1
Bangladesh	4.0	4.6	4.5	4.5	4.5	4.5	0.0	0.1
China	318.9	327.8	347.7	364.4	380.3	404.6	6.4	10.4
China Hong Kong SAR	15.4	13.9	14.9	16.0	14.5	14.0	-3.4	0.4
India	120.2	119.6	120.4	132.9	143.6	148.5	3.4	3.8
Indonesia	61.6	61.4	59.5	60.3	61.9	62.0	0.2	1.6
Japan	241.1	244.1	237.5	229.3	221.9	197.6	-11.0	5.1
Malaysia	22.4	21.5	21.0	22.0	21.8	21.4	-1.8	0.6
New Zealand	6.9	7.1	7.2	7.2	7.3	6.8	-6.8	0.2
Pakistan	16.0	15.3	17.6	19.2	19.3	20.6	6.7	0.5
Philippines	15.9	14.8	13.3	14.0	12.2	12.1	-0.8	0.3
Singapore	38.1	40.9	44.0	47.4	50.4	52.1	3.4	1.3
South Korea	104.9	105.4	105.5	108.3	103.1	104.3	1.2	2.7
Taiwan	51.3	51.3	51.7	52.5	48.3	46.6	-3.5	1.2
Thailand	45.3	46.9	46.2	45.1	43.6	44.2	1.4	1.1
Other Asia Pacific	19.6	20.2	20.2	21.4	22.3	24.1	8.1	0.6
Total Asia Pacific	1120.4	1134.6	1152.5	1186.2	1197.5	1206.2	0.7	31.1
TOTAL WORLD	3828.1	3877.8	3916.2	3969.5	3959.9	3882.1	-2.0	100.0

Notes: Growth rates are adjusted for leap years.

* Inland demand plus international aviation and marine bunkers and refinery fuel and loss. Consumption of fuel ethanol and biodie: ^ Less than 0.05.

Differences between these world consumption figures and world production statistics are accounted for by stock changes, consumption of non-petroleum additives and substitute fuels, and unavoidable disparities in the definition, measurement or conversion of oil supply and demand data.

Source : Ministry of Petroleum & Natural Gas.

Table 9.3: Country-wise Estimates of Production of Natural Gas*

Country/ Region	(Million tonnes oil equivalent)						Change	2009-10
	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2009-10 over 2008-09	% Share of World's Total Production
North America								
USA	480.7	467.6	479.3	499.6	525.0	541.8	3.2	20.1
Canada	165.3	168.7	169.6	165.7	156.1	145.3	-6.9	5.4
Mexico	38.4	40.5	46.4	48.6	48.6	52.4	7.8	1.9
Total North America	684.4	676.8	695.3	713.9	729.7	739.4	1.3	27.4
South and Central America								
Argentina	40.4	41.1	41.5	40.3	39.7	37.2	-6.1	1.4
Bolivia	8.8	10.7	11.6	12.4	12.9	11.0	-14.2	0.4
Brazil	9.9	9.9	10.2	10.2	12.6	10.7	-15.2	0.4
Colombia	5.7	6.0	6.3	6.8	8.2	9.5	16.0	0.4
Trinidad & Tobago	24.6	27.9	32.8	35.1	35.4	36.5	3.3	1.4
Venezuela	25.6	24.7	28.3	28.8	26.3	25.1	-4.3	0.9
Other S. & Cent. America	3.6	4.5	5.2	5.9	6.4	6.3	-1.3	0.2
Total S. & Cent. America	118.6	124.8	136.0	139.6	141.4	136.4	-3.5	5.1
Europe and Euroasia								
Azerbaijan	4.1	4.7	5.5	8.8	13.3	13.3	-0.1	0.5
Denmark	8.5	9.4	9.4	8.3	9.1	7.6	-16.5	0.3
Germany	14.7	14.2	14.1	12.9	11.7	11.0	-6.5	0.4
Italy	10.7	10.0	9.1	8.0	7.6	6.7	-12.3	0.2
Kazakhstan	18.0	20.3	21.5	24.1	26.8	29.0	8.3	1.1
Netherlands	61.6	56.3	55.4	54.5	60.0	56.4	-5.9	2.1
Norway	70.6	76.5	78.9	80.7	89.3	93.1	4.3	3.5
Poland	3.9	3.9	3.9	3.9	3.7	3.7	0.0	0.1
Romania	11.5	11.2	10.7	10.4	10.2	9.8	-4.5	0.4
Russian Federation	516.0	522.1	535.6	532.8	541.5	474.8	-12.3	17.6
Turkmenistan	47.5	51.3	54.3	58.9	59.5	32.7	-44.9	1.2
Ukraine	16.5	16.7	16.9	16.9	17.1	17.3	1.4	0.6
United Kingdom	86.7	79.4	72.0	64.9	62.7	53.7	-14.3	2.0
Uzbekistan	48.8	48.6	49.0	53.2	56.0	58.0	3.6	2.2
Other Europe & Eurasia	9.9	9.7	10.3	9.7	9.2	8.6	-7.1	0.3
Total Europe & Eurasia	929.0	934.2	946.5	947.9	977.7	875.7	-10.4	32.5
Middle East								
Bahrain	8.8	9.6	10.2	10.6	11.4	11.5	1.0	0.4
Iran	76.4	93.2	97.7	100.7	104.7	118.1	12.8	4.4
Kuwait	10.7	11.0	11.3	10.9	11.5	11.3	-2.0	0.4
Oman	16.7	17.8	21.3	21.6	21.7	22.3	2.9	0.8
Qatar	35.3	41.2	45.6	56.9	69.3	80.4	16.0	3.0
Saudi Arabia	59.1	64.1	66.2	67.0	72.4	69.7	-3.7	2.6
Syria	5.8	4.9	5.1	5.0	4.9	5.2	5.9	0.2
United Arab Emirates	41.7	43.0	44.1	45.3	45.2	44.0	-2.8	1.6
Other Middle East	2.3	3.1	3.7	3.7	4.0	4.1	1.0	0.2
Total Middle East	256.6	287.9	305.2	321.7	345.0	366.4	6.2	13.6

Contd....

Table 9.3(Contd.): Country-wise Estimates of Production of Natural Gas*

(Million tonnes oil equivalent)

Country/ Region	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	Change 2009-10 over 2008-09	2009-10 % Share of World's Total Production
Africa								
Algeria	73.8	79.4	76.0	76.3	77.2	73.3	-5.1	2.7
Egypt	29.7	38.3	49.2	50.1	53.1	56.4	6.3	2.1
Libya	7.3	10.2	11.9	13.8	14.3	13.8	-3.8	0.5
Nigeria	20.5	20.2	25.6	31.5	31.5	22.4	-28.9	0.8
Other Africa	8.4	10.1	10.6	13.0	16.7	17.6	5.3	0.7
Total Africa	139.6	158.1	173.4	184.7	192.8	183.5	-4.9	6.8
Asia Pacific								
Australia	31.7	33.4	35.0	36.0	34.4	38.1	10.7	1.4
Bangladesh	11.9	13.1	13.8	14.6	16.1	17.8	10.3	0.7
Brunei	11.0	10.8	11.3	11.0	10.9	10.3	-6.1	0.4
China	37.3	44.4	52.7	62.3	72.3	76.7	6.1	2.8
India	26.3	26.7	26.4	27.1	27.5	35.3	28.6	1.3
Indonesia	63.3	64.1	63.2	60.9	62.7	64.7	3.3	2.4
Malaysia	48.5	55.0	57.0	58.1	58.5	56.4	-3.5	2.1
Myanmar	9.2	11.0	11.3	12.2	11.2	10.4	-6.9	0.4
New Zealand	3.5	3.2	3.3	3.6	3.4	3.6	4.1	0.1
Pakistan	31.0	32.0	32.5	33.1	33.8	34.1	1.1	1.3
Thailand	20.1	21.3	21.9	23.4	25.9	27.8	7.3	1.0
Vietnam	3.7	6.2	6.1	6.4	7.1	7.2	0.8	0.3
Other Asia Pacific	5.6	6.3	9.1	11.2	12.3	12.2	-0.7	0.5
Total Asia Pacific	303.2	327.4	343.6	360.0	376.1	394.6	4.9	14.6
TOTAL WORLD	2431.4	2509.1	2600.0	2667.8	2762.7	2696.0	-2.4	100.0

* Excluding gas flared or recycled.

Source : Ministry of Petroleum & Natural Gas.

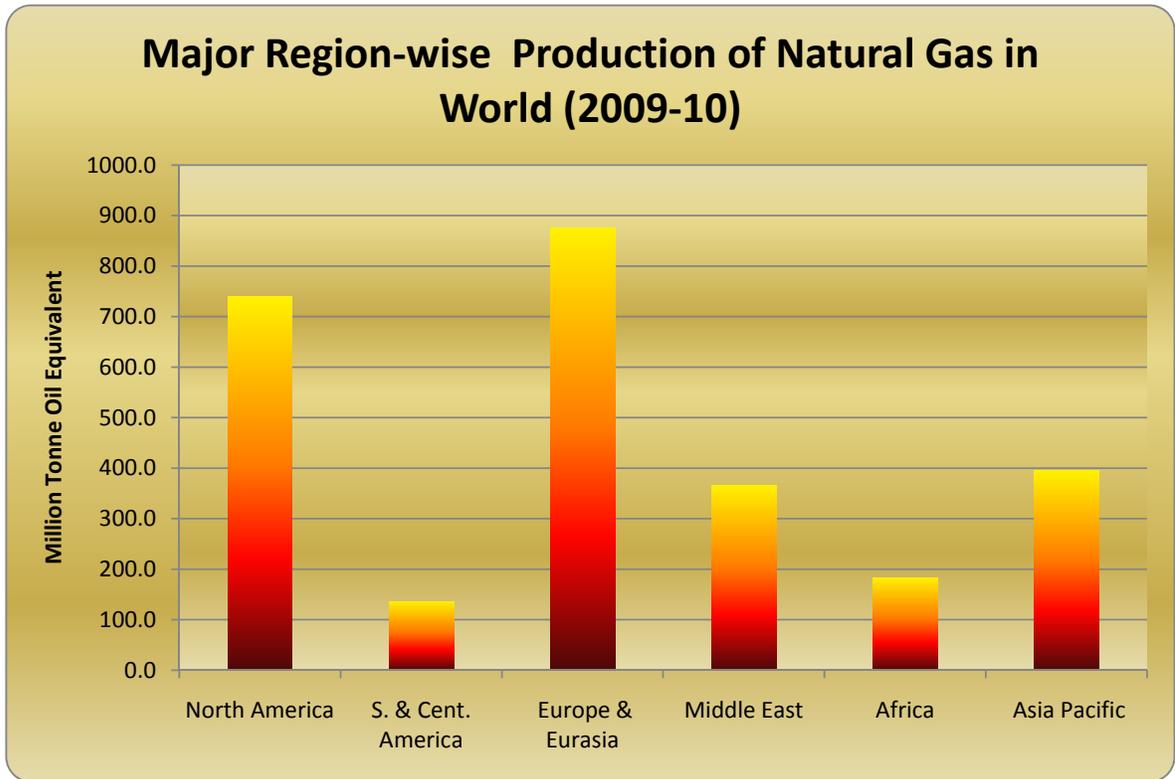


Figure 9.3

Table 9.4 : Country-wise Estimates of Consumption of Natural Gas

Country/ Region	(Million tonnes oil equivalent)						Change	2009-10
	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2009-10 over 2008-09	% Share of World's Total Consumption
North America								
USA	577.3	568.5	560.0	597.3	599.5	588.7	-1.8	22.2
Canada	85.6	88.3	87.3	87.0	88.4	85.2	-3.6	3.2
Mexico	48.0	48.0	54.8	56.8	59.4	62.7	5.4	2.4
Total North America	710.9	704.8	702.1	741.1	747.4	736.6	-1.4	27.8
South and Central America								
Argentina	34.1	36.4	37.6	39.5	40.0	38.8	-2.9	1.5
Brazil	16.8	17.4	18.5	19.8	22.7	18.3	-19.4	0.7
Chile	7.8	7.5	7.0	4.1	2.4	3.0	25.5	0.1
Colombia	5.7	6.0	6.3	6.7	6.8	7.8	15.2	0.3
Ecuador	0.3	0.3	0.7	0.5	0.4	0.4	9.3	0.0
Peru	0.8	1.4	1.6	2.4	3.1	3.1	2.3	0.1
Venezuela	25.6	24.7	28.3	28.9	27.6	26.8	-3.1	1.0
Other S. & Cent. America	14.7	16.6	21.7	22.3	24.0	22.9	-4.4	0.9
Total S. & Cent. America	105.7	110.3	121.7	124.2	126.9	121.2	-4.5	4.6
Europe and Eurasia								
Austria	8.5	9.0	8.5	8.0	8.6	8.4	-2.4	0.3
Azerbaijan	7.5	7.7	8.2	7.2	8.2	6.9	-16.2	0.3
Belarus	16.1	16.5	17.1	17.0	17.3	14.5	-16.2	0.5
Belgium & Luxembourg	14.9	14.9	15.3	15.2	15.3	15.6	1.8	0.6
Bulgaria	2.5	2.8	2.9	3.0	3.0	2.2	-25.3	0.1
Czech Republic	8.2	8.6	8.4	7.8	7.8	7.4	-5.8	0.3
Denmark	4.7	4.5	4.6	4.1	4.1	4.0	-3.9	0.1
Finland	3.9	3.6	3.8	3.5	3.6	3.2	-10.8	0.1
France	40.5	39.6	37.9	38.2	39.4	38.4	-2.7	1.4
Germany	77.3	77.6	78.5	74.6	73.1	70.2	-4.0	2.6
Greece	2.4	2.5	2.9	3.6	3.8	3.0	-19.9	0.1
Hungary	11.7	12.1	11.5	10.7	10.6	9.1	-14.5	0.3
Republic of Ireland	3.7	3.5	4.0	4.3	4.5	4.3	-4.1	0.2
Italy	66.5	71.2	69.7	70.0	70.0	64.5	-8.0	2.4
Kazakhstan	13.4	16.9	18.2	17.5	18.1	17.7	-2.4	0.7
Lithuania	2.8	2.9	2.9	3.3	2.9	2.5	-16.0	0.1
Netherlands	36.8	35.3	34.3	33.3	34.7	35.0	0.8	1.3
Norway	4.1	4.0	4.0	3.8	3.9	3.7	-5.1	0.1
Poland	11.8	12.3	12.3	12.3	12.5	12.3	-1.5	0.5
Portugal	3.4	3.8	3.7	3.9	4.2	3.9	-8.1	0.1
Romania	15.7	15.8	16.3	14.5	14.4	12.2	-15.1	0.5
Russian Federation	354.7	360.2	367.7	379.9	374.4	350.7	-6.3	13.2
Slovakia	5.5	5.9	5.4	5.1	5.2	5.1	-2.2	0.2
Spain	24.7	29.1	30.3	31.6	34.8	31.1	-10.6	1.2
Sweden	0.7	0.7	0.8	0.9	0.8	1.0	22.6	0.0
Switzerland	2.7	2.8	2.7	2.6	2.8	2.7	-2.8	0.1
Turkey	19.9	24.2	27.4	31.6	32.4	28.9	-10.8	1.1
Turkmenistan	13.5	14.5	16.5	19.1	17.1	17.8	4.0	0.7
Ukraine	61.7	62.1	60.3	56.9	54.0	42.3	-21.7	1.6
United Kingdom	87.7	85.2	80.9	81.9	84.4	77.9	-7.7	2.9
Uzbekistan	39.1	38.4	37.7	41.3	43.8	43.9	0.0	1.7
Other Europe & Eurasia	14.0	14.2	14.7	15.2	14.7	12.6	-14.2	0.5
Total Europe & Eurasia	980.5	1002.8	1009.3	1022.0	1024.6	952.8	-7.0	35.9

Contd...

Table 9.4(Contd.) : Country-wise Estimates of Consumption of Natural Gas*

(Million tonnes oil equivalent)

Country/ Region	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	Change 2009-10 over 2008-09	2009-10 % Share of World's Total Consumption
Middle East								
Iran	77.9	94.5	97.8	101.7	107.4	118.5	10.4	4.5
Kuwait	10.7	11.0	11.3	10.9	11.5	12.1	5.0	0.5
Qatar	13.5	16.8	17.6	17.7	18.2	19.0	4.5	0.7
Saudi Arabia	59.1	64.1	66.2	67.0	72.4	69.7	-3.7	2.6
United Arab Emirates	36.2	37.8	39.0	44.3	53.5	53.2	-0.6	2.0
Other Middle East	25.0	27.1	30.4	31.2	35.7	38.6	8.0	1.5
Total Middle East	222.4	251.3	262.3	272.8	298.7	311.0	4.1	11.7
Africa								
Algeria	19.8	20.9	21.4	21.9	22.8	24.0	5.2	0.9
Egypt	28.5	28.4	32.9	34.5	36.8	38.3	4.2	1.4
South Africa	-	-	-	-	-	-	-	-
Other Africa	21.3	22.1	21.5	25.4	26.9	22.3	-17.2	0.8
Total Africa	69.6	71.4	75.7	81.8	86.5	84.6	-2.2	3.2
Asia Pacific								
Australia	20.5	19.7	21.6	23.1	23.0	23.1	0.8	0.9
Bangladesh	11.9	13.1	13.8	14.6	16.1	17.8	10.3	0.7
China	35.7	42.1	50.5	62.6	73.2	79.8	9.1	3.0
China Hong Kong SAR	2.4	2.4	2.6	2.0	2.3	2.3	-2.9	0.1
India	28.7	32.1	33.5	36.1	37.2	46.7	25.5	1.8
Indonesia	29.0	29.9	29.9	28.2	30.0	33.0	10.0	1.2
Japan	69.3	70.7	75.4	81.2	84.4	78.7	-6.7	3.0
Malaysia	21.3	26.9	29.7	29.7	30.2	28.3	-6.3	1.1
New Zealand	3.5	3.2	3.3	3.6	3.4	3.6	4.1	0.1
Pakistan	31.0	32.0	32.5	33.1	33.8	34.1	1.1	1.3
Philippines	2.2	3.0	2.4	2.8	3.0	3.0	1.1	0.1
Singapore	5.9	5.9	7.7	7.7	8.3	8.7	5.4	0.3
South Korea	25.5	27.3	28.8	31.2	32.1	30.4	-5.2	1.1
Taiwan	9.2	9.3	10.0	10.6	10.5	10.2	-2.4	0.4
Thailand	26.9	29.3	30.0	31.8	33.6	35.3	4.9	1.3
Other Asia Pacific	7.8	10.9	11.0	11.7	12.3	11.9	-3.1	0.4
Total Asia Pacific	330.8	357.7	382.8	410.2	433.2	446.9	3.2	16.8
TOTAL WORLD	2420.0	2498.3	2553.9	2652.1	2717.3	2653.1	-2.4	100.0

^ Less than 0.05. # less than 0.05%

The difference between these world consumption figures and the world production statistics is due to variations in stocks at storage facilities and liquefaction plants, together with unavoidable disparities in the definition, measurement or conversion of gas supply and demand data.

Source : Ministry of Petroleum & Natural Gas.

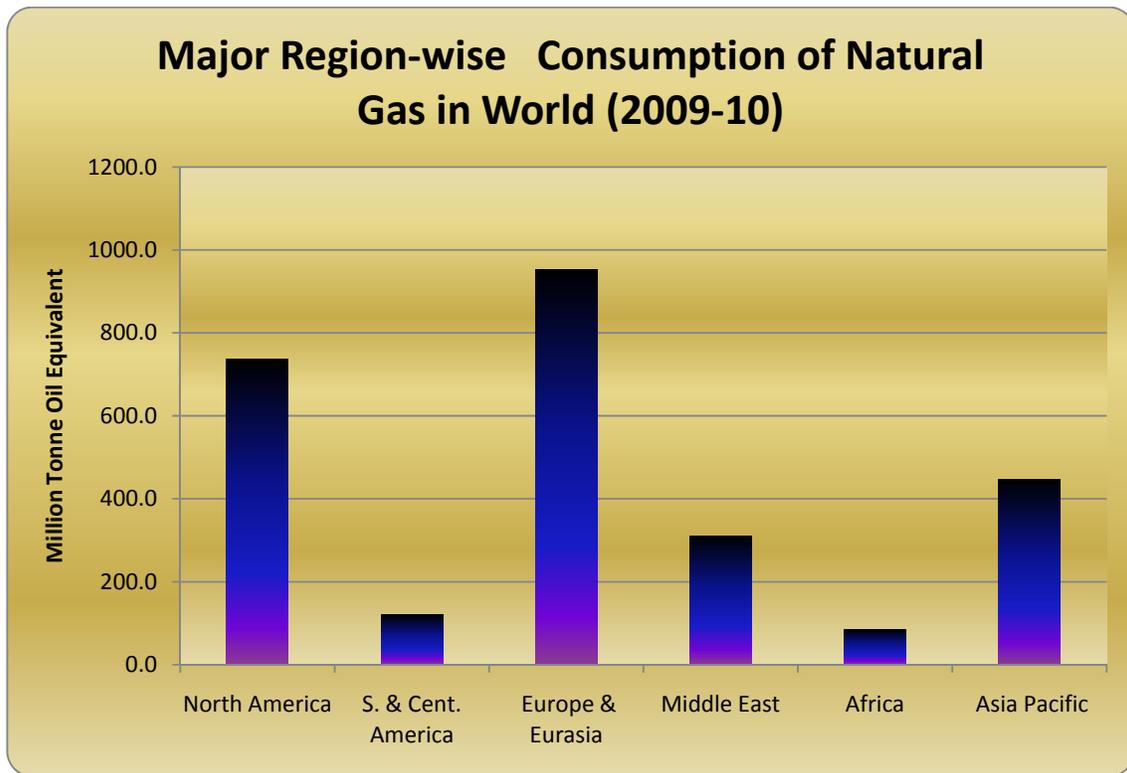


Figure 9.4

Definitions adopted by United Nations & India

1. Solid fuels

1. **Hard Coal:** Coal has a high degree of coalification with a gross calorific value over 24 MJ/Kg.(5700 Kcal/kg) on an ash-free but moist basis. Included are fines, middlings, slurry produced in the installations at pitheads.
2. **Lignite:** Brown coal is a coal with a low degree of coalification. It's gross calorific value is 5,700 K.cal./kg. or less on an ash-free but moist basis.
3. **Coke:** The solid product obtained from carbonization of coal or lignite at high temperature.

2. Liquid fuels

1. **Crude petroleum** comprises of the liquid product obtained from oil wells consisting predominantly of non-aromatic hydrocarbons (paraffinic, cyclanic, etc.) provided that they have not been subjected to any further processes other than those of decantation, dehydration or stabilization (removal of certain dissolved hydrocarbon gases for convenience of transport or to which have been added only hydrocarbons previously recovered by physical methods during the course of the above processes. Data for crude petroleum include shale oil and field condensate but exclude natural gas liquids from plants and oils obtained from the distillation of solid fuels.
2. **Liquified petroleum** gases include (i) hydrocarbons extracted by stripping of natural gas at crude petroleum and natural gas sources; (ii) hydrocarbons extracted by stripping of imported natural gas in installations of the importing country; and (iii) hydrocarbons produced both in refineries and outside refineries in the course of processing of crude petroleum or its derivatives. Included are mainly propane, butane, isobutane and ethane.
3. **Motor gasoline** comprises of a mixture of relatively volatile hydrocarbons with or without small quantities of additives, which have been blended to form a fuel suitable for use in spark-ignition internal combustion engines. Natural gasoline, aviation gasoline and naphtha's are excluded.
4. **Naphtha's** are refined or partly refined light distillates derived roughly between 27 and 221 degrees centigrade, which are to be further blended or mixed with other materials to make high grade motor gasoline or jet fuel, or to be used as raw materials for town gas or feed stocks to make various kinds of chemical products, or to be used as various solvents, depending on the character of naphtha's derived and the demands of various industries.
5. **Kerosene** comprises mixtures of hydrocarbons with a flash point above 38 degrees centigrade, distilling less than 90 per cent in volume at 210 degrees centigrade, including losses. It is a refined crude petroleum fuel in volatility between motor gasoline and gas oil, free of gasoline's and heavy hydrocarbons such as gas oil and

lubricating oil. It is used as a illuminant and as a fuel in certain types of spark-ignition engines such as those used for agricultural tractors and stationary engines. The data include those products, commonly named as burning oil, vaporizing oil, power kerosene and illuminating oil. Jet fuel, white spirit and naphtha's are excluded.

6. **Jet fuels** comprise of fuel meeting of the required properties for use in jet engines and aircraft-turbine engines, mainly refined from kerosene. Gasoline-type jet fuel (light hydrocarbons, also naphtha's type, intended for use in aviation gas-turbine units as opposed to piston power units) is included.
7. **Gas-diesel** oils comprise of gas oils (with a flash point in a closed vessel of at least 55 degrees centigrade and distilling 90 per cent or more in volume at 360 degrees centigrade), fuel oils (with a flash point in a closed vessel of between 55 and 190 degrees centigrade and needle penetration at 25 degrees centigrade of 400 or more), domestic fuel oil (with a viscosity of less than 12 centistokes at 20 degrees centigrade and an asphalt content of not less than 0.5 per cent). It is used as a fuel for internal combustion in diesel engines, as burner fuel in heating installations such as furnaces and for enriching water gas to increase its luminosity. The data refer to those products commonly called diesel fuel, diesel oil, gas oil, solar oil, etc.
8. **Residual fuel oil** comprises of mixtures of hydrocarbons with a viscosity of at least 49 centistokes at 20 degrees centigrade and an asphalt content of at least 1 per cent. It is crude petroleum residues, such as viscous residuum obtained by the refinery operations of crude petroleum after gasoline, kerosene and sometimes heavier distillates (such as gas oil or diesel oil) have been removed. It is commonly used by ships and industrial large scale heating installations as a fuel in furnaces of boilers. It is also known as mazout.
9. **Lubricants** are mixtures of hydrocarbons distilling less than 30 per cent in volume at 300 degrees centigrade with a flow point lower than 30 degrees centigrade. They are heavy liquid distillates obtained by refining crude petroleum and are used for lubricating purposes. They may be produced either from petroleum distillates or residues at refineries. Solid lubricants (e.g. grease) are excluded.
10. **Petroleum coke** is a solid residue consisting mainly of carbon, obtained by the distillation of heavier petroleum oils; used mainly in metallurgical process (excluding those solid residues obtained from carbonization of coal).
11. **Bitumen (Asphalt)** is a brown to black solid or semi-solid material obtained as a residue in the distillation of crude petroleum. It is used mainly in road construction. Natural asphalt is excluded.
12. **Refinery gas** is a non-condensable gas collected in petroleum refineries (it is also known as still gas).

3. Gaseous fuels

1. **Natural Gas** is a mixture of hydrocarbon compounds and small quantities of non-hydrocarbons existing in the gaseous phase, or in solution with oil in natural underground reservoirs. It may be sub-classified as associated gas (that originating from fields producing both liquid and gaseous hydrocarbons), dissolved gas, or non-associated gas (that originating from fields producing only hydrocarbons in gaseous form). Included are methane (CH₄) recovered from coal mines, sewage gas and natural gas liquefied for transportation. Excluded, however, are gases used for re-pressuring and re-injection, as well as gas flared, vented or otherwise wasted, and shrinkage accruing to processing for the extraction of natural gas liquids.
2. **Coke-oven gas** is a by-product of the carbonization process in the production of coke in coke ovens.
3. **Bio-gas** is a by-product of the fermentation of biomass, principally animal wastes by bacteria. It consists mainly of methane gas and carbon dioxide.

4. Electricity

1. **Installed capacity:** The net capacity measured at the terminals of the stations, i.e., after deduction of the power absorbed by the auxiliary installations and the losses in the station transformers.
3. **Utilities:** undertakings of which the essential purpose is the production, transmission and distribution of electric energy. These may be private companies, cooperative organisations, local or regional authorities, nationalised undertakings or governmental organisations.
4. **Hydro Electricity:** as energy value of electricity is obtained by dividing the electricity generation by the average efficiency of all hydro-power stations.
5. **Thermal Electricity** comprises conventional thermal plants of all types, whether or not equipped for the combined generation of heat and electric energy. Accordingly, they include steam-operated generating plants, with condensation (with or without extraction) or with back-pressure turbines, and plants using internal combustion engines or gas turbines whether or not these are equipped for heat recovery.
6. **Nuclear Electricity** is defined as the heat released by the reactors during the accounting period and is obtained by dividing the generation of nuclear electricity by average efficiency of all nuclear power stations.
7. **Production** comprises gross production, i.e. the amount of electric energy produced, including that consumed by station auxiliaries and any losses in the transformers that are considered integral parts of the station. Included is the total production of electric energy produced by pump storage installations.

8. **Imports, exports** refer to the amounts of electric energy transferred to and from the countries concerned, which are measured at the metering points on the lines crossing the frontiers. Included are imports and exports of electric energy made by means of high voltage lines crossing frontiers as well as imports and exports of electric energy made by means of low-voltage lines for use in the immediate vicinity of the frontier, if the quantities so transferred are known.
9. **Station use & loss:** included are consumption by station auxiliaries and losses in transformers which are considered as integral parts of the electric energy generating plants.
10. **Losses in transport & distribution** comprise of the losses in transmission and distribution of electric energy and losses in transformers which are not considered as integral parts of the electric energy generating plants. Included also is the electric energy consumed in pumping for pump storage installations.

5. Non-commercial Energy Sources

1. **Fuelwood** comprises of the volume of all wood (coniferous and non-coniferous) in the rough use for fuel purposes.
2. **Charcoal** comprises of the solid residue consisting mainly of carbon obtained by the destructive distillation of wood in the absence of air.
3. **Bagasse** is a cellulosic residue of the sugar-cane industry, which is often used as a fuel within the sugar milling industry.

Source: Energy Statistics: Definitions, Units of Measure and Conversion Factors-Studies in Methods Series 'F' No.44-UNITED NATIONS, NEW YORK – 1987

Conversion Factors

1 kilogram	=	2.2046 pounds
1 Pound	=	454 gm.
1 Cubic metres	=	35.3 cubic feet (gas)
1 Metric ton	=	1 Tonne
	=	1000 kilogram
1 joule	=	0.23884 calories
1 mega joule	=	10^6 joules = 238.84 x 10^3 calories
1 giga joule	=	10^9 joules = 238.84 x 10^6 calories
1 tera joule	=	10^{12} joules = 238.84 x 10^9 calories
1 peta joule	=	10^{15} joules = 238.84 x 10^{12} calories
One million tonnes of coal in		
	1970 - 81	= 20.93 peta joules of energy.
	1982 - 83	= 19.98 peta joules of energy.
	1984 - 89	= 19.62 peta joules of energy.
	1990 - 96	= 17.81 peta joules of energy.
	1997 - 99	= 17.08 peta joules of energy.
	1999 - 00	= 16.93 peta joules of energy.
	2000 - 01	= 16.88 peta joules of energy.
	2001 - 02	= 16.87 peta joules of energy.
	2002 - 03	= 16.68 peta joules of energy.
	2003 - 04	= 16.69 peta joules of energy.
	2004 - 05	= 16.60 peta joules of energy.
	2005 - 06	= 16.03 peta joules of energy.
	2006 - 07	= 16.14 peta joules of energy
	2007 - 08	= 15.91 peta joules of energy
	2008 - 09	= 15.70 peta joules of energy
	2009 - 10	= 15.70 peta joules of energy
One million tonnes of oil equivalent (MTOE)	=	41.87 peta joules of energy.
	=	4.1868×10^4 terajoule (TJ)
One billion cubic metre of natural gas	=	38.52 peta joules of energy.
One million cubic metre of natural gas	=	38.52 tera joules of energy.
	=	.03852 peta joules of energy.
One billion kilowatt hour of electricity	=	3.60 peta joules of energy.

ANNEX-III**Abbreviations**

ATF	:	Aviation Turbine Fuel
HSDO	:	High Speed Diesel Oil
LDO	:	Light Diesel Oil
LSHS	:	Low Sulphur Heavy Stock
LPG	:	Liquefied Petroleum Gas
MS/MOGAS	:	Motor Spirit/Motor Gasoline
F.O.	:	Furnace Oil
M.T.O.	:	Mineral Turpentine Oil
PET-COKE	:	Petroleum Coke
SBPS	:	Special Boiling Point Spirit
SKO	:	Superior Kerosene Oil
CPEs	:	Centrally Planned Economies
N.C.W.	:	Non-communist World
O.P.E.C.	:	Organisation of Petroleum Exporting Countries
O.E.C.D.	:	Organisation for Economic Cooperation & Development
EMEs	:	Emerging Market Economies (includes countries of South & Central America, Africa, Middle-east, Non-OECD Asia & Non-OECD Europe)
-	:	Not Available
MW	:	Megawatt
KW	:	Kilowatt
(P)	:	Provisional

Annexure- IV***Energy Data Collection Mechanisms-
Country Practice*****I. Coal and Coal Derivatives**

I.1. Organisational set up: The Coal Controller's Organisation is a Subordinate Office of the Ministry of Coal, having its headquarters at Kolkata and field offices at Dhanbad, Ranchi, Bilaspur and Nagpur. Statistics Division of Coal Controller's Organisation, functioning in Kolkata HQs under the overall guidance of Coal Controller, is at present having a Director level officer of the Indian Statistical Service as Head of the Division and one Deputy Director level officer of the Indian Statistical Service.

I.2. Current activities: Statistics Division is doing all works related to Coal Statistics under Ministry of Coal. Major role of Statistics Division may be summarised as follows:-

- Collection, Compilation, Analysis and Dissemination of Coal Statistics.
- Undertakes Annual Survey of Coal Industry to assess the coal production, despatch and stock at pithead
- To monitor the progress of captive coal and lignite blocks.
- To maintain a database of washeries in India.
- To provide no objection certificate in the matter of IEM (Industrial Entrepreneurs Memorandum) from SIA(Secretariat for Industrial Assistance) of D/o Industrial Promotion and Policy of M/o Commerce and Industry and to maintain corresponding database.

I.3. Future initiatives:- The need for Coal Controller Organisation's own survey is felt with an aim to develop a rich database on various aspects of coal statistics –Reserve, production, despatches, pit head closing stock, besides collecting colliery-wise exhaustive technical data.

I.4. Details of the data flows/items:

Data items –This organisation is collecting data on the following items on a regular basis:-

<u>ITEMS</u>	<u>PERIODICITY</u>
1. Reserve(from GSI),	Annual
2. Production (from coal/lignite company)	Monthly
3. Despatches (from coal/lignite company)	-do-
4. Pit head closing stock, “	-do-
5. Price (from non-captive coal companies)	-do-

6. Wagon loading (Rail) (from CIL/SCCL)	-do-
7. Export and import(from DGCI&S)	-do-
8. Coal consumption in steel (from SAIL/RINL/TSL)	Monthly
9. Coal consumption in power, cement etc sector	Annual
10. Captive coal and lignite mining(from CEA etc.),	Monthly
11. Washery in India(from different washery operators),	Monthly
12. World coal statistics(from International Energy Agency),	Annual
13. Colliery/Lignite-wise Production data,	Annual

□ Data Sources and Act/Order/Rule Etc.

The data are collected from different coal / lignite companies under the statutory power vested with the Coal Controller under the provisions of the Collection of Statistics Act, 1953, the Colliery Control Rule, 2004 & Coal Mines (Conservation & Development) Act, 1974 and publications of CIL, SAIL, and DGCI&S.

□ Methodology of Data collection:-

Monthly Data- Data are collected from coal companies (Pvt. & Public) on monthly basis on some major parameters.

Annual survey- Complete enumeration (through mailed questionnaire) and sample check by physical inspection for Annual survey of Coal and Lignite Industries.

Coverage : Entire coal and lignite producing sector.

Response : 100%

□ Details of the data items being compiled and periodicity

<u>ITEMS</u>	<u>PERIODICITY</u>
1. Coal Production data for PMO -	Monthly
2. Data for Infrastructure Bulletin of MOSPI through MOC-	Monthly
3. Monthly Coal Statistics.-	Monthly
4. Data for IIP (Covering Washed Coal, Middling & Hard Coke)-	Monthly
5. Data for IIP of mineral sector (Coal & Lignite-state wise)-	Monthly
6. Provisional Coal Statistics by April end of the next financial year-	Annual
7. Coal Directory of India-Vol.I (Coal Statistics) “	Annual
8. Coal Directory of India –Vol.II (Mine Statistics)	Annual
9. Growth Report (Executive Summary)-	Monthly
10. U.N. annual energy report- through CSO	Annual
11. IEA (for energy balance in case of non-OECD country: India)	Annual
12. Ad-hoc Reports	As and when required

I.5. Data collection problems:

As far as the coverage is concerned, there is no problem. Response of coal and lignite companies is satisfactory. But this organization is having a huge shortage of statistical officials. Due to lack of statistical support officials, data necessary for calculating value

addition, hard coke production price at consumer level etc. could not be collected. Also survey for value addition, coke production has been discontinued. As the Coal Controller, in general, is not having trained/skilled statistical manpower this organisation faces data quality problems at times To overcome this problem physical inspection is undertaken for production, dispatch data etc.

II. Petroleum and Natural Gas

The Ministry of Petroleum and Natural Gas is mandated to take measures for exploration and exploitation of petroleum resources including natural gas and coal bed methane, and also distribution, marketing and pricing of petroleum products.

II.1. Organizational set up and activities

Ministry of Petroleum has an Economic and Statistics Division headed by Economic Adviser. The Division provides economic inputs to the Divisions of the Ministry after detailed analysis of the plan and programmes. An exhaustive data base is maintained on production and trade of crude oil, natural gas, petroleum products and stages of capacity creation by the petroleum industry. The Economic and Statistics Division is involved in the plan formulation exercise of the public sector enterprises associated with petroleum exploration, production, refining and marketing. Also, all issues pertaining to foreign investment policy in the petroleum sector and issues relating to Double Taxation Avoidance Agreement (DTAA) on Income & Capital etc. are handled in the Division.

The Division brings out the following reports for monitoring the performance of Petroleum & Natural gas products:

- ❑ **Monthly & Quarterly Reports on Petroleum Statistics:** Collection, compilation and submission of Reports on:
 - (i) Production of Crude Oil, Natural Gas and Petroleum Products- to Ministries/Department/Committees etc. on monthly basis.
 - (ii) Quarterly report on Production Performance- to Ministry of Statistics & Programme Implementation;
 - (iii) Import/Export of Crude Oil and Petroleum Products- to the designated Ministries/Departments.
 - (iv) Joint Oil Data Initiative Statistics - to United Nations Statistics Division.

- ❑ **Publication of Annual Basic Statistics on Petroleum & Natural Gas Products and Annual Indian Petroleum & Natural Gas Statistics**

II.2. Details of the data flows and items

Data Collected: Production of Crude Oil, all Petroleum Products, Natural Gas, LNG, Imports/Exports of Oil & Petroleum products, Consumption of Petroleum Products and Refinery intake etc. on monthly basis and apart from these data other related data for publication of “Basic Statistics on Indian Petroleum & Natural Gas Products” and “Indian Petroleum & Natural Gas Statistics” being collected annually.

Periodicity & Data Sources: The data being collected on monthly, quarterly, annual basis from all Public Sector Undertakings and Private Oil Companies including oil refineries.

Methods of Data Collection: Data collected through electronic mail, FAX as well as hard copy by post.

Data Dissemination Methods: Monthly, Quarterly and Annual Progress Reports circulated to all concerned and also uploaded on Ministry's web site for the public user.

II.3. Provisions under which statutory returns are collected for the petroleum sector:

(i) For returns on crude oil and natural gas

- Principal Legislation:

THE OILFIELDS (REGULATION AND DEVELOPMENT) ACT, 1948
(53 of 1948) (8TH SEPTEMBER, 1948)

- Subordinate Legislation:

THE PETROLEUM AND NATURAL GAS RULES, 1959
(As amended from time to time)

Section 14: Royalty on petroleum and furnishing of returns and particulars:

(2) The lessee shall, within the first seven days of every month or within such further time as the Central Government or the State Government, as the case may be, may allow, furnish or cause to be furnished to the Central Government or the State Government as the case may be a full and proper return showing the quantity of all crude oil, casing head condensate and natural gas obtained during the preceding month from mining operations conducted pursuant to the lease. The monthly return required to be furnished shall be, as nearly as may be, in the form specified in the schedule annexed to these rules.

(ii) For returns on refinery output (petrol, diesel etc)

-Principal Legislation:

THE INDUSTRIES (DEVELOPMENT AND REGULATION) ACT, 1951, (ACT NO. 65 OF 1951)

-Subordinate Legislation:

Scheduled Industries (Submission of Production Returns) Rules, 1979.

Section 6: However, collection of data is also governed by the Gazette of India (Extraordinary) Part II-Section 3-Sub Section (i) order No.G.S.R.272(E) dated 16.04.1999 wherein clause 8 states that "Every oil refining company shall furnish to the

Central Government or an agency nominated by Central Government any and every information that may be asked for in regard to the procurement, stocking, movements (onshore or offshore), transfers, imports, exports and sales of crude oil and or all products at such period, in such manner and from such of the sources, as may be specified from time to time”.

III. Electricity

III.1 Organisational Setup

The Central Electricity Authority (CEA) is the nodal authority for supply of electricity data. It is a statutory organization under M/o Power. constituted under Section 3 of the repealed Electricity (Supply) Act, 1948. It was established as a part-time body in the year 1951 and made a full-time body in the year 1975.

With the objective of reforming the Power Sector, the Electricity Act, 2003 (No. 36 of 2003) has been enacted and the provisions of this Act have been brought into force with effect from 10th June, 2003.

III.2 Functions

As per section 73 of the Electricity Act, 2003, the Central Electricity Authority shall perform such functions and duties as the Central Government may prescribe or direct, and in particular to -

- a) advise the Central Government on the matters relating to the national electricity policy, formulate short-term and perspective plans for development of the electricity system and coordinate the activities of the planning agencies for the optimal utilization of resources to sub serve the interests of the national economy and to provide reliable and affordable electricity to all consumers;
- b) specify the technical standards for construction of electrical plants, electric lines and connectivity to the grid;
- c) specify the safety requirements for construction, operation and maintenance of electrical plants and electric lines;
- d) specify the Grid Standards for operation and maintenance of transmission lines;
- e) specify the conditions for installation of meters for transmission and supply of electricity;
- f) promote and assist in the timely completion of schemes and projects for improving and augmenting the electricity system;
- g) promote measures for advancing the skills of persons engaged in electricity industry;
- h) advise Central Government on any matter on which its advice is sought or make recommendation to that Government on any matter if, in the opinion of the Authority,

the recommendation would help in improving the generation, transmission, trading, distribution and utilization of electricity;

- i) collect and record the data concerning the generation, transmission, trading, distribution and utilization of electricity and carry out studies relating to cost, efficiency, competitiveness and such like matters;
- j) make public from time to time the information secured under this Act, and provide for the publication of reports and investigations;
- k) promote research in matters affecting the generation, transmission, distribution and trading of electricity;
- l) carry out, or cause to be carried out, any investigation for the purpose of generating or transmitting or distributing electricity;
- m) advise any State Government, licensees or the generating companies on such matters which shall enable them to operate and maintain the electricity system under their ownership or control in an improved manner and where necessary, in coordination with any other Government, licensee or the generating company owning or having the control of another electricity system;
- n) advise the Appropriate Government and the Appropriate Commission on all technical matters relating to generation, transmission and distribution of electricity; and
- o) discharge such other functions as may be provided under this Act.

III.3. Details of the data Flows/ Items

In exercise of the powers conferred by section 177, read with section 74 and clause (i) of section 73 of the Electricity Act, 2003, the Central Electricity Authority published the regulations vide Extra Ordinary Gazette notification dated 19th April 2007, namely:- **Central Electricity Authority (Furnishing of Statistics, Returns and Information) Regulations,2007**

(a) Sources of Statistics, Returns and Information

All licensees, generating companies and person(s) mentioned below, but not limited to, shall furnish to the Authority such statistics, returns or other information relating to generation, transmission, distribution, trading and utilization of electricity at such times and in such form and manner as specified under these regulations-

□ Licensees

- (i) Transmission Licensees;
- (ii) Distribution Licensees;
- (iii) Trading Licensees;
- (iv) Central Transmission Utility;
- (v) State Transmission Utilities;

- (vi) Appropriate Governments who are responsible for transmitting, distributing or trading of electricity;
- (vii) Damodar Valley Corporation established under sub-section (1) of section 3 of the Damodar Valley Corporation Act, 1948 (14 of 1948);
- (viii) Any person engaged in the business of transmission or supply of electricity under the provisions of the repealed laws or any act specified in the Schedule;
- (ix) Any person who intends to generate and distribute electricity in a rural area as notified by the State Government;
- (x) State Electricity Boards;
- (xi) Local authorities including Cantonment Boards;
- (xii) Deemed licensees and entities exempted from licence.
- (xiii) Bhakra Beas Management Board.

□ Generating companies

- (i) Generating companies established by appropriate Governments;
- (ii) Independent Power Producers;
- (iii) Appropriate Governments responsible for generating electricity;
- (iv) Bhakra Beas Management Board;
- (v) Any person engaged in the business of generating electricity under the provisions of the repealed laws or any act specified in the Schedule;
- (vi) Damodar Valley Corporation.

□ Person(s) generating electricity for own use:

- (i) All captive power producers;
- (ii) Any other person including Co-operative Society, Association of persons, body of individuals, etc. engaged in generating electricity for its or his own use.

□ Other entities

- (i) National Load Despatch Centre;
- (ii) Regional Load Despatch Centre(s);
- (iii) State Load Despatch Centre(s);
- (iv) Regional Power Committee(s);
- (v) High voltage or extra high voltage consumers of electricity.

(b) Formats for furnishing of statistics, returns or information –

The entities shall furnish the statistics, returns and information as per the formats annexed to these regulations titled “List of formats, frequency(ies) and target date(s)”. These formats can also be obtained from the website of the Central Electricity Authority. (website www.cea.nic.in)

(c) Time schedule for furnishing of statistics, returns or information –

The time schedule or targets for furnishing of statistics, returns or information is specified by the Authority on its prescribed formats.

(d) Frequency of submission of statistics, returns or information –

The frequency of submission i.e. daily, weekly, monthly, quarterly or annually is specified by the Authority in its prescribed formats.

(e) Manner of furnishing the statistics, returns or information –

The statistics, returns or information in the prescribed formats shall be furnished to the Authority preferably electronically or by post or courier or fax.

III.4 Data collection problems

The Central Electricity Authority is receiving data from various Public and Private Entities/ Utilities / Organizations/Industries. Though, it is mandatory to these organizations to furnish the correct, complete data in time, yet the following problems are being faced in collection of data.

1. Delay in furnishing data.
2. Furnishing incomplete/ incorrect data.
3. Non submission of data.

For smooth collection of the electricity data, CEA is installing electronic data collection system titled as Information Management System (IMS), where all the returns of electricity data can be directly furnished by concerned party (licensees, generating companies, entities etc.)

IV. New and Renewable Energy**IV.1. Nodal ministry**

Ministry of New and Renewable Energy (MNRE) is the nodal Ministry of the Government of India at the National level for all matters relating to new and renewable energy. The Ministry has been facilitating the implementation of broad spectrum programmes including harnessing renewable power, renewable energy to rural areas for lighting, cooking and motive power, use of renewable energy in urban, industrial and commercial applications and development of alternate fuels and applications. In addition, it supports research, design and development of new and renewable energy technologies, products and services.

IV.2. Organisational setup

It is broadly organized into eight Groups dealing with 'Bio-Energy, Research & Development and TIFAD(Technology Information Forecasting, Assessment and Databank), Solar Energy', and Remote Village Electrification', Biomass and Wind Power', 'Energy for Urban, Industrial & Commercial Applications', 'Small Hydro and Information & Public Awareness', 'Hydrogen Energy' and 'Administration and Coordination'. In addition, the Ministry has an

Integrated Finance Division, which is functioning under the Special Secretary and Financial Adviser. The Ministry is classified as a Scientific Ministry.

IV.3. Current responsibilities

Formulating policies and programmes for the development of new and renewable sources of energy;

- (a) Coordinating and intensifying research and development activities in new and renewable sources of energy;
- (b) Ensuring implementing of Government's policies in regard to all matters concerning new and renewable sources of energy.

IV.4. Data flows

The basic data being compiled includes year wise and month wise no. of systems installed, their capacities, locations, etc. and is obtained from various stakeholders i.e. State Government Departments/Nodal Agencies, NGOs, Private Entrepreneurs, etc. Annual statistical information regarding achievements under different programmes/schemes is being included in the yearly Annual Report of the Ministry.