सत्यमेव जयते

# ENERGY STATISTICS

## 2017

CENTRAL STATISTICS OFFICE

MINISTRY OF STATISTICS AND PROGRAMME IMPLEMENTATION

GOVERNMENT OF INDIA

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# ENERGY STATISTICS

## 2017
## (Twenty Fourth Issue)

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

# FOREWORD

Energy being a strategic commodity plays a significant role in economic development of a country. Energy systems in India have evolved over last six decades along with country's economic development, supporting the aspiration of 1.2 billion people, within the framework of democratic polity, globally integrated economy and environmentally sensitive regime. Ever increasing demand of energy has posed tremendous pressure on its limited resources and has necessitated optimum use of its resources. India pursued a reformed development agenda since 1991. Significant effort has gone into improving energy availability, as support to country's development initiatives.

For proper planning, statistics plays a vital role. This publication, 24th 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) further aims to enhance its utility. Some of the data may not match with the previous issues owing to definition or data revision by source ministries.

This is for the first time that theme wise 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. They also simplify a complex and large information base, thus providing a "synthesis" view of prevailing situation.

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
New Delhi

G.C.MANNA
DIRECTOR GENERAL, CSO

**Officers associated with the publication:**

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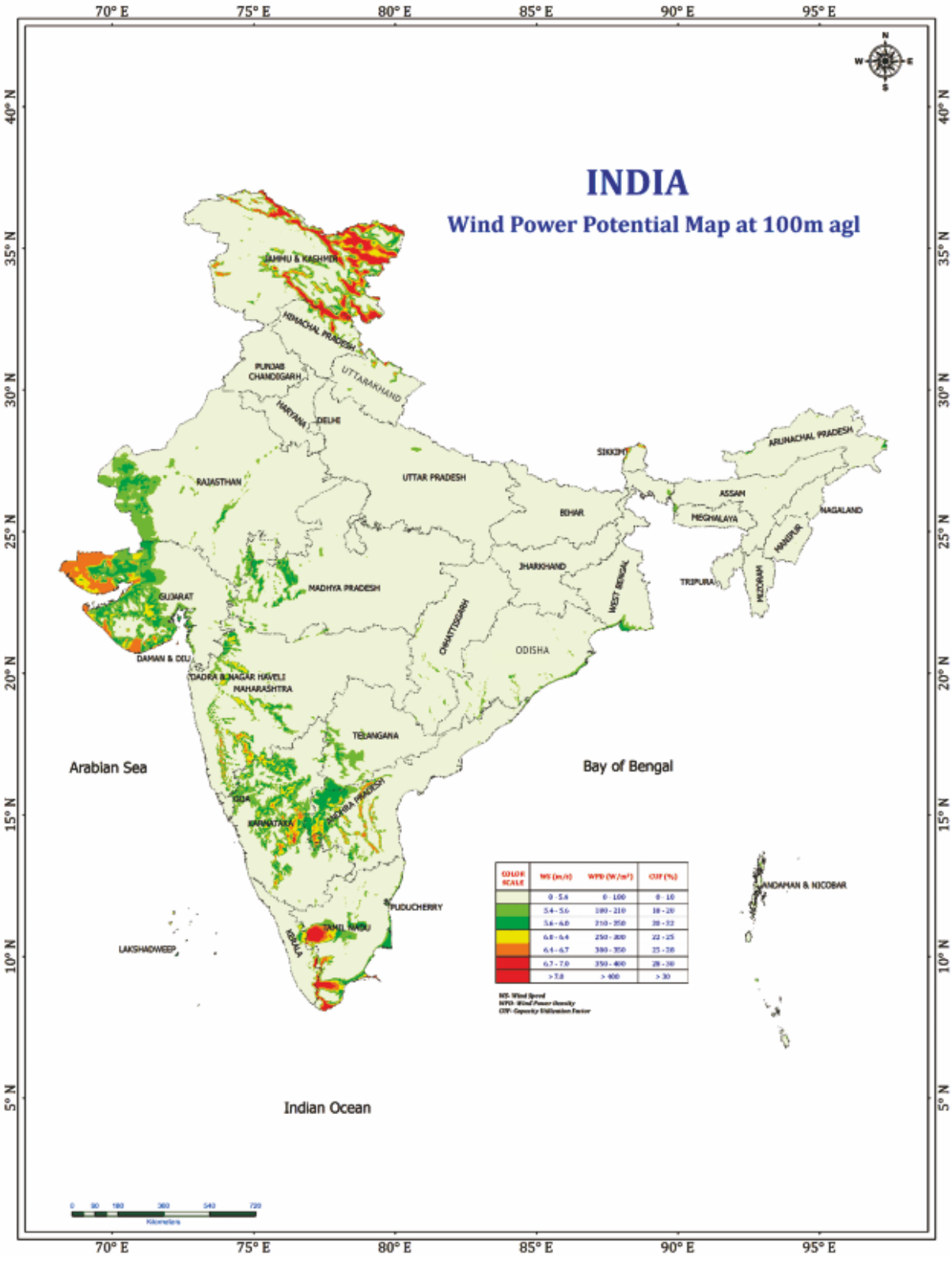
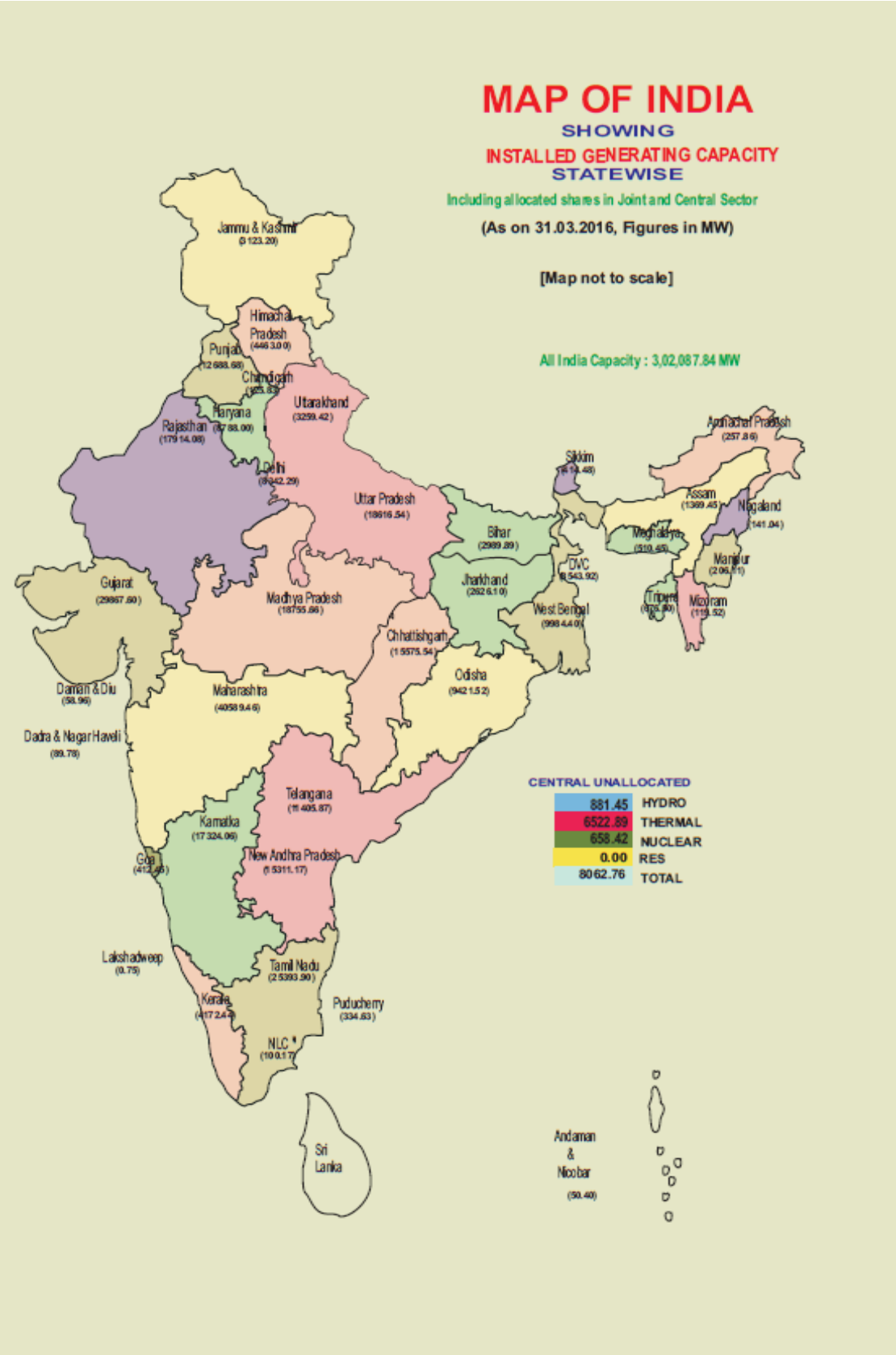



*Source: Ministry of New and Renewable Energy*

## Map 2: Installed Generating Capacity in India




*Source: Central Electricity Authority*

# METADATA-ENERGY STATISTICS

| 1. Contact | |
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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 and Office of the Economic Advisor, Ministry of Commerce and Industry. |
| **2.2. Data description** |
| The statistics present information about the reserves, installed capacity, potential for generation, production, consumption, import, export and wholesale price of different energy commodities. |
| **2.3. Sector coverage** |
| Coal & Lignite, Petroleum & Natural Gas, Renewable Energy Resources and Electricity. (Data collection Mechanism is given in **Annex:V.)** |
| **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 and Office of the Economic Advisor, Ministry of Commerce and Industry. |
| **2.9. Base period** |
| 2004-05 for WPI and 2011-12 for GDP data pertaining to 2011-12 to 2015-16 |
| **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.) 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 -2017" is the financial year 2015-16 and the previous financial years since 2006-07.

## 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.

## 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 2015-16 is published in current publication. Final data will be given in the next publication in March 2018. |

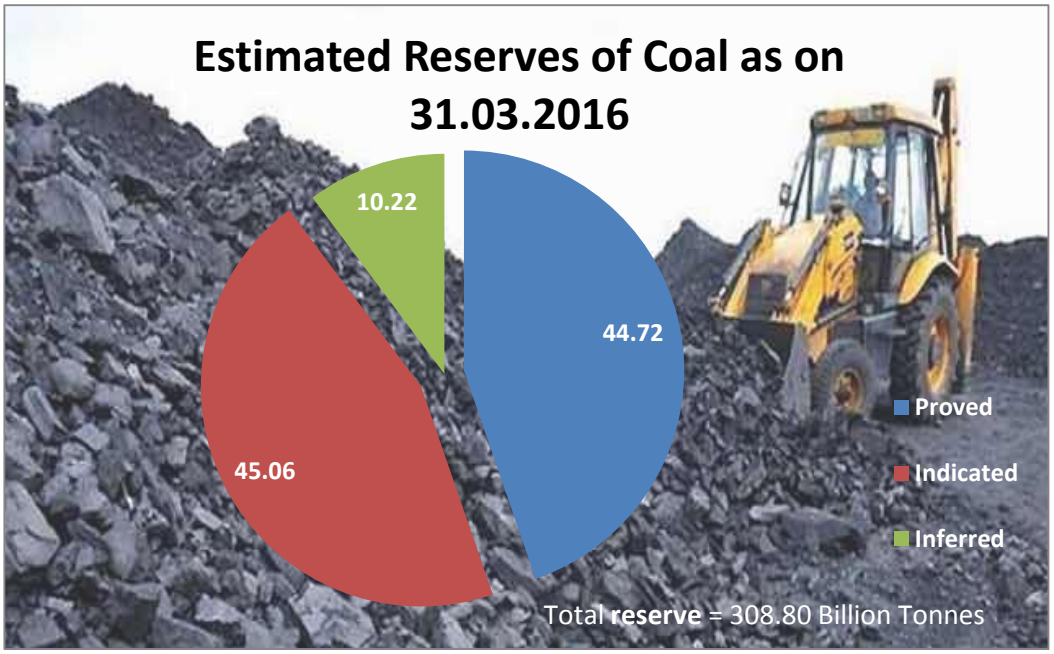
| 13. Statistical processing |
|---|
| **13.1. Source data** |
| Energy data are collected from the source agencies at national level and presented in the publication. It is published in the ministry's web-site. |
| **13.2. Frequency of data collection** |
| Annual. |
| **13.3. Data collection** |
| 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. |

# CHAPTER 1: RESERVES AND POTENTIAL FOR GENERATION

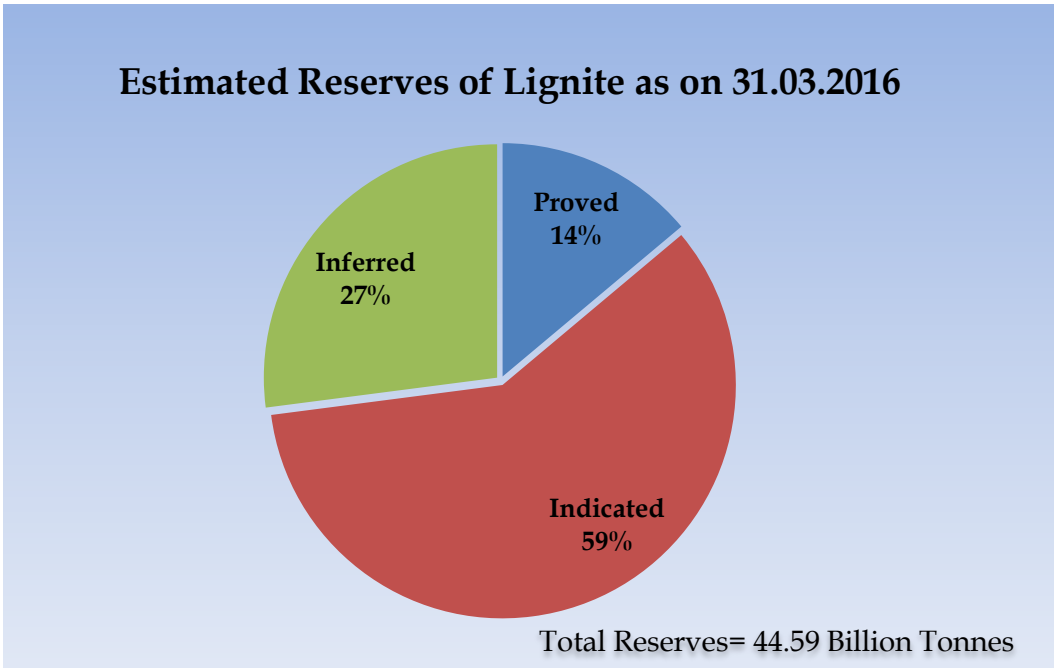
## *1.1 Coal and Lignite*

- 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 98.58 % of the total coal reserves in the country. The State of Jharkhand had the maximum share (26.29%) in the overall reserves of coal in the country as on 31st March 2016 followed by the State of Odisha (24.58%) (Table 1.1).

- As on 31.03.16, the estimated reserves of coal were 308.80 billion tonnes, an addition of 2.20 billion tonnes over the last year (Table 1.1). There has been an increase of 0.7% in the estimated coal reserves during the year 2015-16 with Chattisgarh accounting for the maximum increase of 2.05%.



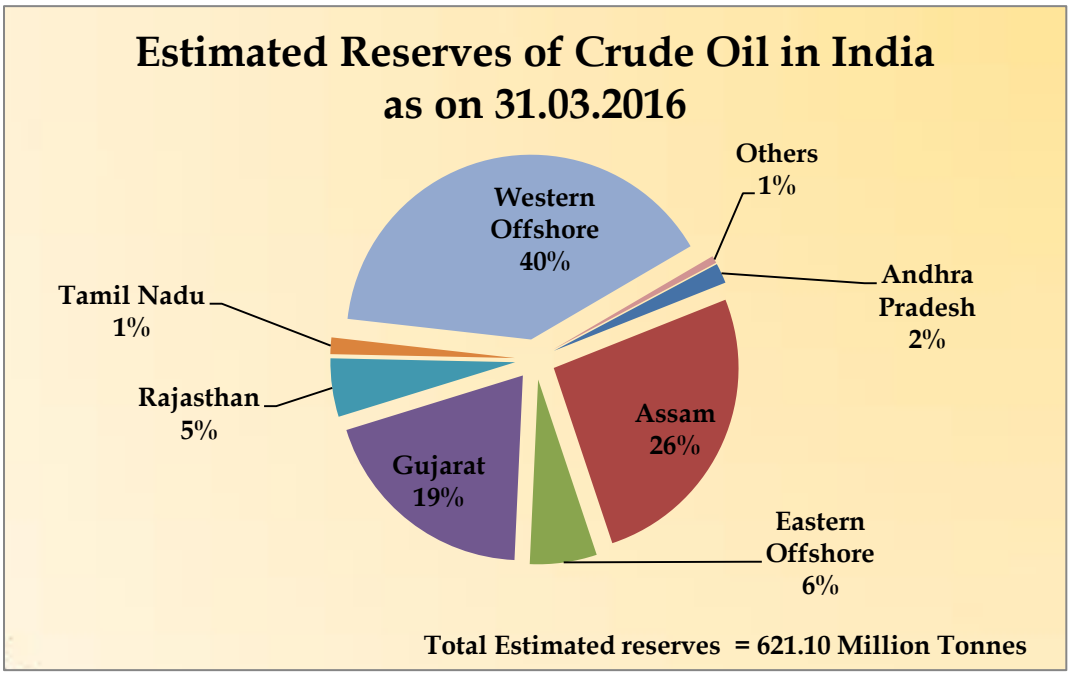

- The estimated total reserves of lignite as on 31.03.16 was 44.59 billion Tonnes against 44.12 billion tonnes on 31.03.15. (Table 1.1(A)).




### *1.2 Petroleum and Natural gas*

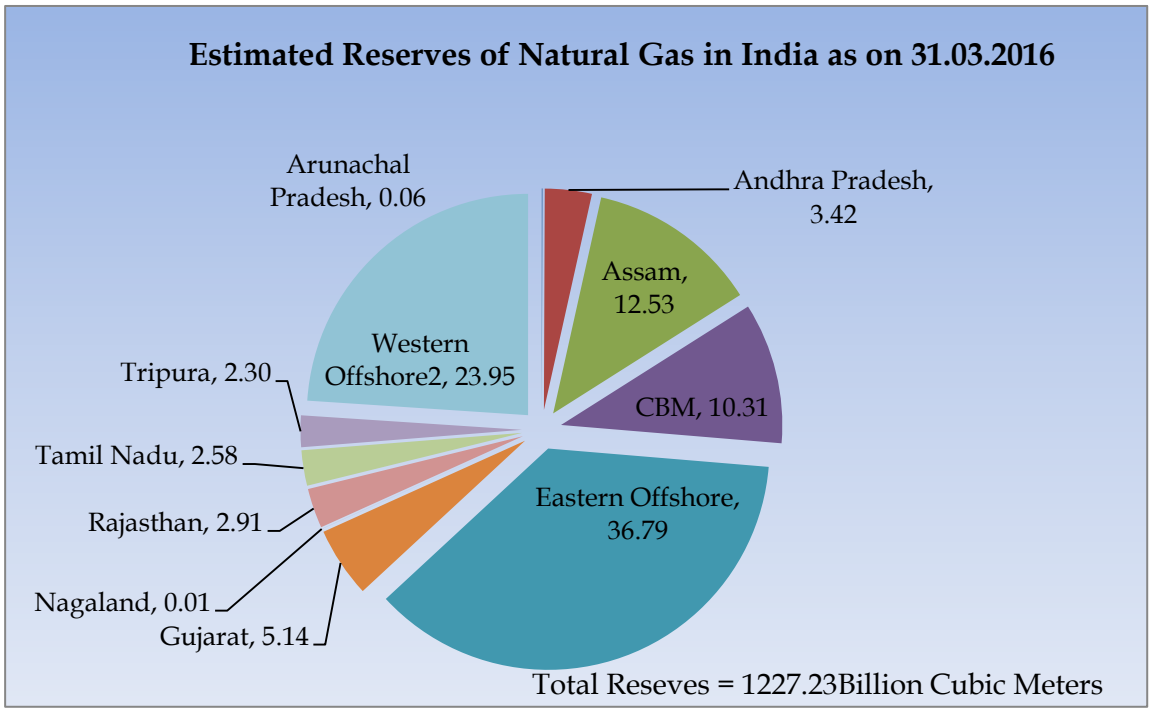
- The estimated reserves of crude oil in India as on 31.03.2016 stood at 621.10 million tonnes (MT) (Table 1.2) against 635.60 million tonnes on 31.03.2015.

- Geographical distribution of Crude oil indicates that the maximum reserves are in the Western Offshore (39.79%) followed by Assam (25.89%), whereas the maximum reserves of Natural Gas are in the Eastern Offshore (36.79%) followed by Western offshore (23.95%). (Table 1.2).



- There was decrease of 2.28% in the estimated reserve of crude oil for the country as a whole during 2015-16 as compared to the position a year ago. During the same period, estimated reserves of crude oil in Arunachal Pradesh, Rajasthan and Assam decreased by 44.75, 17.04 and 2.11 % respectively, while the same in Tamil Nadu, Andhra Pradesh, Gujarat, Western Offshore and Eastern Offshore increased by 18.42 %, 15.30% , 2.58%, 1.88% and 0.59% respectively.

- The estimated reserves of Natural Gas in India as on 31.03.2016 stood at 1227.23 Billion Cubic Meters (BCM) as against 1251.90 BCM as on 31.03.2015 (Table 1.2).

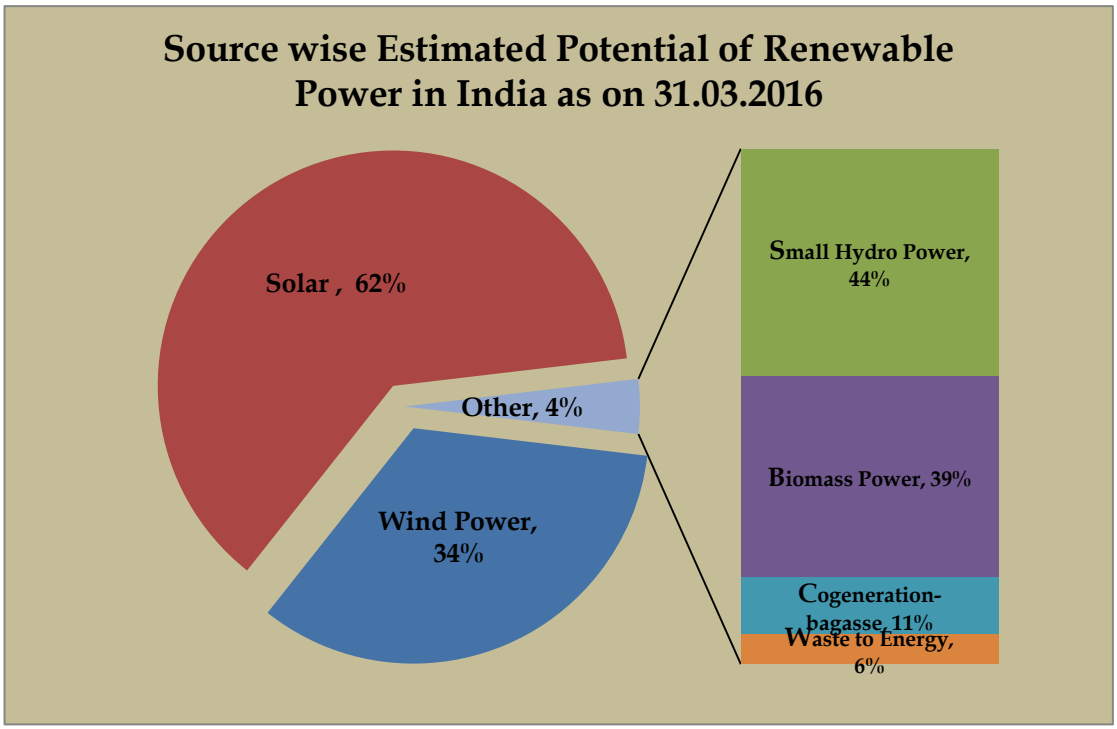


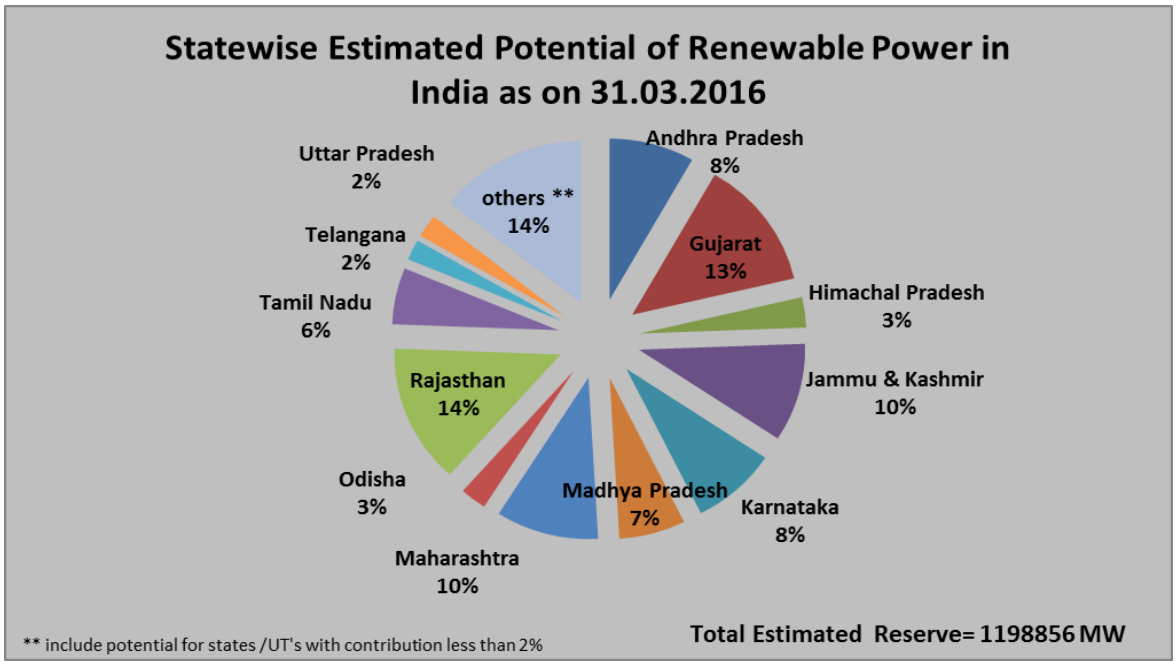

- The estimated reserves of Natural Gas decreased by 1.97% over the last year. The maximum contribution to this decrease has been from Western Offshore, followed by Eastern Offshore.

### *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 31.03.16 is estimated at 1198856 MW (Table 1.3). This includes wind power potential of 102788 MW (8.57%) at 80m hub height, wind power potential of 302235 MW (25.21%) at 100 m hub height, SHP (small-hydro power) potential of 19749 MW (1.65%), Biomass power of 17,538 MW (1.46%), 5000 MW (0.42%) from bagasse-based cogeneration in sugar mills, 2556 MW (0.21%) from waste to energy and solar power potential of 748990 MW (62.48%).




❖ 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 31.03.2015 and 31.03.2016

(in Billion Tonne)

| States/ UTs | Proved | | Indicated | | Inferred | | Total | | Distribution (%) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 31.03.2015 | 31.03.2016 | 31.03.2015 | 31.03.2016 | 31.03.2015 | 31.03.2016 | 31.03.2015 | 31.03.2016 | 31.03.2015 | 31.03.2016 |
| 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 | 0.05 | 0.06 | 0.00 | 0.00 | 0.52 | 0.52 | **0.17** | **0.17** |
| Bihar | 0.00 | 0.00 | 0.00 | 0.00 | 0.16 | 0.16 | 0.16 | 0.16 | **0.05** | **0.05** |
| Chhattisgarh | 18.24 | 19.14 | 34.39 | 34.61 | 2.29 | 2.29 | 54.91 | 56.04 | **17.91** | **18.15** |
| Jharkhand | 41.46 | 42.32 | 33.03 | 32.30 | 6.56 | 6.55 | 81.05 | 81.17 | **26.44** | **26.29** |
| Madhya Pradesh | 10.41 | 10.92 | 12.78 | 12.70 | 3.34 | 3.29 | 26.54 | 26.91 | **8.66** | **8.71** |
| Maharashtra | 5.95 | 6.21 | 3.19 | 3.15 | 2.11 | 2.08 | 11.25 | 11.44 | **3.67** | **3.70** |
| Meghalaya | 0.09 | 0.09 | 0.02 | 0.02 | 0.47 | 0.47 | 0.58 | 0.58 | **0.19** | **0.19** |
| Nagaland | 0.01 | 0.01 | 0.00 | 0.00 | 0.31 | 0.31 | 0.32 | 0.32 | **0.10** | **0.10** |
| Odisha | 30.75 | 34.29 | 36.55 | 33.28 | 8.51 | 8.32 | 75.80 | 75.90 | **24.72** | **24.58** |
| 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 | **0.35** | **0.34** |
| West Bengal | 13.52 | 13.60 | 13.01 | 13.02 | 4.91 | 4.91 | 31.44 | 31.53 | **10.25** | **10.21** |
| Telangana | 9.81 | 10.13 | 9.96 | 8.59 | 3.03 | 2.70 | 22.79 | 21.41 | **7.43** | **6.93** |
| **All India Total** | **131.61** | **138.09** | **143.24** | **139.15** | **31.74** | **31.56** | **306.60** | **308.80** | **100.00** | **100.00** |
| **Distribution (%)** | **42.93** | **44.72** | **46.72** | **45.06** | **10.35** | **10.22** | **100.00** | **100.00** | | |

Source: Office of Coal Controller, Ministry of Coal

# Table 1.1(A) :Statewise Estimated Reserves of Lignite in India as on 31.03.2015 and 31.03.2016

(in Billion Tonne)

| States/ UTs | Proved | | Indicated | | Inferred | | Total | | Distribution (%) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 31.03.2015 | 31.03.2016 | 31.03.2015 | 31.03.2016 | 31.03.2015 | 31.03.2016 | 31.03.2015 | 31.03.2016 | 31.03.2015 | 31.03.2016 |
| **Gujarat** | 1.28 | 1.28 | 0.28 | 0.28 | 1.16 | 1.16 | 2.72 | 2.72 | 6.29 | 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 | 0.96 | 0.93 |
| **Rajasthan** | 1.17 | 1.17 | 2.67 | 2.67 | 1.89 | 1.90 | 5.73 | 5.73 | 13.23 | 12.85 |
| **TamilNadu** | 3.74 | 3.74 | 22.90 | 22.99 | 8.57 | 8.95 | 35.21 | 35.68 | 79.42 | 80.02 |
| **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** | **6.18** | **26.28** | **26.28** | **11.65** | **12.04** | **44.12** | **44.59** | **100.00** | 100.00 |
| **Distribution (%)** | **14.01** | **13.86** | **59.57** | **58.94** | **26.41** | **27.00** | **100.00** | **100.00** | | |

Source:Office of Coal Controller, Ministry of Coal

# Table 1.2 :Statewise Estimated Reserves of Crude Oil and Natural Gas in India as on in 31.03.2015 and 31.03.2016

| States/ UTs/ Region | Crude Petroleum (million tonnes) | | | | Natural Gas (billion cubic metres) | | | |
|---|---|---|---|---|---|---|---|---|
| | 31.03.2015 | | 31.03.2016 | | 31.03.2015 | | 31.03.2016 | |
| | | Distribution (%) | Estimated Reserves | Distribution (%) | Estimated Reserves | Distribution (%) | Estimated Reserves | Distribution (%) |
| **Arunachal Pradesh** | 1.64 | **0.26** | 1.57 | **0.25** | 0.79 | **0.06** | 0.76 | **0.06** |
| **Andhra Pradesh** | 10.94 | **1.72** | 10.90 | **1.75** | 41.79 | **3.34** | 42.03 | **3.42** |
| **Assam** | 165.91 | **26.10** | 160.79 | **25.89** | 149.38 | **11.93** | 153.76 | **12.53** |
| **CBM** | 0.00 | **0.00** | 0.00 | **0.00** | 100.37 | **8.02** | 126.49 | **10.31** |
| **Eastern Offshore[1]** | 34.19 | **5.38** | 36.39 | **5.86** | 467.65 | **37.36** | 451.46 | **36.79** |
| **Gujarat** | 119.41 | **18.79** | 121.16 | **19.51** | 63.79 | **5.10** | 63.06 | **5.14** |
| **Nagaland** | 2.38 | **0.37** | 2.38 | **0.38** | 0.09 | **0.01** | 0.09 | **0.01** |
| **Rajasthan** | 37.32 | **5.87** | 31.72 | **5.11** | 36.93 | **2.95** | 35.66 | **2.91** |
| **Tamil Nadu** | 8.47 | **1.33** | 8.99 | **1.45** | 35.36 | **2.82** | 31.68 | **2.58** |
| **Tripura** | 0.07 | **0.01** | 0.07 | **0.01** | 30.74 | **2.46** | 28.28 | **2.30** |
| **Western Offshore[2]** | 255.27 | **40.16** | 247.13 | **39.79** | 325.01 | **25.96** | 293.96 | **23.95** |
| **Total** | **635.60** | **100.00** | **621.10** | **100.00** | **1251.90** | **100.00** | **1227.23** | **100.00** |

CBM : Cold Bed Methane

Note:

1. Proved and indicated Balance Recoverable Reserves.
2. Western offshore includes Gujarat offshore.
3. The figures maynot match previous year figure owing to the revision in definition by Ministry of Petroleum & Natural Gas.

Source: Ministry of Petroleum & Natural Gas.

## Table 1.3 :Sourcewise and Statewise Estimated Potential of Renewable Power in India as on 31.03.2016

(in MW)

| States/ UTs | Wind Power | | Small Hydro Power | Biomass Power | Cogeneration-bagasse | Waste to Energy | Solar Energy | Total | |
|---|---|---|---|---|---|---|---|---|---|
| | @ 80 m | @ 100 m | | | | | | Estimated Reserves | Distribution (%) |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Andhra Pradesh | 14497 | 44228 | 978 | 578 | 300 | 123 | 38440 | 99144 | 8.27 |
| Arunachal Pradesh | 236 | - | 1341 | 8 | - | - | 8650 | 10235 | 0.85 |
| Assam | 112 | - | 239 | 212 | - | 8 | 13760 | 14331 | 1.20 |
| Bihar | 144 | - | 223 | 619 | 300 | 73 | 11200 | 12559 | 1.05 |
| Chhattisgarh | 314 | 76 | 1107 | 236 | - | 24 | 18270 | 20027 | 1.67 |
| Goa | - | 1 | 7 | 26 | - | - | 880 | 914 | 0.08 |
| Gujarat | 35071 | 84432 | 202 | 1221 | 350 | 112 | 35770 | 157158 | 13.11 |
| Haryana | 93 | - | 110 | 1333 | 350 | 24 | 4560 | 6470 | 0.54 |
| Himachal Pradesh | 64 | - | 2398 | 142 | - | 2 | 33840 | 36446 | 3.04 |
| Jammu & Kashmir | 5685 | - | 1431 | 43 | - | - | 111050 | 118209 | 9.86 |
| Jharkhand | 91 | - | 209 | 90 | - | 10 | 18180 | 18580 | 1.55 |
| Karnataka | 13593 | 55857 | 4141 | 1131 | 450 | - | 24700 | 99872 | 8.33 |
| Kerala | 837 | 1700 | 704 | 1044 | - | 36 | 6110 | 10431 | 0.87 |
| Madhya Pradesh | 2931 | 10484 | 820 | 1364 | - | 78 | 61660 | 77337 | 6.45 |
| Maharashtra | 5961 | 45394 | 794 | 1887 | 1250 | 287 | 64320 | 119893 | 10.00 |
| Manipur | 56 | - | 109 | 13 | - | 2 | 10630 | 10810 | 0.90 |
| Meghalaya | 82 | - | 230 | 11 | - | 2 | 5860 | 6185 | 0.52 |
| Mizoram | - | - | 169 | 1 | - | 2 | 9090 | 9262 | 0.77 |
| Nagaland | 16 | - | 197 | 10 | - | - | 7290 | 7513 | 0.63 |
| Odisha | 1384 | 3093 | 295 | 246 | - | 22 | 25780 | 30820 | 2.57 |
| Punjab | - | - | 441 | 3172 | 300 | 45 | 2810 | 6768 | 0.56 |
| Rajasthan | 5050 | 18758 | 57 | 1039 | - | 62 | 142310 | 167276 | 13.95 |
| Sikkim | 98 | - | 267 | 2 | - | - | 4940 | 5307 | 0.44 |
| Tamil Nadu | 14152 | 33799 | 660 | 1070 | 450 | 151 | 17670 | 67952 | 5.67 |
| Telangana | - | 4244 | - | | - | - | 20410 | 24654 | 2.06 |
| Tripura | - | - | 47 | 3 | - | 2 | 2080 | 2132 | 0.18 |
| Uttar Pradesh | 1260 | - | 461 | 1617 | 1250 | 176 | 22830 | 27594 | 2.30 |
| Uttarakhand | 534 | - | 1708 | 24 | - | 5 | 16800 | 19071 | 1.59 |
| West Bengal | 22 | 2 | 396 | 396 | - | 148 | 6260 | 7224 | 0.60 |
| Andaman & Nicobar | 365 | 8 | 8 | | - | - | - | 381 | 0.03 |
| Chandigarh | - | - | - | | - | 6 | - | 6 | 0.00 |
| Dadar & Nagar Haveli | - | - | - | | - | - | - | | 0.00 |
| Daman & Diu | 4 | - | - | | - | - | - | 4 | 0.00 |
| Delhi | - | - | - | | - | 131 | 2050 | 2181 | 0.18 |
| Lakshadweep | 16 | 7 | - | | - | - | - | 23 | 0.00 |
| Puducherry | 120 | 152 | - | | - | 3 | - | 275 | 0.02 |
| Others* | - | - | - | | - | 1022 | 790 | 1812 | 0.15 |
| **All India Total** | **102788** | **302235** | **19749** | **17538** | **5000** | **2556** | **748990** | **1198856** | **100.00** |
| **Distribution (%)** | **8.57** | **25.21** | **1.65** | **1.46** | **0.42** | **0.21** | **62.48** | **100.00** | |

* Industrial waste

Source: Ministry of New and Renewable Energy

# 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 31.3.2016 (Table 2.1). As on 31.03.16, 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 31.03.16, 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 230 MMT on 31.03.2016 which is 15 MMT higher than the country's refining capacity (215 MMT) on 31.03.2015.

- The Refinery production (crude throughput) achievement was 232.865 MMT during 2015-16 which marks net increase of 4.31% over 2014-15 (223.242 MMT).

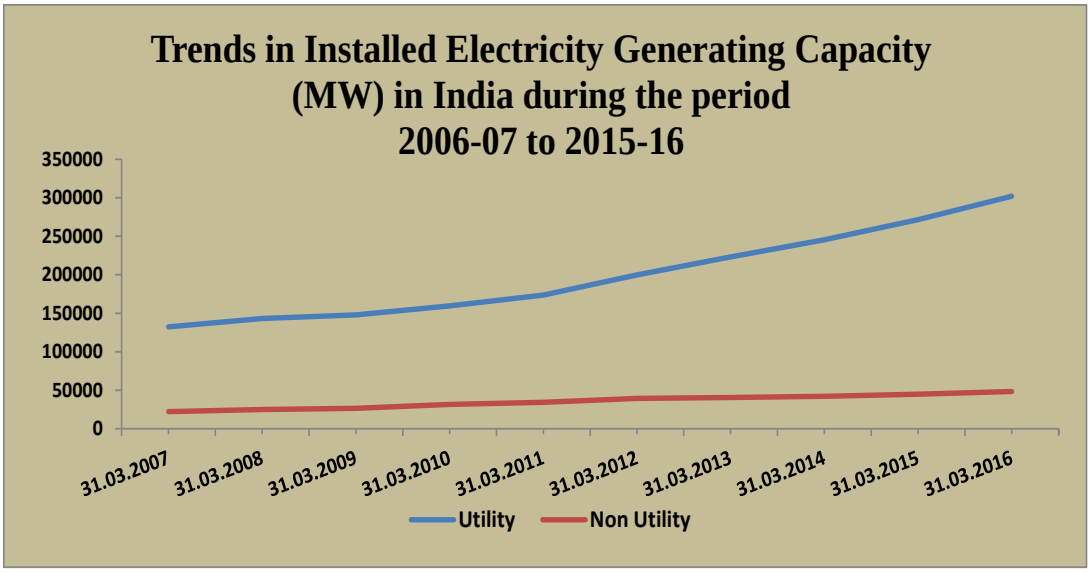
- Capacity utilization of the refineries was 103.8% during 2014-15 which decreased to 101.2% during 2015-16. In the Public Sector, the maximum increase in capacity utilization (31.4%) was at ONGC, Tatipaka, Andhra Pradesh. In the Private Sector the highest increase (5.1%) in capacity utilization was at RIL (DTA), Jamnagar, Gujarat.

- Indian Oil Corporation, the state owned corporation had highest refining capacity of 69.2 MMTY. All units of IOC together processed 58.007 MMT during 2015-16 as compared to 53.585 MMT during 2014-15. The capacity utilization of these refineries was 83.8% during 2015-16 as against 98.9% during 2014-15.

- All the private refineries taken together processed 88.662 MMT during 2015-16 which is higher than 88.533 MMT processed in 2014-15. The capacity utilization of these refineries during 2015-16 was 110.8% which is 0.1% higher than its capacity utilization (110.7%) in 2014-15.

## *2.3 Installed generating capacity of electricity*

- The total installed capacity for electricity generation in the country has increased from 154664 MW as on 31.03.2007 to 350367 MW as on 31.03.2016, registering a compound annual growth rate (CAGR) of 8.52% (Table 2.3).



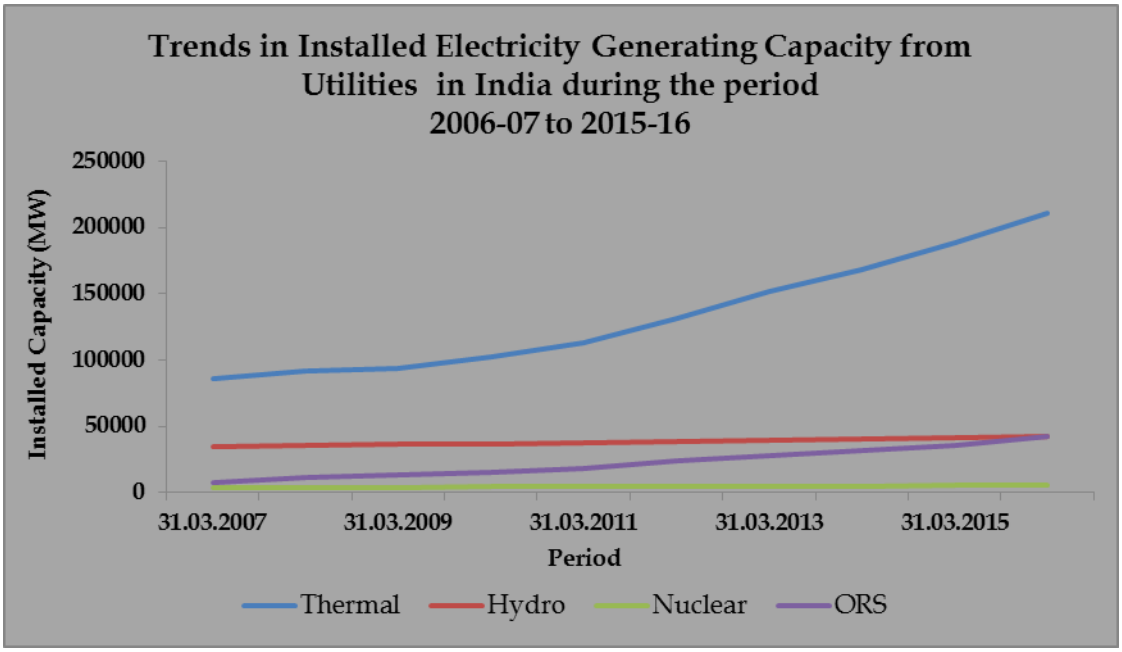

- Electricity generation capacity increased by 10.74% to 33987 MW in 2015-16.

- The highest rate of annual growth from 2014-15 to 2015-16 in installed capacity was for Other Renewable sources (ORS) (19.25%) followed by Thermal Power (10.91%).

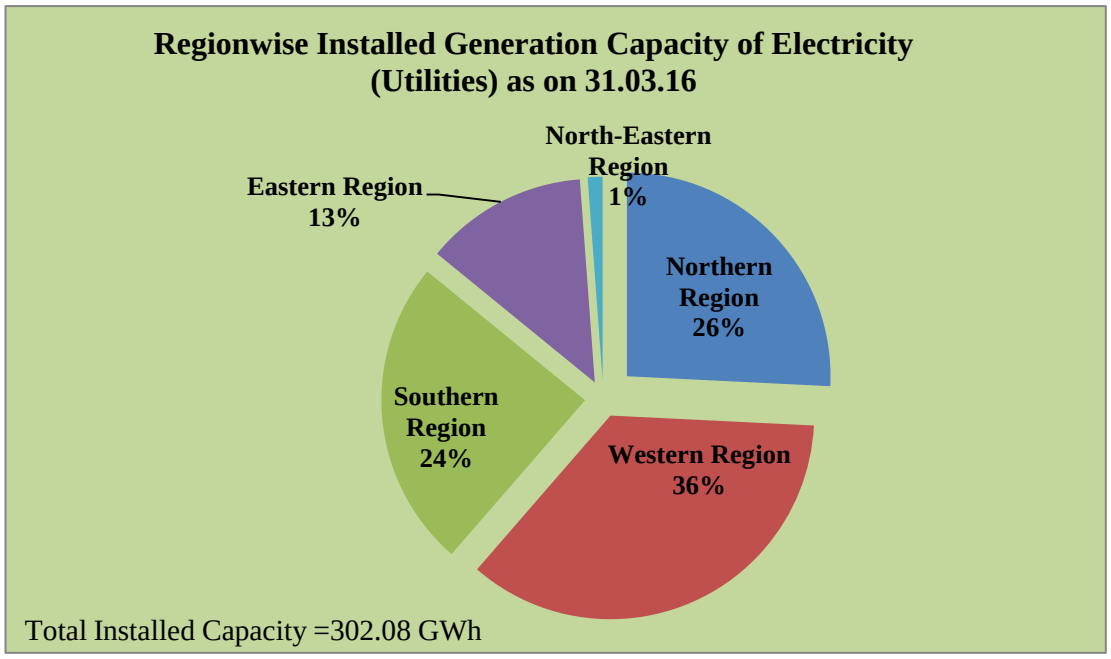
- The total Installed capacity of power utilities in the country increased from 132329 MW in 31.3.2007 to 302088 MW as on 31.3.2016, with a CAGR of 8.60% over the period.

- At the end of March 2016, thermal power plants accounted for an overwhelming 73.50% of the total installed capacity in the country, with an installed capacity of 257528 MW. Other renewable Sources (excluding hydro) come next with an installed capacity of 44217 MW, accounting for 12.62% of the total installed Capacity. The share of Hydro and Nuclear energy was only 12.23% and 1.65% of total installed capacity.

- Non-utilities accounted for 13.78% (48279 MW) of the total installed electricity generation capacity.




❖ The geographical distribution of Installed generating capacity of electricity as on 31.03.16 (Table 2.4) indicates that Western Region (both central and state sector) accounted for the highest share (36%) followed by Northern Region (26%), Southern Region (24%), Eastern Region (13%) and North Eastern Region (1%).




❖ Region wise growth in the installed capacity during 2015-16 reveals that Southern Region registered the highest annual growth of about 17.03%, followed by Northern Region (15.45%), Western Region (6.71%), Eastern Region (6.03%) and North Eastern Region (5.61%).

❖ Among all the states Telangana registered highest annual growth (97.01%) in the installed capacity followed by Nagaland (70.29%) and Sikkim (58.29%).

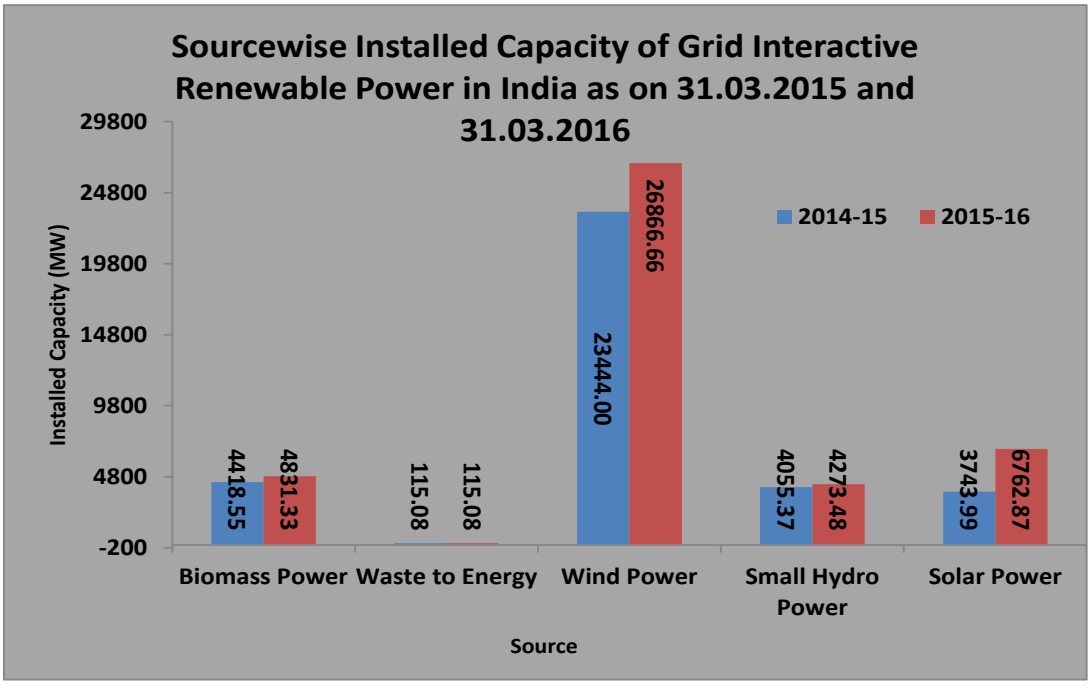
## *2.4 Grid Interactive Renewable Power*

- The total installed capacity of grid interactive renewable power, which was 35776.96 MW as on 31.03.2015, had gone up to 42849.38 MW as on 31.03.2016 indicating growth of 19.77% during the period (Table 2.5).

- Out of the total installed generation capacity of renewable power as on 31-03-2016, Wind power accounted for about 62.7%, followed by Solar power (15.78%) and Biomass power (11.46%).

- Tamil Nadu had the highest installed capacity of grid connected renewable power (9448.68 MW) followed by Maharashtra (6613.28 MW) and Rajasthan (5396.03 MW), mainly on account of wind power.

- As on 31.03.2016, out of total number of Biogas plants installed (48.35 lakh) (Table 2.6), maximum number of plants installed were in Maharashtra (8.71 lakh) followed by Andhra Pradesh (5.32 lakh), Karnataka (4.79 lakh), Uttar Pradesh (4.39 lakh) and Gujarat (4.30 lakh).




- As on 31.03.2016, a total of 5,86,065 villages were electrified (Table 2.6) accounting for 98.1% of the total villages in the country.

# Table 2.1: Installed Capacity of Coal Washeries in India as on 31.03.16

| Sl. No. | Washery & Operator | State of Location | Capacity (MTY) 31.03.2016* |
|---|---|---|---|
| | **COKING COAL :** | | |
| 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 Boakaro-III,TISCO | Jharkhand | 2.10 |
| 18 | Bhelatand | Jharkhand | 0.86 |
| | **(B) PSU & Private** | | **10.01** |
| | **TOTAL (A + B)** | | **29.69** |
| | **NON-COKING COAL** | | |
| 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 |

# Table 2.1(Contd.): Installed Capacity of Coal Washeries in India as on 31.03.16

| Sl. No. | Washery & Operator | State of Location | Capacity (MTY) 31.03.2016* |
|---|---|---|---|
| 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

## Table 2.2: Installed Capacity and Capacity Utilization of Refineries of Crude Oil during 2014-15 and 2015-16

| Sl. No. | Refinery | Installed Capacity (TMTPA) | | Crude Oil Processed (TMT) | | Capacity Utilisation (%) | | |
|---|---|---|---|---|---|---|---|---|
| | | 31.03.2015 | 31.03.2016 | 2014-15 | 2015-16* | 2014-15 | 2015-16 | Change in Utilisation |
| **A** | **Public Sector Refineries** | **120066** | **135066** | **121182** | **127087** | **100.9** | **94.1** | **-6.8** |
| **I** | **IOC RFINERIES** | **54200** | **69200** | **53585** | **58007** | **98.9** | **83.8** | **-15.2** |
| | IOC, Guwahati, Assam | 1000 | 1000 | 1006 | 904 | **100.6** | **90.4** | **-10.1** |
| | IOC,Barauni, Bihar | 6000 | 6000 | 5944 | 6545 | **99.1** | **109.1** | **10.1** |
| | IOC,Koyali, Gujarat | 13700 | 13700 | 13285 | 13820 | **97.0** | **100.9** | **4.0** |
| | IOC, Haldia, West Bengal | 7500 | 7500 | 7650 | 7776 | **102.0** | **103.7** | **1.6** |
| | IOC, Mathura, Uttar Pradesh | 8000 | 8000 | 8515 | 8860 | **106.4** | **110.8** | **4.1** |
| | IOC, Digboi, Assam | 650 | 650 | 591 | 562 | **90.9** | **86.5** | **-4.9** |
| | IOC, Panipat, Haryana | 15000 | 15000 | 14191 | 15282 | **94.6** | **101.9** | **7.7** |
| | IOC, Bongaigaon, Assam | 2350 | 2350 | 2403 | 2442 | **102.3** | **103.9** | **1.6** |
| | IOC, Pradip, Odisha | - | - | - | 1817 | - | - | - |
| **III** | **BPCL RFINERIES** | **21500** | **21500** | **23177** | **24083** | **107.8** | **112.0** | **3.9** |
| | BPCL, Mumbai, Maharastra | 12000 | 12000 | 12821 | 13371 | **106.8** | **111.4** | **4.3** |
| | BPCL, Kochi, Kerala | 9500 | 9500 | 10356 | 10712 | **109.0** | **112.8** | **3.4** |
| **III** | **HPCL RFINERIES** | **14800** | **14800** | **16178** | **17234** | **109.3** | **116.4** | **6.5** |
| | HPCL, Mumbai, Maharastra | 6500 | 6500 | 7408 | 8013 | **114.0** | **123.3** | **8.2** |
| | HPCL, Visakh, Andhra Pradesh | 8300 | 8300 | 8770 | 9220 | **105.7** | **111.1** | **5.1** |
| **IV** | **CPCL RFINERIES** | **11500** | **11500** | **10782** | **9644** | **93.8** | **83.9** | **-10.6** |
| | CPCL, Manali, Tamil Nadu | 10500 | 10500 | 10251 | 9100 | **97.6** | **86.7** | **-11.2** |
| | CPCL, Narimanam, Tamil Nadu | 1000 | 1000 | 531 | 544 | **53.1** | **54.4** | **2.4** |
| **V** | **NRL, Numaligarh, Assam** | **3000** | **3000** | **2777** | **2520** | **92.6** | **84.0** | **-9.3** |
| **VI** | **MRPL, Mangalore, Karanataka** | **15000** | **15000** | **14632** | **15532** | **97.5** | **103.5** | **6.2** |
| **VII** | **ONGC, Tatipaka, Andhra Pradesh** | **66** | **66** | **51** | **67** | **77.3** | **101.5** | **31.4** |
| **B** | **Private Sector Refineries** | **80000** | **80000** | **88533** | **88662** | **110.7** | **110.8** | **0.1** |
| **I** | **RIL RFINERIES** | **60000** | **60000** | **68042** | **69561** | **113.4** | **115.9** | **2.2** |
| | RIL, DTA,Jamnagar, Gujarat | 30000 | 30000 | 30867 | 32428 | **102.9** | **108.1** | **5.1** |
| | RIL(SEZ), Jamnagar, Gujarat | 27000 | 27000 | 37174 | 37133 | **137.7** | **137.5** | **-0.1** |
| II | Essar Oil Ltd.(EOL), Vadinar | 20000 | 20000 | 20491 | 19101 | **102.5** | **95.5** | **-6.8** |
| **C** | **JOINT VENTURE** | **15000** | **15000** | **13527** | **17115** | **90.2** | **114.1** | **26.5** |
| **I** | **BORL,Bina*** ** | **6000** | **6000** | **6209** | **6402** | **103.5** | **106.7** | **3.1** |
| **II** | **HMEL,Bathinda**** | **9000** | **9000** | **7318** | **10713** | **81.3** | **119.0** | **46.4** |
| | **Total (A+B+C)** | **215066** | **230066** | **223242** | **232865** | **103.8** | **101.2** | **-2.5** |

***** 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 (^:Revised)

Source: Ministry of Petroleum and Natural Gas

# Table 2.3 : Trends in Installed Generating Capacity of Electricity in Utilities and Non-utilities in India from 2006-07 to 2015-16

**(in Mega Watt = $10^3$ Kilo Watt )**

| As on | Utilities | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Thermal | | | | Hydro | Nuclear | ORS | Total |
| | Steam | Diesel | Gas | Total | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 31.03.2007 | 71,121 | 13,692 | 1,202 | 86,015 | 34,654 | 3,900 | 7,761 | 1,32,329 |
| 31.03.2008 | 76,019 | 14,686 | 1,202 | 91,907 | 35,909 | 4,120 | 11,125 | 1,43,061 |
| 31.03.2009 | 77,649 | 14,877 | 1,200 | 93,725 | 36,878 | 4,120 | 13,242 | 1,47,966 |
| 31.03.2010 | 84,198 | 17,056 | 1,200 | 1,02,454 | 36,863 | 4,560 | 15,521 | 1,59,398 |
| 31.03.2011 | 93,918 | 17,706 | 1,200 | 1,12,824 | 37,567 | 4,780 | 18,455 | 1,73,626 |
| 31.03.2012 | 1,12,022 | 18,381 | 1,200 | 1,31,603 | 38,990 | 4,780 | 24,503 | 1,99,877 |
| 31.03.2013 | 1,30,221 | 20,110 | 1,200 | 1,51,530 | 39,491 | 4,780 | 27,542 | 2,23,344 |
| 31.03.2014 | 1,45,273 | 21,782 | 1,200 | 1,68,255 | 40,531 | 4,780 | 31,692 | 2,45,259 |
| 31.03.2015 | 1,64,636 | 23,062 | 1,200 | 1,88,898 | 41,268 | 5,780 | 35,777 | 2,71,723 |
| 31.03.2016 | 1,85,173 | 24,509 | 994 | 2,10,675 | 42,783 | 5,780 | 42,849 | 3,02,088 |
| **Growth rate of 2015-16 over 2014-15(%)** | **12.47** | **6.27** | **-17.19** | **11.53** | **3.67** | **0.00** | **19.77** | **11.18** |
| **CAGR 2006-07 to 2015-16(%)** | **10.04** | **6.00** | **-1.88** | **9.37** | **2.13** | **4.01** | **18.63** | **8.60** |

* 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.

# Table 2.3 (conti) : Trends in Installed Generating Capacity of Electricity in Utilities and Non-utilities in India from 2006-07 to 2015-16

**(in Mega Watt = $10^3$ 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 |
| 31.03.2007 | 11,398 | 7,723 | 2,976 | 22,097 | 61 | 178 | 22,335 | 1,54,664 |
| 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 | 2,87,516 |
| 31.03.2015 | 26,089 | 12,009 | 5,193 | 43,291 | 65 | 1,301 | 44,657 | 3,16,380 |
| 31.03.2016 | 28,688 | 12,347 | 5,819 | 46,853 | 59 | 1,368 | 48,279 | 3,50,367 |
| **Growth rate of 2015-16 over 2014-15(%)** | **9.96** | **2.81** | **12.04** | **8.23** | **-9.22** | **5.13** | **8.11** | **10.74** |
| **CAGR 2006-07 to 2015-16(%)** | **9.67** | **4.80** | **6.93** | **7.81** | **-0.24** | **22.64** | **8.01** | **8.52** |

* 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.

## Table 2.4 : Regionwise and Statewise Installed Generating Capacity of Electricity (Utilities) in India as on 31.03.2015 and 31.03.2016

(in GWh)

| States/UTs | Hydro | | Thermal | | Nuclear | | RES | | Total | | % Growth (2014-15 to 2015-16) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 31.03.15 | 31.03.16 | 31.03.15 | 31.03.16 | 31.03.15 | 31.03.16 | 31.03.15 | 31.03.16 | 31.03.15 | 31.03.16 | |
| Delhi | 0.00 | 0.00 | 2.29 | 2.74 | 0.00 | 0.00 | 0.02 | 0.03 | 2.31 | 2.77 | **19.71** |
| Haryana | 0.88 | 0.88 | 4.91 | 5.35 | 0.00 | 0.00 | 0.14 | 0.13 | 5.93 | 6.37 | **7.32** |
| Himachal Pradash | 2.14 | 2.14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.72 | 0.79 | 2.86 | 2.94 | **2.57** |
| Jammu & Kashmir | 0.78 | 1.23 | 0.18 | 0.18 | 0.00 | 0.00 | 0.16 | 0.16 | 1.12 | 1.56 | **39.02** |
| Punjab | 2.23 | 2.23 | 5.22 | 7.67 | 0.00 | 0.00 | 0.49 | 0.74 | 7.94 | 10.64 | **34.01** |
| Rajasthan | 0.99 | 0.99 | 8.12 | 8.99 | 0.00 | 0.00 | 4.39 | 5.40 | 13.50 | 15.37 | **13.90** |
| Uttar Pradesh | 0.52 | 0.52 | 7.77 | 11.25 | 0.00 | 0.00 | 0.99 | 1.04 | 9.29 | 12.82 | **37.99** |
| Uttrakhand | 1.65 | 1.98 | 0.00 | 0.10 | 0.00 | 0.00 | 0.24 | 0.33 | 1.89 | 2.41 | **27.24** |
| Chandigarh | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.01 | - |
| Central Sector NR | 7.87 | 8.27 | 13.11 | 13.11 | 1.62 | 1.62 | 0.00 | 0.00 | 22.60 | 23.00 | **1.75** |
| Sub-Total (NR) | 17.07 | 18.25 | 41.61 | 49.38 | 1.62 | 1.62 | 7.15 | 8.63 | 67.45 | 77.88 | **15.45** |
| Chhatisgarh | 0.12 | 0.12 | 11.10 | 13.41 | 0.00 | 0.00 | 0.32 | 0.43 | 11.54 | 13.95 | **20.87** |
| Goa | 0.00 | 0.00 | 0.05 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 | 0.05 | **0.00** |
| Gujarat | 0.77 | 0.77 | 19.84 | 19.99 | 0.00 | 0.00 | 4.72 | 5.23 | 25.33 | 26.00 | **2.62** |
| Madhya Pradesh | 1.70 | 1.70 | 10.62 | 9.83 | 0.00 | 0.00 | 1.56 | 3.04 | 13.88 | 14.58 | **4.99** |
| Maharashtra | 3.33 | 3.33 | 22.21 | 23.62 | 0.00 | 0.00 | 6.19 | 6.61 | 31.73 | 33.56 | **5.77** |
| Central Sector WR | 1.52 | 1.52 | 14.87 | 16.03 | 1.84 | 1.84 | 0.00 | 0.00 | 18.23 | 19.39 | **6.38** |
| Sub-Total (WR) | 7.45 | 7.45 | 78.69 | 82.93 | 1.84 | 1.84 | 12.79 | 15.31 | 100.77 | 107.53 | **6.71** |
| Andhra Pradesh | 1.24 | 1.76 | 9.37 | 9.28 | 0.00 | 0.00 | 1.95 | 2.68 | 12.57 | 13.71 | **9.07** |
| Telangana | 2.50 | 2.14 | 2.28 | 6.79 | - | 0.00 | 0.06 | 0.61 | 4.84 | 9.54 | **97.01** |
| Karnataka | 3.60 | 3.60 | 5.01 | 6.51 | 0.00 | 0.00 | 4.51 | 5.11 | 13.12 | 15.22 | **15.97** |
| Kerala | 1.88 | 1.88 | 0.43 | 0.41 | 0.00 | 0.00 | 0.20 | 0.26 | 2.51 | 2.55 | **1.34** |
| Lakshadweep | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | **-93.00** |
| Puducherry | 0.00 | 0.00 | 0.03 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 | 0.03 | **0.00** |
| Tamil Nadu | 2.18 | 2.18 | 7.36 | 8.56 | 0.00 | 0.00 | 8.40 | 9.51 | 17.94 | 20.25 | **12.88** |
| Central Sector SR # | 0.00 | 0.00 | 9.95 | 10.45 | 2.32 | 2.32 | 0.00 | 0.00 | 12.27 | 12.77 | **4.07** |
| Sub-Total (SR) | 11.40 | 11.56 | 34.46 | 42.03 | 2.32 | 2.32 | 15.12 | 18.15 | 63.29 | 74.07 | **17.03** |
| A & N Island | 0.00 | 0.00 | 0.06 | 0.04 | 0.00 | 0.00 | 0.01 | 0.01 | 0.07 | 0.05 | **-28.41** |
| Bihar | 0.00 | 0.00 | 0.21 | 0.21 | 0.00 | 0.00 | 0.11 | 0.12 | 0.32 | 0.33 | **1.57** |
| Jharkhand | 0.13 | 0.13 | 2.09 | 2.09 | 0.00 | 0.00 | 0.02 | 0.02 | 2.24 | 2.24 | **0.01** |
| Odisha | 2.06 | 2.06 | 5.07 | 5.42 | 0.00 | 0.00 | 0.12 | 0.15 | 7.25 | 7.63 | **5.33** |
| Sikkim | 0.10 | 0.20 | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 | 0.05 | 0.16 | 0.25 | **58.29** |
| West Bengal | 0.98 | 0.98 | 7.27 | 7.60 | 0.00 | 0.00 | 0.13 | 0.13 | 8.38 | 8.71 | **3.96** |
| DVC | 0.14 | 0.14 | 7.94 | 9.04 | 0.00 | 0.00 | 0.00 | 0.00 | 8.08 | 9.18 | **13.61** |
| Central Sector ER | 0.70 | 0.78 | 9.64 | 9.89 | 0.00 | 0.00 | 0.00 | 0.00 | 10.34 | 10.67 | **3.19** |
| Sub-Total (ER) | 4.11 | 4.29 | 32.28 | 34.29 | 0.00 | 0.00 | 0.44 | 0.49 | 36.84 | 39.06 | **6.03** |
| Arunachal Prd. | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 | 0.10 | 0.10 | 0.12 | 0.10 | **-12.46** |
| Assam | 0.10 | 0.10 | 0.38 | 0.36 | 0.00 | 0.00 | 0.03 | 0.03 | 0.52 | 0.49 | **-4.01** |
| Manipur | 0.00 | 0.00 | 0.05 | 0.04 | 0.00 | 0.00 | 0.01 | 0.01 | 0.05 | 0.04 | **-18.50** |
| Meghalaya | 0.28 | 0.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 | 0.03 | 0.32 | 0.31 | **-0.65** |
| Mizoram | 0.00 | 0.00 | 0.05 | 0.00 | 0.00 | 0.00 | 0.04 | 0.04 | 0.09 | 0.04 | **-59.37** |
| Nagaland | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 | 0.03 | 0.02 | 0.03 | **70.29** |
| Tripura | 0.00 | 0.00 | 0.17 | 0.17 | 0.00 | 0.00 | 0.02 | 0.02 | 0.19 | 0.19 | **0.08** |
| Central Sector NER | 0.86 | 0.86 | 1.19 | 1.48 | 0.00 | 0.00 | 0.00 | 0.00 | 2.05 | 2.34 | **14.05** |
| Sub-Total (NER) | 1.24 | 1.24 | 1.87 | 2.04 | 0.00 | 0.00 | 0.26 | 0.26 | 3.36 | 3.55 | **5.61** |
| **Total States** | **30.32** | **31.36** | **140.13** | **159.72** | **0.00** | **0.00** | **35.77** | **42.85** | **206.23** | **233.92** | **13.43** |
| **Total Central** | **10.95** | **11.43** | **48.76** | **50.96** | **5.78** | **5.78** | **0.00** | **0.00** | **65.49** | **68.16** | **4.08** |
| **Total All India** | **41.28** | **42.78** | **188.89** | **210.68** | **5.78** | **5.78** | **35.77** | **42.85** | **271.72** | **302.08** | **11.18** |

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.

## Table 2.5:Statewise and Sourcewise Installed Capacity of Grid Interactive Renewable Power as on 31.03.2015 and 30.03.2016

(In MW)

| States/ UTs | Bio-Power | | | | | |
|---|---|---|---|---|---|---|
| | Biomass Power | | Waste to Energy | | Wind Power | |
| | 31.03.15 | 31.03.16 | 31.03.15 | 31.03.16 | 31.03.15 | 31.03.16 |
| Andhra Pradesh | 389.75 | 380.75 | 58.16 | 58.16 | 1032.00 | 1431.45 |
| Arunachal Pradesh | - | - | - | - | - | - |
| Assam | - | - | - | - | - | - |
| Bihar | 43.42 | 43.42 | - | - | - | - |
| Chhattisgarh | 264.90 | 279.90 | - | - | - | - |
| Goa | - | - | - | - | - | - |
| Gujarat | 55.90 | 56.30 | - | - | 3645.00 | 4037.50 |
| Haryana | 52.30 | 45.30 | - | - | - | - |
| Himachal Pradesh | - | - | - | - | - | - |
| Jammu & Kashmir | - | - | - | - | - | - |
| Jharkhand | - | - | - | - | - | - |
| Karnataka | 664.28 | 872.18 | 1.00 | 1.00 | 2638.00 | 2869.15 |
| Kerala | - | - | | - | 35.00 | 43.50 |
| Madhya Pradesh | 36.00 | 35.00 | 3.90 | 3.90 | 880.00 | 2141.10 |
| Maharashtra | 1033.40 | 1220.78 | 12.72 | 12.72 | 4446.00 | 4654.15 |
| Manipur | - | - | - | - | - | - |
| Meghalaya | - | - | - | - | - | - |
| Mizoram | - | - | - | - | - | - |
| Nagaland | - | - | - | - | - | - |
| Odisha | 20.00 | 20.00 | - | - | - | - |
| Punjab | 140.50 | 155.50 | 10.25 | 10.25 | - | - |
| Rajasthan | 111.30 | 108.30 | - | - | 3309.00 | 3993.95 |
| Sikkim | - | - | - | - | - | - |
| Tamil Nadu | 662.30 | 641.90 | 8.05 | 8.05 | 7455.00 | 7613.86 |
| Telangana | - | - | | - | | 77.70 |
| Tripura | - | - | | - | - | - |
| Uttar Pradesh | 888.50 | 870.00 | 5.00 | 5.00 | - | - |
| Uttarakhand | 30.00 | 76.00 | - | - | - | - |
| West Bengal | 26.00 | 26.00 | - | - | - | - |
| Andaman & Nicobar | - | - | - | - | - | - |
| Chandigarh | - | - | - | - | - | - |
| Dadar & Nagar Haveli | - | - | - | - | - | - |
| Daman & Diu | - | - | - | - | - | - |
| Delhi | - | - | 16.00 | 16.00 | - | - |
| Lakshadweep | - | - | - | - | - | - |
| Puducherry | - | - | - | - | - | - |
| Others | - | - | - | - | 4.00 | 4.30 |
| **All India Total** | **4418.55** | **4831.33** | **115.08** | **115.08** | **23444.00** | **26866.66** |
| **Distribution (%)** | **12.35** | **11.46** | **0.27** | **0.27** | **65.53** | **62.70** |

- Denotes non availability or indeterminant value

Source: Ministry of New and Renewable Energy

## Table 2.5 (contd):Statewise and Sourcewise Installed Capacity of Grid Interactive Renewable Power as on 31.03.2015 and 30.03.2016

(In MW)

| States/ UTs | Small Hydro Power | | Solar Power | | Total | | Growth* Rate(2014-15 to 2015-16) |
|---|---|---|---|---|---|---|---|
| | 31.03.15 | 31.03.16 | 31.03.15 | 31.03.16 | 31.03.15 | 31.03.16 | |
| Andhra Pradesh | 223.23 | 232.98 | 242.86 | 572.96 | 1946.00 | 2676.30 | **37.53** |
| Arunachal Pradesh | 104.61 | 104.61 | 0.03 | 0.27 | 104.63 | 104.87 | **0.23** |
| Assam | 34.11 | 34.11 | - | - | 34.11 | 34.11 | **0.00** |
| Bihar | 70.70 | 70.70 | - | 5.10 | 114.12 | 119.22 | **4.47** |
| Chhattisgarh | 52.00 | 52.00 | 7.60 | 93.58 | 324.50 | 425.48 | **31.12** |
| Goa | 0.05 | 0.05 | - | 0.00 | 0.05 | 0.05 | **0.00** |
| Gujarat | 16.60 | 16.60 | 1000.05 | 1119.17 | 4717.55 | 5229.57 | **10.85** |
| Haryana | 71.50 | 73.50 | 12.80 | 15.39 | 136.60 | 134.19 | **-1.77** |
| Himachal Pradesh | 723.91 | 793.31 | - | 0.20 | 723.91 | 793.51 | **9.61** |
| Jammu & Kashmir | 156.53 | 156.53 | - | 1.00 | 156.53 | 157.53 | **0.64** |
| Jharkhand | 4.05 | 4.05 | 16.00 | 16.19 | 20.05 | 20.24 | **0.93** |
| Karnataka | 1129.73 | 1217.73 | 77.22 | 145.46 | 4510.23 | 5105.52 | **13.20** |
| Kerala | 168.92 | 198.92 | 0.03 | 13.05 | 203.95 | 255.47 | **25.26** |
| Madhya Pradesh | 86.16 | 86.16 | 558.58 | 776.37 | 1564.64 | 3042.53 | **94.46** |
| Maharashtra | 335.43 | 339.88 | 360.75 | 385.76 | 6188.30 | 6613.28 | **6.87** |
| Manipur | 5.45 | 5.45 | - | - | 5.45 | 5.45 | **0.00** |
| Meghalaya | 31.03 | 31.03 | - | - | 31.03 | 31.03 | **0.00** |
| Mizoram | 36.47 | 36.47 | - | 0.10 | 36.47 | 36.57 | **0.27** |
| Nagaland | 29.67 | 30.67 | - | - | 29.67 | 30.67 | **3.37** |
| Odisha | 64.63 | 64.63 | 31.76 | 66.92 | 116.39 | 151.55 | **30.21** |
| Punjab | 157.40 | 170.90 | 185.27 | 405.06 | 493.42 | 741.71 | **50.32** |
| Rajasthan | 23.85 | 23.85 | 942.10 | 1269.93 | 4386.25 | 5396.03 | **23.02** |
| Sikkim | 52.11 | 52.11 | - | - | 52.11 | 52.11 | **0.00** |
| Tamil Nadu | 123.05 | 123.05 | 142.58 | 1061.82 | 8390.98 | 9448.68 | **12.61** |
| Telangana | - | - | 61.25 | 527.84 | 61.25 | 605.54 | **888.64** |
| Tripura | 16.01 | 16.01 | 5.00 | 5.00 | 21.01 | 21.01 | **0.00** |
| Uttar Pradesh | 25.10 | 25.10 | 71.26 | 143.50 | 989.86 | 1043.60 | **5.43** |
| Uttaranchal | 209.32 | 209.33 | 5.00 | 41.15 | 244.32 | 326.48 | **33.63** |
| West Bengal | 98.50 | 98.50 | 7.21 | 7.77 | 131.71 | 132.27 | **0.43** |
| Andaman & Nicobar | 5.25 | 5.25 | 5.10 | 5.10 | 10.35 | 10.35 | **0.00** |
| Chandigarh | - | - | 4.50 | 6.81 | 4.50 | 6.81 | **51.24** |
| Daman & Diu | - | - | - | 4.00 | 0.00 | 4.00 | - |
| Delhi | - | - | 5.47 | 14.28 | 21.47 | 30.28 | **41.07** |
| Lakshadweep | - | - | 0.75 | 0.75 | 0.75 | 0.75 | **0.00** |
| Puducherry | - | - | 0.03 | 0.03 | 0.03 | 0.03 | **0.00** |
| Others | - | - | 0.79 | 58.31 | 4.79 | 62.61 | **1207.12** |
| **All India Total** | **4055.37** | **4273.48** | **3743.99** | **6762.87** | **35776.96** | **42849.38** | **19.77** |
| **Distribution (%)** | **11.34** | **9.97** | **10.46** | **15.78** | **100.00** | **100.00** | |

- Denotes non availability or indeterminant value

Source: Ministry of New and Renewable Energy

## Table 2.6 : Installation of Off-grid / Decentralised Renewable Energy Systems/ Devices as on 31.03.2016

(Nos. in lakhs)

| Sl. No. | State/UT | Biogas Plants | Water Pumping/ Wind Mills # | SPV Pumps | Solar Photovoltaic (SPV) Systems | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | SLS | HLS | SL | PP |
| | | (Nos.) | (Nos.) | (Nos.) | (Nos.) | (Nos.) | (Nos.) | (KWP) |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 1 | Andhra Pradesh | 5.32 | 6.0 | 615 | 0.1 | 0.2 | 0.5 | 3632.6 |
| 2 | Arunachal Pradesh | 0.03 | 0.0 | 18 | 0.0 | 0.2 | 0.1 | 600.1 |
| 3 | Assam | 1.14 | 3.0 | 45 | 0.0 | 0.1 | 0.0 | 1605.0 |
| 4 | Bihar | 1.30 | 46.0 | 1,666 | 0.0 | 0.1 | 0.5 | 1021.6 |
| 5 | Chhattisgarh | 0.51 | 1.0 | 435 | 0.0 | 0.1 | 0.0 | 22898.7 |
| 6 | Goa | 0.04 | 0.0 | 15 | 0.0 | 0.0 | 0.0 | 32.7 |
| 7 | Gujarat | 4.30 | 945.0 | 268 | 0.0 | 0.1 | 0.3 | 13576.6 |
| 8 | Haryana | 0.61 | 0.0 | 543 | 0.2 | 0.6 | 0.9 | 2321.3 |
| 9 | Himachal Pradesh | 0.47 | 0.0 | 6 | 0.3 | 0.2 | 0.4 | 1512.5 |
| 10 | Jammu & Kashmir | 0.03 | 0.0 | 39 | 0.1 | 0.7 | 0.5 | 7561.9 |
| 11 | Jharkhand | 0.07 | 0.0 | - | 0.0 | 0.1 | 0.2 | 3539.9 |
| 12 | Karnataka | 4.79 | 28.0 | 551 | 0.0 | 0.5 | 0.1 | 4676.4 |
| 13 | Kerala | 1.44 | 79.0 | 810 | 0.0 | 0.4 | 0.5 | 3894.4 |
| 14 | Madhya Pradesh | 3.54 | 0.0 | 87 | 0.1 | 0.0 | 0.1 | 2726.0 |
| 15 | Maharashtra | 8.71 | 26.0 | 251 | 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 | 0.0 | 0.1 | 0.1 | 1185.0 |
| 19 | Nagaland | 0.08 | - | 3 | 0.0 | 0.0 | 0.1 | 1292.0 |
| 20 | Odisha | 2.66 | - | 57 | 0.1 | 0.1 | 0.1 | 567.5 |
| 21 | Punjab | 1.72 | - | 1,857 | 0.1 | 0.1 | 0.2 | 1202.0 |
| 22 | Rajasthan | 0.70 | 222.0 | 27,323 | 0.1 | 1.4 | 0.0 | 15540.0 |
| 23 | Sikkim | 0.09 | - | - | 0.0 | 0.2 | 0.2 | 795.0 |
| 24 | Tamil Nadu | 2.22 | 60.0 | 1,245 | 0.4 | 1.3 | 0.2 | 7297.6 |
| 25 | Telangana | 0.10 | | - | - | - | - | 1833.0 |
| 26 | Tripura | 0.03 | - | 155 | 0.0 | 0.3 | 0.6 | 369.0 |
| 27 | Uttar Pradesh | 4.39 | - | 1,516 | 1.8 | 2.4 | 0.6 | 6263.5 |
| 28 | Uttarakhand | 0.18 | - | 26 | 0.2 | 0.9 | 0.9 | 628.0 |
| 29 | West Bengal | 3.67 | - | 48 | 0.1 | 1.5 | 0.2 | 1126.0 |
| 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 | 1090.0 |
| 36 | Puducherry | 0.01 | - | 21 | 0.0 | 0.0 | 0.0 | 40.0 |
| 37 | Others* | - | - | - | 0.1 | 1.3 | 1.3 | 23885.0 |
| | **Total** | **48.35** | **1,418.08** | **37,803.00** | **3.96** | **12.86** | **10.01** | **1,40,862.44** |

# 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(contd..) : Installation of Off-grid / Decentralised Renewable Energy Systems/ Devices as on 31.03.2016

| 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 | 16.00 | 23.15 | 22914 | 99.0 | 23.01 | 16,158 | 100.0 |
| 2 | Arunachal Pradesh | 6.80 | 0.03 | 750 | - | - | 3,854 | 73.3 |
| 3 | Assam | 6.00 | - | 2,933 | - | - | 23,422 | 92.3 |
| 4 | Bihar | - | - | 11688 | 8.2 | 1.00 | 38,080 | 97.5 |
| 5 | Chhattisgarh | - | 4.00 | 1210 | 2.5 | 0.33 | 18,892 | 96.6 |
| 6 | Goa | 193.80 | 1.69 | - | - | - | 320 | 100.0 |
| 7 | Gujarat | 20.00 | 824.09 | 21530 | - | 15.83 | 17,843 | 100.0 |
| 8 | Haryana | 10.00 | 7.80 | 5423 | 77.1 | 4.00 | 6,642 | 100.0 |
| 9 | Himachal Pradesh | - | - | - | 7.2 | 1.00 | 17,848 | 99.8 |
| 10 | Jammu & Kashmir | 46.40 | - | 200 | - | - | 6,230 | 98.3 |
| 11 | Jharkhand | - | 16.00 | 500 | 4.3 | - | 27,717 | 94.0 |
| 12 | Karnataka | 39.20 | 14.00 | 7447 | 15.2 | 9.63 | 27,358 | 99.9 |
| 13 | Kerala | 8.00 | 0.03 | - | 0.7 | - | 1,017 | 100.0 |
| 14 | Madhya Pradesh | 24.00 | 11.75 | 11618 | 12.4 | 0.47 | 51,674 | 99.5 |
| 15 | Maharashtra | 1613.60 | 34.50 | 7,150 | 16.4 | 22.05 | 40,956 | 100.0 |
| 16 | Manipur | 140.00 | - | - | - | - | 2,178 | 91.6 |
| 17 | Meghalaya | 191.50 | - | 250 | 13.8 | - | 4,458 | 85.9 |
| 18 | Mizoram | - | - | 250 | - | - | 662 | 94.0 |
| 19 | Nagaland | 20.00 | - | 2,100 | - | - | 1,318 | 94.1 |
| 20 | Odisha | 13.10 | 13.00 | 270 | 8.2 | 0.02 | 45,452 | 95.3 |
| 21 | Punjab | 50.00 | 9.33 | - | 123.1 | 7.98 | 12,168 | 100.0 |
| 22 | Rajasthan | 14.00 | 222.90 | 3088 | 2.0 | 3.70 | 42,944 | 99.3 |
| 23 | Sikkim | 15.50 | - | - | - | - | 425 | 100.0 |
| 24 | Tamil Nadu | 157.90 | 17.06 | 16262 | 24.1 | 13.10 | 15,049 | 100.0 |
| 25 | Telangana | - | | - | - | - | 846 | 98.0 |
| 26 | Tripura | 2.00 | - | 1050 | - | - | 10,128 | 100.0 |
| 27 | Uttar Pradesh | - | 12.38 | 35852 | 170.4 | 46.18 | 97,589 | 99.8 |
| 28 | Uttarakhand | 24.00 | 5.05 | 2,150 | 47.5 | 5.02 | 15,669 | 99.5 |
| 29 | West Bengal | 74.00 | 2.00 | 36368 | 19.9 | 1.16 | 37,449 | 100.0 |
| 30 | Andaman & Nicobar | - | - | - | - | - | 341 | 86.1 |
| 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 | - | - | 250 | - | - | 6 | 100.0 |
| 36 | Puducherry | 5.00 | - | - | - | - | 90 | 100.0 |
| 37 | Others* | - | - | - | - | - | - | - |
| | **Total** | **2690.80** | **1221.26** | **191253** | **651.9** | **154.48** | **586065** | **98.1** |

# 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 : 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 2015-16 was 639.23 million tonne (MTs) as compared to 609.18 MTs during 2014-15, registering a growth of 4.93% (Table 3.1).

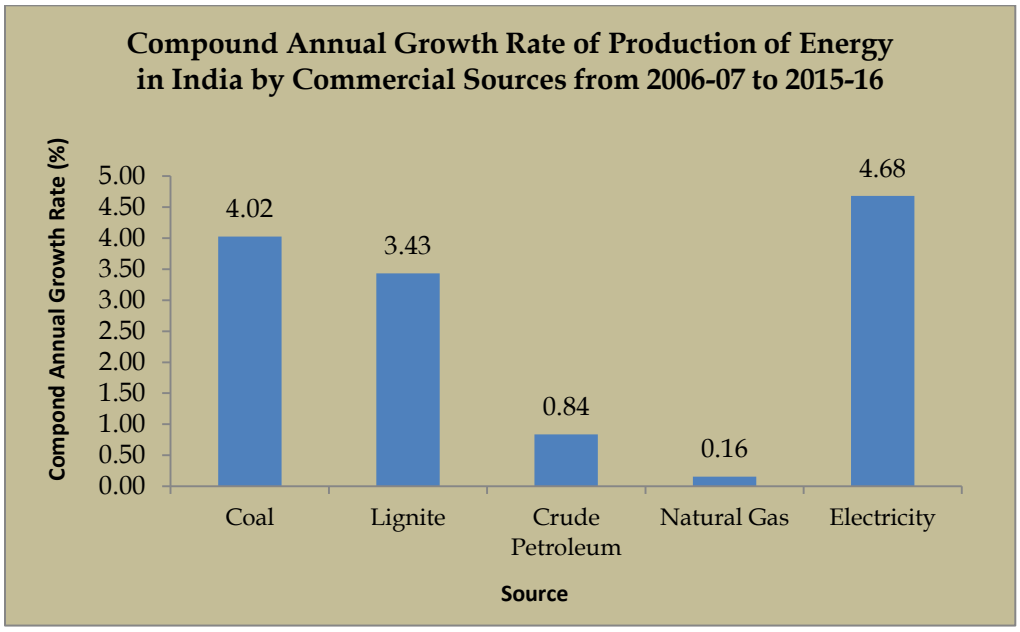
- The Lignite production during 2015-16 was 43.84 million tonnes which is 9.18% lower than the production during 2014-15 (48.27 million tonnes).

- Considering the trend of production from 2006-07 to 2015-16, it is observed that coal production in India was about 430.83 MTs during 2006-07, which increased to 639.23 MTs during 2015-16 with a CAGR of 4.02%.

- During the same period, the CAGR of Lignite was about 3.43% with production increasing from 31.29 MTs in 2006-07 to 43.84 MTs in 2015-16.

- Production of crude petroleum increased from 33.99 MTs during 2006-07 to 36.95 MTs during 2015-16, a CAGR of about 0.84%.

- The CAGRs for natural gas and electricity were 0.16% and 4.68% respectively for the period 2006-07 to 2015-16. Electricity has experienced the highest CAGR i.e. 4.68% among all the commercial sources of energy since 2006-07 to 2015-16.

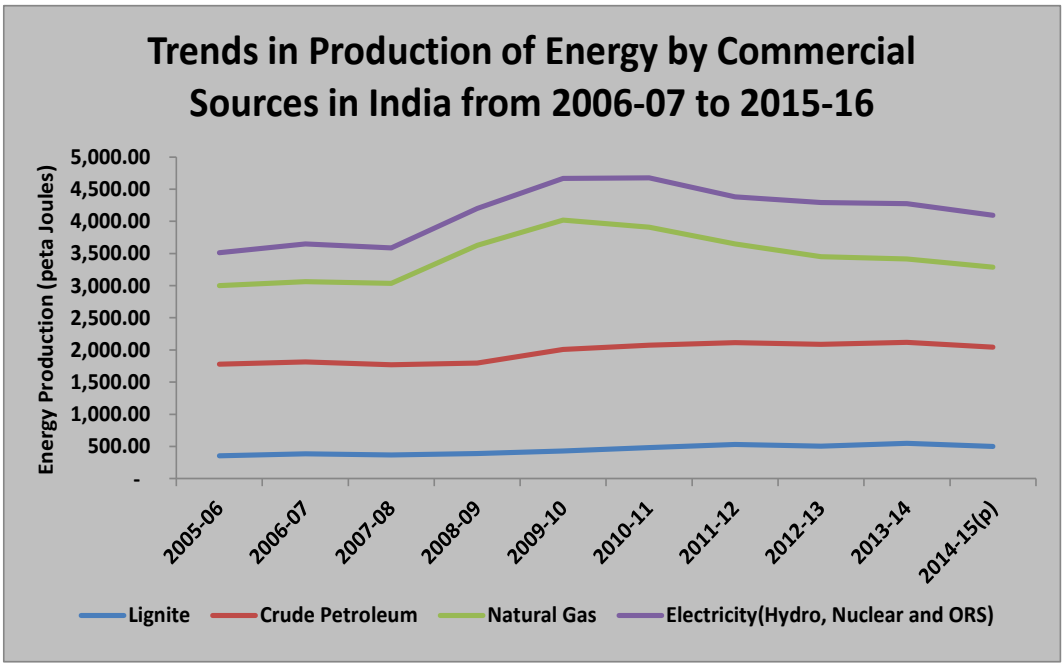



- For more meaningful comparison in the trends and patterns of growth of different energy resources, it is desirable to convert all the resources to their energy

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 decreased from 14090.50 peta joules during 2014-15 to 13767.83 peta joules during 2015-16, showing a decrease of 2.29 % (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 70.25% of the total production during 2015-16. Crude Petroleum was the second (11.24%), while Natural Gas (9.02%) was the third major source. Electricity and lignite contributed 5.87% and 3.62% respectively.



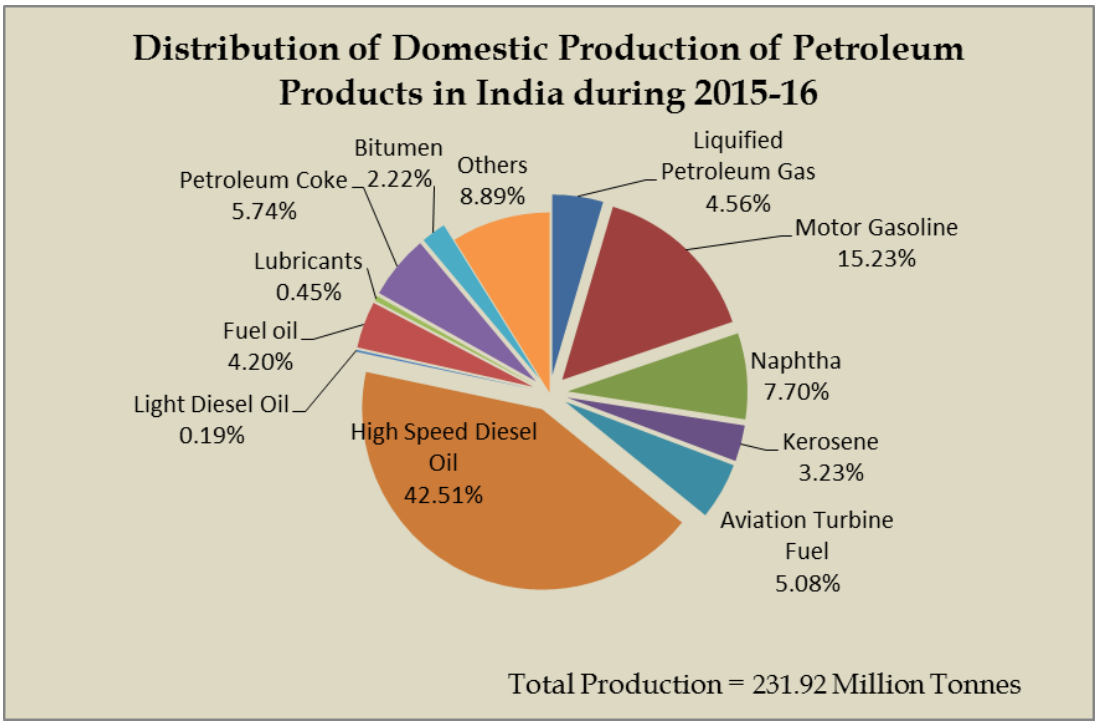

- Out of the total coking coal production of 60.89 MT in the country, 89.78% is produced by public sector, whereas for the private sector, the share of production is 10.22%. A similar pattern is observed for the production of non-coking coal in the country, where the public sector contributes a significant 95.45% (552.02 MTs) of the total production (578.35) and the private sector producing only 4.55% of non-coking coal in the country (26.33 MTs).

### *3.2 Production of Petroleum Products and Natural Gas*

- In the year 2015-16, the production of Petroleum Products in the country was 231.92 MTs as against 221.13 during 2014-15, an increase of 4.88% (Table 3.4).

- In the total production of Petroleum products during 2015-16, High speed diesel oil accounted for the maximum share (42.51%), followed by Motor Gasoline (15.23%). (Table 3.4).

- Net production of Natural Gas decreased from 26.91 billion cubic meters (BCM) in 2014-15 to 25.46 BCM in 2015-16 registering a negative growth of 5.41% and a CAGR of -0.37 from 2006-07 to 2015-16 (Table 3.5).




### *3.3 Generation of electricity*

- The all India gross electricity generation from utilities, excluding that from the captive generating plants, was 6,70,654 Giga Watt-Hours (GWh) during 2006-07 (Table 3.6). It rose to 11,67,584 GWh during 2015-16.

- The production of electricity from utilities has increased from 11,16,850 GWh during 2014-15 to 11,67,584 GWh during 2015-16, registering an annual growth rate of about 4.54%.

- Total Electricity generation in the country, from utilities and non-utilities taken together during 2015-16 was 13,35,956 GWh. Out of the total electricity generated through utilities, 9,43,013 GWh was generated from thermal and 1,21,377 GWh was from hydro and 37,414 GWh was generated from nuclear sources. Total output from non-utilities was 1,68,372 GWh.

## 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 |
| 2006-07 | 430.83 | 31.29 | 33.99 | 31.75 | 1,42,163.75 |
| 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 | 39.83 | 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(P) | 639.23 | 43.84 | 36.95 | 32.25 | 2,24,571.11 |
| **Growth rate of 2015-16 over 2014-15(%)** | **4.93** | **-9.18** | **-1.36** | **-4.19** | **-6.00** |
| **CAGR 2006-07 to 2015-16(%)** | **4.02** | **3.43** | **0.84** | **0.16** | **4.68** |

(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

## 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 |
| 2006-07 | 6,518.49 | 355.71 | 1,423.08 | 1,222.89 | 511.79 | 10,031.96 |
| 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(p) | 9,671.55 | 498.46 | 1,547.10 | 1,242.27 | 808.46 | 13,767.83 |
| **Growth rate of 2015-16 over 2014-15(%)** | **4.93** | **-9.18** | **-1.36** | **-4.19** | **-6.00** | **-2.29** |
| **CAGR 2006-07 to 2015-16(%)** | **4.02** | **3.43** | **0.84** | **0.16** | **4.68** | **3.22** |

(P): provisional

* Electricity from hydro, Nuclear and other Renwable 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

# 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) |
| 2006-07 | 32.10 | 398.74 | 430.83 | 31.29 | 462.12 |
| 2007-08 | 34.46 | 422.63 | 457.08 | 33.98 | 491.06 |
| 2008-09 | 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(p) | 60.89 | 578.35 | 639.23 | 43.84 | 683.08 |
| **Growth rate of 2015-16 over 2014-15(%)** | **5.98** | **4.82** | **4.93** | **-9.17** | **3.90** |
| **CAGR 2006-07 to 2015-16(%)** | **6.61** | **3.79** | **4.02** | **3.43** | **3.99** |

(P): Provisional

Source : Ministry of Coal.Office of Coal Controller

# Table 3.3 A: Grade Wise Production of Coking Coal by Companies in 2014-15 & 2015-16

(Million Tonnes)

| Grade of Coking Coal | Public | | Private | | All India | | Percentage Change |
|---|---|---|---|---|---|---|---|
| | 2014-15 | 2015-16 | 2014-15 | 2015-16 | 2014-15 | 2015-16 | |
| **Steel-I** | 0.052 | 0.037 | 0 | 0 | 0.052 | 0.037 | -28.85 |
| **Steel-II** | 0.327 | 1.051 | 0 | 0 | 0.327 | 1.051 | 221.41 |
| **SC-1** | 0.132 | 0.135 | 0 | 0 | 0.132 | 0.135 | 2.27 |
| **Wash-I** | 0.102 | 0.414 | 0 | 0 | 0.102 | 0.414 | 305.88 |
| **Wash-II** | 1.452 | 2.36 | 0.242 | 0.134 | 1.694 | 2.494 | 47.23 |
| **Wash-III** | 10.897 | 11.919 | 1.038 | 1.049 | 11.935 | 12.968 | 8.66 |
| **Wash-IV** | 37.386 | 38.746 | 4.986 | 5.042 | 42.372 | 43.788 | 3.34 |
| **SLV1** | 0 | 0 | 0 | 0 | 0 | 0 | - |
| **Met.Coal** | 7.115 | 8.617 | 6.266 | 6.225 | 13.381 | 14.842 | 10.92 |
| **Non Met** | 43.233 | 45.642 | 0 | 0 | 43.233 | 45.642 | 5.57 |
| **Total Coking Coal** | **50.348** | **54.662** | **6.266** | **6.225** | **56.614** | **60.887** | **7.55** |

Source: Office of Coal Controller of India

# Table 3.3 B: Grade Wise Production of Non-Coking Coal by Companies in 2014-15 & 2015-16

(Million Tonnes)

| Grade of Non-Coking Coal | Public | | Private | | All India | | Percentage Change |
|---|---|---|---|---|---|---|---|
| | 2014-15 | 2015-16 | 2014-15 | 2015-16 | 2014-15 | 2015-16 | |
| 1 | 0.248 | 0.118 | 5.732 | 3.715 | 5.732 | 3.833 | -33.13 |
| 2 | 1.456 | 0.342 | 0 | 0 | 1.456 | 0.342 | -76.51 |
| 3 | 4.698 | 5.188 | 0 | 0 | 4.698 | 5.188 | 10.43 |
| 4 | 19.116 | 17.665 | 0 | 0 | 19.116 | 17.665 | -7.59 |
| 5 | 16.663 | 16.3 | 0 | 0 | 16.663 | 16.3 | -2.18 |
| 6 | 19.443 | 13.123 | 0.796 | 0 | 20.239 | 13.128 | -35.14 |
| 7 | 38.693 | 39.037 | 0.012 | 0 | 38.705 | 39.037 | 0.86 |
| 8 | 27.658 | 28.884 | 0.929 | 0.165 | 28.587 | 29.049 | 1.62 |
| 9 | 51.899 | 48.561 | 1.416 | 0.12 | 53.315 | 48.681 | -8.69 |
| 10 | 67.618 | 72.118 | 9.752 | 10.738 | 77.37 | 82.856 | 7.09 |
| 11 | 115.903 | 136.432 | 3.979 | 11.029 | 119.882 | 147.461 | 23.01 |
| 12 | 76.345 | 90.574 | 5.957 | 0.003 | 82.302 | 90.577 | 10.05 |
| 13 | 68.98 | 77.448 | 1.262 | 0.171 | 70.242 | 77.619 | 10.50 |
| 14 | 0.33 | 1.049 | 3.875 | 0.39 | 4.205 | 1.439 | -65.78 |
| 15 | 1.424 | 4.073 | 2.022 | 0 | 3.446 | 4.073 | 18.20 |
| 16 | 0 | 0.418 | 0.475 | 0 | 0.475 | 0.418 | -12.00 |
| 17 | 0.36 | 0.668 | 3.269 | 0 | 3.269 | 0.668 | -79.57 |
| UNG | 0.706 | 0.013 | 0 | 0 | 0.706 | 0.013 | -98.16 |
| Non-Coaking | 511.54 | 552.016 | 39.476 | 26.331 | 551.016 | 578.347 | 4.96 |

Source: Office of Coal Controller of India

# Table 3.4 : Trends in Domestic Production of Petroleum Products In India

(Million Tonnes)

| Year | Light distillates | | | Middle distillates | | | |
|---|---|---|---|---|---|---|---|
| | Liquified Petroleum Gas | Motor Gasoline | Naphtha$ | Kerosene | Aviation Turbine Fuel | High Speed Diesel Oil | Light Diesel Oil |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 2006-07 | 8.41 | 12.54 | 18.14 | 8.63 | 7.81 | 53.48 | 0.80 |
| 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 | 17.35 | 7.87 | 10.08 | 91.08 | 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(p) | 10.57 | 35.32 | 17.86 | 7.50 | 11.79 | 98.59 | 0.43 |
| **Growth rate of 2015-16 over 2014-15(%)** | **7.42** | **9.27** | **2.70** | **-0.78** | **6.22** | **4.41** | **20.11** |
| **CAGR 2006-07 to 2015-16(%)** | **2.31** | **10.91** | **-0.16** | **-1.40** | **4.21** | **6.31** | **-6.05** |

(p) : Provisional

Source : Ministry of Petroleum & Natural Gas.

# Table 3.4 (Contd.): Trends in 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 |
| 2006-07 | 15.70 | 0.83 | 3.78 | 3.89 | 5.75 | 139.75 |
| 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 | 19.45 | 217.74 |
| 2013-14 | 13.41 | 0.94 | 12.07 | 4.79 | 17.93 | 220.78 |
| 2014-15 | 11.92 | 0.95 | 12.45 | 4.63 | 18.19 | 221.13 |
| 2015-16(p) | 9.73 | 1.04 | 13.32 | 5.16 | 20.63 | 231.92 |
| **Growth rate of 2015-16 over 2014-15(% )** | **-18.37** | **9.94** | **6.99** | **11.45** | **13.38** | **4.88** |
| **CAGR 2006-07 to 2015-16(% )** | **-4.67** | **2.34** | **13.43** | **2.86** | **13.63** | **5.20** |

(P): Provisional

$: Includes other Light distillates from 2006-07

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

Source : Ministry of Petroleum & Natural Gas.

# Table 3.5 :Trends in Gross and Net Production of Natural Gas

**(in Billion Cubic Metres)**

| Year | Gross Production | Flared | Reinjected | Net Production # |
|---|---|---|---|---|
| 2006-07 | 31.75 | 0.96 | 4.37 | 26.42 |
| 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 | 46.04 |
| 2011-12 | 47.56 | 1.08 | 5.31 | 41.17 |
| 2012-13 | 40.68 | 0.90 | 5.43 | 34.35 |
| 2013-14 | 35.41 | 0.77 | 5.59 | 29.05 |
| 2014-15 | 33.66 | 0.87 | 5.87 | 26.91 |
| 2015-16(p) | 32.25 | 1.01 | 5.79 | 25.46 |
| **Growth rate of 2015-16 over 2014-15** | **-4.18** | **15.27** | **-1.43** | **-5.41** |
| **CAGR 2006-07 to 2015-16(% )** | **0.16** | **0.51** | **2.84** | **-0.37** |

(P) : Provisional

#: Net availability = Gross Production- Flared- Reinjected

Source: Ministry of Petroleum and Natural Gas

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

(Giga Watt hour=10^6 Kilo Watt hour)

| Year | Utilities | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Thermal | | | | Hydro | Nuclear | ORS | Total |
| | Steam | Diesel | Gas | Total | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 2006-07 | 4,61,794 | 2,539 | 64,157 | 5,28,490 | 1,13,502 | 18,802 | 9,860 | 6,70,654 |
| 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(P) | 8,95,340 | 551 | 47,122 | 9,43,013 | 1,21,377 | 37,414 | 65,781 | 11,67,584 |
| **Growth rate of 2015-16 over 2014-15(%)** | **7.19** | **-65.03** | **14.72** | **7.41** | **-6.09** | **3.63** | **-10.58** | **4.54** |
| **CAGR 2006-07 to 2015-16(%)** | **6.84** | **-14.17** | **-3.04** | **5.96** | **0.67** | **7.12** | **20.90** | **5.70** |

(P)-Provisional

Source : Central Electricity Authority.

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

(Giga Watt hour= 10^6 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 | |
| 2006-07 | 56,184 | 9,975 | 15,207 | 81,366 | 218 | 216 | 81,800 | 7,52,454 |
| 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(P) | 1,36,721 | 8,412 | 21,083 | 1,66,216 | 110 | 2,046 | 1,68,372 | 13,35,956 |
| **Growth rate of 2015-16 over 2014-15(%)** | **6.48** | **-13.45** | **-0.25** | **4.37** | **-23.92** | **-22.98** | **3.90** | **4.46** |
| **CAGR 2006-07 to 2015-16(%)** | **9.30** | **-1.69** | **3.32** | **7.40** | **-6.60** | **25.22** | **7.49** | **5.91** |

# CHAPTER 4: FOREIGN TRADE IN COMMERCIAL SOURCES OF ENERGY

## *4.1 Import and export of coal*

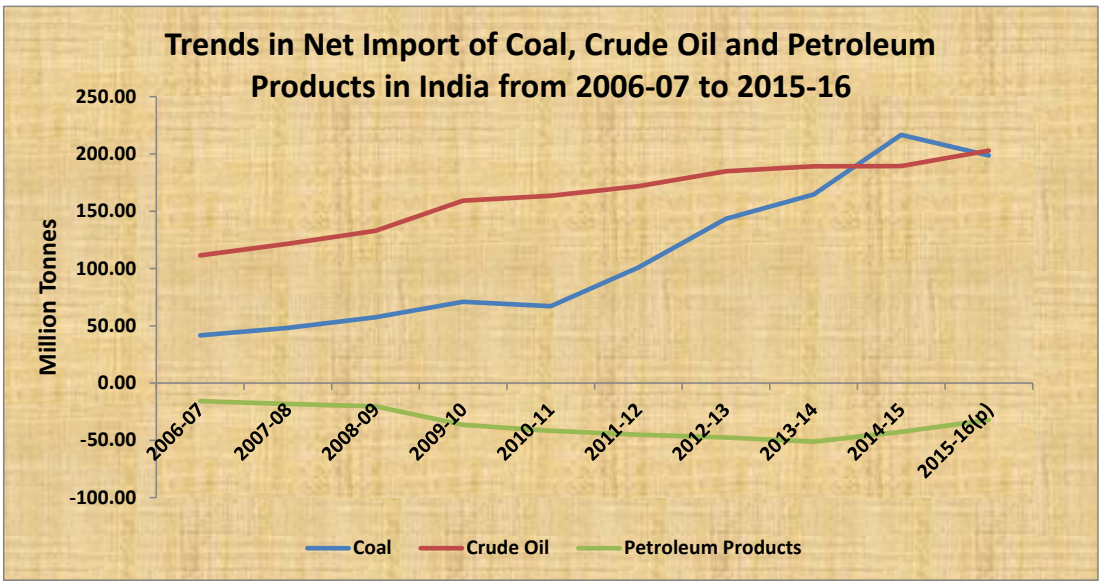
- The average quality of the Indian coal is not very high and this necessitates the import of high quality coal to meet the requirements of steel plants. There has been an increasing trend in the import of coal.

- Import of coal has steadily increased from 43.08 MTs during 2006-07 to 199.88 MTs during 2015-16 (Table 4.1). During this period, the quantum of coal exported increased from 1.55 MTs during 2006-07 to 2.45 MT during 2009-10 and then decreased to 1.25 MTs during 2015-16.

- The gross import decreased at 8.22% and net Import of coal decreased at 8.27% in 2015-16 over the previous year. However there was an increase of 0.81% 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 111.50 MTs during 2006-07 to 202.85 MTs during 2015-16.




- There has been an increase of 7.08% in the net imports of crude oil during 2015-16 over 2014-15, as the net import increased from 189.43 MTs to 202.85 MTs (Table 4.1).

- The export of petroleum product has increased from 33.62 MT during 2006-07 to 60.53 MTs during 2015-16. During 2015-16, exports recorded a decrease of 5.32% from previous year (Table 4.1).

- The import of petroleum products has increased from 17.76 MT in 2006-07 to 28.30 MT during 2015-16, although there are some fluctuations in the trend (Table 4.1). There is growth rate of 32.86% in import of petroleum products over the previous year.

### *4.3 Natural Gas*

- The gross import of natural gas has increased from 6.81 BCM in 2006-07 to 16.58 BCM in 2015-16, recording a CAGR of 9.3%.

### *4.4 Electricity*

- The gross import of electricity has increased with a CAGR 5.90% during the period 2006-07 (2957 GWh) to 2015-16 (5244 GWh). Similarly, the export of electricity has increased from 216 GWh in 2006-07 to 5150 GWh in 2015-16.

- There was decrease in net import of electricity during 2006-07 to 2015-16 and the CAGR for this period is (-) 28.64%.

## 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) |
| 2006-07 | 43.08 | 1.55 | 41.53 | 111.50 | 0.00 | 111.50 | 17.76 | 33.62 | -15.86 |
| 2007-08 | 49.79 | 1.63 | 48.17 | 121.67 | 0.00 | 121.67 | 22.46 | 40.75 | -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 | 15.77 | 63.41 | -47.63 |
| 2013-14 | 166.86 | 2.19 | 164.67 | 189.24 | 0.00 | 189.24 | 16.72 | 67.86 | -51.15 |
| 2014-15 | 217.78 | 1.24 | 216.54 | 189.43 | 0.00 | 189.43 | 21.30 | 63.93 | -42.63 |
| 2015-16(p) | 199.88 | 1.25 | 198.63 | 202.85 | 0.00 | 202.85 | 28.30 | 60.53 | -32.23 |
| **Growth rate of 2015-16 over 2014-15(%)** | **-8.22** | **0.81** | **-8.27** | **7.08** | **-** | **7.08** | **32.86** | **-5.32** | **-24.39** |
| **CAGR 2006-07 to 2015-16(%)** | **16.59** | **-2.15** | **16.94** | **6.17** | **-** | **6.17** | **4.77** | **6.06** | **7.35** |

## Table 4.1 (Conti): 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 | | | | | | |
| 2006-07 | 6.81 | 0.00 | 6.81 | 2957 | 216 | 2741 |
| 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(p) | 16.58 | 0.00 | 16.58 | 5244 | 5150 | 94 |
| **Growth rate of 2015-16 over 2014-15(%)** | **17.67** | **-** | **17.67** | **4.72** | **16.19** | **-83.67** |
| **CAGR 2006-07 to 2015-16(%)** | **9.31** | **-** | **9.31** | **5.90** | **37.29** | **-28.64** |

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

# CHAPTER 5: AVAILABILITY

## *5.1 Availability of Coal and Lignite*

- The total availability of raw coal in India in 2015-16 stood at 843.27 MTs and that of lignite at 45.47 MTs (Table 5.1).

- The availability of coal in the year 2015-16 increased by 1.60% compared to 2014-15. The availability of lignite decreased by 8.27% during the same period.

- The availability of coal has increased at a CAGR of about 5.74% during the period from 2006-07 to 2015-16. This increased availability might be attributed to the increase in the coal production (482.37 MTs during 2006-07 to 843.27 MTs during 2015-16) supplemented by imports (Table 5.2).

- The availability of lignite has increased at a CAGR of about 3.65% during the period from 2006-07 to 2015-16 (Table 5.1).

## *5.2 Availability of Natural Gas*

- The production of natural gas has steadily increased from a mere 37.60 BCM during 2006-07 to 48.83 BCMs during 2015-16, registering a CAGR of 2.65%. Most of this increase in the indigenous production is due to discovery of new reserves.(Table 5.1)

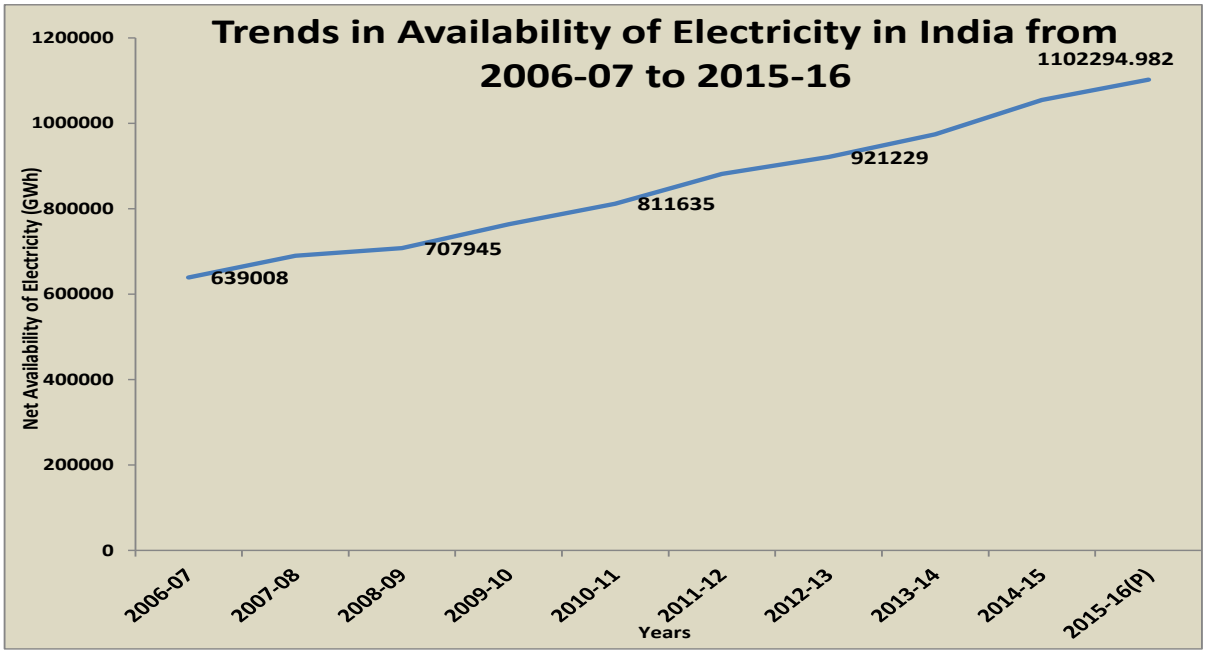
## *5.3 Availability of Crude Oil and Petroleum Products*

- The availability of crude oil in the country increased from 145.49 MTs in 2006-07 to 239.80 MTs during 2015-16 (Table 5.3).

- During this period, crude oil production increased from 33.99 MTs to 36.95 MTs and the net import increased from 111.50 MTs to 202.85 MTs between 2006-07 and 2015-16. There was increase of 5.69% in availability of crude oil during 2015-16 over 2014-15.

## *5.4 Availability of Electricity*

- Electricity available for supply increased from 6,39,008 Gwh in 2006-07 to 11,04,228 Gwh in 2015-16, thus recording a CAGR of 5.62% during this period. The availability of electricity increased at 4.73% in 2015-16 over its value in 2014-15.


Trends in Availability of Electricity in India from 2006-07 to 2015-16
Net Availability of Electricity (GWh)
1200000
1000000
800000
600000
400000
200000
0
639008
707945
811635
921229
1102294.982
2006-07
2007-08
2008-09
2009-10
2010-11
2011-12
2012-13
2013-14
2014-15
2015-16(P)
Years

# 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) |
|---|---|---|---|---|
| 2006-07 | 482.37 | 31.76 | 145.49 | 37.60 |
| 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 | 62.75 |
| 2011-12 | 642.64 | 42.77 | 209.82 | 60.77 |
| 2012-13 | 680.14 | 46.89 | 222.66 | 53.82 |
| 2013-14 | 724.19 | 44.64 | 227.03 | 48.44 |
| 2014-15 | 830.00 | 49.57 | 226.89 | 47.75 |
| 2015-16(p) | 843.27 | 45.47 | 239.80 | 48.83 |
| **Growth rate of 2015-16 over 2014-15(%)** | **1.60** | **-8.27** | **5.69** | **2.26** |
| **CAGR 2006-07 to 2015-16(%)** | **5.74** | **3.65** | **5.12** | **2.65** |

(p) - Provisional

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

# Table 5.2 : Trends in Availability of Raw Coal 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 |
| 2006-07 | 430.83 | 10.01 | 43.08 | 1.55 | 482.37 | 31.29 | 0.48 | 31.76 |
| 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 | 4.27 | 217.78 | 1.24 | 830.00 | 48.26 | 1.32 | 49.57 |
| 2015-16(p) | 639.23 | 5.40 | 199.88 | 1.25 | 843.27 | 43.84 | 1.63 | 45.47 |
| **Growth rate of 2015-16 over 2014-15(%)** | **4.93** | **26.56** | **-8.22** | **0.97** | **1.60** | **-9.15** | **24.09** | **-8.27** |

(P): Provisional

Source : Office of the Coal Controller, Ministry of Coal

## 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 |
| 2006-07 | 33.99 | 111.50 | 145.49 | 139.75 | -15.96 | 123.78 | 30.79 | 6.81 | 37.60 |
| 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 | -42.26 | 152.56 | 52.22 | 9.93 | 62.75 |
| 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 | -47.63 | 170.10 | 40.68 | 13.14 | 53.82 |
| 2013-14 | 37.79 | 189.24 | 227.03 | 220.76 | -51.15 | 169.61 | 35.41 | 13.00 | 48.44 |
| 2014-15 | 37.46 | 189.43 | 226.89 | 221.14 | -42.63 | 178.51 | 33.66 | 14.09 | 47.75 |
| 2015-16(p) | 36.95 | 202.85 | 239.80 | 231.92 | -32.23 | 199.69 | 32.25 | 16.58 | 48.83 |
| **Growth rate of 2015-16 over 2014-15(%)** | **-1.36** | **7.08** | **5.69** | **4.88** | **-24.40** | **11.87** | **-4.19** | **17.67** | **2.26** |

Note: For Natural gas, production and availibility 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 2006-07 to 2015-16

**(in Giga Watt hour = $10^6$ Kilo Watt hour)**

| Year | Gross Electricity Generated from Utilities | Consum- ption in Power Station Auxiliaries | Net Electricity Generated from Utilities | Purchases from Non-Utilities + Imported from Other Countries | Net Electricity Available for Supply |
|---|---|---|---|---|---|
| **1** | **2** | **3** | **4=2-3** | **5** | **6=4+5** |
| 2006-07 | 6,70,654 | 43,577 | 6,27,077 | 11,931 | 6,39,008 |
| 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(P) | 11,67,584 | 79,302 | 10,88,282 | 15,947 | 11,04,228 |
| **Growth rate of 2015-16 over 2014-15(%)** | **4.54** | **3.98** | **4.58** | **15.78** | **4.73** |
| **CAGR 2006-07 to 2015-16(%)** | **5.70** | **6.17** | **5.67** | **2.94** | **5.62** |

(P): Provisional

Source:Central Electricity Authority.

# 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 462.35 MT during 2006-07 to 832.46 MT during 2015-16 with a CAGR of 6.06% (Table 6.1). The annual growth rate from 2014-15 to 2015-16 is 1.29%.

- Consumption of Lignite increased from 30.81 MT in 2006-07 to 42.52 MT in 2015-16 registering a compound growth of 3.28%. Consumption of Lignite in Electricity Generation sector is the highest, accounting for about 89.57% of the total lignite consumption (Table 6.1).

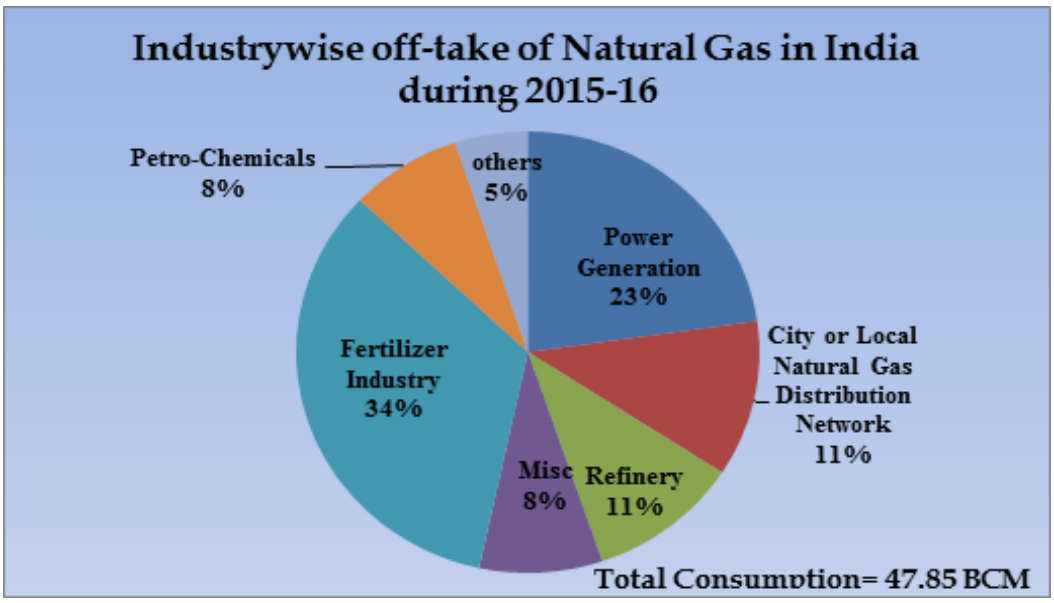
- The maximum consumption of raw coal is in Electricity generation, followed by steel industries. Industry-wise estimates of consumption of coal (Table 6.4) shows that during 2015-16, electricity generating units consumed 508.25 MT of coal, followed by steel & washery industries (56.45 MT), cement industries (8.93 MT) and sponge iron industries (7.76 MT).

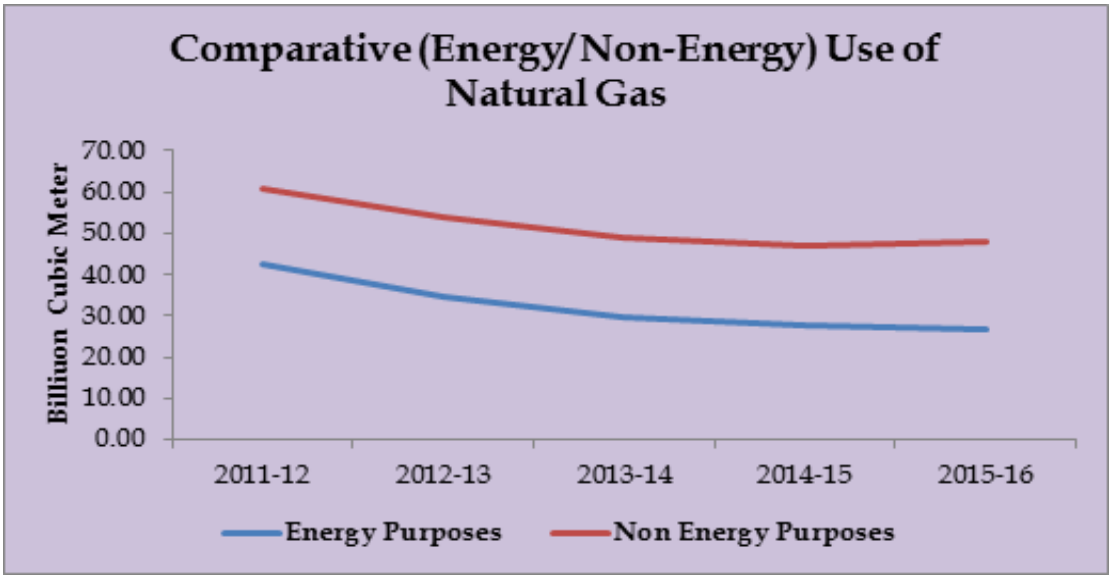
## *6.2 Consumption of Crude Oil and Natural Gas*

- The estimated consumption of crude oil has a steady increase, from 146.55 MMT during 2006-07 to 232.87 MMT during 2015-16 with CAGR of 4.74%. It increased from 223.24 MMT in 2014-15 to 232.87 MMT in 2015-16 (Table 6.1).

- The maximum use of Natural Gas is in fertilizers industry (33.72%) followed by power generation (22.76%) and 11.42% 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 (55.76%) and Non-energy (44.24%) purposes (Table 6.8).

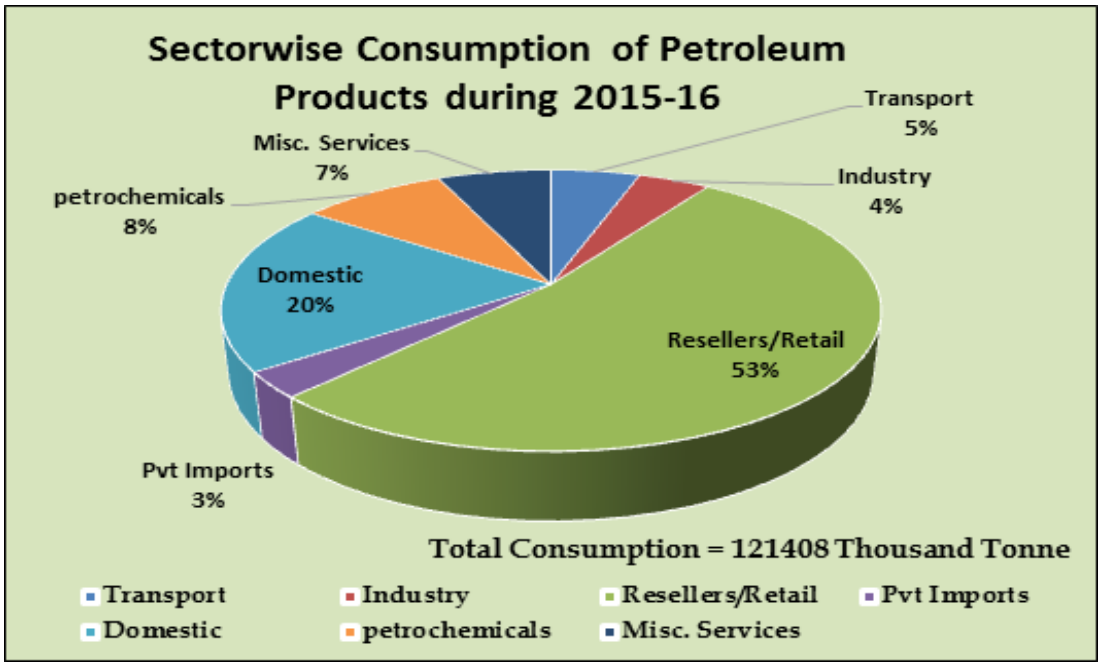





### *6.3 Consumption of Petroleum Products*

- High speed diesel oil accounted for 40.42% of total consumption of all types of petroleum products in 2015-16. This was followed by Petrol (11.83%), LPG (10.63%), Petroleum Coke (10.45%) and Naphtha (7.19%). Consumption of Light Diesel oil continuously decreased from 2006-07 (0.72 MT) to 2015-16 (0.41 MT) (Tables 6.6 & 6.7).

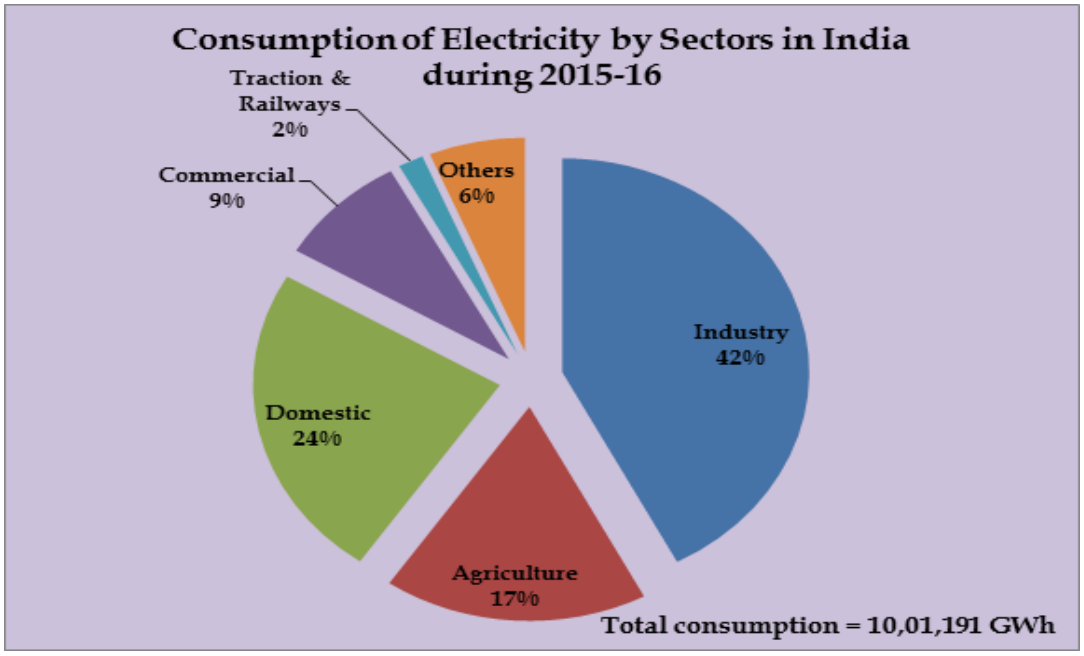
- Sector-wise consumption of different petroleum products reveals that Reseller/Retail contributes 53% in the total consumption followed by Domestic sector with contribution 20%(Table 6.7).



### *6.4 Consumption of Electricity*

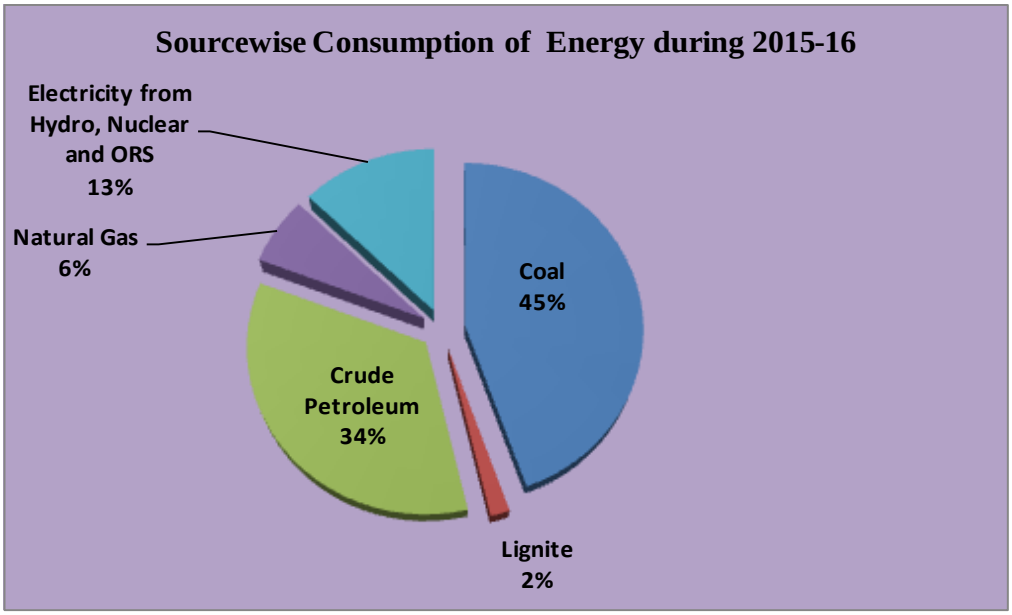
- The estimated electricity consumption increased from 4,55,749 GWh during 2006-07 to 10,01,191 GWh during 2015-16, showing a CAGR of 8.19% (Table 6.9). The increase in electricity consumption is 5.55% from 2014-15 (9,48,522 GWh) to 2015-16 (10,01,191 GWh).

- Of the total consumption of electricity in 2015-16, industry sector accounted for the largest share (42.30%), followed by domestic (23.86%), agriculture (17.30%) and commercial sectors (8.59%).




- The electricity consumption in Industry sector and domestic sector has increased at a much faster pace compared to other sectors during 2006-07 to 2015-16 with CAGRs of 9.47% and 7.97% respectively (Table 6.9).

- Loss of electricity due to transmission has decreased from 28.64% during 2006-07 to 21.81% during 2015-16 (Table 6.10).



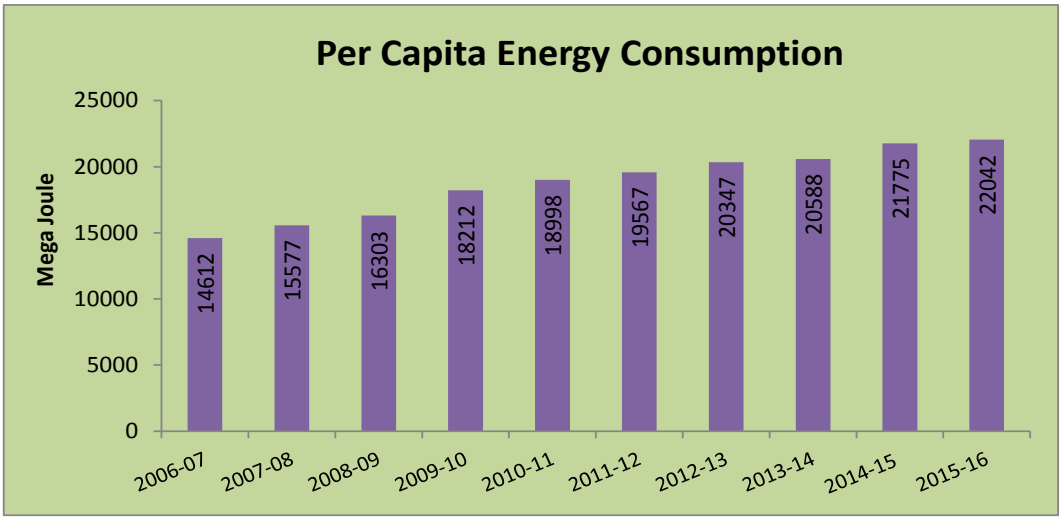

## *6.5 Per-Capita Energy Consumption & Energy Intensity*

- The consumption of energy in petajoules in the form of Coal and Lignite which accounted for about 46.28% of the total consumption during 2015-16. Crude Petroleum was second (34.48%), while Electricity (12.75%) was third.(Table 6.2)

- The total consumption of energy from conventional sources increased from 27,589 petajoules during 2014-15 to 28,276 petajoules during 2015-16, showing an increase of 2.49%..(Table 6.2)

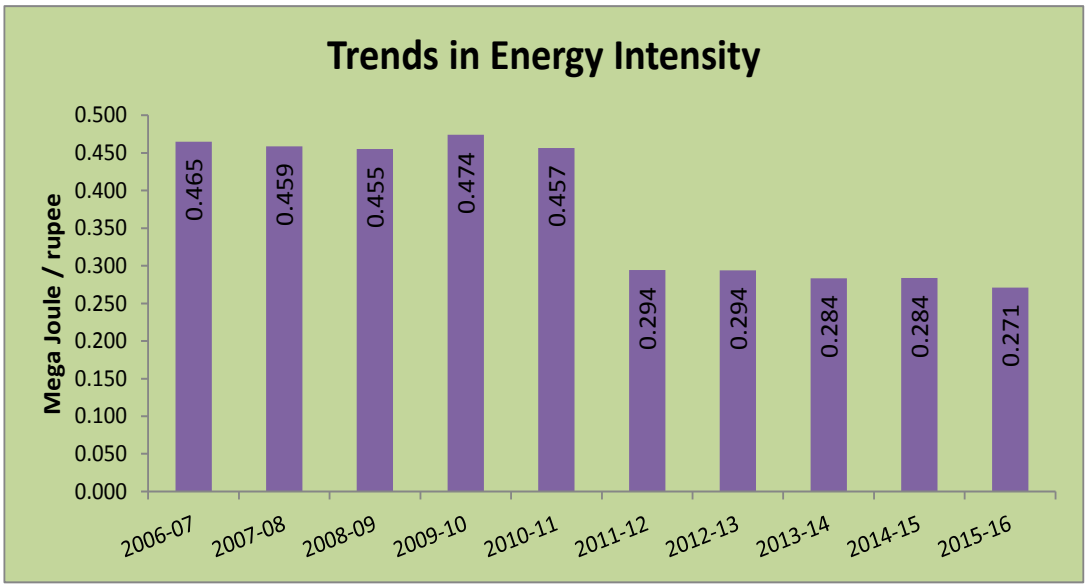
- Per-capita Energy Consumption (PEC) during a year is computed as the ratio of the estimate of total energy consumption during the year to the estimated mid-year population of that year.

- Per-capita Energy Consumption (PEC) increased from 14,612 Mega Joules in 2006-07 to 22,042 Mega Joules in 2015-16, a CAGR of 4.2% (Table 6.3). The annual increase in PEC for 2015-16 over 2014-15 was 1.23%.



- 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 2004-05 prices) decreased from 0.465 Mega Joules per rupee in 2006-07 to 0.284 Mega Joules per rupee in 2014-15 to 0.271 Mega Joules in 2015-16 (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 |
| 2006-07 | 462.35 | 30.81 | 146.55 | 37.60 | 4,55,749.00 |
| 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 | 9,48,521.67 |
| 2015-16(p) | 832.46 | 42.52 | 232.87 | 47.85 | 10,01,190.93 |
| **Growth rate of 2015-16 over 2014-15(%)** | **1.29** | **-9.41** | **4.31** | **1.92** | **5.55** |
| **CAGR 2006-07 to 2015-16(%)** | **6.06** | **3.28** | **4.74** | **2.44** | **8.19** |

(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.

# 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 |
| 2006-07 | 6995 | 350 | 6136 | 1448 | 1641 | 16571 |
| 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 | 25756 |
| 2014-15 | 12435 | 534 | 9347 | 1859 | 3415 | 27589 |
| 2015-16(P) | 12595 | 483 | 9750 | 1843 | 3604 | 28276 |
| **Growth rate of 2015-16 over 2014-15(%)** | **1.29** | **-9.41** | **4.31** | **-0.84** | **5.55** | **2.49** |
| **CAGR 2006-07 to 2015-16(%)** | **6.06** | **3.28** | **4.74** | **2.44** | **8.19** | **5.49** |

*: 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.

# 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) |
|---|---|---|---|---|---|
| 2006-07 | 16571 | 1134 | 3564364 | 14612 | 0.4649 |
| 2007-08 | 17878 | 1148 | 3896636 | 15577 | 0.4588 |
| 2008-09 | 18936 | 1161 | 4158676 | 16303 | 0.4553 |
| 2009-10 | 21408 | 1175 | 4516071 | 18212 | 0.4740 |
| 2010-11 | 22458 | 1182 | 4918533 | 18998 | 0.4566 |
| 2011-12 | 23872 | 1220 | 8106656 | 19567 | 0.2945 |
| 2012-13 | 25128 | 1235 | 8546552 | 20347 | 0.2940 |
| 2013-14 | 25755 | 1251 | 9084369 | 20588 | 0.2835 |
| 2014-15 | 27589 | 1267 | 9727490 | 21775 | 0.2836 |
| 2015-16 (P) | 28258 | 1282 | 10427191 | 22042 | 0.2710 |
| **Growth rate of 2015-16 over 2014-15(%)** | **2.43** | **1.18** | **7.19** | **1.23** | **-4.45** |
| **CAGR 2006-07 to 2014-15(%)** | **5.48** | **1.23** | **11.33** | **4.20** | **-5.25** |

(P): Provisional

* Estimated value based on sourcewise availability of Coal, Crude Petroleum, Natural Gas and

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

** from 2005-06 to 2010-11 GDP estimates are at base 2004-05 price, where as from 2011-12 to 2015-16 GDP estimates are at 2011-12 price

# 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 |
| 2006-07 | 321.91 | 17.30 | 14.71 | 2.50 | 0.30 | - | - | - | 63.08 | 419.80 |
| 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(p) | 508.25 | 56.45 | 8.93 | 1.20 | 0.27 | 7.76 | 2.63 | 0.08 | 246.83 | 832.39 |
| **Distribution (% )** | **61.06** | **6.78** | **1.07** | **0.14** | **0.03** | **0.93** | **0.32** | **0.01** | **29.65** | **100.00** |
| **Growth rate of 2015-16 over 2014-15(% )** | **2.12** | **0.38** | **-21.41** | **-27.12** | **-36.04** | **-56.30** | **14.52** | **-15.38** | **13.78** | **3.47** |
| **CAGR 2006-07 to 2015-16(% )** | **-15.32** | **-8.94** | **-23.04** | **-24.80** | **-20.08** | **-** | **-** | **-** | **-7.27** | **-13.36** |

(P): Provisional

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

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

Source : Office of the Coal Controller, Ministry of Coal

For year 2014-15 & 2015-16 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 |
| 2006-07 | 23.92 | - | 0.77 | 0.22 | 0.84 | 5.06 | 30.80 |
| 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(p) | 37.81 | 0.00 | 0.25 | 0.44 | 1.73 | 1.99 | 42.21 |
| **Distribution (%)** | **89.57** | **0.00** | **0.59** | **1.04** | **4.09** | **4.71** | **100.00** |
| **Growth rate of 2015-16 over 2014-15(%)** | **-4.22** | **-100.00** | **-80.46** | **-32.77** | **-40.15** | **-24.82** | **-10.09** |
| **CAGR 2006-07 to 2015-16(%)** | **14.11** | **-** | **-2.61** | **17.02** | **17.16** | **-0.70** | **12.50** |

(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:** Industrywise breakup of consumption for the period 1970-71 to 1999-2000 are not readily available, hence estimated by production data as it is observed, approximately for lignite, production= despatch= consumption.

Source : Office of the Coal Controller, Ministry of Coal

# Table 6.6 : Trends in Consumption of Petroleum Products in India

(Million Tonnes)

| Year | Light Distillates | | | Middle Distillates | | | |
|---|---|---|---|---|---|---|---|
| | LPG | Petrol | Naphtha | Kerosene | ATF | HSDO | LDO |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 2006-07 | 10.85 | 9.29 | 13.89 | 9.51 | 3.98 | 42.90 | 0.72 |
| 2007-08 | 12.17 | 10.33 | 13.29 | 9.37 | 4.54 | 47.67 | 0.67 |
| 2008-09 | 12.19 | 11.26 | 13.91 | 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 | 0.42 |
| 2012-13 | 15.60 | 15.74 | 12.29 | 7.50 | 5.27 | 69.08 | 0.40 |
| 2013-14 | 16.29 | 17.13 | 11.31 | 7.17 | 5.51 | 68.37 | 0.39 |
| 2014-15 | 18.00 | 19.08 | 11.08 | 7.09 | 5.72 | 69.42 | 0.37 |
| 2015-16(p) | 19.62 | 21.85 | 13.27 | 6.83 | 6.26 | 74.65 | 0.41 |
| **Growth rate of 2015-16 over 2014-15(%)** | **9.02** | **14.50** | **19.75** | **-3.72** | **9.42** | **7.54** | **10.00** |
| **CAGR 2006-07 to 2015-16(%)** | **6.11** | **8.93** | **-0.45** | **-3.26** | **4.63** | **5.70** | **-5.54** |

(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 |
| 2006-07 | 12.62 | 1.90 | 3.83 | - | 5.44 | 5.83 | 120.75 | 10.92 | 131.67 |
| 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 | 10.14 | 5.32 | 157.07 | 18.35 | 175.42 |
| 2013-14 | 6.24 | 3.31 | 5.01 | 0.18 | 11.76 | 5.78 | 158.43 | 17.87 | 176.30 |
| 2014-15 | 5.96 | 3.31 | 5.07 | 0.16 | 14.56 | 5.72 | 165.53 | 17.67 | 183.20 |
| 2015-16(p) | 6.63 | 3.57 | 5.94 | 0.17 | 19.30 | 6.18 | 184.67 | 18.77 | 203.45 |
| **Growth rate of 2015-16 over 2014-15(%)** | **11.26** | **8.05** | **18.52** | **-2.26** | **64.09** | **6.88** | **16.56** | **5.05** | **15.39** |
| **CAGR 2006-07 to 2015-16(%)** | **-6.23** | **6.51** | **4.47** | **-** | **13.50** | **0.58** | **4.34** | **5.57** | **4.45** |

(p) : Provisional

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

Source: Ministry of Petroleum & Natural Gas.

# Table 6.7 : 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 | 2006-07 | 23,817 | 7,914 | 2,894 | 2,188 | 714 | ** | 3,091 | 2,248 | 42,866 |
| 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 | 48,704 | 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 | 1628 | 1073 | 58021 | 2320 | 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(p) | 5,765 | 630 | 224 | 1096 | 1184 | 63772 | 1922 | 55 | 74,647 |
| **Growth rate of 2015-16 over 2014-15(%)** | | **24.85** | **9.55** | **13.54** | **38.02** | **18.59** | **5.58** | **9.93** | **-33.57** | **7.54** |
| **CAGR 2006-07 to 2015-16(%)** | | **-13.23** | **-22.36** | **-22.58** | **-6.68** | **5.19** | **-** | **-4.64** | **-30.95** | **5.70** |

# 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 | 2006-07 | 53 | 13 | 67 | 243 | 7 | ** | 337 | 0 | 720 |
| 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(p) | 4 | 1 | 154 | 61 | 2 | 1 | 184 | 0 | 407 |
| **Growth rate of 2015-16 over 2014-15(%)** | | **-26.00** | **18.18** | **16.64** | **11.36** | **-42.11** | **-71.05** | **11.53** | **-** | **11.44** |
| **CAGR 2006-07 to 2015-16(%)** | | **-23.37** | **-20.57** | **8.69** | **-12.94** | **-10.93** | **-** | **-5.88** | **-** | **-5.54** |

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

Contd…

## 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 | 2006-07 | 502 | 0 | 254 | 1,830 | 0 | ** | 5,600 | 1,071 | 9,257 |
| 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 | 2,774 | 7 | ** | 3,979 | 374 | 8,807 |
| | 2011-12 | 371 | 70 | 647 | 2,408 | 45 | ** | 3,300 | 706 | 7,548 |
| | 2012-13 | 277 | 79 | 587 | 2,019 | 13 | 351 | 2,357 | 608 | 6,291 |
| | 2013-14 | 315 | 75 | 536 | 1,833 | 39 | 309 | 1,985 | 696 | 5,787 |
| | 2014-15 | 346 | 56 | 446 | 1,748 | 45 | 197 | 2,175 | 570 | 5,584 |
| | 2015-16(p) | 380 | 57 | 430 | 2,137 | 53 | 270 | 2,564 | 592 | 6,482 |
| **Growth rate of 2014-15 over 2013-14(%)** | | **9.56** | **1.80** | **-3.45** | **22.20** | **16.85** | **37.23** | **17.86** | **3.88** | **16.09** |
| **CAGR 2005-06 to 2014-15(%)** | | **-2.76** | **-** | **5.42** | **1.56** | **-** | **-** | **-7.51** | **-5.75** | **-3.50** |

## 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 | 2006-07 | 0 | 0 | 298 | 1,358 | - | - | 1,705 | 0 | 3,361 |
| Sulphur | 2007-08 | 0 | 0 | 344 | 1,304 | 0 | - | 1,600 | 0 | 3,248 |
| Heavy | 2008-09 | - | 1 | 1,347 | 1,294 | 0 | - | 526 | 0 | 3,169 |
| Stock | 2009-10 | - | 2 | 937 | 1,225 | 0 | - | 320 | 0 | 2,484 |
| | 2010-11 | - | 0 | 469 | 1,031 | 0 | - | 482 | 0 | 1,983 |
| | 2011-12 | - | 0 | 399 | 1,067 | 1 | - | 292 | 0 | 1,759 |
| | 2012-13 | - | 0 | 439 | 778 | 0 | - | 149 | 0 | 1,366 |
| | 2013-14 | - | 0 | 328 | 76 | 0 | - | 44 | 0 | 449 |
| | 2014-15 | - | 0 | 226 | 104 | 0 | - | 48 | 0 | 377 |
| | 2015-16(p) | - | 0 | 51 | 70 | 0 | - | 29 | 0 | 150 |
| **Growth rate of 2015-16 over 2014-15(%)** | | **-** | **-** | **-77.59** | **-32.05** | **-** | **-** | **-38.53** | **-** | **-60.16** |
| **CAGR 2006-07 to 2015-16(%)** | | **-** | **-** | **-16.23** | **-25.62** | **-** | **-** | **-33.42** | **-** | **-26.71** |

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

Contd…

## 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 | 2006-07 | 0 | 0 | 0 | 31 | 10427 | ** | 66 | 330 | 10854 |
| | 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 | ** | 157 | 430 | 14332 |
| | 2011-12 | 224 | 5 | 0 | 1255 | 13296 | ** | 150 | 421 | 15350 |
| | 2012-13 | 215 | 4 | 0 | 1208 | 13568 | 59 | 45 | 398 | 15497 |
| | 2013-14 | 195 | 4 | 3 | 1208 | 14412 | 58 | 46 | 369 | 16294 |
| | 2014-15 | 165 | 6 | 3 | 1259 | 16040 | 45 | 53 | 429 | 18000 |
| | 2015-16(p) | 172 | 7 | 3 | 1666 | 17182 | 45 | 60 | 489 | 19623 |
| **Growth rate of 2015-16 over 2014-15(%)** | | **4.40** | **16.58** | **-12.34** | **32.35** | **7.12** | **-0.66** | **13.66** | **13.93** | **9.02** |
| **CAGR 2006-07 to 2015-16(%)** | | - | - | - | **48.95** | **5.12** | - | **-0.97** | **4.01** | **6.10** |

## 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 | 2006-07 | 1980 | 1197 | 660 | 33 | 1100 | 8669 | 10854 |
| | 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(p) | 316 | 10350 | 50 | 0 | 37 | 2517 | 13271 |
| **Growth rate of 2015-16 over 2014-15(%)** | | **4.78** | **8.61** | **-74.75** | - | **-82.12** | **198.38** | **19.75** |
| **CAGR 2006-07 to 2015-16(%)** | | **-16.77** | **24.08** | **-22.70** | - | **-28.75** | **-11.63** | **2.03** |

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

| Petroleum Product | Year | Domestic | Commercial/ Industry | Others | Total |
|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6=3 to 5 |
| SKO(Kerosene) | 2006-07 | 9203 | 50 | 159 | 9412 |
| | 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(p) | 6649 | 64 | 113 | 6826 |
| **Growth rate of 2015-16 over 2014-15(%** | | **-3.88** | **6.32** | **3.57** | **-3.68** |
| **CAGR 2006-07 to 2015-16(%)** | | **-3.20** | **2.48** | **-3.34** | **-3.16** |

## Table 6.8 INDUSTRYWISE OFF-TAKE OF NATURAL GAS IN INDIA

(Billion Cubic Metres)

| Year | Energy Purpose | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Power Generation | Industrial Fuel | Tea Plantation | City or Local Natural Gas Distribution Network | Internal Consumption for Pipeline System | Refinery | Miscellaneous | Total |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 2006-07 | 11.96 | - | 0.17 | - | - | - | - | 12.13 |
| 2007-08 | 12.04 | - | 0.16 | - | - | - | - | - |
| 2008-09 | 12.60 | - | 0.15 | 6.01 | - | - | 3.42 | 22.19 |
| 2009-10 | 21.37 | - | 0.17 | 2.57 | - | - | 7.27 | 31.37 |
| 2010-11 | 25.79 | - | 0.19 | 3.43 | - | - | 7.55 | 36.95 |
| 2011-12 | 22.63 | 0.31 | 0.18 | 5.60 | 0.39 | 4.26 | 9.06 | 42.42 |
| 2012-13 | 16.08 | 0.23 | 0.18 | 5.78 | 0.39 | 3.89 | 7.98 | 34.52 |
| 2013-14 | 11.28 | 0.33 | 0.20 | 5.84 | 0.37 | 3.97 | 7.48 | 29.46 |
| 2014-15 | 10.72 | 0.55 | 0.18 | 5.42 | 0.35 | 4.58 | 5.94 | 27.73 |
| 2015-16 (P) | 10.89 | 0.55 | 0.19 | 5.46 | 0.41 | 5.08 | 4.11 | 26.68 |
| **Distribution (%)** | **22.76** | **1.14** | **0.39** | **11.42** | **0.86** | **10.61** | **8.59** | **55.76** |
| **Growth rate of 2015-16 over 2014-15(%)** | **1.59** | **-1.27** | **4.44** | **0.89** | **17.00** | **10.95** | **-30.82** | **-3.79** |

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

NA :Non Availability of data

Source: Ministry of Petroleum & Natural Gas

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

**(Billion Cubic Metres)**

| Non-Energy Purposes | | | | | |
|---|---|---|---|---|---|
| **Fertilizer Industry** | **Petro-Chemicals** | **LPG Shrinkage** | **Sponge Iron** | **Total** | **Grand Total** |
| **9** | **10** | **11** | **12** | **13=10 to 12** | **14** |
| 8.50 | 1.38 | - | - | - | - |
| 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 | 53.87 |
| 15.87 | 2.40 | 0.98 | 0.27 | 19.53 | 48.99 |
| 15.19 | 2.89 | 1.01 | 0.15 | 19.24 | 46.97 |
| 16.13 | 3.73 | 0.75 | 0.54 | 21.17 | 47.85 |
| **33.72** | **7.80** | **1.58** | **1.14** | **44.24** | **100.00** |
| **6.21** | **29.18** | **-24.98** | **255.56** | **10.02** | **1.86** |

Note: Includes of Consumption of LNG in 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 6.9: Consumption of Electricity by Sectors in India

**in Giga Watt Hour = $10^6$ 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 |
| 2006-07 | 1,71,293 | 99,023 | 1,11,002 | 40,220 | 10,800 | 23,411 | 4,55,749 |
| 2007-08 | 1,89,424 | 1,04,182 | 1,20,918 | 46,685 | 11,108 | 29,660 | 5,01,977 |
| 2008-09 | 2,09,474 | 1,09,610 | 1,31,720 | 54,189 | 11,425 | 37,577 | 5,53,995 |
| 2009-10 | 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(P) | 4,23,523 | 1,73,185 | 2,38,876 | 86,037 | 16,594 | 62,976 | 10,01,191 |
| **Distribution (% )** | **42.30** | **17.30** | **23.86** | **8.59** | **1.66** | **6.29** | **100.00** |
| **Growth rate of 2015-16 over 2014-15(% )** | **1.24** | **2.53** | **9.88** | **9.75** | **2.58** | **27.77** | **5.55** |
| **CAGR 2006-07 to 2015-16(% )** | **9.47** | **5.75** | **7.97** | **7.90** | **4.39** | **10.40** | **8.19** |

(P): Provisional

Source : Central Electricity Authority.

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

in Giga Watt hour =$10^6$ Kilo Watt hour

| Year | Net Electricity Generated from Utilities | Purchases from Non-Utilities + Imported from Other Countries | Net Electricity Available for Supply | Sold to Ultimate Consumers & Other Countries | Loss in transm-ission | Loss in transm-ission (%) |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4=2+3 | 5 | 6=4-5 | 7 |
| 2006-07 | 6,27,077 | 11,931 | 6,39,008 | 4,55,965 | 1,83,043 | 28.64 |
| 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 | 8,14,056 | 2,40,299 | 22.79 |
| 2015-16(P) | 10,88,282 | 15,947 | 11,04,228 | 8,63,364 | 2,40,864 | 21.81 |
| **Growth rate of 2015-16 over 2014-15(%)** | **4.58** | **15.78** | **4.73** | **6.06** | **0.24** | **-4.29** |
| **CAGR 2006-07 to 2015-16(%)** | **5.67** | **2.94** | **5.62** | **6.59** | **2.78** | **-2.69** |

(P): Provisional

Source : Central Electricity Authority.

# 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 $CO_2$ 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**

- **1 Toe = 41868 MJ**

- **Conversion factor =** $\dfrac{\text{Net Calorific Value (NCV)}}{\text{Mega joules per ton of oil equivalent}}$

  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 2015-16, Primary Energy Supply added up to 6,75,405 Kilo Tonne of Oil equivalent (ktoe). The share of Coal accounted for 53.91% and the contribution of Crude Oil was 35.50%. (Table 7.2).

- In 2015-16, National Energy Consumption was 5,19,286 ktoe. The industrial sector used 56.91 % 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 15.01 % of the industrial energy use followed by Chemicals and petrochemicals 4.77 % and construction 2.18 % (Table 7.2).

- The transport sector accounted for 7.33% of Total Final Consumption. The consumption of the residential, commercial and public sectors represented 11.43%. (Table 7.2).

- Efforts are being made to reduce the statistical difference, by incorporating more data.

### *7.3 Sankey Diagram (2015-16):*

- 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 2015-16(p)

| Supply | Coal | Lignite | LPG | Naphtha | Kerosene | Diesel | Furnace Oil | Lubricants | Bitumin | Low Sulfur Heavy Stock | Petrol/ Motor Spirit | Other Petroleum Products* | Natural Gas | Electricity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (000 tonnes) | | | | | | | | | | | | (MMSCM) | (GWh) |
| Production | 639234 | 43843 | 10568 | 17861 | 7504 | 98588 | 9468 | 1037 | 5157 | 259 | 35321 | 46162 | 32249 | 1167584 |
| From Other Sources | | | 489 | 2517 | | 55 | 592 | 2259 | 879 | | | | | 168372 |
| Imports | 199884 | | 8885 | 2984 | 41 | 180 | 1162 | 1880 | 750 | 32 | 1024 | 11364 | 21971 | 5244 |
| Exports | 1250 | | 195 | 7116 | 10 | 24035 | 2731 | 17 | 101 | 75 | 16817 | 9439 | | 5150 |
| Stock changes | 5404 | 1631 | | | | | | | | | | | | |
| **Domestic Supply** | 832464 | 42212 | 19747 | 16246 | 7535 | 74788 | 8491 | 5159 | 6685 | 216 | 19528 | 48087 | 54220 | 1336050 |
| Transfer | | | | | | | | | | | | | | |
| Statistical difference | 76 | 0 | 124 | 2976 | 709 | 141 | 2009 | 1588 | 747 | 66 | -2319 | 15769 | 6371 | -142976 |
| **Transformation** | 508246 | 37809 | 3 | 50 | | 224 | 430 | | | 51 | | | 10889 | 79302 |
| Electricity plants | 508246 | 37809 | 3 | 50 | | 224 | 430 | | | 51 | | | 10889 | 79302 |
| **Energy Sector** | 335 | | | | | 1184 | | | | | | | 9187 | |
| Coal mines | 335 | | | | | 1184 | | | | | | | | |
| Petroleum refineries | | | | | | | | | | | | | 5077 | |
| Other energy sector | | | | | | | | | | | | | 4110 | |
| Distribution losses | | | | | | | | | | | | | | 240864 |
| **Final Consumption** | 832388 | 42212 | 19623 | 13271 | 6826 | 74647 | 6482 | 3571 | 5938 | 150 | 21847 | 32318 | 47849 | 1479026 |
| **Industry Sector** | 323807 | 4403 | 2155 | 13221 | 64 | 1151 | 3052 | | | 70 | | 19470 | 545 | 581192 |
| Iron and steel | 64215 | | 134 | | | 170 | 764 | | | 46 | | | | |
| Chemical and petroleum | 2626 | 272 | 5 | 10666 | | 116 | 670 | | | 24 | | | | |
| Non-ferrous metals | | | | | | 26 | 361 | | | | | | | |
| Machinery | | | 18 | | | 460 | 66 | | | | | | | |
| Mining & Quarrying | | | | | | | 53 | | | | | | | |
| Paper, pulp and print | 1201 | 437 | | | | | | | | | | | | |
| Construction | 9003 | 641 | | | | 204 | 15 | | | | | | | |
| Textile and leather | 268 | 1728 | 3 | | | 46 | 68 | | | | | | | |
| Non-specified | 246494 | 1325 | 1995 | 2555 | 64 | 128 | 1056 | | | | | 19470 | 545 | 581192 |
| **Transport Sector** | | | 172 | | | 5765 | 380 | | | | 21847 | 6669 | 410 | 16594 |
| Domestic aviation | | | | | | 1 | | | | | | 6262 | | |
| Road | | | 171 | | | 2671 | 45 | | | | | | | |
| Rail | | | 1 | | | 2726 | 2 | | | | | | | 16594 |
| Pipeline transport | | | | | | | | | | | | | 410 | |
| Domestic navigation | | | | | | 366 | 333 | | | | | | | |
| Non-specified | | | | | | | | | | | 21847 | 407 | | |
| **Other Sectors** | | | 17294 | | 6762 | 66324 | 2621 | 3571 | 5938 | 29 | | 6179 | 5652 | 561074 |
| Residential | | | 17182 | | 6649 | | | | | | | | 5464 | 238876 |
| Comm. And public services | | | | | | | | | | | | | | 86037 |
| Agriculture/forestry | | | 7 | | | 630 | 57 | | | | | | 188 | 173185 |
| Fishing | | | | | | | | | | | | | | |
| Non-specified | | | 105 | | 113 | 65694 | 2564 | 3571 | 5938 | 29 | | 6179 | | 62976 |
| **Non-Energy Use** | | | | | | | | | | | | | 21166 | |

(P): Provisional

Statistical Difference= Estimated Production - Estimated Consumption

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

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

# Table 7.2:Energy Balance of India for 2015-16 (P)

All figures in KToe

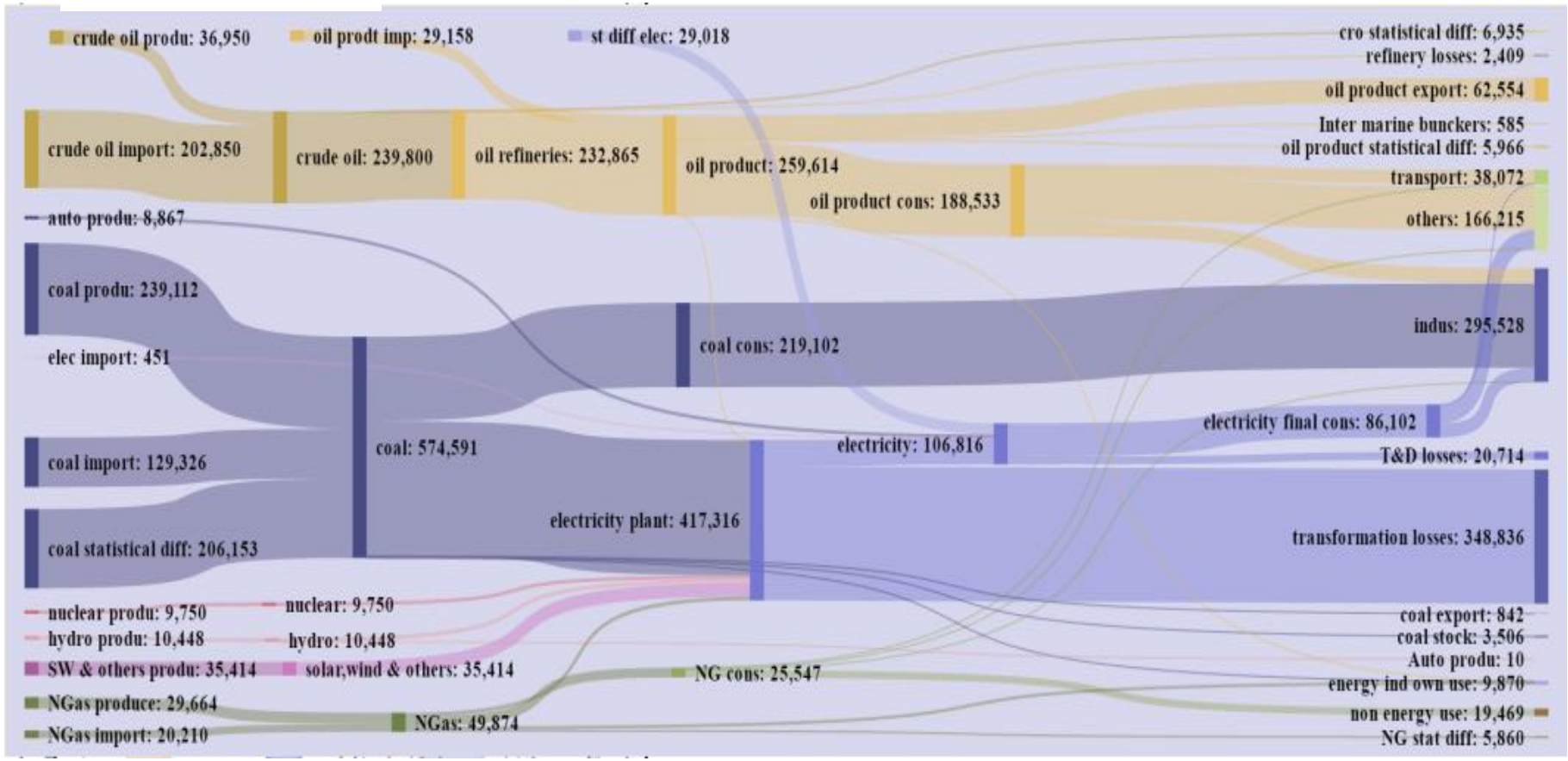
| | Coal | Crude Oil | Oil Products | Natural Gas | Nuclear | Hydro | Solar, Wind, Others | Electricity | Total |
|---|---|---|---|---|---|---|---|---|---|
| Production | 2,39,112.66 | 36,950.00 | - | 29,664.69 | 9,750.32 | 10,447.88 | 35,413.60 | - | 3,61,339.15 |
| Imports | 1,29,326.88 | 2,02,850.00 | 29,157.69 | 20,210.19 | - | - | - | 450.98 | 3,81,995.74 |
| Exports | -841.93 | - | -62,554.05 | - | - | - | - | -442.90 | -63,838.88 |
| International marine bunkers | - | - | -585.07 | - | - | - | - | - | -585.07 |
| International aviation bunkers | - | - | - | - | - | - | - | - | - |
| Stock changes | -3,506.13 | - | - | - | - | - | - | - | -3,506.13 |
| **Total primary energy supply** | **3,64,091.47** | **2,39,800.00** | **-33,981.42** | **49,874.88** | **9,750.32** | **10,447.88** | **35,413.60** | **8.08** | **6,75,404.81** |
| Statistical differences | 2,06,152.75 | -6,935.00 | -5,966.04 | -5,860.82 | - | 0.00 | - | 29,461.19 | 2,16,852.08 |
| Main activity producer electricity plants | -3,50,947.31 | - | -750.63 | -10,016.32 | -9,750.32 | -10,438.42 | -35,413.60 | 68,480.17 | -3,48,836.43 |
| Autoproducer electricity plants | - | - | - | - | - | -9.46 | - | 8,867.29 | 8,857.83 |
| Oil refineries | - | -2,32,865.00 | 2,30,456.44 | - | - | - | - | - | -2,408.56 |
| Energy industry own use | -194.30 | - | -1,224.50 | -8,450.73 | - | - | - | - | -9,869.52 |
| Losses | - | - | | - | - | - | - | -20,714.30 | -20,714.30 |
| **Final consumption** | **2,19,102.62** | **-** | **1,88,533.85** | **25,547.01** | **-** | **-** | **-** | **86,102.43** | **5,19,285.91** |
| **Industry** | **2,19,102.62** | **-** | **39,500.80** | **501.62** | **-** | **-** | **-** | **36,422.98** | **2,95,528.02** |
| Iron and steel | 43,251.72 | - | 1,104.93 | - | - | - | - | - | 44,356.65 |
| Chemical and petrochemical | 1,830.75 | - | 12,255.85 | - | - | - | - | - | 14,086.60 |
| Non-ferrous metals | - | - | 373.51 | - | - | - | - | - | 373.51 |
| Machinery | - | - | 559.44 | - | - | - | - | - | 559.44 |
| Mining and quarrying | - | - | 50.89 | - | - | - | - | - | 50.89 |
| Paper, pulp and print | 908.57 | - | - | - | - | - | - | - | 908.57 |
| Construction | 6,210.08 | - | 225.38 | - | - | - | - | - | 6,435.46 |
| Textile and leather | 574.50 | - | 116.25 | - | - | - | - | - | 690.75 |
| Non-specified (industry) | 1,66,327.01 | - | 24,814.54 | 501.62 | - | - | - | 36,422.98 | 2,28,066.15 |
| **Transport** | **-** | **-** | **36,268.71** | **376.75** | **-** | **-** | **-** | **1,427.08** | **38,072.55** |
| Road | - | - | 26,375.69 | - | - | - | - | - | 26,375.69 |
| Domestic aviation | - | - | 5,983.65 | - | - | - | - | - | 5,983.65 |
| Rail | - | - | 2,822.29 | - | - | - | - | 1,427.08 | 4,249.37 |
| Pipeline transport | - | - | - | 376.75 | - | - | - | - | 376.75 |
| Domestic navigation | - | - | 698.25 | - | - | - | - | - | 698.25 |
| Non-specified (transport) | - | - | 388.84 | - | - | - | - | - | 388.84 |
| **Other** | **-** | **-** | **1,12,764.35** | **5,198.93** | **-** | **-** | **-** | **48,252.36** | **1,66,215.64** |
| Residential | - | - | 26,367.03 | 5,026.00 | - | - | - | 20,543.34 | 51,936.37 |
| Commercial and public services | - | - | - | - | - | - | - | 7,399.18 | 7,399.18 |
| Agriculture/forestry | - | - | 714.19 | 172.93 | - | - | - | 14,893.91 | 15,781.03 |
| Fishing | - | - | - | - | - | - | - | - | - |
| Non-specified (other) | - | - | 85,683.13 | - | - | - | - | 5,415.94 | 91,099.07 |
| **Non-energy use** | **-** | **-** | **-** | **19,469.70** | **-** | **-** | **-** | **-** | **19,469.70** |
| Non-energy use industry/transformation/en | - | - | - | 19,469.70 | - | - | - | - | 19,469.70 |
| **Elect. output in GWh** | **-** | **-** | **-** | **-** | **37,414.00** | **1,21,487.00** | **4,11,786.00** | **-** | **5,70,687.00** |
| Elec output-main activity producer ele plants | - | - | - | - | 37,414.00 | 1,21,377.00 | 4,11,786.00 | - | 5,70,577.00 |
| Elec output-autoproducer electricity plants | - | - | - | - | - | 110.00 | - | - | 110.00 |

**P: Provisional**

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

Total Supply = 675405

Total Final Consumption = 519286




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

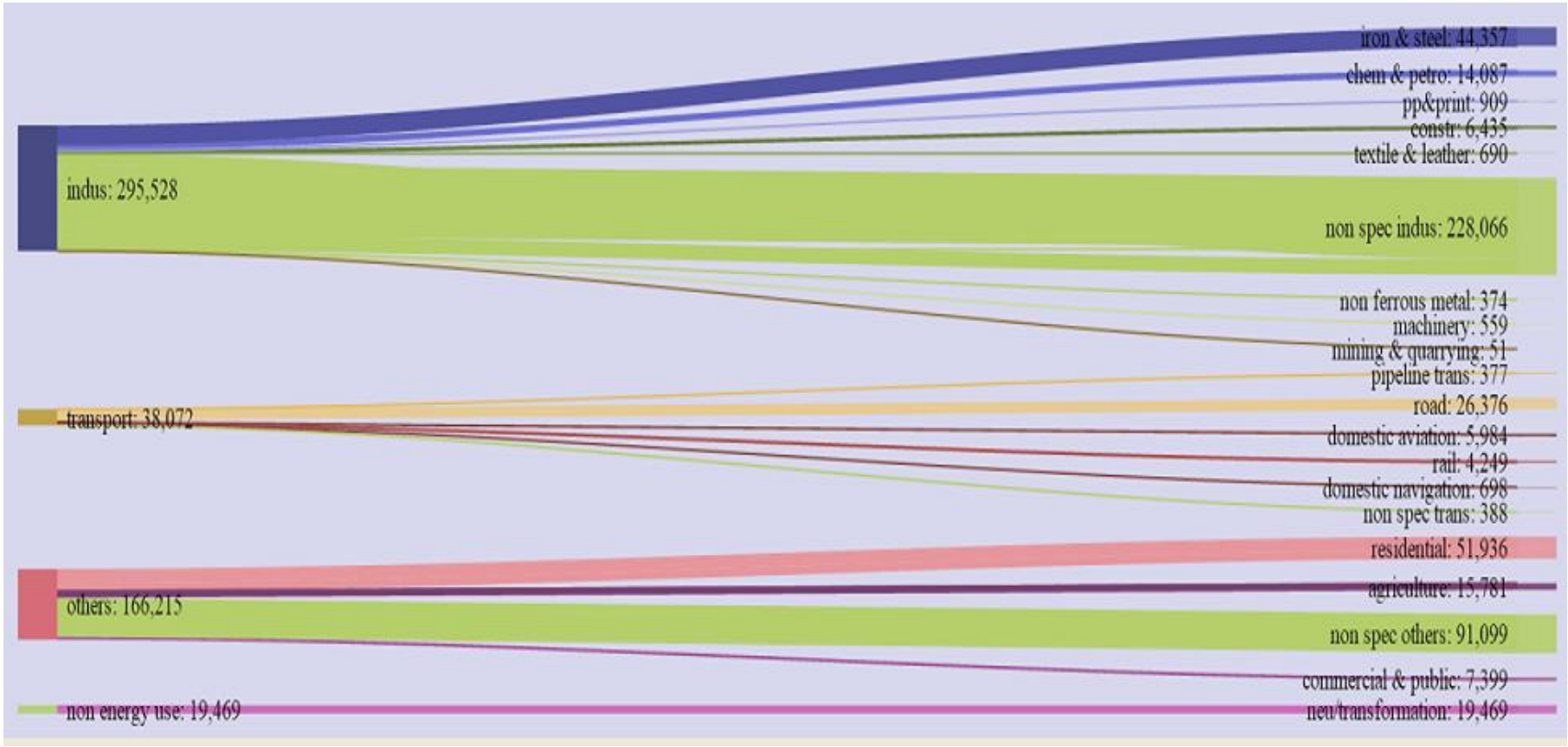
Indus -Industries
SW-Solar & Wind
pp-pulp

Source Program for diagram: SankeyMATIC

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

Total Consumption = 519286

Consumption by Sectors




Chem$petro- chemical and petroleum
constr -construction
trans- transport
produ - production
Cons -Consumption

Indus -Industries
SW-Solar & Wind
pp-pulp
spec-specific

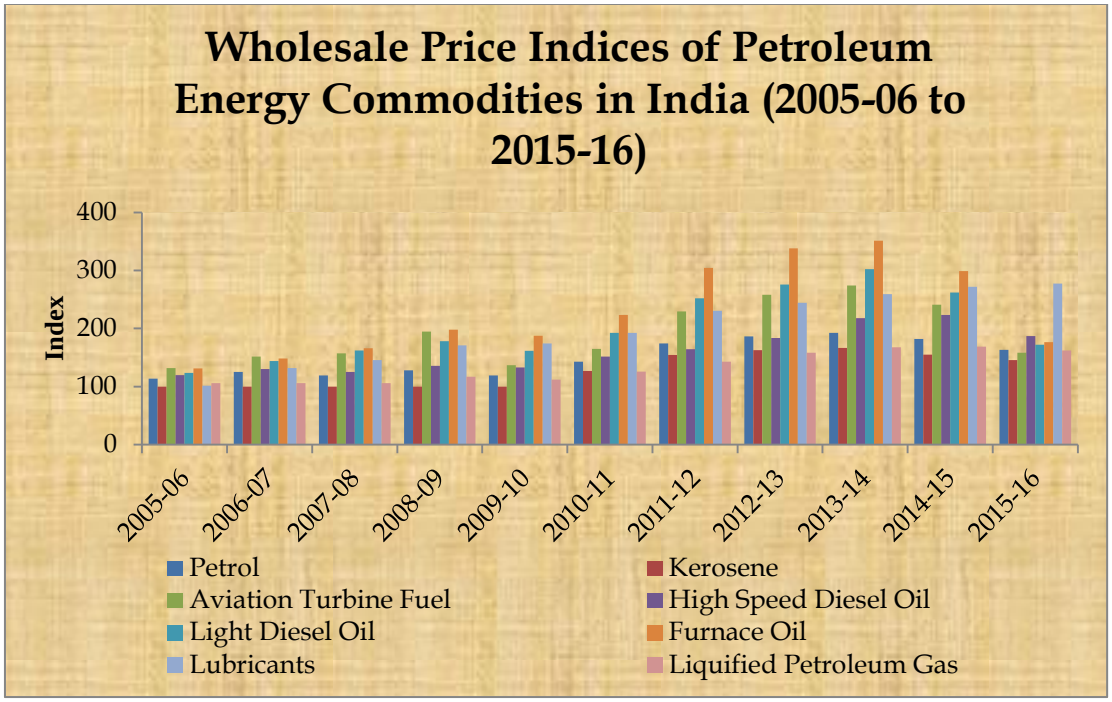
Source Program for diagram: SankeyMATIC

# CHAPTER 8: WHOLE SALE PRICE INDEX OF ENERGY COMMODITIES

## *8.1 The Wholesale Price Index of Petroleum Products*

- Annual increase (2015-16 over 2014-15) in Wholesale Price Index of Petroleum Products varied for different products ranging from -41.05% (Furnace Oil) to 2.11% (Lubricants).

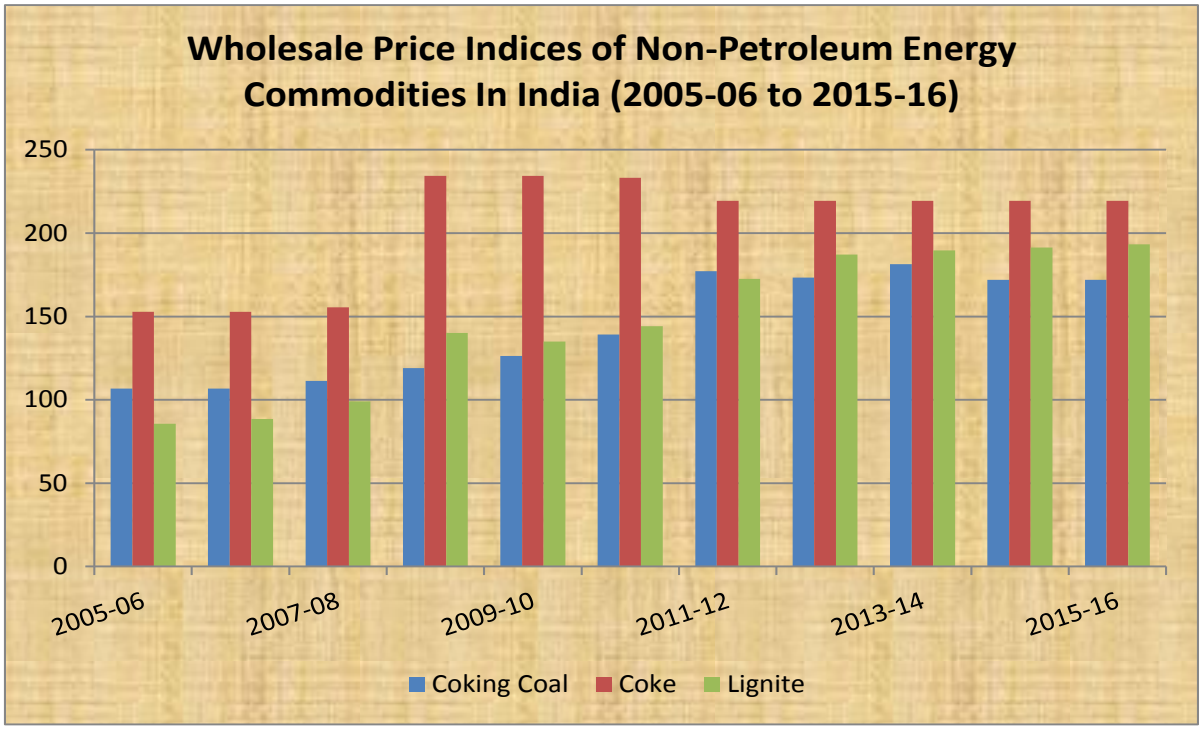
- The maximum decrease was observed in Furnace Oil (-41.05%), followed by Light Speed Diesel Oil (-34.36%).




## *8.2 The Wholesale Price Index of Non-Petroleum Products*

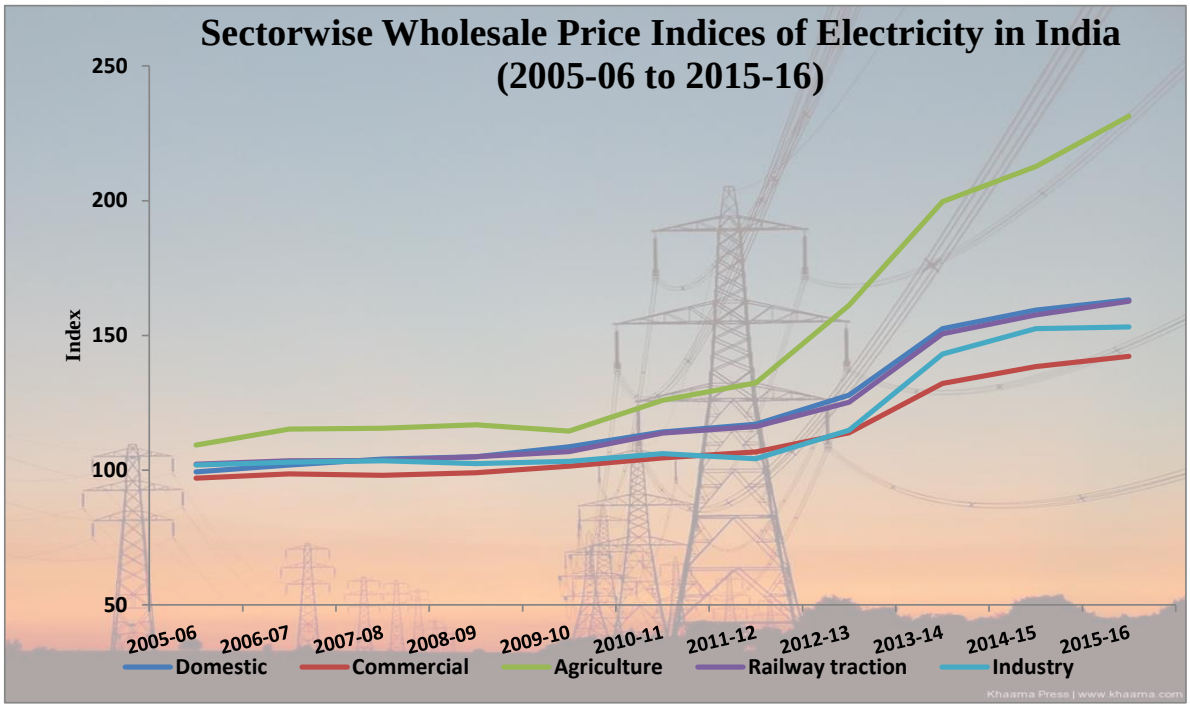
- The wholesale price index remained constant for Coke at 219.3 for the period 2015-16 over 2014-15.

- Wholesale Price Index of Electricity recorded an increase of 3.74% during 2015-16 over 2014-15.




### *8.2 Sector Wise Wholesale Price Indices of Electricity*

- The movement of index for sector-wise electricity show that the maximum annual growth was observed in agriculture (8.79%) followed by railway traction (3.17%). For industries, the annual growth rate in the index was minimum (0.39%).



# Table 8.1 : Wholesale Price Indices of Energy Commodities in India

(2004-05=100)

| | Petroleum Products | | | | | | | | Coking Coal | Coke | Lignite | Electricity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Petrol | Kero-sene | Aviation Turbine Fuel | High Speed Diesel Oil | Light Diesel Oil | Furnace Oil | Lubri-cants | Liquified Petroleum Gas | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| 2005-06 | 113.6 | 99.9 | 132.0 | 119.7 | 123.4 | 131.2 | 101.9 | 106.1 | 106.7 | 152.7 | 85.7 | 102.6 |
| 2006-07 | 125.3 | 99.9 | 151.6 | 130.2 | 143.8 | 148.4 | 131.8 | 106.1 | 106.7 | 152.7 | 88.5 | 105.3 |
| 2007-08 | 119.1 | 99.9 | 157.4 | 125.6 | 162.3 | 166.0 | 145.8 | 106.1 | 111.4 | 155.4 | 99.1 | 106.2 |
| 2008-09 | 128.3 | 99.9 | 194.5 | 135.8 | 178.3 | 197.9 | 171.1 | 117.2 | 119.0 | 234.4 | 140.0 | 106.4 |
| 2009-10 | 119.3 | 99.9 | 137.0 | 133.0 | 161.5 | 187.6 | 174.5 | 111.9 | 126.3 | 234.4 | 134.9 | 107.4 |
| 2010-11 | 143.0 | 127.2 | 164.9 | 151.7 | 192.5 | 223.7 | 192.6 | 125.9 | 139.2 | 233.1 | 144.1 | 113.2 |
| 2011-12 | 174.4 | 154.4 | 229.4 | 164.5 | 252.0 | 304.6 | 230.4 | 143.2 | 177.1 | 219.3 | 172.6 | 115.0 |
| 2012-13 | 186.3 | 162.9 | 257.9 | 183.6 | 275.7 | 337.8 | 244.6 | 158.5 | 173.4 | 219.3 | 187.0 | 129.8 |
| 2013-14 | 192.6 | 166.5 | 274.0 | 217.8 | 302.5 | 351.1 | 259.5 | 168.0 | 181.3 | 219.3 | 189.7 | 158.7 |
| 2014-15 | 182.1 | 155.2 | 241.0 | 223.3 | 262.0 | 299.1 | 271.8 | 169.1 | 172.0 | 219.3 | 191.3 | 168.0 |
| 2015-16 | 163.5 | 145.4 | 158.5 | 186.9 | 172.0 | 176.3 | 277.5 | 162.1 | 172.0 | 219.3 | 193.3 | 174.3 |
| **Increase in 2015-16 over 2014-15 (%)** | **-10.25** | **-6.27** | **-34.22** | **-16.28** | **-34.36** | **-41.05** | **2.11** | **-4.10** | **0.00** | **0.00** | **1.05** | **3.74** |

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

# Table 8.2 : Sector Wise Wholesale Price Indices of Electricity

(2004-05=100)

| | Electricity | | | | | |
|---|---|---|---|---|---|---|
| Year | Domestic | Commercial | Agriculture | Railway traction | Industry | Total |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 2005-06 | 99.3 | 97.0 | 109.3 | 102.2 | 101.9 | 102.6 |
| 2006-07 | 101.9 | 98.6 | 115.3 | 103.5 | 102.9 | 105.3 |
| 2007-08 | 104.1 | 98.1 | 115.5 | 103.5 | 103.5 | 106.2 |
| 2008-09 | 104.9 | 99.0 | 116.8 | 104.9 | 102.4 | 106.4 |
| 2009-10 | 108.7 | 101.4 | 114.5 | 106.9 | 103.2 | 107.4 |
| 2010-11 | 114.2 | 104.5 | 125.9 | 113.8 | 106.1 | 113.2 |
| 2011-12 | 117.0 | 106.7 | 132.4 | 116.2 | 104.2 | 115.0 |
| 2012-13 | 127.8 | 113.8 | 161.2 | 125.2 | 114.8 | 129.8 |
| 2013-14 | 152.5 | 132.2 | 199.6 | 150.6 | 143.1 | 158.7 |
| 2014-15 | 159.4 | 138.4 | 212.7 | 157.6 | 152.6 | 168.0 |
| 2015-16 | 163.2 | 142.2 | 231.4 | 162.6 | 153.2 | 174.3 |
| **Increase in 2015-16 over 2014-15 (%)** | **2.38** | **2.75** | **8.79** | **3.17** | **0.39** | **3.74** |

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

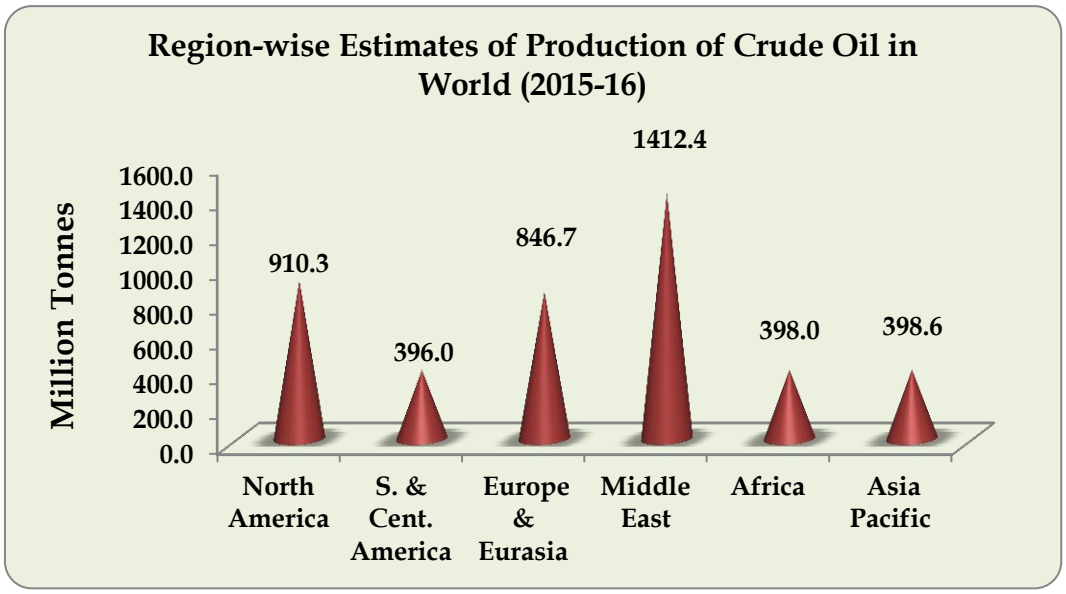
# CHAPTER 9: WORLD PRODUCTION AND CONSUMPTION OF CRUDE OIL & NATURAL GAS

## *9.1 Production and consumption of crude oil*

- The total estimated production of crude oil in the world has increased from about 3963.3 MT in 2006-07 to about 4119.2 MT during 2012-13, and further increased to 4361.9 MT during 2015-16 (Table 9.1). The production increased by 3.2% from 2014-15 to 2015-16.

- Geographical distribution of total world production during 2015-16 across major regions reveals that Middle East accounted for the highest share (32.38%), followed by North America (20.87%), Europe & Eurasia (19.41%), Asia Pacific (9.14%), Africa (9.12%) and South & Central America (9.10%). (Table 9.1)

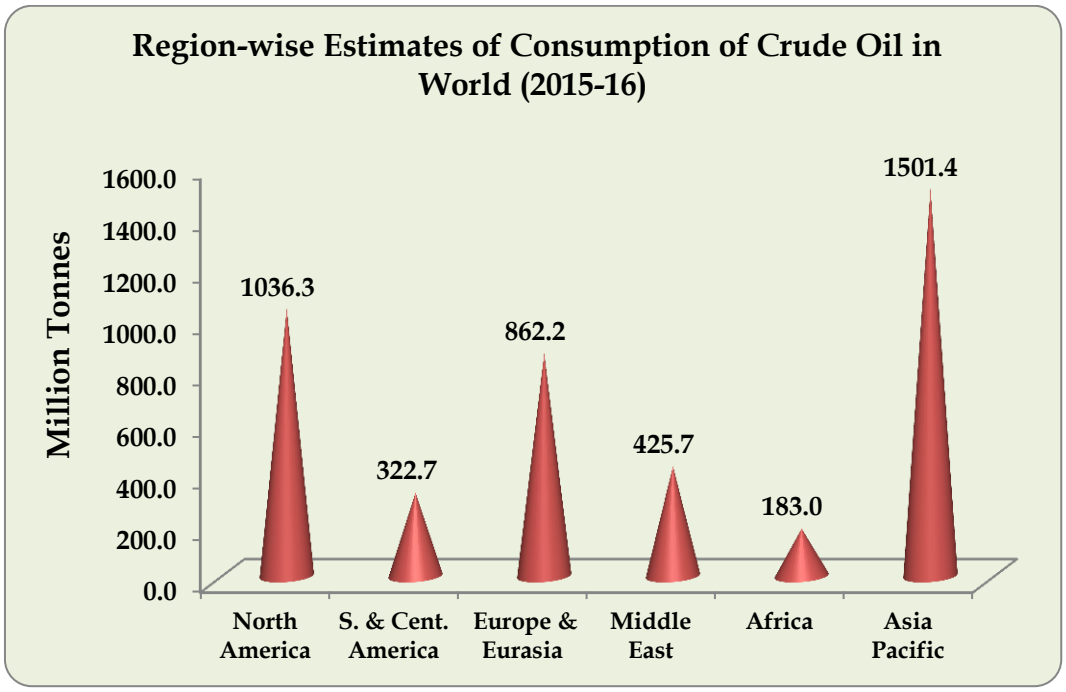
- Distribution of total world production according to countries shows that Saudi Arabia and USA were the first and second highest producers with 13.03% and 13.0% respectively. They were followed by Russian Federation (12.40%), Canada (4.94%), China (4.92%), Iraq (4.52%), Iran (4.19%), UAE(4.02%), Kuwait (3.42%), Venezuela (3.1%), Brazil (3%), Mexico (2.92%) and Nigeria (2.59%) . India has accounted for only 0.94% of the world production.




- Region-wise consumption (Table 9.2) shows that Asia Pacific accounted for the highest share (34.66%) of total world consumption, followed by North America (23.93%), and Europe & Eurasia (19.91%). African countries accounted for the lowest share in the world consumption (4.23%).

- Country-wise distribution of consumption reveals that the United States was the largest consumer of crude oil, consuming 19.66% of the world consumption during 2015-16. China was the second largest consumer (12.92%), followed by **India (4.51%)**, Japan (4.38%), Saudi Arabia (3.88%) and Russian federation (3.30%).

- 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 3199.5 Mtoe in 2015-16. The production has increased by 1.7% from 2014-15 to 2015-16 (Table 9.3).

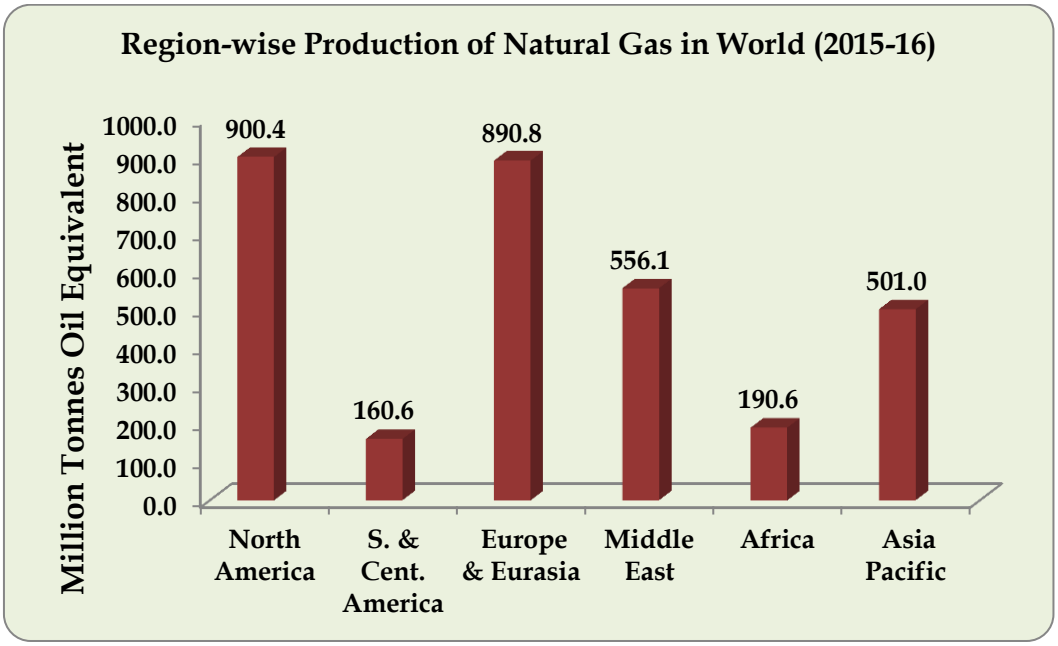
- Distribution of production of natural gas over major regions shows that North America (28.14%) and Europe & Eurasia (27.84%) are the highest and the second highest producers, together accounting for 55.98% of the total world production.

- Country-wise, USA was the largest producer of natural gas (22.04%) in the world during 2015-16, followed by the Russian Federation (16.13%), Iran (5.41%) and Qatar (5.1%). India's share in the total world production of natural gas during 2015-16 was only 0.91% (26.3 Mtoe).(Table 9.3)

- The growth in production of natural gas from 2014-15 to 2015-16 was the highest in Middle East (5.9%), followed by Asia pacific (3.6%), South & Central

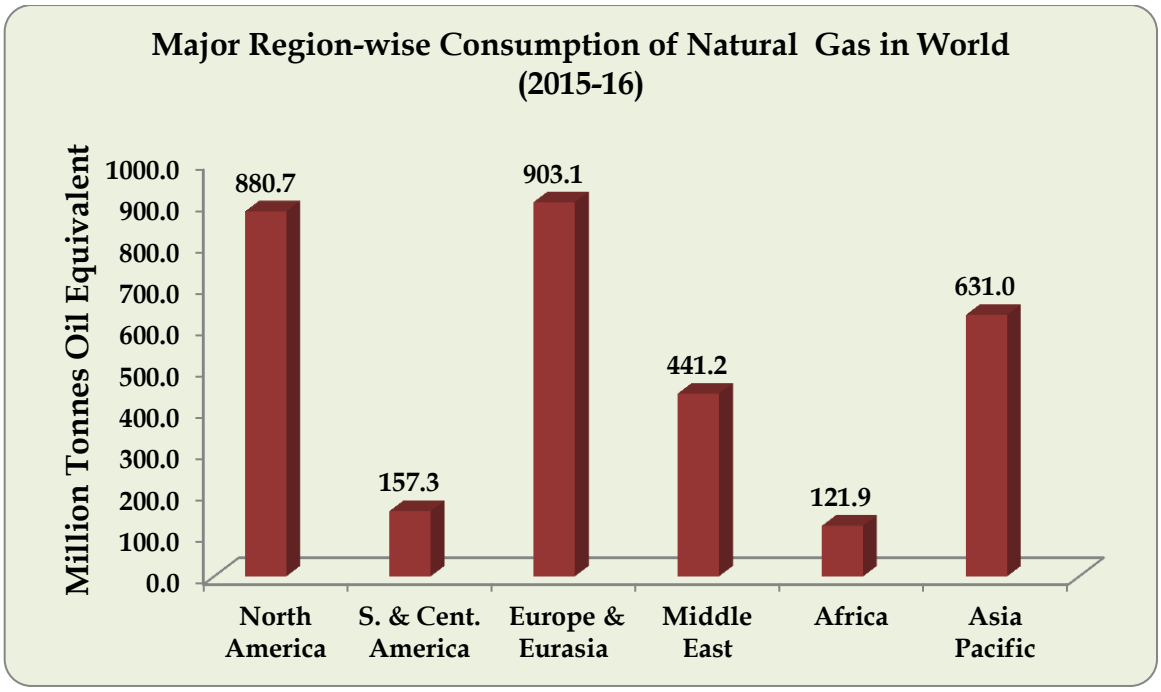
America (1.3%), Africa (1%), North America (0.9%) and Europe & Eurasia (0.6%). (Table 9.3)

❖ The total world consumption of natural gas has increased from 2675.5 Mtoe in 2007-08 to 3135.2 Mtoe in 2015-16 (Table 9.4).




❖ Country-wise distribution of consumption of natural gas indicates that USA was the largest consumer (22.8%), followed by Russian federation (11.24%), China (5.7%) and Iran (5.49%) respectively. India with a consumption of 45.5 Mtoe accounted for only 1.45% of total world consumption (Table 9.4).

❖ Consumption of natural gas over major regions shows that Europe & Eurasia (28.81%) and North America (28.09%) are the highest and the second highest consumers, together accounting for 57.9% of the total world consumption (Table 9.4).


Major Region-wise Consumption of Natural Gas in World (2015-16)
Million Tonnes Oil Equivalent
1000.0
900.0
800.0
700.0
600.0
500.0
400.0
300.0
200.0
100.0
0.0
880.7
157.3
903.1
441.2
121.9
631.0
North America
S. & Cent. America
Europe & Eurasia
Middle East
Africa
Asia Pacific

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

(Million tonnes)

| Country/ | 2006-07 | 2007-08 | 2008-09 | 2009-10 | 2010-11 | 2011-12 | 2012-13 | 2013-14 | 2014-15 | 2015-16 | % Change 2015-16 over 2014-15 | 2015-16 % Share of World's Total Production |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **North America** | | | | | | | | | | | | |
| USA | 304.7 | 305.2 | 302.3 | 322.5 | 332.8 | 345.0 | 393.7 | 448.0 | 522.8 | 567.3 | 8.5 | 13.00 |
| Canada | 150.6 | 166.3 | 152.9 | 152.8 | 160.3 | 169.8 | 182.6 | 195.0 | 209.6 | 215.5 | 2.8 | 4.94 |
| Mexico | 182.5 | 172.2 | 156.9 | 146.7 | 145.7 | 144.6 | 143.9 | 141.9 | 137.1 | 127.6 | -6.9 | 2.92 |
| **Total North** | **637.8** | **632.7** | **612.2** | **622.0** | **638.8** | **659.4** | **720.2** | **785.0** | **869.5** | **910.3** | **4.7** | **20.87** |
| **South and Central America** | | | | | | | | | | | | |
| Argentina | 39.1 | 38.0 | 36.5 | 33.6 | 33.0 | 30.6 | 30.7 | 30.1 | 29.7 | 29.7 | 0.1 | 0.7 |
| Brazil | 93.7 | 95.2 | 98.9 | 105.8 | 111.4 | 114.1 | 112.1 | 109.8 | 122.1 | 131.8 | 7.9 | 3.0 |
| Colombia | 27.9 | 28.0 | 31.1 | 35.3 | 41.4 | 48.2 | 49.9 | 52.9 | 52.2 | 53.1 | 1.7 | 1.2 |
| Ecuador | 28.8 | 27.5 | 27.2 | 26.1 | 26.1 | 26.8 | 27.1 | 28.2 | 29.8 | 29.1 | -2.4 | 0.7 |
| Peru | 4.6 | 4.6 | 4.7 | 4.8 | 5.1 | 4.9 | 4.9 | 4.8 | 5.3 | 4.8 | -11.0 | 0.1 |
| Trinidad & | 9.6 | 8.2 | 7.0 | 6.8 | 6.3 | 6.0 | 5.2 | 5.2 | 5.1 | 4.9 | -4.9 | 0.1 |
| Venezuela | 171.0 | 165.5 | 165.6 | 155.7 | 145.7 | 141.6 | 139.2 | 137.6 | 138.2 | 135.2 | -2.1 | 3.1 |
| Other S. & | 7.1 | 7.1 | 7.1 | 6.6 | 6.9 | 7.0 | 7.3 | 7.5 | 7.6 | 7.4 | -1.7 | 0.2 |
| **Total S. &** | **381.8** | **374.1** | **378.1** | **374.6** | **375.8** | **379.0** | **376.2** | **376.1** | **390.0** | **396.0** | **1.5** | **9.1** |
| **Europe and Eurasia** | | | | | | | | | | | | |
| Azerbaijan | 32.3 | 42.6 | 44.5 | 50.4 | 50.8 | 45.6 | 43.4 | 43.5 | 42.1 | 41.7 | -1.0 | 0.96 |
| Denmark | 16.7 | 15.2 | 14.0 | 12.9 | 12.2 | 10.9 | 10.0 | 8.7 | 8.1 | 7.7 | -5.4 | 0.18 |
| Italy | 5.8 | 5.9 | 5.2 | 4.6 | 5.1 | 5.3 | 5.4 | 5.6 | 5.8 | 5.5 | -5.2 | 0.13 |
| Kazakhstan | 66.1 | 67.1 | 70.7 | 76.5 | 79.7 | 80.1 | 79.2 | 81.8 | 80.8 | 79.3 | -1.9 | 1.82 |
| Norway | 129.0 | 118.6 | 114.7 | 108.7 | 98.9 | 93.8 | 87.3 | 83.2 | 85.3 | 88.0 | 3.2 | 2.02 |
| Romania | 5.0 | 4.7 | 4.7 | 4.5 | 4.3 | 4.2 | 4.0 | 4.1 | 4.1 | 4.0 | -1.0 | 0.09 |
| Russian | 485.6 | 496.8 | 493.7 | 500.8 | 511.8 | 518.8 | 526.1 | 531.1 | 534.1 | 540.7 | 1.2 | 12.40 |
| Turkmenistan | 9.2 | 9.8 | 10.3 | 10.5 | 10.8 | 10.8 | 11.2 | 11.7 | 12.1 | 12.7 | 5.0 | 0.29 |
| United | 76.5 | 76.6 | 71.7 | 68.2 | 63.0 | 52.0 | 44.6 | 40.7 | 39.9 | 45.3 | 13.4 | 1.04 |
| Uzbekistan | 5.4 | 4.9 | 4.8 | 4.5 | 3.7 | 3.6 | 3.2 | 3.2 | 3.1 | 3.0 | -2.9 | 0.07 |
| Other Europe | 21.7 | 21.6 | 20.6 | 19.9 | 19.2 | 19.3 | 19.2 | 19.6 | 19.2 | 18.7 | -2.4 | 0.43 |
| **Total** | **853.2** | **863.8** | **855.0** | **861.4** | **859.3** | **844.4** | **833.3** | **833.0** | **834.7** | **846.7** | **1.4** | **19.41** |
| **Middle East** | | | | | | | | | | | | |
| Iran | 209.2 | 210.9 | 213.0 | 205.6 | 211.9 | 212.7 | 180.5 | 169.6 | 174.7 | 182.6 | 4.5 | 4.19 |
| Iraq | 98.0 | 105.1 | 119.3 | 119.9 | 121.5 | 136.7 | 152.5 | 153.2 | 160.3 | 197.0 | 22.9 | 4.52 |
| Kuwait | 133.7 | 129.9 | 136.1 | 121.0 | 123.4 | 140.9 | 154.0 | 151.5 | 150.8 | 149.1 | -1.1 | 3.42 |
| Oman | 36.6 | 35.2 | 37.6 | 40.2 | 42.8 | 43.8 | 45.0 | 46.1 | 46.2 | 46.6 | 0.8 | 1.07 |
| Qatar | 56.8 | 57.9 | 64.7 | 62.6 | 71.1 | 78.0 | 82.2 | 80.2 | 79.6 | 79.3 | -0.4 | 1.82 |
| Saudi Arabia | 508.9 | 488.9 | 509.9 | 456.7 | 473.8 | 526.0 | 549.8 | 538.4 | 543.4 | 568.5 | 4.6 | 13.03 |
| Syria | 21.0 | 20.1 | 20.3 | 20.0 | 19.2 | 17.6 | 8.5 | 3.0 | 1.6 | 1.3 | -18.3 | 0.03 |
| United Arab | 144.3 | 139.6 | 141.4 | 126.2 | 133.3 | 151.3 | 154.8 | 165.5 | 166.6 | 175.5 | 5.3 | 4.02 |
| Yemen | 18.1 | 15.9 | 14.8 | 14.4 | 14.3 | 11.2 | 8.8 | 6.9 | 6.6 | 2.1 | -67.8 | 0.05 |
| Other Middle | 8.9 | 9.5 | 9.5 | 9.4 | 9.4 | 9.9 | 9.0 | 10.2 | 10.5 | 10.4 | -0.5 | 0.24 |
| **Total** | **1235.7** | **1213.0** | **1266.4** | **1176.0** | **1220.7** | **1327.9** | **1345.1** | **1324.6** | **1340.3** | **1412.4** | **5.4** | **32.38** |

Contd….

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

(Million Tonnes)

| Country/ Region | 2006-07 | 2007-08 | 2008-09 | 2009-10 | 2010-11 | 2011-12 | 2012-13 | 2013-14 | 2014-15 | 2015-16 | % Change 2015-16 | 2015-16 % Share of World's |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Africa** | | | | | | | | | | | | |
| Algeria | 86.2 | 86.5 | 85.6 | 77.2 | 73.8 | 71.7 | 67.2 | 64.8 | 68.8 | 68.5 | -0.4 | 1.57 |
| Angola | 69.3 | 82.1 | 93.5 | 87.6 | 90.5 | 83.8 | 86.9 | 87.3 | 83.0 | 88.7 | 6.8 | 2.03 |
| Chad | 8.0 | 7.5 | 6.7 | 6.2 | 6.4 | 6.0 | 5.3 | 4.4 | 4.3 | 4.1 | -4.8 | 0.09 |
| Rep. of Congo (Braz | 14.0 | 11.4 | 12.3 | 14.2 | 16.2 | 15.5 | 15.2 | 14.5 | 14.2 | 14.3 | 0.5 | 0.33 |
| Egypt | 34.5 | 33.8 | 34.7 | 35.3 | 35.0 | 34.6 | 34.7 | 34.4 | 35.1 | 35.6 | 1.4 | 0.82 |
| Equatorial Guinea | 15.6 | 15.9 | 16.1 | 14.2 | 12.6 | 11.6 | 12.7 | 12.4 | 13.1 | 13.5 | 3.2 | 0.31 |
| Gabon | 12.1 | 12.3 | 12.0 | 12.0 | 12.7 | 12.7 | 12.3 | 11.8 | 11.8 | 11.6 | -1.4 | 0.27 |
| Libya | 85.3 | 85.3 | 85.5 | 77.4 | 77.6 | 22.5 | 71.1 | 46.4 | 23.3 | 20.2 | -13.4 | 0.46 |
| Nigeria | 116.6 | 110.2 | 103.8 | 107.6 | 122.1 | 119.1 | 117.2 | 111.5 | 114.8 | 113.0 | -1.5 | 2.59 |
| South Sudan | - | - | - | - | - | - | 1.5 | 4.9 | 7.7 | 7.3 | -4.8 | 0.17 |
| Sudan | 16.3 | 23.8 | 22.6 | 23.4 | 22.8 | 14.3 | 5.1 | 5.8 | 5.9 | 5.2 | -12.4 | 0.12 |
| Tunisia | 3.3 | 4.6 | 4.6 | 4.3 | 4.0 | 3.7 | 3.9 | 3.6 | 3.4 | 2.9 | -14.0 | 0.07 |
| Other Africa | 11.2 | 9.7 | 9.3 | 9.2 | 8.1 | 10.9 | 11.0 | 12.1 | 12.1 | 13.1 | 7.9 | 0.30 |
| **Total Africa** | **472.3** | **483.0** | **486.6** | **468.6** | **481.8** | **406.3** | **444.0** | **413.9** | **397.5** | **398.0** | **0.1** | **9.12** |
| **Asia Pacific** | | | | | | | | | | | | |
| Australia | 23.3 | 24.7 | 24.1 | 22.4 | 24.5 | 21.5 | 21.4 | 17.8 | 19.1 | 17.0 | -10.9 | 0.39 |
| Brunei | 10.8 | 9.5 | 8.6 | 8.3 | 8.5 | 8.1 | 7.8 | 6.6 | 6.2 | 6.2 | 0.3 | 0.14 |
| China | 184.8 | 186.3 | 190.4 | 189.5 | 203.0 | 202.9 | 207.5 | 210.0 | 211.4 | 214.6 | 1.5 | 4.92 |
| **India** | **37.8** | **36.4** | **37.8** | **38.0** | **41.3** | **42.9** | **42.6** | **42.5** | **41.6** | **41.2** | -1.1 | 0.94 |
| Indonesia | 50.2 | 47.8 | 49.4 | 48.4 | 48.6 | 46.3 | 44.6 | 42.7 | 41.2 | 40.0 | -3.0 | 0.92 |
| Malaysia | 32.7 | 33.8 | 34.0 | 32.2 | 32.6 | 29.4 | 29.8 | 28.5 | 29.8 | 31.9 | 6.9 | 0.73 |
| Thailand | 12.5 | 13.2 | 14.0 | 14.6 | 14.8 | 15.4 | 16.7 | 16.5 | 16.3 | 17.2 | 6.0 | 0.40 |
| Vietnam | 17.2 | 16.3 | 15.2 | 16.7 | 15.6 | 15.8 | 17.3 | 17.4 | 18.1 | 17.4 | -3.4 | 0.40 |
| Other Asia Pacific | 13.1 | 13.9 | 14.8 | 14.4 | 13.8 | 13.0 | 12.7 | 12.0 | 12.9 | 13.1 | 1.4 | 0.30 |
| **Total Asia Pacific** | **382.4** | **382.0** | **388.5** | **384.4** | **402.7** | **395.3** | **400.4** | **394.0** | **396.6** | **398.6** | **0.5** | **9.14** |
| | | | | | | | | | | | | |
| **TOTAL WORLD** | **3963.3** | **3948.6** | **3986.8** | **3887.0** | **3979.1** | **4012.4** | **4119.2** | **4126.6** | **4228.7** | **4361.9** | **3.2** | **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.

**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 | % Change 2015-16 over 2014-15 | 2015-16 % Share of World's Total Consumption |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **North America** | | | | | | | | | | | |
| US | 928.8 | 875.4 | 833.2 | 850.1 | 834.9 | 817 | 832.1 | 838.1 | 851.6 | 1.61 | 19.66 |
| Canada | 102.3 | 101.2 | 95 | 101.6 | 105 | 103.3 | 103.5 | 103.3 | 100.3 | -2.90 | 2.32 |
| Mexico | 92 | 91.6 | 88.5 | 88.6 | 90.3 | 92.3 | 89.7 | 85.2 | 84.3 | -1.06 | 1.95 |
| **Total North America** | **1123.1** | **1068.2** | **1016.7** | **1040.3** | **1030.2** | **1012.6** | **1025.3** | **1026.6** | **1036.3** | **0.94** | **23.93** |
| **South and Central America** | | | | | | | | | | | |
| Argentina | 24 | 24.9 | 24.3 | 28.1 | 28.3 | 29.7 | 31.1 | 30.9 | 31.6 | 2.27 | 0.73 |
| Brazil | 102.2 | 110.1 | 110.3 | 120 | 125.9 | 128.8 | 137.4 | 143.4 | 137.3 | -4.25 | 3.17 |
| Chile | 17 | 18.6 | 18.2 | 16 | 17.6 | 17.5 | 16.8 | 16.7 | 16.9 | 1.20 | 0.39 |
| Colombia | 10.7 | 11.7 | 10.7 | 11.9 | 12.8 | 13.9 | 13.8 | 14.6 | 15.5 | 6.16 | 0.36 |
| Ecuador | 8.5 | 8.7 | 8.9 | 10.3 | 10.5 | 10.9 | 11.6 | 12 | 11.7 | -2.50 | 0.27 |
| Peru | 7.1 | 8 | 8.2 | 8.6 | 9.5 | 9.6 | 10.2 | 10.2 | 10.9 | 6.86 | 0.25 |
| Trinidad & Tobago | 1.6 | 1.8 | 1.7 | 1.9 | 1.7 | 1.6 | 1.7 | 1.8 | 1.8 | 0.00 | 0.04 |
| Venezuela | 29.7 | 33.8 | 34.2 | 34.2 | 34.6 | 37.2 | 38.1 | 36.7 | 32 | -12.81 | 0.74 |
| Cent. America | 61.6 | 63.5 | 62.8 | 63.6 | 64.8 | 63.9 | 62.1 | 63.6 | 65 | 2.20 | 1.50 |
| **America** | **262.6** | **281.1** | **279.3** | **294.6** | **305.6** | **312.9** | **322.9** | **329.8** | **322.7** | **-2.15** | **7.45** |
| **Europe and Eurasia** | | | | | | | | | | | |
| Austria | 13.4 | 13.4 | 12.8 | 13.4 | 12.7 | 12.5 | 12.7 | 12.5 | 12.6 | 0.80 | 0.29 |
| Azerbaijan | 4.5 | 3.6 | 3.3 | 3.2 | 4 | 4.2 | 4.5 | 4.4 | 4.5 | 2.27 | 0.10 |
| Belarus | 8 | 7.9 | 9.3 | 7.5 | 8.6 | 10.4 | 7.1 | 7.3 | 7.1 | -2.74 | 0.16 |
| Belgium | 33.7 | 35.9 | 31.5 | 33 | 30.8 | 29.6 | 30.2 | 29.8 | 30.5 | 2.35 | 0.70 |
| Bulgaria | 4.8 | 4.8 | 4.3 | 3.9 | 3.8 | 3.9 | 3.6 | 3.9 | 4.2 | 7.69 | 0.10 |
| Czech Republic | 9.7 | 9.9 | 9.7 | 9.2 | 9 | 8.9 | 8.5 | 9.1 | 9.4 | 3.30 | 0.22 |
| Denmark | 9.4 | 9.3 | 8.3 | 8.4 | 8.3 | 7.8 | 7.7 | 7.9 | 8.1 | 2.53 | 0.19 |
| Finland | 10.6 | 10.5 | 9.9 | 10.4 | 9.7 | 9.2 | 9 | 8.6 | 8.3 | -3.49 | 0.19 |
| France | 91.4 | 90.8 | 87.5 | 84.5 | 83 | 80.3 | 79.3 | 76.9 | 76.1 | -1.04 | 1.76 |
| Germany | 112.5 | 118.9 | 113.9 | 115.4 | 112 | 111.4 | 113.4 | 110.4 | 110.2 | -0.18 | 2.54 |
| Greece | 21.7 | 20.4 | 19.5 | 18.1 | 17 | 15.3 | 14.5 | 14.4 | 14.8 | 2.78 | 0.34 |
| Hungary | 7.7 | 7.5 | 7.1 | 6.7 | 6.3 | 5.9 | 5.8 | 6.5 | 7 | 7.69 | 0.16 |
| Republic of Ireland | 9.4 | 9 | 8 | 7.6 | 6.8 | 6.5 | 6.5 | 6.5 | 6.9 | 6.15 | 0.16 |
| Italy | 84 | 80.4 | 75.1 | 73.1 | 70.5 | 64.2 | 59.4 | 55.8 | 59.3 | 6.27 | 1.37 |
| Kazakhstan | 11.3 | 11 | 8.9 | 9.3 | 12.3 | 13.1 | 13.1 | 13.5 | 12.7 | -5.93 | 0.29 |
| Lithuania | 2.8 | 3.1 | 2.6 | 2.7 | 2.6 | 2.7 | 2.6 | 2.6 | 2.6 | 0.00 | 0.06 |
| Netherlands | 50.7 | 47.3 | 45.9 | 45.9 | 46.1 | 43.7 | 41.4 | 39.6 | 38.7 | -2.27 | 0.89 |
| Norway | 10.7 | 10.4 | 10.7 | 10.8 | 10.6 | 10.5 | 10.8 | 10.2 | 10.2 | 0.00 | 0.24 |
| Poland | 24.2 | 25.3 | 25.3 | 26.7 | 26.6 | 25.7 | 23.8 | 23.9 | 25.1 | 5.02 | 0.58 |
| Portugal | 14.7 | 14.1 | 13.2 | 13 | 12.1 | 11 | 11.3 | 11.1 | 11.4 | 2.70 | 0.26 |
| Romania | 10.3 | 10.4 | 9.2 | 8.8 | 9.1 | 9.2 | 8.4 | 9 | 9.1 | 1.11 | 0.21 |
| Russian Federation | 130 | 133.6 | 128.2 | 133.3 | 142.2 | 144.6 | 144.9 | 150.8 | 143 | -5.17 | 3.30 |
| Slovakia | 3.6 | 3.9 | 3.7 | 3.9 | 3.9 | 3.6 | 3.6 | 3.4 | 3.8 | 11.76 | 0.09 |
| Spain | 80.3 | 78 | 73.5 | 72.1 | 68.8 | 64.7 | 59.3 | 59 | 60.5 | 2.54 | 1.40 |
| Sweden | 16.9 | 16.7 | 15.5 | 16.2 | 14.8 | 14.6 | 14.4 | 14.5 | 14.1 | -2.76 | 0.33 |
| Switzerland | 11.3 | 12.1 | 12.3 | 11.4 | 11 | 11.2 | 11.8 | 10.6 | 10.7 | 0.94 | 0.25 |
| Turkey | 33.6 | 32.1 | 32.6 | 31.8 | 31.1 | 31.6 | 32.7 | 34.4 | 38.8 | 12.79 | 0.90 |
| Turkmenistan | 5.2 | 5.3 | 5 | 5.5 | 5.8 | 6 | 6.2 | 6.3 | 6.4 | 1.59 | 0.15 |
| Ukraine | 14.7 | 14.2 | 13.5 | 12.6 | 13.1 | 12.5 | 11.9 | 10 | 8.4 | -16.00 | 0.19 |
| United Kingdom | 79.2 | 79.5 | 75.8 | 74.9 | 73.7 | 71.2 | 70.6 | 69.9 | 71.6 | 2.43 | 1.65 |
| Uzbekistan | 4.7 | 4.6 | 4.3 | 3.6 | 3.4 | 3 | 2.9 | 2.8 | 2.8 | 0.00 | 0.06 |
| Other Europe & Eurasia | 32.5 | 35.8 | 35 | 34.7 | 34.5 | 33.4 | 32.6 | 32.8 | 33.1 | 0.91 | 0.76 |
| **Total Europe & Eurasia** | **957.7** | **959.5** | **915.4** | **911.3** | **904.3** | **882.7** | **864.7** | **858.6** | **862.2** | **0.42** | **19.91** |

contd...

## Table 9.2(Contd.) : COUNTRYWISE ESTIMATES OF CONSUMPTION 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 | % Change 2015-16 over 2014-15 | 2015-16 % Share of World's Total Consumption |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Middle East** | | | | | | | | | | | |
| Iran | 89.4 | 93.1 | 95.4 | 86.8 | 88.0 | 89.0 | 95.5 | 93.1 | 88.9 | -4.51 | 2.05 |
| Israel | 12.1 | 12.0 | 10.8 | 11.2 | 11.8 | 13.9 | 10.9 | 10.3 | 11.0 | 6.80 | 0.25 |
| Kuwait | 17.9 | 19.0 | 20.4 | 21.6 | 20.4 | 21.5 | 22.7 | 22.7 | 23.6 | 3.96 | 0.54 |
| Qatar | 5.3 | 6.2 | 6.0 | 6.5 | 8.0 | 8.3 | 9.4 | 10.0 | 10.9 | 9.00 | 0.25 |
| Saudi Arabia | 98.1 | 114.4 | 125.9 | 137.1 | 139.1 | 146.2 | 147.3 | 160.1 | 168.1 | 5.00 | 3.88 |
| United Arab Emirates | 28.9 | 30.2 | 28.9 | 30.8 | 33.3 | 34.5 | 35.1 | 37.6 | 40.0 | 6.38 | 0.92 |
| Other Middle East | 62.4 | 68.5 | 71.1 | 74.3 | 74.9 | 76.8 | 81.0 | 83.2 | 83.3 | 0.12 | 1.92 |
| **Total Middle East** | **314.1** | **343.4** | **358.6** | **368.3** | **375.6** | **390.3** | **402.0** | **417.1** | **425.7** | **2.06** | **9.83** |
| **Africa** | | | | | | | | | | | |
| Algeria | 12.9 | 14.0 | 14.9 | 14.8 | 15.8 | 16.9 | 17.7 | 18.2 | 19.3 | 6.04 | 0.45 |
| Egypt | 30.6 | 32.6 | 34.4 | 36.3 | 33.7 | 35.3 | 35.7 | 38.3 | 39.2 | 2.35 | 0.91 |
| South Africa | 26.6 | 25.7 | 24.2 | 26.6 | 28.1 | 28.2 | 27.9 | 29.3 | 31.1 | 6.14 | 0.72 |
| Other Africa | 75.0 | 80.9 | 82.9 | 86.7 | 82.7 | 88.5 | 92.0 | 91.4 | 93.5 | 2.30 | 2.16 |
| **Total Africa** | **145.0** | **153.2** | **156.3** | **164.5** | **160.3** | **168.9** | **173.3** | **177.2** | **183.0** | **3.27** | **4.23** |
| **Asia Pacific** | | | | | | | | | | | |
| Australia | 42.5 | 42.7 | 43.1 | 43.4 | 45.6 | 47.2 | 46.7 | 45.4 | 46.2 | 1.76 | 1.07 |
| Bangladesh | 3.7 | 3.8 | 3.5 | 3.9 | 5.1 | 5.4 | 5.3 | 5.7 | 5.5 | -3.51 | 0.13 |
| China | 369.3 | 377.5 | 392.2 | 447.9 | 464.2 | 486.3 | 507.2 | 526.8 | 559.7 | 6.25 | 12.92 |
| SAR | 16.4 | 14.8 | 16.9 | 17.8 | 18.0 | 17.2 | 17.6 | 16.7 | 18.3 | 9.58 | 0.42 |
| **India** | **138.1** | **144.7** | **152.6** | **155.4** | **163.0** | **173.6** | **175.3** | **180.8** | **195.5** | 8.13 | 4.51 |
| Indonesia | 60.9 | 60.1 | 59.7 | 64.2 | 73.1 | 74.7 | 74.6 | 76.0 | 73.5 | -3.29 | 1.70 |
| Japan | 230.9 | 224.8 | 200.4 | 202.7 | 203.6 | 217.0 | 208.0 | 197.3 | 189.6 | -3.90 | 4.38 |
| Malaysia | 30.8 | 29.5 | 29.2 | 29.3 | 31.0 | 32.6 | 34.7 | 35.0 | 36.2 | 3.43 | 0.84 |
| New Zealand | 7.1 | 7.2 | 6.9 | 7.0 | 7.0 | 7.0 | 7.1 | 7.2 | 7.5 | 4.17 | 0.17 |
| Pakistan | 19.2 | 20.0 | 21.8 | 21.3 | 21.5 | 20.5 | 21.7 | 22.8 | 25.2 | 10.53 | 0.58 |
| Philippines | 14.1 | 13.3 | 14.0 | 14.6 | 13.8 | 14.4 | 14.9 | 16.1 | 18.4 | 14.29 | 0.42 |
| Singapore | 48.3 | 51.4 | 55.5 | 61.0 | 63.7 | 63.3 | 64.0 | 65.9 | 69.5 | 5.46 | 1.60 |
| South Korea | 107.6 | 103.1 | 103.7 | 105.0 | 105.8 | 108.8 | 108.3 | 107.9 | 113.7 | 5.38 | 2.63 |
| Taiwan | 51.2 | 45.9 | 46.1 | 47.2 | 44.5 | 44.6 | 45.1 | 45.4 | 46.0 | 1.32 | 1.06 |
| Thailand | 45.1 | 44.4 | 45.9 | 47.7 | 49.7 | 52.4 | 54.6 | 54.9 | 56.6 | 3.10 | 1.31 |
| Vietnam | 13.3 | 14.1 | 14.6 | 15.6 | 16.9 | 17.3 | 17.5 | 18.0 | 19.5 | 8.33 | 0.45 |
| Other Asia Pacific | 16.4 | 15.6 | 16.4 | 16.9 | 18.7 | 19.1 | 19.1 | 20.4 | 20.6 | 0.98 | 0.48 |
| **Total Asia Pacific** | **1214.8** | **1212.7** | **1222.4** | **1300.9** | **1345.5** | **1401.2** | **1421.8** | **1442.2** | **1501.4** | **4.10** | **34.66** |
| | | | | | | | | | | | |
| **TOTAL WORLD** | **4017.3** | **4018.1** | **3948.7** | **4079.9** | **4121.6** | **4168.6** | **4209.9** | **4251.6** | **4331.3** | **1.87** | **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.

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

Source : Ministry of Petroleum & Natural Gas

## Table 9.3: 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 | % Change 2015-16 over 2014-15 | 2015-16 % Share of World's Total Consumption |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **North America** | | | | | | | | | | | |
| USA | 498.6 | 521.7 | 532.7 | 549.5 | 589.8 | 620.2 | 626.4 | 669.1 | 705.3 | 5.4 | 22.04 |
| Canada | 164.4 | 158.9 | 147.6 | 143.9 | 143.7 | 140.2 | 140.5 | 145.8 | 147.2 | 0.2 | 4.60 |
| Mexico | 48.2 | 48.0 | 53.4 | 51.8 | 52.4 | 51.5 | 52.4 | 51.4 | 47.9 | 1.7 | 1.50 |
| **Total North America** | **711.2** | **728.7** | **733.6** | **745.2** | **786.0** | **811.8** | **819.3** | **866.3** | **900.4** | **0.9** | **28.14** |
| **South and Central America** | | | | | | | | | | | |
| Argentina | 40.4 | 39.7 | 37.2 | 36.1 | 34.9 | 34.0 | 32.0 | 31.9 | 32.8 | -5.8 | 1.03 |
| Bolivia | 12.4 | 12.9 | 11.1 | 12.8 | 14.0 | 16.0 | 18.3 | 18.9 | 18.8 | 14.2 | 0.59 |
| Brazil | 10.1 | 12.6 | 10.7 | 13.1 | 15.1 | 17.3 | 19.2 | 20.4 | 20.6 | 10.7 | 0.64 |
| Colombia | 6.8 | 8.2 | 9.5 | 10.1 | 9.9 | 10.8 | 11.4 | 10.6 | 9.9 | 5.5 | 0.31 |
| Peru | 2.4 | 3.1 | 3.1 | 6.5 | 10.2 | 10.7 | 11.0 | 11.6 | 11.3 | 2.8 | 0.35 |
| Trinidad & Tobago | 38.0 | 37.8 | 39.3 | 40.3 | 38.8 | 38.5 | 38.6 | 37.9 | 35.7 | 0.3 | 1.11 |
| Venezuela | 32.5 | 29.5 | 27.9 | 27.6 | 24.8 | 26.5 | 25.6 | 25.8 | 29.2 | -3.5 | 0.91 |
| Other S. & Cent. America | 3.5 | 3.1 | 3.1 | 3.1 | 2.7 | 2.5 | 2.4 | 2.4 | 2.4 | -4.4 | 0.07 |
| **Total S. & Cent. America** | **146.1** | **146.7** | **142.0** | **149.6** | **150.3** | **156.2** | **158.3** | **159.4** | **160.6** | **1.3** | **5.02** |
| **Europe and Eurasia** | | | | | | | | | | | |
| Azerbaijan | 8.8 | 13.3 | 13.3 | 13.6 | 13.3 | 14.0 | 14.6 | 15.8 | 16.4 | 3.8 | 0.51 |
| Denmark | 8.3 | 9.1 | 7.6 | 7.4 | 5.9 | 5.2 | 4.4 | 4.2 | 4.1 | -15.8 | 0.13 |
| Germany | 12.9 | 11.7 | 11.0 | 9.6 | 9.0 | 8.1 | 7.4 | 7.0 | 6.5 | -9.1 | 0.20 |
| Italy | 8.0 | 7.6 | 6.6 | 6.9 | 7.0 | 7.1 | 6.3 | 5.9 | 5.6 | -10.8 | 0.17 |
| Kazakhstan | 13.6 | 10.4 | 9.7 | 9.5 | 9.4 | 10.2 | 10.7 | 11.0 | 11.1 | 4.8 | 0.35 |
| Netherlands | 54.5 | 60.0 | 56.4 | 63.4 | 57.7 | 57.4 | 61.8 | 50.1 | 38.7 | 7.6 | 1.21 |
| Norway | 81.3 | 90.1 | 94.0 | 96.5 | 91.1 | 103.3 | 97.9 | 97.9 | 105.4 | -5.2 | 3.30 |
| Poland | 3.9 | 3.7 | 3.7 | 3.7 | 3.9 | 3.9 | 3.8 | 3.7 | 3.7 | -2.3 | 0.12 |
| Romania | 10.4 | 9.0 | 8.9 | 8.6 | 8.7 | 9.0 | 8.6 | 8.8 | 9.3 | -4.5 | 0.29 |
| Russian Federation | 532.8 | 541.6 | 474.9 | 530.0 | 546.3 | 533.1 | 544.2 | 523.6 | 516.0 | 2.1 | 16.13 |
| Turkmenistan | 58.9 | 59.5 | 32.7 | 38.1 | 53.6 | 56.1 | 56.1 | 62.3 | 65.2 | 0.1 | 2.04 |
| Ukraine | 16.9 | 17.1 | 17.4 | 16.7 | 16.8 | 16.7 | 16.6 | 16.1 | 15.7 | -0.7 | 0.49 |
| United Kingdom | 64.9 | 62.7 | 53.7 | 51.4 | 40.7 | 35.0 | 32.8 | 33.1 | 35.7 | -6.2 | 1.12 |
| Uzbekistan | 52.4 | 52.0 | 50.0 | 49.0 | 51.3 | 51.2 | 51.2 | 51.6 | 52.0 | -0.1 | 1.62 |
| Other Europe & Eurasia | 9.6 | 8.9 | 8.7 | 8.8 | 8.3 | 7.6 | 6.6 | 5.9 | 5.6 | -13.4 | 0.18 |
| **Total Europe & Eurasia** | **937.0** | **956.5** | **848.5** | **913.1** | **923.0** | **917.9** | **923.0** | **896.9** | **890.8** | **0.6** | **27.84** |
| **Middle East** | | | | | | | | | | | |
| Bahrain | 10.6 | 11.4 | 11.5 | 11.8 | 12.0 | 12.4 | 13.2 | 13.9 | 14.0 | 7.0 | 0.44 |
| Iran | 112.5 | 117.8 | 129.3 | 137.1 | 143.9 | 149.5 | 150.1 | 163.8 | 173.2 | 0.4 | 5.41 |
| Iraq | 1.3 | 1.7 | 1.0 | 1.2 | 0.8 | 0.6 | 1.1 | 0.8 | 0.9 | 82.8 | 0.03 |
| Kuwait | 10.9 | 11.5 | 10.3 | 10.6 | 12.2 | 14.0 | 14.7 | 13.5 | 13.5 | 5.2 | 0.42 |
| Oman | 21.6 | 23.4 | 24.3 | 26.4 | 27.8 | 29.0 | 31.3 | 30.0 | 31.4 | 8.1 | 0.98 |
| Qatar | 56.9 | 69.3 | 80.4 | 118.1 | 130.7 | 141.3 | 159.8 | 156.7 | 163.3 | 13.1 | 5.10 |
| Saudi Arabia | 67.0 | 72.4 | 70.6 | 78.9 | 83.0 | 89.4 | 90.0 | 92.1 | 95.8 | 0.7 | 2.99 |
| Syria | 5.0 | 4.8 | 5.3 | 7.2 | 6.4 | 5.2 | 4.6 | 4.2 | 3.9 | -12.4 | 0.12 |
| United Arab Emirates | 45.3 | 45.2 | 44.0 | 46.2 | 47.1 | 48.9 | 49.1 | 48.8 | 50.2 | 0.6 | 1.57 |
| Yemen | - | - | 0.7 | 5.6 | 8.1 | 6.6 | 8.9 | 8.4 | 2.4 | 35.9 | 0.08 |
| Other Middle East | 2.7 | 3.3 | 2.6 | 3.1 | 4.0 | 2.4 | 5.9 | 6.9 | 7.6 | 146.0 | 0.24 |
| **Total Middle East** | **333.7** | **360.6** | **380.0** | **446.0** | **476.0** | **499.2** | **528.8** | **539.2** | **556.1** | **5.9** | **17.38** |

Contd….

# 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 | % Change 2015-16 over 2014-15 | % Share of World's Total Consumption for 2015-16 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Africa** | | | | | | | | | | | |
| Algeria | 76.3 | 77.2 | 71.6 | 72.4 | 74.4 | 73.4 | 74.2 | 75.0 | 74.7 | 1.1 | 2.40 |
| Egypt | 50.1 | 53.1 | 56.4 | 55.2 | 55.3 | 54.8 | 50.5 | 43.9 | 41.0 | -13.1 | 1.40 |
| Libya | 13.8 | 14.3 | 14.3 | 15.1 | 7.1 | 11.0 | 9.3 | 10.6 | 11.5 | 14.0 | 0.35 |
| Nigeria | 33.2 | 32.5 | 23.4 | 33.6 | 36.5 | 39.0 | 32.6 | 40.5 | 45.1 | 24.2 | 1.11 |
| Other Africa | 10.9 | 13.6 | 14.0 | 15.7 | 17.2 | 16.3 | 18.8 | 17.1 | 18.3 | -9.0 | 0.57 |
| **Total Africa** | **184.3** | **190.8** | **179.7** | **192.0** | **190.5** | **194.4** | **185.3** | **187.2** | **190.6** | **1.0** | **5.83** |
| **Asia Pacific** | | | | | | | | | | | |
| Australia | 36.0 | 40.0 | 44.1 | 47.3 | 46.7 | 50.6 | 52.1 | 55.2 | 60.3 | 6.0 | 1.59 |
| Bangladesh | 14.3 | 15.3 | 17.5 | 18.0 | 18.3 | 20.0 | 20.5 | 21.5 | 24.1 | 4.9 | 0.68 |
| Brunei | 11.0 | 10.9 | 10.3 | 11.1 | 11.5 | 11.3 | 11.0 | 10.7 | 11.4 | -2.7 | 0.34 |
| China | 64.4 | 74.8 | 79.4 | 89.2 | 98.1 | 100.7 | 110.0 | 118.4 | 124.2 | 7.6 | 3.87 |
| **India** | **27.1** | **27.5** | **33.8** | **44.3** | **40.1** | **34.9** | 29.0 | **27.4** | **26.3** | -5.5 | 0.91 |
| Indonesia | 64.4 | 66.4 | 69.2 | 77.1 | 73.3 | 69.4 | **68.8** | 67.7 | 67.5 | -1.6 | 2.11 |
| Malaysia | 55.4 | 57.3 | 54.8 | 54.8 | 55.8 | 55.4 | 60.4 | 60.0 | 61.4 | -0.7 | 1.91 |
| Myanmar | 12.2 | 11.2 | 10.4 | 11.2 | 11.5 | 11.5 | 11.8 | 15.2 | 17.6 | 28.8 | 0.49 |
| Pakistan | 36.5 | 37.3 | 37.4 | 38.1 | 38.1 | 39.4 | 38.4 | 37.7 | 37.7 | -1.8 | 1.21 |
| Thailand | 23.4 | 25.9 | 27.8 | 32.6 | 33.3 | 37.3 | 37.6 | 37.9 | 35.8 | 0.8 | 1.21 |
| Vietnam | 6.4 | 6.7 | 7.2 | 8.5 | 7.6 | 8.4 | 8.8 | 9.2 | 9.6 | 4.5 | 0.29 |
| Other Asia Pacific | 15.6 | 16.0 | 16.3 | 15.9 | 16.0 | 15.9 | 16.3 | 20.4 | 24.9 | 25.2 | 0.67 |
| **Total Asia Pacific** | **366.6** | **389.3** | **408.3** | **448.0** | **450.3** | **454.5** | 464.6 | **481.3** | **501.0** | **3.6** | **15.28** |
| | | | | | | | | | | | |
| **TOTAL WORLD** | **2678.9** | **2772.5** | **2692.1** | **2894.0** | **2976.1** | **3034.0** | **3079.2** | **3130.3** | **3199.5** | **2.2** | **100.0** |

* Excluding gas flared or recyled

Source : Ministry of Petroleum & Natural Gas

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

(in Million Tonnes Oil Equivalent)

| Country/ Region | 2007-08 | 2008-09 | 2009-10 | 2010-11 | 2011-12 | 2012-13 | 2013-14 | 2014-15 | 2015-16 | % Change 2015-16 over 2014-15 | % Share of World's Total Consumption for 2015-16 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **North America** | | | | | | | | | | | |
| USA | 596.3 | 600.8 | 590.1 | 619.3 | 628.8 | 657.4 | 675.8 | 692.7 | 713.6 | 3.0 | 22.76 |
| Canada | 86.6 | 86.5 | 85.4 | 85.5 | 90.8 | 90.2 | 93.5 | 93.8 | 92.2 | -1.7 | 2.94 |
| Mexico | 57.1 | 59.7 | 65.0 | 65.2 | 68.9 | 71.9 | 74.9 | 78.1 | 74.9 | -4.1 | 2.39 |
| **Total North America** | **739.9** | **747.0** | **740.5** | **770.0** | **788.6** | **819.6** | **843.9** | **864.6** | **880.7** | **1.9** | **28.09** |
| **South and Central America** | | | | | | | | | | | |
| Argentina | 39.5 | 40.0 | 37.9 | 38.9 | 40.7 | 42.2 | 41.8 | 42.4 | 42.8 | 0.9 | 1.37 |
| Brazil | 19.1 | 22.4 | 18.1 | 24.1 | 24.0 | 28.5 | 33.6 | 35.5 | 36.8 | 3.7 | 1.17 |
| Chile | 4.1 | 2.1 | 2.2 | 4.4 | 4.5 | 4.1 | 4.1 | 3.4 | 3.5 | 2.9 | 0.11 |
| Colombia | 6.7 | 6.8 | 7.8 | 8.2 | 8.0 | 8.9 | 9.0 | 9.8 | 9.5 | -3.1 | 0.30 |
| Ecuador | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.5 | 0.6 | 0.6 | 0.6 | 0.0 | 0.02 |
| Peru | 2.4 | 3.1 | 3.1 | 5.0 | 5.6 | 6.1 | 5.9 | 6.5 | 6.8 | 4.6 | 0.22 |
| Trinidad & Tobago | 19.7 | 19.2 | 19.9 | 20.9 | 21.0 | 20.0 | 20.2 | 19.8 | 19.4 | -2.0 | 0.62 |
| Venezuela | 32.5 | 30.9 | 29.0 | 29.0 | 26.7 | 28.3 | 27.5 | 27.7 | 31.1 | 12.3 | 0.99 |
| Other S. & Cent. America | 3.9 | 4.3 | 4.5 | 4.8 | 5.5 | 6.1 | 6.6 | 6.9 | 6.9 | 0.0 | 0.22 |
| **Total S. & Cent. America** | **128.5** | **129.1** | **123.1** | **135.8** | **136.4** | **144.5** | **149.2** | **152.6** | **157. 30** | **19.4** | **5.02** |
| **Europe and Eurasia** | | | | | | | | | | | |
| Austria | 8.0 | 8.5 | 8.2 | 9.0 | 8.4 | 8.1 | 7.7 | 7.1 | 7.5 | 5.6 | 0.24 |
| Azerbaijan | 7.2 | 8.2 | 7.0 | 6.7 | 7.3 | 7.7 | 7.7 | 8.5 | 8.8 | 3.5 | 0.28 |
| Belarus | 16.9 | 17.4 | 14.5 | 17.8 | 16.5 | 16.7 | 16.7 | 16.5 | 15.5 | -6.1 | 0.49 |
| Belgium | 14.9 | 14.8 | 15.1 | 17.0 | 14.2 | 14.4 | 14.2 | 12.4 | 13.6 | 9.7 | 0.43 |
| Bulgaria | 2.9 | 2.9 | 2.1 | 2.3 | 2.6 | 2.5 | 2.4 | 2.4 | 2.6 | 8.3 | 0.08 |
| Czech Republic | 7.8 | 7.1 | 6.7 | 7.6 | 6.9 | 6.9 | 6.9 | 6.2 | 6.5 | 4.8 | 0.21 |
| Denmark | 4.1 | 4.1 | 4.0 | 4.5 | 3.8 | 3.5 | 3.4 | 2.8 | 2.9 | 3.6 | 0.09 |
| Finland | 3.5 | 3.6 | 3.2 | 3.6 | 3.1 | 2.7 | 2.6 | 2.3 | 1.9 | -17.4 | 0.06 |
| France | 38.2 | 39.9 | 38.4 | 42.6 | 37.0 | 38.2 | 38.8 | 32.6 | 35.1 | 7.7 | 1.12 |
| Germany | 74.6 | 77.0 | 72.6 | 75.7 | 69.5 | 69.7 | 73.1 | 64.0 | 67.2 | 5.0 | 2.14 |
| Greece | 3.3 | 3.5 | 2.9 | 3.2 | 4.0 | 3.6 | 3.2 | 2.4 | 2.5 | 4.2 | 0.08 |
| Hungary | 12.2 | 12.1 | 10.5 | 11.3 | 10.0 | 9.1 | 8.3 | 7.5 | 8.0 | 6.7 | 0.26 |
| Republic of Ireland | 4.3 | 4.5 | 4.3 | 4.7 | 4.1 | 4.0 | 3.8 | 3.7 | 3.8 | 2.7 | 0.12 |
| Italy | 70.0 | 69.5 | 63.9 | 68.1 | 63.8 | 61.4 | 57.4 | 50.7 | 55.3 | 9.1 | 1.76 |
| Kazakhstan | 7.3 | 6.3 | 6.0 | 4.0 | 4.6 | 6.1 | 6.3 | 6.9 | 7.8 | 13.0 | 0.25 |
| Lithuania | 3.3 | 2.6 | 2.2 | 2.5 | 2.7 | 2.7 | 2.2 | 2.1 | 2.1 | 0.0 | 0.07 |
| Netherlands | 33.3 | 34.7 | 35.0 | 39.2 | 34.2 | 32.7 | 33.3 | 28.8 | 28.6 | -0.7 | 0.91 |
| Norway | 3.8 | 3.9 | 3.7 | 3.7 | 4.0 | 3.9 | 4.0 | 4.2 | 4.3 | 2.4 | 0.14 |
| Poland | 12.4 | 13.5 | 13.0 | 14.0 | 14.1 | 15.0 | 15.0 | 14.6 | 15.1 | 3.4 | 0.48 |
| Portugal | 3.9 | 4.3 | 4.2 | 4.6 | 4.7 | 4.0 | 3.8 | 3.7 | 3.9 | 5.4 | 0.12 |
| Romania | 14.5 | 12.6 | 10.5 | 10.8 | 11.0 | 11.2 | 10.2 | 9.5 | 9.3 | -2.1 | 0.30 |
| Russian Federation | 379.8 | 374.4 | 350.7 | 372.7 | 382.1 | 374.6 | 372.1 | 370.7 | 352.3 | -5.0 | 11.24 |
| Slovakia | 5.1 | 5.2 | 4.4 | 5.0 | 4.6 | 4.4 | 4.8 | 3.8 | 3.9 | 2.6 | 0.12 |
| Spain | 31.8 | 34.9 | 31.2 | 31.1 | 28.9 | 28.6 | 26.1 | 23.7 | 24.8 | 4.6 | 0.79 |
| Sweden | 0.9 | 0.8 | 1.0 | 1.4 | 1.1 | 1.0 | 1.0 | 0.8 | 0.8 | 0.0 | 0.03 |
| Switzerland | 2.6 | 2.5 | 2.4 | 2.7 | 2.4 | 2.6 | 2.8 | 2.4 | 2.6 | 8.3 | 0.08 |
| Turkey | 32.5 | 33.8 | 32.1 | 35.1 | 36.8 | 37.3 | 37.6 | 40.2 | 39.2 | -2.5 | 1.25 |
| Turkmenistan | 19.1 | 19.3 | 17.7 | 20.4 | 21.2 | 23.7 | 20.6 | 24.9 | 30.9 | 24.1 | 0.99 |
| Ukraine | 56.9 | 54.0 | 42.1 | 47.0 | 48.3 | 44.6 | 38.9 | 33.1 | 25.9 | -21.8 | 0.83 |
| United Kingdom | 81.9 | 84.4 | 78.3 | 84.8 | 70.3 | 66.5 | 65.7 | 60.0 | 61.4 | 2.3 | 1.96 |
| Uzbekistan | 41.3 | 43.8 | 35.9 | 36.8 | 42.9 | 42.5 | 42.2 | 43.9 | 45.3 | 3.2 | 1.44 |
| Other Europe & Eurasia | 16.2 | 15.4 | 13.4 | 14.8 | 14.9 | 14.7 | 13.5 | 13.4 | 13.7 | 2.2 | 0.44 |
| **Total Europe & Eurasia** | **1014.5** | **1019.4** | **937.4** | **1004.4** | **980.2** | **964.4** | **946.1** | **905.8** | **903.1** | **-0.3** | **28.81** |

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 | % Change 2015-16 over 2014-15 | 2015-16 % Share of World's Total Consumption |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Middle East** | | | | | | | | | | | |
| Iran | 113.0 | 119.9 | 128.4 | 137.6 | 146.0 | 145.4 | 146.6 | 162.0 | 172.1 | 6.2 | 5.49 |
| Israel | 2.5 | 3.4 | 3.8 | 4.8 | 4.5 | 2.3 | 6.2 | 6.8 | 7.6 | 11.8 | 0.24 |
| Kuwait | 10.9 | 11.5 | 11.1 | 13.1 | 14.9 | 16.6 | 16.8 | 16.8 | 17.5 | 4.2 | 0.56 |
| Qatar | 17.4 | 17.1 | 17.9 | 28.9 | 18.7 | 23.3 | 38.4 | 35.7 | 40.6 | 13.7 | 1.29 |
| Saudi Arabia | 67.0 | 72.4 | 70.6 | 78.9 | 83.0 | 89.4 | 90.0 | 92.1 | 95.8 | 4.0 | 3.06 |
| United Arab Emirates | 44.3 | 53.5 | 53.2 | 54.7 | 56.9 | 59.0 | 60.5 | 59.6 | 62.2 | 4.4 | 1.98 |
| Other Middle East | 29.1 | 34.5 | 37.4 | 41.6 | 40.2 | 40.2 | 43.7 | 42.2 | 45.4 | 7.6 | 1.45 |
| **Total Middle East** | **284.1** | **312.3** | **322.4** | **359.6** | **364.2** | **376.1** | **402.2** | **415.3** | **441.2** | **6.2** | **14.07** |
| **Africa** | | | | | | | | | | | |
| Algeria | 21.9 | 22.8 | 24.5 | 23.7 | 25.1 | 27.9 | 30.0 | 33.7 | 35.1 | 4.2 | 1.12 |
| Egypt | 34.5 | 36.8 | 38.3 | 40.6 | 44.7 | 47.3 | 46.3 | 43.2 | 43.0 | -0.5 | 1.37 |
| South Africa | 3.1 | 3.4 | 3.0 | 3.5 | 3.7 | 4.0 | 4.1 | 4.5 | 4.5 | 0.0 | 0.14 |
| Other Africa | 26.9 | 27.7 | 23.8 | 28.6 | 29.4 | 31.8 | 30.1 | 34.1 | 39.2 | 15.0 | 1.25 |
| **Total Africa** | **86.4** | **90.6** | **89.6** | **96.5** | **102.8** | **111.0** | **110.6** | **115.6** | **121.9** | 5.5 | **3.89** |
| **Asia Pacific** | | | | | | | | | | | |
| Australia | 23.9 | 28.7 | 29.0 | 29.9 | 29.2 | 29.9 | 30.9 | 32.4 | 30.9 | -4.6 | 0.99 |
| Bangladesh | 14.3 | 15.3 | 17.5 | 18.0 | 18.3 | 20.0 | 20.5 | 21.5 | 24.1 | 12.1 | 0.77 |
| China | 65.6 | 75.7 | 83.3 | 100.1 | 123.4 | 135.8 | 154.7 | 169.6 | 177.6 | 4.7 | 5.66 |
| China Hong Kong SAR | 2.5 | 2.9 | 2.8 | 3.4 | 2.7 | 2.5 | 2.4 | 2.3 | 2.9 | 26.1 | 0.09 |
| **India** | **36.3** | **37.4** | **45.6** | **55.3** | **55.7** | **51.8** | **45.3** | **45.6** | **45.5** | -0.2 | 1.45 |
| Indonesia | 30.7 | 35.2 | 37.3 | 39.1 | 37.9 | 38.0 | 36.7 | 36.8 | 35.8 | -2.7 | 1.14 |
| Japan | 81.2 | 84.4 | 78.7 | 85.1 | 95.0 | 105.2 | 105.2 | 106.2 | 102.1 | -3.9 | 3.26 |
| Malaysia | 31.9 | 35.3 | 31.8 | 31.0 | 31.3 | 31.9 | 36.3 | 36.7 | 35.8 | -2.5 | 1.14 |
| New Zealand | 3.6 | 3.4 | 3.6 | 3.9 | 3.5 | 3.8 | 4.0 | 4.4 | 4.1 | -6.8 | 0.13 |
| Pakistan | 36.5 | 37.3 | 37.4 | 38.1 | 38.1 | 39.4 | 38.4 | 37.7 | 39.0 | 3.4 | 1.24 |
| Philippines | 3.2 | 3.4 | 3.4 | 3.2 | 3.5 | 3.3 | 3.0 | 3.2 | 3.0 | -6.3 | 0.10 |
| Singapore | 7.7 | 8.3 | 8.7 | 7.9 | 7.9 | 8.5 | 9.5 | 9.8 | 10.2 | 4.1 | 0.33 |
| South Korea | 31.2 | 32.1 | 30.5 | 38.7 | 41.7 | 45.2 | 47.3 | 43.0 | 39.2 | -8.8 | 1.25 |
| Taiwan | 9.6 | 10.5 | 10.2 | 12.7 | 14.0 | 14.7 | 14.7 | 15.5 | 16.5 | 6.5 | 0.53 |
| Thailand | 31.8 | 33.6 | 35.3 | 40.5 | 41.9 | 46.1 | 47.0 | 47.4 | 47.6 | 0.4 | 1.52 |
| Vietnam | 6.4 | 6.7 | 7.2 | 8.5 | 7.6 | 8.4 | 8.8 | 9.2 | 9.6 | 4.3 | 0.31 |
| Other Asia Pacific | 5.4 | 5.2 | 4.8 | 5.2 | 5.6 | 5.6 | 5.8 | 6.5 | 7.1 | 9.2 | 0.23 |
| **Total Asia Pacific** | **422.0** | **455.4** | **467.3** | **520.5** | **557.2** | **590.2** | **610.5** | **627.7** | **631.0** | **0.5** | **20.13** |
| | | | | | | | | | | | |
| **TOTAL WORLD** | **2675.5** | **2753.7** | **2680.2** | **2886.7** | **2929.3** | **3005.8** | **3062.5** | **3081.5** | **3135.2** | **1.7** | **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, together with unavoidable disparities in the definition, measurement or conversion of gas supply and demand data.

Source : Ministry of Petroleum & Natural Gas.

# 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

The fuel share percentage in total primary energy supply (TPES) from 2011-12 to 2014-15 indicate that share of coal is maximum and it stands at 66.05% in 2014-15.

Comparing the fuel share % for different fuel, similar trend is evident over the years of study.

**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 per Corresponding 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 (2015-16) AT A GLANCE

| Theme | Sub-theme | Indicator | Category | Unit | Value |
|---|---|---|---|---|---|
| Use and Production Pattern | Overall Use | Energy use per capita | TPES | toe/person | 0.53 |
| | | | TFC | toe/person | 0.41 |
| | | | Electricity | Kwh/person | 777.02 |
| | Overall Productivity | Energy use per unit of GDP | TPES | toe/000'rupees | 0.006 |
| | | | TFC | toe/000'rupees | 0.005 |
| | | | Electricity | Kwh/rupees | 9.55 |
| | Supply Efficiency | Efficiency of energy conversion and distribution | All | % | 20.63 |
| | Production | Reserves-to-production ratio | All | years | 172 |
| | | | coal | years | 216.03 |
| | | | lignite | years | 140.97 |
| | | Resources-to-production ratio | All | years | 402 |
| | | | Crude oil | years | 16.81 |
| | | | Natural Gas | years | 38.05 |
| | | | Coal | years | 483 |
| | | | Lignite | years | 1017 |
| | End Use | Sectoral Energy Intensities | Industry | toe/000'rupees | 0.013 |
| | | | Agriculture | toe/000'rupees | 0.001 |
| | | | Transport | toe/000'rupees | 0.02 |
| | | Sectoral Electricity Intensities | Industry | Kwh/000'rupees | 19.17 |
| | | | Agriculture | Kwh/000'rupees | 10.66 |
| | | | Transport | Kwh/000'rupees | 3.23 |
| | Diversification (Fuel Mix) | Fuel shares in TPES | Crude Oil | % | 26.44 |
| | | | Natural Gas | % | 4.77 |
| | | | Coal | % | 66.05 |
| | | | RE &Others | % | 2.74 |
| | | Fuel share in TFC | Oil Products | % | 37.06 |
| | | | Natural Gas | % | 5.01 |
| | | | Coal | % | 41.08 |
| | | | Electricity | % | 16.85 |
| | | Fuel share in electricity | Thermal | % | 74.11 |
| | | | Nuclear | % | 2.81 |
| | | | Hydro | % | 10.07 |
| | | | Non-Utility | % | 12.62 |
| Security | Imports | Net energy import dependency | Overall | % | 38.64 |
| | | | Crude Oil | % | 84.59 |
| | | | Natural gas | % | 33.95 |
| | | | Coal | % | 35.52 |
| | | | Electricity | % | 0.47 |
| | Strategic Fuel Stocks | Stocks of critical fuels per corresponding fuel consumption | Coal | % | 7.78 |

# ANNEX- I

## 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 20º and a sweet crude oil may be assumed to have less than 0.5% sulphur content.

ii. **Liquefied petroleum** LPG refers to liquefied propane ($C_3H_8$) and butane ($C_4H_{10}$) 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 25ºC to 220ºC.

*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 30ºC and 210ºC 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 145ºC to 300°C, but not usually above 250ºC and with a flash point above 38ºC.

*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 100ºC and 250ºC. 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 160ºC 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 350ºC to 650ºC and a kinematic viscosity in the range 6 to 55 cSt at 100ºC. Their flash point is always above 60ºC 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 630ºC. 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 1330ºC.
Calcined coke is a petroleum coke or coal-derived pitch coke obtained by heat treatment of green coke to about 1330ºC. It will normally have a hydrogen content of less than 0.1 per cent 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:** Fuel wood 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.

## ANNEX- II

# 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 |

# ANNEX- III

**Abbreviations**

| | | |
|---|---|---|
| ATF | : | Aviation Turbine Fuel |
| HSDO | : | High Speed Diesel Oil |
| LDO | : | Light Diesel Oil |
| LSHS | : | Low Sulphur Heavy Stock |
| LPG | : | Liquefied Petroleum Gas |
| MS/MOGAS | : | Motor Spirit/Motor Gasoline |
| F.O. | : | Furnace Oil |
| M.T.O. | : | Mineral Turpentine Oil |
| PET-COKE | : | Petroleum Coke |
| SBPS | : | Special Boiling Point Spirit |
| SKO | : | Superior Kerosene Oil |
| CPEs | : | Centrally Planned Economies |
| N.C.W. | : | Non-communist World |
| O.P.E.C. | : | Organisation of Petroleum Exporting Countries |
| O.E.C.D. | : | Organisation for Economic Cooperation & Development |
| EMEs | : | Emerging Market Economies (includes countries of South & Central America, Africa, Middle-east, Non-OECD Asia & Non-OECD Europe) |
| MW | : | Megawatt |
| KW | : | Kilowatt |
| (P) | : | Provisional |

**ANNEX- IV**

# 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 and3700 |
| **G14** | GCV between3101 and 3400 |
| **G15** | GCV between 2801 and 3100 |
| **G16** | GCV between 2501 and2800 |
| **G17** | GCV between 2201 and 2500 |

Source: Office of Coal Controller

**ANNEX- V**

# 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 mandated to take measures for exploration and exploitation of petroleum resources including natural gas and coal bed methane, and also distribution, marketing and pricing of petroleum products.

### II.1. Organizational set up and activities

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

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

- **Monthly & Quarterly Reports on Petroleum Statistics:** Collection, compilation and submission of Reports on:

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

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

### II.2. Details of the data flows and items

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

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

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

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

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

**(i) For returns on crude oil and natural gas**

**- Principal Legislation:**
THE OILFIELDS (REGULATION AND DEVELOPMENT) ACT, 1948
(53 of 1948) (8TH SEPTEMBER, 1948)

**- Subordinate Legislation:**
THE PETROLEUM AND NATURAL GAS RULES, 1959
(As amended from time to time)

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

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

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

**-Principal Legislation:**
THE INDUSTRIES (DEVELOPMENT AND REGULATION) ACT, 1951, (ACT NO. 65 OF 1951)

**-Subordinate Legislation:**
Scheduled Industries (Submission of Production Returns) Rules, 1979.

**Section 6:** However, collection of data is also governed by the Gazette of India (Extraordinary) Part II-Section 3-Sub Section (i) order No.G.S.R.272(E) dated 16.04.1999 wherein clause 8 states that "Every oil refining company shall furnish to the Central Government or an agency nominated by Central Government any and every information that may be asked for in regard to the procurement, stocking, movements (onshore or offshore), transfers, imports, exports and sales of crude oil and or all products at such period, in such manner and from such of the sources, as may be specified from time to time".

## *III. Electricity*

### III.1 Organisational Setup

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

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

### III.2 Functions

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

a) advise the Central Government on the matters relating to the national electricity policy, formulate short-term and perspective plans for development of the electricity system and coordinate the activities of the planning agencies for the optimal utilization of resources to sub serve the interests of the national economy and to provide reliable and affordable electricity to all consumers;
b) Specify the technical standards for construction of electrical plants, electric lines and connectivity to the grid;
c) Specify the safety requirements for construction, operation and maintenance of electrical plants and electric lines;
d) Specify the Grid Standards for operation and maintenance of transmission lines;
e) Specify the conditions for installation of meters for transmission and supply of electricity;
f) Promote and assist in the timely completion of schemes and projects for improving and augmenting the electricity system;
g) Promote measures for advancing the skills of persons engaged in electricity industry;
h) advise Central Government on any matter on which its advice is sought or make recommendation to that Government on any matter if, in the opinion of the Authority, the recommendation would help in improving the generation, transmission, trading, distribution and utilization of electricity;
i) collect and record the data concerning the generation, transmission, trading, distribution and utilization of electricity and carry out studies relating to cost, efficiency, competitiveness and such like matters;
j) Make public from time to time the information secured under this Act, and provide for the publication of reports and investigations;
k) Promote research in matters affecting the generation, transmission, distribution and trading of electricity;
l) Carry out, or cause to be carried out, any investigation for the purpose of generating or transmitting or distributing electricity;
m) Advise any State Government, licensees or the generating companies on such matters which shall enable them to operate and maintain the electricity system under their ownership or control in an improved manner and where necessary, in

coordination with any other Government, licensee or the generating company owning or having the control of another electricity system;

n) Advise the Appropriate Government and the Appropriate Commission on all technical matters relating to generation, transmission and distribution of electricity; and

o) Discharge such other functions as may be provided under this Act.

### III.3. Details of the data Flows/ Items

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

**(a) Sources of Statistics, Returns and Information**

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

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