

ENERGY STATISTICS

2018
(Twenty Fifth Issue)

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

FOREWORD

Energy is one of the most important building blocks in human development, and as such, acts as a key factor in determining the economic development of all the countries. In an effort to meet the demands of a developing nation, the energy sector has witnessed a rapid growth. It is important to note that non-renewable resources are significantly depleted by human use, whereas renewable resources are produced by ongoing processes that can sustain indefinite human exploitation.

The use of renewable resources of energy is rapidly increasing worldwide. Solar power, one of the potential energy sources, is a fast developing industry in India. The country's solar installed capacity has reached 12.28 GW in year 2016-17 as compared to 6.76 GW during the year 2015-16. India has expanded its solar generation capacity by 5.52 GW during last one year which has led to downward trend in the cost and has increased usage. It clearly signifies that proper integration of policy interventions holds the key to achieve the sustainable development goals.

This publication, 25th in the series is an annual publication of CSO and is a continued effort to provide a comprehensive picture of Energy Sector in India. Energy Statistics is an integrated and updated database of reserves, installed capacity, production, consumption, import, export and whole sale prices of different sources viz. coal, crude petroleum, natural gas and electricity. Energy Balance and Sankey Diagram (Energy flow diagram) adds analytic value and thus increases its utility.

Energy indicators are being brought out by CSO as part of **Energy Statistics** for the use of policy makers as well as for comprehensive reporting. Indicators play a vital role by turning data into information for policy makers and help in decision-making. Keeping in view the importance of Energy Goal no 7 of Sustainable Development Goals, "Double the global rate of improvement in energy efficiency" has been accounted in the form of an indicator i.e. "Energy intensity measured in terms of primary energy and GDP". Disaggregation of the indicator i.e. energy Intensity at sectoral level i.e. Industry, agriculture and transport is also available in the publication.

Identification of list of indicators depends on various factors as transparency, scientific validity, robustness, sensitivity and the extent to which they are linkable to each other. However no single factor can decide all indicators and all situations since each indicator needs different data sets. The indicators are selected on the guidelines/approach followed by IAEA in their publication "Energy Indicators for Sustainable Development: Guidelines and Methodologies", which was brought out in corporation with United Nations Department of Economic and Social Affairs (UNDESA), International Energy Agency (IEA), Eurostat and European Environmental Agency (EEA).

The data in the publication has been sourced from the subject Ministries of the Government of India. The co-operation and support provided by these Ministries/Departments in compiling this publication is appreciated. I also appreciate the efforts of the officers of Economic Statistics Division, Central Statistics Office in bringing out this publication in a time bound manner. I hope the publication will prove to be useful to the policy makers, planners and researchers working in field of Energy. It shall be CSO's endeavour to continuously improve the publication both in content and design with the help of user feedback and data source agencies.

March 2018
New Delhi


M.V.S Ranganadham
DIRECTOR GENERAL, CSO

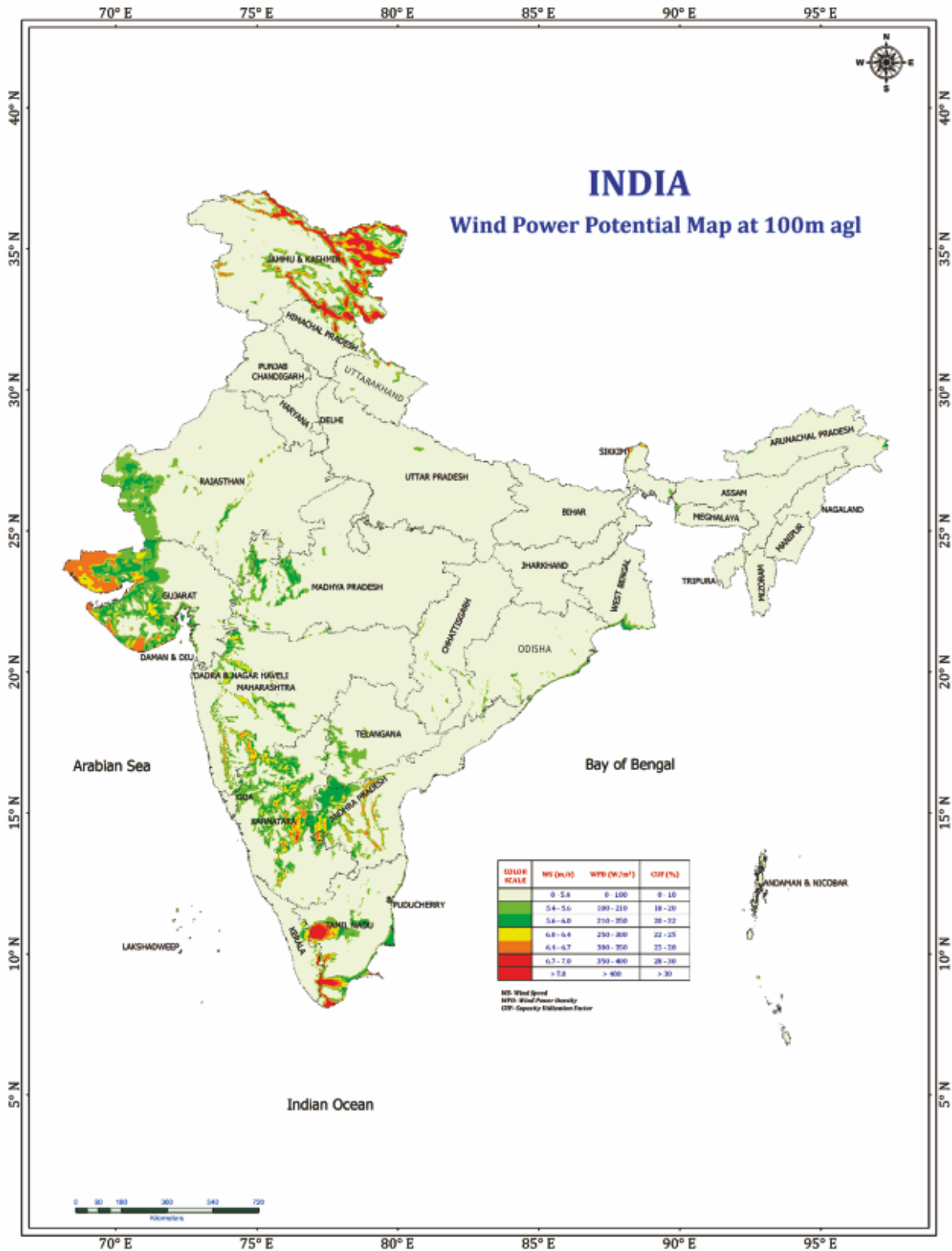
CONTENTS

	PAGE
Energy Maps of India	i
Map 1: Wind Power Potential at 100m agl	i
Metadata-Energy Statistics	ii-iv
Highlights of Energy Statistics 2016-17	v
Chapter 1 : Reserves and Potential for Generation	1-7
Highlights	1-4
Table 1.1: State-wise Estimated Reserves of Coal	5
Table 1.1(A): State-wise Estimated Reserves of Lignite	5
Table 1.2: State-wise Estimated Reserves of Crude Oil and Natural Gas	6
Table 1.3: Source wise and State wise Estimated Potential of Renewable Power	7
Chapter 2 : Installed Capacity and Capacity Utilization	8-20
Highlights	8-11
Table 2.1 : Installed Capacity of Coal Washeries in India	12-13
Table 2.2 : Installed Capacity and Capacity Utilization of Refineries of Crude Oil	14
Table 2.3 : Installed Generation Capacity of Electricity in Utilities and Non Utilities	15
Table 2.4 : Regionwise and State wise Installed Generating Capacity of Electricity(Utilities)	16
Table 2.5 : State wise and Source wise Total Installed Capacity of Grid Interactive Renewable Power	17-18
Table 2.6: Installed of Off-grid/ Decentralised Renewable Energy Systems/ Devices	19-20
Chapter 3: Production of Commercial Sources of Energy	21-29
Highlights	21-23
Table 3.1 : Production of Primary Sources of Conventional Energy	24
Table 3.2 : Production of Energy (in Peta Joules) by Primary Sources	24
Table 3.3 : Production of Coal and Lignite	25-26
Table 3.4 : Domestic Production of Petroleum Products	27
Table 3.5 : Gross and Net Production of Natural Gas	28
Table 3.6 : Gross Generation of Electricity in Utilities and Non-utilities	28-29
Chapter 4 : Foreign Trade in Commercial Sources Of Energy	30-32
Highlights	30-31
Table 4.1 : Foreign Trade in Coal, Crude Oil, Petroleum Products and Electricity in India	32
Chapter 5 : Availability of Energy Sources	33-36
Highlights	33-34
Table 5.1: Availability of Primary Sources of Conventional Energy	35
Table 5.2: Availability of Raw Coal and Lignite for Consumption	35
Table 5.3: Availability of Crude Oil, Petroleum Products and natural gas	36
Table 5.4: Availability of Electricity	36

	PAGE
Chapter 6 :Consumption Of Energy Resources	37-52
Highlights	37-42
Table 6.1: Consumption of Conventional Sources of Energy	43
Table 6.2: Growth in Energy Consumption and Energy intensity	44
Table 6.3: Consumption of Conventional Energy (Peta Joules)	44
Table 6.4: Industry wise Consumption of Raw Coal	45
Table 6.5: Industry wise Consumption of Lignite	45
Table 6.6: Consumption of Petroleum Products	46
Table 6.7: Sector-wise(end use) Consumption of Selected Petroleum Products	47-50
Table 6.8: Industry-wise Off-take of Natural Gas	50-51
Table 6.9: Consumption of Electricity (from utilities) by Sectors	51
Table 6.10: Electricity Generated(from Utilities), Distributed, Sold and Lost	52
Chapter 7 : Energy Balance	53-59
Highlights	53-55
Table 7.1: Energy Commodity Balance	56
Table 7.2: Energy Balance	57
Chapter 8 : Wholesale Price Index of Energy Commodities	60-62
Highlights	60-61
Table 8.1: Wholesale Price Indices of Energy Commodities	62
Chapter 9 : World Production and Consumption of Crude Oil & Natural Gas	63-73
Highlights	63-65
Table 9.1: Country wise Estimates of Production of Crude Oil	66-67
Table 9.2: Country-wise Estimates of Consumption of Crude Oil	68-69
Table 9.3: Country-wise Estimates of Production of Natural Gas	70-71
Table 9.4: Country-wise Estimates of Consumption of Natural Gas	72-73
Chapter 10 : Energy Indicators	74-81
Highlights	74-80
Table: 10.1: List of Energy Indicators	81
Annexures to Metadata	82-101
Annex I :Definitions adopted by United Nations and India	82-88
Annex II :Conversion Factors	89
Annex III :Abbreviations	90
Annex IV: Categori sation of Coal in India	91
Annex V :Energy Data Collection Mechanisms-Country Practice	92-101

ENERGY MAPS OF INDIA

Map: Wind Power Potential at 100m agl (2016-17)



Source: Ministry of New and Renewable Energy

METADATA-ENERGY STATISTICS

1. Contact	
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1.2. Contact organisation unit	Economic Statistics Division, CSO
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2. Statistical presentation	
2.1 Data sources	
The data contained in this publication has been sourced from the Ministry of Petroleum and Natural Gas, Central Electricity Authority, Office of Coal Controller, Ministry of New and Renewable Energy Office of the Economic Advisor, Ministry of Commerce and Industry and National Accounts Division, Ministry of Statistics and Programme Implementation.	
2.2. Data description	
The statistics present information about the reserves, installed capacity, potential for generation, production, consumption, import, export, wholesale price of different energy commodities and energy Indicators on economic dimension.	
2.3. Sector coverage	
Coal & Lignite, Petroleum & Natural Gas, Renewable Energy Resources and Electricity.(Data collection Mechanism is given in Annex:V.). The indicators are based on the guidelines/approach followed by IAEA in their publication “Energy Indicators for Sustainable Development: Guidelines and Methodologies”, which was brought out in corporation with United Nations Department of Economic and Social Affairs (UNDESA), International Energy Agency (IEA), Eurostat and European Environmental Agency (EEA). Also, the choice of indicators was made as per the availability of data from the subject ministries.	
2.4. Data content	
The Statistics are given by type of fuel and energy source. The publication includes analytical indicators viz. Growth Rates, Compound Annual Growth Rates (CAGR), Percentage Distributions and Economics Energy Indicators.	
2.5. Statistical unit	
Data are aggregated appropriately at national and state level.	
2.6. Statistical population	
Data covers all the energy commodity sources.	
2.7. Reference area	
The energy industries of the entire country are covered.	
2.8. Time coverage	
In the current publication the data given is for the period 2006-07 to 2015-16 and is based on statistics compiled by the Ministry of Petroleum and Natural Gas, Central Electricity Authority, Office of Coal Controller, Ministry of New and Renewable Energy. The data for Office of the Economic Advisor, Ministry of Commerce and Industry and National Accounts Division has been sourced for the year 2011-12 to 2016-17. Energy Indicators on Economic Dimension have compiled for the year 2016-17	
2.9. Base period	

Base year 2011-12 for WPI and GDP data.

2.10. Statistical concepts and definitions

The main Concepts and Definitions are given in Annex: I. (Annex: II & Annex: III respectively give certain Conversion Factors and Abbreviations used along with the method of estimation used for estimating midyear population figures) Annex IV gives categorization of coal in India Annex V gives details of definitions and concepts of Economic Energy Indicators.

3. Unit of measure

Energy quantities data are recorded in physical units relevant to the product in question (GWh for electricity, 1000 Tonne for petroleum products etc.). Prices are indicated by Wholesale Price Index. The Energy Balance is given in Kilo Tonne of oil equivalent. Consumption and Production of the Energy resources is also given in petajoules.

4. Reference period

Reference period of the Publication of "Energy Statistics -2018" is the financial year 2016-17 and the previous financial years since 2007-08. For Energy Indicators reference period is Financial Year 2016-17

5. Institutional mandate

5.1. Legal acts and other agreements

No legal acts, however this statistics is collected in view of the mandate of the Ministry in allocation of Business rules.

5.2. Data sharing

The publication is disseminated on the website of the Ministry (MOSPI) and is available free of cost.

6. Confidentiality

6.1. Confidentiality – policy and data treatment

Confidentiality of the data is maintained by the data source ministries.

7. Release policy

7.1. Release calendar

Publication of Energy Statistics is released on MOSPI's web-site in March every year.

7.2. User access

MOSPI disseminates Economic statistics on its website in an objective, professional and transparent manner in which all users are treated equitably. The detailed arrangements are governed by the dissemination policy of Government of India.

8. Dissemination format

8.1. News release

Publication on Energy Statistics is released annually.

8.2. Publications

Annual publication in pdf format is available on the website of MOSPI.

9. Accessibility of documentation

9.1. Documentation on methodology

Information on the relevant Energy indicators methodology can be found in the publication in ch -10.

10. Accuracy and reliability

10.1. Overall accuracy

Data on energy is published on the basis of information received from the source agencies. CSO compiles and analyses data received from the source agencies and then presents in the form of publication.

11. Timeliness and punctuality

11.1. Timeliness

Preliminary data on energy production and consumption and few energy indicators are available 12 months after the reference year. Final data for the year are published 24 months after the end of the reference year.

11.2. Punctuality

Annual publication on Energy Statistics is released by the end of March every year.

12. Data revision

12.1. Data revision - policy

The annual publication provides data on the last reference year and revisions for the year before. Revisions of entire time series when made by source agencies due to specific survey or data revision are incorporated in due time. The data revision by source Ministries is incorporated in the subsequent edition and hence some of the values may not match with the previous issues of this publication.

12.2. Data revision - practice

Preliminary data on energy production and consumption statistics for the year 2016-17 is published in current publication. Final data will be given in the next publication in March 2019.

13. Statistical processing

13.1. Source data

Energy data are collected from the source agencies at national level and presented in the publication. It is published in the ministry's web-site.

13.2. Frequency of data collection

Annual.

13.3. Data collection

Data is collected through e-mail or by post from the source agencies.

13.4. Data validation

Checks are carried out to the data before publishing it.

13.5. Data compilation

National figures are compiled by aggregating the data received from the source agencies.

13.6. Adjustment

No seasonal adjustment or temperature correction of the energy consumption is applied.

HIGHLIGHTS OF ENERGY SECTOR 2016-17

➤ Production & Consumption

- ❖ Compound Annual Growth Rate (CAGR) of Production of Coal & Lignite in 2016-17 over 2007-08 are 3.79% & 2.9% respectively whereas their consumption grew at 5.29% and 2.22% respectively during the same period.
- ❖ In case of Crude Oil and Natural Gas, during the period 2007-08 to 2016-17 the Production increased by 0.54% and (-) 0.16% whereas Consumption increased by 4.63% & (-) 2.47%.
- ❖ During the aforesaid period, Generation of Electricity increased by 4.05 % and Consumption of electricity increased by 7.82%.

Imports & Exports

- ❖ Exports of the Coal during 2007-08 to 2016-17 increased at a CAGR of 27.22% against the decrease in imports by (-) 3.84%.
- ❖ During the period 2007-08 to 2016-17, the imports of Natural gas and Crude Oil increased by 15.42% and 5.46% respectively.
- ❖ Export of Petroleum products, increased at a CAGR of 8.22% and its import increased by 12.57%.
- ❖ For electricity, the import increased at a CAGR of 7.11% whereas the export registered a CAGR of 30.29%.

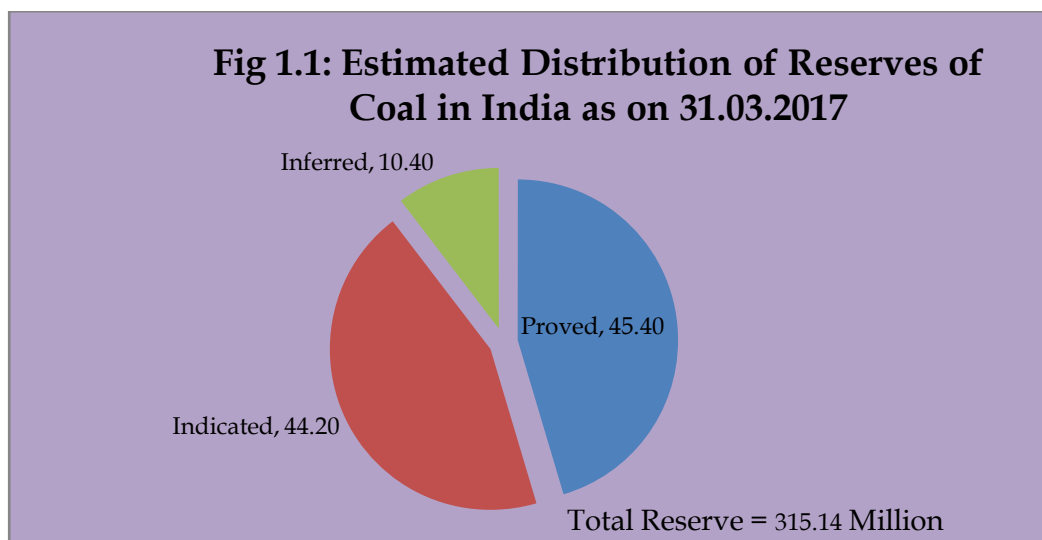
Usage of Energy

- ❖ The maximum energy intensive sector was Industrial sector accounting about 58 % of the total energy consumption.
- ❖ Per Capita Use of Energy has significantly increased with a CAGR of 3.54% during 2011-12 to 2016-17.

CHAPTER 1: RESERVES AND POTENTIAL FOR GENERATION

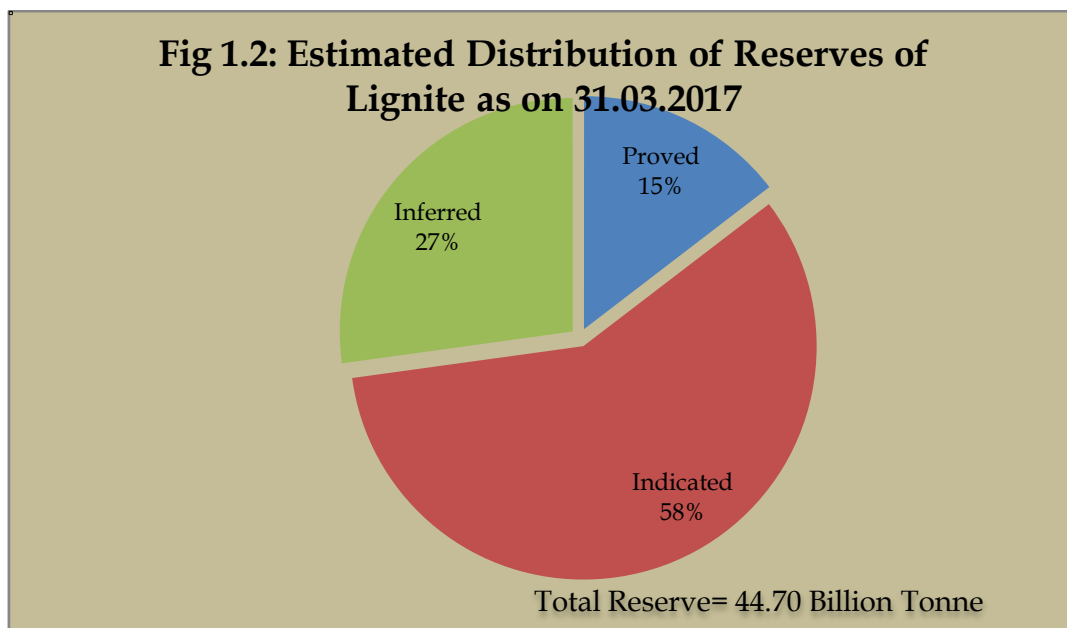
1.1 Coal and Lignite

- ❖ Coal deposits are mainly confined to eastern and south central parts of the country. The states of Jharkhand, Odisha, Chhattisgarh, West Bengal, Madhya Pradesh, Telangana and Maharashtra account for 98.20% of the total coal reserves in the country. The State of Jharkhand had the maximum share (26.16%) in the overall reserves of coal in the country as on 31st March 2017 followed by the State of Odisha (24.52%)(Table 1.1).
- ❖ As on 31.03.17, the estimated reserves of coal were 315.14 billion tonnes, an addition of 6.34 billion tonnes over the last year (Table 1.1). There has been an increase of 2.05% in the estimated coal reserves during the year 2016-17 with Maharashtra accounting for the maximum increase of 7.15%.



- ❖ The estimated total reserves of lignite as on 31.03.17 was 44.70 billion Tonnes against 44.59 billion tonnes on 31.03.16. (Table 1.1(A)).

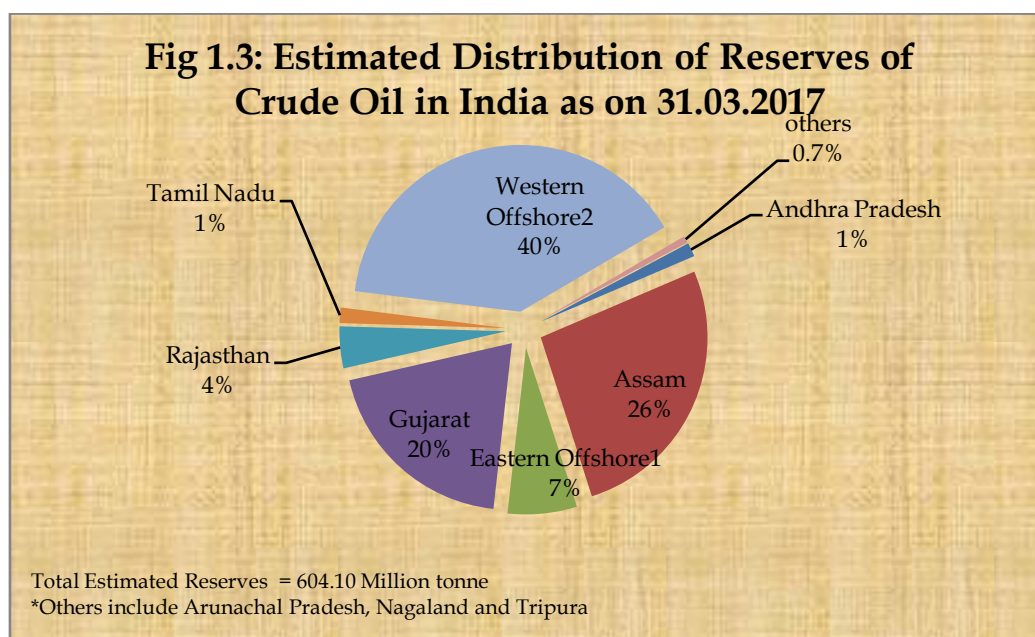
Fig 1.2: Estimated Distribution of Reserves of Lignite as on 31.03.2017



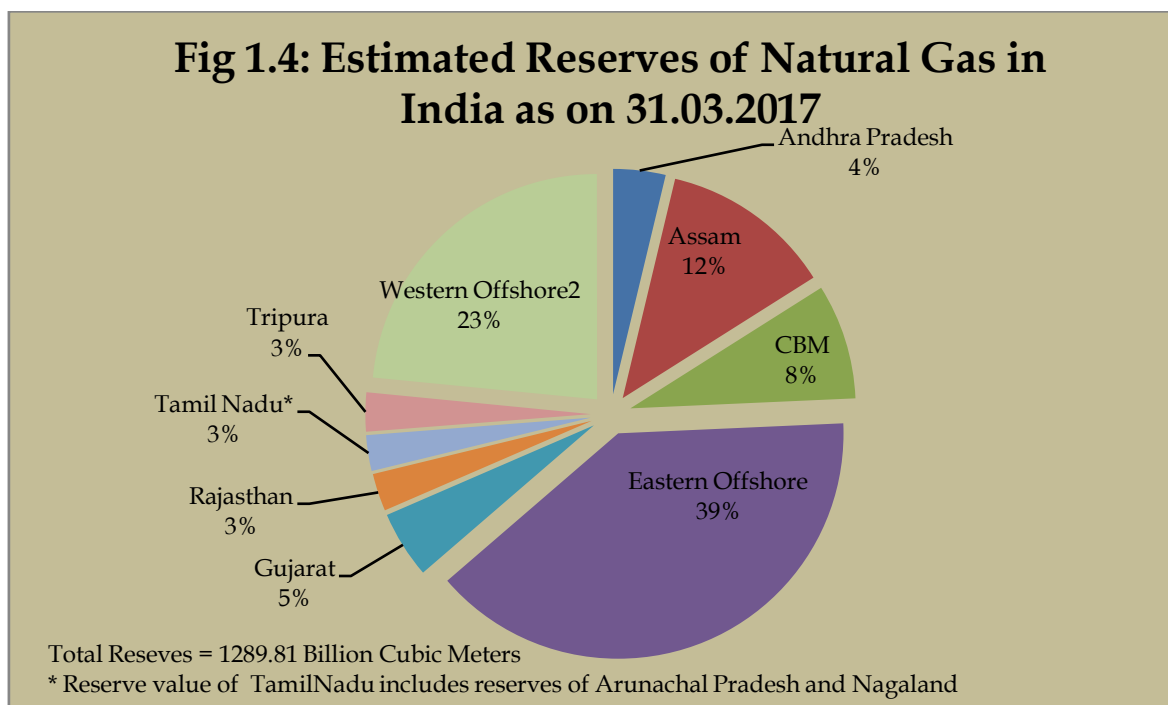
1.2 Petroleum and Natural gas

- ❖ The estimated reserves of crude oil in India as on 31.03.2017 stood at 604.10 million tonnes (MT) (Table 1.2) against 621.28 million tonnes on 31.03.2016.
- ❖ Geographical distribution of Crude oil indicates that the maximum reserves are in the Western Offshore (39.60%) followed by Assam (26.48%), whereas the maximum reserves of Natural Gas are in the Eastern Offshore (39.37%) followed by Western offshore (23.44%). (Table 1.2).

Fig 1.3: Estimated Distribution of Reserves of Crude Oil in India as on 31.03.2017



- ❖ There was decrease of 2.76% in the estimated reserve of crude oil for the country as a whole during 2016-17 as compared to the position a year ago. During the same period, estimated reserves of crude oil in Andhra Pradesh, Rajasthan, Arunachal Pradesh, Western Offshore, Gujarat and Assam decreased by 25.19, 22.60, 12.48, 3.21, 2.11 and 0.51% respectively, while the same in Eastern Offshore and Tamil Nadu increased by 11.75% and 0.04% respectively.
- ❖ The estimated reserves of Natural Gas in India as on 31.03.2017 stood at 1289.81 Billion Cubic Meters (BCM) as against 1227.40 BCM as on 31.03.2016 (Table 1.2).

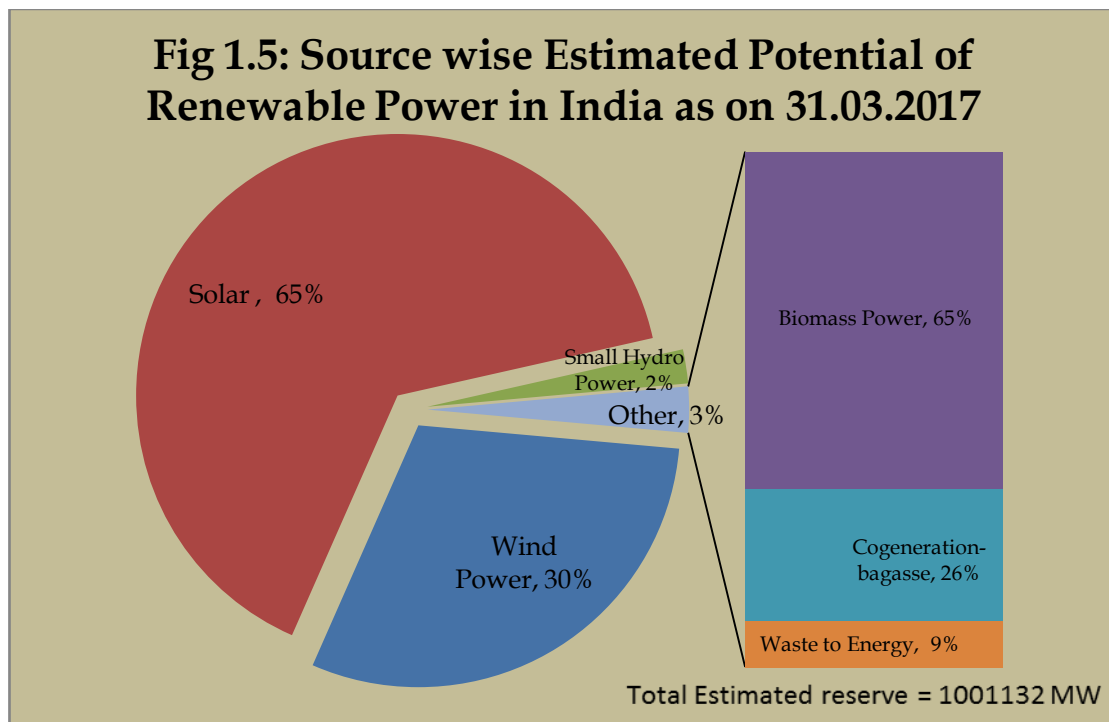


- ❖ The estimated reserves of Natural Gas increased by 5.08% over the last year. The maximum contribution to this increase has been from Tripura (27.65), followed by Andhra Pradesh (14.95).

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 31.03.17 is estimated at 10,01,132MW (Table 1.3). This includes solar power potential of 649342 MW (64.86%). wind power potential of 3,02,251 MW (30.19%) at 100 m hub height, SHP (small-hydro power) potential of 21,134 MW (2%), Biomass

power of 18,601 MW (1.86%), 7,260 MW (0.73%) from bagasse-based cogeneration in sugar mills, 2554 MW (0.26%) from waste to energy



- ❖ The geographic distribution of the estimated potential of renewable power as on 31.03.2016 reveals that Rajasthan has the highest share of about 14% (167276 MW), followed by Gujarat with 13% share (157158 MW) and Maharashtra with 10% share (119893MW), mainly on account of solar power potential.

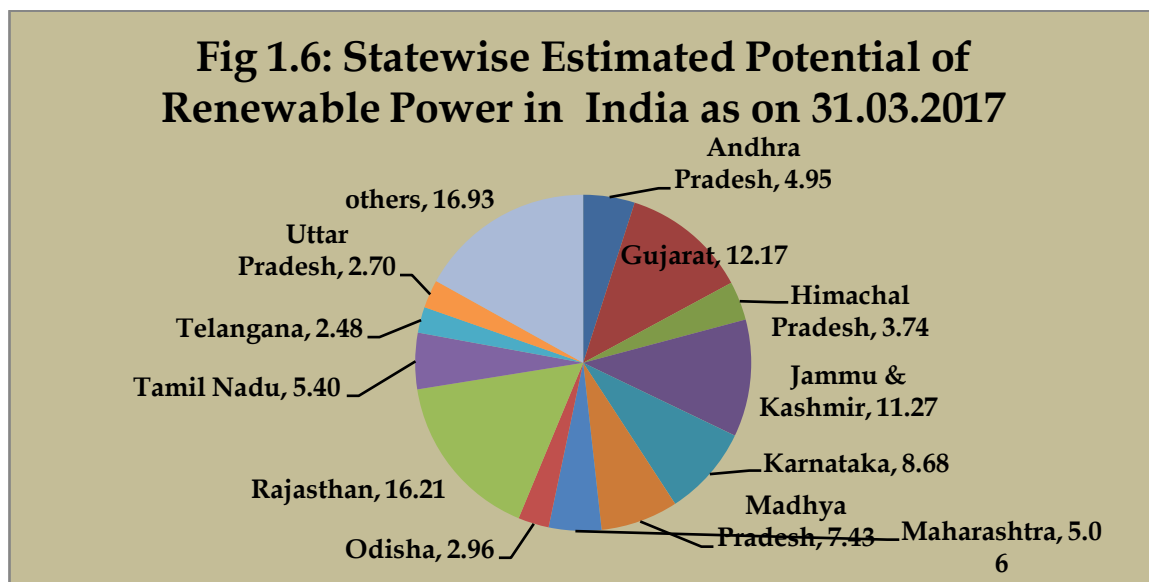


Table 1.1: Statewise Estimated Reserves of Coal in India as on 31.03.2016 and 31.03.2017

(in Billion Tonne)

States/ UTs	Proved		Indicated		Inferred		Total		Distribution (%)	
	31.03.2016	31.03.2017	31.03.2016	31.03.2017	31.03.2016	31.03.2017	31.03.2016	31.03.2017	31.03.2016	31.03.2017
Andhra Pradesh	0	0	1.15	1.15	0.43	0.43	1.58	1.58	0.51	0.50
Arunachal Pradesh	0.03	0.03	0.04	0.04	0.02	0.02	0.09	0.09	0.03	0.03
Assam	0.47	0.47	0.04	0.04	0.00	0.00	0.52	0.51	0.17	0.16
Bihar	0.00	0.00	0.00	0.00	0.16	1.35	0.16	1.35	0.05	0.43
Chhattisgarh	19.14	20.00	34.61	34.46	2.29	2.20	56.04	56.66	18.15	17.98
Jharkhand	42.32	44.34	32.30	31.88	6.55	6.22	81.17	82.44	26.29	26.16
Madhya Pradesh	10.92	11.27	12.70	12.76	3.29	3.65	26.91	27.67	8.71	8.78
Maharashtra	6.21	7.04	3.15	3.16	2.08	2.06	11.44	12.26	3.70	3.89
Meghalaya	0.09	0.09	0.02	0.02	0.47	0.47	0.58	0.58	0.19	0.18
Nagaland	0.01	0.01	0.00	0.00	0.31	0.40	0.32	0.41	0.10	0.13
Odisha	34.29	34.81	33.28	34.06	8.32	8.42	75.90	77.29	24.58	24.52
Sikkim	0.00	0.00	0.06	0.06	0.04	0.04	0.10	0.10	0.03	0.03
Uttar Pradesh	0.88	0.88	0.18	0.18	0.00	0.00	1.06	1.06	0.34	0.34
West Bengal	13.60	13.72	13.02	12.95	4.91	4.99	31.53	31.67	10.21	10.05
Telangana	10.13	10.40	8.59	8.54	2.70	2.52	21.41	21.46	6.93	6.81
All India Total	138.09	143.06	139.15	139.30	31.56	32.78	308.80	315.14	100.00	100.00
Distribution (%)	44.72	45.40	45.06	44.20	10.22	10.40	100.00	102.05		

Source: Office of Coal Controller, Ministry of Coal

[\(Download Table 1.1\)](#)

Table 1.1(A) :Statewise Estimated Reserves of Lignite in India as on 31.03.2016 and 31.03.2017

States/ UTs	Proved		Indicated		Inferred		Total		Distribution (%)	
	31.03.2016	31.03.2017	31.03.2016	31.03.2017	31.03.2016	31.03.2017	31.03.2016	31.03.2017	31.03.2016	31.03.2017
Gujarat	1.28	1.28	0.28	0.28	1.16	1.16	2.72	2.72	6.09	6.10
Jammu & Kashmir	0.00	0.00	0.02	0.02	0.01	0.01	0.03	0.03	0.06	0.06
Kerala	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.02
Pondicherry	0.00	0.00	0.41	0.41	0.01	0.01	0.42	0.42	0.93	0.93
Rajasthan	1.17	1.17	2.67	2.67	1.90	1.90	5.74	5.74	12.83	12.86
TamilNadu	3.74	4.09	22.99	22.63	8.95	9.06	35.68	35.78	80.05	80.01
West Bengal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
All India	6.18	6.54	26.37	26.01	12.04	12.14	44.59	44.70	100.00	100.00
Distribution (%)	13.86	14.63	59.14	58.34	27.00	27.23	100.00	100.24		

Source:Office of Coal Controller, Ministry of Coal

[\(Download Table 1.1A\)](#)

Table 1.2 :Statewise Estimated Reserves of Crude Oil and Natural Gas in India as on in 31.03.2016 and 31.03.2017

States/ UTs/ Region	Crude Petroleum (million tonnes)				Natural Gas (billion cubic metres)			
	31.03.2016		31.03.2017		31.03.2016		31.03.2017	
	Estimated Reserves	Distribution (%)	Estimated Reserves	Distribution (%)	Estimated Reserves	Distribution (%)	Estimated Reserves	Distribution (%)
Arunachal Pradesh	1.73	0.28	1.52	0.25	0.95	0.08	0.93	0.07
Andhra Pradesh	10.90	1.75	8.15	1.35	42.03	3.42	48.31	3.75
Assam	160.78	25.88	159.96	26.48	153.76	12.53	158.57	12.29
Cold Bed Methane (CBM)	0.00	0.00	0.00	0.00	126.48	10.31	106.58	8.26
Eastern Offshore ¹	36.39	5.86	40.67	6.73	451.46	36.78	507.76	39.37
Gujarat	121.16	19.50	118.61	19.63	63.06	5.14	62.28	4.83
Nagaland	2.38	0.38	2.38	0.39	0.09	0.01	0.09	0.01
Rajasthan	31.72	5.11	24.55	4.06	35.66	2.91	34.86	2.70
Tamil Nadu	8.99	1.45	9.00	1.49	31.68	2.58	31.98	2.48
Tripura	0.07	0.01	0.07	0.01	28.28	2.30	36.10	2.80
Western Offshore ²	247.13	39.78	239.20	39.60	293.96	23.95	302.35	23.44
Total	621.28	100.00	604.10	100.00	1227.40	100.00	1289.81	100.00

Note:

1. Proved and indicated Balance Recoverable Reserves.
2. Western offshore includes Gujarat offshore.

Source: Ministry of Petroleum & Natural Gas.

[\(Download Table 1.2\)](#)

Table 1.3 :Sourcewise and Statewise Estimated Potential of Renewable Power in India as on 31.03.2017

(in MW)

States/ UTs	Wind Power	Small Hydro Power	Biomass Power	Cogeneration-bagasse	Waste to Energy	Solar Energy	Total	
	@ 100 m						Estimated Reserves	Distribution (%)
Andhra Pradesh	44229	409	738	250	123	3840	49590	4.95
Arunachal Pradesh	-	2065	9	-	-	8650	10724	1.07
Assam	-	202	279	-	8	13760	14249	1.42
Bihar	-	527	646	200	73	11200	12646	1.26
Chhattisgarh	77	1098	246	10	24	18270	19715	1.97
Goa	1	5	26	-	-	88	120	0.01
Gujarat	84431	202	1226	50	112	35770	121791	12.17
Haryana	-	107	1375	100	24	4560	6167	0.62
Himachal Pradesh	-	3460	142	-	2	33840	37444	3.74
Jammu & Kashmir	-	1707	43	-	-	111050	112800	11.27
Jharkhand	-	228	107	-	10	18180	18525	1.85
Karnataka	55857	3726	1222	1400	-	24700	86906	8.68
Kerala	1700	647	864	-	36	6110	9358	0.93
Madhya Pradesh	10484	820	1386	-	78	61660	74429	7.43
Maharashtra	45394	786	1970	2200	287	64	50701	5.06
Manipur	-	100	15	-	2	10630	10747	1.07
Meghalaya	-	230	11	-	2	5860	6103	0.61
Mizoram	-	169	1	-	2	9090	9262	0.93
Nagaland	-	182	10	-	-	7290	7482	0.75
Odisha	3093	286	433	-	22	25780	29614	2.96
Punjab	-	578	3178	160	45	2810	6771	0.68
Rajasthan	18770	52	1122	10	62	142310	162326	16.21
Sikkim	-	267	2	-	-	4940	5209	0.52
Tamil Nadu	33800	604	1164	700	151	17670	54089	5.40
Telangana	4244	102	-	100	2	20410	24858	2.48
Tripura	-	47	3	-	176	2080	2306	0.23
Uttar Pradesh	-	461	1765	2000	5	22830	27061	2.70
Uttarakhand	-	1664	88	80	148	16800	18781	1.88
West Bengal	2	392	529	-	-	6260	7183	0.72
Andaman & Nicobar	8	7	-	-	6	-	21	0.00
Chandigarh	-	-	-	-	-	-	0	0.00
Dadar & Nagar Haveli	-	-	-	-	-	-	-	0.00
Daman & Diu	-	-	-	-	131	-	131	0.01
Delhi	-	-	-	-	-	2050	2050	0.20
Lakshadweep	8	-	-	-	3	-	11	0.00
Puducherry	153	-	-	-	1022	-	1175	0.12
Others*	-	-	-	-	-	790	790	0.08
All India Total	302251	21134	18601	7260	2554	649342	1001132	100.00
Distribution (%)	30.19	2	1.86	0.73	0.26	64.86	100.00	

* Industrial waste

Source: Ministry of New and Renewable Energy

[\(Download Table 1.3\)](#)

CHAPTER 2: INSTALLED CAPACITY AND CAPACITY UTILIZATION

2.1 Coal Washeries

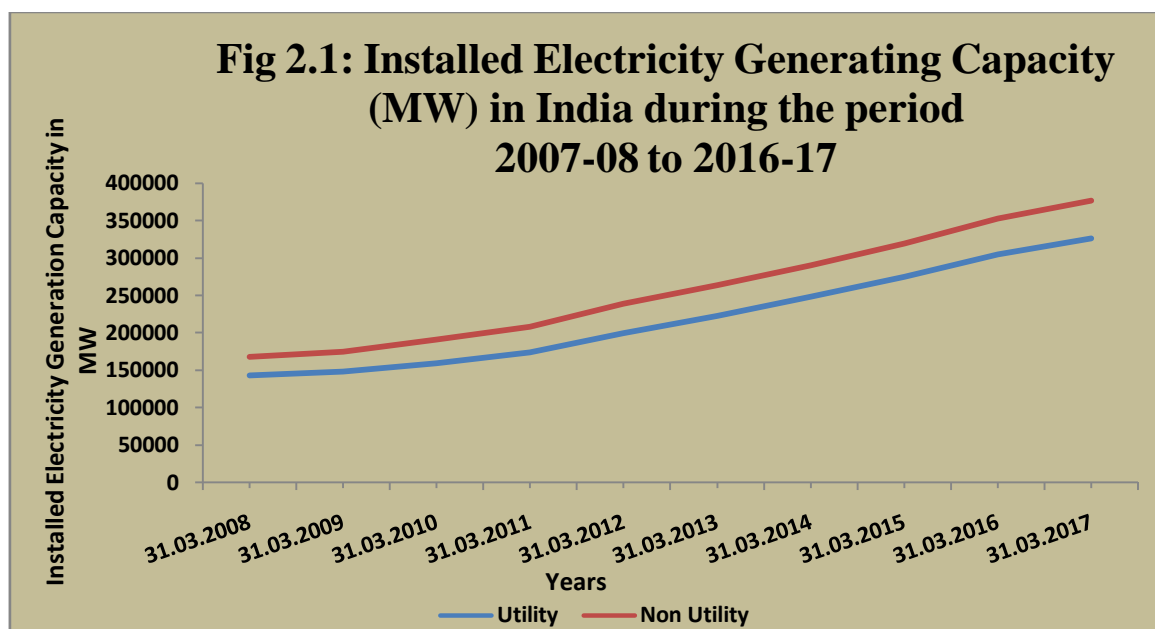
- ❖ Coal washing is an integral part of coal production. Raw coal coming from mines is washed to remove the ash contents to make them fit for feeding into boilers, particularly those of steel plants. Barring a few instances, a coal washery does not form part of a coal mine in India.
- ❖ Total installed capacity of washeries in the country is around 131.24 million tonne per year (MTY) as on 31.3.2017 (Table 2.1). As on 31.03.17, a total of 52 washeries, both PSUs and Private, were operating in the country considering both Coking (29.69 MTY) and Non-Coking Coal (101.55 MTY).

2.2 Refineries of crude oil

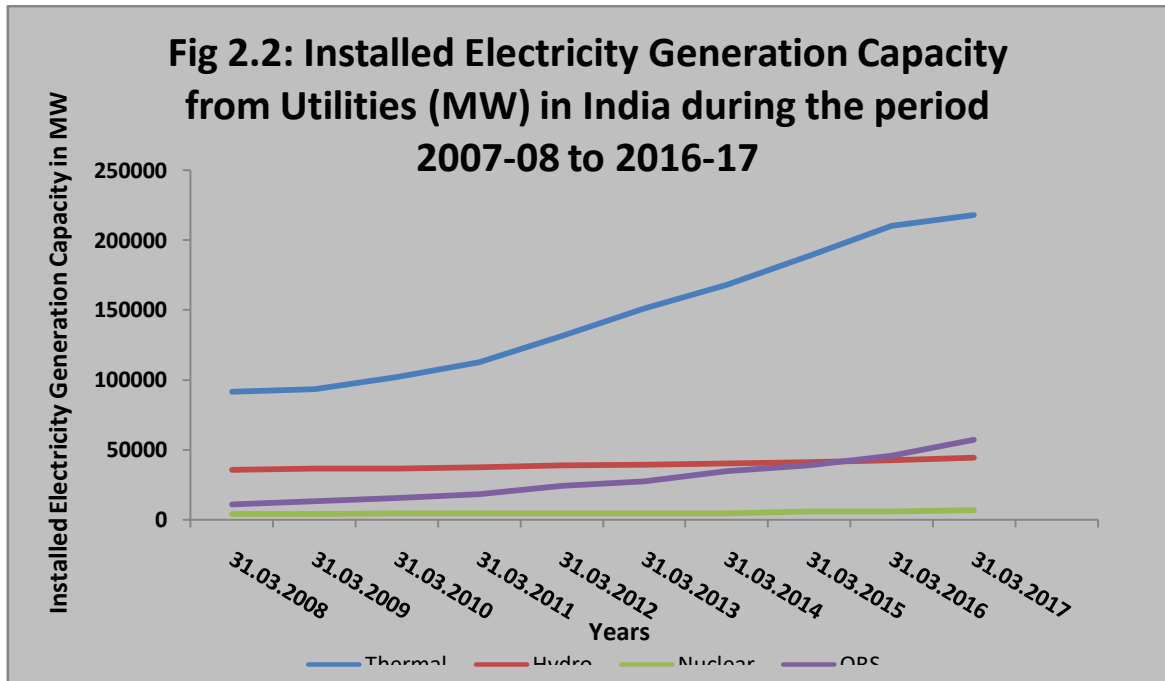
- ❖ As on 31.03.17, there were a total of 23 refineries in the country (Table 2.2) – 18 in the Public Sector, 3 in the Private sector and 2 in Joint Venture.
- ❖ The refining capacity of the country was 234 MMT on 31.03.2017 which is 4 MMT higher than the country's refining capacity (230 MMT) on 31.03.2016.
- ❖ The Refinery production (crude throughput) achievement was 245.362 MMT during 2016-17 which marks net increase of 5.4% over 2015-16 (232.865 MMT).
- ❖ Capacity utilization of the refineries was 108.3% during 2015-16 which decreased to 106.6% during 2016-17. In the Public Sector, the maximum increase in capacity utilization (27.7%) was at ONGC, Tatipaka, Andhra Pradesh. In the Private Sector the highest increase (9.1%) in capacity utilization was at Essar Oil Ltd. (EOL), Vadinar.
- ❖ Indian Oil Corporation, the state owned corporation had the highest refining capacity of 69.2 MMTY. All units of IOC together processed 65.191 MMT during 2016-17 as compared to 58.007 MMT during 2015-16. The capacity utilization of these refineries was 101.7% during 2016-17 as against 105.8% during 2015-16.
- ❖ All the private refineries taken together processed 91.093 MMT during 2016-17 which is higher than 88.662 MMT processed in 2015-16. The capacity utilization of these refineries during 2016-17 was 113.90% which is 2.8% higher than its capacity utilization (110.8%) in 2015-16.

2.3 Installed electricity generating capacity

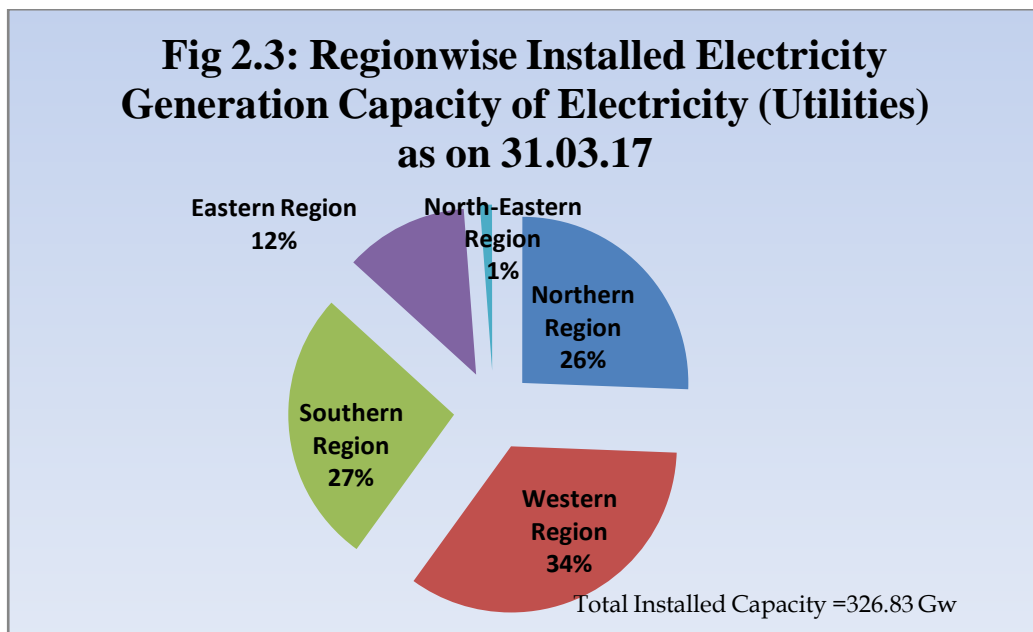
- ❖ The total installed capacity for electricity generation in the country has increased from 1,68,048 MW as on 31.03.2008 to 3,77,122 MW as on 31.03.2017, registering a compound annual growth rate (CAGR) of 8.42% (Table 2.3).



- ❖ Electricity generation capacity increased by 6.70% i.e. (23680 MW) from 2015-16 to 2016-17.
- ❖ The highest rate of annual growth from 2015-16 to 2016-17 in installed capacity was for Other Renewable sources (ORS) (24.08%) followed by Thermal Power (3.73%).
- ❖ The total Installed capacity of power utilities in the country increased from 1,43,061 MW in 31.3.2008 to 3,26,833 MW as on 31.3.2017, with a CAGR of 8.61% over the period.
- ❖ At the end of March 2017, thermal power plants accounted for an overwhelming 70.83% of the total installed capacity in the country, with an installed capacity of 267129 MW. Other renewable Sources (excluding hydro) come next with an installed capacity of 58680 MW, accounting for 15.56% of the total installed Capacity. The share of Hydro and Nuclear energy was only 11.81% and 1.80% of total installed capacity.
- ❖ Non-utilities accounted for 13.34% (50,289 MW) of the total installed electricity generation capacity.



- ❖ The geographical distribution of Installed generating capacity of electricity as on 31.03.17 (Table 2.4) indicates that Western Region (both central and state sector) accounted for the highest share (34%) followed by Southern Region (27%), Northern Region (26%), Eastern Region (12%) and North Eastern Region (1%).



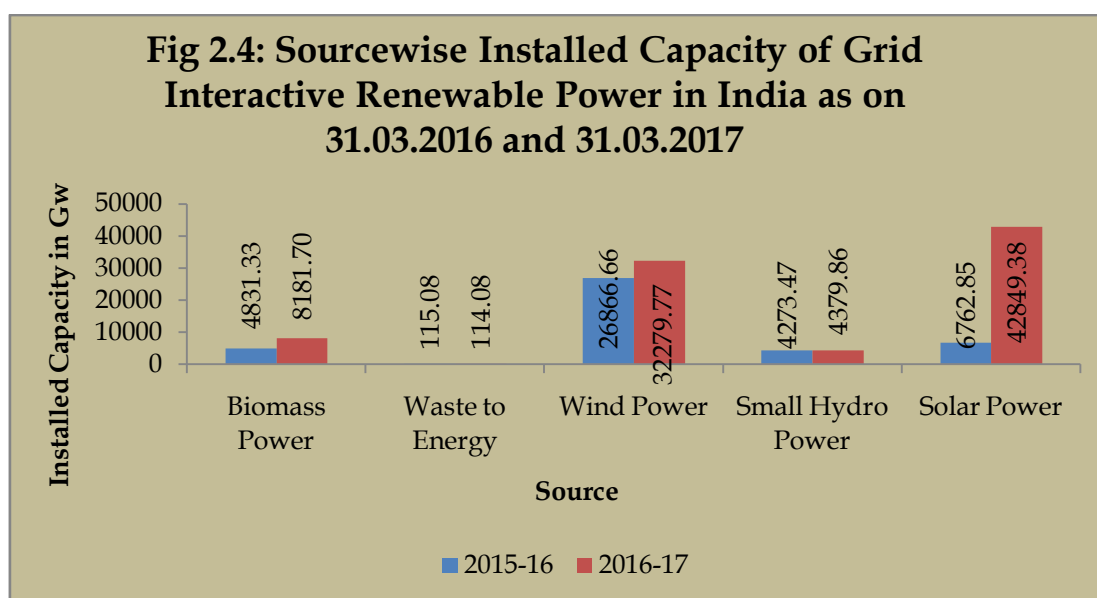
- ❖ Region wise growth in the installed capacity during 2016-17 reveals that Southern Region registered the highest annual growth of about 16.75%, followed by North

Eastern Region (9.58%), Northern Region (5.90%), Western Region (3.86%), and Eastern Region (-0.18%).

- ❖ Among all the states Daman & Diu registered highest annual growth (161.50%) in the installed capacity followed by Chandigarh (154.33%) and Sikkim (145.68%).

2.4 Grid Interactive Renewable Power

- ❖ The total installed capacity of grid interactive renewable power, which was 42849.38MW as on 31.03.2016, had gone up to 57244.23 MW as on 31.03.2017 indicating growth of 33.59% during the period (Table 2.5).
- ❖ Out of the total installed generation capacity of renewable power as on 31-03-2017, Wind power accounted for about 56.39%, followed by Solar power (21.47%) and Biomass power (14.29%).
- ❖ Tamil Nadu had the highest installed capacity of grid connected renewable power (10562.39 MW) followed by Maharashtra (7647.60 MW) and Karnataka(7457.97 MW), mainly on account of wind power.
- ❖ As on 31.03.2017, out of total number of Biogas plants installed (49.56 lakh) (Table 2.6), maximum number of plants installed were in Maharashtra (8.99 lakh) followed by Andhra Pradesh (5.49 lakh), Karnataka (4.9 lakh), Uttar Pradesh (4.41 lakh) and Gujarat (4.33 lakh).



- ❖ As on 31.03.2017, a total of 5,92,972 villages were electrified (Table 2.6) accounting for 99.2% of the total villages in the country.

**Table 2.1: Installed Capacity of Coal Washeries in India as on
31.03.17**

Sl. No.	Washery & Operator	State of Location	Capacity (MTY) 31.03.2017*
<u>COKING COAL :</u>			
1	Dudga-II, CIL	Jharkhand	2.00
2	Bhojudih, CIL	West Bengal	1.70
3	Patherdih, CIL	Jharkhand	1.60
4	Moonidih, CIL	Jharkhand	1.60
5	Sudamdih, CIL	Jharkhand	1.60
6	Mahuda, CIL	Jharkhand	0.63
7	Kathara, CIL	Jharkhand	3.00
8	Swang, CIL	Jharkhand	0.75
9	Rajrappa, CIL	Jharkhand	3.00
10	Kedla, CIL	Jharkhand	2.60
11	Nandan, CIL	Madhya Pradesh	1.20
	(A) CIL		19.68
12	Durgapur, SAIL	West Bengal	1.50
13	DCOP, DPL	West Bengal	1.35
14	Chasnala, IISCO	Jharkhand	1.50
15	Jamadoba, TISCO	Jharkhand	0.90
16	West Bokaro-II, TISCO	Jharkhand	1.80
17	West Bokaro-III, TISCO	Jharkhand	2.10
18	Bhelatand	Jharkhand	0.86
	(B) PSU & Private		10.01
	TOTAL (A + B)		29.69
<u>NON-COKING COAL</u>			
1	Dugda-I, CIL	Jharkhand	2.50
2	Madhuban, CIL	Jharkhand	2.50
3	Gidi, CIL	Jharkhand	2.50
4	Piparwar, CIL	Jharkhand	6.50
5	Kargali, CIL	Jharkhand	2.72
6	Bina, CIL	Uttar Pradesh	4.50
	(A) CIL		21.22
7	Dipka, Aryan coal beneficiation pvt. Ltd.	Chattisgarh	12.00
8	Gevra, Aryan coal beneficiation pvt. Ltd.	Chattisgarh	5.00
9	Panderpauni, Aryan coal beneficiation pvt. Ltd.	Maharashtra	3.00
10	Chakabuwa, Aryan Energy private ltd.	Chattisgarh	4.00
11	Indaram, Aryan Coal Benefication Pvt.Ltd.	Andhra Pradesh	-
12	Talcher, Aryan Energy Pvt. Ltd.	Odisha	2.00

*Provisional

Table 2.1(Contd.): Installed Capacity of Coal Washeries in India as on 31.03.17

Sl. No.	Washery & Operator	State of Location	Capacity (MTY)
			31.03.2017*
13	Wani, Kartikay Coal washeries pvt. ltd.(Aryan)	Maharashtra	2.50
14	Korba, ST-CLI Coal washeries ltd.	Chattisgarh	5.20
15	Ramagundam, Gupta coalfield & washeries ltd.	Andhra Pradesh	2.40
16	Sasti, Gupta coalfield & washeries ltd.	Maharashtra	2.40
17	Wani, Gupta coalfield & washeries ltd.	Maharashtra	1.92
18	Umrer, Gupta coalfield & washeries ltd.	Maharashtra	0.75
19	Bhandara, Gupta coalfield & washeries ltd.	Maharashtra	0.75
20	Gondegaon, Gupta coalfield & washeries ltd.	Maharashtra	2.40
21	Majri, Gupta coalfield & washeries ltd.	Maharashtra	2.40
22	Bilaspur, Gupta coalfield & washeries ltd.	Chattisgarh	3.50
23	Ghugus, Gupta coalfield & washeries ltd.	Maharashtra	2.40
24	Talcher, Global coal Mining (P) Ltd.	Odisha	2.50
25	Ib Valley, Global coal Mining (P) Ltd.	Odisha	3.25
26	Ramagundam, Global coal Mining (P) Ltd.	Andhra Pradesh	1.00
27	Wani, Bhatia International Ltd.	Maharashtra	3.73
28	Ghugus, Bhatia International Ltd.	Maharashtra	4.00
29	Jharsuguda, Bhatia International Ltd.	Odisha	1.50
30	Tamnar, Jindal Steel & Power Ltd.	Chattisgarh	6.00
31	Wani, Indo Unique Flame Ltd.	Maharashtra	2.40
32	Nagpur, Indo Unique Flame Ltd.	Maharashtra	0.60
33	Punwat, Indo Unique Flame Ltd.	Maharashtra	2.40
34	Dharamsthal, BLA Industries	Madhya Pradesh	0.33
	(B) Private		80.33
	TOTAL (A+B)		101.55
	Gross Total (Coking+Non-Coking)		131.24

* Provisional

Source: Office of Coal Controller, Ministry of Coal

[\(Download Table 2.1\)](#)

Table 2.2: Installed Capacity and Capacity Utilization of Refineries of Crude Oil during 2015-16 and 2016-17

Sl. No.	Refinery	Installed Capacity (TMTPA)		Crude Oil Processed (TMT)		Capacity Utilisation (%)		
		01.04.2016	01.04.2017	2015-16	2016-17*	2015-16	2016-17*	Change in Utilisation
A	Public Sector Refineries	135066	138966	127087	137388	105.8	101.7	-4.1
1	IOC RFINERIES	69200	69200	58007	65191	107.0	94.2	-12.8
1.1	IOC, Guwahati, Assam	1000	1000	904	864	90.4	86.4	-4.0
1.2	IOC, Barauni, Bihar	6000	6000	6545	6526	109.1	108.8	-0.3
1.3	IOC, Koyali, Gujarat	13700	13700	13820	13994	100.9	102.1	1.3
1.4	IOC, Haldia, West Bengal	7500	7500	7776	7689	103.7	102.5	-1.2
1.5	IOC, Mathura, Uttar Pradesh	8000	8000	8860	9230	110.8	115.4	4.6
1.6	IOC, Digboi, Assam	650	650	562	533	86.4	82.1	-4.4
1.7	IOC, Panipat, Haryana	15000	15000	15282	15638	101.9	104.3	2.4
1.8	IOC, Bongaigaon, Assam	2350	2350	2442	2486	103.9	105.8	1.9
1.9	IOC, Pradip, Odisha	-	15000	1817	8230	-	54.9	-
2	BPCL RFINERIES	21500	24400	24083	25362	112.0	118.0	5.9
2.1	BPCL, Mumbai, Maharashtra	12000	12000	13371	13541	111.4	112.8	1.4
2.2	BPCL, Kochi, Kerala	9500	12400	10712	11820	112.8	124.4	11.7
3	HPCL RFINERIES	14800	15800	17234	17846	116.4	120.6	4.1
3.1	HPCL, Mumbai, Maharashtra	6500	7500	8013	8510	123.3	130.9	7.6
3.2	HPCL, Visakh, Andhra Pradesh	8300	8300	9220	9335	111.1	112.5	1.4
4	CPCL RFINERIES	11500	11500	9644	10256	83.9	89.2	5.3
4	CPCL, Manali, Tamil Nadu	10500	10500	9100	9725	86.7	92.6	6.0
4.2	CPCL, Narimanam, Tamil Nadu	1000	1000	544	531	54.4	53.1	-1.3
5	NRL, Numaligarh, Assam	3000	3000	2520	2683	84.0	89.4	5.4
6	MRPL, Mangalore, Karanataka	15000	15000	15532	15965	103.5	106.4	2.9
7	ONGC, Tatipaka, Andhra Pradesh	66	66	67	86	102.1	129.8	27.7
B	Private Sector Refineries	80000	80000	88662	91093	110.8	113.9	3.0
1	RIL RFINERIES	60000	60000	69561	70174	235.8	237.8	2.0
1.1	RIL, DTA, Jammagar, Gujarat	33000	33000	32428	32823	98.3	99.5	1.2
1.2	RIL(SEZ), Jammagar, Gujarat	27000	27000	37133	37351	137.5	138.3	0.8
2	Essar Oil Ltd.(EOL), Vadinar	20000	20000	19101	20919	95.5	104.6	9.1
C	JOINT VENTURE	15000	15000	17116	16882	114.1	112.5	-1.6
1	BORL, Bina***	6000	6000	6402	6360	106.7	106.0	-0.7
2	HMEL, Bathinda**	9000	9000	10713	10521	119.0	116.9	-2.1
	Total (A+B+C)	230066	233966	232865	245362	108.3	106.6	-1.6

* Provisional

TMT:Thousand metric Tonnes TMTPA:Thousand metric Tonnes Per Annum

** : HPCL & Mittal Energy Investments Pvt. Ltd., a Joint Venture, Bathinda commissioned on April,2012.

***: BPCL ^ Oman Oil Company, a Joint Venture, Bina Commissioned on May,2011

Source: Ministry of Petroleum and Natural Gas

[\(Download Table 2.2\)](#)

Table 2.3 : Installed Electricity Generation Capacity in Utilities and Non-utilities in India from 2007-08 to 2016-17

(in Mega Watt = 10³ Kilo Watt)

As on	Utilities							
	Thermal				Hydro	Nuclear	ORS	Total
	Steam	Diesel	Gas	Total				
1	2	3	4	5	6	7	8	9
31.03.2008	76,019	1,202	14,686	91,907	35,909	4,120	11,125	1,43,061
31.03.2009	77,649	1,200	14,877	93,725	36,878	4,120	13,242	1,47,966
31.03.2010	84,198	1,200	17,056	1,02,454	36,863	4,560	15,521	1,59,398
31.03.2011	93,918	1,200	17,706	1,12,824	37,567	4,780	18,455	1,73,626
31.03.2012	1,12,022	1,200	18,381	1,31,603	38,990	4,780	24,503	1,99,877
31.03.2013	1,30,221	1,200	20,110	1,51,530	39,491	4,780	27,542	2,23,344
31.03.2014	1,45,273	1,200	21,782	1,68,255	40,531	4,780	34,988	2,48,554
31.03.2015	1,64,636	1,200	23,062	1,88,898	41,267	5,780	38,959	2,74,904
31.03.2016	1,85,173	994	24,509	2,10,675	42,783	5,780	45,924	3,05,162
31.03.2017	1,92,163	838	25,329	2,18,330	44,478	6,780	57,244	3,26,833
Growth rate of 2016-17 over 2015-16(%)	3.77	-15.69	3.35	3.63	3.96	17.30	24.65	7.10
CAGR 2007-08 to 2016-17(%)	9.72	-3.55	5.60	9.04	2.16	5.11	17.80	8.61

Note: Data for ORS has been revised with respect to year 2014, 2015 along with 2016 as per the data supplied by CEA

* ORS means Other Renewable Sources

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

CAGR: Compound Annual Growth Rate = ((Current Value/Base Value)^(1/nos. of years)-1)*100

Source : Central Electricity Authority.

[\(Download Table 2.3\)](#)

Table 2.3 (continue) : Installed Electricity Generation Capacity in Utilities and Non-utilities in India from 2007-08 to 2016-17

(in Mega Watt = 10³ x Kilo Watt)

As on	Non-Utilities							Grand Total
	Thermal				Hydro	ORS	Total	
	Steam	Diesel	Gas	Total				
	10	11	12	13	14	15	16	18= 9+17
31.03.2008	11,764	8,648	4,209	24,621	61	305	24,986	1,68,048
31.03.2009	13,818	8,750	3,621	26,188	111	375	26,674	1,74,639
31.03.2010	17,183	9,457	4,368	31,008	55	454	31,517	1,90,915
31.03.2011	19,112	9,655	5,054	33,821	57	567	34,444	2,08,071
31.03.2012	22,615	9,955	5,885	38,456	48	872	39,375	2,39,252
31.03.2013	23,890	11,148	4,498	39,535	67	1,124	40,726	2,64,070
31.03.2014	24,752	11,432	4,751	40,935	64	1,259	42,258	2,90,812
31.03.2015	26,089	12,009	5,193	43,291	65	1,301	44,657	3,19,561
31.03.2016	28,688	12,347	5,819	46,853	59	1,368	48,279	3,53,442
31.03.2017*	29,889	12,849	6,061	48,799	54	1,436	50,289	3,77,122
Growth rate of 2016-17 over 2015-16(%)	4.19	4.07	4.16	4.15	-8.46	5.00	4.16	6.70
CAGR 2007-08 to 2016-17(%)	9.77	4.04	3.71	7.08	-1.11	16.77	7.25	8.42

* ORS means Other Renewable Sources

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

CAGR: Compound Annual Growth Rate = ((Current Value/Base Value)^(1/nos. of years)-1)*100

Source : Central Electricity Authority.

[\(Download Table 2.3\)](#)

Table 2.4 : Regionwise and Statewise Installed Electricity Generation Capacity of (Utilities) in India as on 31.03.2016 and 31.03.2017

(in Gw)

States/UTs	Hydro		Thermal		Nuclear		RES		Total		Growth Rate(2015-16 to 2016-17)
	31.03.16	31.03.17	31.03.16	31.03.17	31.03.16	31.03.17	31.03.16	31.03.17	31.03.16	31.03.17	
Chandigarh	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.01	0.02	154.33
Delhi	0.00	0.00	2.49	2.49	0.00	0.00	0.01	0.06	2.50	2.55	1.68
Haryana	0.88	1.08	5.47	5.03	0.00	0.00	0.19	0.25	6.54	6.37	-2.66
Himachal Pradesh	2.14	2.37	0.00	0.00	0.00	0.00	0.79	0.83	2.94	3.20	9.00
Jammu & Kashmir	1.23	1.23	0.18	0.18	0.00	0.00	0.16	0.16	1.56	1.56	0.12
Punjab	2.23	2.57	7.79	7.79	0.00	0.00	0.76	1.15	10.79	11.52	6.76
Rajasthan	0.99	1.09	8.99	8.99	0.00	0.00	5.40	6.24	15.38	16.32	6.08
Uttar Pradesh	0.52	0.72	11.25	12.57	0.00	0.00	2.11	2.30	13.88	15.59	12.34
Uttarakhand	1.98	1.98	0.10	0.55	0.00	0.00	0.32	0.52	2.40	3.05	26.71
Central Sector NR	8.27	8.27	13.11	13.61	1.62	1.62	0.00	0.00	23.00	23.50	2.17
Sub-Total (NR)	18.25	19.31	49.38	51.21	1.62	1.62	9.75	11.52	79.00	83.66	5.90
Chhattisgarh	0.12	0.12	13.41	14.23	0.00	0.00	0.37	0.43	13.90	14.78	6.33
Gujarat	0.77	0.77	19.99	20.25	0.00	0.00	5.15	6.67	25.92	27.70	6.88
Madhya Pradesh	1.70	1.70	9.83	9.83	0.00	0.00	3.10	3.54	14.63	15.07	2.99
Maharashtra	3.33	3.33	23.62	23.74	0.00	0.00	7.36	7.65	34.31	34.72	1.18
Daman & Diu	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	161.50
D. & N. Haveli	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	0.00	0.00	0.05	0.05	1.48
Central Sector WR	1.52	1.52	16.03	16.69	1.84	1.84	0.00	0.00	19.39	20.05	3.40
Sub-Total (WR)	7.45	7.45	82.93	84.79	1.84	1.84	15.99	18.30	108.21	112.38	3.86
Andhra Pradesh	1.76	1.75	9.28	12.52	0.00	0.00	2.67	6.16	13.70	20.43	49.12
Telangana	2.14	2.31	6.79	5.47	0.00	0.00	0.76	1.55	9.69	9.32	-3.81
Karnataka	3.60	3.60	6.51	7.23	0.00	0.00	5.64	7.46	15.75	18.29	16.14
Kerala	1.88	1.88	0.41	0.33	0.00	0.00	0.26	0.34	2.55	2.55	0.34
Tamil Nadu	2.18	2.20	8.56	8.71	0.00	0.00	9.75	10.63	20.49	21.54	5.12
Puducherry	0.00	0.00	0.03	0.03	0.00	0.00	0.00	0.00	0.03	0.03	0.15
Lakshadweep	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-5.33
Central Sector SR #	0.00	0.00	10.45	12.05	2.32	3.32	0.00	0.00	12.77	15.37	20.36
Sub-Total (SR)	11.56	11.74	42.03	46.35	2.32	3.32	19.07	26.13	74.98	87.54	16.75
Bihar	0.00	0.00	0.21	0.21	0.00	0.00	0.18	0.29	0.39	0.50	28.84
DVC	0.14	0.14	9.04	8.69	0.00	0.00	0.00	0.00	9.18	8.83	-3.81
Jharkhand	0.13	0.13	2.09	1.78	0.00	0.00	0.02	0.03	2.24	1.93	-13.74
Odisha	2.06	2.06	5.42	5.42	0.00	0.00	0.18	0.19	7.66	7.68	0.16
West Bengal	0.98	0.99	7.60	7.40	0.00	0.00	0.41	0.42	8.98	8.81	-1.92
Sikkim	0.20	0.56	0.00	0.00	0.00	0.00	0.05	0.05	0.25	0.61	145.68
A. & N. Islands	0.00	0.00	0.04	0.04	0.00	0.00	0.01	0.01	0.05	0.05	2.89
Central Sector ER	0.78	0.86	9.89	10.08	0.00	0.00	0.00	0.00	10.67	10.94	2.58
Sub-Total (ER)	4.29	4.74	34.29	33.62	0.00	0.00	0.85	1.00	39.43	39.36	-0.18
Arunachal Pradesh	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.10	0.10	0.10	-0.01
Assam	0.10	0.10	0.36	0.41	0.00	0.00	0.03	0.05	0.49	0.55	11.93
Manipur	0.00	0.00	0.04	0.04	0.00	0.00	0.01	0.01	0.04	0.04	0.07
Meghalaya	0.28	0.28	0.00	0.00	0.00	0.00	0.03	0.03	0.31	0.31	0.00
Mizoram	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.04	0.04	0.04	13.67
Nagaland	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.03	0.03	1.63
Tripura	0.00	0.00	0.17	0.17	0.00	0.00	0.02	0.02	0.19	0.19	0.05
Central Sector NER	0.86	0.86	1.48	1.75	0.00	0.00	0.00	0.00	2.34	2.61	11.78
Sub-Total (NER)	1.24	1.24	2.04	2.37	0.00	0.00	0.26	0.28	3.55	3.89	9.58
Total States	31.36	32.97	159.72	164.14	0.00	0.00	45.92	57.24	237.00	254.36	7.32
Total Central	11.43	11.51	50.96	54.19	5.78	6.78	0.00	0.00	68.16	72.47	6.32
Total All India	42.78	44.48	210.68	218.33	5.78	6.78	45.92	57.24	305.16	326.83	7.10

RES: Other Renewable sources excluding hydro

Includes NLC-Central capacity also

Sub-totals/Totals may not tally due to conversion to GW and rounding off.

Source : Central Electricity Authority.

[\(Download Table 2.4\)](#)

Table 2.5: Statewise and Sourcewise Installed Capacity of Grid Interactive Renewable Power as on 31.03.2016 and 30.03.2017

(In MW)

States/ UTs	Bio-Power				Wind Power	
	Biomass Power		Waste to Energy		Wind Power	
	31.03.16	31.03.17	31.03.16	31.03.17	31.03.16	31.03.17
Andhra Pradesh	380.75	378.20	58.16	58.16	1431.45	3618.85
Arunachal Pradesh	-	-	-	-	-	-
Assam	-	-	-	-	-	-
Bihar	43.42	113.00	-	-	-	-
Chhattisgarh	279.90	228.00	-	-	-	-
Goa	-	-	-	-	-	-
Gujarat	56.30	65.30	-	-	4037.50	5340.62
Haryana	45.30	96.40	-	-	-	-
Himachal Pradesh	-	-	-	-	-	-
Jammu & Kashmir	-	-	-	-	-	-
Jharkhand	-	-	-	-	-	-
Karnataka	872.18	1452.00	1.00	1.00	2869.15	3751.40
Kerala	-	-	-	-	43.50	51.50
Madhya Pradesh	35.00	93.00	3.90	3.90	2141.10	2497.79
Maharashtra	1220.78	2065.00	12.72	12.72	4654.15	4771.33
Manipur	-	-	-	-	-	-
Meghalaya	-	-	-	-	-	-
Mizoram	-	-	-	-	-	-
Nagaland	-	-	-	-	-	-
Odisha	20.00	50.40	-	-	-	-
Punjab	155.50	179.00	10.25	9.25	-	-
Rajasthan	108.30	119.30	-	-	3993.95	4281.72
Sikkim	-	-	-	-	-	-
Tamil Nadu	641.90	878.00	8.05	8.05	7613.86	7861.46
Telangana	-	158.10	-	-	77.70	100.80
Tripura	-	-	-	-	-	-
Uttar Pradesh	870.00	1933.00	5.00	5.00	-	-
Uttarakhand	76.00	73.00	-	-	-	-
West Bengal	26.00	300.00	-	-	-	-
Andaman & Nicobar	-	-	-	-	-	-
Chandigarh	-	-	-	-	-	-
Dadar & Nagar Haveli	-	-	-	-	-	-
Daman & Diu	-	-	-	-	-	-
Delhi	-	-	16.00	16.00	-	-
Lakshadweep	-	-	-	-	-	-
Puducherry	-	-	-	-	-	-
Others	-	-	-	-	4.30	4.30
All India Total	4831.33	8181.70	115.08	114.08	26866.66	32279.77
Distribution (%)	11.28	14.29	0.27	0.20	62.70	56.39

- Denotes non availability or indeterminant value

Source: Ministry of New and Renewable Energy

**Table 2.5 (continue): Statewise and Sourcewise
Installed Capacity of Grid Interactive Renewable
Power as on 31.03.2016 and 30.03.2017**

(In MW)

States/ UTs	Small Hydro Power		Solar Power		Total		Growth* Rate(2015-16 to 2016-17)
	31.03.16	31.03.17	31.03.16	31.03.17	31.03.16	31.03.17	
Andhra Pradesh	232.98	241.98	572.96	1867.23	2676.30	6164.42	130.33
Arunachal Pradesh	104.61	104.61	0.27	0.27	104.87	104.87	0.00
Assam	34.11	34.11	0.00	11.78	34.11	45.89	34.54
Bihar	70.70	70.70	5.10	108.52	119.22	292.22	145.11
Chhattisgarh	52.00	76.00	93.58	128.86	425.48	432.86	1.73
Goa	0.05	0.05	0.00	0.71	0.05	0.76	1420.00
Gujarat	16.60	16.60	1119.17	1249.37	5229.57	6671.89	27.58
Haryana	73.50	73.50	15.39	81.40	134.19	251.30	87.28
Himachal Pradesh	793.31	831.81	0.20	0.73	793.51	832.54	4.92
Jammu & Kashmir	156.53	158.03	1.00	1.36	157.53	159.39	1.18
Jharkhand	4.05	4.05	16.19	23.27	20.24	27.32	35.01
Karnataka	1217.73	1225.73	145.46	1027.84	5105.52	7457.97	46.08
Kerala	198.92	213.02	13.05	74.20	255.47	338.72	32.59
Madhya Pradesh	86.16	86.16	776.37	857.04	3042.53	3537.89	16.28
Maharashtra	339.88	346.18	385.76	452.37	6613.28	7647.60	15.64
Manipur	5.45	5.45	0.00	0.03	5.45	5.48	0.55
Meghalaya	31.03	31.03	0.00	0.01	31.03	31.04	0.03
Mizoram	36.47	41.47	0.10	0.10	36.57	41.57	13.67
Nagaland	30.67	30.67	0.00	0.50	30.67	31.17	1.63
Odisha	64.63	64.63	66.92	79.42	151.55	194.45	28.31
Punjab	170.90	170.90	405.06	793.95	741.71	1153.10	55.46
Rajasthan	23.85	23.85	1269.93	1812.93	5396.03	6237.80	15.60
Sikkim	52.11	52.11	0.00	0.00	52.11	52.11	0.00
Tamil Nadu	123.05	123.05	1061.82	1691.83	9448.68	10562.39	11.79
Telangana			527.84	1286.98	605.54	1545.88	155.29
Tripura	16.01	16.01	5.00	5.09	21.01	21.10	0.43
Uttar Pradesh	25.10	25.10	143.50	336.73	1043.60	2299.83	120.38
Uttarakhand	209.33	209.32	41.15	233.49	326.48	515.81	57.99
West Bengal	98.50	98.50	7.77	26.14	132.27	424.64	221.04
Andaman & Nicobar	5.25	5.25	5.10	6.56	10.35	11.81	14.11
Chandigarh			6.81	17.32	6.81	17.32	154.48
Dadar & Nagar Haveli			0.00	2.97	0.00	2.97	-
Daman & Diu			4.00	10.46	4.00	10.46	161.50
Delhi			14.28	40.27	30.28	56.27	85.83
Lakshadweep			0.75	0.71	0.75	0.71	-5.33
Puducherry			0.03	0.08	0.03	0.08	220.00
Others			58.31	58.31	62.61	62.61	0.00
All India Total	4273.47	4379.86	6762.85	12288.83	42849.38	57244.23	
Distribution (%)	9.97	7.65	15.78	21.47	100.00	100.00	

- Denotes non availability or indeterminant value

Source: Ministry of New and Renewable Energy

[\(Download Table 2.5\)](#)

Table 2.6 : Installation of Off-grid / Decentralised Renewable Energy Systems/ Devices as on 31.03.2017

Sl. No.	State/UT	Biogas Plants (Nos.)	Water Pumping/ Wind Mills # (Nos.)	SPV Pumps (Nos.)	Solar Photovoltaic (SPV) Systems (Nos. in lakhs)			
					SLS	HLS	SL	PP
					(Nos.)	(Nos.)	(Nos.)	(KWP)
1	2	3	4	5	6	7	8	9
1	Andhra Pradesh	5.49	6.0	10,619	0.1	0.2	0.5	3785.6
2	Arunachal Pradesh	0.03	0.0	22	0.0	0.2	0.1	600.1
3	Assam	1.28	3.0	45	0.0	0.1	0.0	1605.0
4	Bihar	1.30	46.0	2,882	0.0	0.1	0.5	3968.6
5	Chhattisgarh	0.54	1.0	11,125	0.0	0.1	0.0	28444.0
6	Goa	0.04	0.0	15	0.0	0.0	0.0	32.7
7	Gujarat	4.33	945.0	8,051	0.0	0.1	0.3	13576.6
8	Haryana	0.62	0.0	543	0.2	0.6	0.9	2321.3
9	Himachal Pradesh	0.48	0.0	6	0.6	0.2	0.3	1853.5
10	Jammu & Kashmir	0.03	0.0	39	0.1	0.7	0.5	7719.9
11	Jharkhand	0.07	0.0	3,146	0.0	0.1	0.2	3639.9
12	Karnataka	4.90	28.0	3,477	0.0	0.5	0.1	7754.0
13	Kerala	1.49	79.0	810	0.0	0.4	0.5	13894.4
14	Madhya Pradesh	3.64	0.0	3,813	0.1	0.0	0.1	3654.0
15	Maharashtra	8.99	26.0	2,028	0.1	0.0	0.7	3857.7
16	Manipur	0.02	-	40	0.0	0.0	0.0	1241.0
17	Meghalaya	0.10	-	19	0.0	0.1	0.2	884.5
18	Mizoram	0.05	-	37	0.1	0.1	0.1	1719.0
19	Nagaland	0.08	-	3	0.1	0.0	0.1	1506.0
20	Odisha	2.70	-	7,079	0.1	0.1	0.1	567.5
21	Punjab	1.77	-	1,857	0.4	0.1	0.2	2066.0
22	Rajasthan	0.71	222.0	40,190	0.1	1.6	0.0	10850.0
23	Sikkim	0.09	-	-	0.0	0.2	0.2	850.0
24	Tamil Nadu	2.23	60.0	4,763	0.4	2.3	0.2	12752.6
25	Telangana	-	-	424	0.0	-	-	5374.0
26	Tripura	0.04	-	151	0.0	0.3	0.6	657.0
27	Uttar Pradesh	4.41	-	10,860	1.9	2.4	0.6	10041.5
28	Uttarakhand	0.21	-	26	0.2	0.9	0.9	1539.0
29	West Bengal	3.67	-	653	0.1	1.5	0.2	1730.0
30	Andaman & Nicobar	0.00	2.0	5	0.0	0.0	0.1	167.0
31	Chandigarh	0.00	-	12	0.0	0.0	0.0	730.0
32	Dadar & Nagar Haveli	0.00	-	-	-	-	-	0.0
33	Daman & Diu	-	-	-	-	-	-	0.0
34	Delhi	0.01	-	90	0.0	-	0.0	1269.0
35	Lakshadweep	-	-	-	0.0	-	0.1	2190.0
36	Puducherry	0.01	-	21	0.0	0.0	0.0	121.0
37	Others*	0.02	-	2,027	0.1	1.3	1.3	23885.0
Total		49.56	1,418.08	1,14,878	4.64	14.07	9.96	1,76,847.36

Data reported for the year 2012

* 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

Source : Ministry of New and Renewable Energy

Table 2.6(continue) : Installation of Off-grid / Decentralised Renewable Energy Systems/ Devices as on 31.03.2017

Sl. No.	State/UT	Aerogen. Hybrid System	Solar Cooker #	Biomass Gasifiers (Rural+ Industrial)	Biomass (non bagasse)	Waste to Energy	Village Electrification	
							Villages	Percentage of village electrified
		(KW)	(MW)	(KW)	(MW)	(MW)	(Nos.)	%
1	2	3	4	5		6	7	8
1	Andhra Pradesh	270.90	23.15	23	99.0	15.77	16,158	100.0
2	Arunachal Pradesh	6.80	0.03	-	-	-	4,029	76.6
3	Assam	6.00	-	3	-	-	24,744	97.5
4	Bihar	-	-	6	8.2	1.00	38,636	98.9
5	Chhattisgarh	-	4.00	1	2.5	0.33	19,186	98.1
6	Goa	193.80	1.69	-	-	-	320	100.0
7	Gujarat	20.00	824.09	20	-	16.88	17,843	100.0
8	Haryana	10.00	7.80	4	77.1	4.00	6,642	100.0
9	Himachal Pradesh	-	-	-	7.2	2.00	17,882	100.0
10	Jammu & Kashmir	95.60	-	0	-	-	6,235	98.4
11	Jharkhand	-	16.00	1	4.3	-	28,875	97.9
12	Karnataka	39.20	14.00	6	15.2	12.04	27,372	99.9
13	Kerala	8.00	0.03	-	0.7	0.23	1,017	100.0
14	Madhya Pradesh	24.00	11.75	10	12.4	0.48	51,877	99.9
15	Maharashtra	1644.50	34.50	7	16.4	27.76	40,956	100.0
16	Manipur	140.00	-	-	-	-	2,299	96.6
17	Meghalaya	191.50	-	0	13.8	-	6,229	96.4
18	Mizoram	21	-	-	-	-	686	97.4
19	Nagaland	20.00	-	-	-	-	1,396	99.7
20	Odisha	13.10	13.00	0	8.2	0.02	47,061	98.7
21	Punjab	50.00	9.33	-	123.1	10.37	12,168	100.0
22	Rajasthan	14.00	222.90	3	2.0	3.91	43,263	100.0
23	Sikkim	15.50	-	-	-	-	425	100.0
24	Tamil Nadu	256.70	17.06	15	24.1	13.10	15,049	100.0
25	Telangana	-	-	-	-	-	10,128	100.0
26	Tripura	2.00	-	-	-	-	863	100.0
27	Uttar Pradesh	-	12.38	30	170.4	55.02	97,804	100.0
28	Uttarakhand	24.00	5.05	2	47.5	6.02	15,687	99.6
29	West Bengal	74.00	2.00	30	19.9	2.17	37,458	100.0
30	Andaman & Nicobar	-	-	-	-	-	396	100.0
31	Chandigarh	-	-	-	-	-	5	100.0
32	Dadar & Nagar Haveli	-	-	-	-	-	65	100.0
33	Daman & Diu	-	-	-	-	-	19	100.0
34	Delhi	-	2.53	-	-	-	103	100.0
35	Lakshaadweep	-	-	-	-	-	6	100.0
36	Puducherry	5.00	-	-	-	-	90	100.0
37	Others*	-	-	-	-	-	-	-
	Total	3145.80	1221.26	161	651.9	171.10	592972	99.2

Data reported for the year 2012

* 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

[\(Download Table 2.6\)](#)

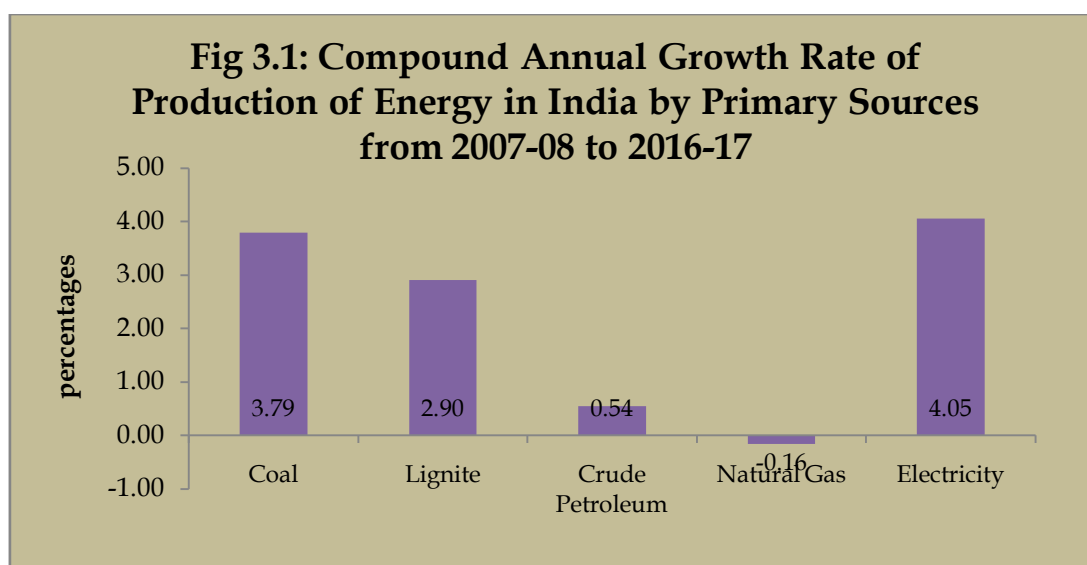
Source : 1. Ministry of New and Renewable Energy

2. Central Electricity Authority

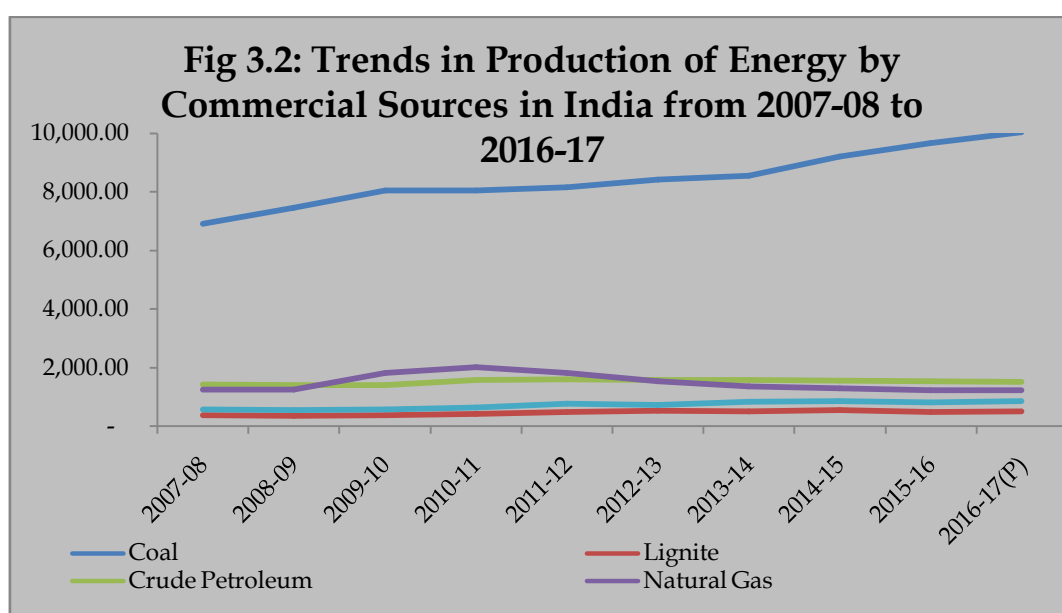
CHAPTER 3: PRODUCTION OF COMMERCIAL SOURCES OF ENERGY

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

- ❖ Coal production in the country during the year 2016-17 was 662.79 million tonne(MTs) as compared to 639.23 MTs during 2015-16, registering a growth of 3.69% (Table 3.1).
- ❖ The Lignite production during 2016-17 was 45.23 million tonnes which is 3.17% higher than the production during 2015-16 (43.84 million tonnes).
- ❖ Considering the trend of production from 2007-08 to 2016-17, it is observed that coal production in India was about 457.08 MTs during 2007-08, which has increased to 662.79 MTs during 2016-17 with a CAGR of 3.79%.
- ❖ During the same period, the CAGR of Lignite was about 2.90% with production increasing from 33.98 MTs in 2007-08 to 45.23 MTs in 2016-17.
- ❖ Production of crude petroleum increased from 34.12 MTs during 2007-08 to 36.01 MTs during 2016-17, a CAGR of about 0.54%.
- ❖ The CAGRs for natural gas and electricity were (-) 0.16% and 4.05% respectively for the period 2007-08 to 2016-17. Electricity has experienced the highest CAGR i.e. 4.05% among all the commercial sources of energy since 2007-08 to 2016-17.



- ❖ 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 total production of energy from commercial sources increased from 13,767.83peta joules during 2015-16 to 14,149.29peta joules during 2016-17, showing an increase of 2.77 %(Table 3.2).
- ❖ The production of energy in peta joules by commercial sources shows that Coal was the major source of energy, accounting for about 70.87% of the total production during 2016-17. Crude Petroleum was the second (10.66%), while Natural Gas (8.68%) was the third major source. Electricity and lignite contributed 6.15% and 3.63% respectively.

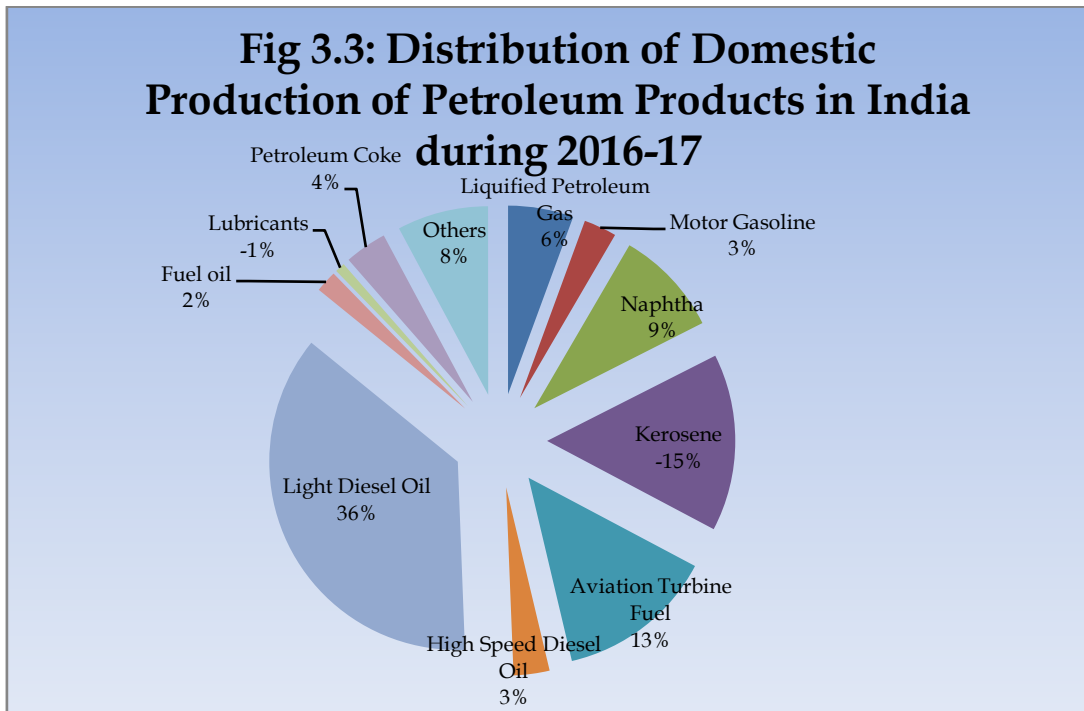


- ❖ Out of the total coking coal production of 61.66 MT in the country, 89.76% is produced by public sector, whereas for the private sector, the share of production is 10.24%. A similar pattern is observed for the production of non-coking coal in the country, where the public sector contributes a significant 95.38% (573.37 MTs) of the total production (601.13) and the private sector producing only 4.62% of non-coking coal in the country (27.76 MTs).

3.2 Production of Petroleum Products and Natural Gas

- ❖ In the year 2016-17, the production of Petroleum Products in the country was 243.55 MTs as against 231.92 during 2015-16, an increase of 5.02% (Table 3.4).

- ❖ In the total production of Petroleum products during 2016-17, High speed diesel oil accounted for the maximum share (42.08%), followed by Motor Gasoline (15.02%). (Table 3.4).
- ❖ Net production of Natural Gas decreased from 31.24 billion cubic meters (BCM) in 2015-16 to 30.92 BCM in 2016-17 registering a negative growth of 1.03% and a CAGR of 1.37 from 2007-08 to 2016-17 (Table 3.5).



3.3 Generation of electricity

- ❖ The all India gross electricity generation from utilities, excluding that from the captive generating plants, was 7,22,625 Giga Watt-Hours(GWh) during 2007-08 (Table 3.6). It rose to 12,35,358GWh during 2016-17.
- ❖ The production of electricity from utilities has increased from 11,67,584GWh during 2015-16 to 12,35,358 GWh during 2016-17, registering an annual growth rate of about 5.80%.
- ❖ Total Electricity generation in the country, from utilities and non-utilities taken together during 2016-17 was 14,32,358GWh. Out of the total electricity generated through utilities, 9,93,516GWh was generated from thermal and 1,22,378GWh was from hydro and 37,916GWh was generated from nuclear sources. Total output from non-utilities was 1,97,000GWh.

Table 3.1 : Trends in Production of Commercial Sources of Energy in India

Year	Coal (million tonnes)	Lignite (million tonnes)	Crude Petroleum (million tonnes)	Natural Gas (Billion Cubic Metres)	Electricity* (GWh)
1	2		3	4	5
2007-08	457.08	33.98	34.12	32.42	1,62,553.72
2008-09	492.76	32.42	33.51	32.85	1,52,886.00
2009-10	532.04	34.07	33.69	47.50	1,59,642.84
2010-11	532.69	37.73	37.68	52.22	1,79,926.46
2011-12	539.95	42.33	38.09	47.56	2,14,024.08
2012-13	556.40	46.45	37.86	40.68	2,04,035.31
2013-14	565.77	44.27	37.79	35.41	2,34,595.01
2014-15	609.18	48.27	37.46	33.66	2,38,908.43
2015-16	639.23	43.84	36.94	32.25	2,24,571.11
2016-17(P)	662.79	45.23	36.01	31.90	2,41,841.64
Growth rate of 2016-17 over 2015-16 (%)	3.69	3.17	-2.53	-1.10	7.69
CAGR 2007-08 to 2016-17(%)	3.79	2.90	0.54	-0.16	4.05

(p): provisional

* Electricity from Hydro, Nuclear and other Renewable energy sources.

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

[\(Download Table 3.1\)](#)

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

(in Peta Joules) @

Year	Coal	Lignite	Crude Petroleum	Natural Gas	Electricity*	Total
1	2	3	4	5	6	7= 2 to 6
2007-08	6,915.65	386.35	1,428.52	1,248.70	585.19	10,564.42
2008-09	7,455.41	368.63	1,402.90	1,265.19	550.39	11,042.52
2009-10	8,049.80	387.39	1,410.64	1,829.55	574.71	12,252.09
2010-11	8,059.66	429.02	1,577.83	2,011.48	647.74	12,725.72
2011-12	8,169.44	481.31	1,594.83	1,831.97	770.49	12,848.05
2012-13	8,418.36	528.17	1,585.28	1,534.25	734.53	12,800.59
2013-14	8,560.02	503.36	1,582.27	1,363.99	844.54	12,854.19
2014-15	9,216.89	548.83	1,568.45	1,296.58	860.07	14,090.50
2015-16	9,671.55	498.46	1,547.10	1,242.27	808.46	13,767.83
2016-17(P)	10,028.04	514.27	1,507.69	1,228.66	870.63	14,149.29
Growth rate of 2016-17 over 2015-16 (%)	3.69	3.17	-2.55	-1.10	7.69	2.77
CAGR 2007-08 to 2016-17(%)	3.79	2.90	0.54	-0.16	4.05	2.96

(P): provisional

* Electricity from hydro, Nuclear and other Renewable energy sources.

@ Conversion factors have been applied to convert production of primary sources of energy into peta joules

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

[\(Download Table 3.2\)](#)

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)
2007-08	34.46	422.63	457.08	33.98	491.06
2008-09	33.81	457.95	491.76	32.42	524.18
2009-10	44.41	487.63	532.04	34.07	566.11
2010-11	49.55	483.15	532.69	37.73	570.43
2011-12	51.65	488.29	539.94	42.33	582.27
2012-13	51.83	505.87	557.71	46.60	604.31
2013-14	56.82	508.95	565.77	44.27	610.04
2014-15	57.45	551.73	609.18	48.27	657.45
2015-16	60.89	578.35	639.23	43.84	683.08
2016-17(P)	61.66	601.13	662.79	45.23	708.02
Growth rate of 2016-17 over 2015-16 (%)	1.27	3.94	3.69	3.16	3.65
CAGR 2007-08 to 2016-17(%)	5.99	3.59	3.79	2.90	3.73

(P): Provisional

Source : Office of Coal Controller, Ministry of Coal

[\(Download Table 3.3\)](#)

Table 3.3 A: Grade Wise Production of Coking Coal by Companies in 2015-16 & 2016-17

(Million Tonnes)

Grade of Coking Coal	Public		Private		All India		Percentage Change
	2015-16	2016-17	2015-16	2016-17	2015-16	2016-17	
Steel-I	0.04	0.02	0.00	0.00	0.04	0.02	-37.84
Steel-II	1.05	1.00	0.00	0.00	1.05	1.00	-4.47
SC-1	0.14	0.11	0.00	0.00	0.14	0.11	-18.52
Wash-I	0.41	0.31	0.00	0.00	0.41	0.31	-24.15
Wash-II	2.36	3.31	0.13	0.12	2.49	3.42	37.21
Wash-III	11.92	9.75	1.05	1.33	12.97	11.08	-14.53
Wash-IV	38.75	40.84	5.04	4.87	43.79	45.70	4.38
SLV1	0.00	0.00	0.00	0.00	0.00	0.00	-
Met.Coal	8.62	8.35	6.23	6.32	14.84	14.67	-1.17
Non Met	45.64	46.99	0.00	0.00	45.64	46.99	2.96
Total Coking Coal	54.66	55.35	6.23	6.32	60.89	61.66	1.27

Source: Office of Coal Controller of India

[\(Download Table 3.3A\)](#)

**Table 3.3 B: Grade Wise Production of Non-Coking Coal
by Companies in 2015-16 & 2016-17**

(Million Tonnes)

Grade of Non-Coking Coal	Public		Private		All India		Percentage Change
	2015-16	2016-17	2015-16	2016-17	2015-16	2016-17	
1	0.12	0.12	3.72	3.71	3.83	3.83	-0.03
2	0.34	0.31	0.00	0.00	0.34	0.31	-9.65
3	5.19	5.28	0.00	0.00	5.19	5.28	1.75
4	17.67	14.32	0.00	0.00	17.67	17.32	-1.96
5	16.30	13.11	0.00	0.00	16.30	13.11	-19.56
6	13.12	14.14	0.00	0.00	13.13	14.14	7.71
7	39.04	35.96	0.00	0.00	39.04	35.96	-7.88
8	28.88	28.74	0.17	0.71	29.05	29.45	1.38
9	48.56	37.59	0.12	0.18	48.68	37.77	-22.42
10	72.12	91.05	10.74	7.03	82.86	98.07	18.37
11	136.43	128.02	11.03	15.11	147.46	143.13	-2.94
12	90.57	91.87	0.00	0.44	90.58	92.32	1.92
13	77.45	90.35	0.17	0.49	77.62	90.84	17.03
14	1.05	7.38	0.39	0.06	1.44	7.44	417.03
15	4.07	3.54	0.00	0.00	4.07	3.54	-13.09
16	0.42	7.77	0.00	0.00	0.42	7.77	1758.61
17	0.67	0.53	0.00	0.00	0.67	0.53	-20.51
UNG	0.01	0.29	0.00	0.03	0.01	0.32	2346.15
Non-Coking	552.02	573.37	26.33	27.76	578.35	601.13	3.94

Source: Office of Coal Controller of India

[\(Download Table 3.3B\)](#)

Table 3.4 : 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
2007-08	8.79	14.17	17.96	7.97	9.11	58.38	0.67
2008-09	9.16	16.02	16.45	8.39	8.07	62.91	0.61
2009-10	10.33	22.54	18.79	8.70	9.30	73.30	0.47
2010-11	9.71	26.14	19.20	7.81	9.59	78.06	0.59
2011-12	9.55	27.19	18.83	7.86	10.06	82.88	0.50
2012-13	9.82	30.12	19.02	7.97	10.09	91.10	0.40
2013-14	10.03	30.28	18.51	7.42	11.22	93.76	0.42
2014-15	9.84	32.33	17.39	7.56	11.10	94.43	0.36
2015-16	10.57	35.32	17.86	7.50	11.79	98.59	0.43
2016-17(P)	11.33	36.59	19.95	6.04	13.83	102.48	0.63
Growth rate of 2016-17 over 2015-16 (%)	7.17	3.61	11.68	-19.49	17.32	3.95	46.68
CAGR 2007-08 to 2016-17(%)	2.56	9.95	1.05	-2.73	4.27	5.79	-0.64

P : Provisional

Source : Ministry of Petroleum & Natural Gas .

Table 3.4 (Continue): Domestic Production of Petroleum Products in India

(Million Tonnes)

Year	Heavy ends				Others*	Total
	Fuel oil	Lubricants	Petroleum Coke	Bitumen		
1	9	10	11	12	13	14= 2 to 13
2007-08	15.81	0.88	4.13	4.51	7.10	149.47
2008-09	17.68	0.87	4.24	4.71	6.03	155.15
2009-10	18.35	0.95	3.71	4.89	13.28	184.61
2010-11	20.52	0.88	2.71	4.48	15.14	194.82
2011-12	18.43	1.03	7.84	4.61	14.43	203.20
2012-13	15.05	0.90	10.94	4.67	17.65	217.74
2013-14	13.41	0.94	12.07	4.79	17.93	220.77
2014-15	11.92	0.95	12.45	4.63	18.19	221.14
2015-16	9.73	1.04	13.32	5.16	20.62	231.92
2016-17(P)	9.96	1.03	13.94	5.19	22.59	243.55
Growth rate of 2016-17 over 2015-16(%)	2.38	-1.08	4.62	0.49	9.54	5.02
CAGR 2007-08 to 2016-17(%)	-4.51	1.56	12.93	1.41	12.27	5.00

P: Provisional

\$: Includes other Light distillates from 2006-07

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

Source : Ministry of Petroleum & Natural Gas .

[\(Download Table 3.4\)](#)

Table 3.5 : Gross and Net Production of Natural Gas

(in Billion Cubic Metres)

Year	Gross Production	Flared	Reinjected	Net Production #
2007-08	32.42	0.94	4.50	26.98
2008-09	32.84	1.10	4.68	27.07
2009-10	47.50	0.97	5.66	40.86
2010-11	52.22	0.97	5.21	51.25
2011-12	47.56	1.08	5.31	46.48
2012-13	40.68	0.90	5.43	39.78
2013-14	35.41	0.77	5.65	34.64
2014-15	33.66	0.87	6.01	32.79
2015-16	32.25	1.01	5.95	31.24
2016-17(P)	31.90	0.98	5.93	30.92
Growth rate of 2016-17 over 2015-16 (%)	-1.09	-2.95	-0.30	-1.03
CAGR 2007-08 to 2016-17(%)	-0.16	0.41	2.80	1.37

P: Provisional

#: Net availability = Gross Production - Flared - Reinjected

Source: Ministry of Petroleum and Natural Gas

[\(Download Table 3.5\)](#)

Table 3.6 : Gross Generation of Electricity from utilities and non-utilities in India

(Giga Watt hour=10⁶ Kilo Watt hour)

Year	Utilities							
	Thermal				Hydro	Nuclear	ORS	Total
	Steam	Diesel	Gas	Total				
1	2	3	4	5	6	7	8	9
2007-08	4,86,998	3,357	69,716	5,60,072	1,20,387	16,957	25,210	7,22,625
2008-09	5,11,895	4,789	71,597	5,88,281	1,10,099	14,927	27,860	7,41,167
2009-10	5,39,586	4,248	96,373	6,40,208	1,04,059	18,636	36,947	7,99,851
2010-11	5,61,298	3,181	1,00,342	6,64,822	1,14,416	26,266	39,245	8,44,748
2011-12	6,12,497	2,649	93,281	7,08,427	1,30,511	32,287	51,226	9,22,451
2012-13	6,91,341	2,448	66,664	7,60,454	1,13,720	32,866	57,449	9,64,489
2013-14	7,45,533	1,998	44,522	7,92,054	1,34,848	34,228	65,520	10,26,649
2014-15	8,35,291	1,576	41,075	8,77,941	1,29,244	36,102	73,563	11,16,850
2015-16	8,95,340	551	47,122	9,43,013	1,21,377	37,414	65,781	11,67,584
2016-17(P)	9,44,022	401	49,094	9,93,516	1,22,378	37,916	81,548	12,35,358
Growth rate of 2016-17 over 2015-16(%)	5.44	-27.30	4.18	5.36	0.82	1.34	23.97	5.80
CAGR 2007-08 to 2016-17(%)	6.84	-19.15	-3.45	5.90	0.16	8.38	12.46	5.51

P-Provisional

Source : Central Electricity Authority.

Table 3.6 (Continue) : Gross Generation of Electricity from utilities and non-utilities in India

(Giga Watt hour= 10⁶ x Kilo Watt hour)

Year	Non-Utilities							Grand Total
	Thermal				Hydro	ORS	Total	
	Steam	Diesel	Gas	Total				
1	10	11	12	13	14	15	16	
2007-08	53,569	10,738	25,585	89,891	202	383	90,477	8,13,102
2008-09	73,626	10,082	15,306	99,015	146	560	99,721	8,40,888
2009-10	77,416	8,217	19,739	1,05,372	152	609	1,06,133	9,05,984
2010-11	96,657	7,754	15,435	1,19,846	149	922	1,20,917	9,65,665
2011-12	1,04,863	6,244	21,972	1,33,079	131	1,178	1,34,388	10,56,839
2012-13	1,13,167	8,205	20,769	1,42,141	118	1,750	1,44,010	11,08,499
2013-14	1,18,178	8,866	19,912	1,46,957	129	1,903	1,48,988	11,75,637
2014-15	1,28,401	9,720	21,135	1,59,256	145	2,656	1,62,057	12,78,907
2015-16	1,36,721	8,412	21,083	1,66,216	110	2,046	1,68,372	13,35,956
2016-17(P)	1,59,967	10,129	24,668	1,94,764	129	2,107	1,97,000	14,32,358
Growth rate of 2016-17 over 2015-16 (%)	17.00	20.41	17.00	17.18	17.00	3.00	17.00	7.22
CAGR 2007-08 to 2016-17(%)	11.56	-0.58	-0.36	8.04	-4.41	18.58	8.09	5.83

(P)-Provisional

Source : Central Electricity Authority.

[\(Download Table 3.6\)](#)

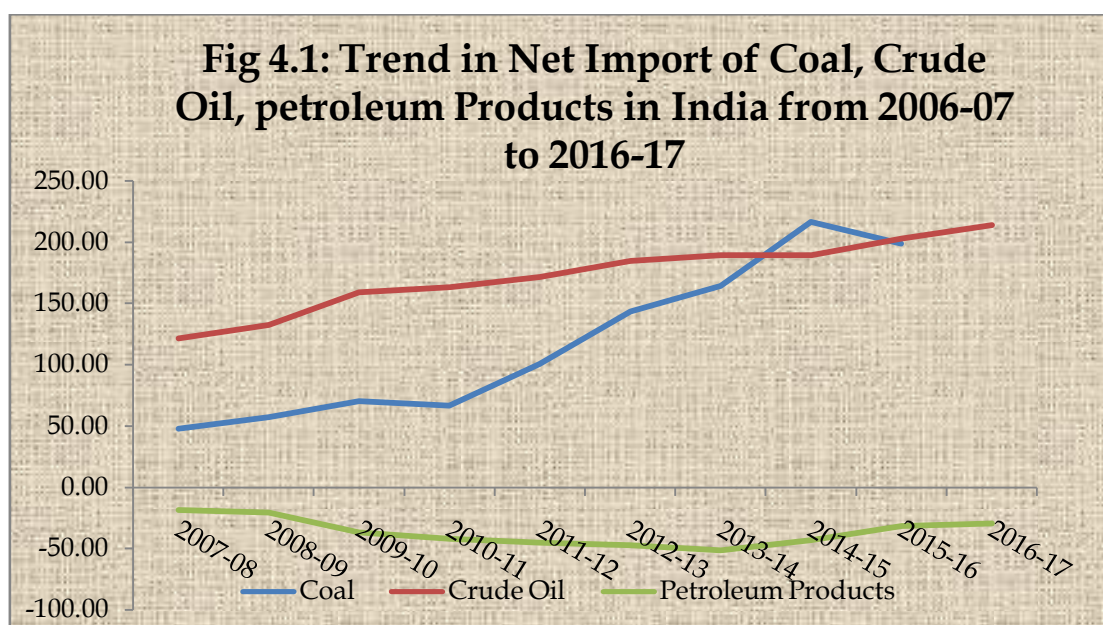
CHAPTER 4: FOREIGN TRADE IN COMMERCIAL SOURCES OF ENERGY

4.1 Import and export of coal

- ❖ The average quality of the Indian coal is not very high and 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.
- ❖ Import of coal has steadily increased from 49.79 MTs during 2007-08 to 190.95 MTs during 2016-17 (Table 4.1). During this period, the quantum of coal exported increased from 1.63 MTs during 2007-08 to 2.44 MT during 2012-13 and then decreased to 1.77 MTs during 2016-17.
- ❖ The gross import decreased at 3.84% and net Import of coal decreased at 4.03% in 2016-17 over the previous year. However there was an increase of 27.22% in export of coal during the same period.

4.2 Crude oil and petroleum products

- ❖ India is highly dependent on import of crude oil. Net imports of crude oil have increased from 121.67 MTs during 2007-08 to 213.93 MTs during 2016-17.



- ❖ There has been an increase of 5.46% in the net imports of crude oil during 2016-17 over 2015-16, as the net import increased from 202.85 MTs to 213.93 MTs (Table 4.1).

- ❖ The export of petroleum product has increased from 40.75 MT during 2007-08 to 65.51 MTs during 2016-17. During 2016-17, exports recorded a increase of 8.22% from previous year (Table 4.1).
- ❖ The import of petroleum products has increased from 22.46 MT in 2007-08 to 36.29 MT during 2016-17, although there are some fluctuations in the trend (Table 4.1). There is growth rate of 12.57% in import of petroleum products over the previous year.

4.3 Natural Gas

- ❖ The gross import of natural gas has increased from 8.32 BCM in 2007-08 to 18.63 BCM in 2016-17, recording a CAGR of 8.40%.

4.4 Electricity

- ❖ The gross import of electricity has increased with a CAGR 0.72% during the period 2007-08 (5230 GWh) to 2016-17 (5617 GWh). Similarly, the export of electricity has increased from 290 GWh in 2007-08 to 6710 GWh in 2016-17.
- ❖ There was decrease in net import of electricity during 2007-08 to 2016-17 and percentage decrease in 2016-17 with respect to 2015-16 is (-) 1263.76%.

Table 4.1: Trends of Foreign Trade in Coal, Crude Oil, Petroleum Products, Natural Gas and Electricity 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)
2007-08	49.79	1.63	48.17	121.67	0.00	121.67	22.46	40.75	-18.29
2008-09	59.00	1.66	57.35	132.78	0.00	132.78	18.59	38.94	-20.36
2009-10	73.26	2.45	70.81	159.26	0.00	159.26	14.67	51.16	-36.49
2010-11	68.92	1.88	67.04	163.60	0.00	163.60	17.38	59.08	-41.70
2011-12	102.85	2.02	100.84	171.73	0.00	171.73	15.85	60.84	-44.99
2012-13	145.79	2.44	143.34	184.80	0.00	184.80	16.35	63.41	-47.05
2013-14	166.86	2.19	164.67	189.24	0.00	189.24	16.70	67.86	-51.17
2014-15	212.10	1.24	210.87	189.43	0.00	189.43	21.30	63.93	-42.63
2015-16	203.95	1.58	202.37	202.85	0.00	202.85	29.46	60.54	-31.08
2016-17(P)	190.95	1.77	189.18	213.93	0.00	213.93	36.29	65.51	-29.23
Growth rate of 2016-17 over 2015-16 (%)	-3.84	27.22	-4.03	5.46	-	5.46	12.57	8.22	-5.97

(p): Provisional.

Sources:

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

Table 4.1 (Continue): Trends of Foreign Trade in Coal, Crude Oil, Petroleum Products, Natural Gas and Electricity in India

Year	Natural Gas (Billion Cubic Metres)			Electricity(Gwh)		
	Gross Imports	Exports	Net Imports	Gross Imports	Exports	Net Imports
1	2	3	4=(2)-(3)	5	6	7=(5)-(6)
2007-08	8.32	0.00	8.32	5230	290	4940
2008-09	8.06	0.00	8.06	5897	58	5838
2009-10	9.15	0.00	9.15	5359	105	5254
2010-11	9.93	0.00	9.93	5611	128	5482
2011-12	13.21	0.00	13.21	5253	135	5118
2012-13	13.14	0.00	13.14	4795	154	4641
2013-14	12.99	0.00	12.99	5598	1651	3947
2014-15	14.09	0.00	14.09	5008	4433	575
2015-16	16.14	0.00	16.14	5244	5150	94
2016-17(P)	18.63	0.00	18.63	5617	6710	-1093
Growth rate of 2016-17 over 2015-16 (%)	15.42	-	15.42	7.11	30.29	-1263.76
CAGR 2007-08 to 2016-17(%)	8.40	-	8.40	0.72	36.91	-

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

[\(Download Table 4.1\)](#)

CHAPTER 5: AVAILABILITY OF ENERGY SOURCES

5.1 Availability of Coal and Lignite

- ❖ The total availability of raw coal in India in 2016-17 stood at 863.90 MTs and that of lignite at 47.30 MTs (Table 5.1).
- ❖ The availability of coal in the year 2016-17 increased by 1.93% compared to 2015-16. The availability of lignite increased by 4.03% during the same period.
- ❖ The availability of coal has increased at a CAGR of about 5.46% during the period from 2007-08 to 2016-17. This increased availability might be attributed to the increase in the coal production (507.68 MTs during 2007-08 to 863.90 MTs during 2016-17) supplemented by imports (Table 5.2).
- ❖ The availability of lignite has increased at a CAGR of about 4.03% during the period from 2007-08 to 2016-17 (Table 5.1).

5.2 Availability of Natural Gas

- ❖ The availability of natural gas has steadily increased from a mere 39.80 BCM during 2007-08 to 50.53 BCM during 2016-17, registering a CAGR of 2.42%. Most of this increase in the indigenous production is due to discovery of new reserves. (Table 5.1).

5.3 Availability of Crude Oil and Petroleum Products

- ❖ The availability of crude oil in the country increased from 155.79 MTs in 2007-08 to 249.94 MTs during 2016-17 (Table 5.3).
- ❖ During this period, crude oil production increased from 34.12 MTs to 36.01 MTs and the net import increased from 121.67 MTs to 213.93 MTs between 2007-08 and 2016-17. There was increase of 5.46% in availability of crude oil during 2016-17 over 2015-16.

5.4 Availability of Electricity

- ❖ Electricity available for supply increased from 6,89,780 Gwh in 2007-08 to 11,68,317 Gwh in 2016-17, thus recording a CAGR of 5.41% during this period. The availability of electricity increased at 5.80% in 2016-17 over its value in 2015-16.

Fig 5.1: Trends in Availability of Electricity in India from 2007-08 to 2016-17

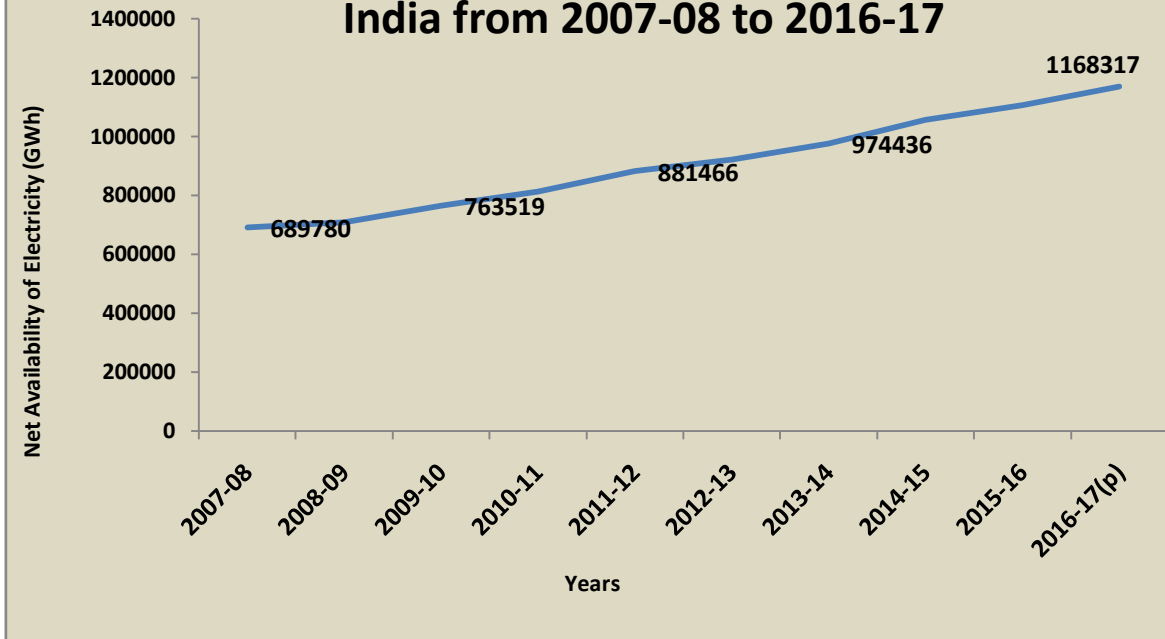


Table 5.1 : Trends in Availability of Primary Energy Sources in India

Year	Coal (Million Tonnes)	Lignite (Million Tonnes)	Crude Petroleum (Million Tonnes)	Natural Gas (Billion Cubic Metres)
2007-08	507.68	33.31	155.79	39.80
2008-09	550.64	33.00	166.28	40.90
2009-10	620.39	33.73	192.95	56.65
2010-11	604.53	37.78	201.28	62.15
2011-12	642.64	42.77	209.82	60.77
2012-13	680.14	46.89	222.66	53.81
2013-14	724.19	44.64	227.03	48.40
2014-15	824.26	49.57	226.90	47.75
2015-16	847.58	45.47	239.79	48.39
2016-17(P)	863.90	47.30	249.94	50.53
Growth rate of 2016-17 over 2015-16 (%)	1.93	4.03	4.23	4.42
CAGR 2007-08 to 2016-17 (%)	5.46	3.57	4.84	2.42

(p) - Provisional

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

[\(Download Table 5.1\)](#)

Table 5.2 : Trends in Availability of Raw Coal and Lignite in India

(Million Tonnes)

Year	Coal					Lignite		
	Production (Coking + Non-coking)	Change of Vendible Stock (closing stock-Opening stock)	Imports	Exports	Availability for Consumption	Production	Change of Vendible Stock (closing stock-Opening stock)	Availability for Consumption
1	2	3	4	5	6=2+3+4-5	7	8	9=7+8
2007-08	457.08	2.43	49.79	1.63	507.68	33.98	-0.67	33.31
2008-09	492.76	0.54	59.00	1.66	550.64	32.42	0.58	33.00
2009-10	532.04	17.55	73.26	2.45	620.39	34.07	-0.34	33.73
2010-11	532.69	7.33	68.92	4.41	604.53	37.73	0.05	37.78
2011-12	539.95	1.85	102.85	2.02	642.64	42.33	0.44	42.77
2012-13	556.40	-10.99	137.56	2.83	680.14	46.45	0.44	46.89
2013-14	565.77	-7.87	168.44	2.15	724.19	44.27	0.37	44.64
2014-15	609.18	4.21	212.10	1.24	824.26	48.26	1.32	49.57
2015-16	639.23	5.97	203.95	1.58	847.58	43.84	1.63	45.47
2016-17(P)	662.79	11.92	190.95	1.77	863.90	45.23	2.07	47.30
Growth rate of 2016-17 over 2015-16 (%)	3.69	99.67	-6.37	12.57	1.93	3.17	27.01	4.03

(P): Provisional

Source : Office of the Coal Controller, Ministry of Coal

[\(Download Table 5.2\)](#)

[\(Download Table 5.3\)](#)

Table 5.3 : Trends in Availability of Crude Oil, Petroleum Products and Natural Gas in India

Year	Crude Oil (Million Tonne)			Petroleum Products (Million Tonne)			Natural Gas (Billion Cubic Meter)		
	Production	Net Imports	Availability	Production	Net Imports	Availability	Production	Net Imports	Availability
1	2	3	4=2+3	5	6	7=5+6	8	9	10=8+9
2007-08	34.12	121.67	155.79	149.47	-18.38	131.10	31.48	8.32	39.80
2008-09	33.51	132.78	166.28	155.15	-20.38	134.77	32.84	8.06	40.90
2009-10	33.69	159.26	192.95	184.61	-36.31	148.30	47.50	9.15	56.65
2010-11	37.68	163.60	201.28	194.82	-41.70	153.12	52.22	9.93	62.15
2011-12	38.09	171.73	209.82	203.20	-44.99	158.21	47.56	13.21	60.77
2012-13	37.86	184.80	222.66	217.74	-47.05	170.68	40.68	13.14	53.81
2013-14	37.79	189.24	227.03	220.76	-51.17	169.59	35.41	12.99	48.40
2014-15	37.46	189.43	226.90	221.14	-42.63	178.50	33.66	14.09	47.75
2015-16	36.94	202.85	239.79	231.92	-31.08	200.84	32.25	16.14	48.39
2016-17(P)	36.01	213.93	249.94	243.55	-29.23	214.32	31.90	18.63	50.53
Growth rate of 2016-17 over 2015-16 (%)	-2.53	5.46	4.23	5.01	-5.97	6.71	-1.09	15.42	4.42

Note: For Natural gas, production and availability is Net and for Crude Oil and Petroleum Products, the Gross availability is taken equivalent to Net.

(P): Provisional

Source : Ministry of Petroleum & Natural Gas.

Table 5.4 : Trends in Availability of Electricity in India from 2007-08 to 2016-17

(in Giga Watt hour = 10⁶ Kilo Watt hour)

Year	Gross Electricity Generated from Utilities	Consumption in Power Station Auxiliaries	Net Electricity Generated from Utilities	Purchases from Non-Utilities + Net Import from Other Countries	Net Electricity Available for Supply
1	2	3	4=2-3	5	6=4+5
2007-08	7,22,626	45,531	6,77,095	12,685	6,89,780
2008-09	7,41,168	47,404	6,93,764	14,181	7,07,945
2009-10	7,99,851	50,723	7,49,128	14,391	7,63,519
2010-11	8,44,748	52,952	7,91,796	19,839	8,11,635
2011-12	9,22,451	56,499	8,65,952	15,514	8,81,466
2012-13	9,64,489	64,109	9,00,380	20,849	9,21,229
2013-14	10,26,649	70,161	9,56,488	17,948	9,74,436
2014-15	11,16,850	76,268	10,40,582	13,773	10,54,355
2015-16	11,67,584	79,302	10,88,282	15,947	11,04,228
2016-17(P)	12,35,358	83,387	11,51,971	16,345	11,68,317
Growth rate of 2016-17 over 2015-16 (%)	5.80	5.15	5.85	2.50	5.80
CAGR 2007-08 to 2016-17 (%)	5.51	6.24	5.46	2.57	5.41

(P): Provisional

Source: Central Electricity Authority.

[Download Table 5.4](#)

CHAPTER 6: CONSUMPTION OF ENERGY RESOURCES

6.1 Consumption of Coal and Lignite

- ❖ The estimated total consumption of raw coal by industry has increased from 502.82 MT during 2007-08 to 841.56 MT during 2016-17 with a CAGR of 5.29% (Table 6.1). The annual growth rate from 2015-16 to 2016-17 is 0.58%.
- ❖ Consumption of Lignite increased from 34.65 MT in 2007-08 to 43.16 MT in 2016-17 registering a compound growth of 2.22%. (Table 6.1).
- ❖ The maximum consumption of raw coal is in Electricity generation, followed by steel industries. Industry-wise estimates of consumption of coal (Table 6.4) shows that during 2016-17, electricity generating units consumed 527.26 MT of coal, followed by steel & washery industries (54.15 MT), cement industries (6.43 MT) and sponge iron industries (5.68 MT).
- ❖ Consumption of Lignite in Electricity Generation sector is the highest, accounting for about 89.96% of the total lignite consumption (Table 6.5).

6.2 Consumption of Crude Oil and Natural Gas

- ❖ The estimated consumption of crude oil has a steady increase, from 156.10 MMT during 2007-08 to 245.36 MMT during 2016-17 with CAGR of 4.63%. It increased from 232.86 MMT in 2015-16 to 245.36 MMT in 2016-17 registering a growth rate of 5.37% (Table 6.1).
- ❖ The maximum use of Natural Gas is in fertilizers industry (30.38%) followed by power generation (24.28%) and 14.47% natural gas was used for domestic fuel (Table 6.8).
- ❖ Industry wise off-take of natural gas shows that natural gas has been used both for Energy (58.16%) and Non-energy (41.84%) purposes (Table 6.8).

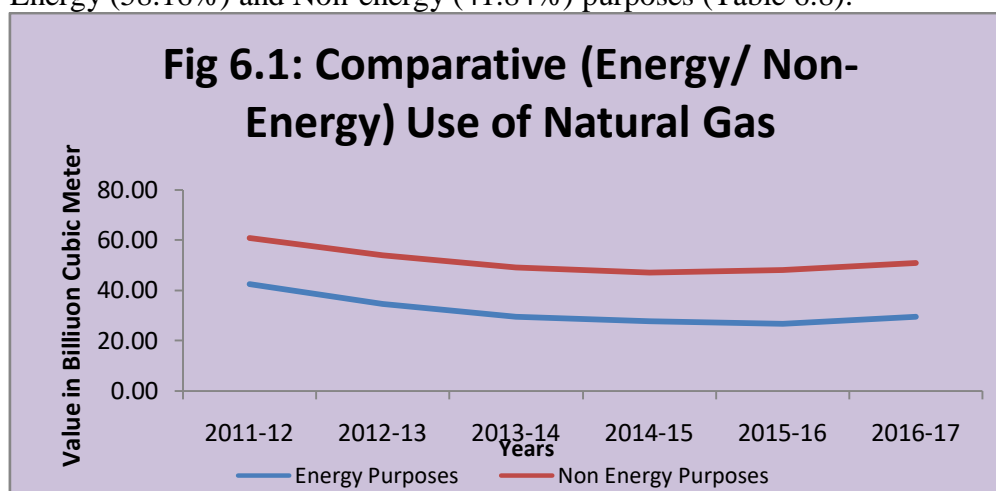
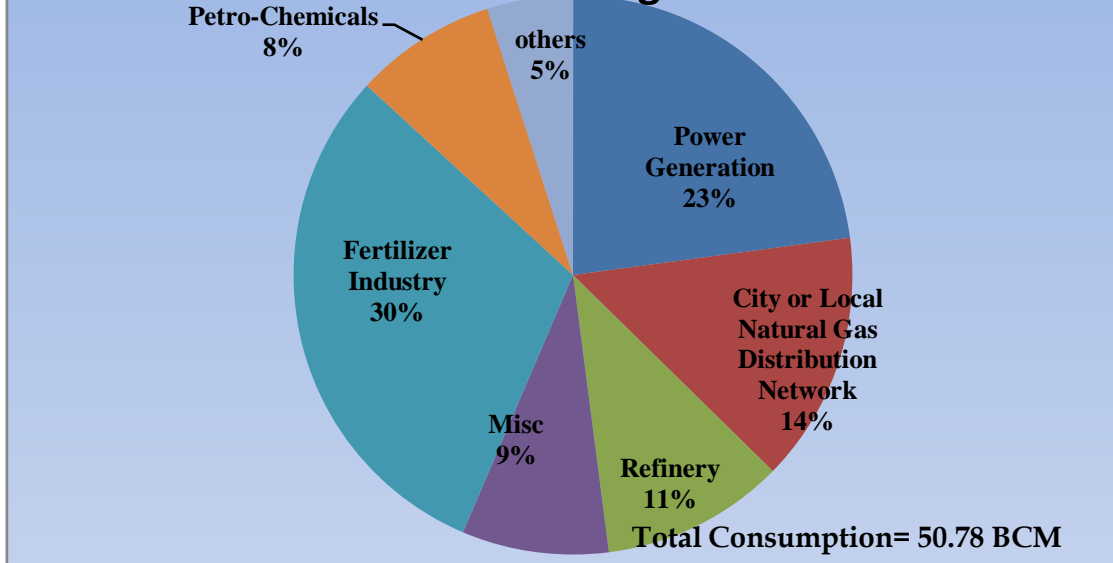


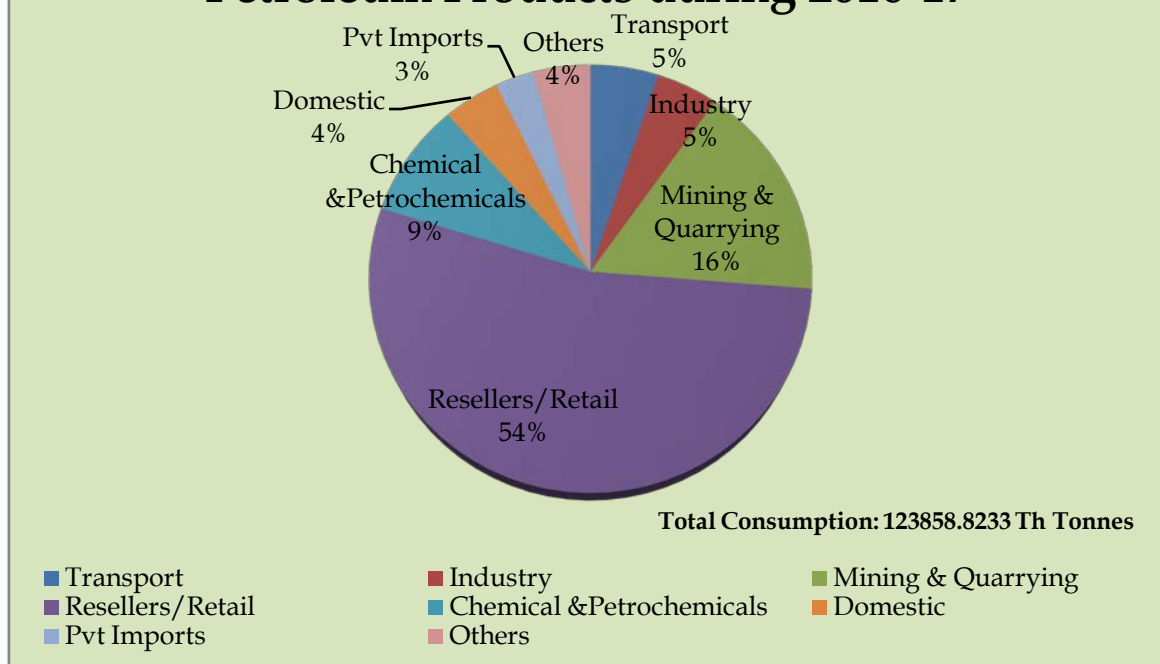
Fig 6.2: Industrywise off-take of Natural Gas in India during 2016-17



6.3 Consumption of Petroleum Products

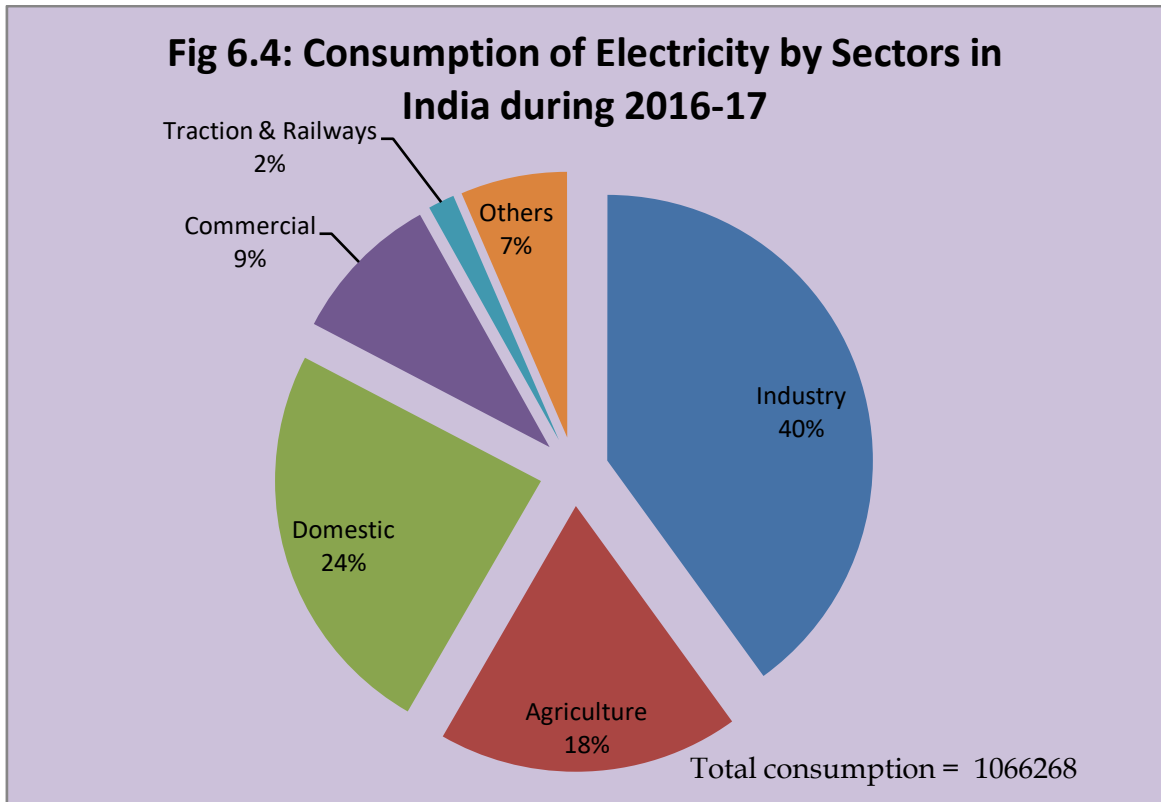
- ❖ High speed diesel oil accounted for 39.06% of total consumption (Excluding refinery fuels and losses) of all types of petroleum products in 2016-17. This was followed by Petroleum Coke (12.31%), Petrol (12.21%), LPG (11.11%) and Naphtha (6.80%). Consumption of Light Diesel oil continuously decreased from 2007-08 (0.67 MT) to 2016-17 (0.45 MT) (Tables 6.6 & 6.7).
- ❖ Sector-wise consumption of different petroleum products reveals that Reseller/Retail contributes 53% in the total consumption followed by Domestic sector with contribution 19% (Table 6.7).

Fig 6.3: Sectoral Consumption of Petroleum Products during 2016-17

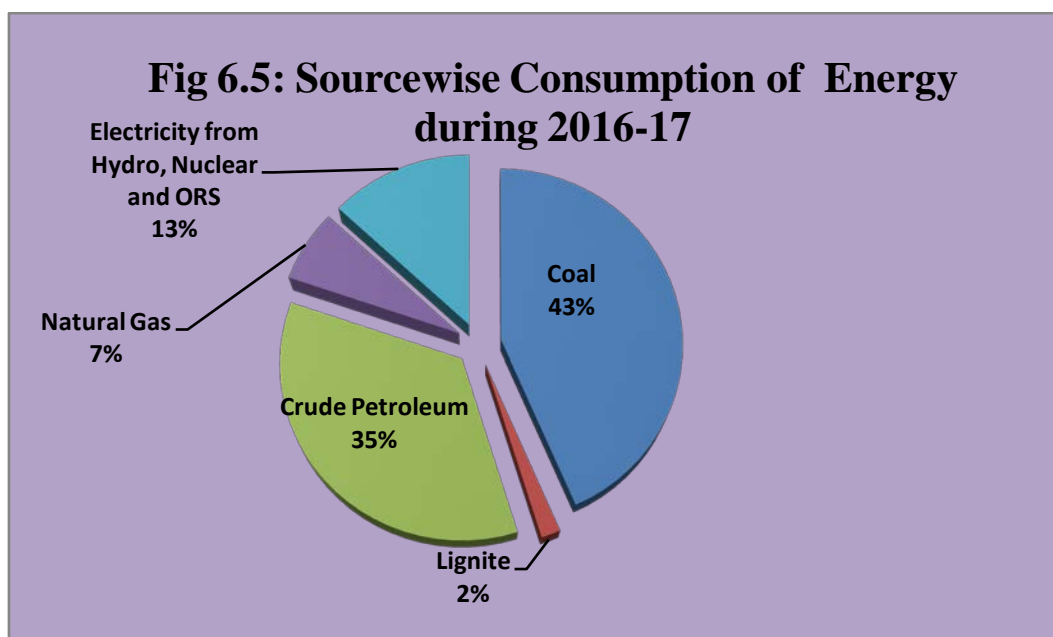


6.4 Consumption of Electricity

- ❖ The estimated electricity consumption increased from 5,01,977GWh during 2007-08 to 10,66,268 GWh during 2016-17, showing a CAGR of 7.82% (Table 6.9). The percentage increase in electricity consumption from 2015-16 (10,01,191GWh) to 2016-17 (10,66,268 GWh) is 6.50%.
- ❖ Of the total consumption of electricity in 2016-17, industry sector accounted for the largest share (40.01%), followed by domestic (24.32%), agriculture (18.33%) and commercial sectors (9.22%).

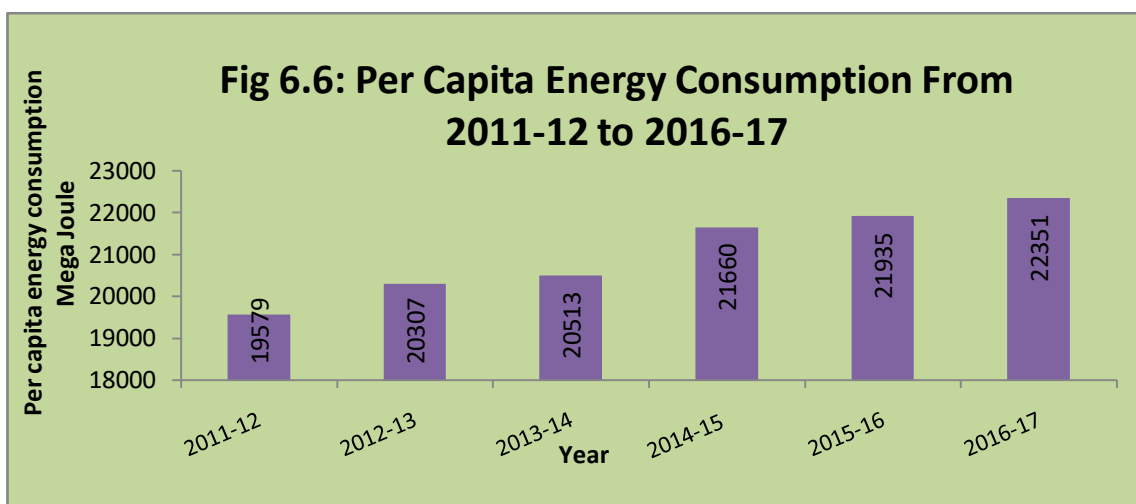


- ❖ The electricity consumption in Industry sector and domestic sector has increased at a much faster pace compared to other sectors during 2007-08 to 2016-17 with CAGRs of 8.46% and 7.93% respectively (Table 6.9).
- ❖ Loss of electricity due to transmission has decreased from 27.18% during 2007-08 to 21.30% during 2016-17 (Table 6.10).

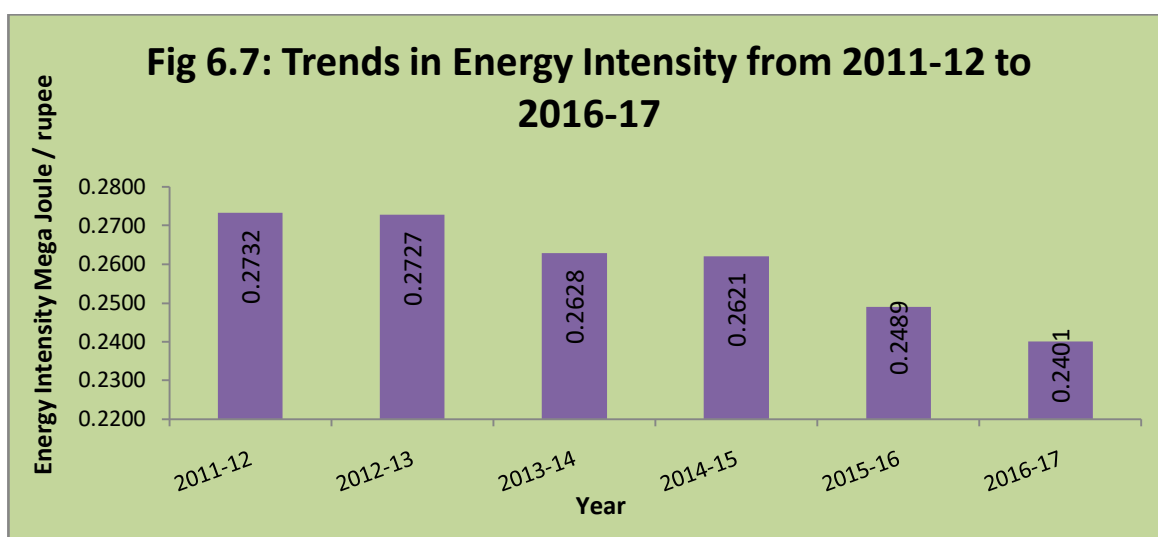


6.5 Per-Capita Energy Consumption & Energy Intensity

- ❖ The consumption of energy in petajoules in the form of Coal and Lignite which accounted for about 45.16% of the total consumption during 2016-17. Crude Petroleum was second (35.05%), while Electricity (13.11%) was third. (Table 6.2)
- ❖ The total consumption of energy from conventional sources increased from 28,337 petajoules during 2015-16 to 29,279 petajoules during 2016-17, showing an increase of 3.32%. (Table 6.2)
- ❖ 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.
- ❖ Per-capita Energy Consumption (PEC) increased from 19579 Mega Joules in 2011-12 to 22351 Mega Joules in 2016-17. The annual increase in PEC for 2015-16 over 2014-15 was 1.89% (Table 6.3).



- ❖ 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 these two indicators are generally computed on the basis of consumption of conventional energy.



- ❖ The Energy Intensity (at 2011-12 prices) decreased from 0.2732 Mega Joules per rupee in 2011-12 to 0.2401 Mega Joules per rupee in 2016-17 (Table 6.3).
- ❖ Energy intensity has decreased over the last decade. This decline may be attributed to faster growth of GDP than energy demand, the services sector having a growing share of the economy, use of energy efficiency programmes, etc.

Table 6.1: Trends in Consumption of Energy Sources in India

Year	Coal #	Lignite	Crude Oil** MMT	Natural Gas (Billion Cubic Metres)	Electricity (GWh)
	(Million Tonnes)				
1	2	3	4	5	6
2007-08	502.82	34.65	156.10	39.80	5,01,977.00
2008-09	549.57	31.85	160.77	39.81	5,53,994.71
2009-10	585.30	34.41	186.55	48.34	6,12,644.99
2010-11	589.87	37.69	196.99	52.02	6,94,392.00
2011-12	642.64	41.89	204.12	60.68	7,85,194.00
2012-13	688.75	46.01	219.21	53.91	8,24,300.99
2013-14	724.18	43.90	222.50	48.99	8,74,208.57
2014-15	821.85	46.94	223.24	46.95	9,48,521.82
2015-16	836.73	42.21	232.86	47.85	10,01,190.68
2016-17	841.56	43.16	245.36	50.78	10,66,268.00
Growth rate of 2016-17 over 2015-16 (%)	0.58	2.24	5.37	6.12	6.50
CAGR 2007- 08 to 2016- 17(%)	5.29	2.22	4.63	2.47	7.82

(p): Provisional

Data on electricity has been revised as per the inputs from CEA and hence may not match with the previous year data.

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

**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.

[\(Download Table 6.1\)](#)

Table 6.2 Trends in Consumption of Energy Sources**(In Peta Joules)**

Year	Coal	Lignite	Crude Petroleum *	Natural Gas	Electricity #	Total
1	2	3	4	5	6	7
2007-08	7608	394	6536	1533	1807	17878
2008-09	8315	362	6731	1533	1994	18936
2009-10	8856	391	7811	2144	2206	21408
2010-11	8925	429	8248	2357	2500	22458
2011-12	9723	476	8547	2299	2827	23872
2012-13	10421	523	9178	2038	2967	25128
2013-14	10957	499	9316	1836	3147	25755
2014-15	12435	534	9347	1859	3415	27589
2015-16	12660	480	9750	1843	3604	28337
2016-17(P)	12733	491	10261	1956	3839	29279
Growth rate of 2016-17 over 2015-16 (%)	0.58	2.24	5.24	6.12	6.50	3.32
CAGR 2007-08 to 2016-17(%)	5.29	2.22	4.61	2.47	7.82	5.06

*: Crude oil in terms of refinery crude throughput.

(p): Provisional.

#: Include Hydro, Nuclear and other renewable sources electricity from utilities

Note: Here the value of energy in peta joules relates to the production value from Hydro and Nuclear only. Due to non availability of the data the consumption value is taken equivalent to production value

Sources:

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

[\(Download Table 6.2\)](#)**Table 6.3 : Trends in Per-Capita Energy Consumption (PEC) and Energy intensity in India**

Year	Energy Consumption in peta joules	Mid year population (in Million)	GDP (Rs. crore)	Per Capita Energy Consumption (in Mega Joules)	Energy Intensity (Mega Joules per rupee)
2011-12	23872	1219	8736329	19579	0.2732
2012-13	25128	1237	9213017	20307	0.2727
2013-14	25755	1256	9801370	20513	0.2628
2014-15	27589	1274	10527674	21660	0.2621
2015-16	28337	1292	11386145	21935	0.2489
2016-17(P)	29279	1310	12196006	22351	0.2401
Growth rate of 2016-17 over 2015-16 (%)	3.32	1.40	7.11	1.89	-3.54

(P): Provisional

* Estimated value based on sourcewise availability of Coal, Crude Petroleum, Natural Gas and Electricity (Hydro & Energy Intensity=Amount of energy consumed for producing one unit of Gross Domestic Product.

** GDP estimates are at 2011-12 price as per the National Account Division's revised data (revised series of new IIP and WPI)

Mid year population is estimated assuming linear growth (details at annexure II)

[\(Download Table 6.3\)](#)

[\(Download Table 6.4\)](#)

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

(Million tonnes)

Year	Electricity	Steel & Washery	Cement	Paper	Textile	Sponge Iron	Fertilizers & chemicals	Brick	Others *	Total
1	2	3	4	5	6	7	8		9	10 = 2 to 9
2007-08	350.58	16.99	15.27	2.64	0.37	-	-	-	67.72	453.57
2008-09	377.27	16.58	13.12	2.16	2.53	-	-	-	77.52	489.17
2009-10	390.58	16.45	14.66	2.34	0.27	-	-	-	89.50	513.79
2010-11	395.84	17.26	15.08	2.43	0.28	-	-	-	92.58	523.47
2011-12	437.67	47.86	26.36	2.03	0.26	21.69	2.82	0.13	69.36	608.17
2012-13	485.47	51.70	31.79	2.12	0.30	20.90	2.86	2.01	116.24	713.39
2013-14	493.25	53.05	32.46	1.91	0.36	18.49	2.64	4.01	133.19	739.34
2014-15	497.70	56.24	11.36	1.65	0.42	17.77	2.29	0.09	216.93	804.45
2015-16	517.77	56.83	8.99	1.21	0.27	7.76	2.74	0.07	241.09	836.73
2016-17(P)	527.26	54.15	6.43	1.18	0.24	5.68	3.33	0.10	246.83	845.19
Distribution (%)	62.38	6.41	0.76	0.14	0.03	0.67	0.39	0.01	29.20	100.00
Growth rate of 2016-17 over 2015-16 (%)	1.83	-4.73	-28.39	-2.23	-8.99	-26.87	21.60	31.08	2.38	1.01
CAGR 2007-08 to 2016-17(%)	4.17	12.29	-8.28	-7.71	-4.01	-20.02	2.78	-4.64	13.81	6.42

(P): Provisional

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

Source : Office of the Coal Controller, Ministry of Coal

For year 2014-15, 2015-16 & 2016-17 value of Cement does not include any import as revised by Office of the Coal Controller, Ministry of Coal in Provisional coal statistics 2015-16

Table 6.5 : Trends in Industrywise Consumption of Lignite in India

(Million Tonnes)

Year	Electricity	Steel & Washery	Cement	Paper	Textile	Others *	Total
1	2	3	4	5	6	7	8=2 to 7
2007-08	26.76	-	0.96	0.35	0.77	5.83	34.66
2008-09	25.71	-	0.34	0.36	-	6.01	32.42
2009-10	28.14	-	0.38	0.82	-	4.09	33.43
2010-11	29.90	-	0.36	0.84	1.18	6.25	38.53
2011-12	32.06	0.03	1.01	0.63	3.67	4.48	41.88
2012-13	37.20	0.05	1.10	0.69	0.30	3.81	43.15
2013-14	36.34	0.03	1.49	1.29	0.73	4.02	43.90
2014-15	39.47	0.02	1.27	0.65	2.89	2.65	46.95
2015-16	37.56	0.01	0.23	0.43	1.73	2.26	42.21
2016-17(P)	38.82	0.07	0.29	0.53	1.46	1.98	43.16
Distribution (%)	89.96	0.17	0.67	1.22	3.39	4.58	100.00
Growth rate of 2016-17 over 2015-16 (%)	3.38	-	29.33	23.19	-15.28	-12.68	2.24
CAGR 2007-08 to 2016-17(%)	3.79	-	-11.21	4.28	6.66	-10.25	2.22

(P): Provisional

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

From 2008-09 onwards cotton is also included in others.

Note:For lignite, production= despatch= consumption.

Source : Office of the Coal Controller, Ministry of Coal

[\(Download Table 6.5\)](#)

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
2007-08	12.17	10.33	13.29	9.37	4.54	47.67	0.67
2008-09	12.19	11.26	13.91	9.30	4.42	51.71	0.55
2009-10	13.14	12.82	10.13	9.30	4.63	56.24	0.46
2010-11	14.33	14.19	10.68	8.93	5.08	60.07	0.46
2011-12	15.35	14.99	11.22	8.23	5.54	64.75	0.41
2012-13	15.60	15.74	12.29	7.50	5.27	69.08	0.40
2013-14	16.29	17.13	11.31	7.16	5.50	68.36	0.39
2014-15	18.00	19.08	11.08	7.09	5.72	69.42	0.37
2015-16	19.62	21.85	13.27	6.83	6.26	74.65	0.41
2016-17(P)	21.61	23.76	13.24	5.40	7.00	76.03	0.45
Growth rate of 2016-17 over 2015-16 (%)	10.12	8.78	-0.23	-20.94	11.75	1.85	10.27
CAGR 2007-08 to 2016-17(%)	5.91	8.69	-0.04	-5.36	4.41	4.78	-3.88

(p) : Provisional

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

(Million Tonnes)

Year	Heavy Ends					Others*	Total	Refinery Fuel and Losses	Total including Refinery Fuel and
	Fuel Oil	Lubricants	Bitumen	Waxes	Petroleum Coke				
	9	10	11	12	13	14	15=2 to 14	16	17
2007-08	12.72	2.29	4.51	-	5.95	5.45	128.95	11.75	140.70
2008-09	12.59	2.00	4.75	-	6.17	4.60	133.45	11.91	145.36
2009-10	11.63	2.54	4.93	0.29	6.59	5.11	137.81	15.11	152.92
2010-11	10.79	2.43	4.54	0.25	4.98	4.32	141.04	16.38	157.42
2011-12	9.31	2.63	4.64	0.27	6.14	4.65	148.13	17.29	165.43
2012-13	7.66	3.20	4.68	0.19	10.13	5.32	157.07	18.35	175.40
2013-14	6.24	3.31	5.01	0.18	11.76	5.78	158.43	17.87	176.27
2014-15	5.96	3.31	5.07	0.16	14.56	5.72	165.53	17.67	183.19
2015-16	6.63	3.57	5.94	0.17	19.30	6.18	184.67	18.77	203.45
2016-17(P)	7.15	3.47	5.94	0.26	23.96	6.33	194.59	20.07	214.67
Growth rate of 2016-17 over 2015-16 (%)	7.82	-2.83	-0.04	50.87	24.18	2.41	5.37	6.91	5.51
CAGR 2007-08 to 2016-17(%)	-5.60	4.24	2.79	-	14.95	1.51	4.20	5.50	4.32

(p) : Provisional

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

Source: Ministry of Petroleum & Natural Gas.

[\(Download Table 6.6\)](#)

Table 6.7 : Sectorwise (end use) Consumption of Selected Petroleum Products in India

(’000 tonnes)

Petroleum Product	Year	Transport	Agriculture	Power Generation	Industry	Mining & Quarrying	Resellers/ Retail	Misc. Services	Pvt Imports	Total
1	2	3	4	5	6	7	8	9	10	11 =3 to10
High Speed Diesel Oil	2007-08	5,003	504	313	1,241	925	**	39,652	31	47,669
	2008-09	5,293	490	336	1,310	1,025	**	43,195	62	51,710
	2009-10	5,365	594	303	1,502	1,248	**	47,137	94	56,242
	2010-11	5,417	616	166	1,440	1,366	48704	2,170	193	60,071
	2011-12	5,529	684	168	1,649	1,181	53,208	2,262	70	64,750
	2012-13	5,160	617	214	1,628	1,073	58,021	2,320	47	69,080
	2013-14	3,203	429	204	687	873	61465	1426	77	68,364
	2014-15	4,617	575	197	794	998	60403	1748	83	69,416
	2015-16	5,765	630	224	1096	1184	63772	1922	55	74,647
	2016-17(P)	5,658	607	208	1033	1224	65089	2161	34	76,014
Growth rate of 2016-17 over 2015-16 (%)		-1.86	-3.61	-7.01	-5.74	3.39	2.07	12.44	-38.28	1.83
CAGR 2007-08 to 2016-17(%)		1.24	1.88	-3.99	-1.82	2.84	-	-25.24	0.83	4.78

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

(’000 tonnes)

Petroleum Product	Year	Transport	Agriculture	Power Generation	Industry	Mining & Quarrying	resellers/ Retail	Misc. Services	Pvt Imports	Total
1	2	3	4	5	6	7	8	9	10	11 =3 to10
Light Diesel Oil	2007-08	36	3	77	200	2	**	350	0	668
	2008-09	15	4	175	171	5	**	182	0	552
	2009-10	6	3	152	143	2	**	152	0	458
	2010-11	5	2	137	127	3	0	182	0	455
	2011-12	3	1	127	102	2	0	180	0	415
	2012-13	3	1	142	74	2	1	175	0	399
	2013-14	4	1	132	64	3	1	182	0	386
	2014-15	5	1	132	55	4	4	165	0	365
	2015-16	4	1	154	61	2	1	184	0	407
	2016-17(P)	7	2	174	59	2	1	203	0	449
Growth rate of 2015-16 over 2014-15(%)		93.12	61.12	13.06	-2.06	4.55	-5.45	10.20	-	10.30
CAGR 2006-07 to 2015-16(%)		-14.72	-5.04	8.49	-11.42	4.09	-	-5.32	-	-3.89

Note: ** denotes that the data of Resellers / Retail are included in Miscellaneous services

Contd...

[\(Download Table 6.7\)](#)

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

('000 tonnes)

Petroleum Product	Year	Transport	Agriculture	Power Generation	Industry	Mining & Quarrying	resellers/ Retail	Misc. Services	Pvt Imports	Total
1	2	3	4	5	6	7	8	9	10	11 =3 to10
Furnace Oil	2007-08	315	0	281	1,634	1	**	6,400	839	9,470
	2008-09	469	55	749	2,843	35	**	4,355	913	9,419
	2009-10	560	68	688	3,135	23	**	4,134	538	9,145
	2010-11	780	70	823	2,773	7	**	3,986	374	8,814
	2011-12	371	70	647	2,408	45	**	3,345	706	7,593
	2012-13	277	79	587	2,019	13	351	2,721	608	6,654
	2013-14	315	75	536	1,833	39	309	2,332	696	6,135
	2014-15	346	56	446	1,748	45	197	2,417	570	5,826
	2015-16	380	57	430	2,136	53	270	2,564	592	6,482
	2016-17(P)	444	51	361	2,492	71	357	2,453	815	7,045
Growth rate of 2016-17 over 2015-16(%)		17.03	-9.21	-16.13	16.63	16.76	37.23	-4.32	37.64	8.69
CAGR 2007-08 to 2016-17(%)		3.50	76.03	2.54	4.31	54.70	-	-9.14	-0.29	-2.91

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

('000 tonnes)

Petroleum Product	Year	Transport	Agriculture	Power Generation	Industry	Mining & Quarrying	resellers/ Retail	Misc. Services	Pvt Imports	Total
1	2	3	4	5	6	7	8	9	10	11 =3 to10
Low Sulphur Heavy Stock	2007-08	0	0	344	1,304	0	-	1,600	0	3,248
	2008-09	-	1	1,347	1,294	0	-	526	0	3,169
	2009-10	-	2	937	1,225	0	-	320	0	2,484
	2010-11	0	0	469	1,031	0	-	482	0	1,982
	2011-12	0	0	399	1,067	1	-	293	0	1,759
	2012-13	0	0	439	778	0	-	149	0	1,366
	2013-14	0	0	328	76	0	-	44	0	449
	2014-15	0	0	226	104	0	-	47	0	377
	2015-16	0	0	51	70	0	-	29	0	150
	2016-17(P)	0	0	16	51			37	0	104
Growth rate of 2016-17 over 2015-16 (%)		-	-	-67.58	-27.77	-	-	26.26	-	-30.69
CAGR 2007-08 to 2016-17(%)		-	-	-26.21	-27.70	-	-	-31.40	-	-29.10

Note: ** denotes that the data of Resellers / Retail are included in Miscellaneous services

Contd...

[\(Download Table 6.7\)](#)

Table 6.7 (Contd.) : Sectorwise (end use) Consumption of Selected Petroleum Products in India

('000 tonnes)

Petroleum Product	Year	Transport	Agriculture	Power Generation	manufacturing/Non domestic	Domestic Distribution	Reseller/Retail	Misc. Services	Private import	Total
1	2	3	4	5	6	7	8	9	10	11=3 to 10
Liquefied Petroleum Gas	2007-08	202	0	0	687	10299	**	146	676	12010
	2008-09	182	1	0	825	10637	**	136	409	12191
	2009-10	225	4	0	1014	11364	**	133	395	13135
	2010-11	224	2	0	1150	12369	**	156	430	14331
	2011-12	224	5	0	1255	13296	**	150	421	15350
	2012-13	215	4	0	1312	13568	59	103	398	15659
	2013-14	195	4	3	1208	14412	58	104	369	16351
	2014-15	165	6	3	1259	16040	45	98	429	18045
	2015-16	172	7	3	1666	17182	45	105	489	19668
	2016-17(P)	168	8	2	1996	18871	67	204	358	21675
Growth rate of 2016-17 over 2015-16 (%)		-2.19	8.72	-18.37	19.80	9.83	49.22	94.96	-26.71	10.20
CAGR 2007-08 to 2016-17(%)		-	-	-	11.26	6.24	-	3.44	-6.15	6.08

Table 6.7 (Contd.) : Sectorwise (end use) Consumption of Selected Petroleum Products in India

('000 tonnes)

Petroleum Product	Year	Fertiliser Sector	Petrochemicals	Power Sector	Steel Plants	Others	Private import	Total
1	2	3	4	5	6	7	8	9 =3 to 8
Naptha	2007-08	1689	6048	753	54	332	4417	13293
	2008-09	1803	5889	1147	71	693	4307	13910
	2009-10	844	6968	639	3	560	1121	10134
	2010-11	892	7500	419	0	155	1710	10676
	2011-12	962	8141	187	0	163	1768	11222
	2012-13	898	9412	342	0	203	1434	12289
	2013-14	516	9464	215	0	240	870	11305
	2014-15	302	9530	199	0	208	844	11082
	2015-16	316	10350	50	0	37	2517	13271
	2016-17(P)	349	10312	60	0	114	2339	13174
Growth rate of 2016-17 over 2015-16 (%)		10.59	-0.37	19.68	-	207.68	-7.10	-0.73
CAGR 2007-08 to 2016-17(%)		-14.58	5.48	-22.33	-	-10.13	-6.16	-0.09

P: Provisional

[\(Download Table 6.7\)](#)

Table 6.7 (Contd.) : Sectorwise (end use) Consumption of Selected Petroleum Products in India

('000 tonnes)

Petroleum Product	Year	Domestic	Commercial/ Industry	Others	Total
1	2	3	4	5	6=3 to 5
SKO(Kerosene)	2007-08	9163	85	117	9365
	2008-09	9131	43	128	9302
	2009-10	9101	69	134	9304
	2010-11	8722	67	139	8928
	2011-12	8045	61	123	8229
	2012-13	7349	37	115	7502
	2013-14	7009	49	107	7165
	2014-15	6917	60	109	7087
	2015-16	6649	64	113	6826
	2016-17(P)	5204	77	116	5397
Growth rate of 2016-17 over 2015-16 (%)		-21.73	20.67	2.10	-20.94
CAGR 2007-08 to 2016-17(%)		-5.50	-0.97	-0.12	-5.36

P: Provisional

Table 6.8 INDUSTRYWISE OFF-TAKE OF NATURAL GAS IN INDIA

(Billion Cubic Metres)

Year	Energy Purpose						
	Power Generation	Industrial Fuel	Tea Plantation	Domestic fuel/Transport Distribution Network	Refinery	Miscellaneous	Total
1	2	3	4	5	7	8	9
2007-08	12.04	-	0.16	-	-	-	12.20
2008-09	12.60	-	0.15	-	-	3.42	16.18
2009-10	21.37	-	0.17	-	-	7.27	28.80
2010-11	25.79	-	0.19	-	-	7.55	33.53
2011-12	22.63	0.28	0.18	5.60	4.26	9.48	42.42
2012-13	16.08	0.27	0.18	5.78	3.89	8.36	34.56
2013-14	11.28	0.16	0.20	5.90	3.97	7.96	29.46
2014-15	10.72	0.39	0.18	5.42	4.58	6.43	27.72
2015-16	10.89	0.40	0.19	5.46	5.08	4.67	26.68
2016-17 (P)	11.62	0.69	0.18	7.35	5.37	4.32	29.53
Distribution (%)	24.28	1.36	0.36	14.47	10.58	8.51	58.16
Growth rate of 2016-17 over 2015-16 (%)	6.68	71.56	-2.00	34.52	5.87	-7.35	10.69

* Consumption of LNG included from 2011-12 & onwards.

NA :Non Availability of data

Source: Ministry of Petroleum & Natural Gas

Note:

Re-classification among the sectors of consumption of Natural gas under energy and non-energy sectors, as advised by GAIL has been done. Sectors where natural gas is being used as feedstock are classified as consumption of gas under non energy purpose whereas those sectors where natural gas is being used as fuel are classified as consumption of gas under energy purpose.

Table 6.8 (contd) INDUSTRYWISE OFF-TAKE OF NATURAL GAS IN INDIA

(Billion Cubic Metres)

Non-Energy Purposes					Grand Total
Fertilizer Industry	Petro-Chemicals	Captive Use/LPG Shrinkage	Sponge Iron	Total	
9	10	11	12	13=10 to 12	14
9.82	1.43	-	-	-	-
9.08	1.11	-	-	-	-
13.17	1.26	-	-	-	-
11.46	1.31	-	-	-	-
14.00	1.86	1.07	1.33	18.26	60.68
14.73	2.49	1.03	1.11	19.35	53.91
15.87	2.40	0.98	0.27	19.53	48.99
15.19	2.89	1.01	0.15	19.24	46.95
16.13	3.73	0.75	0.54	21.17	47.85
15.43	4.17	0.76	0.89	21.24	50.78
30.38	8.21	1.50	1.74	41.84	100.00
-4.38	11.70	0.70	62.60	0.36	6.12

Note: Includes of Consumption of LNG in 2011-12 & onwards.

NA :Non Availability of data

Source: Ministry of Petroleum & Natural Gas

[\(Download Table 6.8\)](#)

Table 6.9: Consumption of Electricity by Sectors in India

in Giga Watt Hour = 10⁶ 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
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	2,36,752	1,20,209	1,46,080	60,600	12,408	36,595	6,12,645
2010-11	2,72,589	1,31,967	1,69,326	67,289	14,003	39,218	6,94,392
2011-12	3,52,291	1,40,960	1,71,104	65,381	14,206	41,252	7,85,194
2012-13	3,65,989	1,47,462	1,83,700	72,794	14,100	40,256	8,24,301
2013-14	3,84,418	1,52,744	1,99,842	74,247	15,540	47,418	8,74,209
2014-15	4,18,346	1,68,913	2,17,405	78,391	16,177	49,289	9,48,522
2015-16	4,23,523	1,73,185	2,38,876	86,037	16,594	62,976	10,01,191
2016-17(P)	4,26,665	1,95,473	2,59,311	98,333	17,217	69,269	10,66,268
Distribution (%)	40.01	18.33	24.32	9.22	1.61	6.50	100.00
Growth rate of 2016-17 over 2015-16 (%)	0.74	12.87	8.55	14.29	3.75	9.99	6.50
CAGR 2007-08 to 2016-17(%)	8.46	6.50	7.93	7.73	4.48	8.85	7.82

(P): Provisional

Source : Central Electricity Authority.

[\(Download Table 6.9\)](#)

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

in Giga Watt hour =10⁶ Kilo Watt hour

Year	Net Electricity Generated from Utilities	Purchases from Non-Utilities + Net Import from Other Countries	Net Electricity Available for Supply	Sold to Ultimate Consumers & Other Countries	Loss in transmission & distribution	Loss in transmission & distribution (%)
1	2	3	4=2+3	5	6=4-5	7
2007-08	6,77,095	12,685	6,89,780	5,02,267	1,87,513	27.18
2008-09	6,93,764	14,181	7,07,945	5,27,623	1,80,322	25.47
2009-10	7,49,128	14,391	7,63,519	5,69,723	1,93,796	25.38
2010-11	7,91,796	19,839	8,11,635	6,17,098	1,94,537	23.97
2011-12	8,65,952	15,514	8,81,466	6,73,068	2,08,398	23.64
2012-13	9,00,380	20,849	9,21,229	7,08,997	2,12,232	23.04
2013-14	9,56,488	17,948	9,74,436	7,51,908	2,22,528	22.84
2014-15	10,40,582	13,773	10,54,355	8,14,250	2,40,105	22.77
2015-16	10,88,282	15,947	11,04,228	8,63,364	2,40,864	21.81
2016-17(P)	11,51,971	16,345	11,68,317	9,19,483	2,48,834	21.30
Growth rate of 2016-17 over 2015-16 (%)	5.85	2.50	5.80	6.50	3.31	-2.36
CAGR 2007-08 to 2016-17(%)	5.46	2.57	5.41	6.23	2.87	-2.41

(P): Provisional

Source : Central Electricity Authority.

[\(Download Table 6.10\)](#)

CHAPTER 7: ENERGY BALANCE

7.1 *Definition*

- ❖ **Commodity balance:** The purpose of commodity balance is to show the sources of supply and various uses of particular energy product with reference to national territory of the compiling country. The balance is compiled for any energy commodity provided that the commodity remains homogeneous at each point in the balance.
- ❖ International Recommendations on Energy Statistics (IRES) recommends that the format of energy balance and all applicable concepts are consistently used in the compilation of a commodity balance to ensure data consistency. 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.
- ❖ **Energy Balance:** An energy balance is a framework to complete data on all energy products entering, existing and used within a given country during a reference periods (e.g. a year). It expresses all data in common energy units, which makes it possible to define a “total” product.
- ❖ The purpose of compiling an energy balance starting from the various commodity balances are numerous; they are to:
 - Provide a comprehensive overview of the energy profile of a country, to monitor energy security, energy markets, relevant policy goals and to formulate adequate energy policies;
 - Provide the basis for aggregate socio-economic indicators, as well as for estimates of CO₂ emissions;
 - Compare data of different reference periods and different countries;
 - Provide a tool to ensure completeness, consistency and comparability of basic statistics;
 - Calculate efficiencies of transformation processes, as well as relative shares of different sectors or products in the country’s total supply or consumption

- ❖ An energy balance generally takes the form of a matrix of products and flows, with varying levels of disaggregation, although graphical formats also exist (e.g. sankey diagram).
- ❖ Two major components of the energy balance statistics are Total Primary Energy Supply and Total Final Consumption of energy commodity.
- ❖ Within a balance, the total final consumption is disaggregated into sectors, like industry, transport, residential, services and others. However, the level of disaggregation of such energy data is not enough to monitor energy efficiency, as no information is available for example on the residential or services end uses, nor on the transport vehicle types or segments. The energy balance will therefore be useful to assess the largest consuming sectors within a country where the energy saving potential will have more impact, before starting more detailed collection programmes on data for energy efficiency indicators.

7.2 Methodology used for Energy Balance

- ❖ **Energy (in KToe) = Quantity of Commodity * Conversion factor**
- ❖ **1Toe = 41868 MJ**
- ❖ **Conversion factor = Net Calorific Value (NCV)
Mega joules per ton of oil equivalent**
where NCV is in kj per kg
- ❖ **Net Calorific Value(NCV) = Gross calorific value (GCV) – (% Moisture Content) [1NCV = 0.9 GCV]**
 - The difference between net and gross calorific values are typically about 5% to 6% of the gross value of solid and liquid fuels and about 10% for Natural gas.
 - Net Calorific Values are, as recommended by IEA for all commodities.

7.3 Highlights of Energy Balance:

- ❖ In 2016-17, Primary Energy Supply added up to 8,17,370.21 Kilo Tonne of Oil equivalent (ktoe). The share of Coal accounted for 64.17% and the contribution of Crude Oil was 31.25%. (Table 7.2).
- ❖ In 2016-17, National Energy Consumption was 5,40,931.75ktoe. The industrial sector used 57.71 % of the total final energy consumption (table 7.2).

- ❖ Within the industry sector, the most energy intensive industries were iron and steel, which accounted for 13.36 % of the industrial energy use followed by Chemicals and petrochemicals 4.67 % and construction 1.70 % (Table 7.2).
- ❖ The transport sector accounted for 8.44% of Total Final Consumption. The consumption of the residential, agriculture/forestry, commercial and public sectors represented 13.90%. (Table 7.2).
- ❖ Efforts are being made to reduce the statistical difference, by incorporating more data.

7.3 Sankey Diagram (2016-17):

- ❖ The concept of data visualization in the digital age has revived interest in a style of chart called a Sankey diagram. This style of diagram makes it easy to see the dominant flows within a system and highlights where losses occur.
- ❖ The Sankey diagram is very useful tool to represent an entire input and output energy flow in energy system after carrying out energy balance calculation. The thicker the line, the greater the amount of energy involved.
- ❖ The data of Energy Balance (Table 7.2) is used to construct the Sankey diagram, in which flows of energy are traced from energy sources to end-use consumption. The resulting diagram provides a convenient and clear snapshot of existing energy transformations in India which can usefully be compared with a similar global analysis. It gives a basis for examining and communicating future energy scenarios.

Table 7.1 : Energy Commodity Balance for the year 2016-17(P)

Supply	Coal	Lignite	LPG	Naphtha	Kerosene	Diesel	Fuel Oil	Lubricants	Bitumin	Petrol/Motor Spirit	Other Petroleum Products*	Natural Gas	Electricity
	(000 tonnes)											(MMSCM)	(GWh)
Production	662792	45230	11326	19946	6041	103113	9962	1029	5185	36593	50,356	31897	1235358
From Other Sources			358	2339		34	815						197000
Imports	190953	19	11026	2693		996	956	2014	955	476	16299	18631	5617
Exports	-1773	-5	-317	-8727	-15	-27452	-2248	-13	-38	-15417	-11256		-6710
Stock changes	11924	2074											
Domestic Supply	863896	47318	22393	16251	6026	76691	9485	3030	6102	21652	55399	50528	1431265
Transfer													
Statistical difference	-22335	-4164	-856	-5416	-629	-247	-2304	-345	-235	-2319	-18439	249	-32776
Transformation	527256	38824	2	60		382	377					11616	83387
Electricity plants	527256	38824	2	60		382	377					11616	83387
Energy Sector	289											9120	
Coal mines	289												
Petroleum refineries												5374	
Other energy sector												3746	
Distribution losses													248834
Final Consumption	314016	4330	21535	10775	5397	76062	6804	2685	5867	21847	36960	30041	1066268
Industry Sector	314016	4330	1996	10775	77	2300	2614				22457	794	426665
Iron and steel	59824	73	0	0		159	1285						
Chemical and petroleum	3327	200	12	10661		125	732						
Non-ferrous metals						28	361						
Machinery			21			161	19						
Mining & Quarrying			139			1226	71						
Paper, pulp and print	1184	526											
Construction	6531	673				506	233						
Textile and leather	243	1463	2			37	74						
Non-specified	242907	1395	1822	114	77	58	200				22457	794	426665
Transport Sector			526			5665	444			21847	7045	471	17217
Domestic aviation						2709					6545		
Road			167			2	37						
Rail			1			2651							17217
Pipeline transport												471	
Domestic navigation						303	407						
Non-specified			358							21847	500		
Other Sectors			19013		5320	68097	3746	2685	5867		7458	7533	622386
Residential			18871		5204							7350	259311
Comm. And public services													98333
Agriculture/forestry			8			609	51					183	195473
Non-specified			134		116	67488	3695	2685	5867		7458		69269
Non-Energy Use												21243	

(P): Provisional

Statistical difference is defined as deliveries to final consumption + use for transformation processes and consumption by energy industry own use + losses – domestic supply

Final consumption = Total Industrial Consumption+ Total Consumption in Transport+Consumption by Other sectors+Non energy Use

* Include ATF, Pet Coke, Paraffin waxes, petroleum jelly, LSWR, MTBE and reformate, BGO, Benzene, MTO, CBFS and Sulfur etc.

[\(Download Table 7.1\)](#)

Table 7.2: Energy Balance of India for 2016-17 (P)

All figures in KToe

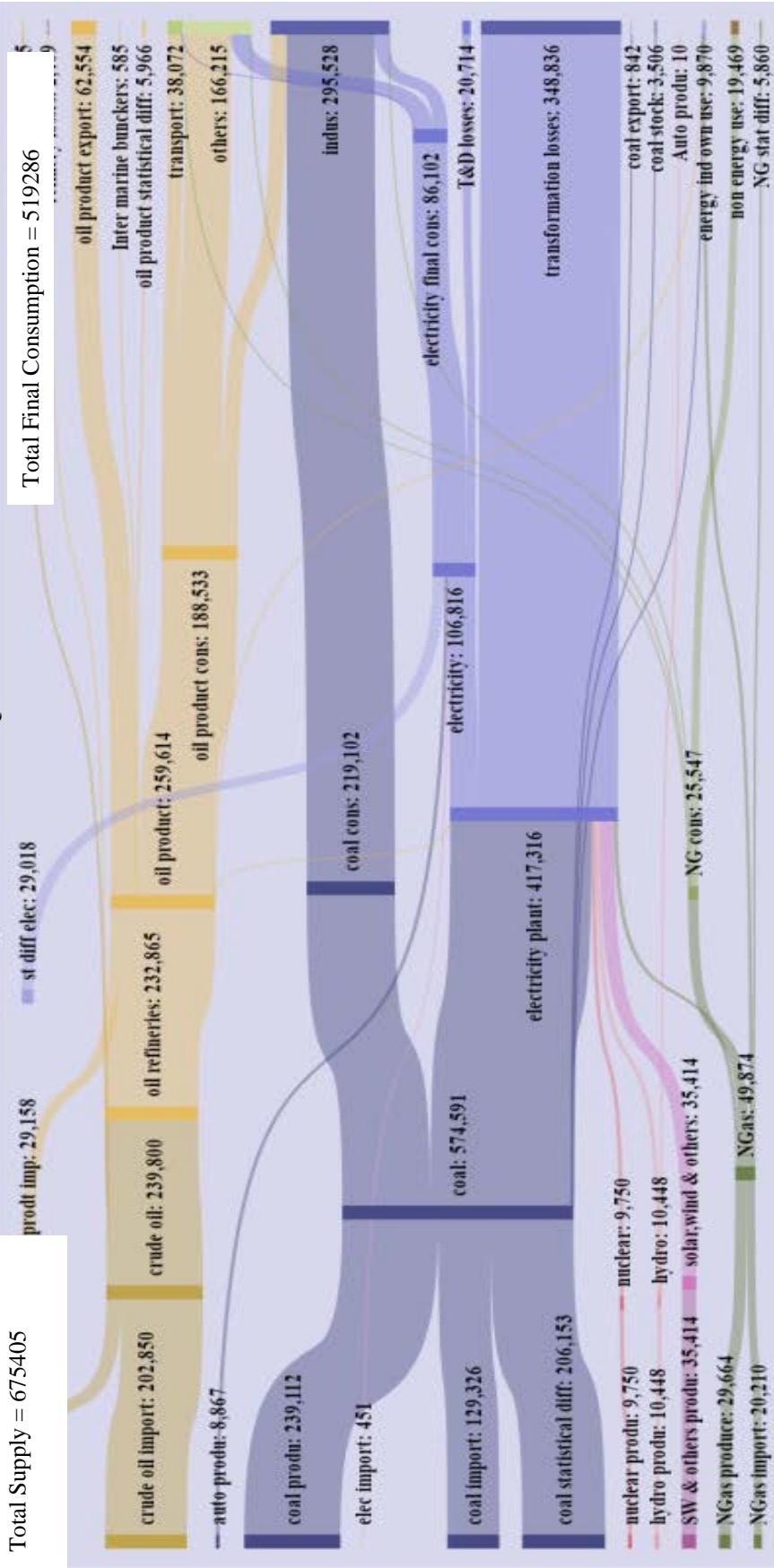
	Coal	Crude Oil	Oil Products	Natural Gas	Nuclear	Hydro	Wind	Electricity	Total
Production	3,94,724.94	36,801.12	-	29,343.46	9,881.11	10,535.55	2,778.55	-	4,84,064.72
Imports	1,23,552.77	2,18,618.60	36,327.16	17,136.96	-	-	-	483.06	3,96,118.54
Exports	-1,195.34	-	-68,429.32	-	-	-	-	-577.06	-70,201.72
Stock changes	7,388.67	-	-	-	-	-	-	-	7,388.67
Total primary energy supply	5,24,471.04	2,55,419.71	-32,102.17	46,480.41	9,881.11	10,535.55	2,778.55	-94.00	8,17,370.21
Statistical differences	52,170.70	15,851.18	-6,177.78	2,602.28	-	-	-	-9,990.02	54,456.36
Main activity producer electricity plants	-3,63,982.83	-	-823.79	-10,688.74	-9,881.11	-10,524.47	-2,778.55	1,06,240.79	-2,92,438.70
Autoproducer electricity plants	-	-	-	-	-	-11.08	-	16,942.00	16,930.92
Oil refineries	-	-2,50,759.40	2,48,741.88	-4,943.66	-	-	-	-	-6,961.19
Energy industry own use	-167.62	-	-	-6,347.02	-	-	-	-	-6,514.63
Losses	-	-20,511.49	-	-	-	-	-	-21,399.72	-41,911.22
Final consumption	2,12,491.29	-	2,09,638.14	27,103.27	-	-	-	91,699.05	5,40,931.75
Industry	2,12,491.29	-	62,368.47	633.01	-	-	-	36,693.19	3,12,185.96
Iron and steel	40,310.83	-	1,398.24	-	-	-	-	-	41,709.07
Chemical and petrochemical	2,286.49	-	12,304.18	-	-	-	-	-	14,590.67
Non-ferrous metals	-	-	28.96	-	-	-	-	-	28.96
Machinery	-	-	208.47	-	-	-	-	-	208.47
Mining and quarrying	-	-	1,493.14	-	-	-	-	-	1,493.14
Paper, pulp and print	917.41	-	-	-	-	-	-	-	917.41
Construction	4,552.37	-	747.02	-	-	-	-	-	5,299.39
Textile and leather	497.24	-	111.58	-	-	-	-	-	608.82
Non-specified (industry)	1,63,926.96	-	46,076.87	633.01	-	-	-	36,693.19	2,47,330.04
Transport	-	-	37,396.77	6,760.95	-	-	-	1,480.66	45,638.39
Road	-	-	26,194.13	-	-	-	-	-	26,194.13
Domestic aviation	-	-	7,351.25	-	-	-	-	-	7,351.25
Rail	-	-	2,742.80	-	-	-	-	1,480.66	4,223.46
Pipeline transport	-	-	-	6,760.95	-	-	-	-	6,760.95
Domestic navigation	-	-	704.15	-	-	-	-	-	704.15
Non-specified (transport)	-	-	404.45	-	-	-	-	-	404.45
Other	-	-	1,01,068.12	168.64	-	-	-	53,525.20	1,54,761.96
Residential	-	-	26,763.48	-	-	-	-	22,300.75	49,064.23
Commercial and public services	-	-	-	-	-	-	-	8,456.64	8,456.64
Agriculture/forestry	-	-	687.84	168.64	-	-	-	16,810.68	17,667.15
Non-specified (other)	-	-	73,616.81	-	-	-	-	5,957.13	79,573.94
Non-energy use	-	-	8,804.77	19,540.67	-	-	-	-	28,345.44
Non-energy use industry/transformation/energy	-	-	8,804.77	19,540.67	-	-	-	-	28,345.44
Elect. output in GWh	-	-	-	-	37,915.87	1,22,506.36	32,308.77	-	1,92,731.00
Elec output-main activity producer ele plants	-	-	-	-	37,915.87	1,22,377.56	32,308.77	-	1,92,602.20
Elec output-autoproducer electricity plants	-	-	-	-	-	128.80	-	-	128.80

* Final consumption refers to End Use Consumption

P: Provisional

[\(Download Table 7.2\)](#)

**SANKEY DIAGRAM (INDIA)
BALANCE (2015-16)
MILLION TONNE OF OIL EQUIVALENT**



Coal cons -Coal Final Consumption
 NGas -Natural Gas
 St diff -Statistical Difference
 produ - production
 Cons -Consumption
 T&D -Transmission & distribution

Indus -Industries
 SW-Solar & Wind
 pp-pulp

Source Program for diagram: SankeyMATIC

**SANKEY DIAGRAM (INDIA)
FINAL CONSUMPTION(2015-16)
MILLION TONNE OF OIL EQUIVALENT**

Total Supply = 817370

Total Consumption = 519286

Consumption by Sectors

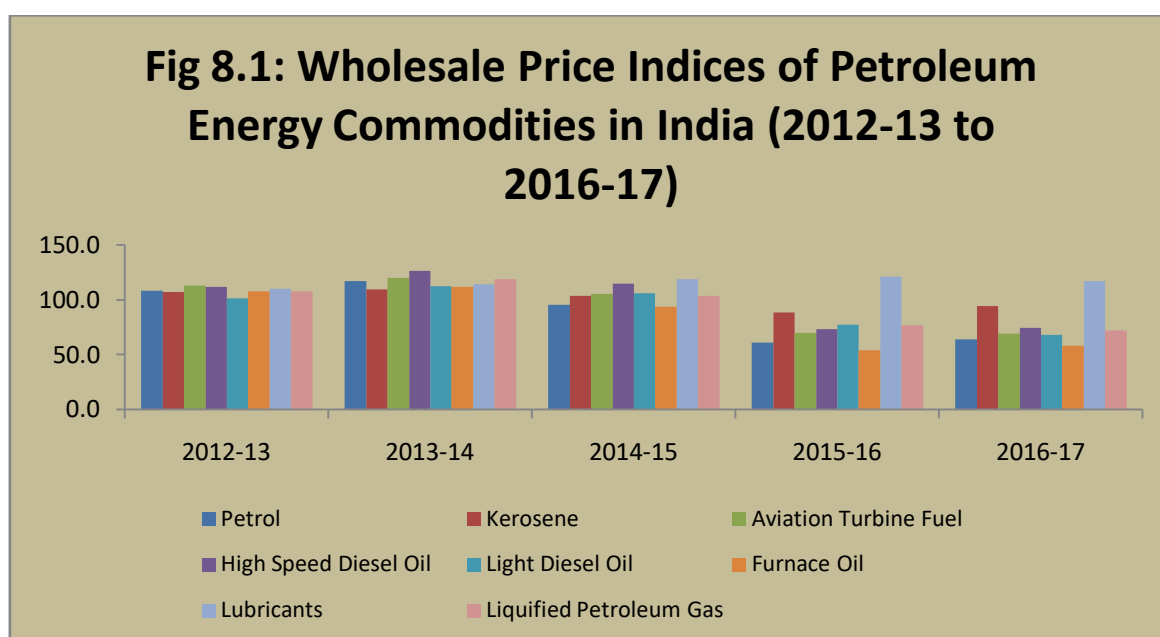


Source Program for diagram: SankeyMATIC

CHAPTER 8: WHOLE SALE PRICE INDEX OF ENERGY COMMODITIES

8.1 The Wholesale Price Index of Petroleum Products

- ❖ Annual increase (2016-17 over 2015-16) in Wholesale Price Index of Petroleum Products varied for different products ranging from -11.80% (Bitumen) to 7.00% (Furnace Oil).
- ❖ The maximum decrease was observed in Bitumen (-11.80%), followed by Liquefied Petroleum Gas(-6.13%).



8.2 The Wholesale Price Index of Non-Petroleum Products

- ❖ The wholesale price index for Coke was 93.0 for the period 2016-17 registering a growth of 18.77% from its value in 2015-16 (i.e. 78.3).
- ❖ Wholesale Price Index of Electricity recorded a decrease of -1.04% during 2016-17 over 2015-16.

Fig 8.2: Wholesale Price Index of Non-Petroleum Energy Commodities in India (2012-13 to 2016-17)

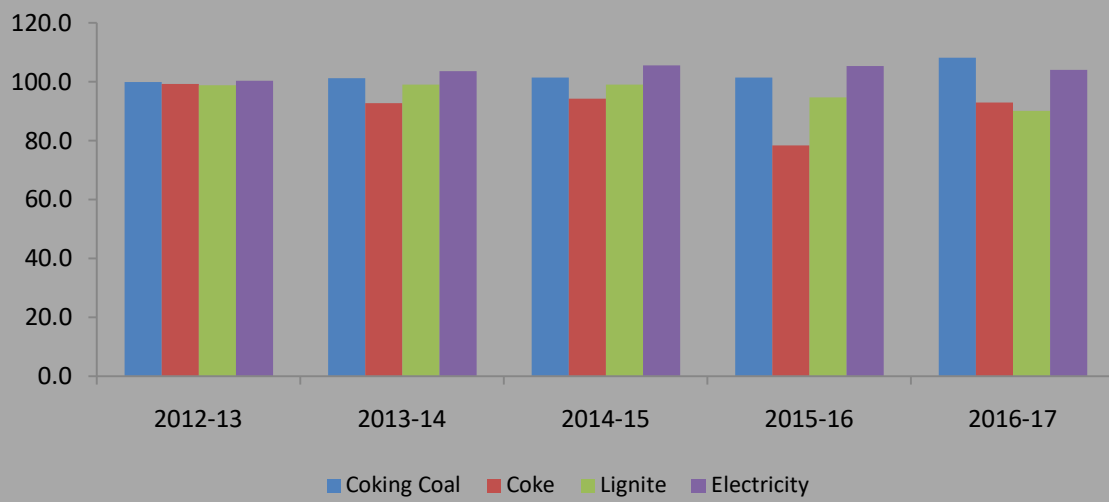


Table 8.1 : Wholesale Price Indices of Energy Commodities in India

(2011-12=100)

Year	Petroleum Products								Coking Coal	Coke	Lignite	Electricity
	Petrol	Kero-sene	Aviation Turbine Fuel	High Speed Diesel Oil	Bitumen	Furnace Oil	Lubri-cants	Liquified Petroleum Gas				
1	2	3	4	5	6	7	8	9	10	11	12	13
2012-13	108.4	107.1	112.6	111.6	101.3	107.7	109.6	107.8	100.0	99.4	98.9	100.5
2013-14	117.1	109.3	119.7	126.3	112.1	111.5	114.2	118.6	101.2	92.8	99.2	103.6
2014-15	95.2	103.5	105.1	114.8	106.1	93.6	118.8	103.5	101.4	94.3	99.2	105.7
2015-16	60.9	88.4	69.5	73.4	77.1	54.3	120.8	76.7	101.4	78.3	94.7	105.3
2016-17(p)	63.8	94.3	69.3	74.4	68.0	58.1	116.8	72.0	108.2	93.0	90.2	104.2
Increase in 2016-17 over 2015-16 (%)	4.76	6.67	-0.29	1.36	-11.80	7.00	-3.31	-6.13	6.71	18.77	-4.75	-1.04

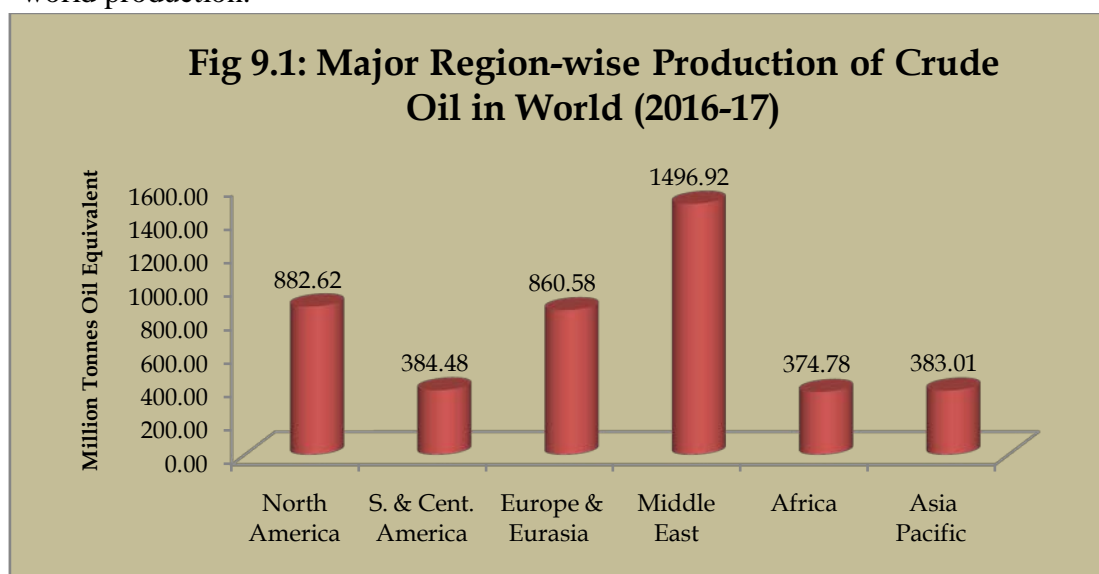
Source :Office of the Economic Advisor, Ministry of Commerce & Industry.

[\(Download Table 8.1\)](#)

CHAPTER 9: WORLD PRODUCTION AND CONSUMPTION OF CRUDE OIL & NATURAL GAS

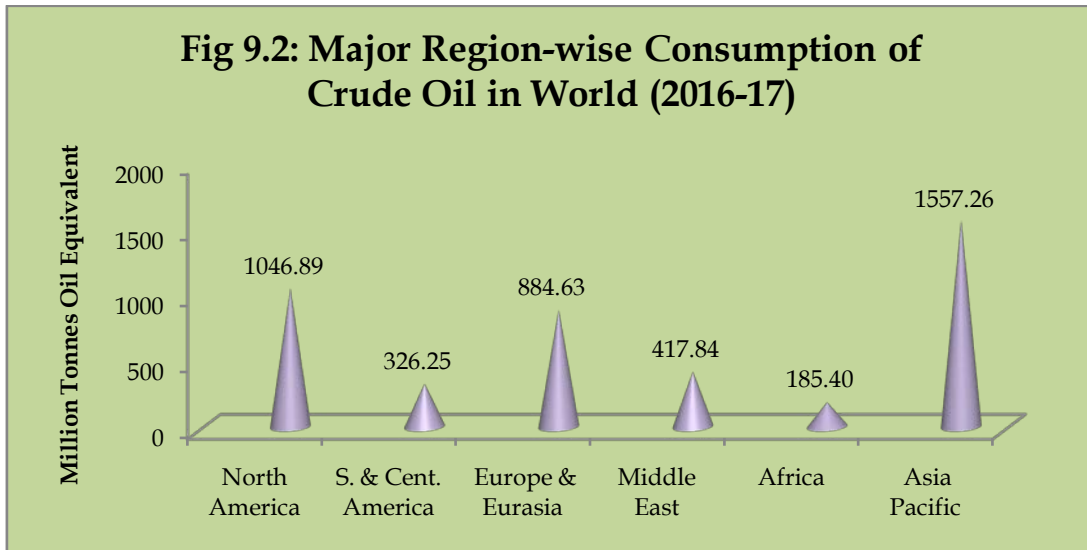
9.1 Production and consumption of crude oil

- ❖ The total estimated production of crude oil in the world has increased from about 3948.6 MT in 2007-08 to about 4116.4 MT during 2012-13, and further increased to 4382.4 MT during 2016-17 (Table 9.1). The production increased by 0.5% from 2015-16 to 2016-17.
- ❖ Geographical distribution of total world production during 2016-17 across major regions reveals that Middle East accounted for the highest share (34.16%), followed by North America (20.1%), Europe & Eurasia (19.64%), South & Central America (8.8%), Asia Pacific (8.74%) and Africa (8.6%). (Table 9.1)
- ❖ Distribution of total world production according to countries shows that Saudi Arabia and Russian Federation were the first and second highest producers with 13.36% and 12.65 respectively. They were followed by USA (12.39%), Iraq (5.00%), Canada (4.98%), Iran (4.94%), China (4.56%), UAE(4.16%), Kuwait (3.49%), Brazil (3.1%), Venezuela (2.8%), Mexico (2.77%), Nigeria (2.25%), Norway (2.06%) and Angola (2.01%). India has accounted for only 0.92% of the world production.



- ❖ Region-wise consumption (Table 9.2) shows that Asia Pacific accounted for the highest share (35.25%) of total world consumption, followed by North America (23.69%), and Europe & Eurasia (20.02%). African countries accounted for the lowest share in the world consumption (4.20%).

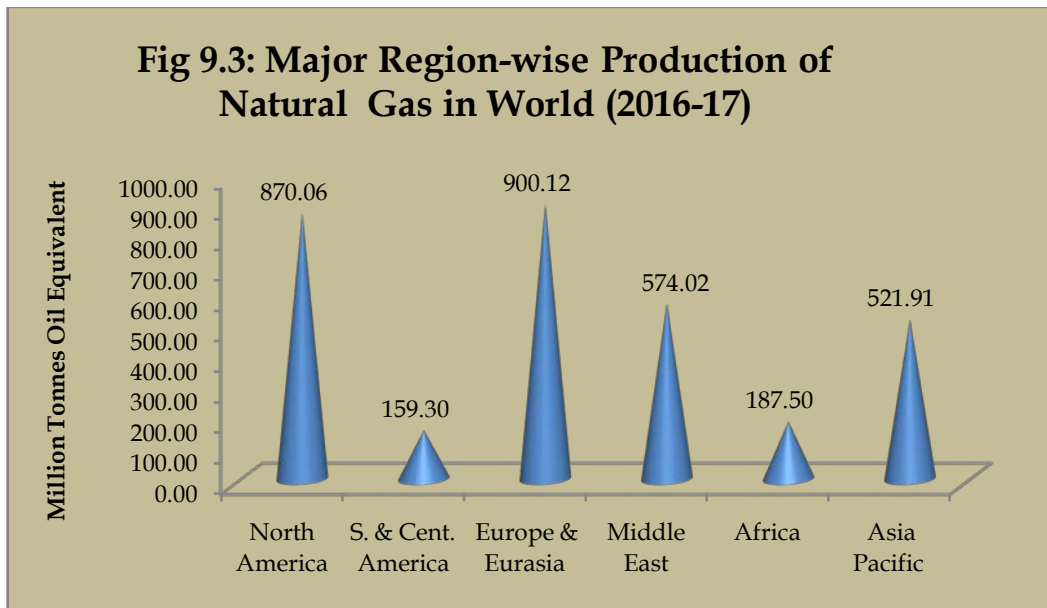
- ❖ Country-wise distribution of consumption reveals that the United States was the largest consumer of crude oil, consuming 19.54% of the world consumption during 2016-17. China was the second largest consumer (13.10%), followed by India (4.81%), Japan (4.17%), Saudi Arabia (3.80%), Russian federation (3.35%) and Brazil (3.14%).
- ❖ India was the third largest consumer of crude oil in the world and the second largest crude oil consumer in the Asia-Pacific region after China.



9.2 Production and Consumption of Natural Gas

- ❖ The total world production of Natural Gas increased from 2678.9 Million Tonne oil equivalent (Mtoe) in 2007-08 to 3212.9Mtoe in 2016-17. The production has increased by 0.6% from 2015-16 to 2016-17 (Table 9.3).
- ❖ Distribution of production of natural gas over major regions shows that Europe & Eurasia (28.02%) and North America (27.10%) are the highest and the second highest producers, together accounting for 55.10% of the total world production.
- ❖ Country-wise, USA was the largest producer of natural gas (21.50%) in the world during 2016-17, followed by the Russian Federation (16.23%), Iran (5.67%) and Qatar (5.08%). India's share in the total world production of natural gas during 2016-17 was only 0.77% (24.9Mtoe).(Table 9.3)
- ❖ The growth in production of natural gas from 2015-16 to 2016-17 was the highest in Middle East (3.6%), followed by Asia Pacific (3.2%), and Europe & Eurasia (0.5%). (Table 9.3).

- ❖ The total world consumption of natural gas has increased from 2675.5Mtoe in 2007-08 to 3204.1Mtoe in 2016-17 (Table 9.4).



- ❖ Country-wise distribution of consumption of natural gas indicates that USA was the largest consumer (22.36%), followed by Russian federation (10.98%), China (5.91%) and Iran (5.64%) respectively. India with a consumption of 45.1Mtoe accounted for only 1.41% of total world consumption (Table 9.4).
- ❖ Consumption of natural gas over major regions shows that Europe & Eurasia (28.93%) and North America (27.7%) are the highest and the second highest consumers, together accounting for 56.61% of the total world consumption (Table 9.4).

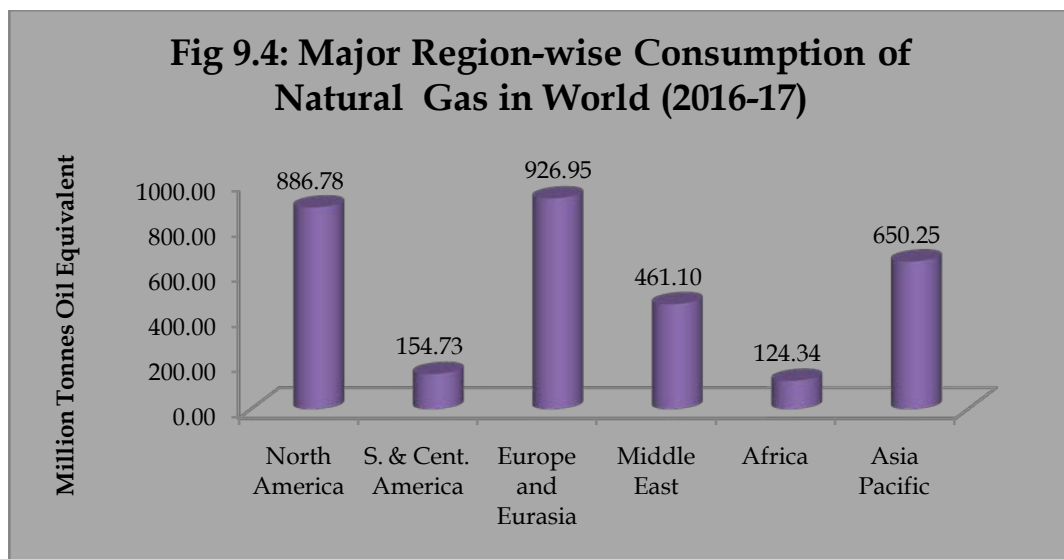


Table 9.1:Country-wise Estimates of Production of Crude Oil*

(Million tonnes)

Country/	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	% Change 2016-17 over 2015-16	2016-17 % Share of World's Total
North America												
USA	305.2	302.3	322.5	332.7	344.9	393.2	446.9	522.7	565.1	543.0	-3.9	12.39
Canada	166.3	152.9	152.8	160.3	169.8	182.6	195.1	209.4	215.6	218.2	1.2	4.98
Mexico	172.2	156.9	146.7	145.6	144.5	143.9	141.8	137.1	127.5	121.4	-4.8	2.77
Total North	632.7	612.2	622.0	638.6	659.2	719.6	783.8	869.2	908.3	882.6	-2.8	20.1
South and Central America												
Argentina	38.0	36.5	33.6	33.3	30.9	31.1	30.5	29.9	29.8	28.8	-3.5	0.7
Brazil	95.2	98.9	105.8	111.6	114.0	112.4	110.2	122.5	132.2	136.7	3.4	3.1
Colombia	28.0	31.1	35.3	41.4	48.2	49.9	52.9	52.2	53.0	48.8	-7.9	1.1
Ecuador	27.5	27.2	26.1	26.1	26.8	27.1	28.2	29.8	29.1	29.3	0.7	0.7
Peru	4.6	4.7	4.8	7.0	6.7	6.7	7.1	7.3	6.2	5.6	-10.1	0.1
Trinidad & Tobago	8.2	7.0	6.8	6.2	5.9	5.2	5.1	5.1	4.8	4.3	-10.2	0.1
Venezuela	165.5	165.6	155.7	145.8	141.5	139.3	137.8	138.5	135.9	124.1	-8.7	2.8
Other S. & C.	7.1	7.1	6.6	6.9	7.0	7.3	7.5	7.7	7.5	7.0	-7.2	0.2
Total S. & C.	374.1	378.1	374.6	378.4	381.1	378.9	379.2	392.9	398.6	384.5	-3.5	8.8
Europe and Eurasia												
Azerbaijan	42.6	44.5	50.4	50.8	45.6	43.4	43.5	42.1	41.6	41.0	-1.4	0.94
Denmark	15.2	14.0	12.9	12.2	10.9	10.0	8.7	8.1	7.7	6.9	-10.0	0.16
Italy	5.9	5.2	4.6	5.1	5.3	5.4	5.6	5.8	5.5	3.8	-31.2	0.09
Kazakhstan	67.1	70.7	76.5	79.7	80.1	79.3	82.3	81.1	80.2	79.3	-1.1	1.81
Norway	118.6	114.7	108.7	98.8	93.8	87.3	83.2	85.3	88.0	90.4	2.7	2.06
Romania	4.7	4.7	4.5	4.3	4.2	4.0	4.1	4.1	4.0	3.8	-5.0	0.09
Russian Federation	496.8	493.7	500.8	511.8	518.8	526.2	531.1	534.1	540.7	554.3	2.5	12.65
Turkmenistan	9.8	10.3	10.5	10.8	10.8	11.2	11.7	12.1	12.7	12.7	-0.2	0.29
United Kingdom	76.6	71.7	68.2	63.2	52.1	44.7	40.7	40.0	45.4	47.5	4.7	1.08
Uzbekistan	4.9	4.8	4.5	3.6	3.6	3.2	2.9	2.8	2.7	2.6	-3.0	0.06
Other Europe	21.6	20.6	19.9	19.2	19.2	19.2	19.6	19.2	18.8	18.2	-3.1	0.41
Total	863.8	855.0	861.4	859.5	844.5	833.6	833.3	834.7	847.3	860.6	1.6	19.64
Middle East												
Iran	210.9	213.0	205.6	211.7	212.7	180.7	169.8	174.2	181.6	216.4	19.2	4.94
Iraq	105.1	119.3	119.9	121.5	136.7	152.5	153.2	160.3	197.0	218.9	11.1	5.00
Kuwait	129.9	136.1	121.0	123.3	140.8	153.9	151.3	150.1	148.2	152.7	3.0	3.49
Oman	35.2	37.6	40.2	42.2	43.2	45.0	46.1	46.2	48.0	49.3	2.7	1.13
Qatar	57.9	64.7	62.6	71.1	78.0	82.2	80.3	79.4	79.1	79.4	0.4	1.81
Saudi Arabia	488.9	509.9	456.7	473.8	525.9	549.8	538.4	543.4	567.8	585.7	3.2	13.36
Syria	20.1	20.3	20.0	18.5	16.9	8.1	2.7	1.5	1.2	1.1	-8.1	0.03
United Arab Emirates	139.6	141.4	126.2	133.3	151.3	154.8	165.1	166.2	176.2	182.4	3.5	4.16
Yemen	15.9	14.8	14.4	14.3	10.1	8.0	8.9	6.7	2.0	0.8	-60.7	0.02
Other Middle East	9.5	9.5	9.4	9.4	9.9	9.0	10.3	10.5	10.5	10.1	-3.6	0.23
Total	1213.0	1266.4	1176.0	1219.2	1325.6	1344.0	1326.1	1338.7	1411.6	1496.9	6.0	34.16

Contd....

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

(Million tonnes)

Country/ Region	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	% Change 2016-17 over 2015-16	2016-17 % Share of World's Total Production
Africa												
Algeria	86.5	85.6	77.2	73.8	71.7	67.2	64.8	68.8	67.2	68.5	1.9	1.56
Angola	82.1	93.5	87.6	90.5	83.8	86.9	87.3	83.0	88.7	87.9	-0.9	2.01
Chad	7.5	6.7	6.2	6.4	6.0	5.3	4.4	4.3	3.8	3.8	0.9	0.09
Rep. of Congo (Braz)	11.4	12.3	14.2	16.0	15.3	14.3	12.6	13.4	12.9	11.9	-7.6	0.27
Egypt	33.8	34.7	35.3	35.0	34.6	34.7	34.4	35.1	35.4	33.8	-4.5	0.77
Equatorial Guinea	15.9	16.1	14.2	12.6	11.6	12.7	12.4	13.1	13.5	13.1	-3.0	0.30
Gabon	12.3	12.0	12.0	12.4	12.5	12.7	11.6	11.6	11.5	11.4	-0.9	0.26
Libya	85.3	85.5	77.4	77.8	22.5	71.2	46.5	23.4	20.3	20.0	-1.2	0.46
Nigeria	110.2	103.8	107.6	119.1	115.9	114.4	109.2	112.8	112.0	98.8	-11.8	2.25
South Sudan	-	-	-	na	na	1.5	4.9	7.7	7.3	5.8	-19.7	0.13
Sudan	23.8	22.6	23.4	22.8	14.3	5.1	5.8	5.9	5.4	5.1	-4.7	0.12
Tunisia	4.6	4.6	4.3	4.0	3.7	3.9	3.6	3.4	3.0	2.9	-3.5	0.07
Other Africa	9.7	9.3	9.2	7.6	10.3	10.2	11.5	11.7	12.6	11.6	-8.3	0.26
Total Africa	483.0	486.6	468.6	478.2	402.3	440.1	408.9	394.2	393.7	374.8	-4.8	8.6
Asia Pacific												
Australia	24.7	24.1	22.4	24.5	21.5	21.4	17.8	19.1	17.4	15.5	-10.8	0.35
Brunei	9.5	8.6	8.3	8.5	8.1	7.8	6.6	6.2	6.2	5.9	-4.5	0.14
China	186.3	190.4	189.5	203.0	202.9	207.5	210.0	211.4	214.6	199.7	-6.9	4.56
India	36.4	37.8	38.0	41.3	42.9	42.5	42.5	41.6	41.2	40.2	-2.3	0.92
Indonesia	47.8	49.4	48.4	48.6	46.3	44.6	42.7	41.2	40.7	43.0	5.5	0.98
Malaysia	33.8	34.0	32.2	32.6	29.4	29.8	28.5	29.7	32.3	32.7	1.2	0.75
Thailand	13.2	14.0	14.6	14.9	15.4	16.6	16.5	16.2	17.0	17.6	3.5	0.40
Vietnam	16.3	15.2	16.7	15.6	15.8	17.3	17.4	18.1	17.4	16.0	-8.3	0.36
Other Asia Pacific	13.9	14.8	14.4	13.8	13.0	12.6	12.0	13.0	13.2	12.4	-5.9	0.28
Total Asia Pacific	382.0	388.5	384.4	402.7	395.2	400.2	393.9	396.5	400.0	383.0	-4.2	8.74
TOTAL WORLD	3948.6	3986.8	3887.0	3976.5	4007.9	4116.4	4125.3	4226.2	4359.5	4382.4	0.5	100.00

* 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.

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

Source : Ministry of Petroleum & Natural Gas.

[\(Download Table 9.1\)](#)

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

(in Million tonnes)

Country/ Region	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	% Change 2016-17 over 2015-16	2016-17 % Share of World's Total Consumption
North America												
US	928.8	875.4	833.2	850.1	834.9	817.0	832.1	838.1	856.5	863.1	0.78	19.54
Canada	102.3	101.2	95	101.0	104.2	102.3	103.5	103.1	99.1	100.9	1.79	2.28
Mexico	92	91.6	88.5	88.6	90.3	92.3	89.8	85.4	84.4	82.8	-1.84	1.87
Total North America	1123.1	1068.2	1016.7	1039.7	1029.5	1011.6	1025.4	1026.6	1040.0	1046.9	0.7	23.69
South and Central America												
Argentina	24	24.9	24.3	28.1	28.3	29.6	31.9	31.3	32.2	31.9	-0.86	0.72
Brazil	102.2	110.1	110.3	126.8	131.9	134.3	144.2	150.6	146.6	138.8	-5.32	3.14
Chile	17	18.6	18.2	16.0	17.6	17.5	16.8	17.4	17.6	17.8	0.65	0.40
Colombia	10.7	11.7	10.7	11.9	12.8	13.9	13.9	14.8	15.6	15.9	2.31	0.36
Ecuador	8.5	8.7	8.9	10.3	10.5	10.9	11.6	12.2	11.8	11.0	-6.39	0.25
Peru	7.1	8	8.2	8.6	9.5	9.6	10.1	10.0	10.7	11.4	7.13	0.26
Trinidad & Tobago	1.6	1.8	1.7	2.2	2.1	2.0	2.3	2.1	2.2	2.2	-4.05	0.05
Venezuela	29.7	33.8	34.2	34.1	34.6	37.2	36.7	33.6	30.2	28.7	-5.07	0.65
Cent. America	61.6	63.5	62.8	65.5	66.9	66.1	64.5	64.7	67.5	68.5	1.52	1.55
America	262.6	281.1	279.3	303.6	314.0	321.0	332.0	336.5	334.4	326.2	-2.45	7.38
Europe and Eurasia												
Austria	13.4	13.4	12.8	13.4	12.7	12.5	12.7	12.5	12.5	12.7	1.62	0.29
Azerbaijan	4.5	3.6	3.3	3.2	4.0	4.2	4.5	4.4	4.5	4.6	1.77	0.10
Belarus	8	7.9	9.3	7.5	8.6	10.4	7.1	8.1	7.7	7.5	-2.21	0.17
Belgium	33.7	35.9	31.5	32.7	30.5	29.6	30.1	29.7	31.0	31.8	2.62	0.72
Bulgaria	4.8	4.8	4.3	3.9	3.8	3.9	3.6	3.9	4.4	4.5	3.21	0.10
Czech Republic	9.7	9.9	9.7	9.2	9.0	9.0	8.5	9.1	8.9	8.4	-5.90	0.19
Denmark	9.4	9.3	8.3	8.4	8.3	7.8	7.7	7.8	8.0	8.0	0.62	0.18
Finland	10.6	10.5	9.9	10.6	9.7	9.1	9.0	8.6	8.7	9.0	2.93	0.20
France	91.4	90.8	87.5	84.5	83.0	80.3	79.3	76.9	76.8	76.4	-0.53	1.73
Germany	112.5	118.9	113.9	115.4	112.0	111.4	113.4	110.4	110.0	113.0	2.71	2.56
Greece	21.7	20.4	19.5	18.1	17.0	15.3	14.5	14.4	14.9	15.4	3.08	0.35
Hungary	7.7	7.5	7.1	6.7	6.4	5.9	5.9	6.6	7.0	7.1	1.54	0.16
Republic of Ireland	9.4	9	8	7.6	6.8	6.5	6.5	6.5	6.8	7.0	3.33	0.16
Italy	84	80.4	75.1	73.1	70.5	64.2	59.4	55.8	57.6	58.1	0.81	1.32
Kazakhstan	11.3	11	8.9	9.9	11.5	11.5	12.1	12.3	13.2	13.2	0.10	0.30
Lithuania	2.8	3.1	2.6	2.7	2.6	2.7	2.6	2.6	2.8	3.0	7.03	0.07
Netherlands	50.7	47.3	45.9	45.9	46.1	43.7	41.4	39.6	38.7	39.9	3.13	0.90
Norway	10.7	10.4	10.7	10.8	10.6	10.5	10.8	10.2	10.3	10.4	1.00	0.24
Poland	24.2	25.3	25.3	26.7	26.6	25.7	23.8	23.9	24.9	27.2	9.06	0.62
Portugal	14.7	14.1	13.2	13.0	12.1	11.0	11.3	11.1	11.5	11.2	-2.93	0.25
Romania	10.3	10.4	9.2	8.8	9.1	9.2	8.4	9.0	9.2	9.5	3.66	0.21
Russian Federation	130	133.6	128.2	133.3	142.2	144.6	144.3	152.3	144.2	148.0	2.64	3.35
Slovakia	3.6	3.9	3.7	3.9	3.9	3.6	3.6	3.4	3.7	4.0	8.90	0.09
Spain	80.3	78	73.5	72.1	68.8	64.7	59.3	59.0	61.2	62.5	2.09	1.41
Sweden	16.9	16.7	15.5	16.2	14.8	14.6	14.4	14.5	14.1	14.7	4.00	0.33
Switzerland	11.3	12.1	12.3	11.4	11.0	11.2	11.8	10.6	10.7	10.2	-5.18	0.23
Turkey	33.6	32.1	32.6	31.8	31.1	31.6	33.5	34.3	38.9	41.2	5.86	0.93
Turkmenistan	5.2	5.3	5	5.5	5.8	6.0	6.2	6.5	6.6	6.7	1.08	0.15
Ukraine	14.7	14.2	13.5	12.6	13.1	12.5	11.9	10.3	9.2	9.1	-0.60	0.21
United Kingdom	79.2	79.5	75.8	74.9	73.6	71.4	70.3	69.8	71.8	73.1	1.93	1.66
Uzbekistan	4.7	4.6	4.3	3.6	3.4	3.0	2.9	2.7	2.7	2.8	1.00	0.06
Other Europe & Eurasia	32.5	35.8	35	35.3	35.0	34.1	33.4	32.2	33.3	34.5	3.52	0.78
Total Europe & Eurasia	957.7	959.5	915.4	912.3	903.7	882.1	864.3	858.8	865.9	884.6	2.17	20.02

contd..

Table 9.2(Contd.) : COUNTRYWISE ESTIMATES OF CONSUMPTION OF CRUDE OIL

(Million tonnes)

Country/ Region	2007-2008	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	% Change 2016-17 over 2015- 16	2016-17 % Share of World's Total Consumption
Middle East												
Iran	89.4	93.1	95.4	83.6	84.7	85.7	93.6	90.4	84.5	83.8	-0.80	1.90
Israel	12.1	12.0	10.8	11.2	11.8	13.9	11.5	10.6	11.4	11.6	2.23	0.26
Kuwait	17.9	19.0	20.4	20.9	20.4	24.4	22.7	21.0	22.3	22.0	-1.26	0.50
Qatar	5.3	6.2	6.0	6.5	8.0	8.2	9.3	9.7	10.7	11.7	9.46	0.26
Saudi Arabia	98.1	114.4	125.9	137.1	139.1	146.2	147.3	159.8	166.6	167.9	0.78	3.80
United Arab Emirates	28.9	30.2	28.9	30.7	33.2	35.0	35.5	38.6	40.9	43.5	6.38	0.98
Other Middle East	62.4	68.5	71.1	73.1	74.4	76.0	78.8	78.2	76.5	77.3	1.08	1.75
Total Middle East	314.1	343.4	358.6	363.1	371.7	389.5	398.6	408.4	412.8	417.8	1.22	9.46
Africa												
Algeria	12.9	14.0	14.9	14.8	15.8	16.8	17.6	17.7	19.5	18.9	-2.93	0.43
Egypt	30.6	32.6	34.4	36.3	33.7	35.3	35.8	38.3	39.6	40.6	2.56	0.92
South Africa	26.6	25.7	24.2	25.6	25.7	26.5	27.3	27.0	27.9	26.9	-3.33	0.61
Other Africa	75	80.9	82.9	87.7	84.2	90.0	94.8	94.5	95.1	98.9	3.98	2.24
Total Africa	145	153.2	156.3	164.5	159.4	168.6	175.4	177.5	182.1	185.4	1.81	4.20
Asia Pacific												
Australia	42.5	42.7	43.1	43.7	46.3	47.9	48.2	48.1	47.9	47.8	-0.06	1.08
Bangladesh	3.7	3.8	3.5	3.9	5.1	5.4	5.3	5.8	6.2	6.6	6.75	0.15
China	369.3	377.5	392.2	448.5	465.1	487.1	508.1	528.0	561.8	578.7	3.19	13.10
China Hong Kong SAR	16.4	14.8	16.9	17.8	18.0	17.2	17.6	16.6	18.3	18.9	3.78	0.43
India	138.1	144.7	152.6	155.4	163.0	173.6	175.3	180.8	195.8	212.7	9.32	4.81
Indonesia	60.9	60.1	59.7	64.7	73.1	74.4	74.5	75.3	71.8	72.6	1.06	1.64
Japan	230.9	224.8	200.4	202.7	203.7	217.7	207.4	197.0	189.0	184.3	-2.39	4.17
Malaysia	30.8	29.5	29.2	29.3	31.5	32.9	34.9	34.9	35.5	36.3	2.14	0.82
New Zealand	7.1	7.2	6.9	7.0	7.0	7.0	7.1	7.2	7.5	7.7	2.20	0.17
Pakistan	19.2	20.0	21.8	20.5	20.7	20.0	21.9	22.6	24.6	27.5	12.75	0.62
Philippines	14.1	13.3	14.0	14.6	13.8	14.4	14.9	16.1	18.3	19.9	9.99	0.45
Singapore	48.3	51.4	55.5	60.9	63.7	63.4	64.2	65.8	69.4	72.2	4.22	1.63
South Korea	107.6	103.1	103.7	105.0	105.8	108.8	108.3	107.9	113.8	122.1	7.76	2.76
Taiwan	51.2	45.9	46.1	47.2	44.5	44.6	45.1	46.1	46.5	46.7	0.42	1.06
Thailand	45.1	44.4	45.9	47.7	49.7	52.3	54.5	55.0	57.3	59.0	3.03	1.33
Vietnam	13.3	14.1	14.6	15.6	16.9	17.1	17.3	18.0	18.8	20.1	6.77	0.45
Other Asia Pacific	16.419382	15.6	16.4	17.5	19.4	19.7	20.6	21.7	23.2	24.4	5.20	0.55
Total Asia Pacific	1214.8	1212.7	1222.4	1302.2	1347.4	1403.4	1425.2	1447.0	1505.8	1557.3	3.42	35.25
TOTAL WORLD	4017.3	4018.1	3948.7	4085.4	4125.7	4176.2	4220.9	4254.8	4341.0	4418.2	1.78	100.00

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 biodiesel is also included.

Note: 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.

[\(Download Table 9.2\)](#)

Table 9.3: Countrywise Estimates of Production of Natural Gas

(Million tonnes oil equivalent)

Country/ Region	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	% Change 2016-17 over 2015-16	2016-17 % Share of World's Total Consumption
North America												
USA	498.6	521.7	532.7	549.5	589.8	620.2	626.4	673.3	707.1	690.8	-2.3	21.50
Canada	164.4	158.9	147.6	130.1	130.0	127.0	127.3	132.4	134.2	136.8	1.9	4.26
Mexico	48.2	48.0	53.4	51.8	52.4	51.5	52.4	51.4	48.7	42.5	-12.7	1.32
Total North America	711.2	728.7	733.6	731.4	772.2	798.7	806.1	857.1	890.0	870.1	-2.2	27.1
South and Central America												
Argentina	40.4	39.7	37.2	36.1	34.9	34.0	32.0	31.9	32.8	34.4	4.9	1.07
Bolivia	12.4	12.9	11.1	12.8	14.0	16.0	18.3	18.9	18.2	17.8	-2.7	0.55
Brazil	10.1	12.6	10.7	13.1	15.1	17.3	19.2	20.4	20.8	21.1	1.5	0.66
Colombia	6.8	8.2	9.5	10.1	9.9	10.8	11.4	10.6	10.0	9.4	-6.3	0.29
Peru	2.4	3.1	3.1	6.5	10.2	10.7	11.0	11.6	11.2	12.6	12.1	0.39
Trinidad & Tobago	38.0	37.8	39.3	40.3	38.8	38.4	38.6	37.9	35.7	31.0	-13.0	0.97
Venezuela	32.5	29.5	27.9	27.6	24.8	26.5	25.6	25.8	29.2	30.9	5.8	0.96
Other S. & Cent. America	3.5	3.1	3.1	3.1	2.5	2.4	2.2	2.1	2.2	2.1	-4.4	0.07
Total S. & Cent. Amer	146.1	146.7	142.0	149.6	150.2	156.1	158.1	159.2	160.2	159.3	-0.6	4.96
Europe and Eurasia												
Azerbaijan	8.8	13.3	13.3	13.6	13.3	14.0	14.6	15.8	16.2	15.7	-3.1	0.49
Denmark	8.3	9.1	7.6	7.3	5.9	5.2	4.3	4.1	4.1	4.0	-1.6	0.13
Germany	12.9	11.7	11.0	9.6	9.0	8.1	7.4	7.0	6.5	6.0	-6.4	0.19
Italy	8.0	7.6	6.6	6.9	6.9	7.0	6.3	5.9	5.5	4.7	-11.5	0.15
Kazakhstan	13.6	10.4	9.7	15.8	15.6	15.5	16.6	16.9	17.1	17.9	5.3	0.56
Netherlands	54.5	60.0	56.4	63.4	57.7	57.4	61.8	52.1	39.0	36.1	-5.0	1.12
Norway	81.3	90.1	94.0	96.5	91.1	103.3	97.9	97.9	105.4	105.0	-0.4	3.27
Poland	3.9	3.7	3.7	3.7	3.8	3.9	3.8	3.7	3.7	3.6	-3.3	0.11
Romania	10.4	9.0	8.9	8.6	8.7	9.0	8.6	8.8	8.8	8.2	-6.1	0.26
Russian Federation	532.8	541.6	474.9	530.0	546.3	533.0	544.2	523.6	517.6	521.5	0.7	16.23
Turkmenistan	58.9	59.5	32.7	38.1	53.6	56.1	56.1	60.4	62.6	60.1	-4.5	1.87
Ukraine	16.9	17.1	17.4	16.7	16.9	16.7	17.3	16.4	16.1	16.0	-0.8	0.50
United Kingdom	64.9	62.7	53.7	51.4	40.7	35.0	32.8	33.1	35.6	36.9	3.6	1.15
Uzbekistan	52.4	52.0	50.0	49.0	51.3	51.2	51.2	51.6	52.0	56.5	8.8	1.76
Other Europe & Eurasia	9.6	8.9	8.7	8.4	8.3	7.5	6.5	5.7	5.6	7.9	30.3	0.25
Total Europe & Eurasi	937.0	956.5	848.5	919.0	929.2	923.0	929.4	902.9	895.9	900.1	0.5	28.02
Middle East												
Bahrain	10.6	11.4	11.5	11.8	12.0	12.4	13.2	13.9	14.0	13.9	-0.5	0.43
Iran	112.5	117.8	129.3	137.1	143.9	149.5	150.1	167.3	170.4	182.2	6.9	5.67
Iraq	1.3	1.7	1.0	1.2	0.8	0.6	1.1	0.8	0.9	1.0	12.9	0.03
Kuwait	10.9	11.5	10.3	10.6	12.2	14.0	14.7	13.5	15.2	15.4	1.3	0.48
Oman	21.6	23.4	24.3	26.4	27.8	29.0	31.3	30.0	31.3	31.9	2.0	0.99
Qatar	56.9	69.3	80.4	118.0	130.7	141.3	159.8	156.7	160.6	163.1	1.6	5.08
Saudi Arabia	67.0	72.4	70.6	78.9	83.0	89.4	90.0	92.1	94.0	98.4	4.7	3.06
Syria	5.0	4.8	5.3	7.2	6.4	5.2	4.3	4.0	3.7	3.2	-11.4	0.10
United Arab Emirates	45.3	45.2	44.0	46.2	47.1	48.9	49.1	48.8	54.2	55.7	2.8	1.73
Yemen	-	-	0.7	5.4	8.1	6.5	8.9	8.4	2.5	0.7	-73.4	0.02
Other Middle East	2.7	3.3	2.6	3.1	4.0	2.4	5.9	6.9	7.6	8.5	12.2	0.26
Total Middle East	333.7	360.6	380.0	445.8	475.9	499.2	528.5	542.4	554.3	574.0	3.6	17.87

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Table 9.3 (contd.): Countrywise Estimates of Production of Natural Gas*

(Million Tonnes Oil Equivalent)

Country/ Region	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	% Change 2016-17 over 2015-16	% Share of World's Total Consumption for 2016-17
Africa												
Algeria	76.3	77.2	71.6	72.4	74.4	73.4	74.2	75.0	76.1	82.2	7.9	2.56
Egypt	50.1	53.1	56.4	55.2	55.3	54.8	50.5	43.9	39.8	37.6	-5.5	1.17
Libya	13.8	14.3	14.3	15.1	7.1	10.0	10.5	10.2	10.6	9.1	-14.5	0.28
Nigeria	33.2	32.5	23.4	33.6	36.5	39.0	32.6	40.5	45.1	40.4	-10.4	1.26
Other Africa	10.9	13.6	14.0	15.6	15.1	15.9	18.0	16.8	17.4	18.2	4.8	0.57
Total Africa	184.3	190.8	179.7	191.9	188.4	192.9	185.7	186.3	189.0	187.5	-0.8	5.84
Asia Pacific												
Australia	36.0	40.0	44.1	45.4	47.9	51.2	53.1	57.3	65.4	82.0	25.5	2.55
Bangladesh	14.3	15.3	17.5	18.0	18.3	20.0	20.5	21.5	24.2	24.8	2.5	0.77
Brunei	11.0	10.9	10.3	11.1	11.5	11.3	11.0	10.7	10.5	10.1	-3.5	0.31
China	64.4	74.8	79.4	89.2	98.1	100.7	110.0	118.4	122.5	124.6	1.7	3.88
India	27.1	27.5	33.8	44.3	40.1	35.0	28.9	27.5	26.4	24.9	-5.7	0.77
Indonesia	64.4	66.4	69.2	77.1	73.3	69.4	68.8	67.7	67.5	62.7	-7.1	1.95
Malaysia	55.4	57.3	54.8	50.6	56.0	55.4	60.5	61.5	64.1	66.5	3.7	2.07
Myanmar	12.2	11.2	10.4	11.2	11.5	11.5	11.8	15.2	17.6	17.0	-3.6	0.53
Pakistan	36.5	37.3	37.4	38.1	38.1	39.4	38.4	37.7	37.8	37.4	-1.1	1.16
Thailand	23.4	25.9	27.8	32.2	32.9	36.9	37.2	37.5	35.4	34.7	-1.9	1.08
Vietnam	6.4	6.7	7.2	8.5	7.6	8.4	8.8	9.2	9.6	9.6	0.5	0.30
Other Asia Pacific	15.6	16.0	16.3	15.9	16.0	15.8	16.3	20.8	24.8	27.7	11.6	0.86
Total Asia Pacific	366.6	389.3	408.3	441.5	451.2	454.9	465.3	484.9	505.7	521.9	3.2	16.24
TOTAL WORLD	2678.9	2772.5	2692.1	2879.2	2967.3	3024.7	3073.1	3132.8	3195.0	3212.9	0.6	100.0

* Excluding gas flared or recycled

Source : Ministry of Petroleum & Natural Gas

[\(Download Table 9.3\)](#)

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

(Million Tonnes Oil Equivalent)

Country/ Region	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	% Change 2016-17 over 2015- 16	% Share of World's Total Consumption for 2016-17
North America												
USA	596.3	600.8	590.1	619.3	628.8	657.4	675.5	690.0	710.5	716.3	0.8	22.36
Canada	86.6	86.5	85.4	85.5	90.8	90.2	93.5	93.8	92.2	89.9	-2.5	2.80
Mexico	57.1	59.7	65.0	65.2	68.9	71.9	74.9	78.1	78.4	80.6	2.8	2.52
Total North America	739.9	747.0	740.5	770.0	788.6	819.5	843.9	862.0	881.2	886.8	0.6	27.7
South and Central America												
Argentina	39.5	40.0	37.9	39.0	40.6	42.1	42.1	42.5	43.4	44.6	2.9	1.39
Brazil	19.1	22.4	18.1	24.1	24.0	28.5	33.6	35.6	37.5	32.9	-12.3	1.03
Chile	4.1	2.1	2.2	4.4	4.5	4.1	4.1	3.4	3.7	4.1	11.4	0.13
Colombia	6.7	6.8	7.8	8.2	8.0	8.9	9.0	9.8	9.6	9.5	-1.4	0.30
Ecuador	0.4	0.4	0.4	0.4	0.4	0.5	0.6	0.6	0.6	0.6	1.8	0.02
Peru	2.4	3.1	3.1	4.4	5.0	5.5	5.4	6.1	6.4	7.1	10.1	0.22
Trinidad & Tobago	19.7	19.2	19.9	20.9	21.0	20.0	20.2	19.8	19.4	17.2	-11.2	0.54
Venezuela	32.5	30.9	29.0	29.0	26.7	28.3	27.5	27.7	31.1	32.0	3.0	1.00
Other S. & Cent. America	3.9	4.3	4.5	4.8	5.3	5.8	6.3	6.6	6.6	6.7	1.3	0.21
Total S. & Cent. America	128.5	129.1	123.1	135.2	135.4	143.6	148.7	152.0	158.3	154.7	-2.2	4.83
Europe and Eurasia												
Austria	8.0	8.5	8.2	9.0	8.4	8.1	7.7	7.1	7.5	7.9	4.7	0.25
Azerbaijan	7.2	8.2	7.0	6.7	7.3	7.7	7.7	8.5	9.6	9.4	-1.9	0.29
Belarus	16.9	17.4	14.5	17.8	16.5	16.7	16.7	16.5	14.0	15.3	9.3	0.48
Belgium	14.9	14.8	15.1	17.0	14.2	14.4	14.2	12.4	13.6	13.9	2.1	0.43
Bulgaria	2.9	2.9	2.1	2.3	2.6	2.5	2.4	2.4	2.6	2.7	4.2	0.08
Czech Republic	7.8	7.1	6.7	7.6	6.9	6.9	6.9	6.2	6.5	7.0	8.2	0.22
Denmark	4.1	4.1	4.0	4.5	3.7	3.5	3.3	2.8	2.8	2.9	1.7	0.09
Finland	3.5	3.6	3.2	3.6	3.1	2.7	2.6	2.3	2.0	1.8	-9.0	0.06
France	38.2	39.9	38.4	42.6	37.0	38.2	38.8	32.6	35.1	38.3	9.3	1.20
Germany	74.6	77.0	72.6	75.7	69.5	69.7	73.1	63.5	66.2	72.4	9.5	2.26
Greece	3.3	3.5	2.9	3.2	4.0	3.6	3.2	2.4	2.5	2.6	0.9	0.08
Hungary	12.2	12.1	10.5	9.8	9.4	8.4	7.8	7.0	7.5	8.0	7.3	0.25
Republic of Ireland	4.3	4.5	4.3	4.7	4.1	4.0	3.8	3.7	3.8	4.3	14.3	0.13
Italy	70.0	69.5	63.9	68.1	63.8	61.4	57.4	50.7	55.3	58.1	5.0	1.81
Kazakhstan	7.3	6.3	6.0	8.0	9.0	9.7	10.1	11.3	11.6	12.0	4.1	0.38
Lithuania	3.3	2.6	2.2	2.5	2.7	2.7	2.2	2.1	2.1	1.8	-10.9	0.06
Netherlands	33.3	34.7	35.0	39.2	34.3	32.4	32.8	28.6	28.3	30.2	6.7	0.94
Norway	3.8	3.9	3.7	3.7	4.0	3.9	4.0	4.2	4.4	4.4	0.7	0.14
Poland	12.4	13.5	13.0	14.0	14.1	15.0	15.0	14.6	14.7	15.6	6.0	0.49
Portugal	3.9	4.3	4.2	4.6	4.7	4.0	3.8	3.7	4.3	4.6	8.4	0.14
Romania	14.5	12.6	10.5	10.8	11.0	11.2	10.2	9.5	9.0	9.5	6.5	0.30
Russian Federation	379.8	374.4	350.7	372.7	382.1	374.6	372.1	368.7	362.5	351.8	-3.0	10.98
Slovakia	5.1	5.2	4.4	5.0	4.6	4.4	4.8	3.8	3.9	4.0	1.9	0.12
Spain	31.8	34.9	31.2	31.1	28.9	28.6	26.1	23.7	24.6	25.2	2.3	0.79
Sweden	0.9	0.8	1.0	1.3	1.1	0.9	0.9	0.8	0.8	0.8	10.3	0.03
Switzerland	2.6	2.5	2.4	2.7	2.4	2.6	2.8	2.4	2.6	2.7	5.1	0.08
Turkey	32.5	33.8	32.1	35.1	36.8	37.3	37.8	40.1	39.2	37.9	-3.4	1.18
Turkmenistan	19.1	19.3	17.7	20.4	21.2	23.7	20.6	23.0	26.5	26.6	0.3	0.83
Ukraine	56.9	54.0	42.1	47.0	48.3	44.6	38.9	33.1	25.9	26.1	0.6	0.81
United Kingdom	81.9	84.4	78.3	84.8	70.3	66.5	65.7	60.0	61.3	69.0	12.6	2.15
Uzbekistan	41.3	43.8	35.9	36.8	42.9	42.5	42.2	43.9	45.2	46.2	2.2	1.44
Other Europe & Eurasia	16.2	15.4	13.4	14.4	14.6	14.4	13.4	13.4	13.6	13.9	2.7	0.44
Total Europe & Eurasia	1014.5	1019.4	937.4	1006.5	983.5	966.6	949.0	905.0	909.2	926.9	2.0	28.93

Contd...

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

Country/ Region	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	(Million Tonnes Oil Equivalent)	
											% Change 2016-17 over 2015-16	2016-17 % Share of World's Total Consumption
Middle East												
Iran	113.0	119.9	128.4	137.6	146.0	145.4	146.6	165.3	171.7	180.7	5.3	5.64
Israel	2.5	3.4	3.8	4.8	4.5	2.3	6.2	6.8	7.6	8.7	14.9	0.27
Kuwait	10.9	11.5	11.1	13.1	15.0	16.6	16.8	16.6	19.2	19.7	2.8	0.62
Qatar	17.4	17.1	17.9	26.9	17.7	21.1	34.1	32.8	39.5	37.5	-5.2	1.17
Saudi Arabia	67.0	72.4	70.6	78.9	83.0	89.4	90.0	92.1	94.0	98.4	4.7	3.07
United Arab Emirates	44.3	53.5	53.2	54.7	56.9	59.0	60.2	59.3	66.4	69.0	3.9	2.15
Other Middle East	29.1	34.5	37.4	41.0	39.9	39.8	42.2	41.7	45.9	47.1	2.5	1.47
Total Middle East	284.1	312.3	322.4	356.9	363.0	373.5	396.3	414.7	444.3	461.1	3.8	14.39
Africa												
Algeria	21.9	22.8	24.5	23.7	25.1	27.9	30.0	33.7	35.5	36.0	1.5	1.12
Egypt	34.5	36.8	38.3	40.6	44.7	47.3	46.3	43.2	43.0	46.1	7.2	1.44
South Africa	3.1	3.4	3.0	3.5	3.7	4.0	4.1	4.5	4.6	4.6	1.6	0.14
Other Africa	26.9	27.7	23.8	28.0	28.5	29.3	30.4	32.9	39.2	37.6	-4.1	1.17
Total Africa	86.4	90.6	89.6	95.8	101.9	108.6	110.9	114.3	122.2	124.3	1.7	3.88
Asia Pacific												
Australia	23.9	28.7	29.0	28.0	30.3	30.4	32.0	34.4	38.6	37.0	-4.1	1.15
Bangladesh	14.3	15.3	17.5	18.0	18.3	20.0	20.5	21.5	24.2	24.8	2.5	0.77
China	65.6	75.7	83.3	100.1	123.4	135.8	154.7	169.6	175.3	189.3	8.0	5.91
China Hong Kong SAR	2.5	2.9	2.8	3.4	2.7	2.5	2.4	2.3	2.9	3.0	2.7	0.09
India	36.3	37.4	45.6	54.3	55.0	64.0	44.4	43.9	41.2	45.1	9.5	1.41
Indonesia	30.7	35.2	37.3	39.1	37.9	38.0	36.7	36.8	36.4	33.9	-6.8	1.06
Japan	81.2	84.4	78.7	85.1	95.0	105.2	105.2	106.2	102.1	100.1	-1.9	3.12
Malaysia	31.9	35.3	31.8	26.6	31.3	31.9	36.3	38.0	37.6	38.7	3.0	1.21
New Zealand	3.6	3.4	3.6	3.9	3.5	3.8	4.0	4.4	4.0	4.2	4.6	0.13
Pakistan	36.5	37.3	37.4	38.1	38.1	39.4	38.4	37.7	39.2	40.9	4.5	1.28
Philippines	3.2	3.4	3.4	3.2	3.5	3.3	3.0	3.2	3.0	3.4	14.6	0.11
Singapore	7.7	8.3	8.7	7.9	7.9	8.5	9.5	9.8	11.0	11.3	2.8	0.35
South Korea	31.2	32.1	30.5	38.7	41.7	45.2	47.3	43.0	39.3	40.9	4.2	1.28
Taiwan	9.6	10.5	10.2	12.7	14.0	14.7	14.7	15.5	16.5	17.2	3.9	0.54
Thailand	31.8	33.6	35.3	37.2	38.1	41.8	42.0	42.9	43.8	43.5	-0.8	1.36
Vietnam	6.4	6.7	7.2	8.5	7.6	8.4	8.8	9.2	9.6	9.6	0.5	0.30
Other Asia Pacific	5.4	5.2	4.8	5.2	5.6	5.6	5.8	6.5	7.0	7.2	3.0	0.22
Total Asia Pacific	422.0	455.4	467.3	509.8	553.8	598.6	605.6	624.9	631.6	650.3	3.0	20.29
TOTAL WORLD	2675.5	2753.7	2680.2	2874.2	2926.3	3010.5	3054.4	3073.0	3146.7	3204.1	1.8	100.0

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

Source : Ministry of Petroleum & Natural Gas.

[\(Download Table 9.4\)](#)

CHAPTER 10: ENERGY INDICATORS

The availability of resources and the reliability of their supply are essential for a sustainable economic growth. All sectors of the economy including residential, commercial, transportation, service and agricultural sectors depend on secure, sufficient and efficient energy services. Job availability, industrial productivity, urban and rural development and all major economic activities are strongly affected by energy input. The most important form of energy, viz. electricity is an important and sometimes irreplaceable input to modern productive activities, communication, dissemination of information and other service industries.

10.1 ENERGY INDICATORS

Energy indicators are the medium to provide a snap shot of the energy scenario of the country. They help to understand the various aspects of energy and are capable of detecting the grey areas in the complete chain of energy flow. Energy and energy efficiency indicators are indispensable tools for identifying and understanding the key drivers of trends, and for prioritizing interventions to control energy consumption growth. Indicators are also effective in quantifying the potential impact and benefits of interventions. While defining and constructing energy indicators is rather flexible, their accuracy strongly depends on the quality and detail of available energy end-use data.

As per “Energy Indicators for Sustainable Development: Guidelines and Methodology” the list of indicators includes indicators on Social, Economic and Environment. While the importance of these various indicators is recognized and since Social and Environmental indicators require additional levels of detail than that are presented in Energy Statistics his report is restricted to the economic dimension only due to non-availability of data or Energy Balance and therefore only Economic Indicators are presented in this publication.

Yet, choosing and developing appropriate indicators to support the development of policies is not straightforward. This publication should enable energy analysts and policy makers to: Identify priority areas for the development of energy sector and develop a strategy to advance policy development through the improved use of indicators to track progress of energy policies. No set of energy indicators can be final and definitive. To be useful, indicators must evolve over time to fit country-specific conditions, priorities and capabilities. The information inherent in these indicators is not only meaningful for internal management, but also of interest for external users.

10.2 ECONOMIC DIMENSION AND ENERGY INDICATORS

Modern Economies are highly dependent on reliable and adequate energy supply owing to the fact that it's the prerequisite for industrialization. All sectors of the economy- residential, commercial, transport, services and agriculture, demand energy in different forms. In turn, these sectors foster growth on economic and social front. Energy supply affects employment, productivity and development. Owing to the economic importance of energy it is important to develop the economic energy indicators and provide a profound basis for strategic changes and policy making.

The economic indicators have two themes: Use & production patterns and Security. The first has the sub theme of Overall Use, Overall Productivity, Supply Efficiency, Production, End Use, Diversification (Fuel Mix) and Prices. The second has the sub themes of Imports and strategic Fuel stocks.

Table: 10.1 List of Energy Indicators

Theme	Sub-theme	
Use and Production Pattern	Overall Use	Energy use per capita
	Overall Productivity	Energy use per unit of GDP
	Supply Efficiency	Efficiency of energy conversion and distribution
	Production	Reserves-to-production ratio
		Resources-to-production ratio
	End Use	Industrial energy intensities
		Agricultural energy intensities
		Transport energy intensities
	Diversification (Fuel Mix)	Fuel shares in energy and electricity
		Non-carbon energy share in energy and electricity
Renewable energy share in energy and electricity		
Prices	WPI of energy sources	
Security	Imports	Net Energy Import Dependency
	Strategic fuel stocks	Stocks of critical fuels per corresponding fuel consumption

The indicators as indicated in the earlier chapter have been classified under two themes Use and Production Pattern and Security. Indian scenario for each of these indicators has been presented in the current chapter. The indicators have been numbered irrespective of their theme and sub- theme

10.3. THEME: USE AND PRODUCTION PATTERN

This theme is further sub classified into sub themes as Overall Use, Overall Productivity, Supply Efficiency, Production, End Use, Diversification (Fuel Mix) and Prices.

➤ SUB THEME: OVERALL USE

10.3.1. Energy Indicator: Energy Use per Capita-

- ❖ **Purpose and Measurement method:** This indicator measures the level of energy use on per capita basis and reflects the energy-use patterns and aggregate energy intensity of a society. It is calculated as the ratio of the total annual use of energy to the mid-year population. It may be further classified as follows:

- a) Total Primary energy supply per capita
- b) Total Final consumption of energy per capita
- c) Electricity use per capita

➤ SUB THEME: OVERALL PRODUCTIVITY

10.3.2. Energy Indicator: Energy Use Per Unit of GDP

- ❖ **Purpose and Measurement method:** This indicator reflects the trends in overall energy use relative to GDP, indicating the general relationship of energy use to economic development. This indicator is calculated as the ratio of energy use to economic output. Here Energy Use indicates Total Primary Energy Supply (TPES), Total Final Consumption (TFC) and final electricity consumption and Output is taken as GDP measured in thousand INR. It may be further classified as follows:

- a) Total Primary energy supply per 000' rupees
- b) Total Final consumption of energy per 000' rupees
- c) Electricity Use per 000' rupees

➤ SUB THEME: PRODUCTION

10.3.3. Energy Indicator:

I. Reserve-to-Production Ratio

- ❖ **Purpose and Measurement method:** – The purpose of this indicator is to measure the availability of national energy reserves with respect to corresponding fuel production. Reserves are generally defined as identified

(demonstrated and inferred) resources that are economically recoverable at the time of assessment. The indicator provides a basis for estimating future energy supplies in years with respect to current availability of energy reserves and levels of production.

It is computed by dividing the proven energy reserves of a commodity at the end of a year by the total production of that commodity in that year.

II. Resources To Production Ratio

- ❖ **Purpose and Measurement method:** – The purpose of this indicator is to measure the availability of national energy resources with respect to corresponding fuel production. Total resources include reserves, and hypothetical and speculative undiscovered resources. It provides a relative measure of the length of time that resources would last if production were to continue at current levels.

The lifetime of fuel resources in terms of years by using resources-to-production ratio is computed by dividing the total energy resources of a commodity at the end of a year by the total production of that commodity in that year.

➤ SUB THEME: END USE

10.3.4. Energy Indicator:End Use Energy Intensities

I. Industrial Energy Intensities-

- ❖ **Purpose and Measurement method:** – This set of indicators measures the aggregate energy use of the industrial sector and selected energy intensive industries per corresponding value added. Intensities provide information about the relative energy use per thousand units of output. The set is used to analyze trends in energy efficiency and evaluating trends in technological improvements. It is measured as Energy Use per thousand units of value added by industrial sector and by selected energy intensive industries.

II. Agricultural Energy Intensities

- ❖ **Purpose and Measurement method:** – This indicator is a measure of aggregate energy intensity in the agricultural sector that can be used for analyzing trends, particularly in renewables and non-commercial energy use. It is measured as Energy Use per thousand units of value added by Agriculture sector.

III. Transport Energy Intensities

- ❖ **Purpose and Measurement method:** – This indicator is used to monitor trends in energy use in the Transport sector. It is measured as Energy Use per thousand units of value added by Transport sector. The transport indicators measure how much energy is used for moving both goods and people. Transport is a major user of energy, mostly in the form of oil products, which makes transport the most important driver behind growth in global oil demand.

It is evident from the value of the indicator that industrial sector and transport sector are energy intensive. It must be noted that changes in the aggregate indicator can also be due to change in relative output of the sector. Hence we can say that the difference seen across the time development do not necessarily reflect differences in energy efficiency.

➤ SUB THEME: DIVERSIFICATION

10.3.5. Energy Indicator: Fuel share in energy and electricity

- I. Fuel Share In Energy
- II. Fuel Share In electricity

- ❖ **Purpose and Measurement method:** – This indicator provides the share of fuels in TPES, TFC and electricity generation. This indicator is computed by calculating the ratio of consumption or production of the specific energy fuels identified above to total energy use or production with respect to:
 - i. TPES,
 - ii. TFC and
 - iii. Electricity generation

10.3.6. Energy Indicator: Non carbon energy share in energy and electricity

- I. Non Carbon Energy Share In Energy
- II. Non Carbon Energy Share In Electricity

- ❖ **Purpose and Measurement method:** – This indicator measures the share of non-carbon energy sources in TPES and electricity generation. Share of non-carbon energy in TPES is computed by calculating the ratio of primary supply of non-carbon energy to TPES. The share of non-carbon in electricity generation is the total electricity generated from non-carbon energy sources divided by total electricity generated.

10.3.7. Energy Indicator: Renewable energy share in energy and electricity

- I. Renewable Energy Share In TPES
- II. Renewable Energy Share In TFC
- III. Renewable Energy Share In Electricity

- ❖ **Purpose and Measurement method:** – This indicator measures the share of Renewable energy in TPES, TFC and electricity generation. This indicator is computed by calculating the ratio of the consumption and production of renewables to total final energy supply and production. The share of renewables in electricity is the electricity generated from renewables divided by total electricity generated.

➤ SUB THEME: PRICES

10.3.8. Energy Indicator: WPI Of Energy Sources

- ❖ **Purpose and Measurement method:** – This is a price indicator of energy sources and reflects the price change with respect to base year 2004-05. It is to be noted that energy prices are driving forces for incentive or conservation, or efficiency improvements. Also, it shows affordability and therefore is one of the factors responsible for fuel diversification.

➤ SUB THEME: SUPPLY EFFICIENCY

10.3.9. Energy Indicator: Efficiency of energy conversion and distribution

- ❖ **Purpose and Measurement method:** – This indicator measures the efficiency of energy conversion and distribution systems in various energy supply chains including losses occurring during electricity transmission and distribution, and gas transportation and distribution. Due to constraint of data availability only the losses in transmission of electricity are used. The indicator is calculated as ratio of losses in transmission of electricity to electricity generated.

10.4 THEME: SECURITY

➤ SUB THEME: STRATEGIC FUEL STOCKS

10.4.1 Energy Indicator: Stock Of Critical Fuels perCorresponding Fuel consumption

- ❖ **Purpose and Measurement method:** – The purpose of this indicator is to measure the availability of national stocks of critical fuels, such as oil, with respect to corresponding fuel consumption. Many countries maintain stocks of oil in anticipation of disruptions in oil supply. For some countries, the critical fuel might be natural gas or other types of fuel. In Indian context we have taken coal as critical fuel. The indicator provides a relative measure of the length of time that stocks would last if supply were disrupted and fuel use were to continue at current levels. This indicator is defined by dividing the stocks of the critical fuels maintained by countries by the corresponding annual fuel consumption.

➤ SUB THEME: IMPORTS

10.4.2 Energy Indicator: Net energy import dependency

- ❖ **Purpose and Measurement method:** – This indicator measures the extent to which a country relies on imports to meet its energy requirements. This indicator is computed by calculating the ratio of net imports to consumption. Petroleum products are excluded as India is net exporter of them and have taken into account only the import value of different energy sources to calculate the indicator.

ENERGY INDICATORS (2016-17) AT A GLANCE

Theme	Sub-theme	Indicator	category	Unit	Value
Use and Production Pattern	Overall Use	Energy use per capita	TPES	toe/person	0.6240
			TFC	toe/person	0.4129
			Electricity	Kwh/person	813.9500
	Overall Productivity	Energy use per unit of GDP	TPES	toe/000'rupees	0.0067
			TFC	toe/000'rupees	0.0044
			Electricity	Kwh/000'rupees	8.7400
	Supply Efficiency	Efficiency of energy conversion and distribution	All	%	20.14
	Production	Reserves-to-production ratio	All	years	174
			coal	years	216
			lignite	years	145
		Resources-to-production ratio	All	years	403
			Crude oil	years	17
			Natural Gas	years	41
			Coal	years	475
	Lignite	years	988		
	End Use	Sectoral Energy Intensities	Industry	toe/000'rupees	0.00940
			Agriculture	toe/000'rupees	0.00102
			Transport	toe/000'rupees	0.00831
		Sectoral Electricity Intensities	Industry	Kwh/000'rupees	12.940
			Agriculture	Kwh/000'rupees	11.390
			Transport	Kwh/000'rupees	3.140
	Diversification (Fuel Mix)	Fuel shares in TPES	Crude Oil	%	27.32
			Natural Gas	%	5.69
Coal			%	64.17	
RE &Others			%	2.82	
Fuel share in TFC		Oil Products	%	38.76	
		Natural Gas	%	5.01	
		Coal	%	39.28	
Fuel share in electricity		Electricity	%	16.95	
		Thermal	%	82.96	
		Nuclear	%	2.65	
	Hydro	%	8.55		
RE (other than Hydro)	%	5.84			
Security	Imports	Net energy import dependency	Overall	%	36.35
			Crude Oil	%	84.59
			Natural gas	%	36.87
			Coal	%	23.56
			Electricity	%	0.39
	Strategic Fuel Stocks	Stocks of critical fuels per corresponding consumption	Coal	%	9.1800

DEFINITIONS OF ENERGY PRODUCTS

1. *Solid fuels*

- i. **Hard Coal:** Coals with a gross calorific value (moist, ash-free basis) which is not less than 24 MJ/kg or which is less than 24 MJ/kg provided that the coal has a vitrinite mean random reflectance greater than or equal to 0.6 per cent. Hard coal comprises anthracite and bituminous coals.
- ii. **Lignite:** Brown coal with a gross calorific value (moist, ash-free basis) less than 20 MJ/kg.
- iii. **Coke:** Products derived directly or indirectly from the various classes of coal by carbonisation or pyrolysis processes, or by the aggregation of finely divided coal or by chemical reactions with oxidising agents, including water.
- iv. **Proved Reserves:** A 'Proven Mineral Reserve' is the economically mineable part of a Measured Mineral Resource demonstrated by at least a Preliminary Feasibility Study. This Study must include adequate information on mining, processing, metallurgical, economic, and other relevant factors that demonstrate, at the time of reporting, that economic extraction is justified.
- v. **Indicated Reserves:** An 'Indicated Mineral Resource' is that part of a Mineral Resource for which quantity, grade or quality, densities, shape and physical characteristics can be estimated with a level of confidence sufficient to allow the appropriate application of technical and economic parameters, to support mine planning and evaluation of the economic viability of the deposit. The estimate is based on detailed and reliable exploration and testing information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes that are spaced closely enough for geological and grade continuity to be reasonably assumed.
- vi. **Inferred Reserves:** An 'Inferred Mineral Resource' is that part of a Mineral Resource for which quantity and grade or quality can be estimated on the basis of geological evidence and limited sampling and reasonably assumed, but not verified, geological and grade continuity. The estimate is based on limited information and sampling gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes. Due to the uncertainty that may be attached to Inferred Mineral Resources, it cannot be assumed that all or any part of an Inferred Mineral Resource will be upgraded to an Indicated or Measured Mineral Resource as a result of continued exploration. Confidence in the estimate is insufficient to allow the meaningful application of technical and economic parameters or to enable an evaluation of economic viability worthy of

public disclosure. Inferred Mineral Resources must be excluded from estimates forming the basis of feasibility or other economic studies

2. Liquid fuels

- i. **Crude petroleum** A mineral oil of fossil origin extracted by conventional means from underground reservoirs, and comprises liquid or near-liquid hydrocarbons and associated impurities such as sulphur and metals.

Remark: Conventional crude oil exists in the liquid phase under normal surface temperature and pressure, and usually flows to the surface under the pressure of the reservoir. This is termed “conventional” extraction. Crude oil includes condensate from condensate fields, and “field” or “lease” condensate extracted with the crude oil.

The various crude oils may be classified according to their sulphur content (“sweet” or “sour”) and API gravity (“heavy” or “light”). There are no rigorous specifications for the classifications but a heavy crude oil may be assumed to have an API gravity of less than 20° and a sweet crude oil may be assumed to have less than 0.5% sulphur content.

- ii. **Liquefied petroleum** LPG refers to liquefied propane (C₃H₈) and butane (C₄H₁₀) or mixtures of both. Commercial grades are usually mixtures of the gases with small amounts of propylene, butylene, isobutene and isobutylene stored under pressure in containers.

Remark: The mixture of propane and butane used varies according to purpose and season of the year. The gases may be extracted from natural gas at gas separation plants or at plants re-gasifying imported liquefied natural gas. They are also obtained during the refining of crude oil. LPG may be used for heating and as a vehicle fuel. Certain oil field practices also use the term LPG to describe the high vapour pressure components of natural gas liquids.

- iii. **Motor gasoline** A mixture of some aromatics (e.g., benzene and toluene) and aliphatic hydrocarbons in the C₅ to C₁₂ range. The distillation range is 25°C to 220°C.

Remark: Additives are blended to improve octane rating, improve combustion performance, reduce oxidation during storage, maintain cleanliness of the engine and improve capture of pollutants by catalytic converters in the exhaust system. Motor gasoline may also contain bio-gasoline products.

- iv. **Naphtha** Light or medium oils distilling between 30°C and 210°C which do not meet the specification for motor gasoline.

Remark: Different naphthas are distinguished by their density and the content of paraffins, isoparaffins, olefins, naphthenes and aromatics. The main uses for

naphthas are as feedstock for high octane gasolines and the manufacture of olefins in the petrochemical industry.

- v. **Kerosene** Mixtures of hydrocarbons in the range C9 to C16 and distilling over the temperature interval 145°C to 300°C, but not usually above 250°C and with a flash point above 38°C.

Remark: The chemical compositions of kerosenes depend on the nature of the crude oils from which they are derived and the refinery processes that they have undergone. Kerosenes obtained from crude oil by atmospheric distillation are known as straight-run kerosenes. Such streams may be treated by a variety of processes to produce kerosenes that are acceptable for blending as jet fuels. Kerosenes are primarily used as jet fuels. They are also used as domestic heating and cooking fuels, and as solvents. Kerosenes may include components or additives derived from biomass.

- vi. **Gasoline-type Jet fuels** Light hydrocarbons for use in aviation turbine power units, distilling between 100°C and 250°C. They are obtained by blending kerosene and gasoline or naphtha in such a way that the aromatic content does not exceed 25 per cent in volume, and the vapour pressure is between 13.7 kPa and 20.6 kPa.

Remark: Gasoline-type jet fuel is also known as “aviation turbine fuel”.

- vii. **Gas oil / Diesel oil** Gas oils are middle distillates, predominantly of carbon number range C11 to C25 and with a distillation range of 160°C to 420°C.

Remark: The principal marketed products are fuels for diesel engines (diesel oil), heating oils and marine fuel. Gas oils are also used as middle distillate feedstock for the petrochemical industry and as solvents.

- viii. **Fuel oil** Comprises residual fuel oil and heavy fuel oil. Residual fuel oils have a distillation range of 350°C to 650°C and a kinematic viscosity in the range 6 to 55 cSt at 100°C. Their flash point is always above 60°C and their specific gravity is above 0.95. Heavy fuel oil is a general term describing a blended product based on the residues from various refinery processes.

Remark: Other names commonly used to describe fuel oil include: bunker fuel, bunker C, fuel oil No. 6, industrial fuel oil, marine fuel oil and black oil. Residual and heavy fuel oil are used in medium to large industrial plants, marine applications and power stations in combustion equipment such as boilers, furnaces and diesel engines. Residual fuel oil is also used as fuel within the refinery.

- ix. **Lubricants** Oils, produced from crude oil, for which the principal use is to reduce friction between sliding surfaces and during metal cutting operations.

Remark: Lubricant base stocks are obtained from vacuum distillates which result from further distillation of the residue from atmospheric distillation of crude oil.

The lubricant base stocks are then further processed to produce lubricants with the desired properties.

- x. **Petroleum coke** Petroleum coke is a black solid obtained mainly by cracking and carbonizing heavy hydrocarbon oils, tars and pitches. It consists mainly of carbon (90 to 95 per cent) and has a low ash content. The two most important categories are "green coke" and "calcined coke".
- xi. Green coke (raw coke) is the primary solid carbonization product from high boiling hydrocarbon fractions obtained at temperatures below 630°C. It contains 4-15 per cent by weight of matter that can be released as volatiles during subsequent heat treatment at temperatures up to approximately 1330°C. Calcined coke is a petroleum coke or coal-derived pitch coke obtained by heat treatment of green coke to about 1330°C. It will normally have a hydrogen content of less than 0.1 percent by weight.

Remark: In many catalytic operations (e.g., catalytic cracking) carbon or catalytic coke is deposited on the catalyst, thus deactivating it. The catalyst is reactivated by burning off the coke which is used as a fuel in the refining process. The coke is not recoverable in a concentrated form

- xii. **Bitumen (Asphalt)** A solid, semi-solid or viscous hydrocarbon with a colloidal structure, being brown to black in color.

Remark: It is obtained as a residue in the distillation of crude oil and by vacuum distillation of oil residues from atmospheric distillation. It should not be confused with the nonconventional primary extra heavy oils which may also be referred to as bitumen. In addition to its major use for road pavements, bitumen is also used as an adhesive, a waterproofing agent for roof coverings and as a binder in the manufacture of patent fuel. It may also be used for electricity generation in specially designed power plants. Bitumen is also known in some countries as asphalt but in others asphalt describes the mixture of bitumen and stone aggregate used for road pavements.

- xiii. **Refinery gas** is a non-condensable gas collected in petroleum refineries (it is also known as still gas).

3. Gaseous fuels

- i. **Natural Gas:** A mixture of gaseous hydrocarbons, primarily methane, but generally also including ethane, propane and higher hydrocarbons in much smaller amounts and some noncombustible gases such as nitrogen and carbon dioxide.

Remark: The majority of natural gas is separated from both "non-associated" gas originating from fields producing hydrocarbons only in gaseous form, and "associated" gas produced in association with crude oil. The separation process produces natural gas by removing or reducing the hydrocarbons other than

methane to levels which are acceptable in the marketable gas. The natural gas the natural gasliquids (NGL) removed in the process are distributed separately.

- ii. **Coke-oven gas:**A gas produced from coke ovens during the manufacture of coke oven coke.
- iii. **Biogases:** Gases arising from the anaerobic fermentation of biomass and the gasification of solid biomass (including biomass in wastes).
Remark: The biogases from anaerobic fermentation are composed principally of methane and carbon dioxide and comprise landfill gas, sewage sludge gas and other biogases from anaerobic fermentation. Biogases can also be produced from thermal processes (by gasification or pyrolysis) of biomass and are mixtures containing hydrogen and carbon monoxide (usually known as syngas) along with other components. These gases may be further processed to modify their composition and can be further processed to produce substitute natural gas. The gases are divided into two groups according to their production: biogases from anaerobic fermentation and biogases from thermal processes. They are used mainly as a fuel but can be used as a chemical feedstock.

4. Electricity

- i. **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.
- ii. **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.
- iii. **Non-Utilities:**An Independent Power Producer which is not a public utility, but which owns facilities to generate electric power for sale to utilities and end users. They may be privately held facilities, corporations, cooperatives such as rural solar or wind energy producers, and non-energy industrial concerns capable of feeding excess energy into the system
- iv. **Hydro Electricity:** refers to electricity produced from devices driven by fresh, flowing or falling water.
- v. **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.

- vi. **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.
- vii. **Production** is defined as the capture, extraction or manufacture of fuels or energy in forms which are ready for general use. In energy statistics, two types of production are distinguished, primary and secondary. Primary production is the capture or extraction of fuels or energy from natural energy flows, the biosphere and natural reserves of fossil fuels within the national territory in a form suitable for use. Inert matter removed from the extracted fuels and quantities reinjected flared or vented are not included. The resulting products are referred to as “primary” products. Secondary production is the manufacture of energy products through the process of transformation of primary fuels or energy. The quantities of secondary fuels reported as production include quantities lost through venting and flaring during and after production. In this manner, the mass, energy and carbon within the primary source(s) from which the fuels are manufactured may be balanced against the secondary fuels produced. Fuels, electricity and heat produced are usually sold but may be partly or entirely consumed by the producer. 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.
- viii. **Imports of energy products** comprise all fuel and other energy products entering the national territory. Goods simply being transported through a country (goods in transit) and goods temporarily admitted are excluded but re-imports, which are domestic goods exported but subsequently readmitted, are included. The bunkering of fuel outside the reference territory by national merchant ships and civil aircraft engaged in international travel is excluded from imports. Fuels delivered to national merchant ships and civil aircraft which are outside of the national territory and are engaged in international travel should be classified as “International Marine” or “Aviation Bunkers”, respectively, in the country where such bunkering is carried out (see paragraph 5.12). Note that the “country of origin” of energy products should be recorded as a country from which goods were imported.
- ix. **Exports of energy products** comprise all fuel and other energy products leaving the national territory with the exception that exports exclude quantities of fuels delivered for use by merchant (including passenger) ships and civil aircraft, of all nationalities, during international transport of goods and passengers. Goods simply being transported through a country (goods in transit) and goods temporarily withdrawn are excluded but re-exports, foreign goods exported in the same state as previously imported, are included. Fuels delivered to foreign merchant ships and civil aircraft engaged in international travel are classified as “International Marine” or “Aviation Bunkers”, respectively. Note that “country of destination” of energy products (that is country of the last known destination as it is known at the time of exportation) should be recorded as a country to which these products are exported to.

- x. **Losses** refer to losses during the transmission, distribution and transport of fuels, heat and electricity. Losses also include venting and flaring of manufactured gases, losses of geothermal heat after production and pilferage of fuels or electricity. Production of secondary gases includes quantities subsequently vented or flared. This ensures that a balance can be constructed between the use of the primary fuels from which the gases are derived and the production of the gases.
- xi. **Energy Industries Own Use** refers to consumption of fuels and energy for the direct support of the production, and preparation for use of fuels and energy. Quantities of fuels which are transformed into other fuels or energy are not included here but within the transformation use. Neither are quantities which are used within parts of the energy industry not directly involved in the activities listed in the definition. These quantities are reported within final consumption.

5. Non-commercial Energy Sources

- i. **Fuelwood, wood residues and by-products:** Fuelwood or firewood (in log, brushwood, pellet or chip form) obtained from natural or managed forests or isolated trees. Also included are wood residues used as fuel and in which the original composition of wood is retained.
Remark: Charcoal and black liquor are excluded.
- ii. **Charcoal** The solid residue from the carbonisation of wood or other vegetal matter through slow pyrolysis.
- iii. **Bagasse** The fuel obtained from the fiber which remains after juice extraction in sugar cane processing.

6. Other important definitions:

- i. **Gross Domestic Product (GDP)** is the broadest quantitative measure of a nation's total economic activity. More specifically, GDP represents the monetary value of all goods and services produced within a nation's geographic borders over a specified period of time.
- ii. **Energy Use** indicates Total Primary Energy Supply (TPES), Total Final Consumption (TFC) and final electricity consumption.
- iii. **Transformation/Conversion Losses:** When one form of energy is converted into another form, the amount of losses are referred as transformation/conversion losses.

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	=	15.13 peta Jules of energy
One million tonnes of oil equivalent (MTOE)	=	15.13 peta Jules of energy
One billion cubic meter of natural gas	=	38.52 peta Jules of energy
One million cubic meter of natural gas	=	38.52 tera Jules of energy
	=	0.03852 peta Jules of energy
One billion kilowatt hour of electricity	=	3.60 peta Jules of energy

Estimating Mid Year Population

Assuming Linear growth o population mid year population is given by:

$$P_1 + \frac{n}{N}(P_2 - P_1)$$

Where: P₁ is the population in census period before the latest available census i.e population in the year 2001

P₂ is the population in the latest available census i.e population in the year 2011

n is no of months from 2001 to date of estimation

N is no of months between two census i.e between 2001 and 2011 to the date of estimation

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)
MW	:	Megawatt
KW	:	Kilowatt
(P)	:	Provisional

Categorisation of Coal in India

Grading of Coking Coal based on ash content

Grade	Ash Content
Steel Gr I	Ash content < 15%
Steel Gr II	15% <= Ash content < 18%
Washery Gr.I	18% <= Ash content < 21%
Washery Gr.II	21% <= Ash content < 24%
Washery Gr.III	24% <= Ash content < 28%
Washery Gr.IV	28% <= Ash content < 35%

Grading of Non Coking Coal based on Gross Calorific Value(GCV)

Grade	GCV Range (Kcal/Kg)
G1	GCV exceeding 7000
G2	GCV between 6701 and 7000
G3	GCV between 6401 and 6701
G4	GCV between 6101 and 6400
G5	GCV between 5801 and 6100
G6	GCV between 5501 and 5800
G7	GCV between 5201 and 5500
G8	GCV between 4901 and 5200
G9	GCV between 4601 and 4900
G10	GCV between 4301 and 4600
G11	GCV between 4001 and 4300
G12	GCV between 3700 and 4000
G13	GCV between 3400 and 3700
G14	GCV between 3101 and 3400
G15	GCV between 2801 and 3100
G16	GCV between 2501 and 2800
G17	GCV between 2201 and 2500

Source: Office of Coal Controller

Energy Data Collection Mechanisms

I. *Coal and Coal Derivatives*

I.1 Organizational set up: The Coal controller's Office is a subordinate office of Ministry of Coal having headquarters in Kolkata and five field offices at Dhanbad, Ranchi, Bilaspur and Nagpur. The Statistical Division of coal controller's Office, working under overall guidance of Coal Controller located at Kolkata is having a Deputy Director General and Deputy Director from Indian Statistical Service.

I.2. Current Activities: Statistics division of Coal Controller's Office (CCO) look's after the work related to coal and lignite statistics. Major role of this division are as under:-

- Collection, compilation, analysis and dissemination of Coal Statistics
- Undertake Annual Survey of Coal and Lignite Industry to assess production, dispatch, stock at pithead etc.
- To monitor the progress of captive coal and lignite blocks
- To maintain a database of washeries in India

I.3 Future initiatives:-To develop a more robust database, Coal Controller's Office needs to conduct own survey on various aspect of coal statistics like reserve, production, dispatch, stock at pithead etc.

I.4. Details of data flows/ items:

- **Data items-** The organization is collecting data on the following items on regular basis:-

Items	Periodicity
1.Reserve (from GSI)	Annual
2.Production (from coal/ lignite company)	Monthly
3.Despatches(from coal/ lignite company)	Monthly
4. Pit head closing stock (from coal/ lignite company)	Monthly
5. Price (for non-captive coal mines)	Monthly
6. Wagon Loading (Rail)(from CIL/ SCCL)	Monthly
7. Import & Export (DGC&S)	Monthly
8. Coal consumption in steel (from SAIL/RINL/TSL)	Monthly
9. Coal consumption in power & cement sector (from CEA etc.)	Annual
10. Captive coal & lignite mining	Monthly
11. Washery in India	Monthly
12. World Coal Statistics (from IEA)	Annual
13.Colliery-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 Collection of Statistics Act, 1953, the Colliery Control Rule, 2004 and Coal Mines (Conservation & Development) Act, 1974 and publications of CIL, SAIL and DGCIS.

- **Methodology of Data Collection**

Monthly Data- Data are collected from coal companies (pvt. And pub) on monthly basis on some major parameters.

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

Coverage:- Entire coal and lignite producing sector.

Response:- 100%

- Details of data items being compiled and periodicity

Items	Periodicity
1. Coal production data for PMO	Monthly
2. Data for Infrastructure Bulletin of MOSPI through MOC	Monthly
3. Data for IIP(Covering Washed Coal, Middlings, Hard Coke)	Monthly
4. Data for IIP of Mineral Sector (Coal & Lignite – state-wise)	Monthly
5. Provisional Coal Statistics	Annual
6. Coal Directory of India- Vol I & II	Annual
7. U. N. Annual energy Report- through CSO	Annual
8. IEA(for energy balance in case of non-OECD country: India)	Annual
9. Ad-hoc Reports	As and when required

II. Petroleum and Natural Gas

The Ministry of Petroleum and Natural Gas is entrusted with the responsibility of exploration and production of oil and natural gas, their refining, distribution and marketing, import, export and conservation of petroleum products and liquefied natural gas.

II.1. Organizational set up and activities

Ministry of Petroleum and Natural Gas has an Economic and Statistics Division headed by Senior Adviser. The Division provides economic and statistics related inputs to all the Divisions of the Ministry as well as other Ministries / Departments. An exhaustive data base is maintained on important parameters of oil and gas sector. This Division is involved in the plan formulation exercise of the Central public sector enterprises (CPSEs) associated with petroleum exploration, production, refining, distribution & marketing, import, export and conservation of Petroleum products. This Division also handles matters related to foreign direct investment (FDI) policy in the Oil and Gas sector and issues related to Double Taxation, Action plan under Swachh Bharat Abhiyaan / SwachhtaPakhwada by CPSEs as well as MoPNG. The Division is also involved in monitoring projects of Oil & Gas CPSEs and facilitating pending issues of projects under Oil and Gas Sector with Centre & States at various fora like PRAGATI, e-Samiksha, Project Monitoring Group (PMG) of PMO and in meetings chaired by the Hon'ble Prime Minister.

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

❑ **Weekly & Monthly Reports on Petroleum Statistics:** Collection, compilation and submission of Reports on:

- (i) Weekly Production Report: Weekly report on Crude Oil and Natural Gas production in the country and by ONGC Videsh Ltd. abroad.
- (ii) Monthly Production Report: Monthly report on production of Crude Oil, Natural Gas, refinery production, refinery capacity utilization prepared by the 25th day of the following month and circulated to Ministries / Departments.
- (iii) Monthly data on Imports / Exports: Monthly data on import of Crude Oil, Petroleum products and export of Petroleum products compiled and circulated to relevant Ministries / Departments.
- (iv) Joint Organization Data Initiative (JODI): JODI data on Oil and Gas submitted monthly to United Nations Statistics Division.

❑ **Annual Publication: Indian Petroleum & Natural Gas Statistics**

II.2. Details of the data flows and items

Data Collected: Production of Crude Oil, Natural Gas, Petroleum Products, Imports of Crude Oil, Petroleum products & LNG, export of Petroleum products and Consumption of

Petroleum Products and Natural Gas are collected on monthly basis. Data published in Indian Petroleum and Natural Gas Statistics are collected annually.

Periodicity & Data Sources: Data are collected from all Public Sector Undertakings and Private Oil Companies and Joint Venture companies of Oil and Gas Sector on weekly, monthly, quarterly and yearly basis as applicable for a given dataset.

Methods of Data Collection: Data collected through e-mail, FAX as well as hard copies by post.

Data Dissemination Methods: Monthly, Quarterly and Annual Reports circulated to all concerned and also uploaded on Ministry's website.

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

(i) For Returns on Crude Oil and Natural Gas

(a) Principal Legislation:

**The Oilfields (Regulation and Development) Act,
1948(53 of 1948) (8th September, 1948)**

XXXXXX

5. Power to make rules as respects mining leases

XXXXXX

6. Power to make rules as respects development of mineral oil

XXXXXX

(b) Subordinate Legislation:

**The Petroleum and Natural Gas Rules, 1959
(As amended from time to time)**

G.S.R.1288. In exercise of the powers conferred by sections 5 and 6 of the Oilfields (Regulation and Development) Act, 1948 (53 of 1948) and in supersession of the Petroleum Concession Rules, 1949, the Central Government hereby makes the following rules, regulating the grant of exploration licenses and mining leases in respect of petroleum and natural gas which belongs to Government, and for conservation and development thereof, namely:-

THE PETROLEUM AND NATURAL GAS RULES, 1959

XXXXXX

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

XXXXXX

(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 quality 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 returns 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

(a) Principal Legislation:

The Industries (Development and Regulation) Act, 1951, (Act No. 65 of 1951)

30. Power to make rules:

(1) The Central Government may, subject to the condition of previous publication, make rules for carrying out the purposes of this Act.

(2) In particular, and without prejudice to the generality of the foregoing power, such rules may provide for all or any of the following matters, namely:-

XXXXXX

(g) the collection of any information or statistics in respect of any scheduled industry;

XXXXXX

XXXXXX

2. Fuels:

XXXXXX

(2) Mineral oil (crude oil), motor and aviation spirit, diesel oil, kerosene oil, fuel oil, diverse hydrocarbon oils and their blends including synthetic fuels, lubricating oils and the like.

(3) Fuel gases-(coal gas, natural gas and the like)

(b) Subordinate Legislation:

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

8. (1) 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".

8. (2) "Every marketing 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 refinery, stocking, movements (onshore or offshore), transfers, imports, exports and sales of crude and or all products, refined there from, at such period, in such manner and from such of the sources, as may 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 license.
- (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.

- i. Delay in furnishing data.
- ii. Furnishing incomplete/ incorrect data.
- iii. 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.