सत्यमेव जयते

National Sample Survey
Celebrating 75 years of NSS

Energy Statistics
India 2025

Government of India
Ministry of Statistics and Programme Implementation
National Statistics Office
https://www.mospi.gov.in

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सत्यमेव जयते

भारत सरकार
सांख्यिकी एवं कार्यक्रम कार्यान्वयन मंत्रालय
Government of India
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Message

Energy is the backbone of India's economic growth and social development. As one of the world's most populous and fastest-growing economies, India's energy demands are evolving rapidly.

The latest edition of the **Energy Statistics India - 2025** provides valuable insights into India's energy sector. This publication offers data on energy reserves, capacity, production, trade, prices, consumption, energy efficiency parameters, energy balance, and the energy account of India, which will help policymakers, industry leaders, and the public better understand our energy landscape.

The Government of India is committed to enhancing energy access, investing in renewable sources, and improving energy efficiency as part of our vision for a low-carbon economy. This publication highlights the trends and developments in the sector, offering a clear picture of how energy consumption aligns with the country's ambitions for sustainable growth, clean energy, and energy security.

I encourage all stakeholders—government agencies, businesses, academia, and civil society—to use the insights in this publication to contribute to the nation's goal of achieving a sustainable, secure, and affordable energy system for all.

Saurabh Garg

(Dr. Saurabh Garg)

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सत्यमेव जयते

आज़ादी का अमृत महोत्सव

भारत सरकार / Government of India
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Foreword

Energy plays a central role in human development, from the Industrial Revolution to the present era of near-continuous economic growth. Its contribution as an enabler of modern development and prosperity is fundamental and cannot be overstated.

In 2015, 193 Member States of the United Nations, including India, committed to the Post-2015 Development Agenda, with the guiding principle of "No one left behind." This pledge aims to create a world that is more prosperous, inclusive, sustainable, and resilient. Central to this agenda is **Goal 7**, which emphasizes the importance of access to affordable, reliable, and modern energy services for a sustainable path to prosperity, particularly for the most vulnerable communities.

In India, the transition to renewable and energy-efficient technologies has been prioritized as a means to ensure access to power and clean cooking for all citizens. This aligns with the country's broader policy objectives of improving welfare and ensuring dignity for all. In his address at the UN Summit in 2015, the Hon'ble Prime Minister of India underscored this commitment, stating, *"We are focusing on the basics: housing, power, water, and sanitation for all – important not just for welfare, but also for human dignity."*

The 32nd edition of the **Energy Statistics** publication offers an integrated database on energy in India for the financial year 2023-24. Given the critical role that energy plays in shaping the future, this publication serves as a vital instrument for providing a comprehensive overview of the country's evolving energy landscape. The data is sourced from various Government of India Ministries and Departments, including the Ministry of Power, Ministry of Coal, Ministry of Petroleum & Natural Gas, and the Ministry of New and Renewable Energy.

I trust this publication will provide valuable insights to policymakers, assisting them in formulating effective strategies and making necessary course corrections to ensure sustainable and reliable energy access for all.

Place: New Delhi
Date: 25.03.2025

(N.K. Santoshi)

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Foreword

Energy is a vital driver of India's economic and social development, supporting everything from industrial growth to improving living standards. As the country navigates the challenges of meeting growing energy demands while ensuring sustainability, accurate and up-to-date data plays a critical role in guiding informed decision-making and policy formulation.

The 32nd edition of the publication **Energy Statistics India 2025** report, which has been brought out by the Economic Statistics Division (ESD) under Ministry of Statistics and Programme Implementation, provides a comprehensive overview of India's energy landscape, including key statistics on production, consumption, and trade across both traditional and renewable energy sources. The publication offers valuable insights into national energy trends, highlighting the increasing role of clean energy sources like solar and wind, alongside ongoing efforts to enhance energy efficiency across sectors. Additionally, the publication includes *Energy commodity Balance, Energy Balance, Sankey Diagram*, all prepared in accordance with the *International Guidelines* outlined in the IRES (International Recommendation for energy Statistics).

This publication serves as an essential resource for policymakers, researchers, and industry stakeholders committed to building a sustainable and equitable energy future for India. By providing access to reliable data, we aim to support efforts to ensure energy security, foster economic growth, and contribute to global climate goals.

I acknowledge the contributions of various stakeholders who have provided the data and insights that have shaped this publication. I would also like to personally congratulate all the officers involved in finalizing the 32nd edition of this report.

I trust that the information contained in this report will serve as a valuable resource in guiding energy-related decision-making and will contribute to the continued success of India's energy sector.

Date: 25.03.2025

(Dr. Dalip Singh)

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Abbreviations and Acronyms

ATF	Aviation Turbine Fuel
BCM	Billion Cubic Metres
BT	Billion Tonne
F.O.	Furnace Oil
GW	Giga Watt
GWh	Giga Watt Hour
SHP	Small Hydro Power
HSDO	High Speed Diesel Oil
IAEA	International Atomic Energy Agency
IEA	International Energy Agency
IOC	Indian Oil Corporation
IRES	International Recommendations on Energy Statistics
KToE	Kilo Tonne of oil Equivalent
KW	Kilowatt
KWH	Kilo Watt Hour
LDO	Light Diesel Oil
LNG	Liquefied Natural Gas
LPG	Liquefied Petroleum Gas
LSHS	Low Sulphur Heavy Stock
Lubes	Lubricant
MJ	Mega-joules
MMSCM	Million Metric Standard Cubic Metres
MS/MOGAS	Motor Spirit/Motor Gasoline
MT	Million Tonne
MTBE	Methyl Tert-Butyl Ether
M.T.O.	Mineral Turpentine Oil
MTY	Million Tonne Per Year
MW	Megawatt
O.E.C.D.	Organization for Economic Cooperation & Development

O.P.E.C.	Organization of Petroleum Exporting Countries
(P)	Provisional
PJ	Peta-joules
PEC	Per Capita Energy Consumption
PET-COKE	Petroleum Coke
SBPS	Special Boiling Point Spirit
SDG	Sustainable Development Goal
SEEA	System of Environmental Economic Accounting
SKO	Superior Kerosene Oil
SNA	System of National Accounts
TEC	Total Energy Consumption
TFC	Total Final Consumption
TPES	Total Primary Energy Supply
TMT	Thousand Metric Tonne
TMTPA	Thousand Metric Tons Per Annum
VGO	Vacuum Gas Oil

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Executive Summary

Energy is an essential ingredient for almost all human activities, be it the power sector, the Industry, transportation or the household, the requirement of energy is indispensable and ubiquitous. In the Financial Year 2023-24, India has experienced a steady and healthy growth in both, energy supply and consumption by overcoming the shock of global Pandemic. The Indian economy, continued to have higher quench for energy to support the rapidly expanding urbanisation and industrialization and the vision of becoming the *Vikshit Bharat* by 2047. The key highlights of the overall performance of the energy sector of India during FY 2023-24 are as follows:

1. As on March 31, 2024, the reserves of Coal stood at 389.42 billion tonnes of which Odisha has the highest share of 25.47% followed by Jharkhand (23.58%), Chhattisgarh (21.23%), West Bengal (8.72%) and M.P(8.43%). The *Proved Reserves* (i.e. economically mineable reserve) consists of around 55% of the total Coal reserve in India during FY 2023-24. The estimated Crude Oil reserves was 671.40 million tonnes of which Western Offshore accounted for around 32%, followed by Assam (21.66%), Rajasthan (19.59%) and Gujrat (17.70%). The Natural Gas reserves were recorded at 1,094.19 billion cubic meters (BCM) during FY 2023-24; which is primarily located at the Western Offshore (31.28%) followed by Eastern Offshore (24.07%) and Assam (15.03%).

2. The estimated potential for generation of energy from renewable re-sources have reached at 21,09,655 MW as on March 31, 2024. Highest potential for generation of Energy comes from *wind (@ 150 mtr*) which is at 11,63,856 MW (55.17%), followed by Solar Energy 7,48,990 MW (35.50%) and large Hydro 1,33,410 MW (6.32%).

3. The capacity of Coal washeries in India has displayed a staggered growth over the years from 131.4 MTY as on March 31, 2015 to 257.79 MTY as on March 31, 2024; in contrast there is a steep rise in the volume of production of Coal over the years (an increase of 389 MTs from FY 2014-15 to FY: 2023-24).

4. Coal remained the backbone of India's energy supply, accounting for nearly 79% of the total energy supplied domestically in FY 2023-24. Coal production grew by 11.71%,

reaching at 997.83 million tonnes, up from 893.19 million tonnes in the previous year. The Non-Coking Coal is having the dominating share of the total production of Coal, at around 93.3% during FY: 2023-24.

5. The gross generation of electricity from the Renewable resources (both Utility and Non-Utility together) has also emerged significantly over the years. From an amount of 2,05,608 GWH of electricity which was generated during FY 2014-15, has increased to 3,70,320 GWH during FY 2023-24, which is a CAGR of 6.76% over a period of 10 years.

6. To meet the domestic demand, India relies heavily on Import of Coal, Crude Oil and Natural Gas. During FY 2023-24 the Net-Import of Coal rose by 11.2% and reached at 262.99 million tonnes, while the Net-Import of Natural Gas surged by almost 21%, amounting to 31.8 BCM (Billion Cubic Meter) during FY 2023-24 over last year. The import of Crude Oil also grew from 232.70 Million Tonnes to 234.26 Million during FY 2023-24, over last year.

7. India's electricity availability showed a notable increase. The losses due to *Transmission and Distribution* stood at 17.08% during FY 2023-24 and the net electricity available for supply grew by 7.25%, over last FY reaching at 16,46,998 GWh during FY 2023-24.

8. India's Total Primary Energy Supply (TPES) continued its steady growth post-COVID-19, with a 7.8% increase in FY 2023-24, amounting to 9,03,158 KToe over the previous year. The major source of energy comes from Coal (60.21%) which is followed by Crude Oil (29.83%) and Natural Gas (6.99%).

9. Energy supplied from the Renewable energy resources have experienced a healthy and consistent growth over the years; from an amount of 17,682 KToE during FY: 2014-15 to 31,847 KToE during FY: 2023-24 i.e. it has registered a CAGR of 6.76% over 10 years. The energy generated from *Solar, Wind and Others (excluding Large Hydro)* has recorded a growth from a 6,555 KToE during 2014-15 to 20,289 KToE during 2023-24 i.e. close to 210% over the past 10 years.

10. The *Total Final Consumption (TFC)* of energy, into different end-use sectors, has also experienced a sound rise. TFC of energy surged by over 38% since 2014-15, reaching at 6,13,605 KToE in FY 2023-24. In the year 2023-24, among all the end use sectors, the industry

sector saw the highest growth at 13.2%, followed by transport (10.7%) and commercial/public service sectors (6.6%) as compared to previous year, all of which are the driving forces of an economy. The energy consumption against the Residential sector also rose steadily over years, reflecting India's rapid urbanization and testament to the steadfast progress of Indian economy.

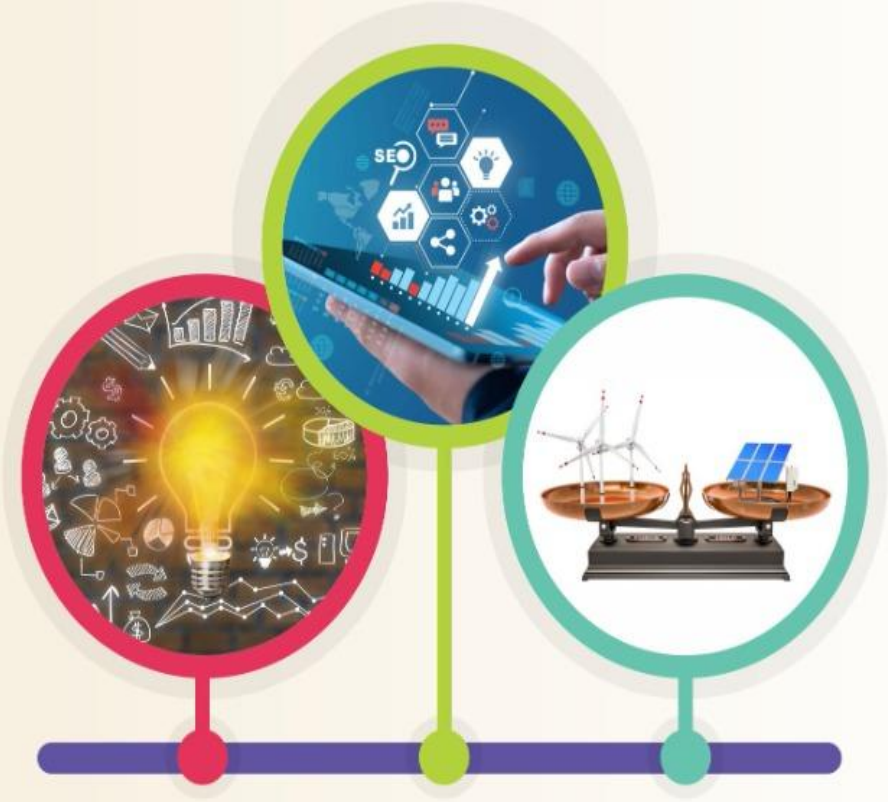
11. The sector Agriculture/Forestry, has also witnessed a sound increase of energy consumption over years. From an amount of 15,347 KToE of energy during FY 2014-15 it rose to 22,564 KToE of energy during FY 2023-24, which is a CAGR of 4.38% over past 10 years.

12. The *per-capita-energy-consumption* (after excluding components like Industry Own Consumption, Losses etc.) in India has also experienced a growth over the years. From an amount of 14,682 Mega Joule/person during FY 2014-15, the same has risen by over 25% during the last 10 years and reached at 18,410 Mega Joule/person during FY 2023-24. The *per-capita-electricity-consumption* has gone up from 748 KWh/person during FY 2014-15 to 1,106 KWh/person during FY: 2023-24, i.e. an increase of around 48% over a span of 10 years.

13. The overall Energy intensity has witnessed a slight improvement during FY 2023-24. In FY 2023-24, it took 0.2180 Mega Joules of energy to generate 1 INR of GDP as compared to 0.2192 MJ per INR of GDP in FY 2022-23. The Energy Intensity for Industry has come down from 361.47 Mega Joule / '000 Rs. of GDP to 284.20 Mega Joule/'000 Rs. of GDP during 2023-24.

14. India's dependency on the energy Imports has remained significant. During FY 2023-24, the Import-dependency of Crude Oil was close to 89%, whereas the same was 46.60% for Natural Gas and 25.86% for Coal.

Introduction



Introduction

The history of human evolution rests on the availability and use of energy. From the transformation from the early use of fire and animal power that improved lives, to the present world with use of electricity and cleaner sustainable fuels for a multitude of purposes – energy has been the enabler of development. Energy presents a fundamental need ranging from, but not limited to, the essential services of cooking, heating, cooling, lighting, mobility, and operation of appliances, to information and communications technology, and machines in every sector of every country. The lack of access to reliable and clean energy supplies is now considered as a major barrier to improving human well-being around the globe.

In response to increasing concerns about the effect of anthropogenic greenhouse gases on global climate, international action has agreed to reduce emissions. Renewable energy is being explored with renewed commitments as an intelligent solution to be tapped for addressing challenges such as poverty and global warming. If the world is to develop sustainably, it has been recognised that it is then necessary to secure access to affordable, reliable, sustainable, and modern energy services while reducing greenhouse gas emissions and the carbon footprint of the energy sector.

For well-balanced analysis of the energy situation of a country, it becomes imperative to compile the energy statistics for a greater understanding and course-correction to the pathway to sustainability. However, not all energy is an object of statistical observation. Energy existing in nature and not having a direct impact on society is not measured and monitored as part of energy statistics conventionally. Energy statistics are a specialized field of statistics whose scope has been evolving over time and broadly covers (i) extraction, production, transformation, distribution, storage, trade and final consumption of energy products and (ii) the main characteristics and activities of the energy industries. Energy statistics are seen as a multipurpose body of data.

2. Energy Resources and Products

Energy resources refer to "all non-renewable energy resources of both inorganic and organic origins discovered in the earth's crust in solid, liquid and gaseous form." Energy reserves are part of the resources that, based on technical, economic and other relevant (e.g., environmental) considerations, could be recovered and for which extraction is justified to some extent.

The term products are understood in the same way as in economic statistics where it refers to all goods and services that are the result of production.

Introduction

Energy products are a subset of products. As a general guideline, energy products refer to products exclusively or mainly used as a source of energy. They include forms of energy suitable for direct use (e.g., electricity and heat) and energy products that release energy while undergoing some chemical or other process (including combustion). By convention, energy products also include peat, biomass and waste when and only when they are used for energy purposes.

Since a number of energy products are transformed into other kinds of energy products prior to their consumption, a distinction is made between primary and secondary energy products. This distinction is necessary for various analytical purposes, including for avoiding the double-counting of energy production in cross-fuel tabulations, such as energy balances. Energy products can be obtained from both renewable (e.g., solar, biomass, etc.) and non-renewable sources (e.g., coal, crude oil, etc.).

The description of the boundary of the universe of energy products in energy statistics is not always straightforward. For example, different forms of corn/corncobs are: (1) combusted directly to produce heat; (2) used in the production of ethanol as a biofuel, (3) consumed as food, or (4) thrown away as waste.

3. Energy Statistics and International Recommendations

Countries, often in the delineation of energy products, follow the International Recommendations on Energy Statistics or the IRES.

The United Nations Statistical Commission, at its forty second session (22–25 February 2011), adopted IRES as a statistical standard and encouraged its implementation in all countries. IRES provide a comprehensive methodological framework for the collection, compilation and dissemination of energy statistics in all countries irrespective of the level of development of their statistical system. In particular, IRES provides of a set of internationally agreed recommendations covering all aspects of the statistical production process, from the institutional and legal framework, basic concepts, definitions and classifications to data sources, data compilation strategies, energy balances, data quality issues and statistical dissemination.

Introduction

As per the IRES 2011, recommended unit of dissemination for main categories of energy products are:

Recommended units for dissemination

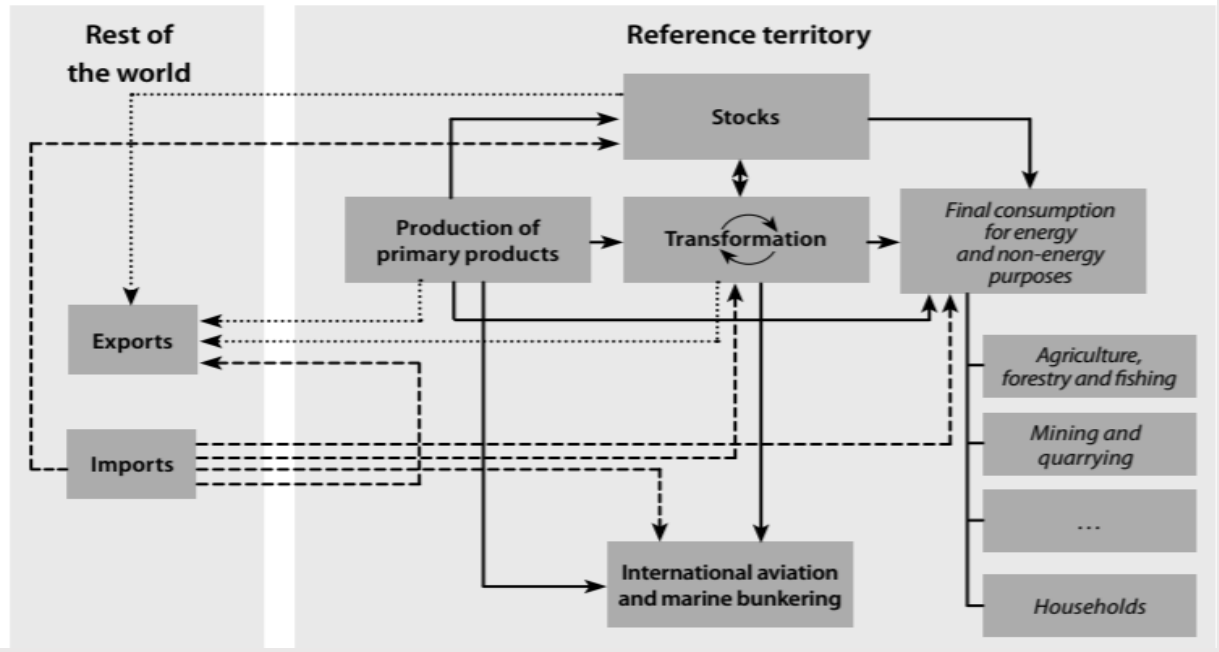
Energy products	Dimension	Unit
Solid fossil fuels	Mass	Thousand metric tons
Liquid fossil fuels	Mass	Thousand metric tons
(Liquid) Biofuels	Mass/Volume	Thousand metric tons/ Thousand cubic metres
Gases	Energy	Terajoules
Wastes	Energy	Terajoules
Fuelwood	Volume/ Energy	Thousand cubic metres/ Terajoules
Charcoal	Mass	Thousand metric tons
Electricity	Energy	GWh
Heat	Energy	Terajoules
Common unit (e.g., balances)	Energy	Terajoules
Electricity installed capacity	Power	MW
Refinery capacity	Mass/time	Thousand metric tons/year

Source: IRES, 2011, United Nations

4. Energy Flows

In the context of basic energy statistics and energy balances, the term "energy flow" refers to the production, import, export, bunkering, stock changes, transformation, energy use by energy industries, losses during the transformation, and final consumption of energy products within the territory of reference for which these statistics are compiled. This territory generally corresponds to the national territory; however, it can also refer to an administrative region at the sub-national level or even to a group of countries. The term "rest of the world" is used here to denote all areas/territories outside the reference territory. The broad sectoral diagram representation of Energy Flow in an economy is presented below.

Diagram of the main energy flows



Source: IRES, 2011, United Nations

Introduction

The present publication, Energy Statistics India 2025, is compliant with the IRES 2011 and follows the practices prescribed therein.

5. Energy Statistics India 2025

The publication provides a comprehensive analysis of India's energy sector, covering the reserves and potential for energy generation, installed capacity, and capacity utilization. It also provides the production of energy resources, energy imports, exports, and pricing trends, as well as the total energy available from domestic production and trade. The publication highlights sector/industry-wise energy consumption patterns and presents a national energy balance. It also addresses sustainability in energy, exploring environmental impacts and renewable energy adoption Finally, the publication introduces a new chapter on the country's energy accounts, which is featured in the latest edition.

The data for this report has been sourced from various line ministries and government departments, including:

- **Ministry of Coal**
- **Ministry of Petroleum and Natural Gas**
- **Ministry of Power**
- **Ministry of New and Renewable Energy**
- **Geological Survey of India, Ministry of Mines**

1 Chapter

Reserves and Potential for Generation

CHAPTER 1
Reserves and Potential for Generation

Introduction

Energy reserves are part of the energy resources that, based on technical, economic and other relevant (e.g. environmental) considerations, can be recovered and for which extraction is justified. The exact definition of reserves depends on the kind resources in focus.

Global Classification of Energy Reserves

The classification of energy reserves is guided by the **United Nations Framework Classification for Fossil Energy and Mineral Reserves and Resources (UNFC 2009)**. This framework evaluates resources based on:

- **Economic and Social Viability**
- **Field Project Status and Feasibility**
- **Geological Knowledge**

The **System of Environmental Economic Accounting (SEEA)-Energy** groups the detailed categories of UNFC into three aggregated classes characterizing the commercial recoverability of the resources as follows:

- **Class A**: Commercially recoverable resources.
- **Class B**: Potentially commercially recoverable resources.
- **Class C**: Non-commercial and other known deposits.

Energy Reserves in India

India has a diverse range of energy resources, with significant reserves of both fossil fuels and renewable energy potential. The country's energy mix is undergoing a transformation to reduce dependence on fossil fuels and promote the use of renewable energy sources, driven by environmental, economic, and macroeconomic consideration.

This chapter highlights the energy reserves and potential in India, focusing on both fossil fuels and renewable energy resources. It explores coal, lignite, crude oil, natural gas, and renewable energy potential, providing an overview of the country's energy landscape.

Chapter 1: Reserves and Potential for Generation

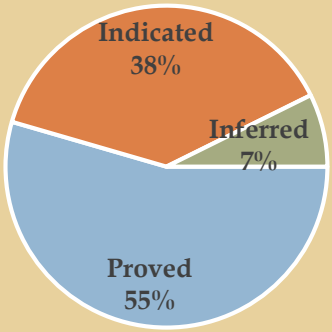
Highlights of reserves in India

1.1 Coal Reserves

India is home to one of the **largest proven coal reserves** in the world. As of **01-04-2024**, the total estimated coal reserves were **389.42 billion tonnes**, showing an addition of **11.21 billion tonnes** compared to the previous year. This marks a **growth of 2.97%** in total coal reserves during the year **2023-24(P)** over the previous year (2022-23) (Table 1.1). The distribution of coal reserves in India is concentrated in a few states like **Odisha**, **Jharkhand** and **Chhattisgarh.** These three states account for approximately **70% of the total coal reserves** in the country.

Out of the total reserves in the country, proven reserves i.e. economically viable and geologically confirmed account for approximately 55% of the total estimated coal reserves as depicted in the **figure 1.1**.

Fig 1.1: Estimated Reserves of Coal in India as on 01.04.2024



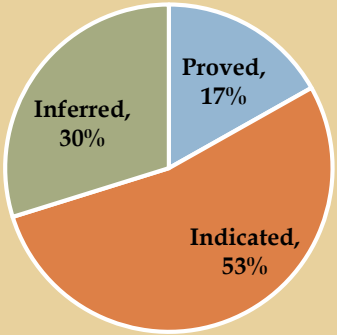
Total Estimated reserves = 389.42 Billion Tonnes

1.2 Lignite Reserves

The total estimated reserves of **lignite** as on **01-04-2024** stood at **47.30 billion tonnes**, showing a decrease of **0.07 billion tonnes** over the previous year. This marks a **decline of 0.15%** in lignite reserves during the year **2023-24(P)** compared to **2022-23 (Table 1.2)**. The highest reserves of lignite are located in the state of **Tamil Nadu (79%)**.

Out of the total lignite reserves in the country, proven reserves of lignite account for approximately **17%** of the total lignite reserves in India as shown in the **figure 1.2**.

Fig 1.2: Estimated Reserves of Lignite in India as on 01.04.2024



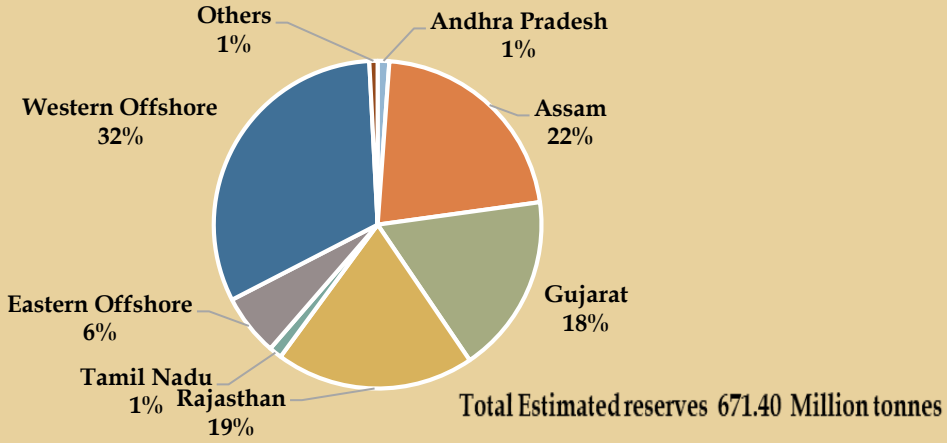
Total Estimated reserves = 47.30 Billion Tonnes

** Brief about the Proved, Inferred and Indicated has been given under Annexure-I.*

1.3 Crude Oil Reserves

As of **01-04-2024**, the estimated reserves of **crude oil** in India stood at **671.40 million tonnes**, compared to **669.47 million tonnes** in the previous year, reflecting a **0.29% increase** over the last year (Table 1.3). Geographically, the maximum crude oil reserves in India are concentrated in the **Western Offshore** region, which accounts for **32%** of the total crude oil reserves. This is followed by the **Assam** region, which holds **22%** of the country's crude oil reserves as shown in **figure 1.3**.

Fig 1.3: Estimated Reserves of Crude Oil in India as on 01.04.2024

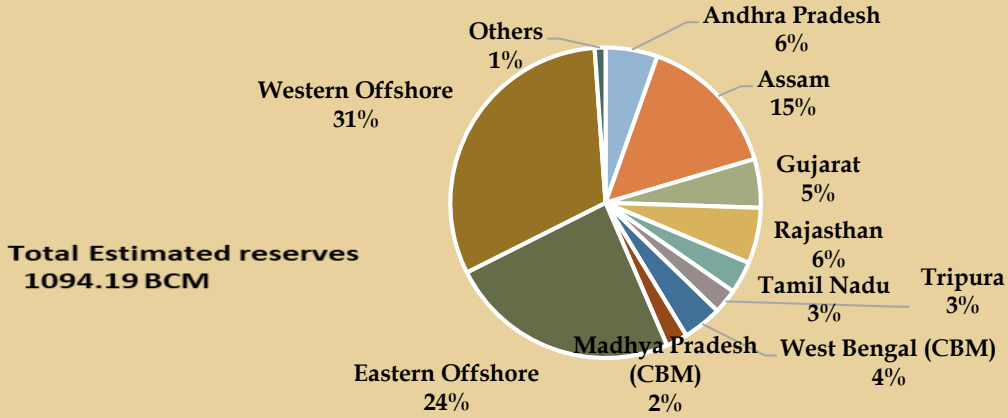


Others include Arunachal Pradesh (0.43%), Nagaland (0.35%), Tripura (0.01%), West Bengal (0.01%)

1.4 Natural Gas Reserves

The estimated reserves of **natural gas** as of **01-04-2024** were **1,094.19 billion cubic meters**. The largest reserves of natural gas in India are located in the **Western Offshore** region, which holds approximately **31%** of the total natural gas reserves. This is followed by the **Eastern Offshore**, which accounts for **24%** of the reserves as shown in **figure 1.4**.

Fig 1.4 : Estimated Reserves of Natural Gas in India as on 01.04.2024



#Others include Arunachal Pradesh (0.67%), Jharkhand (CBM) (0.44%), Nagaland (0.009%)

1.5 Renewable Energy Potential in India

India is increasingly focusing on renewable energy sources as part of its sustainable development and climate action efforts. As of **March 31, 2024**, the total estimated potential for renewable power generation in India stood at **2,109,655 MW**. This potential comes from a variety of renewable sources, including **wind**, **solar**, **biomass**, **small hydro**, and **cogeneration from bagasse (Table 1.4)**.

Fig 1.5: Source wise Estimated Potential of Renewable Power in India as on 31.03.2024

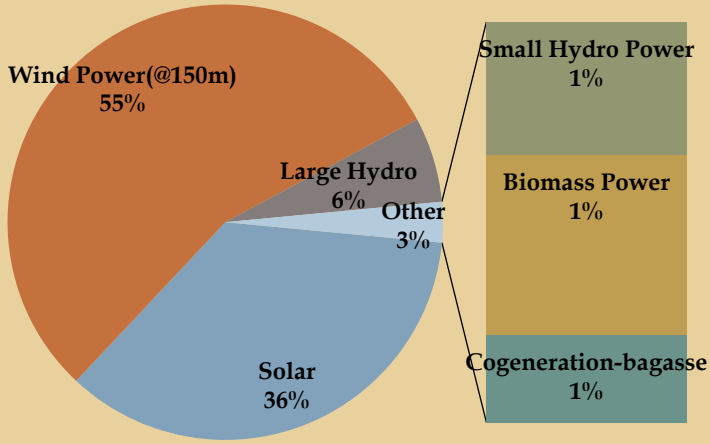


Figure 1.5 shows the potential is spread across several key renewable energy sources, as detailed below:

- **Solar Power**: India has immense potential for solar power generation, estimated at **748,990 MW**, which accounts for **36%** of the total renewable energy potential.
- **Wind Power**: With an estimated potential of **1,163,856 MW** (55% of total renewable energy potential), wind power stands as the most significant source of renewable energy in India.
- **Large Hydropower (Large Hydro)**: The potential for large hydropower generation is estimated at **133,410 MW**, contributing **6%** to the country's renewable energy potential.
- **Small Hydro Power (SHP)**: India also has a notable potential of **21,134 MW** (1%) from **small hydro power** projects.
- **Biomass Power**: Biomass, which includes agricultural waste, forest residues, and other organic matter, has a potential of **28,447 MW**, accounting for **1%** of the total renewable power potential.
- **Cogeneration from Bagasse**: India has a specific potential of **13,818 MW** (1%) from **bagasse-based cogeneration** in sugar mills. This is a highly efficient form of energy generation, especially in regions with a robust sugar industry.

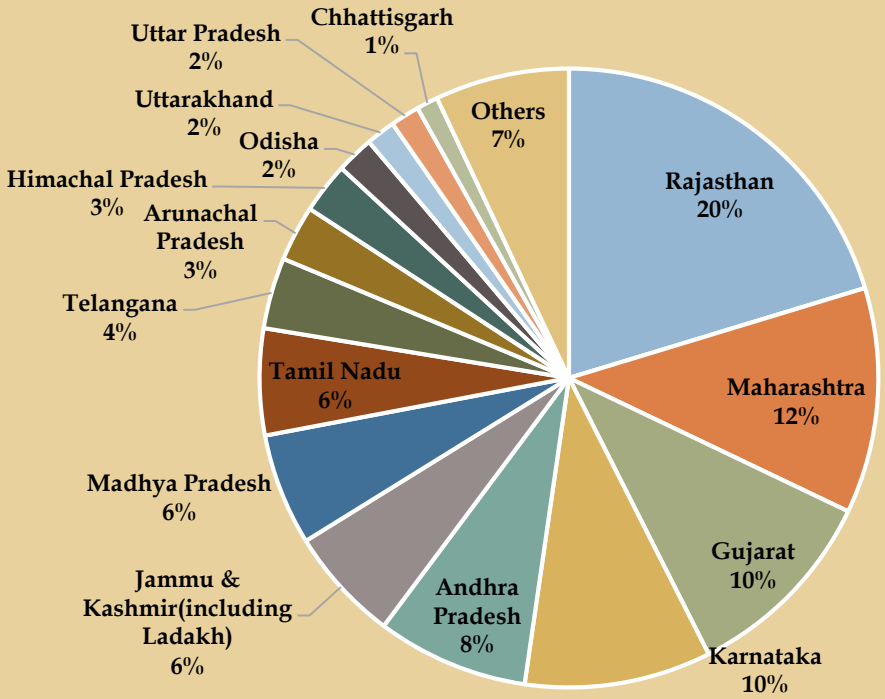
Geographical Distribution of Renewable Energy Potential

The geographical distribution of renewable energy potential in India (**Figure 1.6**) shows significant regional variations. The states with the highest renewable energy potential, as of **March 31, 2024**, are:

- **Rajasthan**: **20**% of total potential (428,322 MW)
- **Maharashtra**: **12**% of total potential (248,665 MW)
- **Gujarat**: **10**% of total potential (220,505 MW)
- **Karnataka**: **10**% of total potential (205,648 MW)

Together, these four states account for over **52**% of India's total renewable energy potential, highlighting their critical role in India's renewable energy future.

Fig 1.6: Statewise Estimated Potential of Renewable Power in India as on 31.03.2024



Total Estimated Potential of Renewable Power =21,09,655 MW

Table 1.1: Statewise Estimated Reserves of Coal (As on 1st April)

(in Million Tonnes)

States/ UTs	Proved		Indicated		Inferred		Total		Distribution (%)	
	2023	2024	2023	2024	2023	2024	2023	2024	2023	2024
Andhra Pradesh	1,025	1,025	2,369	2,369	778	778	4,172	4,172	1.10	1.07
Arunachal Pradesh	31	31	40	40	19	19	90	90	0.02	0.02
Assam	465	465	57	57	3	3	525	525	0.14	0.13
Bihar	310	2,346	5,040	3,015	48	37	5,398	5,398	1.43	1.39
Chhattisgarh	37,236	40,078	42,294	41,093	1,244	1,495	80,774	82,666	21.36	21.23
Jharkhand	55,749	59,877	26,994	27,135	5,095	4,799	87,838	91,812	23.22	23.58
Madhya Pradesh	15,279	15,425	12,457	12,379	4,482	5,011	32,219	32,815	8.52	8.43
Maharashtra	8,065	8,163	3,425	3,372	1,847	1,817	13,336	13,352	3.53	3.43
Meghalaya	89	96	17	17	471	471	576	583	0.15	0.15
Nagaland	9	9	22	22	448	448	478	478	0.13	0.12
Odisha	52,046	53,799	37,536	39,053	4,936	6,351	94,519	99,204	24.99	25.47
Sikkim	0	0	58	58	43	43	101	101	0.03	0.03
Telangana	11,257	11,257	8,497	8,497	3,433	3,452	23,186	23,206	6.13	5.96
Uttar Pradesh	884	884	178	178	0	0	1,062	1,062	0.28	0.27
West Bengal	17,459	18,752	12,699	11,433	3,775	3,773	33,933	33,958	8.97	8.72
All India Total	**199,904**	**212,207**	**151,682**	**148,717**	**26,621**	**28,498**	**378,207**	**389,421**	**100**	**100**
Distribution (%)	**52.86**	**54.49**	**40.11**	**38.19**	**7.04**	**7.32**	**100**	**100**		

Total may not tally due to rounding off

Source: Ministry of Coal

Table 1.2: Statewise Estimated Reserves of Lignite(As on 1st April)

(in Million Tonnes)

States/ UTs	Proved		Indicated		Inferred		Total		Distribution (%)	
	2023	2024	2023	2024	2023	2024	2023	2024	2023	2024
Gujarat	1279	1279	284	284	1160	1160	2722	2722	5.75	5.76
Jammu & Kashmir	0	0	20	20	7	7	28	28	0.06	0.06
Kerala	0	0	0	0	10	10	10	10	0.02	0.02
Odisha	6	6	0	0	0	0	6	6	0.01	0.01
Puducherry	0	0	406	406	11	11	417	417	0.88	0.88
Rajasthan	1204	1204	3109	3109	2274	2274	6586	6586	13.90	13.93
Tamil Nadu	5023	5476	21885	21412	10688	10635	37597	37524	79.37	79.34
West Bengal	0	0	1	1	3	3	4	4	0.01	0.01
All India	**7512**	**7964**	**25704**	**25231**	**14153**	**14100**	**47369**	**47296**	**100**	**100**
Distribution (%)	**15.86**	**16.84**	**54.26**	**53.35**	**29.88**	**29.81**	**100**	**100**		

Total may not tally due to rounding off

Source: Ministry of Coal

Table 1.3: Statewise Estimated Reserves of Crude Oil and Natural Gas (As on 1st April)

States/ UTs/ Region	Crude Oil (Million Tonnes)				Natural Gas (Billion Cubic Metres)			
	2023		2024		2023		2024	
	Estimated Reserves	Distribution (%)	Estimated Reserves	Distribution (%)	Estimated Reserves	Distribution (%)	Estimated Reserves	Distribution (%)
Andhra Pradesh	11.11	1.66	7.69	1.15	63.16	5.53	59.27	5.42
Arunachal Pradesh	2.97	0.44	2.88	0.43	7.24	0.63	7.33	0.67
Assam	148.13	22.13	145.41	21.66	165.68	14.51	164.51	15.03
Guiarat	120.33	17.97	118.86	17.70	56.60	4.96	55.46	5.07
Nagaland	2.38	0.36	2.38	0.35	0.09	0.01	0.09	0.01
Rajasthan	116.68	17.43	131.50	19.59	63.96	5.60	63.55	5.81
Tamil Nadu	8.72	1.30	8.54	1.27	37.54	3.29	36.57	3.34
Tripura	0.07	0.01	0.07	0.01	28.93	2.53	28.18	2.58
West Bengal	0.11	0.02	0.15	0.02	0.00	0.00	0.00	0.00
West Bengal (CBM)	0.00	0.00	0.00	0.00	79.33	6.95	44.37	4.06
Jharkhand (CBM)	0.00	0.00	0.00	0.00	4.87	0.43	4.86	0.44
Madhya Pradesh (CBM)	0.00	0.00	0.00	0.00	25.18	2.21	24.38	2.23
Eastern Offshore	40.54	6.06	40.67	6.06	262.36	22.98	263.34	24.07
Western Offshore	218.42	32.63	213.26	31.76	346.80	30.37	342.29	31.28
Total	**669.47**	**100.00**	**671.40**	**100.00**	**1141.73**	**100.00**	**1094.19**	**100.00**

CBM : Cold Bed Methane (Jharkhand, West Bengal and M.P.)

1. Western offshore includes Gujarat offshore

2. Total may not tally due to rounding off

Source: M/o Petroleum & Natural Gas

Chapter 1: Reserves and Potential for Generation

Table 1.4: Sourcewise and Statewise Estimated Potential of Renewable Power in India (as on 31.03.2024)

(in MW)

Sl. No.	States/ UTs	Wind Power @ 150m	Small Hydro Power*	Biomass Power	Cogeneration-bagasse	Solar Energy	Large Hydro#	Total	Distribution (%)
1	Andhra Pradesh	123336	409	1999	280	38440	2596	**167060**	**7.92**
2	Arunachal Pradesh	246	2065	18	0	8650	50394	**61373**	**2.91**
3	Assam	459	202	322	0	13760	643	**15386**	**0.73**
4	Bihar	4023	527	964	347	11200	130	**17191**	**0.81**
5	Chhattisgarh	2749	1098	354	0	18270	1311	**23782**	**1.13**
6	Goa	14	5	33	0	880	0	**932**	**0.04**
7	Gujarat	180790	202	2638	555	35770	550	**220505**	**10.45**
8	Haryana	593	107	1353	362	4560	0	**6976**	**0.33**
9	Himachal Pradesh	239	3460	70	0	33840	18305	**55914**	**2.65**
10	J& K(including Ladakh)	1 (Ladakh)	1707	83	0	111050	12972	**125813**	**5.96**
11	Jharkhand	16	228	146	0	18180	300	**18870**	**0.89**
12	Karnataka	169251	3726	1794	1762	24700	4414	**205648**	**9.75**
13	Kerala	2621	647	778	0	6110	2473	**12629**	**0.60**
14	Madhya Pradesh	55423	820	2516	0	61660	2819	**123239**	**5.84**
15	Maharashtra	173868	786	2630	3917	64320	3144	**248665**	**11.79**
16	Manipur	0	100	62	0	10630	615	**11407**	**0.54**
17	Meghalaya	55	230	69	0	5860	2026	**8240**	**0.39**
18	Mizoram	0	169	3	0	9090	1927	**11189**	**0.53**
19	Nagaland	0	182	54	0	7290	325	**7851**	**0.37**
20	Odisha	12129	286	299	0	25780	2825	**41318**	**1.96**
21	Punjab	428	578	3022	414	2810	1301	**8554**	**0.41**
22	Rajasthan	284250	52	1300	0	142310	411	**428322**	**20.30**
23	Sikkim	0	267	5	0	4940	6051	**11262**	**0.53**
24	Tamil Nadu	95107	604	1560	639	17670	1785	**117366**	**5.56**
25	Telangana	54717	102	1678	117	20410	1302	**78327**	**3.71**
26	Tripura	0	47	34	0	2080	0	**2161**	**0.10**
27	Uttar Pradesh	510	461	2800	4926	22830	502	**32028**	**1.52**
28	Uttarakhand	49	1664	93	215	16800	13481	**32303**	**1.53**
29	West Bengal	1281	392	1742	0	6260	809	**10484**	**0.50**
30	Andaman & Nicobar	1245	7	18	0	0	0	**1270**	**0.06**
31	Chandigarh	0	0	0	0	0	0	**0**	**0.00**
32	Dadar & Nagar Haveli, Daman & Diu	17	0	2	0	0	0	**19**	**0.00**
33	Delhi	0	0	0	0	2050	0	**2050**	**0.10**
34	Lakshadweep	31	0	1	0	0	0	**32**	**0.00**
35	Puducherry	408	0	5	0	0	0	**413**	**0.02**
36	Others$	0	0	0	284	790	0	**1074**	**0.05**
All India Total		**1,163,856**	**21,134**	**28,447**	**13,818**	**748,990**	**133,410**	**2,109,655**	**100**
Distribution (%)		**55.17**	**1.00**	**1.35**	**0.66**	**35.50**	**6.32**	**100.00**	

$ Others includes installations through NGOs/IREDA in different states

*capacity upto 25 MW, # capacity > 25 MW

Source: Ministry of New and Renewable Energy

2 Chapter

Installed Capacity and Capacity Utilization

CHAPTER 2
Installed Capacity and Capacity Utilization

Introduction

In alignment with global sustainability commitments, the world has pledged to expand infrastructure and upgrade technologies to supply modern and sustainable energy services, particularly in developing countries. This aligns with Sustainable Development Goal (SDG) Target 7.B, which focuses on increasing energy access.

In the context of rapidly growing economies, especially in densely populated regions like Asia, there is an urgent need to shift towards cleaner energy sources. The demand for energy is continuously rising, driving the need for larger energy systems that can cater to the energy requirements of emerging economies.

In India, the focus has been on expanding the installed capacity of power generation while reducing reliance on primary fossil fuels. The goal is to provide reliable and affordable power through the optimized use of various energy resources, incorporating innovative and eco-friendly technologies. Furthermore, environmental and health concerns associated with the use of hydrocarbons have prompted the global community to adopt energy-efficient and clean energy systems.

It is essential to understand that not all potential energy resources can be converted into capacity, and generating capacity does not directly equate to actual generation due to factors like production losses, plant downtime for maintenance, and refuelling.

This chapter presents a comprehensive overview of the installed capacity for coal washeries, oil refineries, and electricity generation in India.

Chapter 2: Installed capacity and capacity utilization

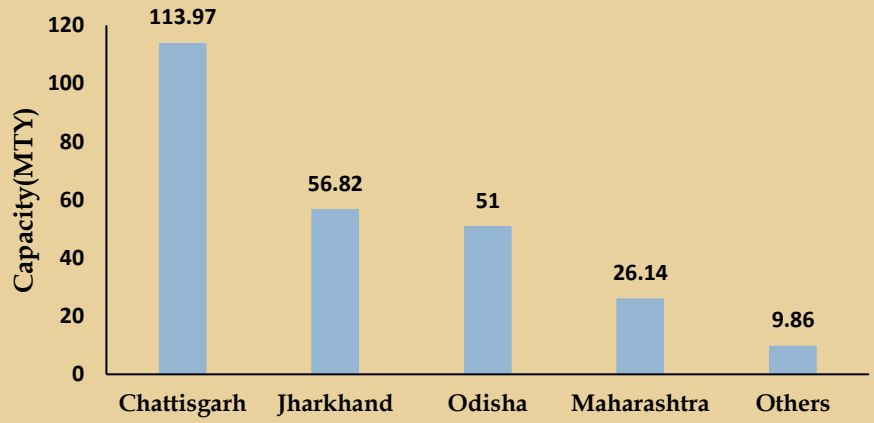
Highlights of installed capacity and capacity utilisation

2.1 Installed Capacity of Coal Washeries

As of 31-03-2024, the total installed capacity of coal washeries in India stood at **257.79 million Tons per Year (MTY)** (Table 2.1). This capacity plays a critical role in enhancing the quality of coal, ensuring its efficient use in power plants and industrial applications.

The State wise Installed Capacity of Coal washeries shown in **figure 2.1**.

Fig. 2.1 State wise Installed Capacity of Coal washeries



Others states include Uttar Pradesh, West Bengal, Madhya Pradesh and Telangana

2.2 Refinery and Oil Refining Capacity in India

As of **March 31, 2024**, India has 23 refineries in total—19 in the public sector and 4 in the private sector/joint ventures. India's total refining capacity reached **2,56,816** thousand Metric Tonnes per Annum (TMTPA), an increase of **2,900** TMTPA from the previous year. Public sector refineries still lead, making up over 61% of the refining capacity, with major players like **IOC**, **BPCL**, and **HPCL** at the forefront. Crude throughput increased from 2,55,233 TMT in 2022-23 to 2,61,545 TMT in 2023-24, a **2.47**% rise, which reflects the growing demand for petroleum products.

Fig. 2.2: Refinery wise capacity utilisation(in%)

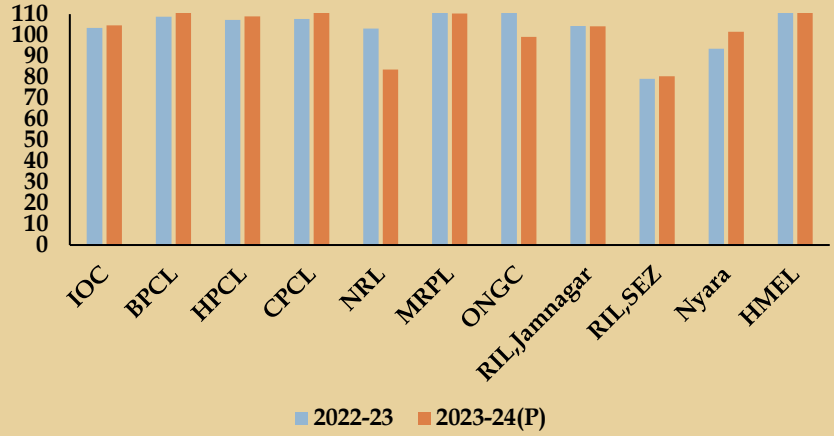
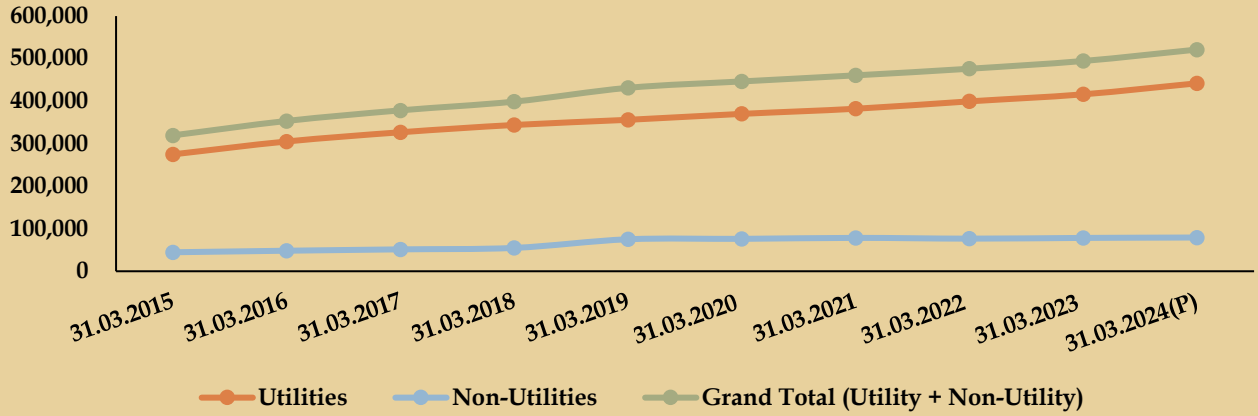


Figure 2.2 shows all the refineries have improved their utilization or maintained a solid performance over the previous year except NRL and ONGC.

2.3 Installed Electricity Generation Capacity

India's electricity generation capacity has continued to grow significantly, driven by both traditional and renewable energy sources. The total installed capacity in the FY 2023-24 reached **5,21,310 MW**, marking a **5.43** % increase from the previous year, where it stood at **4,94,459 MW**. This robust growth highlights the country's commitment to meeting the rising demand for electricity driven by industrialization, urbanization, and population growth. The year wise growth of installed electricity generation capacity over the last 10 years is shown in **figure 2.3**.

Fig 2.3:Trends in Installed Electricity Generation Capacity (MW) in India



2.3.1 Capacity by Source and Utility Distribution

A significant portion of the total installed capacity comes from utility-owned generation, which accounts for 84.78% of the total. This dominance is largely due to the substantial contributions of large public-sector utilities in the country, which play a major role in energy generation.

Fig 2.4: Trends in Installed Electricity Generation Capacity from Utilities (MW) in India - Sourcewise

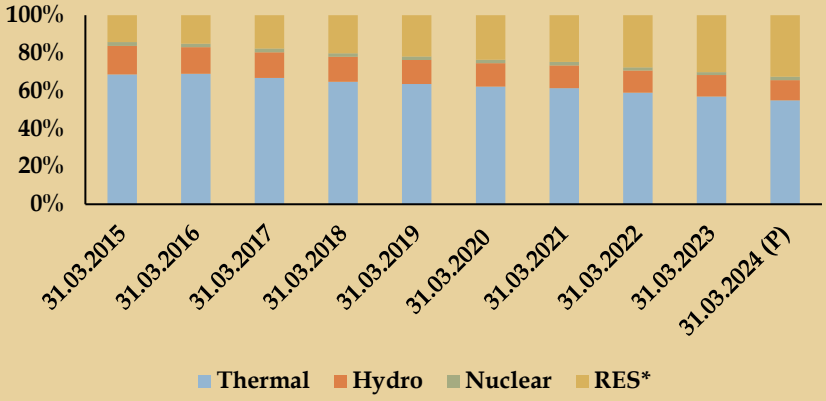


Figure 2.4 shows the installed capacity by energy source, such as thermal, nuclear, renewable, and hydro, over the last decade.

2.3.2 Growth in Renewable Energy

The evolution of India's energy mix is increasingly shifting towards renewable energy sources, reflecting global trends toward sustainability. In 2023-24(P), the installed capacity of renewable energy sources (excluding large hydro-capacity>25 MW) grew by 14.77%, showcasing the strong momentum towards cleaner energy. This growth aligns with India's national renewable energy targets and the country's commitment to reducing its carbon footprint.

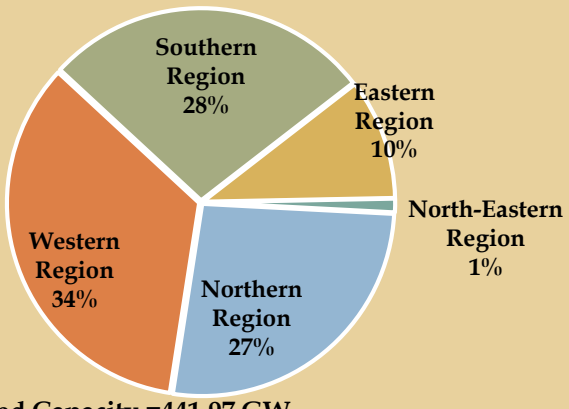
2.3.3 Thermal Energy Growth (Utility and Non-utility)

While renewable sources are growing rapidly, thermal energy generation—largely powered by coal and natural gas—continues to form the backbone of India's energy infrastructure. However, the growth rate of thermal energy capacity was more modest at **2.08%** in **2023-24(P)** compared to previous year. This slower growth rate reflects a broader strategic shift towards diversifying the energy mix and decreasing dependency on fossil fuels.

2.4 Geographical Distribution of Installed Electricity Capacity (As of 31.03.2024)

As shown in **figure 2.5**, the geographical distribution of India's installed electricity generation capacity shows the **Western Region** leading with **34%**, followed by the **Southern Region** at **28%** and the **Northern Region** with **27%**.

Fig 2.5: Regionwise Installed Generation Capacity of Electricity (Utilities)



Total Installed Capacity =441.97 GW

Additionally, Table 2.4 indicates that the **Northern Region** also holds the largest share of the country's hydropower capacity, while **Karnataka** leading in hydroelectric power at **3.63 GW** among states and Rajasthan leads in other renewable resources with **26.35 GW**.

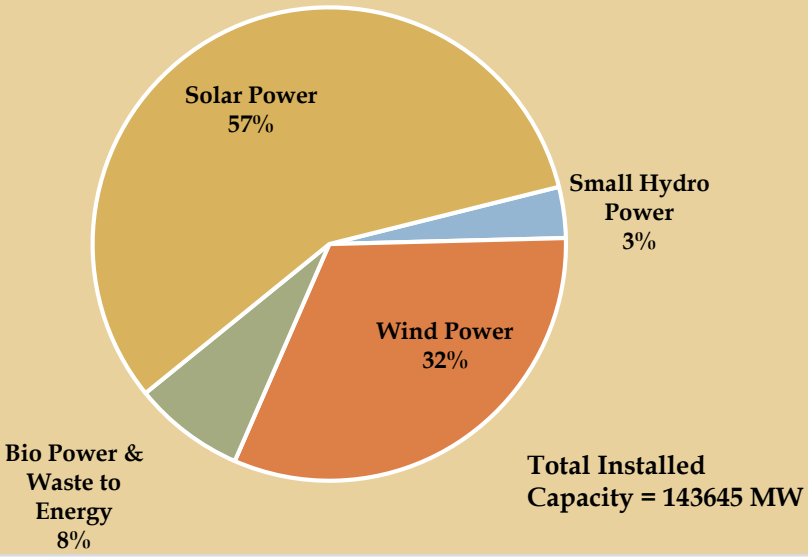
In terms of regional growth during 2023-24(P), the **Western Region** experienced the highest increase in installed capacity, registering a **7.66%** growth overall, alongside a significant **23.40%** rise in the installed capacity for renewable energy sources (RES), underscoring the region's increasing focus on clean energy. This trend highlights the ongoing shift towards renewable energy while meeting the rising demand for electricity across the country.

2.5 Grid-Interactive Renewable Power Capacity

The total installed capacity for **grid-interactive renewable power** grew from **1,25,160 MW** (as on 31.03.2024) to **1,43,645 MW** (as on 31.03.2023), reflecting a **growth of 14.77%** (Table 2.5).

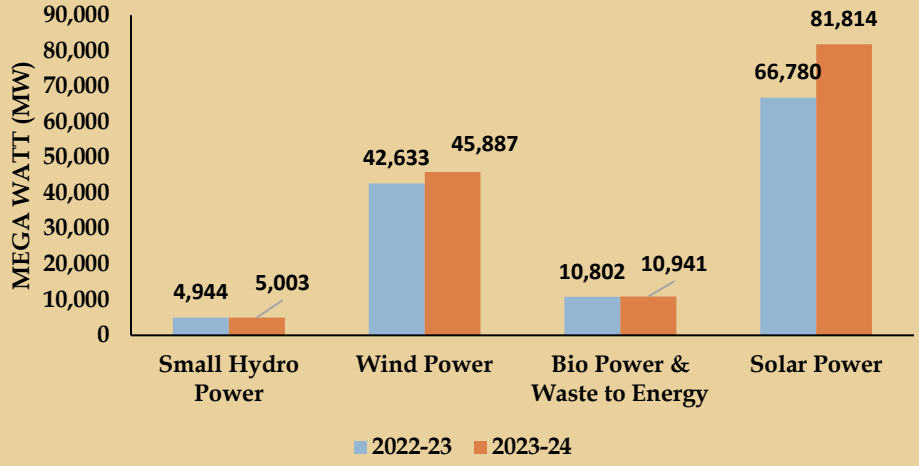
As shown in the **figure 2.6**, the Solar power continued to dominate the renewable energy sector, accounting for **57%** of the total installed capacity followed by wind power (32%) and bio power & waste-to-energy (8%).

Fig 2.6 : Sectorwise percentage distribution of Installed Grid-Interactive Renewable Power Capacity as on 31.03.2024



Among all sector solar power saw a significant growth rate of **22.51%** in installed capacity from **2022-23** to **2023-24(P)** as shown in the **figure 2.7**.

Fig 2.7 : Installed Capacity of Grid-Interactive Renewable Power During 2022-23 and 2023-24(P)



Among all the states, **Rajasthan** and **Gujarat** lead in renewable energy installations, with Rajasthan having the highest installed capacity of **26,693 MW** and Gujarat closely following at **25,472 MW**, largely driven by wind and solar power.

2.6 Off-Grid/Decentralized Renewable Energy Systems

India's off-grid or decentralized renewable energy systems have also shown steady growth. The installation of **solar street lighting systems (SLS)**, **home lighting systems**, and **solar lanterns** remained stable compared to the previous year. However, **solar photovoltaic plants (SPV)** registered a **growth rate of 19.61%** over the previous year, indicating a positive trend in decentralized renewable energy solutions (Figure 2.8).

Fig 2.8 : Installation of Off-grid / Decentralised Renewable Energy Systems/ Devices during last 3 years

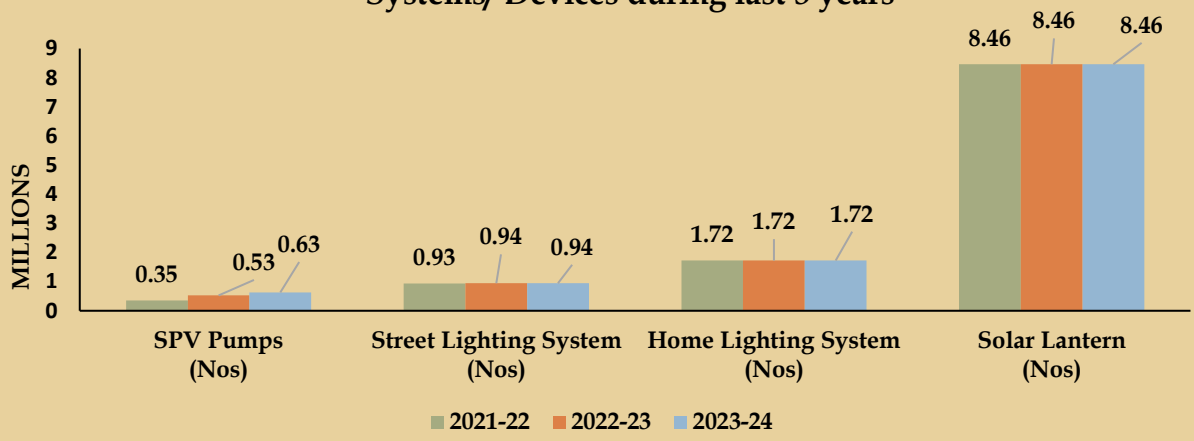


Table 2.1: Installed Capacity of Coal Washeries (as on 31.03.2024)

Sl. No.	Washery & Operator	State	Capacity (MTY)
	COKING COAL :		
1	Dudga-II, CIL	Jharkhand	2.00
2	Patherdih, CIL	Jharkhand	5.00
3	Moonidih, CIL	Jharkhand	1.60
4	Sudamdih, CIL	Jharkhand	1.60
5	Mahuda, CIL	Jharkhand	0.63
6	Madhuban,CIL	Jharkhand	2.50
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
12	Bhojudih, CIL	West Bengal	1.70
13	DahibarI, CIL	Jharkhand	1.60
14	Patherdih-New (NLW) , CIL	Jharkhand	5.00
15	Madhuband 5MTPA, CIL	Jharkhand	5.00
	(A) CIL		**37.18**
16	Chasnala, IISCO	Jharkhand	2.04
17	Jamadoba, TISCO	Jharkhand	2.00
18	West Bokaro-II, TISCO	Jharkhand	2.50
19	West Boakaro-III,TISCO	Jharkhand	4.50
20	Bhelatand, TISCO	Jharkhand	1.50
	(B) PSU & Private		**12.54**
	TOTAL COKING (A + B)		**49.72**
	NON-COKING COAL		
1	Piparwar,CIL	Jharkhand	6.50
2	Bina (De-Shaling Plant) CIL	Uttar Pradesh	4.50
3	Lakanpur IB Vallley Coal Washery , CIL	Odisha	10.00
	(A) CIL		**21.00**
4	MDCWL, Dakra, Ranchi	Jharkhand	3.50
5	Sarshatali Coal Washery	West Bengal	1.50
6	Dipka, Aryan coal beneficiation pvt. Ltd.	Chattisgarh	14.00
7	Gevra, Aryan coal beneficiation pvt. Ltd.	Chattisgarh	6.25
8	Chakabuwa, Aryan Energy private ltd.	Chattisgarh	7.50
9	Binjhari, Aryan Energy private ltd.	Chattisgarh	4.80
10	Tamnar, Jindal Steel & Power Ltd.(Unit1)	Chattisgarh	4.75
11	Ratija, Spectrum Coal & Power Ltd.	Chattisgarh	11.00
12	Maruti Clean Coal	Chattisgarh	3.30
13	Jindal Power Limited(JPL) (Unit 2)	Chattisgarh	3.20
14	Jindal Power Limited(JPL) (Unit 3)	Chattisgarh	3.60
15	Parsa East and Kanta Basan Coal Washery	Chattisgarh	15.00
16	ACB(India) Ltd,Renki Washery (formerly S.V.Power Pvt Ltd.)	Chattisgarh	2.50
17	Chattisgarh Power & Coal Benefication Ltd.	Chattisgarh	1.25

Contd….

Source: Ministry of Coal

Table 2.1(Contd.): Installed Capacity of Coal Washeries (as on 31.03.2024)

Sl. No.	Washery & Operator	State	Capacity (MTY)
18	Hind Energy & Coal Benefication (India) Ltd, Baloda	Chattisgarh	0.96
19	Hind Energy & Coal Benefication (India) Ltd., Gatora	Chattisgarh	0.96
20	Hind Multi Services Private Limited, Birghani, Janjgir	Chattisgarh	0.96
21	Clean Coal Enterprises Pvt. Ltd.,Gatora (Unit-1,2 &3)	Chattisgarh	4.42
22	Hind Multi Services Private Limited, Hindadih, Bilaspur	Chattisgarh	3.60
23	Sambhavi Coal Benefication Pvt. Ltd., Gatora	Chattisgarh	0.90
24	Bhatia Energy & Minerals Pvt Ltd Coal Washery	Chattisgarh	5.00
25	KJSL Coal & Power Pvt. Ltd.	Chattisgarh	4.10
26	K L Energy & Coal Beneficiation Pvt. Ltd.	Chattisgarh	0.90
27	Mahavir Coal Washeries Pvt. Ltd., Baloda (Unit I)	Chattisgarh	0.95
28	Mahavir Coal Washeries Pvt. Ltd,Baloda. (Unit II)	Chattisgarh	0.96
29	Mahavir Coal Washeries Pvt. Ltd.	Chattisgarh	2.48
30	Mahavir Coal Washeries Pvt. Ltd.,Sakri Belmundi	Chattisgarh	0.95
31	Paras Power & Coal Benefication Ltd., Ghutku	Chattisgarh	0.96
32	Paras Power & Coal Benefication Ltd., Ghutku	Chattisgarh	2.50
33	Phil Coal Benefication Pvt. Ltd, Ghutku Washery	Chattisgarh	2.50
34	Phil Coal Benefication Pvt. Ltd, Tenda Washery	Chattisgarh	0.90
35	Radiant coal beneficiation Pvt Ltd	Chattisgarh	1.86
36	Sarda Energy and Minerals Ltd.	Chattisgarh	0.96
37	Panderpauni, Aryan coal beneficiation pvt. Ltd.	Maharashtra	2.60
38	Wani, Kartikay Coal washeries pvt. ltd.(Aryan)	Maharashtra	2.50
39	Maha Mineral Mining & Beneficiation Pvt Ltd,Gondegaon Washery	Maharashtra	2.40
40	Maha Mineral Mining & Beneficiation Pvt Ltd, Ghugus Washery	Maharashtra	2.40
41	Maha Mineral Mining & Beneficiation Pvt Ltd, Pimpalgaon Washery	Maharashtra	4.80
42	Maha Mineral Mining & Beneficiation Pvt Ltd, Sasti Washery	Maharashtra	2.40
43	Maha Mineral Mining & Beneficiation Pvt Ltd, Wani Washery	Maharashtra	0.45
44	Maha Mineral Mining & Beneficiation Pvt Ltd, Majri Washery	Maharashtra	2.40
45	Rukhmai Coal Washery LLP, Nimbala Washery (Formerly M/s Bhatiya Coal Washery Ltd.)	Maharashtra	3.73
46	Rukhmai infrastructure Pvt. Ltd., Gondegaon	Maharashtra	1.50
47	Rukhmai infrastructure Pvt. Ltd., Pandharpouni (Bhatiya Coal washeries Ltd)	Maharashtra	0.96
48	ALPS Mining Services (Formerly Bhatia Coal Washery)	Odisha	2.00
49	Aryan Energy Pvt. Ltd., Talcher	Odisha	2.34
50	Aryan Ispat and Power Pvt. Ltd.	Odisha	0.70
51	ACB (india) Ltd, Hemgir	Odisha	5.00
52	ACB (india) Ltd,Talcher Unit.	Odisha	11.00
53	Earth Minerals Company Ltd.	Odisha	4.00
54	Global Coal & Mining Pvt. Ltd.,Talcher Unit	Odisha	4.00
55	Global Coal & Mining Pvt. Ltd.,Jharsuguda Unit, IB Valley	Odisha	4.00
56	Jindal Steel & Power Ltd, Angul	Odisha	6.00
57	Shyam Metalics and Energy Ltd, Rengali	Odisha	1.00
58	Utkal Energy Ltd.	Odisha	0.96
59	Manuguru, Global coal Mining (P) Ltd.	Telengana	0.96
	(B) Private		**187.07**
	TOTAL NON-COKING (A+B)		**208.07**
	Gross Total (Coking + Non-Coking)		**257.79**

Source: Ministry of Coal

Table 2.2: Installed Capacity and Utilization of Refineries of Crude Oil

Sl. No.	Refinery	Refinery Capacity (TMTPA)			Crude Oil Processed (TMT)		Capacity Utilisation (%)		
		31.03.2022	31.03.2023	31.03.2024	2022-23	2023-24 (P)	2022-23	2023-24 (P)	Change in Utilisation
1	2	3	4	5	6	7	8	9	10
(a)	**PUBLIC SECTOR**	**151,716**	**154,416**	**157,316**	**161,500**	**165,885**	**106.45**	**107.43**	**0.98**
	IOCL, Guwahati, Assam	1,000	1,000	1,200	1,080	1,000	107.97	100.05	-7.92
	IOCL, Barauni, Bihar	6,000	6,000	6,000	6,785	6,618	113.09	110.29	-2.79
	IOCL, Koyali, Gujarat	13,700	13,700	13,700	15,567	15,202	113.63	110.96	-2.66
	IOCL, Haldia, West Bengal	8,000	8,000	8,000	8,506	8,060	106.33	100.74	-5.59
	IOCL, Mathura, Uttar Pradesh	8,000	8,000	8,000	9,573	9,191	119.66	114.88	-4.78
	IOCL, Digboi, Assam	650	650	650	713	710	109.68	109.26	-0.42
	IOCL, Panipat, Haryana	15,000	15,000	15,000	13,810	14,305	92.07	95.36	3.30
	IOCL, Bongaigaon, Assam	2,700	2,700	2,700	2,775	3,009	102.78	111.44	8.66
	IOCL, Paradip, Odisha	15,000	15,000	15,000	13,599	15,213	90.66	101.42	10.77
	Total IOC	**70,050**	**70,050**	**70,250**	**72,408**	**73,308**	**103.37**	**104.65**	**1.28**
	BPCL, Mumbai, Maharashtra	12,000	12,000	12,000	14,546	15,052	121.22	125.43	4.21
	BPCL, Kochi, Kerala	15,500	15,500	15,500	16,017	17,314	103.33	111.70	8.37
	BPCL, Bina, Madhya Pradesh	7,800	7,800	7,800	7,841	7,133	100.52	91.45	-9.08
	Total BPCL	**35,300**	**35,300**	**35,300**	**38,404**	**39,499**	**108.79**	**111.89**	**3.10**
	HPCL, Mumbai, Maharashtra	9,500	9,500	9,500	9,804	9,639	103.20	101.46	-1.74
	HPCL, Visakh, Andhra Pradesh	8,300	11,000	13,700	9,287	12,689	111.89	115.35	3.47
	Total HPCL	**17,800**	**20,500**	**23,200**	**19,091**	**22,328**	**107.25**	**108.92**	**1.66**
	CPCL, Manali, Tamil Nadu	10,500	10,500	10,500	11,316	11,642	107.77	110.88	3.11
	CPCL, Narimanam, Tamil Nadu	-	-	-	-	-	-	-	-
	Total CPCL	**10,500**	**10,500**	**10,500**	**11,316**	**11,642**	**107.77**	**110.88**	**3.11**
	NRL, Numaligarh, Assam	3,000	3,000	3,000	3,091	2,510	103.05	83.66	-19.39
	MRPL, Mangalore, Karnataka	15,000	15,000	15,000	17,116	16,533	114.11	110.22	-3.89
	ONGC, Tatipaka, Andhra Pradesh	66	66	66	74	65	111.40	99.10	-12.29
(b)	**PRIVATE SECTOR & JVs SECTOR**	**99,500**	**99,500**	**99,500**	**93,733**	**95,660**	**94.20**	**96.14**	**1.94**
	RIL, Jamnagar, Gujarat	33,000	33,000	33,000	34,433	34,390	104.34	104.21	-0.13
	RIL, SEZ-Jamnagar, Gujarat	35,200	35,200	35,200	27,872	28,300	79.18	80.40	1.22
	Nyara Energy Ltd. Vadinar	20,000	20,000	20,000	18,692	20,322	93.46	101.61	8.15
	HMEL, GGS, Bathinda, Punjab	11,300	11,300	11,300	12,735	12,648	112.70	111.93	-0.77
	Total (a+b)	**251,216**	**253,916**	**256,816**	**255,233**	**261,545**	**101.60**	**103.00**	**1.41**

1.Total may not tally due to rounding off (P): Provisional

2. Crude throughput in terms of crude oil processed.

3. Capacity utilisation is equal to crude oil processsed in during year divided by refineing capacity at the 1st April of initial of year*100

Source: M/o Petroleum & Natural Gas

Table 2.3 (A) : Yearwise Installed Capacity of Electicity Generation in Utilities and Non-Utilities

(in Mega Watt = 10^3 Kilo Watt)

As on	Utilities							
	Thermal				Large Hydro	Nuclear	RES*	Total
	Steam	Diesel	Gas	Total				
1	2	3	4	5	6	7	8	9
31.03.2014	145,273	1,200	21,782	168,255	40,531	4,780	34,988	248,554
31.03.2015	164,636	1,200	23,062	188,898	41,267	5,780	38,959	274,904
31.03.2016	185,173	994	24,509	210,675	42,783	5,780	45,924	305,162
31.03.2017	192,163	838	25,329	218,330	44,478	6,780	57,244	326,833
31.03.2018	197,172	838	24,897	222,907	45,293	6,780	69,022	344,002
31.03.2019	200,705	638	24,937	226,279	45,399	6,780	77,642	356,100
31.03.2020	205,135	510	24,955	230,600	45,699	6,780	87,028	370,106
31.03.2021	209,295	510	24,924	234,728	46,209	6,780	94,434	382,151
31.03.2022	210,700	510	24,900	236,109	46,723	6,780	109,885	399,497
31.03.2023	211,856	589	24,824	237,269	46,850	6,780	125,160	416,059
31.03.2024 (P)	217,589	589	25,038	243,217	46,928	8,180	143,645	441,970
Growth rate of 2023-24 over 2022-23(%)	**2.71**	**0.03**	**0.86**	**2.51**	**0.17**	**20.65**	**14.77**	**6.23**
CAGR 2014-15 to 2023-24(%)	**3.15**	**-7.60**	**0.92**	**2.85**	**1.44**	**3.93**	**15.60**	**5.42**

* RES= Comprising of Solar, Wind, Bio-Power and Small Hydro Power (P): Provisional

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 (B) : Yearwise Installed Capacity of Electicity Generation in Utilities and Non-Utilities

(in Mega Watt = 10^3 x Kilo Watt)

As on	Non-Utilities							Grand Total (Utility + Non-Utility)
	Thermal				Large Hydro	RES*	Total	
	Steam	Diesel	Gas	Total				
	10	11	12	13	14	15	16	17= 9+16
31.03.2014	24,752	11,432	4,751	40,935	64	1,259	42,258	290,812
31.03.2015	26,089	12,009	5,193	43,291	65	1,301	44,657	319,561
31.03.2016	28,688	12,347	5,819	46,853	59	1,368	48,279	353,442
31.03.2017	30,572	13,350	6,109	50,031	65	1,433	51,529	378,362
31.03.2018	32,854	13,145	7,156	53,155	51	1,726	54,933	398,935
31.03.2019	47,679	15,571	8,787	72,037	103	3,067	75,207	431,307
31.03.2020	51,543	12,775	7,316	71,633	131	4,475	76,239	446,346
31.03.2021	47,760	17,563	7,361	72,683	131	5,694	78,508	460,659
31.03.2022	45,303	18,649	5,685	69,637	135	6,961	76,732	476,229
31.03.2023	46,782	18,078	6,360	71,220	132	7,047	78,400	494,459
31.03.2024(P)	46,900	18,300	6,500	71,700	140	7,500	79,340	521,310
Growth rate of 2023-24 over 2022-23(%)	**0.25**	**1.23**	**2.20**	**0.67**	**5.85**	**6.42**	**1.20**	**5.43**
CAGR 2014-15 to 2023-24(%)	**6.73**	**4.79**	**2.52**	**5.77**	**8.88**	**21.49**	**6.59**	**5.59**

* RES=Comprising of Solar, Wind, Bio-Power and Small Hydro Power (P): Provisional

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.

Chapter 2: Installed capacity and capacity utilization

Table 2.4 : Regionwise and Statewise Installed Capacity of Electricity Generation (Utilities)

(in GW)

States/UTs	Large Hydro		Thermal		Nuclear		RES*		Total		Growth Rate (2022-23 to 2023-24) (%)
	31.03.2023	31.03.2024	31.03.2023	31.03.2024	31.03.2023	31.03.2024	31.03.2023	31.03.2024	31.03.2023	31.03.2024	
Chandigarh	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.07	0.06	0.07	**11.64**
Delhi	0.00	0.00	2.36	2.36	0.00	0.00	0.30	0.34	2.66	2.70	**1.44**
Haryana	0.20	0.20	4.82	4.82	0.00	0.00	1.36	1.83	6.38	6.85	**7.38**
Himachal Pradesh	2.91	2.91	0.00	0.00	0.00	0.00	1.07	1.08	3.98	3.99	**0.19**
Jammu & Kashmir	1.23	1.23	0.18	0.18	0.00	0.00	0.24	0.29	1.65	1.69	**2.50**
Punjab	1.24	1.24	6.92	6.92	0.00	0.00	1.87	2.07	10.03	10.24	**2.01**
Rajasthan	0.43	0.43	11.63	11.93	0.00	0.00	22.05	26.35	34.12	38.71	**13.47**
Uttar Pradesh	0.72	0.72	13.34	14.44	0.00	0.00	4.75	5.17	18.82	20.33	**8.05**
Uttarakhand	2.20	2.20	0.55	0.76	0.00	0.00	0.93	0.94	3.68	3.90	**5.89**
Central Sector NR	11.53	11.61	15.54	15.54	1.62	1.62	0.38	0.38	29.08	29.16	**0.27**
Sub-Total (NR)	**20.48**	**20.56**	**55.34**	**56.95**	**1.62**	**1.62**	**33.01**	**38.49**	**110.46**	**117.63**	**6.49**
Chhattisgarh	0.12	0.12	16.01	16.01	0.00	0.00	1.30	1.56	17.43	17.69	**1.51**
Gujarat	0.77	0.77	20.23	20.23	0.00	0.00	19.19	25.23	40.19	46.23	**15.02**
Madhya Pradesh	1.70	1.70	11.20	11.25	0.00	0.00	5.61	6.80	18.51	19.75	**6.69**
Maharashtra	3.33	3.33	22.26	22.41	0.00	0.00	12.63	14.36	38.22	40.10	**4.91**
Daman & Diu	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.05	0.04	0.05	**13.31**
D. & N. Haveli	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	-
Goa	0.00	0.00	0.05	0.05	0.00	0.00	0.03	0.05	0.07	0.09	**24.83**
Central Sector WR	1.52	1.52	22.88	22.88	1.84	3.24	0.67	0.67	26.91	28.31	**5.21**
Sub-Total (WR)	**7.45**	**7.45**	**92.62**	**92.82**	**1.84**	**3.24**	**39.47**	**48.71**	**141.38**	**152.21**	**7.66**
Andhra Pradesh	1.67	1.67	13.10	13.90	0.00	0.00	9.11	9.17	23.89	24.75	**3.60**
Telangana	2.48	2.48	7.46	7.46	0.00	0.00	5.10	5.19	15.04	15.13	**0.62**
Karnataka	3.63	3.63	7.11	7.11	0.00	0.00	16.72	17.75	27.46	28.49	**3.76**
Kerala	1.86	1.86	0.33	0.33	0.00	0.00	1.04	1.32	3.24	3.51	**8.40**
Tamil Nadu	2.18	2.18	9.03	9.45	0.00	0.00	17.74	19.80	28.95	31.43	**8.56**
Puducherry	0.00	0.00	0.03	0.03	0.00	0.00	0.04	0.05	0.07	0.08	**21.14**
Lakshadweep	0.00	0.00	0.03	0.03	0.00	0.00	0.00	0.00	0.03	0.03	**5.65**
Central Sector SR #	0.00	0.00	13.25	14.85	3.32	3.32	0.54	0.54	17.11	18.71	**9.35**
Sub-Total (SR)	**11.83**	**11.83**	**50.35**	**53.16**	**3.32**	**3.32**	**50.29**	**53.82**	**115.78**	**122.14**	**5.49**
Bihar	0.00	0.00	0.00	0.00	0.00	0.00	0.39	0.45	0.39	0.45	**15.54**
Jharkhand	0.13	0.13	2.25	2.25	0.00	0.00	0.11	0.19	2.49	2.57	**2.86**
Odisha	2.07	2.07	4.94	4.94	0.00	0.00	0.62	0.66	7.63	7.67	**0.56**
West Bengal	0.99	0.99	6.93	6.93	0.00	0.00	0.62	0.64	8.53	8.55	**0.23**
Sikkim	0.87	0.87	0.00	0.00	0.00	0.00	0.06	0.06	0.93	0.93	**0.25**
A. & N. Islands	0.00	0.00	0.09	0.09	0.00	0.00	0.03	0.03	0.12	0.12	**0.00**
Central Sector ER $	1.01	1.01	22.30	23.62	0.00	0.00	0.02	0.01	23.32	24.64	**5.64**
Sub-Total (ER)	**5.07**	**5.07**	**36.51**	**37.83**	**0.00**	**0.00**	**1.85**	**2.04**	**43.43**	**44.94**	**3.48**
Arunachal Pradesh	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.14	0.14	0.14	**0.10**
Assam	0.10	0.10	0.31	0.31	0.00	0.00	0.16	0.17	0.57	0.57	**1.46**
Manipur	0.00	0.00	0.04	0.04	0.00	0.00	0.02	0.02	0.05	0.05	**1.41**
Meghalaya	0.32	0.32	0.00	0.00	0.00	0.00	0.05	0.07	0.37	0.40	**6.06**
Mizoram	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.08	0.07	0.08	**3.12**
Nagaland	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.04	0.04	0.04	**0.36**
Tripura	0.00	0.00	0.11	0.11	0.00	0.00	0.03	0.03	0.13	0.13	**0.64**
Central Sector NER	1.61	1.61	2.00	2.00	0.00	0.00	0.03	0.04	3.64	3.64	**0.14**
Sub-Total (NER)	**2.03**	**2.03**	**2.45**	**2.45**	**0.00**	**0.00**	**0.54**	**0.58**	**5.02**	**5.06**	**0.80**
Total States	**31.19**	**31.19**	**161.30**	**164.32**	**0.00**	**0.00**	**123.53**	**142.01**	**316.01**	**337.52**	**6.81**
Total Central	**15.66**	**15.74**	**75.98**	**78.90**	**6.78**	**8.18**	**1.63**	**1.63**	**100.05**	**104.45**	**4.40**
Total All India	**46.85**	**46.93**	**237.27**	**243.22**	**6.78**	**8.18**	**125.16**	**143.64**	**416.06**	**441.97**	**6.23**

$ Damodar Valley Corporation (DVC) installed capacity is considered under central sector(ER)

* RES: Comprising of Solar, Wind, Bio-Power and Small Hydro Power

Includes NLC-Central capacity also

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

Source : Central Electricity Authority.

Chapter 2: Installed capacity and capacity utilization

Table 2.5: State-wise cumulative Installed Capacity of Renewable Power

S. No.	STATES / UTs	Small Hydro Power (MW)		Wind Power (MW)		Bio-Power-BM Power/Cogen. Bagasse (MW)		Waste to Energy (MW)		Solar Power (MW)		Total Capacity (MW)		Growth Rate(2022-23 to 2023-24)
		31.03.2023	31.03.2024	31.03.2023	31.03.2024	31.03.2023	31.03.2024	31.03.2023	31.03.2024	31.03.2023	31.03.2024	31.03.2023	31.03.2024	
1	Andhra Pradesh	163.31	163.31	4096.65	4096.65	483.67	491.67	82.36	82.72	4534.19	4584.98	**9360**	**9419**	**0.63**
2	Arunachal Pradesh	133.11	133.11			0.00	0.00	0.00	0.00	11.64	11.79	**145**	**145**	**0.10**
3	Assam	34.11	34.11			2.00	2.00	0.00	0.00	147.93	156.18	**184**	**192**	**4.48**
4	Bihar	70.70	70.70			124.70	138.90	1.32	1.32	192.88	239.23	**390**	**450**	**15.54**
5	Chhatisgarh	76.00	76.00			274.59	274.59	0.41	0.41	948.82	1212.39	**1300**	**1563**	**20.28**
6	Goa	0.05	0.05			0.00	0.00	0.34	1.94	26.49	43.48	**27**	**45**	**69.16**
7	Gujarat	91.64	91.64	9978.92	11722.72	77.30	77.30	33.43	35.18	9254.56	13544.88	**19436**	**25472**	**31.06**
8	Haryana	73.50	73.50			240.66	262.66	18.77	21.04	1029.16	1475.72	**1362**	**1833**	**34.57**
9	Himachal Pradesh	969.71	969.71			9.20	9.20	1.00	1.00	87.49	95.23	**1067**	**1075**	**0.73**
10	Jammu & Kashmir	146.68	169.93			0.00	0.00	0.00	0.00	49.44	65.44	**196**	**235**	**20.01**
11	Jharkhand	4.05	4.05			4.30	19.10	0.00	0.00	105.84	162.40	**114**	**186**	**62.49**
12	Karnataka	1280.73	1280.73	5294.95	6019.61	1887.30	1887.30	14.85	20.42	8241.40	8544.68	**16719**	**17753**	**6.18**
13	Kerala	266.52	276.52	62.50	63.50	2.27	2.27	0.23	0.23	761.43	1022.79	**1093**	**1365**	**24.92**
14	Ladakh	40.99	42.99			0.00	0.00	0.00	0.00	7.80	7.80	**49**	**51**	**4.10**
15	Madhya Pradesh	123.71	123.71	2844.29	2844.29	107.35	107.35	27.59	27.59	2802.14	3995.43	**5905**	**7098**	**20.21**
16	Maharashtra	381.08	382.28	5012.83	5207.98	2584.40	2584.40	56.29	58.79	4722.90	6249.67	**12758**	**14483**	**13.53**
17	Manipur	5.45	5.45			0.00	0.00	0.00	0.00	12.28	13.04	**18**	**18**	**4.29**
18	Meghalaya	32.53	55.03			13.80	13.80	0.00	0.00	4.15	4.24	**50**	**73**	**44.75**
19	Mizoram	45.47	45.47			0.00	0.00	0.00	0.00	28.02	30.31	**73**	**76**	**3.12**
20	Nagaland	32.67	32.67			0.00	0.00	0.00	0.00	3.04	3.17	**36**	**36**	**0.36**
21	Odisha	115.63	115.63			59.22	59.22	0.00	0.00	453.17	495.63	**628**	**670**	**6.76**
22	Punjab	176.10	176.10			496.15	531.29	26.12	35.96	1167.26	1324.27	**1866**	**2068**	**10.83**
23	Rajasthan	23.85	23.85	5193.42	5195.82	121.25	121.25	3.83	4.39	17055.70	21347.58	**22398**	**26693**	**19.18**
24	Sikkim	55.11	55.11			0.00	0.00	0.00	0.00	4.69	7.04	**60**	**62**	**3.93**
25	Tamil Nadu	123.05	123.05	10017.17	10603.54	1012.65	1012.65	31.05	32.80	6736.43	8211.38	**17920**	**19983**	**11.51**
26	Telangana	90.87	90.87	128.10	128.10	160.10	161.40	60.27	60.27	4666.03	4758.16	**5105**	**5199**	**1.83**
27	Tripura	16.01	16.01			0.00	0.00	0.00	0.00	17.60	18.46	**34**	**34**	**2.56**
28	Uttar Pradesh	49.10	49.10			2118.26	2122.76	98.47	103.38	2515.22	2920.33	**4781**	**5196**	**8.67**
29	Uttarakhand	218.82	218.82			130.22	132.72	9.22	9.52	575.53	575.53	**934**	**937**	**0.30**
30	West Bengal	98.50	98.50			338.62	343.52	4.48	4.84	179.97	194.07	**622**	**641**	**3.11**
31	Andaman & Nicobar	5.25	5.25			0.00	0.00	0.00	0.00	29.91	29.91	**35**	**35**	**0.00**
32	Chandigarh					0.00	0.00	0.00	0.00	58.69	65.52	**59**	**66**	**11.64**
32	Dadar & Nagar Haveli					0.00	0.00	0.00	0.00	46.47	46.47	**46**	**46**	**0.00**
34	Daman & Diu											**0**	**0**	**-**
35	Delhi					0.00	0.00	84.00	84.00	218.26	256.51	**302**	**341**	**12.65**
36	Lakshwadeep					0.00	0.00	0.00	0.00	3.27	4.97	**3**	**5**	**51.99**
37	Puducherry					0.00	0.00	0.00	0.00	35.53	49.91	**36**	**50**	**40.47**
38	Others			4.30	4.30	0.00	0.00	0.00	0.00	45.01	45.01	**49**	**49**	**0.00**
Total (MW)		**4944**	**5003**	**42633**	**45887**	**10248**	**10355**	**554**	**586**	**66780**	**81814**	**125160**	**143645**	**14.77**
Percentages Distribution		**4.0**	**3.5**	**34.1**	**31.9**	**8.2**	**7.2**	**0.4**	**0.4**	**53.4**	**57.0**	**100**	**100**	

Source: Ministry of New and Renewable Energy

Chapter 2: Installed capacity and capacity utilization

Table 2.6 : Installation of Off-grid / Decentralised Renewable Energy Systems/ Devices as on 31.03.2024

Sl. No.	State/UT	Biogas Plants (Nos)	SPV Pumps (Nos.)	Solar Photovoltaic (SPV) Systems				Waste to Energy (off Grid)(MW)
				SLS (Nos.)	HLS (Nos.)	SL (Nos.)	PP (KWP)	
1	2	3	4	5	6	7	8	9
1	Andhra Pradesh	268,628	34,045	16,460	22,972	77,803	3,816	30
2	Arunachal Pradesh	3,686	221	25,008	35,065	218,551	963	
3	Assam	139,435	45	29,538	46,879	647,761	1,605	
4	Bihar	130,091	2,813	54,147	12,303	1,735,227	6,905	1
5	Chhattisgarh	60,717	119,282	4,538	42,232	3,311	31,373	0
6	Goa	4,245	45	707	393	1,093	33	
7	Gujarat	438,320	14,920	5,004	9,253	31,603	13,577	28
8	Haryana	64,092	88,937	34,625	56,727	93,853	2,321	10
9	Himachal Pradesh	47,718	644	98,800	22,592	33,909	1,906	1
10	Jammu & Kashmir	3,201	877	39,076	144,316	51,224	8,130	
11	Jharkhand	7,890	17,655	14,344	9,450	790,515	3,770	
12	Karnataka	516,091	7,734	5,694	52,638	7,781	7,854	19
13	Kerala	154,879	826	1,735	41,912	54,367	16,268	0
14	Ladakh	-	-	-	-	-	-	
15	Madhya Pradesh	383,347	25,138	16,808	7,920	529,101	3,654	12
16	Maharashtra	939,275	91,408	10,420	3,497	239,297	3,858	46
17	Manipur	2,128	118	32,767	24,583	69,722	1,581	
18	Meghalaya	11,156	101	5,800	14,874	97,360	2,004	
19	Mizoram	5,857	37	20,325	12,060	155,217	3,895	
20	Nagaland	7,954	68	16,045.0	1,045.0	30,766.0	1,506.0	
21	Odisha	271,932	10,962	19,109.0	5,274.0	99,843.0	2,321.5	
22	Punjab	189,148	17,534	43,758	8,626	17,495	2,066	25
23	Rajasthan	73,145	118,784	8,934.0	187,968.0	225,851.0	30,449.0	4.4
24	Sikkim	9,044	-	504	15,059	45,200	850	
25	Tamil Nadu	224,148	8,695	41,419	298,641	16,818	13,053	26
26	Telangana	316,870	424	2,458	-	142,000	7,450	14
27	Tripura	4,132	2,268	15,517	32,723	364,012	867	
28	Uttar Pradesh	441,447	60,862	302,532	235,909	2,351,205	10,638	103
29	Uttarakhand	366,083	344	43,803	91,595	165,071	4,060	10
30	West Bengal	1,216	653	18,203	145,332	17,662	1,730	5
31	Andaman & Nicobar	97	5	1,490	468	6,296	167	
32	Chandigarh	169	12	901	275	1,675	730	
33	Dadar & Nagar Haveli	681.0		-	-	-	-	
34	Daman & Diu	-		-	-	-	-	
35	Delhi	587	90	301	-	4,807	1,269	
36	Lakshadweep	-		4,465	600	5,289	2,190	
37	Puducherry	17,541	21	417	25	1,637	121	
38	Others*	-	4,621	9,150	140,273	125,797	23,885	
	Total	**5,104,950**	**630,189**	**944,802**	**1,723,479**	**8,459,119**	**216,863**	**336**

* Others includes installations through NGOs/IREDA in different states

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

MW = Mega Watt; KWP = Kilowatt peak

Source : Ministry of New and Renewable Energy

3 Chapter

Production of Energy Resources

CHAPTER 3
Production of Energy Resources

Introduction

Energy production plays a critical role in shaping a nation's economic stability and growth. High-quality, detailed energy statistics equip policymakers with the information necessary to make informed decisions, including anticipating global price shocks in energy commodities. Additionally, data on energy production and stock changes are essential for monitoring national energy security. In a global energy landscape marked by evolving trade dynamics, consumption patterns, and stock levels, disruptions in national energy supply are often perceived as a threat to national independence—particularly when domestic energy resources do not meet the growing demand.

In Energy Statistics, production is defined as the capture, extraction or manufacture of fuels or energy that are ready for general use. 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.

Secondary production is the manufacture of energy products through the process of transformation of other fuels or energy, whether primary or secondary. The quantities of secondary fuels reported as production include quantities lost through venting and flaring during and after production.

This chapter discusses the production of various energy resources, including coal, lignite, crude oil, natural gas, and electricity.

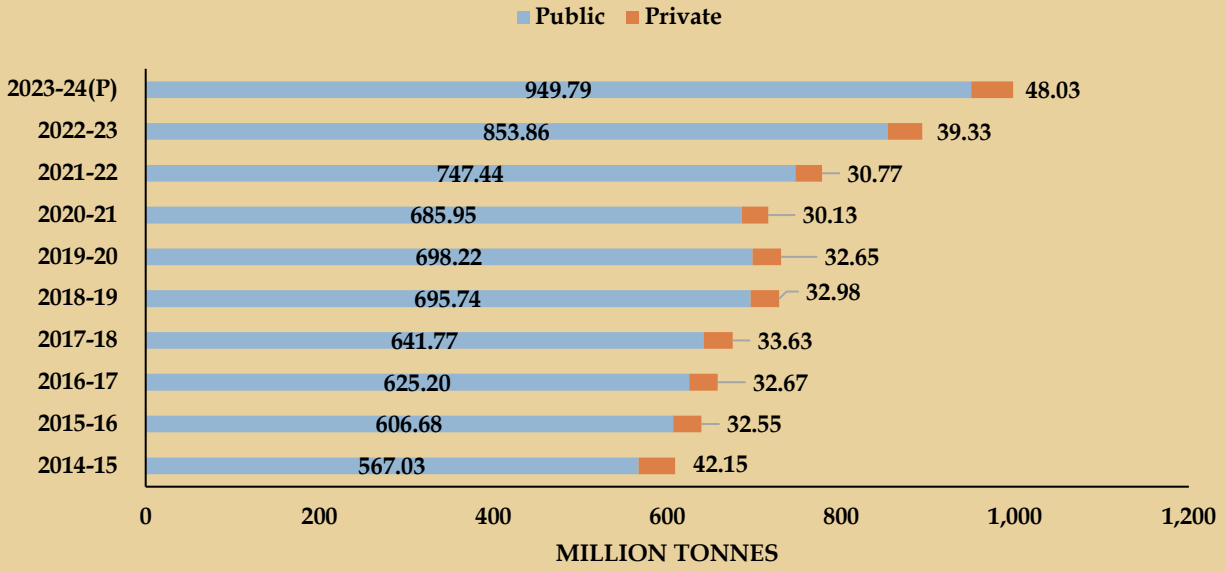
Chapter 3: Production of Energy Resources

Highlights of Production of Energy Resources

3.1 Coal Production

During the FY 2023-24(P), coal production in India reached **997.83 million tonnes**, marking an increase of **11.71**% from **893.19 million tonnes** in FY 2022-23. The production of coal has shown a steady increase over the past decade, with a compound annual growth rate (CAGR) of 5.64% from FY 2014-15 to FY 2023-24(P). The exception to this upward trend occurred in FY 2020-21(Table 3.1). The public sector remains dominant in coal production, contributing nearly 95% of the total coal production in India during FY 2023-24. A scenario of performance made by Public and Private sector during past 10 years is shown in **figure 3.1**.

Fig 3.1: Share of Private and Public sector in Production of Coal in India



3.2 Lignite Production

In contrast to coal, lignite production saw a slight decrease in FY 2023-24(P), with total production recorded at **42.92 million tonnes**, down by **2.52**% from **44.03 million tonnes** in FY 2022-23(Table 3.1).

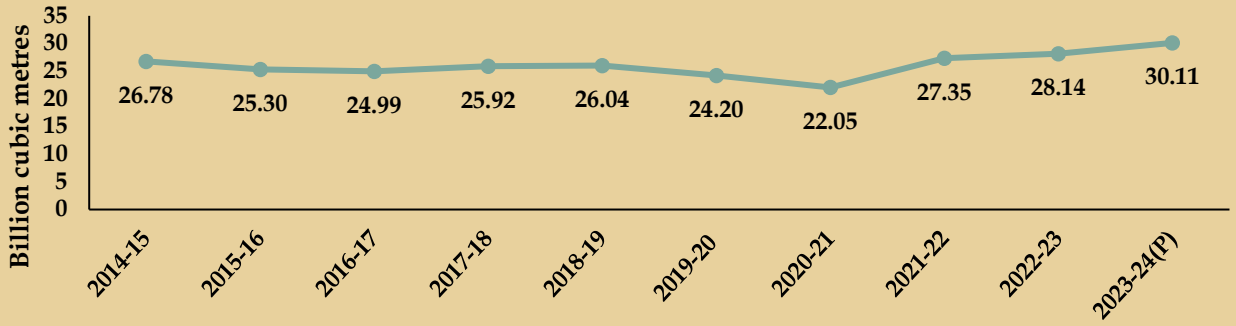
3.3 Crude Oil Production

Crude oil production in India experienced a marginal increase in FY 2023-24(P), reaching **29.36 million tonnes** compared to **29.18 million tonnes** in FY 2022-23, reflecting an increase of **0.61**% (Table 3.1).

3.4 Natural Gas Production

The net production of natural gas for consumption increased by **6.03%** in FY 2023-24(P), reaching **35.68 billion cubic meters (BCM)**, compared to **33.65 BCM** in FY 2022-23. Similarly, the net production of natural gas for sale also saw a growth of over 7%, increasing from **28.14 BCM** in FY 2022-23 to **30.11 BCM** in FY 2023-24(P). **T**he year wise net production of natural gas during the last 10 years is shown in below figure.

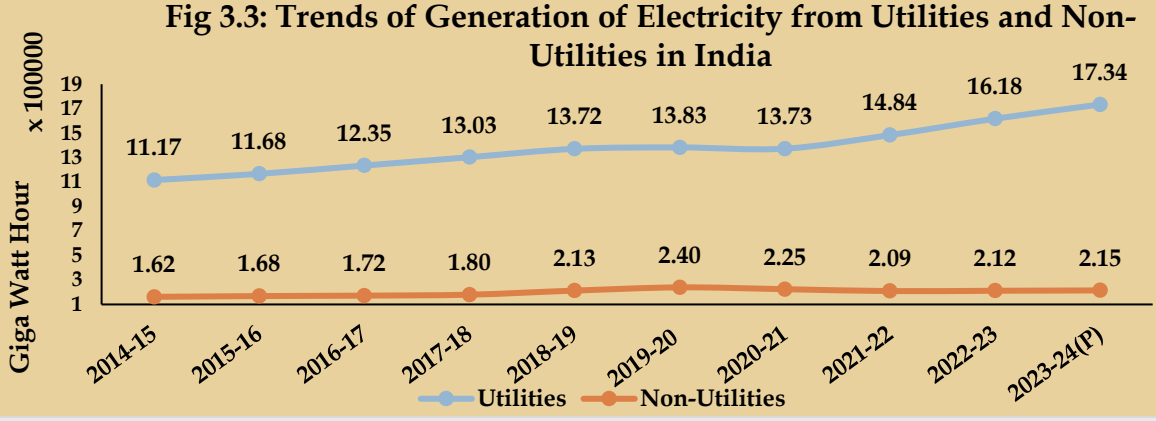
Fig 3.2 : Trend of Net production (for Sale) of Natural Gas in India



3.5 Electricity Generation Trends

India has experienced a steady growth in terms of gross electricity generation (from Utility) over time except 2020-21. The CAGR grew at a rate of 5.01% in the last ten years from 2014-15 to 2023-24(P). The generation of electricity in India still depends heavily on Coal. During FY:2023-24(P) close to 76% of the electricity (from utilities and non-utilities) has been generated from Steam. However, the RES (Renewable Energy Resources other than Hydro for utility and non-utility) has shown some good signs as it has registered a growth of 11.15% during FY: 2023-24(P), as compared to 2022-23. The year wise generation of electricity from utilities and Non utilities from 2014-15 to 2023-24(P) is shown in below figure.

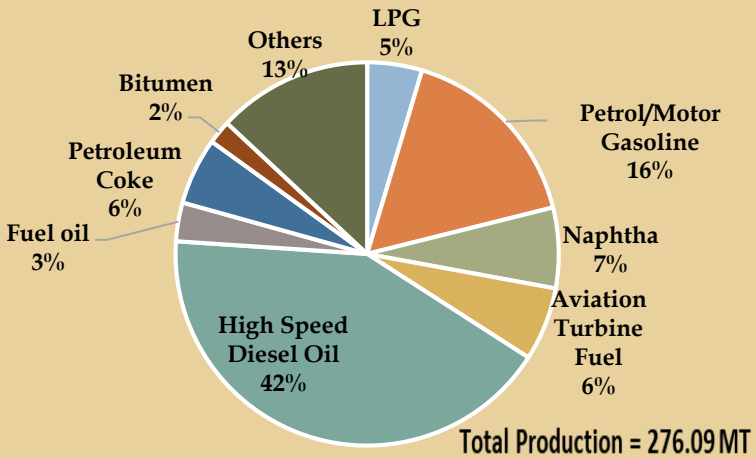
Fig 3.3: Trends of Generation of Electricity from Utilities and Non-Utilities in India



3.6 Petroleum Products Production

The production of petroleum products in India rose by 3.58% in FY 2023-24(P), with a total production of 276.09 million tonnes, compared to 266.54 million tonnes in FY 2022-23 (Table 3.4).

Fig 3.4 : Production of Petroleum Products by type during 2023-24 (P)

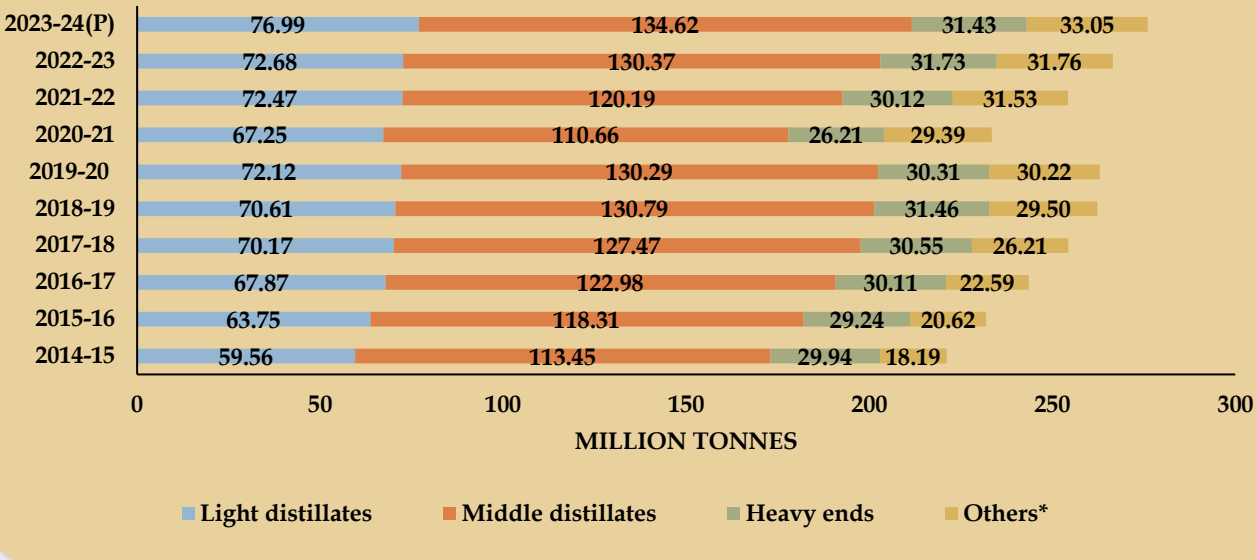


The High-speed diesel oil was the dominant petroleum product, accounting for 42% of total production, followed by petrol/motor gasoline at 16% as shown in **figure 3.4**.

Within the three main categories of petroleum products, middle distillates—such as Kerosene, Aviation Turbine Fuel (ATF), High speed Diesel (HSD) and LDO—constitute the largest share, accounting for 48.76% of India's petroleum production. These products experienced a growth of 3.26% in FY 2023-24(P) compared to the previous year.

A sectoral overview during last 10 years is shown in below figure:

Fig 3.5 : Yearwise domestic production of Petroleum products

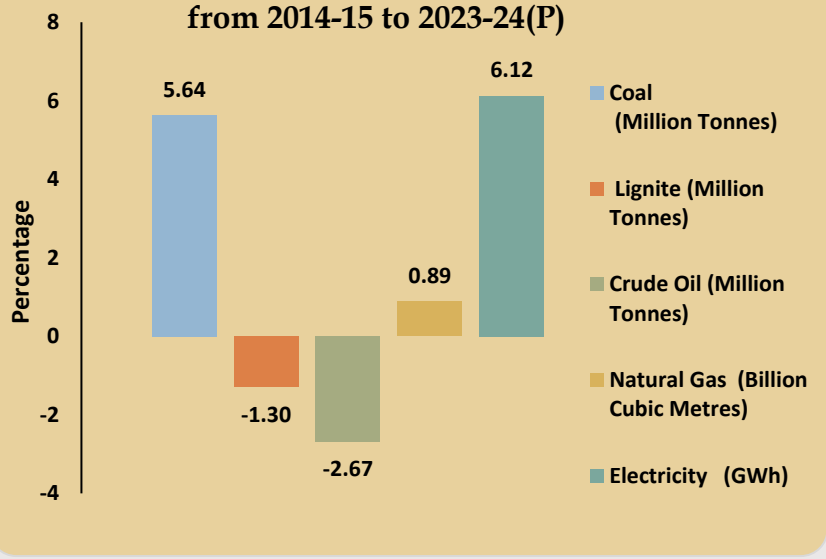


Others include VGO, Benzene, MTO, CBFS, Sulphur, waxes. MTBE& Reformate etc.

3.7 Compound annual growth rate of production of primary energy resources

The compound annual growth rates (CAGRs) of crude oil and natural gas production, relative to FY 2014-15, show a decline for crude oil at -2.67% and a modest growth for natural gas at 0.89%. Conversely, electricity generation from hydro, nuclear, and other renewable sources exhibited the highest CAGR of 6.12%, showing remarkable growth of renewable energy in India as shown in **figure 3.6**.

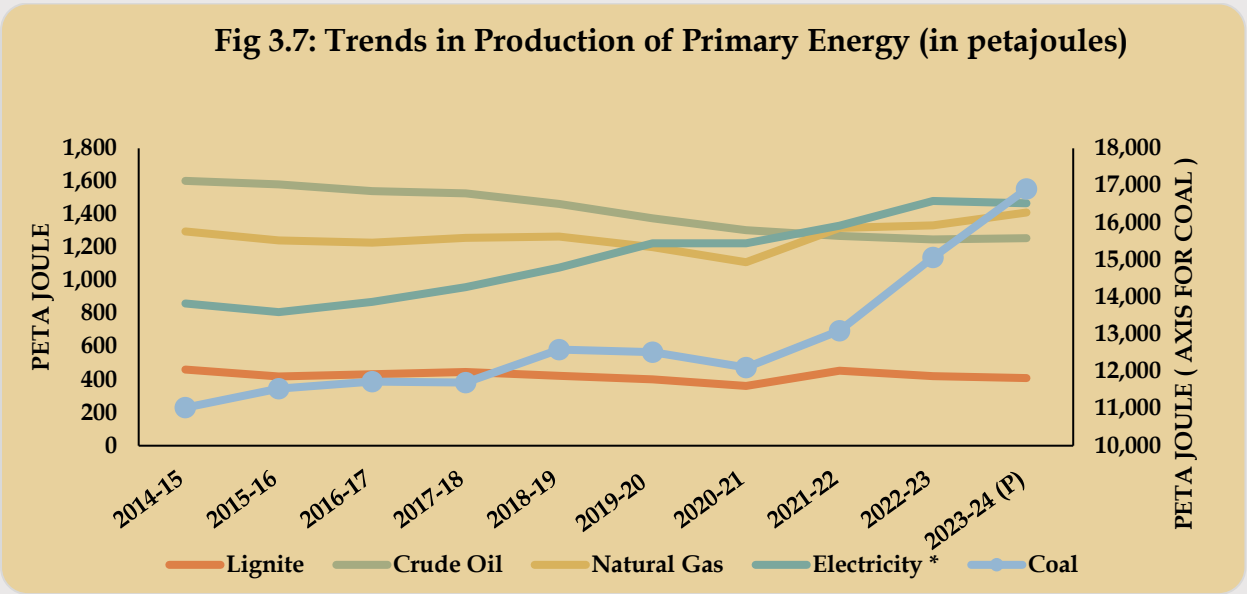
Fig 3.6 : Compound Annual Growth Rate of Production of Primary Energy Resources from 2014-15 to 2023-24(P)



3.8 Energy Production in Petajoules

Energy production in terms of Petajoules (PJ) increased by 9.73% from 19,549 PJ in FY 2022-23 to 21,452 PJ in FY 2023-24(P). This growth indicates a general expansion of energy production across various sources (Table 3.2). The production of primary energy sources in India during last 10 years is shown in below figure:

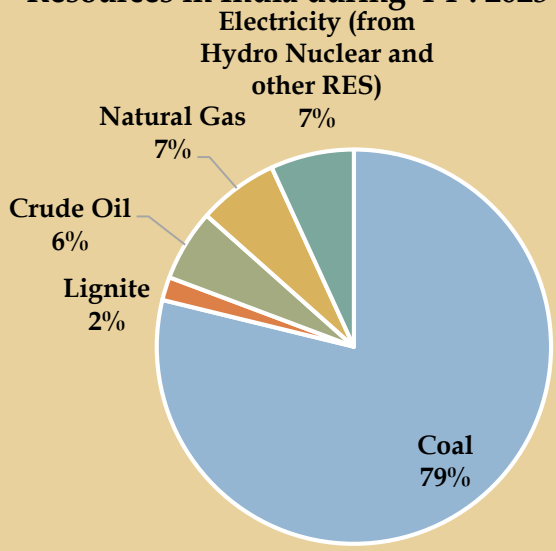
Fig 3.7: Trends in Production of Primary Energy (in petajoules)



3.9 Dependency on Coal for Primary Energy Generation

India continues to rely heavily on coal for energy generation. In FY 2023-24(P), coal contributed to about **79%** of the total primary energy generation, followed by electricity from hydro, nuclear, and other renewable sources (7%) and natural gas (7%). The share of total energy generated from different commercial sources in India during FY 2023-24 is shown in below figure:

Fig 3.8: Share of Total Energy Generated from Primary Energy Resources in India during FY : 2023-24(P)



Total Energy Generated = 21,452 PJ

Chapter 3: Production of Energy Resources

Table 3.1 : Yearwise Production of Primary Energy Resources in Physical Units

Year	Coal (Million Tonnes)	Lignite (Million Tonnes)	Crude Oil (Million Tonnes)	Natural Gas # (Billion Cubic Metres)	Electricity* (GWh)
1	2	3	4	5	6
2014-15	609.18	48.27	37.46	33.66	238,908
2015-16	639.23	43.84	36.94	32.25	224,571
2016-17	657.87	45.23	36.01	31.90	241,842
2017-18	675.40	46.64	35.68	32.65	266,308
2018-19	728.72	44.28	34.20	32.87	299,465
2019-20	730.87	42.10	32.17	31.18	340,579
2020-21	716.08	37.90	30.49	28.67	340,576
2021-22	778.21	47.49	29.69	34.02	369,652
2022-23	893.19	44.03	29.18	34.45	411,514
2023-24(P)	997.83	42.92	29.36	36.44	407,826
Growth rate of 2023-24 over 2022-23 (%)	**11.71**	**-2.52**	**0.61**	**5.77**	**-0.90**
CAGR 2014-15 to 2023-24(%)	**5.64**	**-1.30**	**-2.67**	**0.89**	**6.12**

(P): Provisional

For Natural Gas Gross Production is reported

* Electricity from Hydro, Nuclear and other Renewable energy sources (Utility)

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

Table 3.2 : Yearwise Production of Primary Energy Resources in Energy

(in Petajoules) @

Year	Coal	Lignite	Crude Oil	Natural Gas	Electricity *	Total
1	2	3	4	5	6	7= 2 to 6
2014-15	11,024	461	1,603	1,296	860	15,244
2015-16	11,539	419	1,581	1,242	808	15,589
2016-17	11,722	432	1,541	1,229	871	15,794
2017-18	11,695	445	1,527	1,258	959	15,884
2018-19	12,587	423	1,464	1,266	1,078	16,818
2019-20	12,521	402	1,377	1,201	1,226	16,726
2020-21	12,105	362	1,305	1,111	1,226	16,109
2021-22	13,091	453	1,270	1,318	1,331	17,464
2022-23	15,064	420	1,249	1,334	1,481	19,549
2023-24 (P)	16,906	410	1,256	1,411	1,468	21,452
Growth rate of 2023-24 over 2022-23 (%)	**12.23**	**-2.52**	**0.61**	**5.77**	**-0.90**	**9.73**
CAGR 2014-15 to 2023-24(%)	**4.87**	**-1.30**	**-2.67**	**0.95**	**6.12**	**3.87**

(P): Provisional

* Electricity from hydro, Nuclear and other Renwable energy sources (utility)

@ Conversion factors have been applied to convert production of primary resources of energy into petajoules

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

Table 3.3 : Yearwise Production of Coal - Typewise and Sectorwise

(Million Tonnes)

Year	Coal			Public	Private	Total
	Coking	Non-coking	Total			
1	2	3	4=2+3	5	6	7=5+6
2014-15	57.45	551.73	609.18	567.03	42.15	609.18
2015-16	60.89	578.34	639.23	606.68	32.55	639.23
2016-17	61.66	596.21	657.87	625.20	32.67	657.87
2017-18	40.15	635.25	675.40	641.77	33.63	675.40
2018-19	41.13	687.59	728.72	695.74	32.98	728.72
2019-20	52.94	677.94	730.87	698.22	32.65	730.87
2020-21	44.79	671.30	716.08	685.95	30.13	716.08
2021-22	51.70	726.51	778.21	747.44	30.77	778.21
2022-23	60.76	832.43	893.19	853.86	39.33	893.19
2023-24(P)	66.82	931.01	997.83	949.79	48.03	997.83
Growth rate of 2023-24 over 2022-23 (%)	**9.98**	**11.84**	**11.71**	**11.23**	**22.13**	**11.71**
CAGR 2014-15 to 2023-24(%)	**1.69**	**5.99**	**5.64**	**5.90**	**1.46**	**5.64**

(P): Provisional

Source : Ministry of Coal

Table 3.3 A: Grade Wise Production of Coking Coal by Sector during 2022-23 & 2023-24

(Million Tonnes)

Grade of Coaking Coal	Public		Private		All India		Change in production (%)
	2022-23	2023-24 (P)	2022-23	2023-24 (P)	2022-23	2023-24 (P)	
Steel-I	0.00	0.00	0.00	0.00	0.00	0.00	-
Steel-II	0.06	0.10	0.00	0.00	0.06	0.10	-
SC-1	0.25	0.22	0.00	0.00	0.25	0.22	-
Wash-I	0.17	1.23	0.00	0.00	0.17	1.23	-
Wash-II	3.45	2.95	0.34	0.49	3.78	3.44	-9.12
Wash-III	2.31	4.31	0.33	0.29	2.64	4.60	74.37
Wash-IV	26.10	30.41	5.11	5.15	31.21	35.55	13.90
Wash-V	22.48	21.21	0.00	0.00	22.48	21.21	-5.64
Wash-VI	0.17	0.48	0.00	0.00	0.17	0.48	-
Washery Feed	0.00	0.00	0.00	0.00	0.00	0.00	-
SLV1	0.00	0.00	0.00	0.00	0.00	0.00	-
All India Total	**54.99**	**60.90**	**5.77**	**5.92**	**60.76**	**66.82**	9.98
Met.Coal	**37.60**	**43.50**	**5.77**	**5.92**	**43.37**	**49.42**	13.96
Non Met	**17.39**	**17.40**	**0.00**	**0.00**	**17.39**	**17.40**	0.05
All India Total	**54.99**	**60.90**	**5.77**	**5.92**	**60.76**	**66.82**	9.98

(P): Provisional

Source: Ministry of Coal

Table 3.3 B: Grade Wise Production of Non-Coking Coal by Sector during 2022-23 & 2023-24

(Million Tonnes)

Grade of Non-Coaking Coal	Public		Private		All India		Change in production (%)
	2022-23	2023-24 (P)	2022-23	2023-24 (P)	2022-23	2023-24 (P)	
G1	0.02	0.05	0.00	0.00	0.02	0.05	-
G2	0.08	0.09	0.00	0.00	0.08	0.09	-
G3	1.70	2.59	0.00	0.00	1.70	2.59	-
G4	16.10	18.01	0.00	0.00	16.10	18.01	11.84
G5	9.90	8.95	0.00	0.18	9.90	9.13	-7.81
G6	6.43	7.30	0.13	0.15	6.55	7.45	13.64
G7	45.80	54.63	0.61	0.88	46.41	55.51	19.63
G8	53.20	57.81	0.46	0.00	53.66	57.81	7.73
G9	53.13	67.46	0.00	10.95	53.13	78.41	47.58
G10	63.28	68.36	9.95	1.17	73.23	69.53	-5.06
G11	236.80	267.67	10.84	4.28	247.64	271.96	9.82
G12	99.45	108.44	4.11	12.79	103.56	121.23	17.06
G13	99.05	112.40	1.07	2.87	100.12	115.27	15.13
G14	92.16	89.35	0.43	3.80	92.59	93.15	0.60
G15	17.18	24.49	0.75	0.10	17.93	24.59	37.10
G16	4.28	0.00	0.00	4.32	4.28	4.32	1.08
G17	0.23	1.30	5.21	0.61	5.43	1.91	-
UNG	0.09	0.00	0.00	0.00	0.09	0.00	-
All India Total	**798.87**	**888.90**	**33.56**	**42.11**	**832.43**	**931.01**	11.84

(P): Provisional

Source: Ministry of Caol

Table 3.4 : Yearwise Domestic Production of Petroleum Products

(Million Tonnes)

Year	Light distillates				Middle distillates					Heavy ends					Others*	Total
	LPG	Petrol/MG	Naphtha	Total	Kerosene	ATF	HSD	LDO	Total	Fuel oil	Lubes	Pet. Coke	Bitumen	Total		
1	2	3	4	5	6	7	8	9	10	11	12	12	14	15	16	17
2014-15	9.84	32.33	17.39	59.56	7.56	11.10	94.43	0.36	113.45	11.92	0.95	12.45	4.63	29.94	18.19	221.14
2015-16	10.57	35.32	17.86	63.75	7.50	11.79	98.59	0.43	118.31	9.73	1.04	13.32	5.16	29.24	20.62	231.92
2016-17	11.33	36.59	19.95	67.87	6.04	13.83	102.48	0.63	122.98	9.96	1.03	13.94	5.19	30.11	22.59	243.55
2017-18	12.38	37.78	20.01	70.17	4.41	14.59	107.90	0.56	127.47	9.49	1.04	14.75	5.28	30.55	26.21	254.40
2018-19	12.79	38.04	19.79	70.61	4.07	15.48	110.53	0.70	130.79	10.03	0.95	14.68	5.80	31.46	29.50	262.36
2019-20	12.82	38.62	20.68	72.12	3.21	15.24	111.22	0.62	130.29	8.61	0.93	15.53	5.24	30.31	30.22	262.94
2020-21	12.07	35.78	19.40	67.25	2.39	7.09	100.44	0.73	110.66	7.24	1.07	12.66	5.25	26.21	29.39	233.51
2021-22	12.24	40.24	19.99	72.47	1.92	10.29	107.17	0.81	120.19	8.33	1.17	15.51	5.11	30.12	31.53	254.31
2022-23	12.83	42.82	17.04	72.68	0.95	15.00	113.77	0.65	130.37	9.24	1.30	16.04	5.14	31.73	31.76	266.54
2023-24(P)	12.78	45.48	18.74	76.99	0.98	17.11	115.87	0.66	134.62	9.02	1.35	15.56	5.49	31.43	33.05	276.09
Growth rate of 2023-24 over 2022-23(%)	**-0.43**	**6.22**	**9.97**	**5.93**	**3.71**	**14.08**	**1.84**	**1.70**	**3.26**	**-2.40**	**3.87**	**-3.01**	**6.76**	**-0.97**	**4.08**	**3.58**
CAGR 2014-15 to 2023-24 (%)	**2.94**	**3.87**	**0.83**	**2.89**	**-20.28**	**4.92**	**2.30**	**6.99**	**1.92**	**-3.05**	**4.05**	**2.51**	**1.91**	**0.54**	**6.86**	**2.50**

(P): Provisional LPG=Liquified Petroleum Gas, MG= Motor Gasoline, ATF= Aviation Turbine Fuel, Lubes= Lubricant, Pet.Coke= Petroleum Coke

* Others include VGO, Benzene, MTO, CBFS, Sulphur, Waxes, MTBE & Reformate, etc.

Source : Ministry of Petroleum & Natural Gas.

Table 3.5 : Yearwise Gross and Net Production of Natural Gas

(in Billion Cubic Metres)

Year	Gross Production	Internal Consumption	Flared	Losses	Net Production (For Consumption)	Net Production (For Sales)
1	2	3	4	5	6=2-4-5	7 = 6 - 3
2014-15	33.66	5.91	0.87	0.10	32.69	26.78
2015-16	32.25	5.83	1.01	0.12	31.12	25.30
2016-17	31.90	5.86	0.98	0.07	30.85	24.99
2017-18	32.65	5.81	0.82	0.09	31.73	25.92
2018-19	32.87	6.02	0.73	0.09	32.05	26.04
2019-20	31.18	6.05	0.86	0.07	30.26	24.20
2020-21	28.67	5.73	0.82	0.07	27.78	22.05
2021-22	34.02	5.77	0.81	0.09	33.12	27.35
2022-23	34.45	5.51	0.69	0.11	33.65	28.14
2023-24(P)	36.44	5.57	0.65	0.11	35.68	30.11
Growth rate of 2023-24 over 2022-23(%)	**5.77**	**0.98**	**-6.60**	**3.26**	**6.03**	**7.02**
CAGR 2014-15 to 2023-24 (%)	**0.89**	**-0.66**	**-3.17**	**1.05**	**0.98**	**1.31**

(P) : Provisional

Total may not tally due to rounding off.

Source : Ministry of Petroleum & Natural Gas.

Table 3.6 (A): Yearwise Gross Generation of Electricity from Utilities

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

Year	Utilities							
	Thermal				Large Hydro	Nuclear	RES*	Total
	Steam	Diesel	Gas	Total				
1	2	3	4	5	6	7	8	9
2014-15	835,291	1,576	41,075	877,941	129,244	36,102	73,563	1,116,850
2015-16	895,340	551	47,122	943,013	121,377	37,414	65,781	1,167,584
2016-17	944,022	401	49,094	993,516	122,378	37,916	81,548	1,235,358
2017-18	986,591	348	50,208	1,037,146	126,123	38,346	101,839	1,303,455
2018-19	1,022,265	215	49,834	1,072,314	134,894	37,813	126,759	1,371,779
2019-20	994,197	199	48,443	1,042,838	155,769	46,472	138,337	1,383,417
2020-21	981,443	224	50,944	1,032,611	150,300	43,029	147,248	1,373,187
2021-22	1,078,581	214	36,016	1,114,811	151,627	47,112	170,912	1,484,463
2022-23	1,182,096	409	23,885	1,206,390	162,099	45,861	203,555	1,617,904
2023-24(P)	1,294,852	401	31,296	1,326,549	134,054	47,937	225,835	1,734,375
Growth rate of 2023-24 over 2022-23(%)	**9.54**	**-2.06**	**31.03**	**9.96**	**-17.30**	**4.53**	**10.95**	**7.20**
CAGR 2014-15 to 2023-24(%)	**4.99**	**-14.12**	**-2.98**	**4.69**	**0.41**	**3.20**	**13.27**	**5.01**

(P):Provisional * RES: Comprising of Solar, Wind, Bio-Power and Small Hydro Power

Source : Central Electricity Authority.

Table 3.6 (B) : Yearwise Gross Generation of Electricity from Non-Utilities

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

Year	Non-Utilities							Grand Total
	Thermal				Large Hydro	RES*	Total	
	Steam	Diesel	Gas	Total				
1	10	11	12	13	14	15	16	17
2014-15	128,401	9,720	21,135	159,256	145	2,656	162,057	1,278,907
2015-16	136,721	8,412	21,083	166,216	110	2,046	168,372	1,335,956
2016-17	137,588	9,182	22,855	169,625	144	2,277	172,046	1,407,404
2017-18	143,868	8,107	25,362	177,337	112	2,328	179,777	1,483,232
2018-19	184,250	5,334	19,545	209,130	270	3,674	213,074	1,584,853
2019-20	205,546	1,919	25,443	232,908	348	6,310	239,567	1,622,983
2020-21	193,143	2,504	21,684	217,330	339	7,158	224,827	1,598,014
2021-22	179,235	2,105	20,801	202,141	357	6,813	209,311	1,693,774
2022-23	179,831	2,035	21,087	202,953	291	8,688	211,932	1,829,836
2023-24(P)	180,500	2,150	21,500	204,150	351	10,080	214,581	1,948,956
Growth rate of 2023-24 over 2022-23(%)	**0.37**	**5.63**	**1.96**	**0.59**	**20.74**	**16.02**	**1.25**	**6.51**
CAGR 2014-15 to 2023-24(%)	**3.86**	**-15.43**	**0.19**	**2.80**	**10.35**	**15.97**	**3.17**	**4.79**

(P): Provisional * RES: Comprising of Solar, Wind, Bio-Power and Small Hydro Power

Source : Central Electricity Authority.

4 Chapter

Foreign Trade and Prices of Energy Resources

CHAPTER 4
Foreign Trade and Prices of Energy Resources

Introduction

India's economic growth is significantly shaped by foreign trade, with energy resources playing a central role. The country's heavy reliance on imports, particularly crude oil, natural gas, and coal, makes it highly susceptible to fluctuations in global energy prices. These fluctuations affect the trade balance, as rising energy prices increase India's import bill, leading to a higher trade deficit.

Energy prices are particularly influential on key sectors like transportation, manufacturing, and agriculture, all of which depend heavily on affordable energy. As India continues to expand its industrial base and infrastructure, the cost of energy becomes a critical factor in maintaining competitiveness and economic stability. India is focusing on increasing its energy security by diversifying sources, investing in renewable energy, and promoting energy efficiency. Managing energy imports and stabilizing energy prices are key to India's goal of achieving sustainable economic growth while reducing its dependence on volatile global energy markets.

This chapter presents the foreign trade and prices of energy resources i.e. Coal, Crude Oil, Petroleum, Natural Gas and Electricity.

Chapter 4: Foreign Trade and Prices of Energy Resources

4.1 Coal Imports

India has experienced a steady increase in coal imports over the last decade, reflecting the country's growing demand for energy. The net import of coal increased from **216.54 million tonnes (MT)** in FY 2014-15 to **236.50 MT** in FY 2022-23. In FY 2023-24 (P), this figure rose further to **262.99 MT**, marking an **11.20**% increase compared to the previous year. Despite fluctuations in certain years, coal imports have followed a consistent upward trend.

4.2 Crude Oil Imports

India remains heavily reliant on crude oil imports to meet domestic consumption. Crude oil imports grew from **189.43 MT** in FY 2014-15 to **226.95 MT** in FY 2019-20. The COVID-19 pandemic caused a dip in 2020-21, reducing imports to **196.46 MT**. However, imports rose again in FY 2023-24 (P), reaching **234.26 MT**, an increase of **0.67**% from the previous year.

4.3 Petroleum Product Exports

India is an exporter of petroleum products. The export of petroleum products has grown at a slow but steady rate, from **63.93 MT** in FY **2014-15** to **65.69 MT** in FY **2019-20.** Exports decreased in 2020-21 but rebounded in subsequent years, reaching **62.59 MT** in FY 2023-24 (P), reflecting a **2.59**% increase compared to the previous year.

4.4 Natural Gas Imports

Natural gas imports have risen substantially over the past decade. From **18.61 BCM** (Billion Cubic Meter) in FY 2014-15, imports grew to **33.89 BCM** in FY 2019-20. In FY 2023-24 (P), the import figure stood at **31.80 BCM**, up from **26.30 BCM** in FY 2022-23. The compound annual growth rate (CAGR) of natural gas imports between FY 2014-15 and FY 2023-24 (P) is **6.13**%.

4.5 Electricity Exports and Imports

India's electricity exports rose from **4,432.76 GWh** in FY 2014-15 to **11,361.98 GWh** in FY 2023-24 (P) with a CAGR of **11.02**%.
Simultaneously, India also imported electricity to meet domestic demand. The gross import of electricity increases from **5,007.74 GWh** in FY 2014-15 to **6,648.69 GWh in 2023-24(P) with a CAGR of 3.20**%. However, compared to the previous year, the gross import of electricity marked a 12.97% decrease, standing at **7,639.76 GWh**.

4.6 Trend of Import of Coal, Crude Oil, Petroleum Products, Natural Gas and electricity in India during 2014-15 to 2023-24(P)

Fig 4.1: Trends of Import of Coal, Crude oil,Petroleum products in India

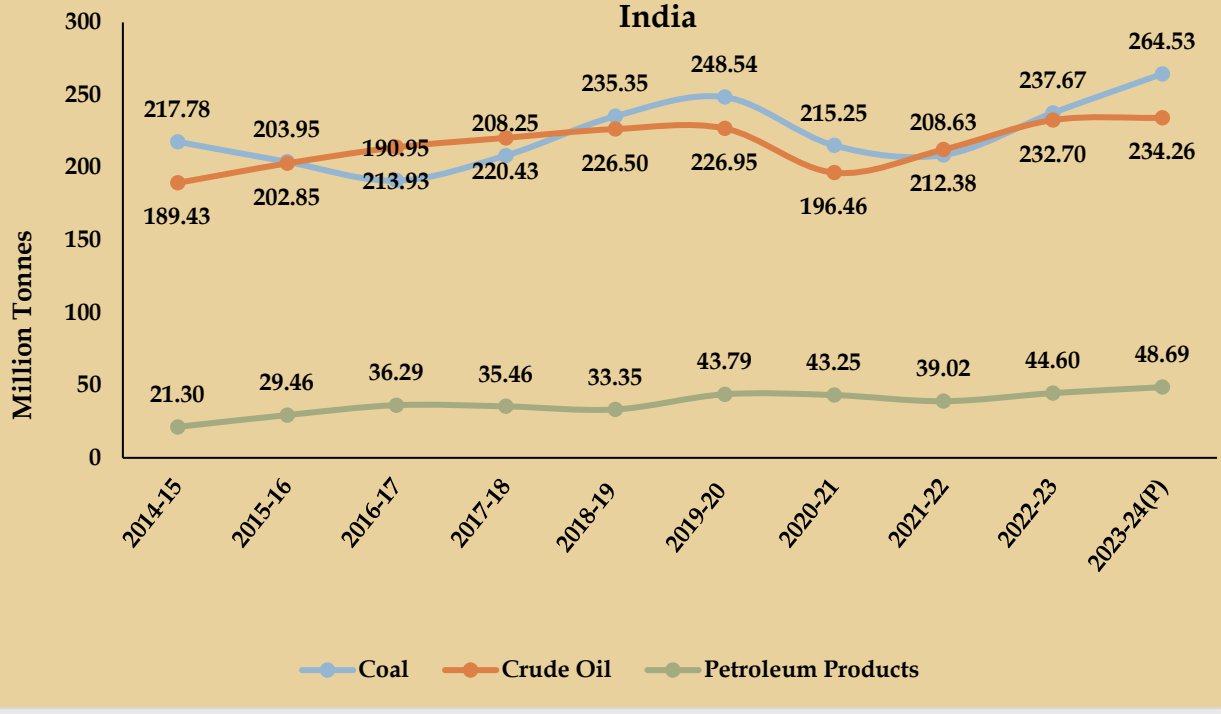
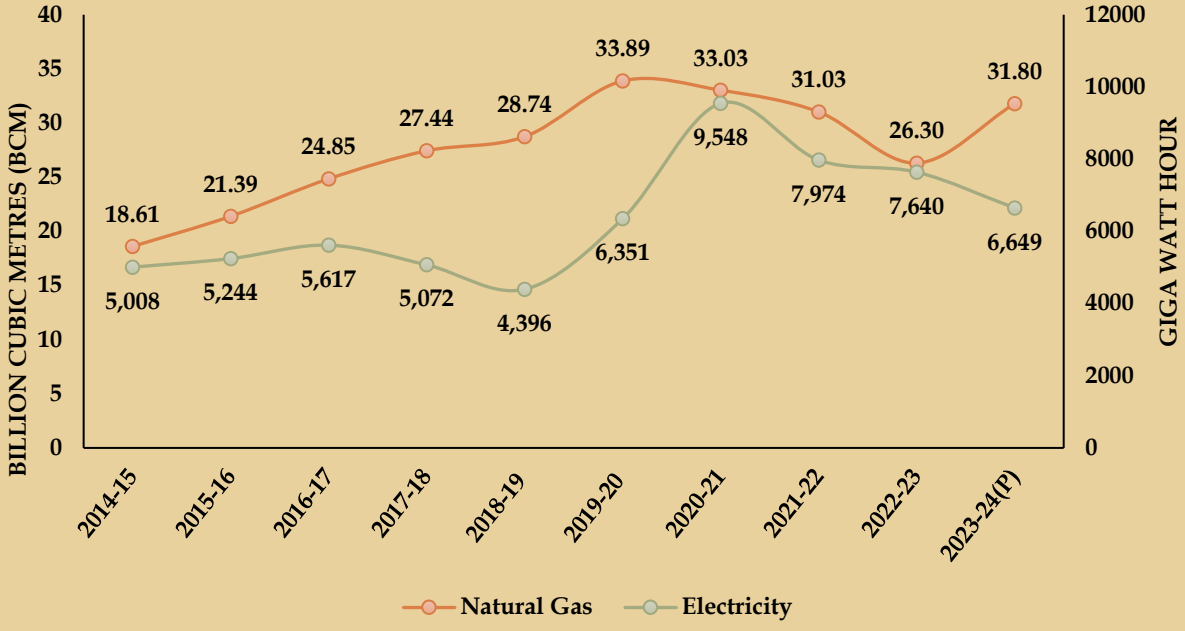


Fig 4.2: Trends of Import of Natural Gas and Electricity in India



4.7 Trend of whole sale price Indices (base 2011-12) of Energy commodities

Fig 4.3: Yearwise Wholesale Price Indices (base 2011-12) of Energy Commodities

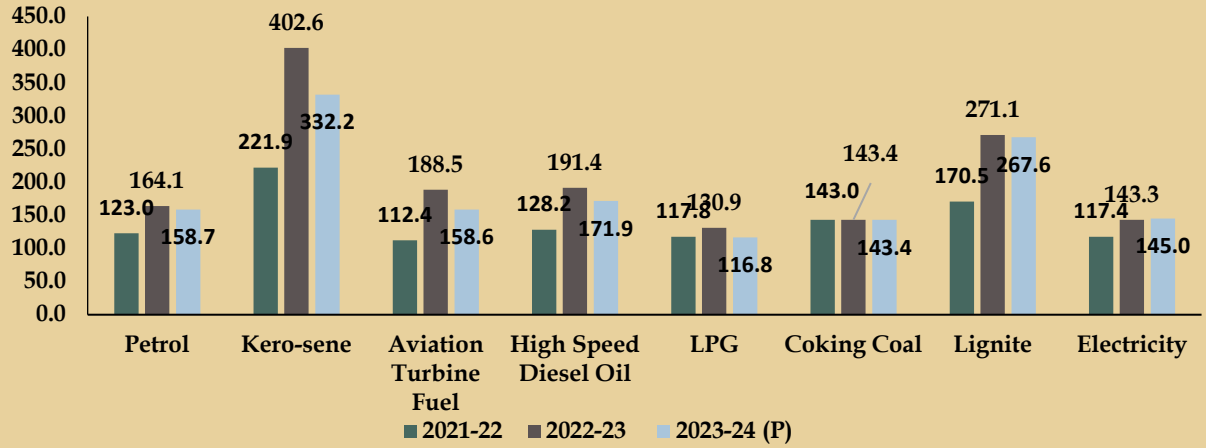


Figure 4.3 shows that most energy prices (Petrol, Kerosene, Aviation Fuel, Diesel, LPG, and Lignite) decreased in 2023-24 compared to 2022-23, with the biggest drop in Kerosene. However, Coking Coal prices remained the same, and Electricity prices slightly increased.

Table 4.1: Yearwise Foreign Trade in Coal, Crude Oil, Petroleum Products(total), Natural Gas and Electricity

(Million Tonnes)

Year	Coal			Lignite			Crude Oil			Petroleum Products		
	Gross Imports	Exports	Net Imports	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	11	12	13=11-12
2014-15	217.78	1.24	216.54	0.00	0.00	0.00	189.43	0.00	189.43	21.30	63.93	-42.63
2015-16	203.95	1.58	202.37	0.00	0.00	0.00	202.85	0.00	202.85	29.46	60.54	-31.08
2016-17	190.95	1.77	189.18	0.02	0.01	0.01	213.93	0.00	213.93	36.29	65.51	-29.23
2017-18	208.25	1.50	206.75	0.01	0.00	0.01	220.43	0.00	220.43	35.46	66.83	-31.37
2018-19	235.35	1.31	234.04	0.02	0.08	-0.06	226.50	0.00	226.50	33.35	61.10	-27.75
2019-20	248.54	1.03	247.51	0.05	0.09	-0.04	226.95	0.00	226.95	43.79	65.69	-21.90
2020-21	215.25	2.95	212.31	0.02	0.19	-0.17	196.46	0.00	196.46	43.25	56.77	-13.52
2021-22	208.63	1.32	207.31	0.01	0.02	-0.01	212.38	0.00	212.38	39.02	62.75	-23.74
2022-23	237.67	1.17	236.50	0.02	0.33	-0.31	232.70	0.00	232.70	44.60	61.01	-16.42
2023-24(P)	264.53	1.55	262.99	0.05	0.00	0.05	234.26	0.00	234.26	48.69	62.59	-13.90
Growth rate of 2023-24 over 2022-23(%)	**11.30**	**32.53**	**11.20**	**-**	**-**	**-**	**0.67**	**-**	**0.67**	**9.18**	**2.59**	**-15.33**
CAGR 2014-15 to 2023-24 (%)	**2.18**	**2.49**	**2.18**	**-**	**-6.10**	**-**	**2.39**	**-**	**2.39**	**9.62**	**-0.23**	**-11.71**

Table 4.1 (Contd): Yearwise Foreign Trade in Coal, Crude Oil, Petroleum Products, Natural Gas and Electricity

Year	Natural Gas (BCM)			Electricity(Gwh)		
	Gross Imports	Exports	Net Imports	Gross Imports	Exports	Net Imports
1	14	15	16=14-15	17	18	19=17-18
2014-15	18.61	0.00	18.61	5007.74	4432.76	574.98
2015-16	21.39	0.00	21.39	5244.21	5150.30	93.91
2016-17	24.85	0.00	24.85	5617.30	6710.19	-1092.89
2017-18	27.44	0.00	27.44	5072.08	7202.86	-2130.78
2018-19	28.74	0.00	28.74	4395.86	8468.94	-4073.08
2019-20	33.89	0.00	33.89	6350.60	9490.91	-3140.31
2020-21	33.03	0.00	33.03	9547.70	9573.55	-25.85
2021-22	31.03	0.00	31.03	7974.01	9249.39	-1275.39
2022-23	26.30	0.00	26.30	7639.76	13791.92	-6152.16
2023-24(P)	31.80	0.00	31.80	6648.69	11361.98	-4713.29
Growth rate of 2023-24 over 2022-23(%)	**20.87**	**-**	**20.87**	**-12.97**	**-17.62**	**-23.39**
CAGR 2014-15 to 2023-24 (%)	**6.13**	**-**	**6.13**	**3.20**	**11.02**	**-**

(P): Provisional.

Sources:

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

Table 4.2 : Yearwise Wholesale Price Indices of Energy Commodities

(Base Year 2011-12=100)

Year	Petrol	Kero-sene	Aviation Turbine Fuel	High Speed Diesel Oil	Bitumen	Furnace Oil	Lubri-cants	LPG	Coking Coal	Petroleum Coke	Lignite	Electricity
2014-15	108.6	103.5	105.1	114.8	106.1	93.6	118.8	103.5	101.4	94.3	99.2	105.7
2015-16	75.7	88.4	69.5	73.4	77.1	54.3	120.8	76.7	101.4	78.3	94.7	105.3
2016-17	72.4	94.3	69.3	74.4	68.0	58.1	116.8	72.0	108.2	93.0	90.2	104.2
2017-18	80.3	117.8	78.7	84.4	71.3	68.8	114.0	82.2	134.1	117.2	104.2	103.7
2018-19	88.4	152.4	102.8	97.1	85.6	94.7	124.8	92.1	132.9	149.7	120.3	109.6
2019-20	85.6	172.8	97.2	93.7	82.8	81.0	131.7	84.5	138.1	128.6	129.1	111.8
2020-21	75.5	116.8	62.5	80.2	77.9	67.9	137.2	82.2	141.8	132.4	130.9	109.6
2021-22	123.0	221.9	112.4	128.2	113.2	108.2	162.0	117.8	143.0	220.1	170.5	117.4
2022-23	164.1	402.6	188.5	191.4	131.4	127.2	180.0	130.9	143.4	293.6	271.1	143.3
2023-24 (P)	158.7	332.2	158.6	171.9	123.5	127.3	189.7	116.8	143.4	204.9	267.6	145.0
Increase in 2023-24 over 2022-23(%)	**-3.29**	**-17.49**	**-15.86**	**-10.19**	**-6.01**	**0.08**	**5.39**	**-10.77**	**0.00**	**-30.21**	**-1.29**	**1.19**

* Annual average of monthly index, Financial Year wise

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

5 Chapter

Availability of Energy Resources

CHAPTER 5
Availability of Energy Resources

Introduction

The availability of energy resources is crucial for the economic and social development of a country, especially for poverty reduction and improving living standards. Timely and reliable data on energy availability is essential for sound decision-making and long-term planning. Monitoring energy resources, helps assess their availability and depletion over time. This is crucial for maintaining energy security and supporting sustainable development.

Importance of Energy Availability

Energy availability is a key enabler of improved quality of life, fostering economic growth, and addressing the energy needs of households and industries. For developing countries like India, tracking energy resources and their depletion is vital for assessing long-term sustainability. The push towards renewable and cleaner forms of energy has gained momentum in recent years, aiming to bridge the gap between energy demand and supply while minimizing environmental impact. Furthermore, energy access for all, particularly clean energy, has been recognized as a key goal in the Sustainable Development Goals (SDGs), with a target for 2030.

This chapter outlines the current status of energy availability in India, focusing on coal, crude oil, petroleum products, and electricity.

Chapter 5: Availability of Energy Resources

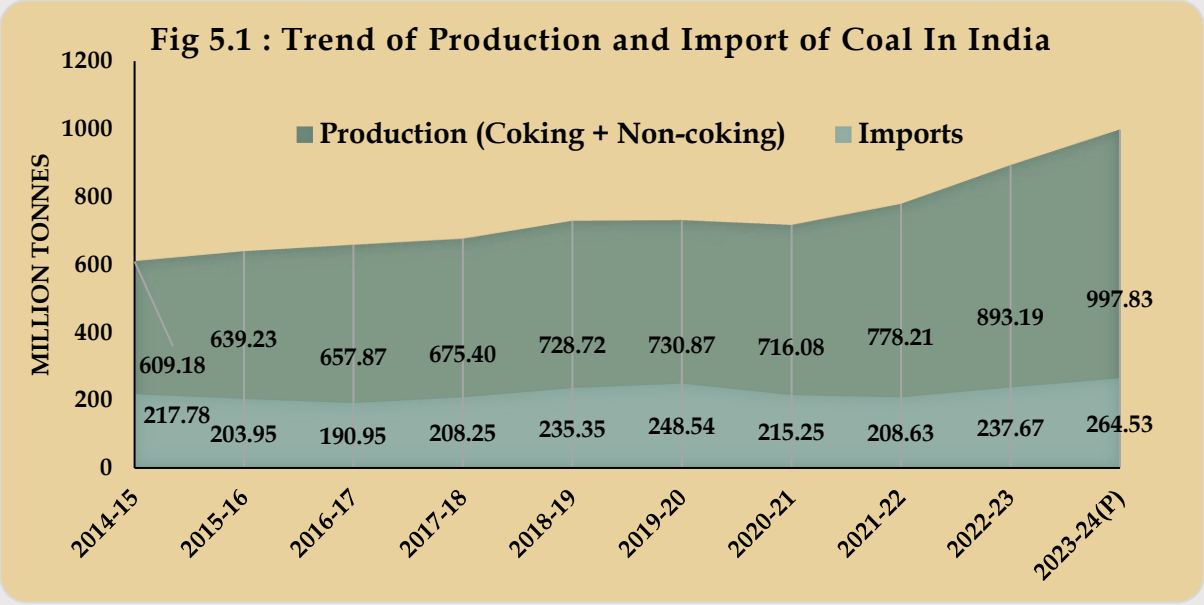
Key Highlights of Energy Availability

5.1 Availability of energy resources

Table 5.1 indicates that coal availability in India has shown consistent growth, with a notable **10.98%** increase in FY 2023-24 (P) compared to FY 2022-23, and a **CAGR of 4.64%** over the past decade, indicating a steady rise in domestic production over the years except in FY 2020-21. Conversely, lignite availability has declined by **6.38%**, reflecting a shift away from this resource, with a **CAGR of -1.06%** over the period. Crude oil availability has seen modest growth of **0.66%**, while natural gas availability has experienced a significant **12.54%** rise, with a **CAGR of 3.09%.**

5.2 Coal Availability

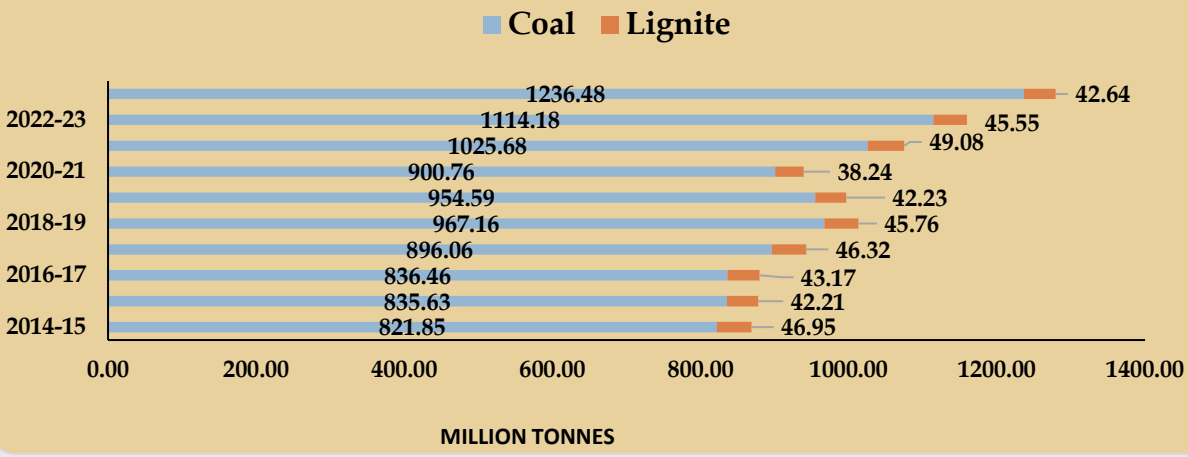
Table 5.2 indicates that India's coal production has seen a steady rise (except in FY 2020-21), reaching **997.83 MT** in FY 2023-24 (P), reflecting an **11.71%** increase from the previous year, indicating a growing capacity to meet domestic energy needs. Coal imports also rose by **11.30%** to **264.53 MT**, highlighting the continued dependence on external sources to supplement domestic production and meet rising demand. The year wise trend in production and import of coal in India is shown in below figure:



However, Exports of coal remained stable, with an increase to **1.55 MT**. The **change in vendible stock** is 24.33 **MT**. As a result, the **availability for consumption** reached

1236.48 MT, a **10.98**% increase from the previous year. The Lignite availability in India has shown a downward trend, with production in FY 2023-24 (P) falling by **-2.52**% to **42.92 MT**, compared to **44.03 MT** in FY 2022-23. Imports have remained minimal, and exports of lignite have been negligible, in FY 2023-24 (P). As a result, the **availability for consumption** of lignite decreased by **6.38**% to **42.64 MT** in FY 2023-24 (P). The year wise availability of Coal and Lignite is shown in below figure:

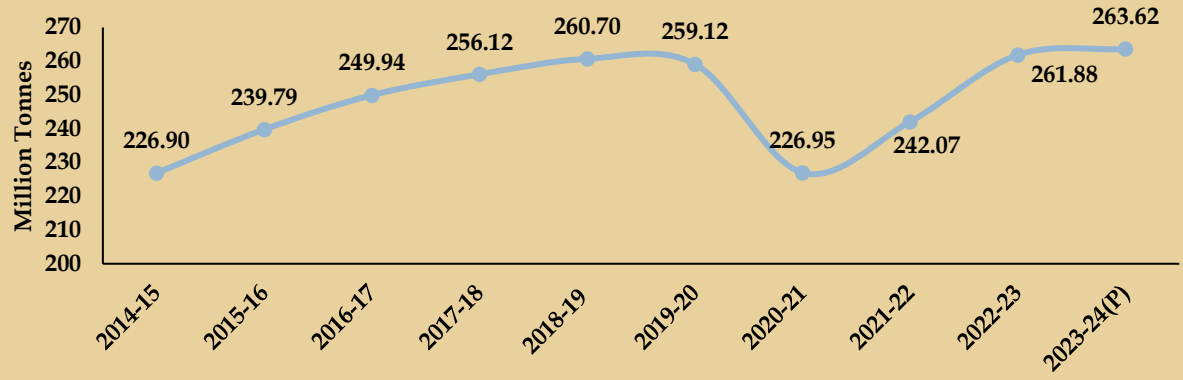
Fig 5.2: Yearwise Total Availability of Coal and Lignite in India



5.3 Crude Oil Availability

Table 5.3 indicates that the Crude oil production in India has been steadily declining, with a marginal **0.61**% increase in FY 2023-24 (P), reaching **29.36 MT**, but over the long term, the compound annual growth rate (CAGR) is **-2.67**%, signaling a consistent decline in domestic production. The net **imports** of crude oil have been rising, reaching **234.26 MT** in FY 2023-24 (P), a **0.67**% increase from the previous year, with a **CAGR of 2.39**% over the past decade, indicating India's continued reliance on foreign sources to meet domestic demand. As a result, the **total availability** of crude oil has slightly increased by **0.66**% in FY 2023-24 (P) to **263.62 MT**, driven by higher imports despite the decline in domestic production.

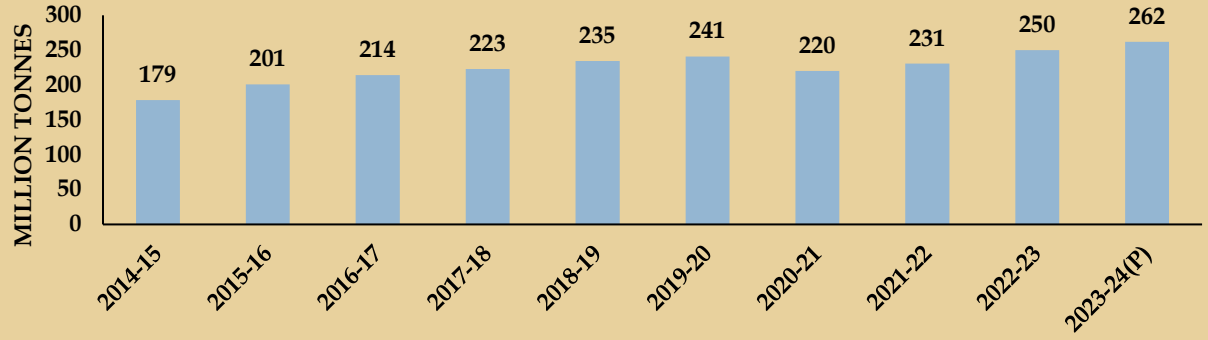
Fig 5.3: Yearwise Total Availability of Crude Oil in India during FY : 2014-15 to FY : 2023-24(P)



5.4 Petroleum Products Availability

Table 5.3 indicates that, In FY 2023-24 (P), the production of petroleum products increased by **3.58%**, reaching **276.09 MT** compared to **266.54 MT** in FY 2022-23, with a **CAGR of 2.50%** over the long term (2014-15 to 2023-24). Meanwhile, **net imports** of petroleum products decreased significantly by **15.33%**, dropping to **-13.90 MT** in 2023-24(P) to **-16.42 MT** in FY 2022-23, reflecting a reduced reliance on imports likely due to enhanced domestic refining capacity. As a result, the **availability** of petroleum products increased by **4.82%** to **262.19 MT** in FY 2023-24(P). The year wise availability of petroleum products during last 10 years is shown below:

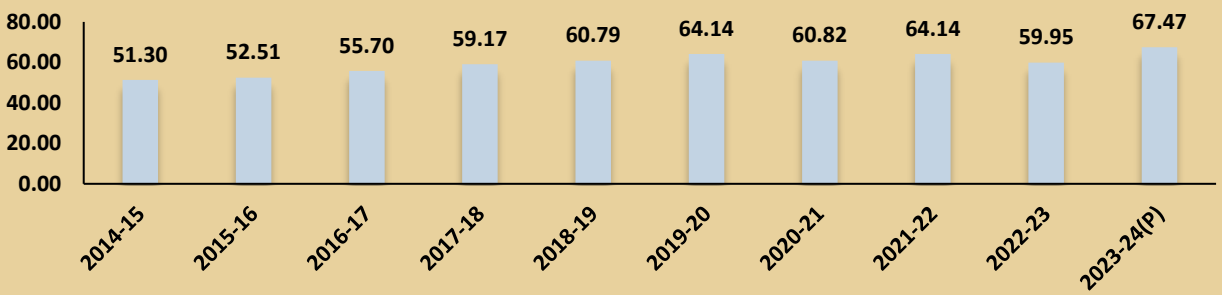
Fig 5.4: Yearwise Total Availability of petroleum products in India during FY : 2014-15 to FY: 2023-24(P)



5.5 Natural Gas Availability

Table 5.3 indicates that In FY 2023-24 (P), **natural gas production** grew by **6.03%**, reaching **35.68 BCM**, reflecting a positive trend in domestic production with a **CAGR of 0.98%** over the past decade. At the same time, **net imports** of natural gas increased by **20.87%**, reaching **31.80 BCM** compared to **26.30 BCM** in FY 2022-23, which grew at a **CAGR of 6.13%**. As a result, the **total availability** of natural gas increased by **12.54%** to **67.47 BCM** in FY 2023-24 (P). The year wise availability of natural gas during last 10 years is shown below:

Fig 5.5: Yearwise Total Availability of Natural Gas in India during FY : 2014-15 to FY : 2023-24(P)



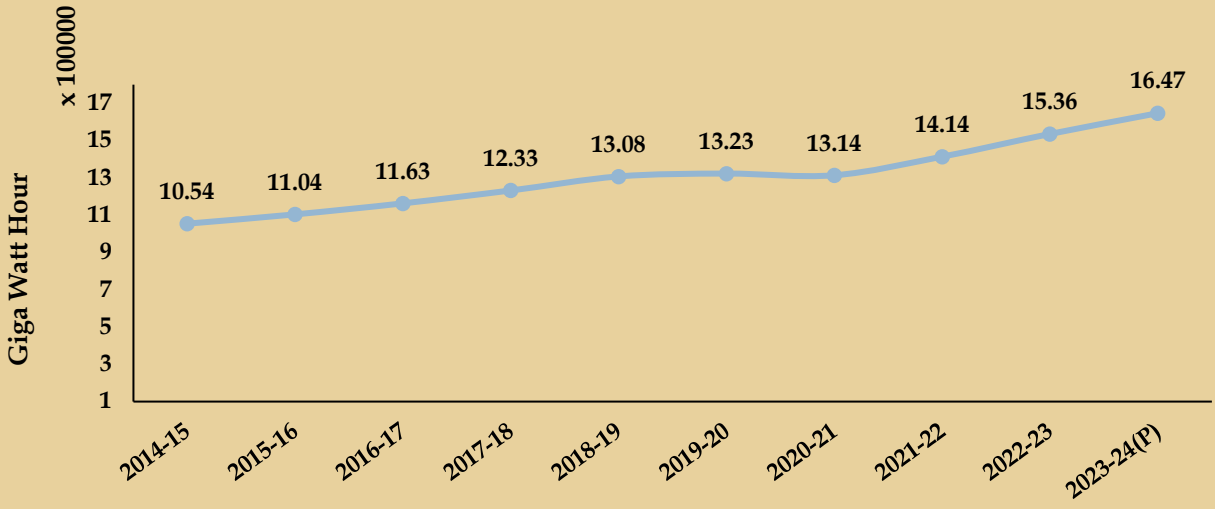
5.6 Electricity Availability

Table 5.4 indicates that from 2014-15 to 2023-24 (P), India's electricity generation and supply have shown consistent growth. Gross electricity generation (utility) increased by **7.20%** in FY 2023-24 (P), reaching **1,734,375 GWh**, with a **CAGR** of **5.01%** over the decade. Similarly, net electricity generated (utility) grew by **7.20%**, reaching **1,634,302 GWh**, driven by both improved generation and efficiency.

Purchases from non-utilities and net imports also increased by **13.45%** to **12,696 GWh**, though their long-term growth has been more modest, with a **CAGR** of **-0.90%**.

Overall, the **net electricity available for supply** rose by **7.25%** to **1,646,998 GWh**, showing a steady rise, with a **CAGR** of **5.08%** from 2014-15 to 2023-24(P). The year wise availability of electricity during last 10 years is shown below:

Fig 5.6: Trends of Net availability of Electricity in India



Chapter 5: Availability of Energy Resources

Table 5.1 : Yearwise Availability of Energy Resources

Year	Coal (Million Tonnes)	Lignite (Million Tonnes)	Crude Oil (Million Tonnes)	Natural Gas (Billion Cubic Metres)
2014-15	821.85	46.95	226.90	51.30
2015-16	835.63	42.21	239.79	52.51
2016-17	836.46	43.17	249.94	55.70
2017-18	896.06	46.32	256.12	59.17
2018-19	967.16	45.76	260.70	60.79
2019-20	954.59	42.23	259.12	64.14
2020-21	900.76	38.24	226.95	60.82
2021-22	1025.68	49.08	242.07	64.14
2022-23	1114.18	45.55	261.88	59.95
2023-24(P)	1236.48	42.64	263.62	67.47
Growth rate of 2023-24 over 2022-23(%)	**10.98**	**-6.38**	**0.66**	**12.54**
CAGR 2014-15 to 2023-24 (%)	**4.64**	**-1.06**	**1.68**	**3.09**

(P): Provisional

Note: Availability is defined as below:
Coal/lignite: Production+Import -Export- change in stocks (Figure for 2014-15 to 2022-23 stand modified due to correction in formula)
Natural gas:Net Production i.e. (Gross production -Flared - Losses) + Net imports

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

Table 5.2 : Yearwise Availability of Coal and Lignite

(Million Tonnes)

Year	Coal					Lignite				
	Production (Coking + Non-coking)	Imports	Exports	Change of Vendible Stock (closing stock-Opening stock)	Availability for Consumption	Production	Imports	Exports	Change of Vendible Stock (closing stock-Opening stock)	Availability for Consumption
1	2	3	4	5	6=2+3-4-5	7	8	9	10	11=7+8-9-10
2014-15	609.18	217.78	1.24	3.88	821.85	48.27	0.00	0.00	1.32	46.95
2015-16	639.23	203.95	1.58	5.97	835.63	43.84	0.00	0.00	1.63	42.21
2016-17	657.87	190.95	1.77	10.59	836.46	45.23	0.02	0.01	2.07	43.17
2017-18	675.40	208.25	1.50	-13.92	896.06	46.64	0.01	0.00	0.33	46.32
2018-19	728.72	235.35	1.31	-4.40	967.16	44.28	0.02	0.08	-1.54	45.76
2019-20	730.87	248.54	1.03	23.79	954.59	42.10	0.05	0.09	-0.18	42.23
2020-21	716.08	215.25	2.95	27.63	900.76	37.90	0.02	0.19	-0.51	38.24
2021-22	778.21	208.63	1.32	-40.16	1025.68	47.49	0.01	0.02	-1.59	49.08
2022-23	893.19	237.67	1.17	15.52	1114.18	44.03	0.02	0.33	-1.83	45.55
2023-24(P)	997.83	264.53	1.55	24.33	1236.48	42.92	0.05	0.00	0.33	42.64
Growth rate of 2023-24 over 2022-23(%)	**11.71**	**11.30**	**32.53**	**-**	**10.98**	**-2.52**	**-**	**-**	**-**	**-6.38**

(P): Provisional

Total may not tally due to rounding off

Source : Ministry of Coal

Table 5.3 : Yearwise Availability of Crude Oil, Petroleum Products and Natural Gas.

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
2014-15	37.46	189.43	226.90	221.14	-42.63	178.50	32.69	18.61	51.30
2015-16	36.94	202.85	239.79	231.92	-31.08	200.84	31.12	21.39	52.51
2016-17	36.01	213.93	249.94	243.55	-29.23	214.32	30.85	24.85	55.70
2017-18	35.68	220.43	256.12	254.40	-31.37	223.03	31.73	27.44	59.17
2018-19	34.20	226.50	260.70	262.36	-27.75	234.61	32.05	28.74	60.79
2019-20	32.17	226.95	259.12	262.94	-21.90	241.04	30.26	33.89	64.14
2020-21	30.49	196.46	226.95	233.51	-13.52	219.99	27.78	33.03	60.82
2021-22	29.69	212.38	242.07	254.31	-23.74	230.57	33.12	31.03	64.14
2022-23	29.18	232.70	261.88	266.54	-16.42	250.12	33.65	26.30	59.95
2023-24(P)	29.36	234.26	263.62	276.09	-13.90	262.19	35.68	31.80	67.47
Growth rate of 2023-24 over 2022-23(%)	**0.61**	**0.67**	**0.66**	**3.58**	**-15.33**	**4.82**	**6.03**	**20.87**	**12.54**
CAGR 2014-15 to 2023-24 (%)	**-2.67**	**2.39**	**1.68**	**2.50**	**-11.71**	**4.36**	**0.98**	**6.13**	**3.09**

* : Availability of natural gas is equal to indigenous net production (Gross production-Flared/Losses) + net imports

(P): Provisional; Total may not tally due to rounding off.

Source : Ministry of Petroleum & Natural Gas.

Table 5.4 : Yearwise Availability of Electricity

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

Year	Gross Electricity Generated from Utilities	Consumption in Power Station Auxiliaries	Net Electricity Generated from Utilities	Purchases from Non-Utilities + Net Import from Other Countries	Net Electricity Available for Supply
1	2	3	4=2-3	5	6=4+5
2014-15	1,116,850	76,268	1,040,582	13,773	1,054,355
2015-16	1,167,584	79,302	1,088,282	15,947	1,104,228
2016-17	1,235,358	81,044	1,154,314	8,977	1,163,290
2017-18	1,303,455	82,148	1,221,307	11,198	1,232,505
2018-19	1,371,779	83,386	1,288,393	19,291	1,307,685
2019-20	1,383,417	83,301	1,300,116	22,932	1,323,048
2020-21	1,373,187	80,472	1,292,715	21,310	1,314,025
2021-22	1,484,463	86,756	1,397,707	16,197	1,413,903
2022-23	1,617,904	93,429	1,524,475	11,191	1,535,665
2023-24(P)	1,734,375	100,073	1,634,302	12,696	1,646,998
Growth rate of 2023-24 over 2022-23(%)	**7.20**	**7.11**	**7.20**	**13.45**	**7.25**
CAGR 2014-15 to 2023-24 (%)	**5.01**	**3.06**	**5.14**	**-0.90**	**5.08**

(P): Provisional

Source:Central Electricity Authority.

6 Chapter

Consumption of Energy Resources

CHAPTER 6
Consumption of Energy Resources

Introduction

The study of energy consumption patterns within any economy is essential to understand how final demand drives energy use. The SEEA – Energy highlights that "resource uses and environmental pressures at the level of production are determined by final use, which initiates the production chain." This implies that final consumption plays a significant role in shaping resource utilization and environmental impact.

In the context of climate change, understanding various consumption activities such as heating of buildings, electricity use, industrial processes, and transportation—activities involving combustion processes—is critical. Global economies are increasingly measuring and tracking energy-related air emissions, as most economic activities are linked to the combustion processes needed for energy production.

Total Energy Consumption (TEC) and Its Importance

The International Energy Agency (IEA), where India has been an associated member since March 2017, defines TEC as the total energy consumed in end-use sectors and for non-energy purposes, excluding energy used in transformation processes. TEC serves as an indicator of energy efficiency and can help identify areas requiring policy adjustments for sustainability. This chapter presents the total consumption of energy resources along with sector wise end use of different energy resources and products in India.

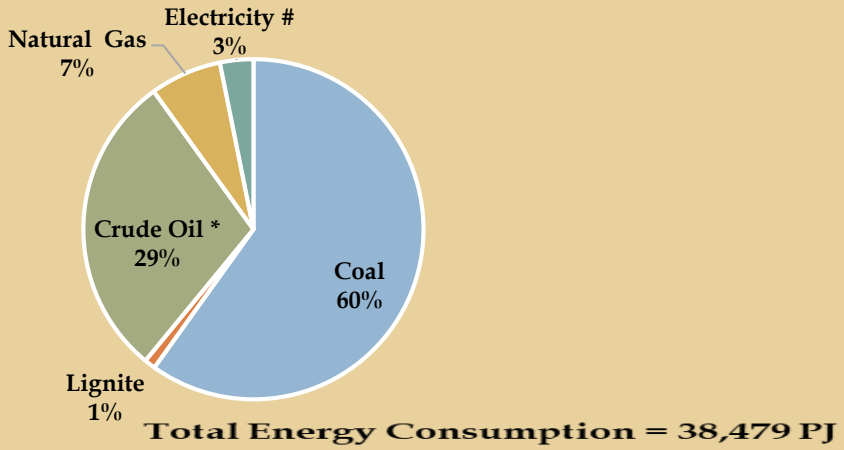
Chapter 6: Consumption of Energy Resources

Key Highlights of Energy Consumption

6.1 Source wise Consumption of Primary Energy Resources

Figure 6.1 shows the consumption of energy in petajoules from Coal which accounted for 60% of the total consumption during 2023-24(P) followed by Crude Oil (29%) and Natural Gas (7%).

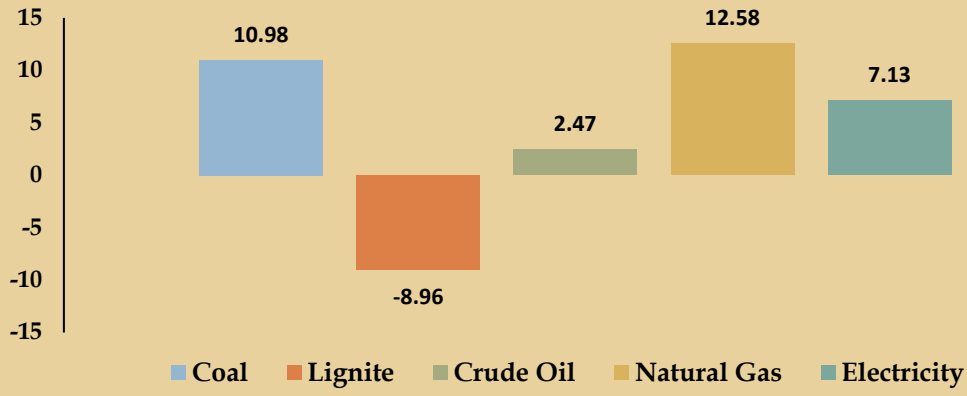
Fig 6.1: Source wise consumption of Primary Energy during 2023-24(P)



#: Electricity from Hydro, Nuclear and other Renewable energy sources (Utility)

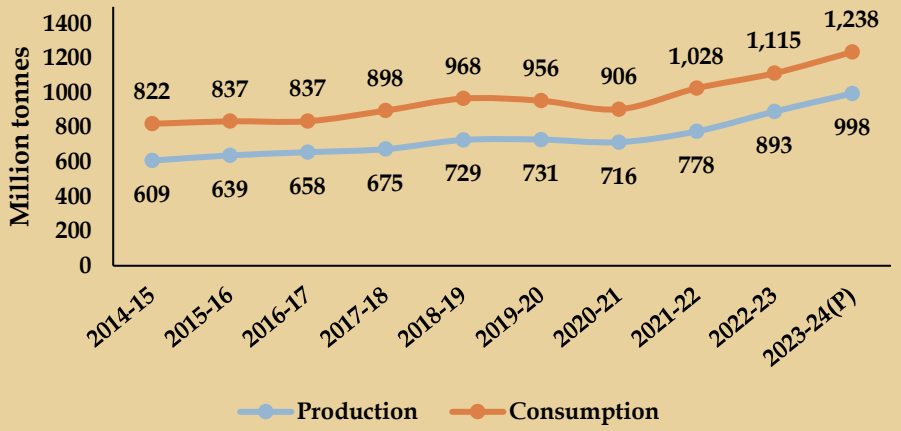
Figure 6.2 shows the India's **overall energy consumption trend** for FY 2023-24 (P), highlighting a steady increase across all major energy resources. The figure shows a significant **growth in coal consumption**, which remains the dominant energy source, along with an upward trend in **electricity** and **natural gas** consumption. While **lignite** consumption slightly decreased, reflecting a shift in energy preferences, **crude oil** consumption experienced moderate growth.

Fig 6.2 : Growth rate of consumption of energy resources during FY:2023-24(P) w.r.t 2022-23



India, being one of the largest producers and consumers of coal, has witnessed a significant growth in coal consumption over the years as shown in **figure 6.3**.

Fig 6.3 : Yearwise Trend of Production and Consumption of Coal in India during FY:2014-15 to FY:2023-24(P)

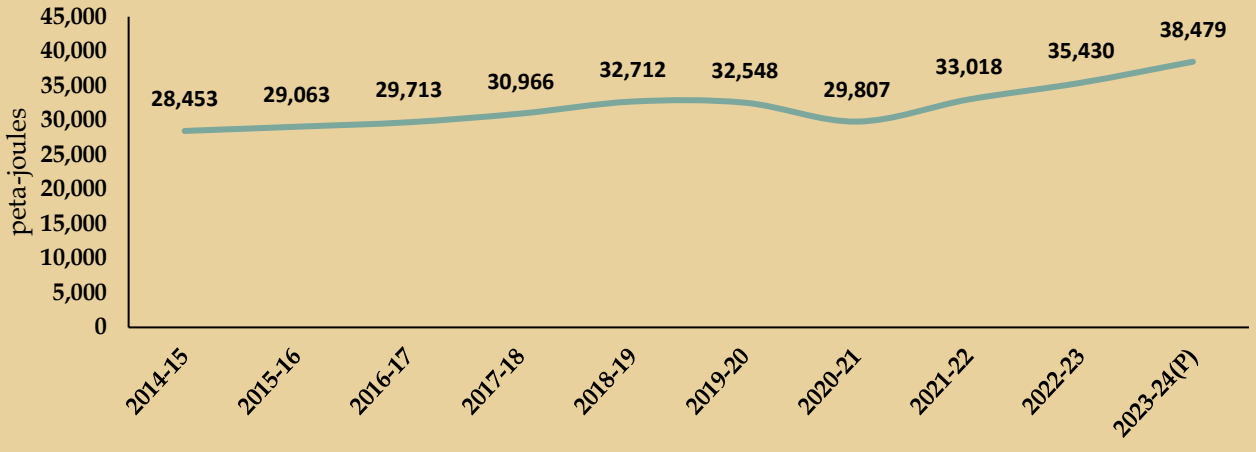


After a notable increase of **7.54**% in FY 2021-22 compared to FY 2019-20, the trend of rising demand and consumption continues. In FY 2023-24(P), coal consumption has grown by **10.98**% over FY 2022-23, reflecting the ongoing strong demand across various sectors, particularly in power generation (Table 6.1).

6.2 Total consumption of Primary Energy in India

Figure 6.4 shows the total energy consumption of Primary energy Resources (Coal, Lignite, Crude Oil, Natural gas and Electricity) increased from **28,453 Petajoules (PJ)** in 2014-15 to **38,479 Petajoules (PJ)** in 2023-24 (P), reflecting a notable rise. Specifically, from **35,430 PJ** in 2022-23, the consumption surged by **8.60**% in FY 2023-24 (P). Among the various energy resources, **Coal and Lignite** accounted for the highest growth, with a combined increase of approximately **11.87**% during FY 2023-24 (P) compared to the previous year.

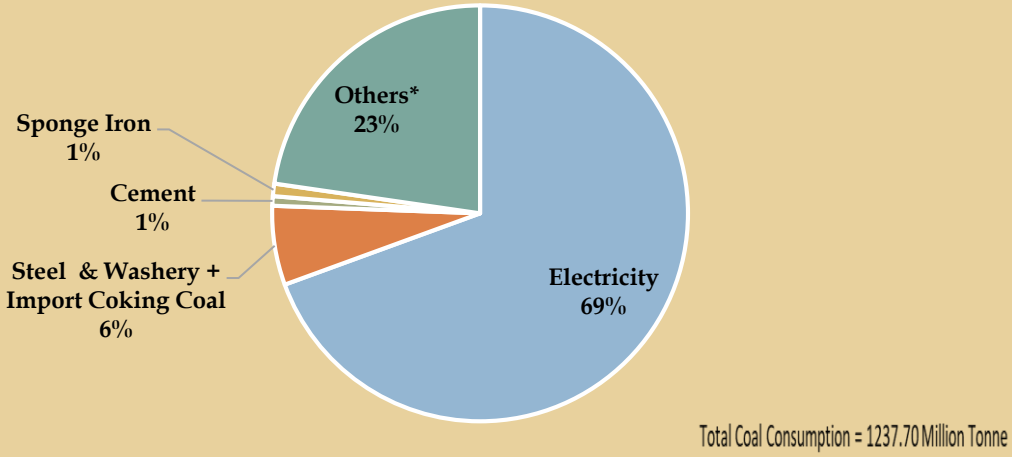
Fig 6.4 : Trend of total consumption of Primary Energy in India



6.3 Consumption of Coal into different sectors

Figure 6.5 indicates that **Electricity** is the largest consumer, using **69%** of the total coal consumed in the country. Cement, Paper and Textile sectors are declining, non-coking coal imports and others are becoming increasingly important with significant growth in recent years (Table 6.2). The consumption of coal into different sectors is shown below:

Fig 6.5 : Consumption of Coal into different sectors during FY:2023-24(P)

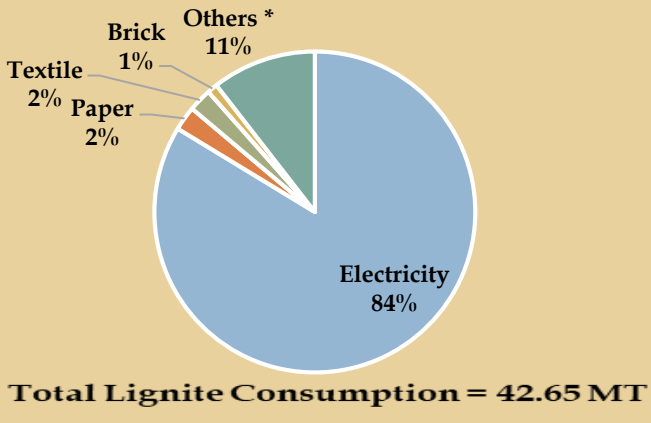


#Others include Non-coking coal, Paper (0.08%), Textiles (0.01%), Fertilizers and Chemicals (0.06%), Bricks (0.01%) and colliery consumption, jute, coal for soft coke & other industries.

6.4 Consumption of Lignite into different sectors (in percentage)

Figure 6.6 indicates that electricity is largest consumer, using 84% of the total lignite consumption. The consumption of lignite into different sectors is shown in below:

Fig 6.6: Percentage Consumption of Lignite intodifferent sectors during FY:2023-24(P)

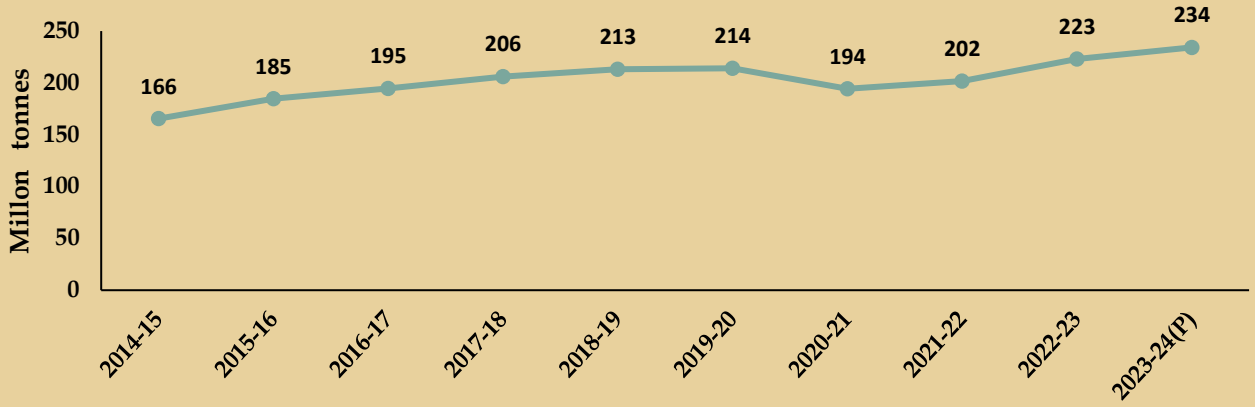


#Others include Steel and Washery (0.20), Cement (0.31) and Sponge Iron, colliery consumption., jute, bricks, coal for soft coke, chemicals, fertilizers & other industries consumption and imported lignite.

6.5 Consumption of Petroleum products

Petroleum products in India have shown steady growth over time, increasing from **166 MTs** in 2014-15 to **234 MTs** in 2023-24(P), reflecting a CAGR of **3.93%** over a span of 10 years. However, due to the impact of the **COVID-19 pandemic**, consumption dropped by **9.26%** in FY 2020-21. In FY 2023-24 (P), there was a positive rebound, with a growth rate of **5.04%** compared to the previous year, bringing the total to **234.26 MTs (Table 6.5)**.

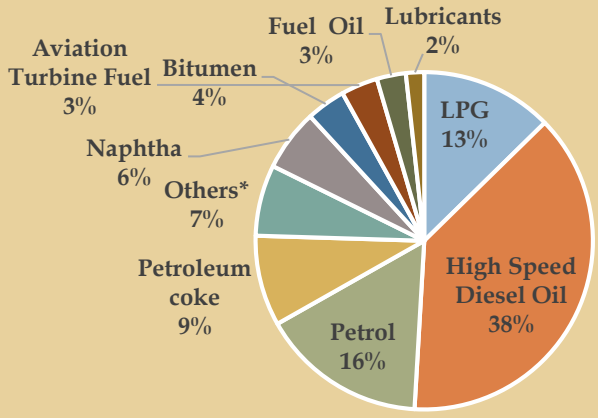
Fig 6.7 : Trend of total consumption of Petroleum Products in India during FY: 2014-15 to FY: 2023-24 (P)



6.5.1 Consumption of petroleum products- by type

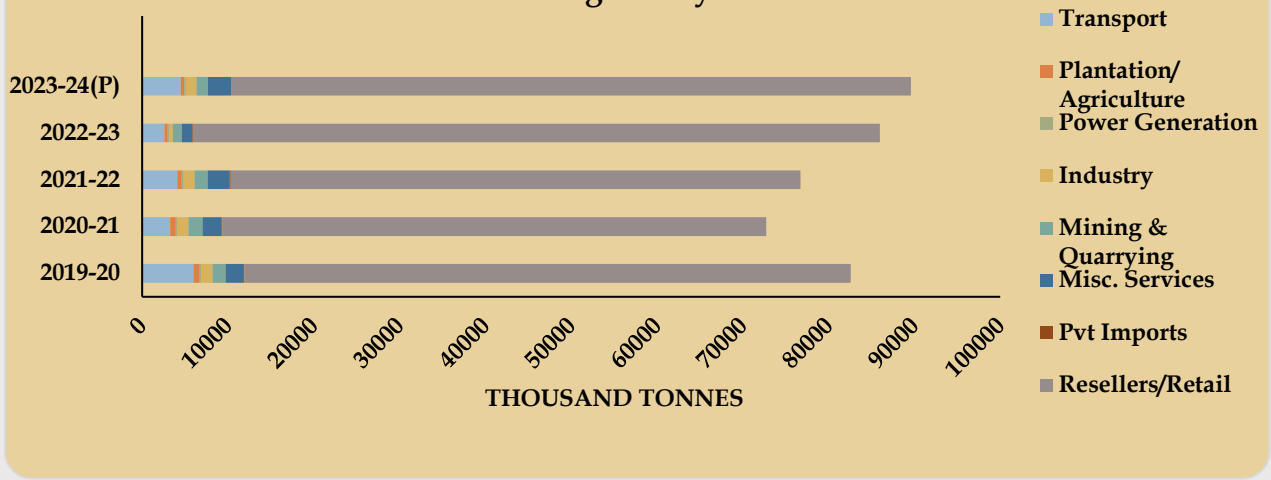
Figure 6.8 shows that the among all the petroleum products the High Speed Diesel Oil(HSDO) accounted for 38% of total consumption,followed by Petrol(16%), LPG(13%) and Petroleum coke(9%).

Fig 6.8 : Consumption of Petroleum Products- By type during FY:2023-24(P)



During FY 2023-24(P), HSDO experienced a positive growth of 4.34% over last year. The Petrol and Pet coke are also having a growth of 6.41% and 10.77% respectively. The sector wise consumption of HSDO during last 5 years is shown in below graph:

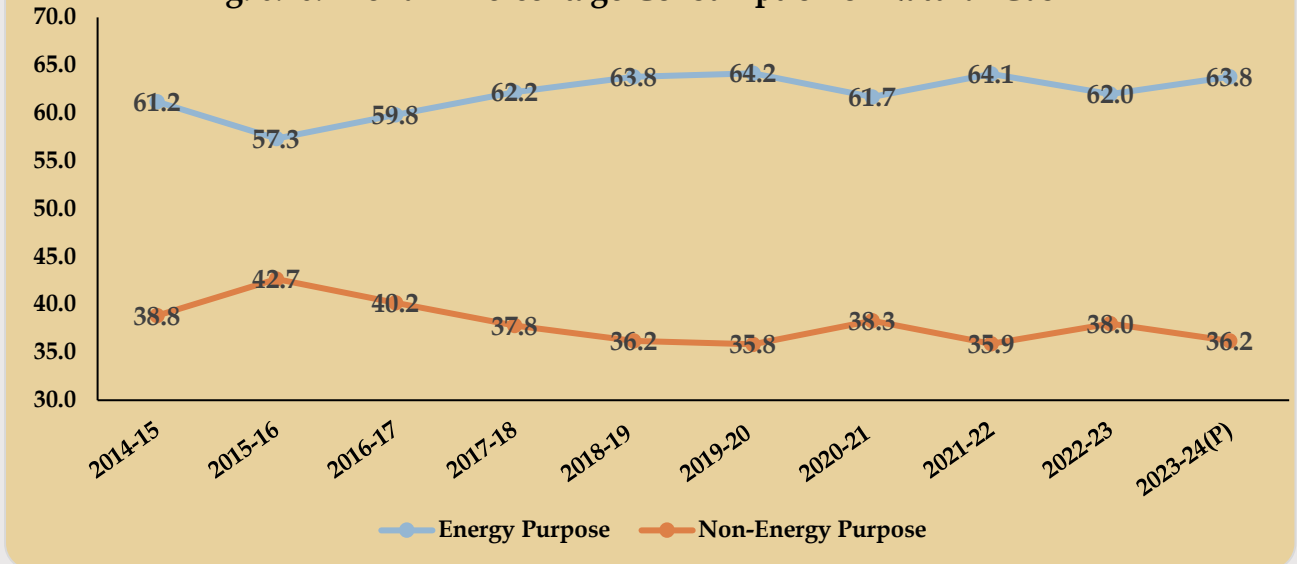
Fig 6.9 :Sector-wise comsumption of HSDO(High Speed Diesel Oil) during last 5 years



6.6 Consumption of Natural Gas

Table 6.7 indicates that the consumption of Natural Gas has experienced a fluctuation over time. During FY: 2023-24(P) the consumption against the *Energy Purpose* has experienced a growth of 20.58% (from 36,383 BCM during 2022-23 to 43,872 BCM during 2023-24(P)); the *Non-Energy Purpose* however has experienced a growth of 11.52% (from 22,319 BCM during 2022-23 to 24,890 BCM during 2023-24(P)). The year wise consumption of Natural Gas (Energy and Non energy purpose) is shown in below graph:

Fig. 6.10: Trend in Percentage Consumption of Natural Gas

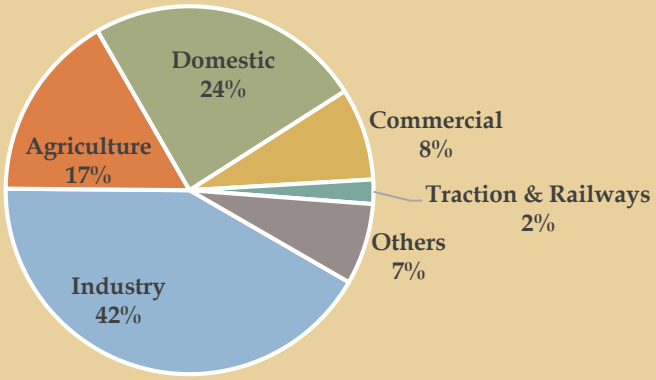


From the **table 6.7** it is also observed that the maximum use of Natural Gas is in fertilizers industry (30.61%) followed by City or Local Natural Gas Distribution Network incl. Road Transport (19.62%). While 63.8% of natural gas has been used for Energy purposes, 36.2% is used for non-energy purposes.

6.7 Consumption of electricity

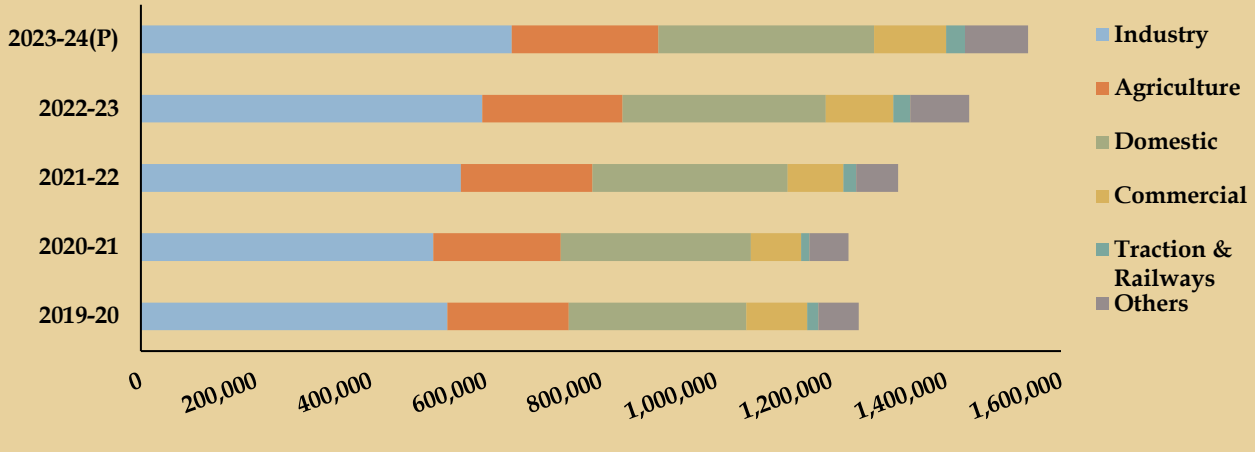
From **table 6.8** it can be seen that India's electricity consumption has grown significantly, from **9,48,522 GWh** in FY 2014-15 to **15,43,000 GWh** in FY 2023-24 (P), reflecting a **CAGR of 5.56%**. **Figure 6.11** shows that industrial sector remains the largest consumer of electricity, accounting for **42%** of the total consumption, followed by the **domestic sector (24%)**, **agriculture (17%)**, and **commercial sectors (8%)**. The sector wise consumption of electricity during last 5 years is shown in **figure 6.12**.

Fig 6.11: Consumption of Electricity by Sectors in India during 2023-24(P)



Total Electricity Consumption = 15,43,000 GWh

Fig 6.12: Sector-wise consumption of Electricity



Chapter 6: Consumption of Energy Resources

Table 6.1: Yearwise Consumption of Energy Resources in Physical Units

Year	Coal #	Lignite	Crude Oil*	Natural Gas	Electricity**
	(Million Tonnes)		MMT	(Billion Cubic Metres)	(GWh)
1	2	3	4	5	6
2014-15	822	47	223	51	948,522
2015-16	837	42	233	53	1,001,191
2016-17	837	43	245	56	1,061,183
2017-18	898	46	252	59	1,123,427
2018-19	968	46	257	61	1,209,972
2019-20	956	42	254	64	1,248,086
2020-21	906	38	222	61	1,230,208
2021-22	1,028	49	242	64	1,316,765
2022-23	1,115	47	255	60	1,440,311
2023-24(P)	1,238	43	262	68	1,543,000
Growth rate of 2023-24 over 2022-23(%)	**10.98**	**-8.96**	**2.47**	**12.58**	**7.13**
CAGR 2014-15 to 2023-24(P) (%)	**4.65**	**-1.06**	**1.78**	**3.10**	**5.56**

P: Provisional

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

Does not include Lignite

*Crude oil in terms of refinery crude throughput.

** Total Electricity Consumed

Sources:

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

Table 6.2: Yearwise Consumption of Primary Energy Resources in Energy Units

(In Petajoules)

Year	Coal	Lignite	Crude Oil *	Natural Gas	Electricity #	Total
1	2	3	4	5	6	7
2014-15	15,812	448	9,552	1,976	664	28,453
2015-16	16,041	403	9,964	2,023	632	29,063
2016-17	15,972	412	10,499	2,145	684	29,713
2017-18	16,707	442	10,780	2,279	757	30,966
2018-19	18,072	437	11,006	2,342	855	32,712
2019-20	17,814	403	10,885	2,471	975	32,548
2020-21	16,616	367	9,489	2,362	972	29,807
2021-22	18,648	469	10,342	2,485	1,074	33,018
2022-23	20,520	447	10,921	2,323	1,219	35,430
2023-24(P)	23,048	407	11,191	2,615	1,217	38,479
% Share in total consumption for 2023-24 (P)	**59.9**	**1.1**	**29.1**	**6.8**	**3.2**	**100.0**
CAGR 2014-15 to 2023-24(%)	**4.28**	**-1.06**	**1.78**	**3.16**	**6.96**	**3.41**

*: Crude oil in terms of refinery crude processed. P: Provisional.

#: Electricity from Hydro, Nuclear and other Renewable energy sources (Utility)

Note: The figure against electricity has been calculated using the following formula:
Generattion from Electricity (Utility) from Hydro, Nuclear and other RE - Losses

Sources:

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

Chapter 6: Consumption of Energy Resources

Table 6.3: Yearwise Consumption of Coal - Industrywise

(Million Tonnes)

Year	Electricity	Steel & Washery + Import Coking Coal	Cement	Paper	Textile	Sponge Iron	Fertilizers & Chemicals	Bricks	Others+ Import Non-Coking Coal*	Total
1	2	3	4	5	6	7	8	9	10	11 = 2 to 10
2014-15	497.70	56.24	11.36	1.65	0.42	17.77	2.70	0.09	234.22	822
2015-16	517.77	57.08	8.99	1.21	0.27	7.76	2.62	0.07	240.95	837
2016-17	535.04	51.98	6.36	1.18	0.24	5.56	2.45	0.10	234.31	837
2017-18	585.49	58.45	7.71	1.51	0.24	8.53	2.16	0.12	234.30	898
2018-19	621.64	64.65	8.82	1.64	0.20	12.09	1.79	0.09	257.44	968
2019-20	626.15	63.74	8.57	1.33	0.10	10.53	1.76	0.03	243.72	956
2020-21	581.23	60.17	6.75	1.05	0.08	9.57	1.53	0.03	245.93	906
2021-22	710.05	66.28	7.31	1.24	0.08	9.02	1.31	0.02	232.72	1,028
2022-23	785.40	69.43	9.31	1.26	0.09	8.09	0.86	0.11	240.67	1,115
2023-24(P)	859.34	76.16	9.16	1.03	0.17	11.97	0.80	0.10	278.98	1,238
% Share in total consumption for 2023-24 (P)	**69.43**	**6.15**	**0.74**	**0.08**	**0.01**	**0.97**	**0.06**	**0.01**	**22.54**	**100.00**
Growth rate of 2023-24 over 2022-23(%)	**9.41**	**9.68**	**-1.57**	**-**	**-**	**-**	**-**	**-**	**15.92**	**10.98**
CAGR 2014-15 to 2023-24(%)	**6.26**	**3.43**	**-2.36**	**-5.12**	**-9.26**	**-4.30**	**-**	**1.05**	**1.96**	**4.65**

(P): Provisional

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

Source : Ministry of Coal

Table 6.4: Yearwise Consumption of Lignite - Industrywise

(Million Tonnes)

Year	Electricity	Steel & Washery	Cement	Paper	Textile	Brick	Others *	Total
1	2	3	4	5	6	7	8	9=2 to 8
2014-15	39.47	0.02	1.27	0.65	2.89	0.67	1.98	47
2015-16	37.56	0.01	0.23	0.43	1.73	0.39	1.87	42
2016-17	38.82	0.04	0.29	0.53	1.29	0.42	1.77	43
2017-18	38.84	0.12	1.09	0.76	2.46	0.38	2.67	46
2018-19	37.73	0.09	1.80	0.60	2.61	0.63	2.34	46
2019-20	36.33	0.02	1.00	0.55	0.16	0.47	3.75	42
2020-21	32.94	0.02	0.81	0.57	0.29	0.43	3.44	38
2021-22	38.76	0.26	1.55	2.11	2.08	1.13	3.20	49
2022-23	38.95	0.12	0.84	0.89	1.85	0.61	3.58	47
2023-24(P)	35.70	0.09	0.13	1.04	0.99	0.44	4.26	43
% Share in total consumption for 2023-24 (P)	**83.70**	**0.20**	**0.31**	**2.44**	**2.33**	**1.03**	**10.00**	**100.00**
Growth rate of 2023-24 over 2022-23(%)	**-8.35**	**-**	**-**	**-**	**-**	**-**	**18.99**	**-8.96**
CAGR 2014-15 to 2023-24(%)	**-1.11**	**15.78**	**-22.30**	**5.35**	**-11.17**	**-4.63**	**8.92**	**-1.06**

(P): Provisional

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

Source : Ministry of Coal

Table 6.5 : Yearwise Consumption of Petroleum Products - Categorywise

(Million Tonnes)

Year	Light Distillates			Middle Distillates				Heavy Ends					Total Consumption	Refinery Fuel and Losses	Total including Refinery Fuel and losses
	LPG	Petrol	Naphtha	Kerosene	Aviation Turbine Fuel	High Speed Diesel Oil	Light Diesel Oil	Fuel Oil	Lubricants	Bitumen	Petroleum coke	Others*			
1	2	3	4	5	6	7	8	9	10	11	12	13	14=2 to13	15	16
2014-15	18.00	19.08	11.08	7.09	5.72	69.42	0.37	5.96	3.31	5.07	14.56	5.87	165.52	17.67	183.19
2015-16	19.62	21.85	13.27	6.83	6.26	74.65	0.41	6.63	3.57	5.94	19.30	6.35	184.67	18.77	203.45
2016-17	21.61	23.76	13.24	5.40	7.00	76.03	0.45	7.15	3.47	5.94	23.96	6.59	194.60	20.07	214.67
2017-18	23.34	26.17	12.89	3.85	7.63	81.07	0.52	6.72	3.88	6.09	25.66	8.34	206.17	21.16	227.33
2018-19	24.91	28.28	14.13	3.46	8.30	83.53	0.60	6.56	3.67	6.71	21.35	11.72	213.22	21.45	234.67
2019-20	26.33	29.98	14.27	2.40	8.00	82.60	0.63	6.30	3.83	6.72	21.71	11.36	214.13	23.61	237.74
2020-21	27.56	27.97	14.10	1.80	3.70	72.71	0.86	5.59	4.10	7.52	15.61	12.79	194.30	22.81	217.10
2021-22	28.25	30.85	13.25	1.49	5.01	76.66	1.02	6.26	4.54	7.82	14.26	12.30	201.70	23.50	225.19
2022-23	28.50	34.98	12.13	0.49	7.38	85.90	0.73	6.96	3.74	8.04	18.34	15.84	223.02	26.04	249.06
2023-24(P)	29.66	37.22	13.81	0.48	8.25	89.63	0.78	6.52	4.09	8.81	20.32	14.70	234.26	26.65	260.91
% Share in total consumption for 2023-24 (P)	**12.66**	**15.89**	**5.90**	**0.20**	**3.52**	**38.26**	**0.33**	**2.78**	**1.74**	**3.76**	**8.67**	**6.27**	**100.00**	**-**	**-**
Growth rate of 2023-24 over 2022-23 (%)	**4.07**	**6.41**	**13.90**	**-2.15**	**11.78**	**4.34**	**7.75**	**-6.29**	**9.37**	**9.53**	**10.77**	**-7.24**	**5.04**	**2.33**	**4.76**
CAGR 2014-15 to 2023-24(%)	**5.71**	**7.71**	**2.48**	**-**	**4.14**	**2.88**	**8.82**	**1.00**	**2.37**	**6.32**	**3.77**	**10.73**	**3.93**	**4.67**	**4.01**

(P) : Provisional; Consumption includes sales by oil companies, own consumption and direct private imports

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

Total may not tally due to rounding off.

Source: Ministry of Petroleum & Natural Gas.

Table 6.6 (A): Yearwise Consumption of Selected Petroleum Products - Sectorwise(end use)

('000 Tonnes)

Petroleum Product	Year	Transport	Plantation/ Agriculture	Power Generation	Industry	Mining & Quarrying	Resellers /Retail	Misc. Services	Pvt Imports	Total
1	2	3	4	5	6	7	8	9	10	11 =3 to10
High Speed Diesel Oil	2014-15	4617	575	197	794	998	60383	1768	83	69416
	2015-16	5765	630	224	1096	1184	63754	1940	55	74647
	2016-17	5658	607	208	1033	1224	65072	2179	46	76027
	2017-18	5999	618	223	1155	1255	69846	1887	90	81073
	2018-19	6210	639	222	1264	1465	71697	1938	93	83528
	2019-20	6011	616	214	1334	1542	70704	2064	117	82602
	2020-21	3257	571	204	1355	1642	63374	2232	79	72713
	2021-22	4089	530	213	1291	1540	66404	2552	39	76659
	2022-23	2608	299	166	439	1053	80026	1242	68	85901
	2023-24(P)	4505	413	202	1253	1328	79135	2749	41	89626
% Share in total consumption for 2023-24 (P)		**5.03**	**0.46**	**0.23**	**1.40**	**1.48**	**88.29**	**3.07**	**0.05**	**100.00**
Growth rate of 2023-24 over 2022-23(%)		**72.75**	**38.28**	**21.76**	**185.07**	**26.11**	**-1.11**	**121.34**	**-38.85**	**4.34**
CAGR 2014-15 to 2023-24 (%)			**-3.61**	**0.27**	**5.20**	**3.22**	**3.05**	**5.03**	**-7.49**	**2.88**

Source: Ministry of Petroleum & Natural Gas

Table 6.6(A-1) : Distribution of High Speed Diesel(HSD) under Reseller/ Retail into different End-Use sectors

('000 Tonnes)

FY	Road Transport	Shipping	Railways	Agriculture	Power Generation	Other Consumer/ Industrial Goods	Others	Total
2021-22	51,663	531	1,394	3,187	1,062	4,183	4,383	66,404
2022-23	62,260	640	1,681	3,841	1,280	5,042	5,282	80,026
2023-24	61,567	633	1,662	3,798	1,266	4,986	5,223	79,135
% Share in total consumption for 2023-24 (P)	**77.80**	**0.80**	**2.10**	**4.80**	**1.60**	**6.30**	**6.60**	**100.00**
Growth rate of 2023-24 over 2022-23(%)	**-1.11**	**-1.11**	**-1.11**	**-1.11**	**-1.11**	**-1.11**	**-1.11**	**-1.11**

Note : The above end-use distribution of *High Speed Diesel(HSD)* (under *Retail/Reseller* segment) has been made based on the findings mentioned in *Figure 17 (End-use share(%) of diesel (retail and direct) across India) of* ***Sectoral Study Report of PPAC*** *(https://ppac.gov.in/uploads/rep_studies/1666932000_ExecutiveSummarySectoralConsumptionStudy.pdf).*

Table 6.6 (B) : Yearwise Consumption of Selected Petroleum Products - Sectorwise(end use)

('000 Tonnes)

Petroleum Product	Year	Transport	Plantation/ Agriculture	Power Generation	Industry	Mining & Quarrying	Resellers /Retail	Misc. Services	Pvt Imports	Total
1	2	3	4	5	6	7	8	9	10	11 =3 to10
Light Diesel Oil	2014-15	4.95	1.06	132.18	54.63	3.80	3.81	164.83	0.00	365.26
	2015-16	3.74	1.26	154.21	60.79	2.23	1.11	183.77	0.00	407.11
	2016-17	7.23	2.02	174.35	59.50	2.30	1.04	202.54	0.00	448.98
	2017-18	7.16	9.29	142.94	148.82	6.12	2.57	206.89	0.00	523.79
	2018-19	9.98	15.65	276.51	174.77	22.42	33.33	65.32	0.00	597.97
	2019-20	4.55	12.47	342.15	153.33	14.44	37.53	63.33	0.00	627.80
	2020-21	5.02	15.30	252.28	308.66	7.71	124.83	128.90	12.36	855.06
	2021-22	6.04	17.75	288.58	296.79	10.28	205.95	187.20	4.91	1017.50
	2022-23	7.60	13.80	260.60	233.30	12.50	60.60	131.70	5.20	725.30
	2023-24(P)	11.00	11.50	290.40	214.30	10.60	56.10	187.20	0.90	782.00
% Share in total consumption for 2023-24 (P)		**1.41**	**1.47**	**37.14**	**27.40**	**1.36**	**7.17**	**23.94**	**0.12**	**100.00**
Growth rate of 2023-24 over 2022-23(%)		**44.74**	**-16.67**	**11.44**	**-8.14**	**-15.20**	**-7.43**	**42.14**	**-**	**7.82**
CAGR 2014-15 to 2023-24(%)		**9.27**	**30.31**	**9.14**	**16.40**	**12.07**	**34.85**	**1.42**	**-**	**8.83**

Source: Ministry of Petroleum & Natural Gas

Table 6.6 (C) : Yearwise Consumption of Selected Petroleum Products - Sectorwise(end use)

('000 Tonnes)

Petroleum Product	Year	Transport	Plantation/ Agriculture	Power Generation	Industry	Mining & Quarrying	Resellers /Retail	Misc. Services	Pvt Imports	Total
1	2	3	4	5	6	7	8	9	10	11 =3 to10
Furnace Oil	2014-15	346	56	446	1748	45	197	2175	570	5584
	2015-16	380	57	430	2136	53	270	2564	592	6482
	2016-17	444	51	361	2492	71	357	2485	784	7046
	2017-18	601	50	314	2346	68	321	2234	672	6605
	2018-19	786	78	339	2577	54	298	1449	611	6195
	2019-20	849	71	303	2143	84	290	1398	775	5912
	2020-21	1022	80	226	1874	92	268	1330	316	5208
	2021-22	1209	65	312	2092	127	211	1388	411	5815
	2022-23	1561	50	418	1966	94	153	1405	537	6185
	2023-24(P)	1484	24	170	1226	115	125	1985	518	5648
% Share in total consumption for 2023-24 (P)		**26.28**	**0.42**	**3.01**	**21.72**	**2.04**	**2.22**	**35.15**	**9.17**	**100.00**
Growth rate of 2023-24 over 2022-23(%)		**-4.94**	**-52.93**	**-59.31**	**-37.62**	**21.89**	**-18.30**	**41.31**	**-3.48**	**-8.69**
CAGR 2014-15 to 2023-24(%)		**17.55**	**-9.05**	**-10.15**	**-3.86**	**10.95**	**-4.91**	**-1.01**	**-1.06**	**0.13**

Source: Ministry of Petroleum & Natural Gas

Table 6.6 (D) : Yearwise Consumption of Selected Petroleum Products - Sectorwise(end use)

('000 Tonnes)

Petroleum Product	Year	Plantation/ Agriculture	Power Generation	Industry	Mining & Quarrying	Resellers/ Retail	Misc. Services	Pvt Imports	Total
1	2	3	4	5	6	7	8	9	10 =3 to 9
Low Sulphur Heavy Stock	2014-15	0.00	226.18	103.54	0.00	0.00	47.50	0.00	377.22
	2015-16	0.00	50.70	70.45	0.00	0.00	29.23	0.00	150.38
	2016-17	0.00	16.43	50.88	0.00	0.00	36.91	0.00	104.23
	2017-18	1.18	0.00	53.78	0.31	14.67	46.33	0.00	116.27
	2018-19	7.90	9.31	175.13	0.00	48.04	128.67	0.00	369.04
	2019-20	6.42	17.88	201.93	0.00	50.29	113.02	0.00	389.54
	2020-21	6.79	10.71	196.23	0.00	48.50	115.97	0.00	378.20
	2021-22	6.51	29.66	191.26	0.00	67.39	151.88	0.00	446.70
	2022-23	3.50	18.90	250.30	0.00	83.60	416.70	0.00	773.00
	2023-24(P)	10.90	37.50	224.80	0.00	64.80	534.70	0.00	872.70
% Share in total consumption for 2023-24 (P)		**1.25**	**4.30**	**25.76**	**0.00**	**7.43**	**61.27**	**0.00**	**100.00**
Growth rate of 2023-24 over 2022-23(%)		**-**	**-**	**-10.19**	**-**	**-22.49**	**28.32**	**-**	**12.90**
CAGR 2014-15 to 2023-24 (%)		**-**	**-18.10**	**9.00**	**-**	**-**	**30.87**	**-**	**9.77**

Source: Ministry of Petroleum & Natural Gas

Table 6.6 (E) : Yearwise Consumption of Selected Petroleum Products - Sectorwise(end use)

('000 Tonnes)

Petroleum Product	Year	Transport	Plantation/ Agriculture	Power Generation	Manufacturing /Non domestic	Mining	Domestic Distribution	Non-Domestic /Industry/Commercial	Reseller/ Retail	Other/ Misc. Services	Private Import	Total
1	2	3	4	5	6	7	8	9	10	11	12	13= 3 to 12
Liquefied Petroleum Gas	2014-15	164.59	6.09	3.08	207.92	0.00	16040.39	1050.98	45.19	52.68	429.17	18000.10
	2015-16	171.83	7.13	2.68	201.66	0.00	17181.72	1464.37	44.92	59.87	489.05	19623.22
	2016-17	168.07	7.75	2.19	220.03	0.00	18871.36	1775.91	67.03	66.56	429.31	21608.21
	2017-18	185.09	7.46	1.25	204.57	0.00	20351.78	2085.82	74.25	67.13	364.46	23341.82
	2018-19	181.11	21.98	1.77	204.23	0.35	21728.02	2364.39	0.01	88.93	315.98	24906.79
	2019-20	172.79	25.70	1.49	153.40	0.07	23075.97	2614.43	0.00	81.90	204.04	26329.78
	2020-21	119.01	28.11	0.35	214.98	1.50	25128.09	1885.96	0.88	115.38	64.17	27558.43
	2021-22	122.99	29.57	0.41	180.03	3.48	25501.59	2238.83	2.46	174.07	0.06	28253.49
	2022-23	108.43	21.71	0.61	228.53	4.90	25381.61	2606.06	1.83	150.08	0.08	28503.83
	2023-24(P)	89.45	26.50	0.29	375.06	4.88	26207.42	2759.94	0.28	185.71	14.10	29663.62
% Share in total consumption for 2023-24 (P)		**0.30**	**0.09**	**0.00**	**1.26**	**0.02**	**88.35**	**9.30**	**0.00**	**0.63**	**0.05**	**100.00**
Growth rate of 2023-24 over 2022-23(%)		**-17.50**	**-**	**-**	**64.11**	**-0.35**	**3.25**	**5.90**	**-**	**23.74**	**-**	**4.07**
CAGR 2014-15 to 2023-24(%)		**-6.55**	**17.74**	**-**	**6.77**	**-**	**5.61**	**11.32**	**-**	**15.03**	**-31.58**	**5.71**

Source: Ministry of Petroleum & Natural Gas

Table 6.6 (F) : Yearwise Consumption of Selected Petroleum Products - Sectorwise(end use)

('000 Tonnes)

Petroleum Product	Year	Fertiliser Sector	Petro Chemicals	Power Sector	Steel Plants	Others	Private Import	Total
1	2	3	4	5	6	7	8	9 = 3 to 8
Naptha	2014-15	301	9530	199	0	208	844	11082
	2015-16	316	10350	50	0	37	2517	13271
	2016-17	349	10210	60	0	199	2423	13241
	2017-18	368	10011	67	0	405	2038	12889
	2018-19	352	10602	5	0	462	2711	14131
	2019-20	150	10874	0	0	880	2364	14268
	2020-21	66	11339	70	0	885	1740	14100
	2021-22	0	11904	6	0	799	536	13246
	2022-23	0	10402	19	0	714	991	12127
	2023-24(P)	0	10424	0	0	1038	2350	13812
% Share in total consumption for 2023-24 (P)		**0.00**	**75.47**	**0.00**	**0.00**	**7.51**	**17.02**	**100.00**
Growth rate of 2023-24 over 2022-23(%)		-	**0.21**	-	-	**45.35**	**137.16**	**13.90**
CAGR 2014-15 to 2023-24 (%)		-	**1.00**	-	-	**19.58**	**12.06**	**2.48**

Source: Ministry of Petroleum & Natural Gas

Table 6.6 (G) : Yearwise Consumption of Selected Petroleum Products - Sectorwise(end use)

('000 Tonnes)

Petroleum Product	Year	Domestic/PDS	Commercial/ Industry	Others	Total
1	2	3	4	5	6= 3 to 5
SKO(Kerosene)	2014-15	6917	60	109	7087
	2015-16	6649	64	113	6826
	2016-17	5197	84	116	5397
	2017-18	3634	97	115	3845
	2018-19	3231	97	131	3459
	2019-20	2174	87	137	2397
	2020-21	1587	69	143	1798
	2021-22	1292	64	138	1493
	2022-23	308	62	119	490
	2023-24(P)	298	62	118	479
% Share in total consumption for 2023-24 (P)		**62.29**	**12.99**	**24.72**	**100.00**
Growth rate of 2023-24 over 2022-23(%)		**-3.18**	**0.32**	**-0.74**	**-2.15**
CAGR 2014-15 to 2023-24 (%)		**-29.48**	**0.39**	**0.90**	**-25.87**

Source: Ministry of Petroleum & Natural Gas

Table 6.7: Yearwise Consumption of Natural Gas - Sectorwise

(Figures in MMSCM)

Sector	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24(P)	% Share of Total
	2	3	4	5	6	7	8		9	10	11
(a) Energy Purpose											
Power	10,720	10,889	11,616	12,028	12,005	11,080	10,836	10,157	8,153	9,082	13.21
Industrial & Manufacturing	533	545	794	999	1,086	701	555	829	865	1,458	2.12
City or Local Natural Gas Distribution Network incl. Road Transport	5,416	5,464	7,350	8,585	9,206	10,883	9,230	12,175	12,028	13,491	19.62
Agriculture (Tea Plantation)	180	187	183	189	192	200	177	156	154	142	0.21
Internal Consumption for Pipeline System	351	410	471	496	541	525	439	486	1,764	1,924	2.80
Refinery	4,575	5,077	5,374	6,533	7,047	7,786	7,911	5,312	3,909	5,837	8.49
LPG Shrinkage	1,005	754	759	798	874	858	900	1,070	976	1,001	1.46
Miscellaneous	5,941	4,111	3,929	3,226	3,393	4,209	4,569	9,229	8,534	10,938	15.91
Total (a)	**28,721**	**27,437**	**30,478**	**32,854**	**34,343**	**36,241**	**34,617**	**39,414**	**36,383**	**43,872**	**63.80**
(b) Non-Energy Purpose											
Fertilizer Industry	15,190	16,135	15,429	14,676	14,987	16,115	17,781	18,079	19,400	21,046	30.61
Petrochemical	2,890	3,733	4,170	4,024	3,386	3,569	3,072	2,864	1,959	2,667	3.88
Sponge Iron	154	544	885	1,278	1,124	567	647	1,134	960	1,177	1.71
Total (b)	**18,234**	**20,412**	**20,484**	**19,978**	**19,497**	**20,251**	**21,500**	**22,077**	**22,319**	**24,890**	**36.20**
Total Sectorial Sales (a+b)	**46,955**	**47,849**	**50,961**	**52,832**	**53,840**	**56,492**	**56,117**	**61,491**	**58,702**	**68,761**	**100**
Total Consumption **	**51,300**	**52,517**	**55,697**	**59,170**	**60,796**	**64,144**	**60,981**	**64,159**	**59,969**	**67,512**	**-**
Total Consumption in MMSCMD	**141**	**143**	**153**	**162**	**167**	**175**	**167**	**176**	**164**	**184**	**-**

Note: **: Availability Basis (Net Production+LNG Imports) P: Provisional

1. Re-classification among the sectors of consumption of natural gas under energy and non-energy sectors, has been done depending on usage. 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 .
2. Sectorial Sales/consumption of natural gas includes RLNG.
3. Total may not tally due to rounding off.
4. The reasons for the variation between the consolidated availability and the consumption can be attributed to stock changes, conversion factor (volume/energy) and the provisional data reported by the companies.
5. LPG shrinkage is being shifted from Non-Energy purpose to Energy Purpose. Since, LPG shrinkage is a transformation process and LPG produced is used for energy purposes to meet domestic / household energy .

Source: Ministry of Petroleum and Natural Gas

Table 6.8: Yearwise Consumption of Electricity - Sectorwise

(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
2014-15	418,346	168,913	217,405	78,391	16,177	49,289	948,522
2015-16	423,523	173,185	238,876	86,037	16,594	62,976	1,001,191
2016-17	440,206	191,151	255,826	89,825	15,683	68,493	1,061,183
2017-18	468,613	199,247	273,545	93,755	17,433	70,834	1,123,427
2018-19	519,196	213,409	288,243	98,228	18,837	72,058	1,209,972
2019-20	532,820	211,295	308,745	106,047	19,148	70,031	1,248,086
2020-21	508,776	221,303	330,809	86,950	14,668	67,701	1,230,208
2021-22	556,481	228,451	339,780	97,121	21,935	72,996	1,316,765
2022-23	593,895	243,852	353,156	117,231	30,028	102,149	1,440,311
2023-24(P)	645,000	255,000	375,000	125,000	33,000	110,000	1,543,000
% Share in total consumption for 2023-24 (P)	**41.80**	**16.53**	**24.30**	**8.10**	**2.14**	**7.13**	**100.00**
Growth rate of 2023-24 over 2022-23(%)	**8.61**	**4.57**	**6.19**	**6.63**	**9.90**	**7.69**	**7.13**
CAGR 2014-15 to 2023-24 (%)	**4.93**	**4.68**	**6.24**	**5.32**	**8.24**	**9.33**	**5.56**

(P): Provisional

Source : Central Electricity Authority.

Table 6.9 : Electricity Generated (from Utilities), Distributed, Sold and Transmission & Distribution Losses

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

Year	Net Electricity Generated from Utilities	Purchases from Non-Utilities + Net Import from Other Countries	Net Electricity Available for Supply	Sold to Ultimate Consumers	Loss in transmission & distribution	Loss in transmission & distribution (%)
1	2	3	4=2+3	5	6=4-5	7
2014-15	1,040,582	13,773	1,054,355	814,250	240,105	22.77
2015-16	1,088,282	15,947	1,104,228	863,364	240,864	21.81
2016-17	1,154,314	8,977	1,163,290	914,093	249,197	21.42
2017-18	1,221,307	11,198	1,232,505	973,131	259,375	21.04
2018-19	1,288,393	19,291	1,307,685	1,037,518	270,167	20.66
2019-20	1,300,116	22,932	1,323,048	1,052,346	270,701	20.46
2020-21	1,292,715	21,310	1,314,025	1,041,656	272,369	20.73
2021-22	1,397,707	16,197	1,413,903	1,141,485	272,418	19.27
2022-23	1,524,475	11,191	1,535,665	1,264,103	271,563	17.68
2023-24(P)	1,634,302	12,696	1,646,998	1,365,642	281,356	17.08
Growth rate of 2023-24 over 2022-23(%)	**7.20**	**13.45**	**7.25**	**8.03**	**3.61**	**-3.40**
CAGR 2014-15 to 2023-24 (%)	**5.14**	**-0.90**	**5.08**	**5.91**	**1.78**	**-3.14**

(P): Provisional

Source : Central Electricity Authority.

7 Chapter

Energy Balance and Sankey Diagram

CHAPTER 7
Energy Balance and Sankey Diagram

Introduction

The concept of commodity balance plays a crucial role in understanding the supply and consumption of energy products within a nation. By examining the sources of supply and various uses of specific energy commodities, it becomes possible to track the flow of energy resources across sectors. Energy balance, a broader framework, is designed to provide an overview of all energy products entering and exiting a given country during a reference period, expressed in common energy units for comparison and analysis. This chapter outlines the significance of commodity balance and energy balance, the methodology employed, and the resulting data, with a specific focus on India's energy supply and consumption patterns.

Commodity Balance

The commodity balance presents a comprehensive view of the energy commodities within a country's national territory, based on international guidelines. The **International Recommendations on Energy Statistics (IRES)** ensures that the format and concepts used in compiling the commodity balance are consistent to maintain data consistency. In India, the major sources of commercial energy include coal, oil products, natural gas, and electricity. These resources are used both as final products and intermediates in power generation and other sectors, which may lead to over- or under-estimation of energy consumption. For instance, coal and natural gas are extensively used in power generation, while petroleum products such as High-Speed Diesel Oil (HSDO) and Naphtha are also utilized in various sectors outside energy production.

Energy Balance

Energy balance is an essential tool for monitoring energy supply, consumption, and efficiency within a country. It is formulated as a matrix of products and flows, where all energy data is expressed in unified units, typically kilo-tonnes of oil equivalent (ktoe), to allow for consistent comparison and analysis. The key components of an energy balance are the **Total Primary Energy Supply (TPES)** and **Total Final Consumption (TFC)** of energy commodities. TPES reflects the total energy available within the country, while TFC breaks down the energy usage by various sectors like industry, transport, residential, and services.

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The energy balance helps:

- Provide an overview of a country's energy profile.
- Monitor energy security and policy goals.
- Serve as the foundation for socio-economic indicators, including CO2 emissions.
- Facilitate comparisons between countries and across time periods.
- Calculate the efficiency of energy transformation processes.

Methodology for Energy Balance Calculation

Energy balance calculations use conversion factors to standardize different energy products into a common unit. The formula is as follows:

- **Energy (in KToe) = Quantity of Commodity × Conversion Factor** Where:
    - 1 Toe = 41868 MJ
    - **Conversion Factor** = Net Calorific Value (NCV) ÷ Mega joules per ton of oil equivalent.

The **Net Calorific Value (NCV)** is calculated by subtracting the moisture content from the Gross Calorific Value (GCV), and it is generally provided by the International Energy Agency (IEA) for all energy commodities.

Sankey Diagram

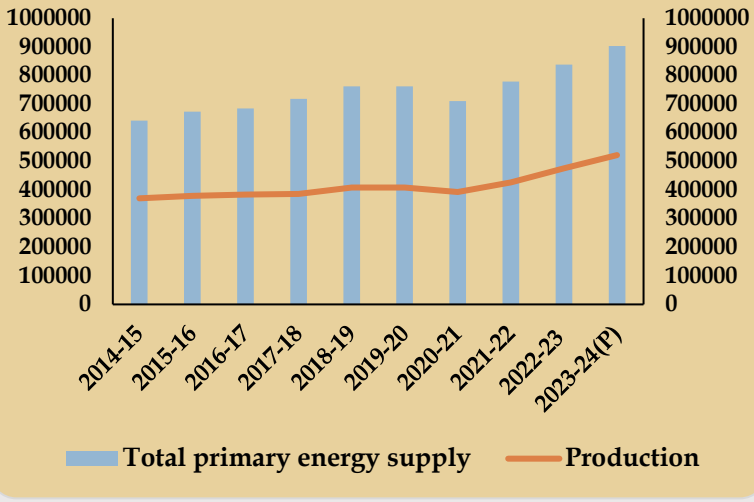
The concept of data visualization in the digital age has revived interest in a style of chart called a Sankey diagram. This style of diagram makes it easy to see the dominant flows within a system and highlights where losses occur. The Sankey diagram is very useful tool to represent an entire input and 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.

7.1 Primary Energy Supply (PES)

Table 7.5 indicates that in FY 2023-24 (P), India's **Primary Energy Supply** totaled **9,03,158 Ktoe**, representing an increase of **7.81%** from the previous year. The major contributors to energy supply were **Coal (59.14%)** and **Crude Oil (29.83%)**.

Figure 7.1 shows the gap between total primary energy supply and production has been steadily widening over the years, suggesting a growing reliance on external sources to meet energy demands.

Fig. 7.1: Trend of Total Primary Energy supply and Prduction



7.2 Total Final Consumption (TFC)

Total Final Consumption reached **6,13,605 Ktoe**, an increase of **9.5%** compared to the previous year, indicating robust economic growth in India.

Fig. 7.2:Trend of sector wise consumption of energy resources(in KToE)

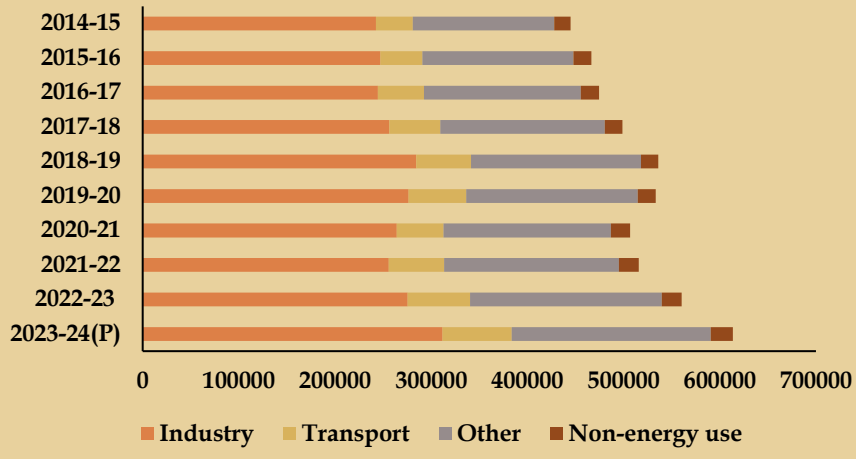


Figure 7.2 shows the industry consumption peaked in 2018-19 and has fluctuated since, while the transport sector shows a consistent upward trend. The other category has steadily increased and non-energy use has shown a rise in recent years.

7.3 Consumption Breakdown of Industry Sector in the year 2023-24(P)

- The **Iron and Steel** industry accounted for **15.25%** of industrial energy consumption.
- **Chemicals and Petrochemicals** consumed **3.89%**, and
- **Construction** used **1.81%**.
- Other sectors, including **residential, agriculture, commercial & public services**, and **non-specified**, contributed to **33.70%** of the total final energy consumption.

The **transport sector** accounted for **11.72%** of the total final consumption.

7.4 Energy Balance from 2012-13 to 2023-24(P)

The energy balance table, reflecting final audited figures from various ministries and utilizing domestic conversion factors, covers data from FY 2012-13 to FY 2021-22. This is further detailed in Annexure – IV. However, Energy Commodity Balance, Energy Balance (in KToE and PJ) and Energy Balance of Petroleum products for the year 2022-23 (F) and 2023-24 (P) have been shown in subsequent pages.

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Table-7.1 : Energy Commodity Balance for 2022-23 (Final)

Supply	Coal	Lignite	LPG	Naphtha	Kerosene	Diesel (HSD+ LDO)	Fuel Oil	Lubricants	Bitumin	Petrol/Motor Spirit	ATF	Petroleum Coke	Other Petroleum Products*	Natural Gas	Electricity
	(000 tonnes)													MMSCM	(GWh)
Production	893191	44029	12832	17036	948	114421	9242	1301	5144	42817	15000	16044	31756	34450	1617904
From Other Sources															211932
Imports	237668	23	18335	897	0	322	8563	2152	2797	1069	0	8664	1799	26304	7640
Exports	-1166	-333	-540	-5714	-11	-28496	-1841	-14	-9	-13127	-7264	-284	-3717	0	-13792
Stock changes	-15515	1833													
Domestic Supply	**1114178**	**45552**	**30627**	**12219**	**937**	**86248**	**15964**	**3440**	**7933**	**30759**	**7737**	**24424**	**29838**	**60755**	**1823684**
Transfer															
Statistical difference	1039	1293	-2124	-92	-448	378	-9006	298	108	4218	-359	-6081	-13995	3566	-18381
Transformation	**785396**	**38948**	**1**	**19**	**0**	**427**	**437**	**0**	**0**	**0**	**0**	**0**	**0**	**8153**	**0**
Electricity plants	785396	38948	1	19		427	437							8153	
Energy industry own use	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**17954**	**93429**
Oil and Gas extraction														5511	
Petroleum refineries														3909	
Own use in electricity, CHP and heat plants															93429
Other energy sector														8534	
Distribution losses														**108**	**271563**
Final Consumption	**329821**	**7897**	**28503**	**12107**	**490**	**86200**	**6521**	**3737**	**8041**	**34976**	**7378**	**18343**	**15842**	**38106**	**1440311**
Industry Sector	**329821**	**7897**	**2839**	**12107**	**0**	**1738**	**2311**	**0**	**0**	**0**	**0**	**18343**	**15842**	**865**	**593895**
Iron and steel	77528	122		0		158	871								
Chemical and petroleum	857			10402		86	525								
Non-ferrous metals						21	385								
Machinery						64	18								
Mining & Quarrying			5			1066	94								
Paper, pulp and print	1255	894													
Construction	9418	1445				179	193								
Textile and leather	92	1853				127	24								
Non-specified	240671	3583	2835	1705		39	200					18343	15842	865	593895
Transport Sector	**0**	**0**	**108**	**0**	**0**	**2615**	**1561**	**0**	**0**	**34976**	**7378**	**0**	**0**	**13792**	**30028**
Road			108			148	178			34976				12028	
Domestic Aviation						1									
Rail						1716	0								30028
Pipeline transport														1764	
Domestic navigation						750	1383				7378				
Non-specified							0								
Other Sectors	**0**	**0**	**25555**	**0**	**490**	**81846**	**2649**	**3737**	**8041**	**0**	**0**	**0**	**0**	**1131**	**816388**
Residential			25382		308										353156
Comm. And public services					62										117231
Agriculture/forestry			22			312	54							154	243852
Non-specified			152		119	81533	2595	3737	8041					976	102149
Non-Energy Use														**22319**	

Statistical Difference is defined as final consumption + use for transformation processes and consumption by energy industry own use + losses - domestic supply

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

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

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Table-7.2 : Energy Balance of India for 2022-23 (Final)

All figures in KToE

	Coal	Lignite	Crude Oil	Oil Products	Natural Gas	Nuclear	Large Hydro	Solar, Wind, Others	Electricity	Total
Production	359,798	10,039	29,821	0	31,866	11,952	13,965	18,253	0	475,694
Imports	126,343	5	237,819	44,703	24,331	0	0	0	657	433,858
Exports	-785	-76	0	-63,660	0	0	0	0	-1,186	-65,708
Stock changes	-6,502	418	0	0	0	0	0	0	0	-6,084
Total primary energy supply	**478,853**	**10,386**	**267,640**	**-18,957**	**56,198**	**11,952**	**13,965**	**18,253**	**-529**	**837,761**
Statistical differences	11,250	295	19,822	-25,004	3,299	0	0	0	-1,581	8,080
Main activity producer electricity plants	-317,764	-8,880	0	-893	-7,541	-11,952	-13,940	-17,506	139,140	-239,336
Autoproducer electricity plants	0	0	0	0	0	0	-25	-747	18,226	17,454
Oil refineries	0	0	-260,847	271,968	0	0	0	0	0	11,121
Energy industry own use	0	0	0	0	-16,607	0	0	0	-8,035	-24,642
Losses	0	0	-26,615	0	-100	0	0	0	-23,354	-50,069
Final consumption	**172,340**	**1,801**	**0**	**227,113**	**35,248**	**0**	**0**	**0**	**123,867**	**560,369**
Industry	**172,340**	**1,801**	**0**	**49,519**	**800**	**0**	**0**	**0**	**51,075**	**275,535**
Iron and steel	40,510	28	0	1,021	0	0	0	0	0	41,559
Chemical and petrochemical	448	0	0	11,786	0	0	0	0	0	12,234
Non-ferrous metals	0	0	0	400	0	0	0	0	0	400
Machinery	0	0	0	85	0	0	0	0	0	85
Mining and quarrying	0	0	0	1,196	0	0	0	0	0	1,196
Paper, pulp and print	656	204	0	0	0	0	0	0	0	860
Construction	4,921	329	0	376	0	0	0	0	0	5,626
Textile and leather	48	422	0	155	0	0	0	0	0	625
Non-specified (industry)	125,757	817	0	34,500	800	0	0	0	51,075	212,949
Transport	**0**	**0**	**0**	**49,652**	**12,758**	**0**	**0**	**0**	**2,582**	**64,992**
Road	0	0	0	37,877	11,126	0	0	0	0	49,003
Domestic aviation	0	0	0	7,861	0	0	0	0	0	7,861
Rail	0	0	0	1,776	0	0	0	0	2,582	4,358
Pipeline transport	0	0	0	0	1,632	0	0	0	0	1,632
Domestic navigation	0	0	0	2,138	0	0	0	0	0	2,138
Non-specified (transport)	0	0	0	0	0	0	0	0	0	0
Other	**0**	**0**	**0**	**127,942**	**1,046**	**0**	**0**	**0**	**70,209**	**199,198**
Residential	0	0	0	28,997	0	0	0	0	30,371	59,368
Commercial and public services	0	0	0	65	0	0	0	0	10,082	10,147
Agriculture/forestry	0	0	0	401	143	0	0	0	20,971	21,515
Non-specified (other)	0	0	0	98,480	903	0	0	0	8,785	108,168
Non-energy use	**0**	**0**	**0**	**0**	**20,645**	**0**	**0**	**0**	**0**	**20,645**
Non-energy use industry/transformation/energy	0	0	0	0	20,645	0	0	0	0	20,645
Non-energy use in transport	0	0	0	0	0	0	0	0	0	0
Non-energy use in other	0	0	0	0	0	0	0	0	0	0
Elect. output in GWh	**0**	**0**	**0**	**0**	**0**	**45,861**	**162,389**	**212,242**	**0**	**420,493**
Elec output-main activity producer ele plants	0	0	0	0	0	45,861	162,099	203,555	0	411,514
Elec output-autoproducer electricity plants	0	0	0	0	0	0	291	8,688	0	8,979

Final consumption refers to End Use Consumption

Chapter 7: Energy Balance and Sankey Diagram

Table-7.3 : Energy Balance of India for 2022-23 (Final)

All figures in Peta Joule

	Coal	Lignite	Crude Oil	Oil Products	Natural Gas	Nuclear	Large Hydro	Solar, Wind, Others	Electricity	Total
Production	15,064	420	1,249	0	1,334	500	585	764	0	19,916
Imports	5,290	0	9,957	1,872	1,019	0	0	0	28	18,165
Exports	-33	-3	0	-2,665	0	0	0	0	-50	-2,751
Stock changes	-272	17	0	0	0	0	0	0	0	-255
Total primary energy supply	**20,049**	**435**	**11,206**	**-794**	**2,353**	**500**	**585**	**764**	**-22**	**35,075**
Statistical differences	471	12	830	-1,047	138	0	0	0	-66	338
Main activity producer electricity plants	-13,304	-372	0	-37	-316	-500	-584	-733	5,826	-10,021
Autoproducer electricity plants	0	0	0	0	0	0	-1	-31	763	731
Oil refineries	0	0	-10,921	11,387	0	0	0	0	0	466
Energy industry own use	0	0	0	0	-695	0	0	0	-336	-1,032
Losses	0	0	-1,114	0	-4	0	0	0	-978	-2,096
Final consumption	**7,216**	**75**	**0**	**9,509**	**1,476**	**0**	**0**	**0**	**5,186**	**23,462**
Industry	**7,216**	**75**	**0**	**2,073**	**33**	**0**	**0**	**0**	**2,138**	**11,536**
Iron and steel	1,696	1	0	43	0	0	0	0	0	1,740
Chemical and petrochemical	19	0	0	493	0	0	0	0	0	512
Non-ferrous metals	0	0	0	17	0	0	0	0	0	17
Machinery	0	0	0	4	0	0	0	0	0	4
Mining and quarrying	0	0	0	50	0	0	0	0	0	50
Paper, pulp and print	27	9	0	0	0	0	0	0	0	36
Construction	206	14	0	16	0	0	0	0	0	236
Textile and leather	2	18	0	6	0	0	0	0	0	26
Non-specified (industry)	5,265	34	0	1,444	33	0	0	0	2,138	8,916
Transport	**0**	**0**	**0**	**2,079**	**534**	**0**	**0**	**0**	**108**	**2,721**
Road	0	0	0	1,586	466	0	0	0	0	2,052
Domestic aviation	0	0	0	329	0	0	0	0	0	329
Rail	0	0	0	74	0	0	0	0	108	182
Pipeline transport	0	0	0	0	68	0	0	0	0	68
Domestic navigation	0	0	0	90	0	0	0	0	0	90
Non-specified (transport)	0	0	0	0	0	0	0	0	0	0
Other	**0**	**0**	**0**	**5,357**	**44**	**0**	**0**	**0**	**2,940**	**8,340**
Residential	0	0	0	1,214	0	0	0	0	1,272	2,486
Commercial and public services	0	0	0	3	0	0	0	0	422	425
Agriculture/forestry	0	0	0	17	6	0	0	0	878	901
Non-specified (other)	0	0	0	4,123	38	0	0	0	368	4,529
Non-energy use	**0**	**0**	**0**	**0**	**864**	**0**	**0**	**0**	**0**	**864**
Non-energy use industry/transformation/energy	0	0	0	0	864	0	0	0	0	864
Non-energy use in transport	0	0	0	0	0	0	0	0	0	0
Non-energy use in other	0	0	0	0	0	0	0	0	0	0
Elect. output in GWh	**0**	**0**	**0**	**0**	**0**	**1,920**	**6,799**	**8,886**	**0**	**17,605**
Elec output-main activity producer ele plants	0	0	0	0	0	1,920	6,787	8,522	0	17,229
Elec output-autoproducer electricity plants	0	0	0	0	0	0	12	364	0	376

Final consumption refers to End Use Consumption

Chapter 7: Energy Balance and Sankey Diagram

Table 7.4: Energy Balance of Petroleum Products for 2022-23(Final)

All figures in KToE

	LPG	Naphtha	Kerosene	Diesel (HSD+ LDO)	Fuel Oil	Lubricants	Bitumin	Petrol/Motor Spirit	ATF	Petroleum Coke	Other Petroleum Products *	Petroleum Products Total
Production	14,496	18,311	991	118,428	9,104	1,305	4,792	45,815	15,979	12,263	30,485	271,968
Imports	20,714	964	0	334	8,434	2,159	2,606	1,144	0	6,622	1,727	44,703
Exports	-610	-6,142	-11	-29,494	-1,813	-14	-8	-14,046	-7,738	-217	-3,568	-63,660
Stock changes	0	0	0	0	0	0	0	0	0	0	0	0
Total primary energy supply	**34,601**	**13,133**	**979**	**89,268**	**15,725**	**3,450**	**7,389**	**32,913**	**8,242**	**18,667**	**28,644**	**253,011**
Statistical differences	-2,405	-99	-468	392	-8,872	298	101	4,513	-382	-4,648	-13,436	-25,004
Main activity producer electricity plants	-1	-21	0	-441	-430	0	0	0	0	0	0	-893
Autoproducer electricity plants	0	0	0	0	0	0	0	0	0	0	0	0
Oil refineries	14,496	18,311	991	118,428	9,104	1,305	4,792	45,815	15,979	12,263	30,485	271,968
Energy industry own use	0	0	0	0	0	0	0	0	0	0	0	0
Losses	0	0	0	0	0	0	0	0	0	0	0	0
Final consumption	**32,196**	**13,013**	**512**	**89,218**	**6,423**	**3,749**	**7,490**	**37,426**	**7,860**	**14,020**	**15,209**	**227,113**
Industry	**3,202**	**13,013**	**0**	**1,799**	**2,276**	**0**	**0**	**0**	**0**	**14,020**	**15,209**	**49,519**
Iron and steel	0	0	0	163	858	0	0	0	0	0	0	1,021
Chemical and petrochemical	0	11,181	0	89	517	0	0	0	0	0	0	11,786
Non-ferrous metals	0	0	0	22	379	0	0	0	0	0	0	400
Machinery	0	0	0	66	18	0	0	0	0	0	0	85
Mining and quarrying	0	0	0	1,103	93	0	0	0	0	0	0	1,196
Paper, pulp and print	0	0	0	0	0	0	0	0	0	0	0	0
Construction	0	0	0	185	191	0	0	0	0	0	0	376
Textile and leather	0	0	0	131	24	0	0	0	0	0	0	155
Non-specified (industry)	3,202	1,832	0	40	197	0	0	0	0	14,020	15,209	34,500
Transport	**123**	**0**	**0**	**2,707**	**1,538**	**0**	**0**	**37,426**	**7,860**	**0**	**0**	**49,652**
Road	123	0	0	153	176	0	0	37,426	0	0	0	37,877
Domestic aviation	0	0	0	1	0	0	0	0	7,860	0	0	7,861
Rail	0	0	0	1,776	0	0	0	0	0	0	0	1,776
Pipeline transport	0	0	0	0	0	0	0	0	0	0	0	0
Domestic navigation	0	0	0	776	1,362	0	0	0	0	0	0	2,138
Non-specified (transport)	0	0	0	0	0	0	0	0	0	0	0	0
Other	**28,871**	**0**	**512**	**84,712**	**2,609**	**3,749**	**7,490**	**0**	**0**	**0**	**0**	**127,942**
Residential	28,675	0	322	0	0	0	0	0	0	0	0	28,997
Commercial and public services	0	0	65	0	0	0	0	0	0	0	0	65
Agriculture/forestry	25	0	0	323	53	0	0	0	0	0	0	401
Non-specified (other)	172	0	125	84,388	2,556	3,749	7,490	0	0	0	0	98,480
Non-energy use	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Non-energy use industry/transformation/energy	0	0	0	0	0	0	0	0	0	0	0	0
Non-energy use in transport	0	0	0	0	0	0	0	0	0	0	0	0
Non-energy use in other	0	0	0	0	0	0	0	0	0	0	0	0
Elect. output in GWh												**0**
Elec output-main activity producer ele plants	0	0	0	0	0	0	0	0	0	0	0	0
Elec output-autoproducer electricity plants	0	0	0	0	0	0	0	0	0	0	0	0

Final consumption refers to End Use Consumption

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

Chapter 7: Energy Balance and Sankey Diagram

Table 7.5 : Energy Commodity Balance for 2023-24(P)

Supply	Coal	Lignite	LPG	Naphtha	Kerosene	Diesel (HSD+ LDO)	Fuel Oil	Lubricants	Bitumin	Petrol/Motor Spirit	ATF	Petroleum Coke	Other Petroleum Products*	Natural Gas	Electricity
	(000 tonnes)													MMSCM	(GWh)
Production	997826	42921	12777	18736	983	116525	9021	1352	5492	45480	17113	15561	33050	36438	1734375
From Other Sources															214581
Imports	264531	52	18514	1211	0	42	9053	2412	3244	717	0	10956	2544	31795	6649
Exports	-1545	-2	-525	-5275	-11	-28204	-2103	-15	-18	-13472	-8579	-28	-4362	0	-11362
Stock changes	-24330	-327													
Domestic Supply	**1236482**	**42644**	**30766**	**14671**	**972**	**88362**	**15970**	**3749**	**8718**	**32725**	**8533**	**26489**	**31232**	**68233**	**1944243**
Transfer															
Statistical difference	1217	2	-1102	-859	-493	2046	-9450	338	89	4494	-286	-6171	-16536	6205	-19814
Transformation	**859336**	**35695**	**0**	**0**	**0**	**492**	**208**	**0**	**0**	**0**	**0**	**0**	**0**	**9082**	**0**
Electricity plants	859336	35695	0	0		492	208							9082	
Energy industry own use	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**22340**	**100073**
Oil and Gas extraction														5565	
Petroleum refineries														5837	
Own use in electricity, CHP and heat plants															100073
Other energy sector														10938	
Distribution losses														**111**	**281356**
Final Consumption	**378363**	**6951**	**29663**	**13812**	**479**	**89916**	**6313**	**4087**	**8807**	**37219**	**8247**	**20319**	**14696**	**42906**	**1543000**
Industry Sector	**378363**	**6951**	**3140**	**13812**	**0**	**2806**	**1566**	**0**	**0**	**0**	**0**	**20319**	**14696**	**1458**	**645000**
Iron and steel	88122	86		0		180	557								
Chemical and petroleum	800			10424		101	408								
Non-ferrous metals						20	233								
Machinery						96	15								
Mining & Quarrying			5			1339	115								
Paper, pulp and print	1027	1039													
Construction	9263	569				457	114								
Textile and leather	173	994				503	19								
Non-specified	278978	4263	3135	3388		111	106					20319	14696	1458	645000
Transport Sector	**0**	**0**	**89**	**0**	**0**	**4516**	**1484**	**0**	**0**	**37219**	**8247**	**0**	**0**	**15415**	**33000**
Road			89			2284	174			37219				13491	
Domestic Aviation						1									
Rail						1458	0								33000
Pipeline transport														1924	
Domestic navigation						773	1310				8247				
Non-specified							0								
Other Sectors	**0**	**0**	**26434**	**0**	**479**	**82594**	**3262**	**4087**	**8807**	**0**	**0**	**0**	**0**	**1143**	**865000**
Residential			26207		298										375000
Comm. And public services					62										125000
Agriculture/forestry			26			424	35							142	255000
Non-specified			200		118	82170	3228	4087	8807					1001	110000
Non-Energy Use														**24890**	

P: Provisional

Statistical Difference is defined as final consumption + use for transformation processes and consumption by energy industry own use + losses - domestic supply

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

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

Chapter 7: Energy Balance and Sankey Diagram

Table 7.6: Energy Balance of India for 2023-24 (P)

All figures in KToE

	Coal	Lignite	Crude Oil	Oil Products	Natural Gas	Nuclear	Large Hydro	Solar, Wind, Others	Electricity	Total
Production	403,799	9,786	30,002	0	33,705	12,493	11,559	20,289	0	521,633
Imports	141,639	12	239,415	48,203	29,410	0	0	0	572	459,250
Exports	-1,041	0	0	-65,333	0	0	0	0	-977	-67,352
Stock changes	-10,299	-75	0	0	0	0	0	0	0	-10,374
Total primary energy supply	**534,098**	**9,723**	**269,417**	**-17,131**	**63,115**	**12,493**	**11,559**	**20,289**	**-405**	**903,158**
Statistical differences	16,395	0	25,117	-25,545	5,740	0	0	0	-1,704	20,003
Main activity producer electricity plants	-349,546	-8,139	0	-714	-8,400	-12,493	-11,529	-19,422	149,156	-261,086
Autoproducer electricity plants	0	0	0	0	0	0	-30	-867	18,454	17,557
Oil refineries	0	0	-267,299	282,077	0	0	0	0	0	14,778
Energy industry own use	0	0	0	0	-20,664	0	0	0	-8,606	-29,270
Losses	0	0	-27,235	0	-103	0	0	0	-24,197	-51,535
Final consumption	**200,947**	**1,585**	**0**	**238,687**	**39,687**	**0**	**0**	**0**	**132,698**	**613,605**
Industry	**200,947**	**1,585**	**0**	**52,471**	**1,348**	**0**	**0**	**0**	**55,470**	**311,822**
Iron and steel	46,801	20	0	735	0	0	0	0	0	47,556
Chemical and petrochemical	425	0	0	11,711	0	0	0	0	0	12,135
Non-ferrous metals	0	0	0	250	0	0	0	0	0	250
Machinery	0	0	0	114	0	0	0	0	0	114
Mining and quarrying	0	0	0	1,499	0	0	0	0	0	1,499
Paper, pulp and print	545	237	0	0	0	0	0	0	0	782
Construction	4,920	130	0	585	0	0	0	0	0	5,634
Textile and leather	92	227	0	539	0	0	0	0	0	857
Non-specified (industry)	148,164	972	0	37,039	1,348	0	0	0	55,470	242,994
Transport	**0**	**0**	**0**	**54,848**	**14,259**	**0**	**0**	**0**	**2,838**	**71,945**
Road	0	0	0	42,461	12,479	0	0	0	0	54,941
Domestic aviation	0	0	0	8,786	0	0	0	0	0	8,786
Rail	0	0	0	1,509	0	0	0	0	2,838	4,347
Pipeline transport	0	0	0	0	1,779	0	0	0	0	1,779
Domestic navigation	0	0	0	2,091	0	0	0	0	0	2,091
Non-specified (transport)	0	0	0	0	0	0	0	0	0	0
Other	**0**	**0**	**0**	**131,368**	**1,057**	**0**	**0**	**0**	**74,390**	**206,815**
Residential	0	0	0	29,919	0	0	0	0	32,250	62,169
Commercial and public services	0	0	0	65	0	0	0	0	10,750	10,815
Agriculture/forestry	0	0	0	503	131	0	0	0	21,930	22,564
Non-specified (other)	0	0	0	100,880	926	0	0	0	9,460	111,266
Non-energy use	**0**	**0**	**0**	**0**	**23,023**	**0**	**0**	**0**	**0**	**23,023**
Non-energy use industry/transformation/energy	0	0	0	0	23,023	0	0	0	0	23,023
Non-energy use in transport	0	0	0	0	0	0	0	0	0	0
Non-energy use in other	0	0	0	0	0	0	0	0	0	0
Elect. output in GWh	**0**	**0**	**0**	**0**	**0**	**47,937**	**134,405**	**235,915**	**0**	**418,257**
Elec output-main activity producer ele plants	0	0	0	0	0	47,937	134,054	225,835	0	407,826
Elec output-autoproducer electricity plants	0	0	0	0	0	0	351	10,080	0	10,431

Final consumption refers to End Use Consumption

P: Provisional

Chapter 7: Energy Balance and Sankey Diagram

Table 7.7: Energy Balance of India for 2023-24 (P)

All figures in Peta Joule

	Coal	Lignite	Crude Oil	Oil Products	Natural Gas	Nuclear	Large Hydro	Solar, Wind, Others	Electricity	Total
Production	16,906	410	1,256	0	1,411	523	484	849	0	21,840
Imports	5,930	0	10,024	2,018	1,231	0	0	0	24	19,228
Exports	-44	0	0	-2,735	0	0	0	0	-41	-2,820
Stock changes	-431	-3	0	0	0	0	0	0	0	-434
Total primary energy supply	**22,362**	**407**	**11,280**	**-717**	**2,643**	**523**	**484**	**849**	**-17**	**37,813**
Statistical differences	686	0	1,052	-1,070	240	0	0	0	-71	838
Main activity producer electricity plants	-14,635	-341	0	-30	-352	-523	-483	-813	6,245	-10,931
Autoproducer electricity plants	0	0	0	0	0	0	-1	-36	773	735
Oil refineries	0	0	-11,191	11,810	0	0	0	0	0	619
Energy industry own use	0	0	0	0	-865	0	0	0	-360	-1,225
Losses	0	0	-1,140	0	-4	0	0	0	-1,013	-2,158
Final consumption	**8,413**	**66**	**0**	**9,993**	**1,662**	**0**	**0**	**0**	**5,556**	**25,690**
Industry	**8,413**	**66**	**0**	**2,197**	**56**	**0**	**0**	**0**	**2,322**	**13,055**
Iron and steel	1,959	1	0	31	0	0	0	0	0	1,991
Chemical and petrochemical	18	0	0	490	0	0	0	0	0	508
Non-ferrous metals	0	0	0	10	0	0	0	0	0	10
Machinery	0	0	0	5	0	0	0	0	0	5
Mining and quarrying	0	0	0	63	0	0	0	0	0	63
Paper, pulp and print	23	10	0	0	0	0	0	0	0	33
Construction	206	5	0	24	0	0	0	0	0	236
Textile and leather	4	9	0	23	0	0	0	0	0	36
Non-specified (industry)	6,203	41	0	1,551	56	0	0	0	2,322	10,174
Transport	**0**	**0**	**0**	**2,296**	**597**	**0**	**0**	**0**	**119**	**3,012**
Road	0	0	0	1,778	522	0	0	0	0	2,300
Domestic aviation	0	0	0	368	0	0	0	0	0	368
Rail	0	0	0	63	0	0	0	0	119	182
Pipeline transport	0	0	0	0	75	0	0	0	0	75
Domestic navigation	0	0	0	88	0	0	0	0	0	88
Non-specified (transport)	0	0	0	0	0	0	0	0	0	0
Other	**0**	**0**	**0**	**5,500**	**44**	**0**	**0**	**0**	**3,115**	**8,659**
Residential	0	0	0	1,253	0	0	0	0	1,350	2,603
Commercial and public services	0	0	0	3	0	0	0	0	450	453
Agriculture/forestry	0	0	0	21	5	0	0	0	918	945
Non-specified (other)	0	0	0	4,224	39	0	0	0	396	4,658
Non-energy use	**0**	**0**	**0**	**0**	**964**	**0**	**0**	**0**	**0**	**964**
Non-energy use industry/transformation/energy	0	0	0	0	964	0	0	0	0	964
Non-energy use in transport	0	0	0	0	0	0	0	0	0	0
Non-energy use in other	0	0	0	0	0	0	0	0	0	0
Elect. output in GWh	**0**	**0**	**0**	**0**	**0**	**2,007**	**5,627**	**9,877**	**0**	**17,512**
Elec output-main activity producer ele plants	0	0	0	0	0	2,007	5,613	9,455	0	17,075
Elec output-autoproducer electricity plants	0	0	0	0	0	0	15	422	0	437

Final consumption refers to End Use Consumption

P: Provisional

Table 7.8 : Energy Balance of Petroleum Products for 2023-24(P)

All figures in KToE

	LPG	Naphtha	Kerosene	Diesel (HSD+ LDO)	Fuel Oil	Lubricants	Bitumin	Petrol/Motor Spirit	ATF	Petroleum Coke	Other Petroleum Products*	Petroleum Products Total
Production	14,435	20,137	1,027	120,605	8,885	1,356	5,116	48,665	18,229	11,893	31,728	282,077
Imports	20,916	1,301	0	44	8,917	2,420	3,021	768	0	8,374	2,442	48,203
Exports	-594	-5,670	-11	-29,192	-2,071	-15	-16	-14,416	-9,139	-21	-4,188	-65,333
Stock changes	0	0	0	0	0	0	0	0	0	0	0	0
Total primary energy supply	**34,757**	**15,769**	**1,016**	**91,456**	**15,731**	**3,761**	**8,121**	**35,017**	**9,090**	**20,246**	**29,982**	**264,946**
Statistical differences	-1,251	-923	-515	2,117	-9,308	339	83	4,809	-305	-4,716	-15,874	-25,545
Main activity producer electricity plants	0	0	0	-510	-204	0	0	0	0	0	0	-714
Autoproducer electricity plants	0	0	0	0	0	0	0	0	0	0	0	0
Oil refineries	14,435	20,137	1,027	120,605	8,885	1,356	5,116	48,665	18,229	11,893	31,728	282,077
Energy industry own use	0	0	0	0	0	0	0	0	0	0	0	0
Losses	0	0	0	0	0	0	0	0	0	0	0	0
Final consumption	**33,506**	**14,845**	**501**	**93,064**	**6,218**	**4,100**	**8,204**	**39,826**	**8,785**	**15,530**	**14,108**	**238,687**
Industry	**3,542**	**14,845**	**0**	**2,904**	**1,543**	**0**	**0**	**0**	**0**	**15,530**	**14,108**	**52,471**
Iron and steel	0	0	0	186	549	0	0	0	0	0	0	735
Chemical and petrochemical	0	11,204	0	104	402	0	0	0	0	0	0	11,711
Non-ferrous metals	0	0	0	20	230	0	0	0	0	0	0	250
Machinery	0	0	0	100	14	0	0	0	0	0	0	114
Mining and quarrying	0	0	0	1,386	113	0	0	0	0	0	0	1,499
Paper, pulp and print	0	0	0	0	0	0	0	0	0	0	0	0
Construction	0	0	0	473	112	0	0	0	0	0	0	585
Textile and leather	0	0	0	520	18	0	0	0	0	0	0	539
Non-specified (industry)	3,542	3,641	0	114	104	0	0	0	0	15,530	14,108	37,039
Transport	**101**	**0**	**0**	**4,674**	**1,462**	**0**	**0**	**39,826**	**8,785**	**0**	**0**	**54,848**
Road	101	0	0	2,363	171	0	0	39,826	0	0	0	42,461
Domestic aviation	0	0	0	1	0	0	0	0	8,785	0	0	8,786
Rail	0	0	0	1,509	0	0	0	0	0	0	0	1,509
Pipeline transport	0	0	0	0	0	0	0	0	0	0	0	0
Domestic navigation	0	0	0	800	1,291	0	0	0	0	0	0	2,091
Non-specified (transport)	0	0	0	0	0	0	0	0	0	0	0	0
Other	**29,864**	**0**	**501**	**85,486**	**3,213**	**4,100**	**8,204**	**0**	**0**	**0**	**0**	**131,368**
Residential	29,608	0	312	0	0	0	0	0	0	0	0	29,919
Commercial and public services	0	0	65	0	0	0	0	0	0	0	0	65
Agriculture/forestry	30	0	0	439	34	0	0	0	0	0	0	503
Non-specified (other)	226	0	124	85,047	3,179	4,100	8,204	0	0	0	0	100,880
Non-energy use	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Non-energy use industry/transformation/energy	0	0	0	0	0	0	0	0	0	0	0	0
Non-energy use in transport	0	0	0	0	0	0	0	0	0	0	0	0
Non-energy use in other	0	0	0	0	0	0	0	0	0	0	0	0
Elect. output in GWh	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Elec output-main activity producer ele plants	0	0	0	0	0	0	0	0	0	0	0	0
Elec output-autoproducer electricity plants	0	0	0	0	0	0	0	0	0	0	0	0

Final consumption refers to End Use Consumption

P: Provisional

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

Fig. 7.3: Sankey Diagram on Overall Flow of Energy in India during FY: 2022-23 (Final) (in KToe)

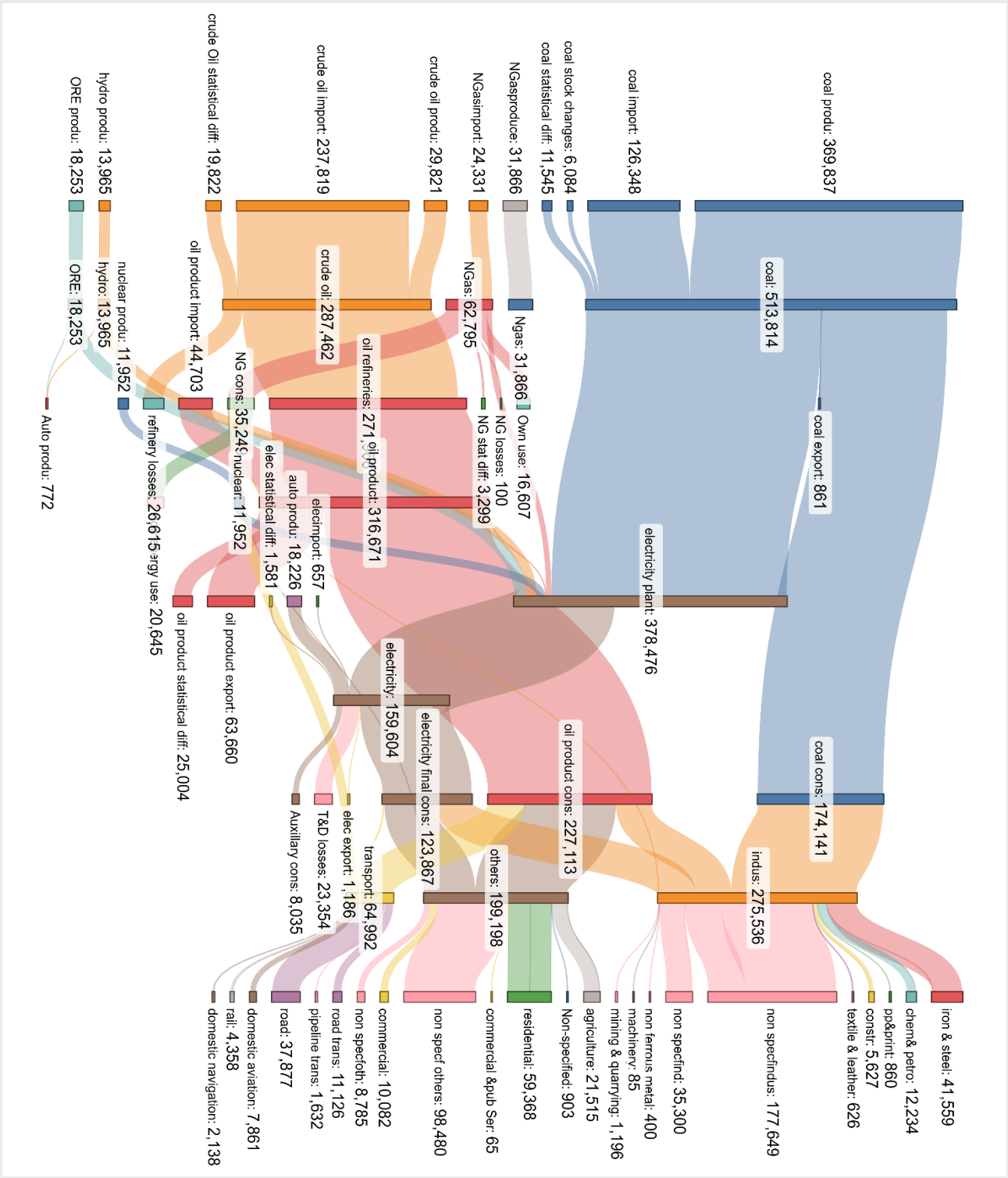


Fig. 7.4: Sankey Diagram on Final Consumption by sectors in India during FY: 2022-23 (Final) (in KToe)

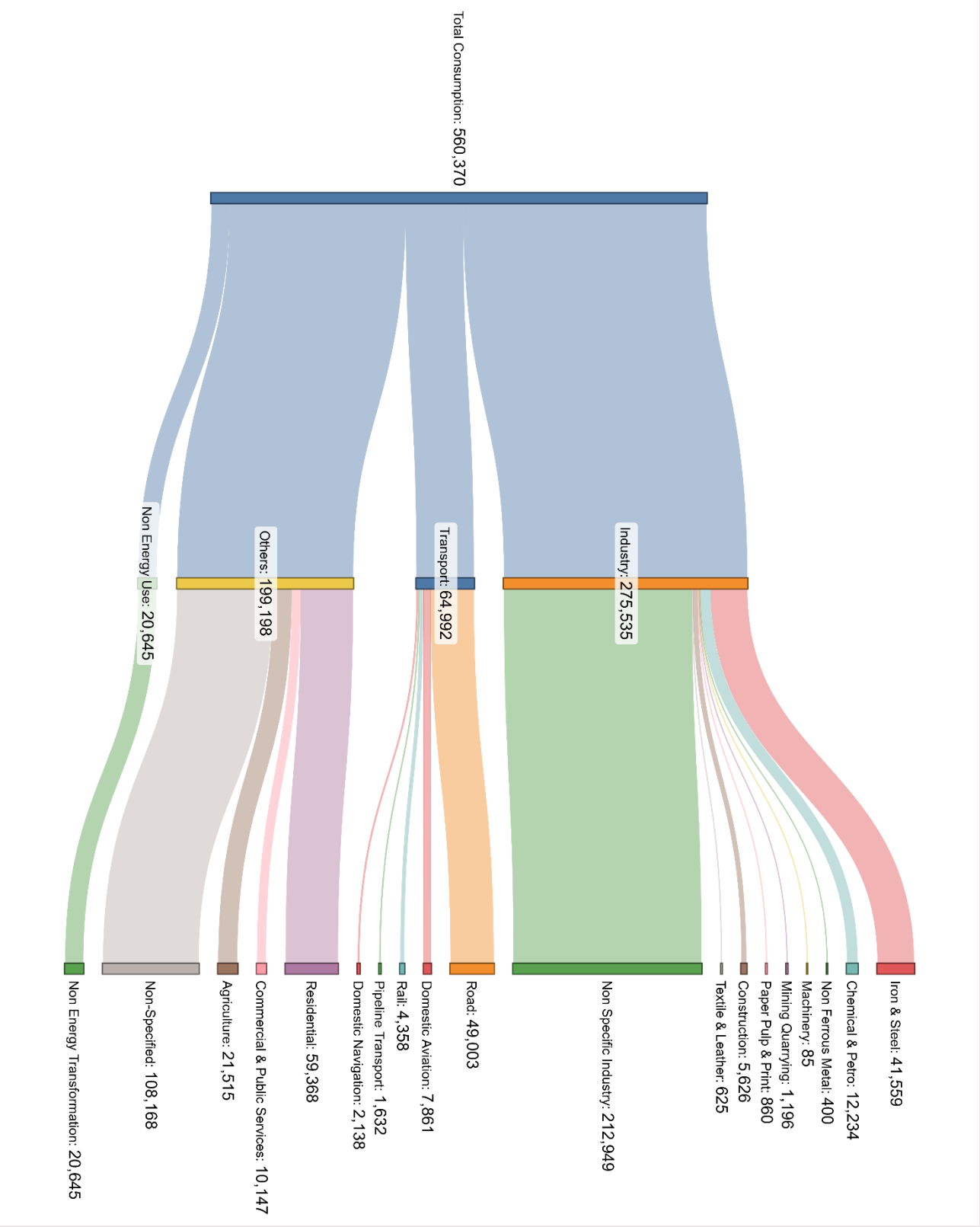


Fig. 7.5: Sankey Diagram on Overall Flow of Energy in India during FY: 2023-24(P) (in KToe)

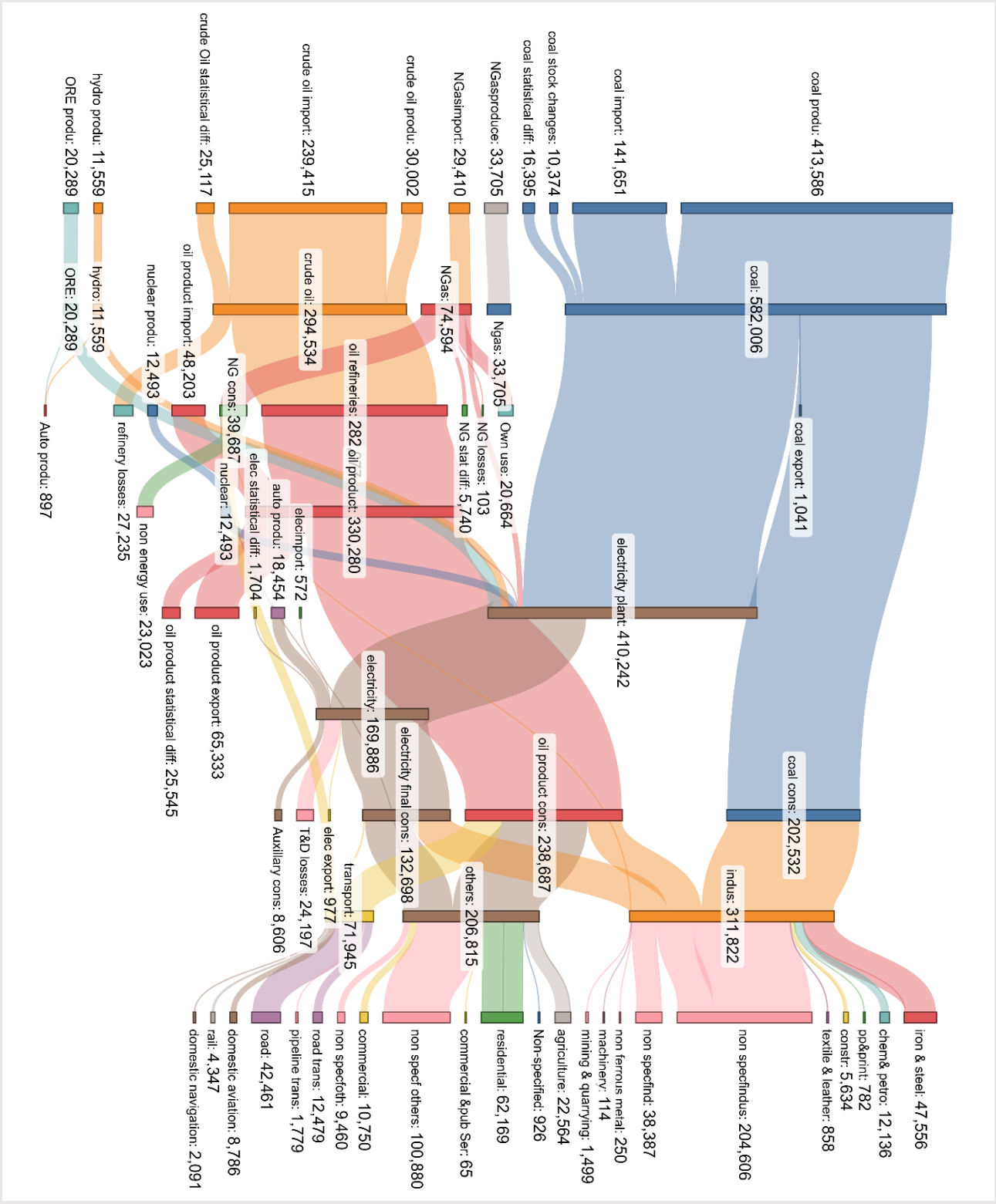
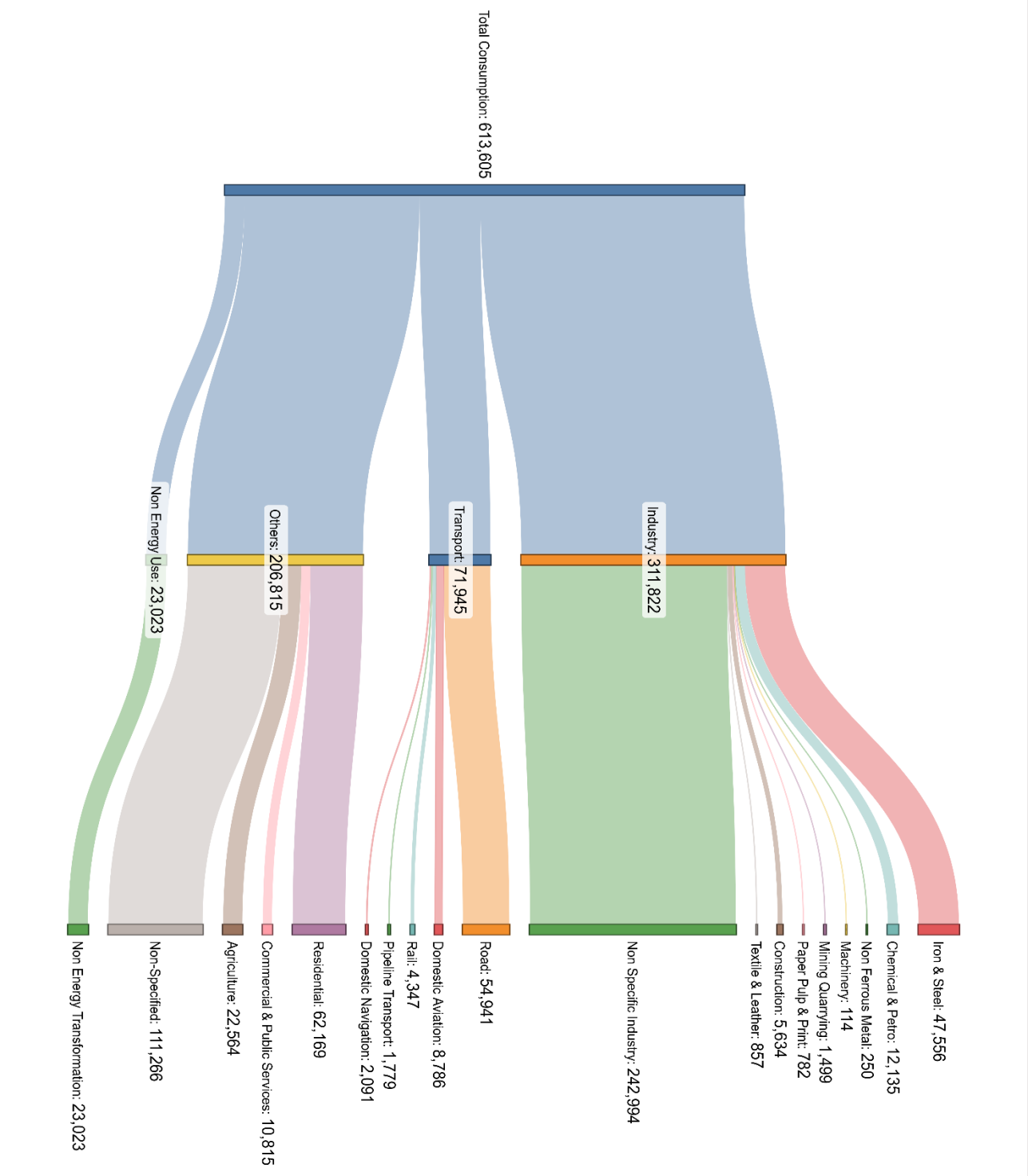


Fig. 7.6: Sankey Diagram on Final Consumption by sectors in India during FY: 2023-24 (P) (in KToe)



8 Chapter

Sustainability and Energy

CHAPTER 8
Sustainability and Energy

Introduction

Sustainability has become an essential global objective, underlined by the **United Nations (UN) 2030 Agenda for Sustainable Development.** This chapter presents some of the concepts related to sustainable energy systems in continuation of the data presented earlier on renewable energy resources in the earlier chapters and also covers the energy indicators for sustainable development. The chapter also focuses on the **economic dimension** of sustainable energy, social and environmental indicators which play a significant role in measuring the effectiveness of energy policies.

SDG 7 outlines specific targets to promote sustainability through energy access and efficiency improvements. These targets include:

- By 2030, ensure universal access to affordable, reliable, and modern energy services.
- By 2030, increase substantially the share of renewable energy in the global energy mix.
- By 2030**,** double the global rate of improvement in energy efficiency.
- By 2030**,** enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil fuel technology, and promote investment in energy infrastructure and clean energy technology.
- By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States, and land-locked developing countries, in accordance with their respective programmes of support.

The renewable energy sources identified in SDG 7—wind, solar, hydro, biomass, and geothermal—are clean, inexhaustible, and vital to achieving sustainable development.

Energy Indicators for Sustainable Development

To support the achievement of these targets, the **International Atomic Energy Agency**, **United Nations Department of Economic and Social Affairs**, **International Energy Agency**, **Eurostat**, and **European Environment Agency** have established core **Energy Indicators for Sustainable Development**. These indicators are designed to provide valuable insights on current energy trends, helping nations assess and formulate effective energy policies.

Energy indicators describe the links between energy use and human activity in a disaggregated framework. They are essential measures of energy consumption and identifying the underlying factors driving that consumption; using these data the analyst commonly constructs ratios of the energy consumed per unit of a given output (energy intensities) in order to calculate changes in energy efficiency. Using index number methodologies, the indicators can be used to measure the impact of changes in energy intensities or changes in mix of activities on total energy use. The indicators are not meant to be normative; they are descriptive and analytical. Indicators help to show how energy use is shaped by economic and technical factors, such as energy prices, economic growths and new technologies. Disaggregated measures of energy intensities are necessary to determine the impact of prices, policies or other factors on reducing energy consumption and hence transcending the system from efficient to sustainable.

Energy security

Addressing the energy security is also one of the major objectives in the sustainable development criteria of many countries. Interruptions of energy supply can cause serious financial and economic losses. To support the goals of sustainable development, energy must be available at all times, in sufficient quantities and at affordable prices. The continuous monitoring of the Sustainable Energy Indicators is the key to ensure the same. Secured energy supplies are essential to provide reliable energy services to the society for maintaining the economic activity. The monitoring of trends of net energy imports and the availability of appropriate stocks of critical fuels are important for assessing energy security.

Economic Dimension Indicators

The publication "*Energy Indicators for Sustainable Development: Guidelines and Methodology, Vienna, 2005, IAEA*" presents a list of indicators on Social, Economic and Environment dimensions associated with sustainability in Energy. While the importance of these various indicators is recognized and since Social and Environmental indicators require additional levels of details than that are presented in Energy Statistics, thus this report is restricted to the economic dimension only. The Sustainable Energy Indicators on the Economic Dimension are useful,

- To determine the sectorial energy intensity of all the major sectors of economic growth;
- To determine the fuel-specific energy dependency of a nation;
- To evaluate the efficiency of the supply system of energy;
- To determine the import dependency of the nations for catering the energy need;
- To frame sustainable policies of a nation.

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.

List of Sustainability Energy Indicators of Economic Dimension: Themes and Sub-Themes

Themes	Sub-theme	Indicator
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

Highlights

8.1 Electrification of Villages

India achieved 100% electrification of villages by March 2022, based on 2011 Census figures. This milestone is a crucial part of Sustainable Development Goal (SDG) 7, which aims to ensure access to affordable, reliable, sustainable, and modern energy for all. This accomplishment demonstrates India's commitment to ensuring that all its citizens have access to modern energy services, helping drive overall development and well-being.

8.2 Energy Intensity and Per Capita Energy Consumption

Energy intensity is defined as the amount of energy consumed to generate one unit of GDP at constant prices. It is a crucial metric for evaluating the energy efficiency of a country's economy. **Per Capita Energy Consumption (PEC)** is computed by dividing total energy consumption for the year by the mid-year population of that year. While both of these indicators are typically based on conventional energy consumption, it is important to note that they may not fully account for the consumption of non-conventional energy sources, especially in rural areas.

Fig 8.1 : Energy Intensity in India (Megajoule per rupee)

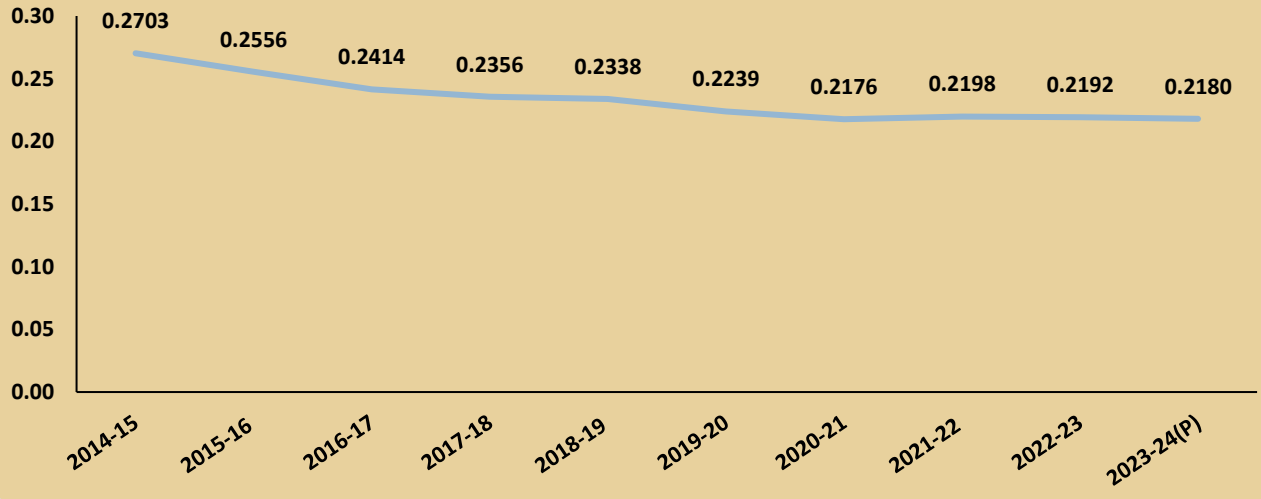
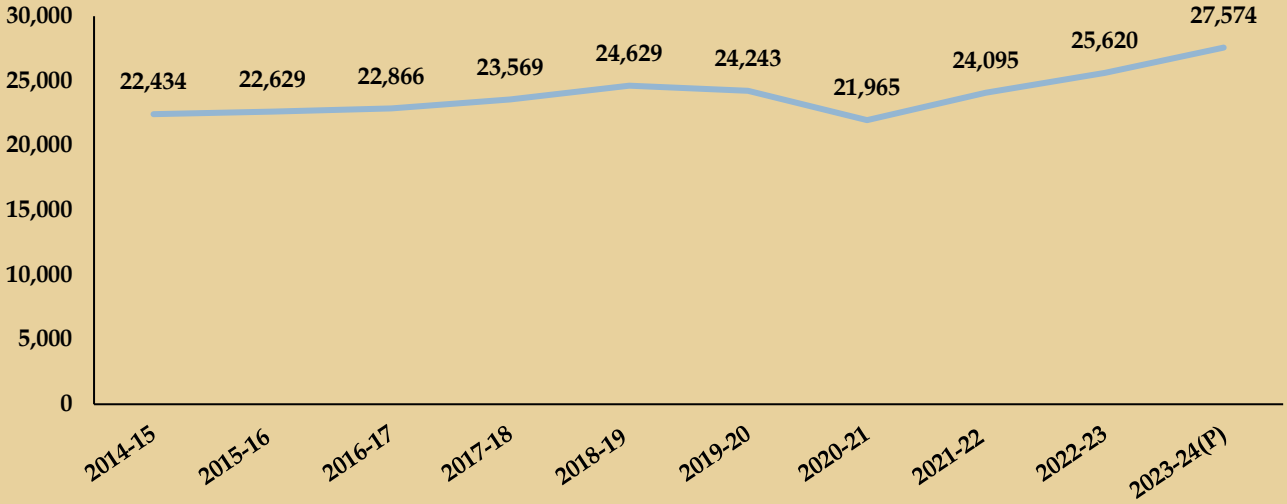


Figure 8.1 shows the energy intensity in India decreased from **0.2703 Mega Joules per rupee in 2014-15** to **0.2180 Mega Joules per rupee in 2023-24 (P)**. This decline indicates an improvement in the efficiency of energy use relative to the economic output, showcasing that India's economy is becoming more energy-efficient over time.

Similarly, figure 8.2 shows the India's per capita primary energy consumption increased from **22,434 Mega joules/person** in 2014-15 to **27,574 Mega joules/person** in FY 2023-24 (P), indicating a growing demand for energy.

Fig 8.2 :Per Capita Primary Energy Consumption in India (Megajoule/Person)



8.3 Emissions from the Energy Sector

India's **total CO2 emissions related to energy sector** increased from **19,09,766 GgCO2 equivalent** in 2014 to **22,38,409 GgCO2 equivalent** in 2020, based on the latest estimates by the Ministry of Environment, Forest and Climate Change (MoEFCC). The **Energy Industries** sector continues to be the largest contributor to these emissions, although its share decreased slightly from **59.74**% in 2014 to **56.53**% in 2020, reflecting progress toward cleaner energy sources (**Table 8.2**).

8.4 Overview of Sustainability Energy Indicators: Economic Dimension

8.4.1 Theme- Use and Production Pattern

(i) Sub Theme-Overall Use

Energy Indicator- Energy Use per Capita

This indicator measures the level of energy use on per capita basis and reflects the energy-use patterns and aggregated energy intensity of a society. The indicator is defined as:

(Total annual supply or use of energy) / (mid-year population)

It is calculated as the ratio of the total annual use of energy to the mid-year population. It may be further classified into three (3) categories, which are given as below:

a) Total Primary Energy Supply (TPES) per capita

b) Total Final Energy Consumption (TFEC) of energy per capita

c) Electricity consumption per capita.

Fig 8.3: TPES/TFEC per capita

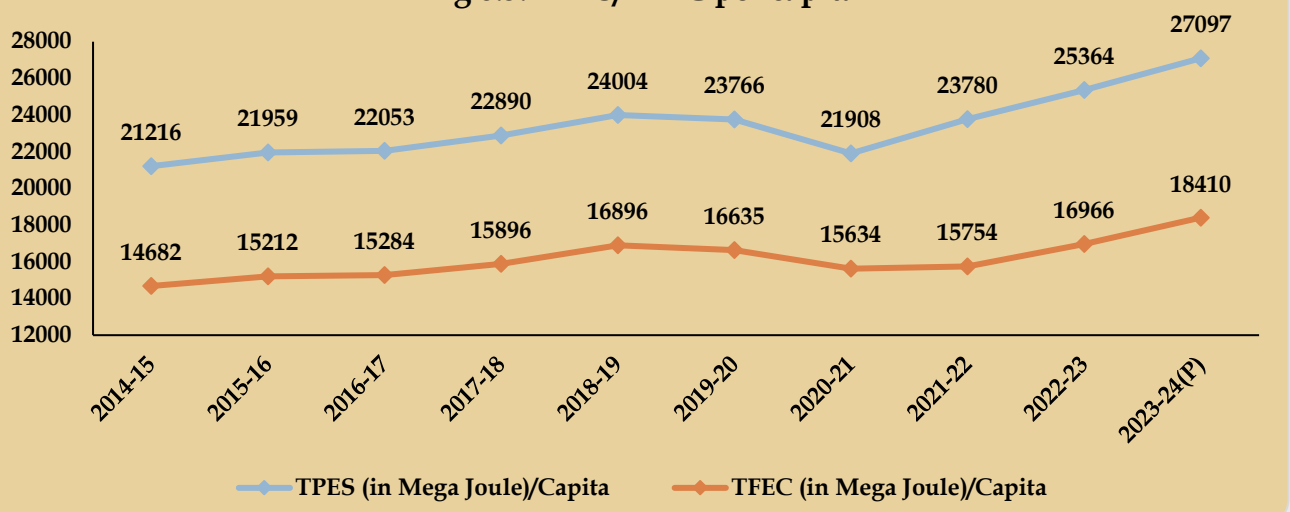


Figure 8.3 shows, from 2014 to 2024, the Total Primary Energy Supply (TPES) increased from **21,216 MJ** to **27,097 MJ**, with slight fluctuations, including a dip in 2020-21 to **21,908 MJ**, but rising again from 2021-22 onwards. Similarly, Total Final Energy Consumption (TEFC) grew from **14,682 MJ** in 2014-15 to **18,410 MJ** in 2023-24, with fluctuations, including a decline to **15,634 MJ** in 2020-21 due to the COVID-19 pandemic. However, TEFC rebounded after 2020-21, reaching **18,410 MJ** in 2023-24(P), reflecting an economic recovery and increased energy demand.

Fig 8.4: Electricity Consumption Per Capita (in Kwh)

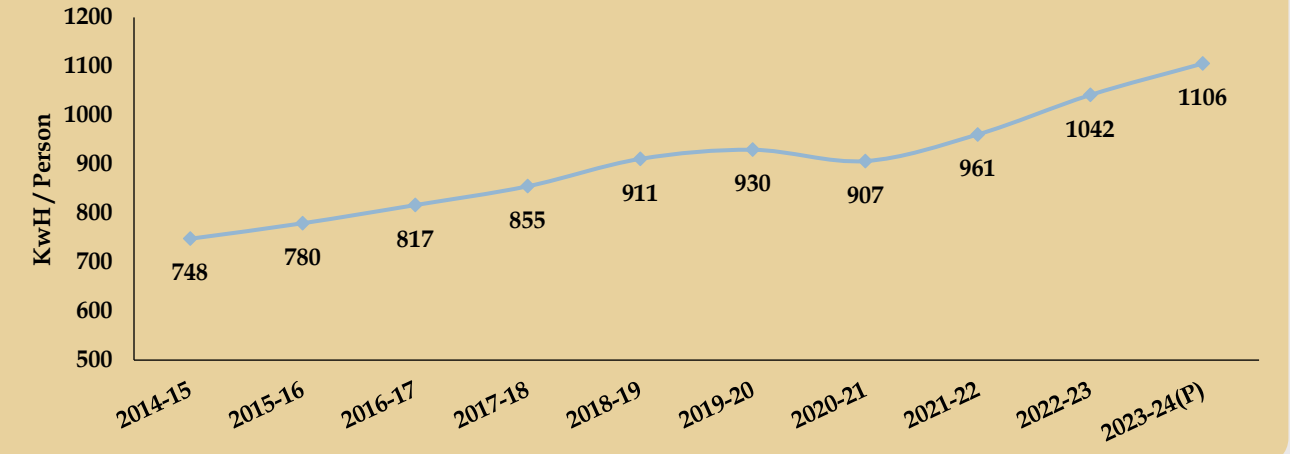


Figure 8.4 shows the steady increase in electricity consumption per capita from **748 Kwh** in 2014-15 to **1,106 KWh** in 2023-24(P). The slight dip in 2021-22 (907 kWh) likely reflects the impact of the COVID-19 pandemic, which temporarily reduced energy consumption. However, consumption rebounded in subsequent years, reaching **1,106 kWh** in 2023-24(P).

(ii) Sub theme -Overall Productivity
Energy Indicator-Energy Use per Unit of GDP

This indicator reflects the trends in overall energy use relative to GDP, indicating the general relationship of energy use to economic development. The indicator is defined as:

(Total supply or use of energy / GDP at constant price)

It has been further classified into three (3) categories, which are given as below:

a) Total Primary Energy Supply (TPES) per 000' rupees of GDP
b) Total Final Energy Consumption (TFEC) of energy per 000'rupees of GDP
c) Electricity Use per 000' rupees of GDP

Fig 8.5: TPES/TEFC per 000' rupees of GDP

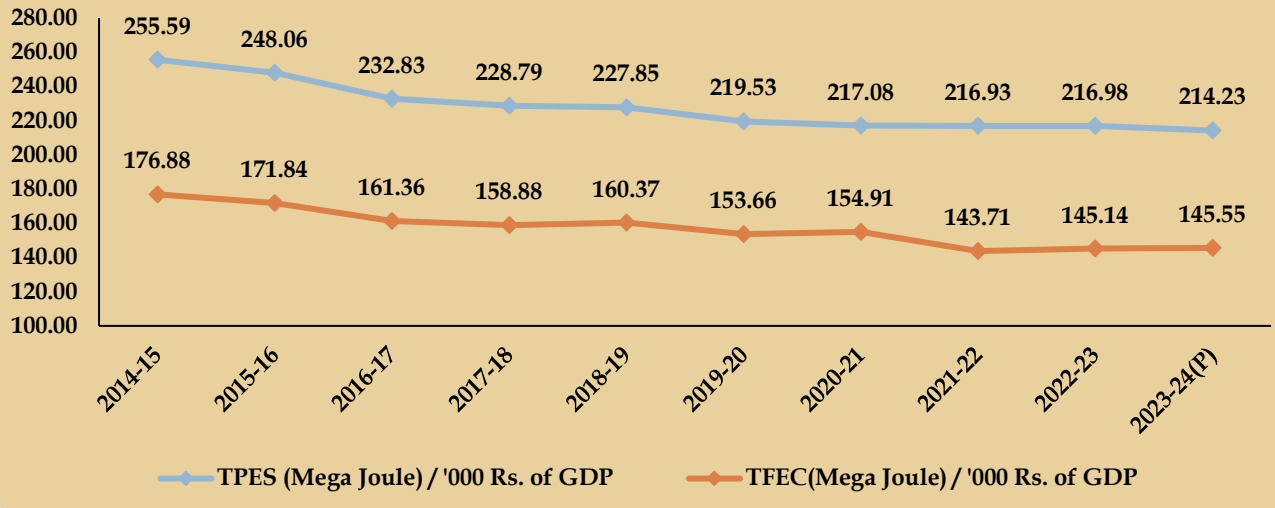


Figure 8.5 shows, from 2014-24, both TPES and TFEC per '000 Rs. of GDP generally declined, suggesting improved energy efficiency. The slight increases in TFEC in 2022-24 suggest a small rise in energy demand, possibly due to economic recovery or growth in energy-intensive sectors.

Fig 8.6: Electricity use KwH / '000 Rs. of GDP

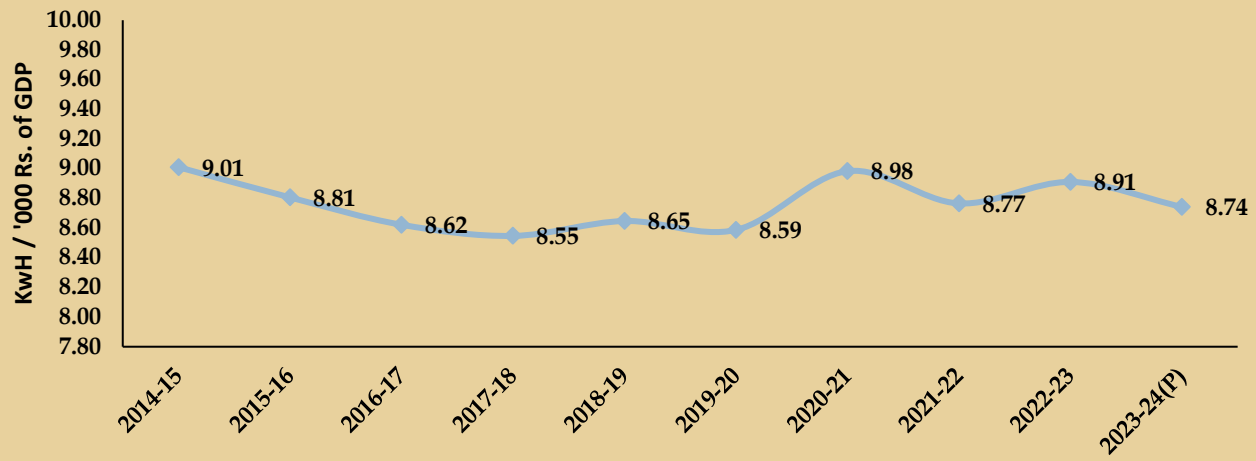


Figure 8.6 shows, from 2014-15 to 2020-21, the efficiency of electricity uses per unit of GDP generally improved, as less electricity was needed to produce each unit of economic output, but a slight increase in electricity uses per GDP unit after 2020, possibly due to growth in energy-intensive sectors or changes in energy consumption patterns, leading to a higher demand for electricity.

(iii) Sub theme- Supply Efficiency

Energy Indicator-Efficiency of Energy Conversion and Distribution

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:

(Losses in transmission of electricity / Gross generation of electricity)

Fig 8.7: Efficiency of energy conversion and distribution

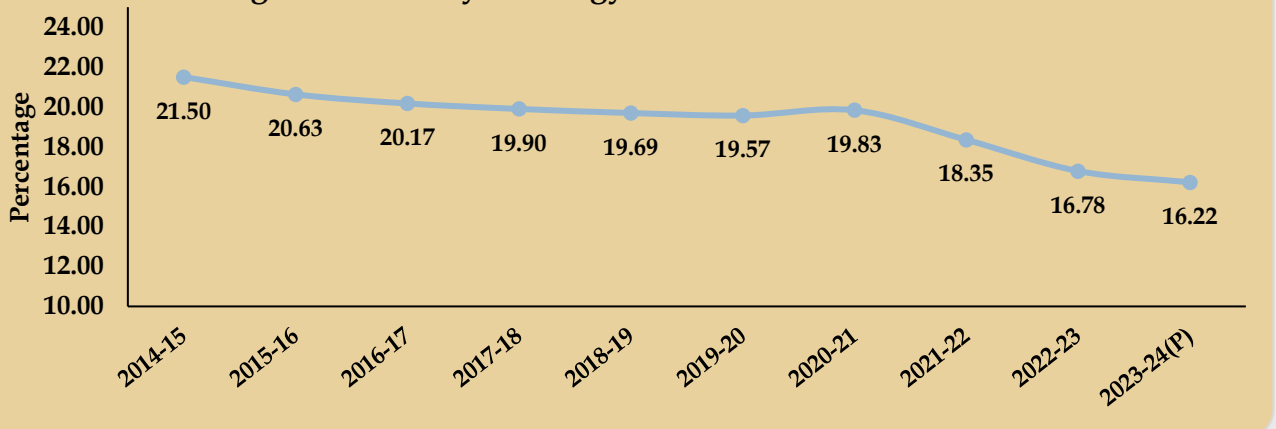


Figure 8.7 shows that the steady decline in transmission and distribution losses from **21.50%** in 2014-15 to **16.22%** in 2023-24 indicates improved efficiency in the electricity grid.

(iv) Sub theme- Production

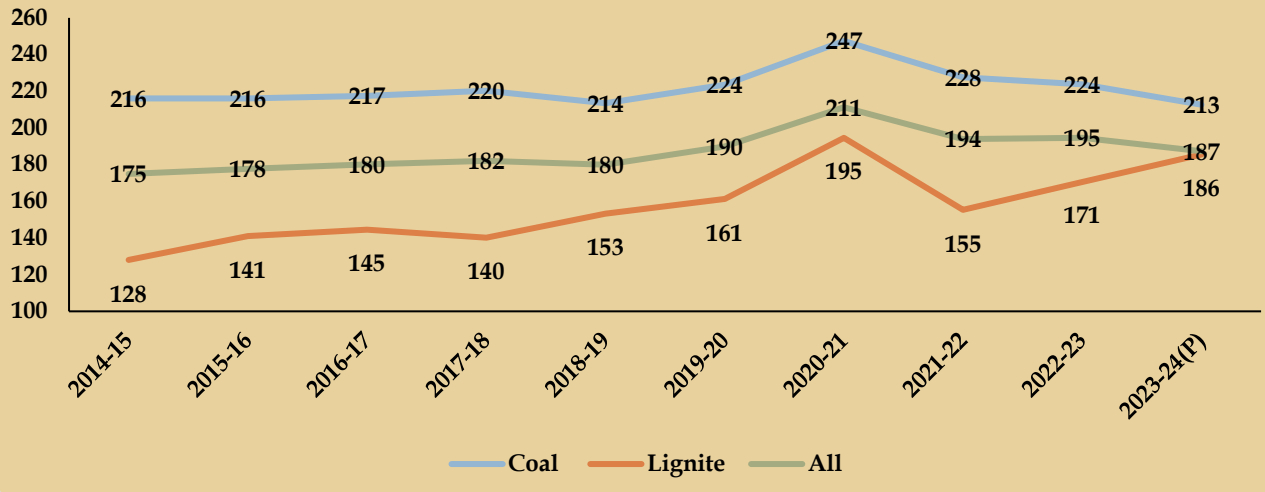
Energy Indicator- Reserve-to-Production Ratio

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 resources* (demonstrated and inferred) 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. The indicator is computed as:

(Proven energy reserves of a commodity at the end of a year / Total production of that commodity in that year)

Figure 8.8 shows that the fluctuating coal reserves-to-production ratio, ranging from 213 to 247, indicates sufficient long-term coal availability, with a peak in 2020-21 reflecting either higher reserves or reduced production. The lignite ratio steadily increased from 128 in 2014-15 to 186 in 2023-24, while the combined ratio of coal, lignite, crude oil, and natural gas rose from 175 in 2014-15 to 211 in 2020-21, before slightly declining to 187 in 2023-24, suggesting stable but slightly lower future reserves relative to production.

Fig 8.8: Reserves to Production Ratio



Note: All incudes coal, lignite, Crude Oil and natural Gas

(v) Sub theme- Production

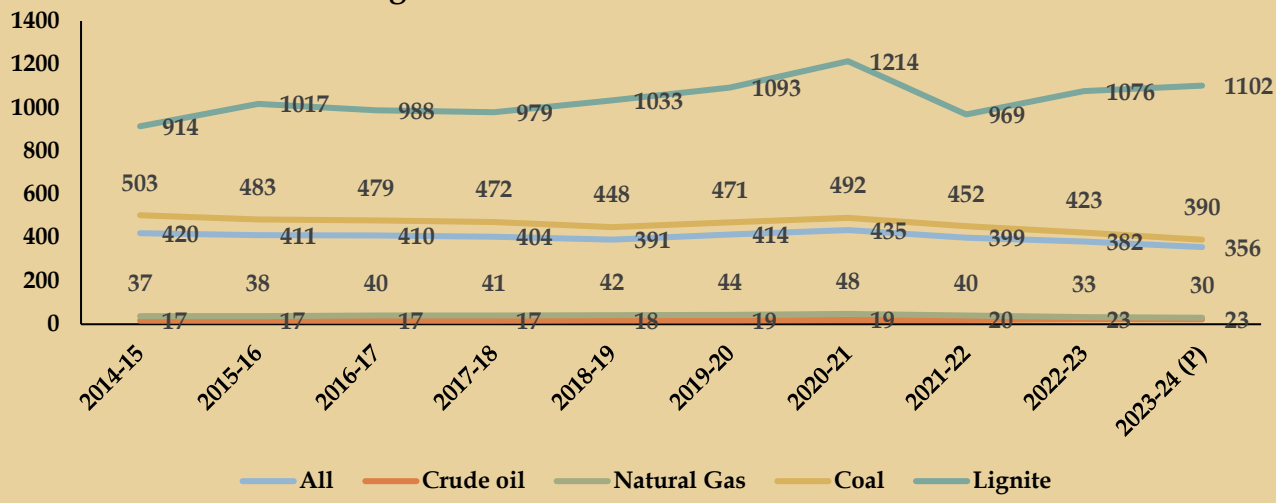
Energy indicator- Resources-to-Production Ratio

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 indicator is measured as:

(Proven energy resources of a commodity at the end of a year / Total production of that commodity in that year)

Figure 8.9 shows that the resource-to-production ratio increase for crude oil (from 17 in 2014-15 to 23 in 2023-24), indicating more resources available for production. Natural gas fluctuated, peaking at 48 in 2020-21 before decreasing to 30 in 2023-24. Coal's ratio decreased from 503 in 2014-15 to 390 in 2023-24, suggesting improved efficiency or reduced resources. Lignite's ratio increased from 914 in 2014-15 to 1102 in 2023-24, indicating growing reliance or reduced production efficiency.

Fig 8.9: Resources to Production Ratio



Note: All incudes coal, lignite, Crude Oil and natural Gas

(vi) Sub theme- End use

Energy Indicator- Sectoral Energy Intensities

This indicator measures the sectoral energy-intensity of major energy-consuming sectors. How efficiently the technologies are being used in different sectors to improve the efficiency of energy-generation, gets captured in this Indicator. The use of sophisticated and environment-friendly technology in generating the revenue of any sector will imply lesser use of energy to do so. The indicator has been measured as:

(Amount of energy consumed by a sector / GVA of that sector)

The indicator is computed against the following major consuming end-use sectors of Energy:

(a) Industrial Energy Intensities-

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.

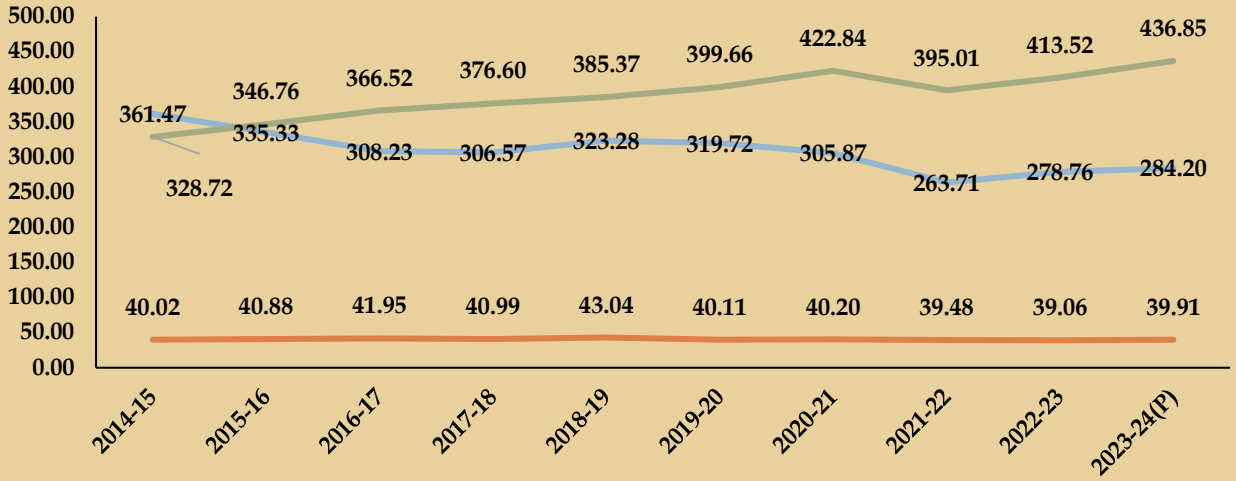
(b) **Transport Energy Intensities**

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.

© Agricultural Energy Intensities:

This indicator is measure of aggregate energy intensity in the agricultural sector that can be used for analyzing trends, particularly in renewable and non-commercial energy use. It is measured as Energy Use per thousand units of value added by Agriculture sector.

Fig 8.10 : Energy Intensity (in MJ/'000 Rs. of GVA) of major sectors



(vii) Sub theme- End use

Energy Indicator- Sectoral Electricity Intensities

This indicator measures the sectoral electricity-intensity of major energy-consuming sectors. The indicator is closely related to the *Sectoral Energy Indicator*. It aims to measure how efficiently the technologies are being used in different sectors to improve the efficiency of electricity consumed. The indicator has been measured as:

(Amount of electricity consumed against a sector / GVA of that sector)

The indicator is also computed against the following major consuming end-use sectors of Energy:

(a) **Industrial Electricity Intensities:**

This Indicator represents the average use of electricity per thousand units of output. It is worth noting that the specific functions of industry as an energy producer and industry regenerator are important components of sustainable development programmes in some countries.

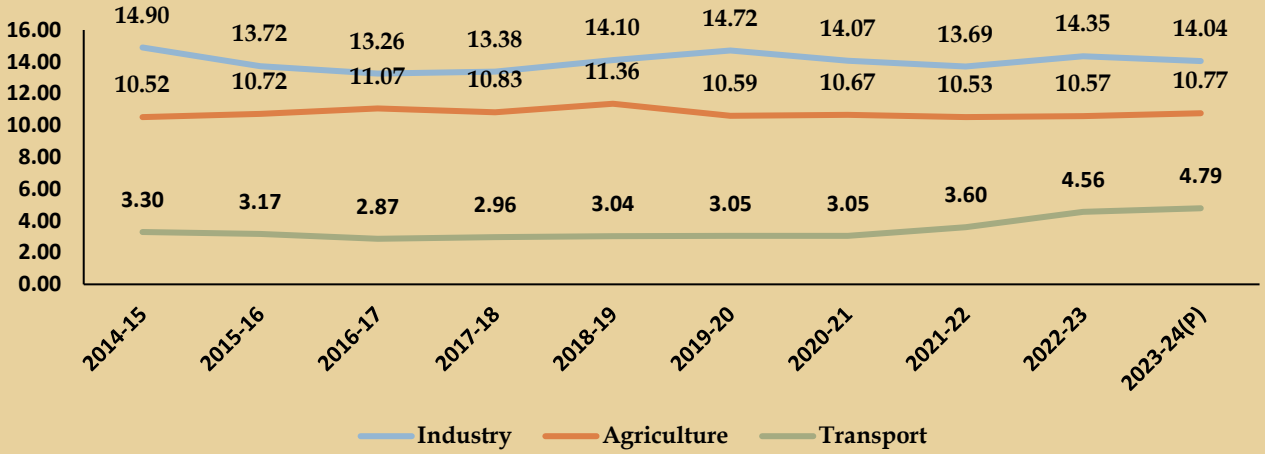
(b) Transport Electricity Intensities:

This Indicator measures the effective use of electricity in the field of Transport. How efficiently we are able to make use of the energy resources to generate a greater amount of electricity in the field of transport over time can be measures using this Indicator.

(c) Agricultural Electricity Intensities:

This Indicator measures the effective use of electricity in the field of Agriculture. How efficiently we are able to make use of the energy resources to generate a greater amount of electricity in the field of Agriculture over time can be measures using this Indicator.

Fig 8.11: Electricity Intensity (in Kwh/'000 Rs. of GVA) of major sectors



(viii) Sub theme- Diversification (Fuel Mixed)

Energy Indicator- Fuel share in Total Primary Energy Supply (TPES)

This indicator measures the share of different energy-commodities in the Total Primary Energy Supply (TPES). The indicator depicts the dependency of the nation over a particular fuel and also helps us to understand that in a country like India what is the trend of fuel-specific dependency over time. How much we have been able to shift from fossil fuel to non-fossil fuel. This indicator is measured as:

Energy supplied by a particular energy-commodity / Total Primary Energy Supply

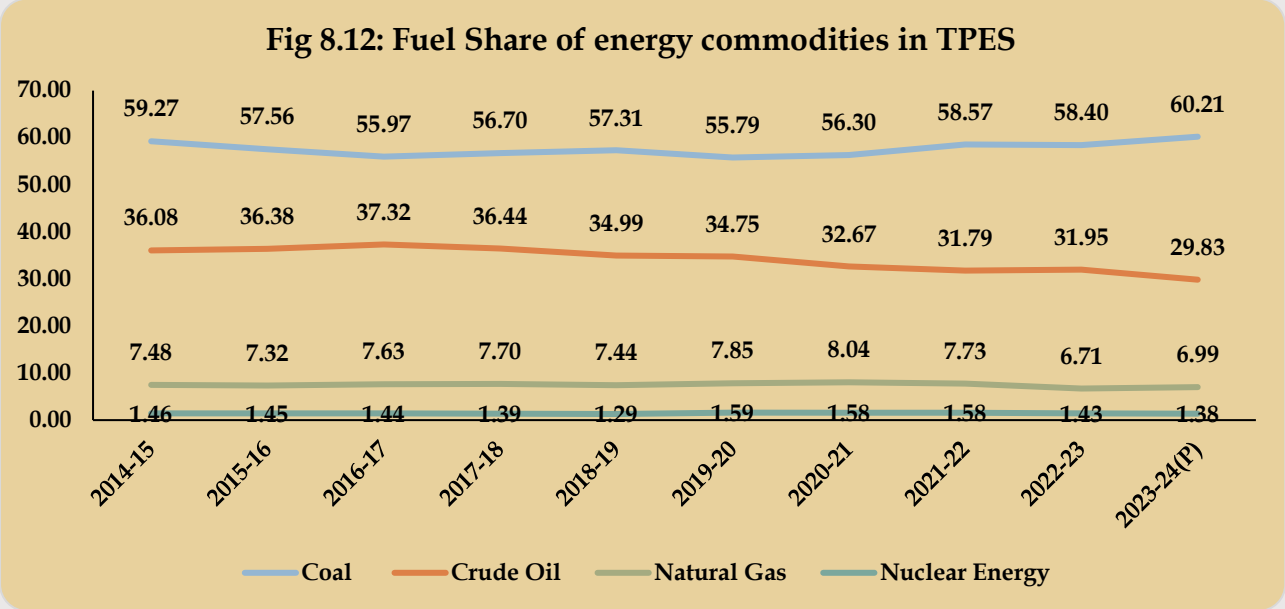


Figure 8.12 shows that coal remains the dominant energy source in India's TPES, while crude oil's share has gradually decreased. Natural gas has seen fluctuations, with a slight decline in recent years, and nuclear energy's contribution has remained low and stable.

(ix) Sub theme- Diversification (Fuel Mix)

Energy Indicator- Fuel share in Total Final Energy Consumption (TFEC)

This indicator measures the share of different energy-commodities in the total final consumption of energy. The indicator depicts the dependency of the nation over a particular fuel and also helps us to understand that in a country like Indian where we are having an increasing demand of energy, how much we have able to meet from which energy-commodity. This indicator is measured as:

Energy consumed from a particular energy-commodity / Total Final Energy Consumption (TFEC)

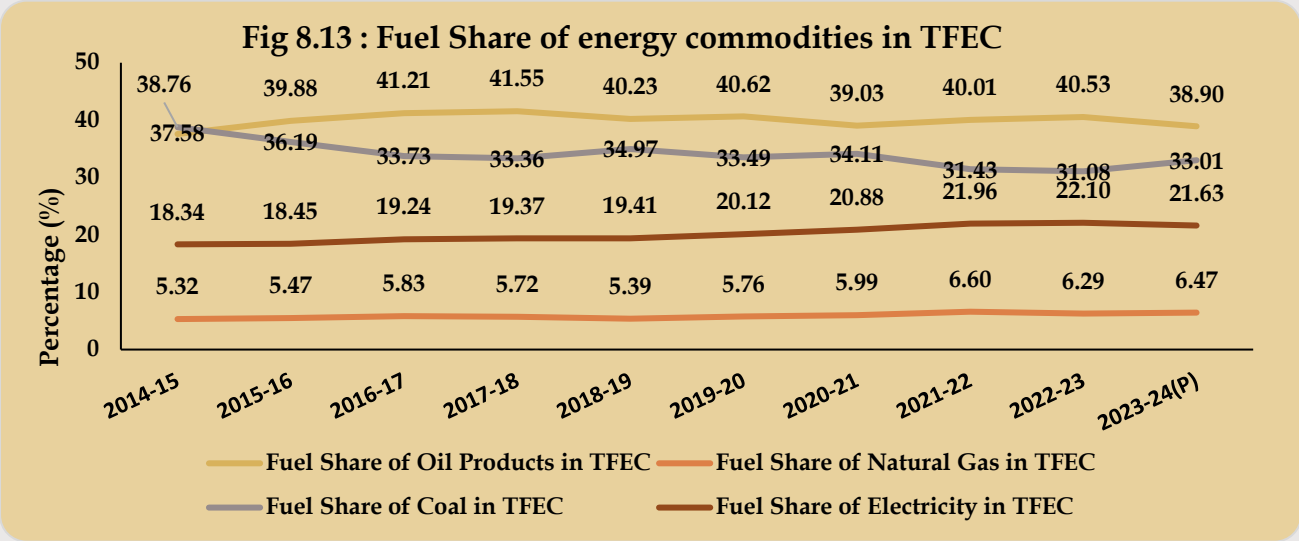


Figure 8.13 shows a gradual shift in India's Total Final Energy Consumption, with a slight decline in oil products and coal use, an increase in electricity consumption, and a modest rise in natural gas usage, indicating a move toward cleaner energy sources.

(x) Sub theme- Diversification (Fuel Mix)
Energy Indicator-Fuel share in electricity

This indicator measures the share of different energy-commodities in the total generation of electricity. The indicator depicts the dependency of the nation over a fossil fuel, what is the trend of use of thermal/non-thermal source in the generation of the electricity in India.

Table 8.13 shows that thermal energy's share in electricity generation decreased from 81% in 2014-15 to 78% in 2020-21, then rose slightly to 79% in 2023-24. Nuclear energy remained stable at 2%-3%, while hydro energy's share declined from around 9% to 7% by 2023-24. Renewable energy (excluding hydro) grew significantly from 6% in 2014-15 to 12% by 2023-24, reflecting a shift towards cleaner energy sources.

8.4.2 Theme- Security

(i) Sub theme- Imports
Energy Indicator- Net energy import dependency

This indicator measures the extent to which a country relies on imports to meet its energy requirements. This indicator is computed as:

(Net imports of the energy commodity / Total Supply of that energy commodity)

Petroleum products are excluded as India is net exporter of them and have considered only the import value of different energy sources to calculate the indicator.

Fig. 8.14: Net Energy Import Dependency of major energy commodities

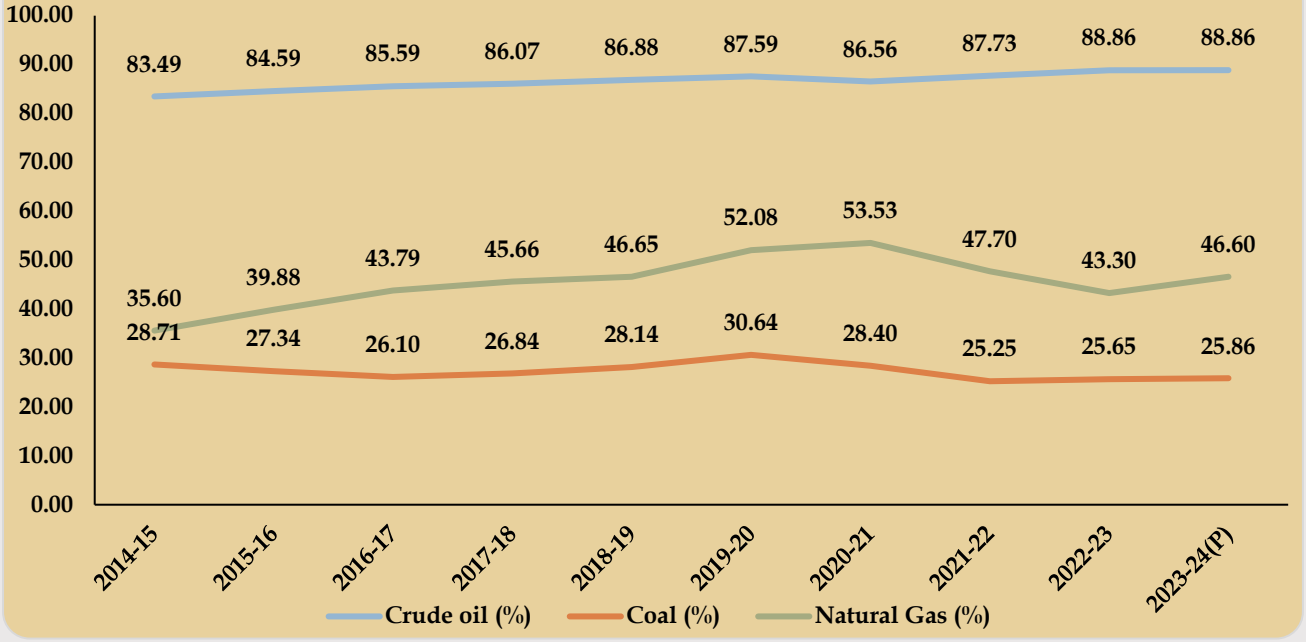


Figure 8.14 shows that India's dependency on energy imports remains high for crude oil, with a slight increase over the years, reaching **88.86**% in 2023-24. The import dependency for coal fluctuates but decreases slightly over time, from **28.71**% in 2014-15 to **25.86**% in 2023-24. Natural gas import dependency rises significantly from **35.60**% in 2014-15 to **46.60**% in 2023-24, reflecting growing reliance on imported natural gas.

Table 8.1: Per-Capita Primary Energy Consumption and Energy Intensity					
Year	**Energy Consumption# in petajoules**	**Mid-year population* (in Thousands)**	**GDP at 2011-12 prices** (Rs. crore)**	**Per Capita Energy Consumption (in Megajoules)**	**Energy Intensity (Megajoules per rupee)**
2014-15	28,453	1,268,310	10,527,674	22,434	0.2703
2015-16	29,063	1,284,350	11,369,493	22,629	0.2556
2016-17	29,713	1,299,434	12,308,193	22,866	0.2414
2017-18	30,966	1,313,815	13,144,582	23,569	0.2356
2018-19	32,712	1,328,206	13,992,914	24,629	0.2338
2019-20	32,548	1,342,586	14,534,641	24,243	0.2239
2020-21	29,807	1,356,980	13,694,869	21,965	0.2176
2021-22	33,018	1,370,311	15,021,846	24,095	0.2198
2022-23	35,430	1,382,894	16,164,913	25,620	0.2192
2023-24(P)	38,479	1,395,478	17,650,591	27,574	0.2180
Growth rate of 2023-24 over 2022-23 (%)	**8.60**	**0.91**	**9.19**	**7.62**	**-0.54**
CAGR 2014-15 to 2023-24(P) (%)	**3.41**	**1.07**	**5.91**	**2.32**	**-2.36**

P: Provisional

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

** Mid-Year (as on 1st October) population has been taken from Population Projections for India and states 2011 – 2036; Report of the Technical Group On Population Projections, July, 2020*

** GDP estimates are at base 2011-12 price as per the National Accounts Divisions's, NSO, MoSPI.

Energy consumption from Primary Energy Resources

Table 8.2 India's Total Emissions related to Energy Sector

(GgCO2 Equivalent)*

GHG sources and removals	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
A. Fuel Combustion activities	**1,604,503**	**1,704,639**	**1,774,788**	**1,871,709**	**2,055,017**	**2,092,250**	**2,168,704**	**2,307,753**	**2,338,432**	**2,211,513**
1. Energy Industries	924,258	1,005,813	1,053,981	1,140,983	1,197,123	1,206,587	1,255,716	1,324,177	1,331,901	1,265,328
2. Manufacturing industries & construction	338,816	343,603	356,771	351,910	394,092	397,739	393,312	412,086	404,676	390,667
3. Transport	221,202	236,020	241,253	250,173	261,517	274,434	290,732	307,328	314,817	297,371
4. Other sectors	120,228	119,202	122,783	128,643	202,286	213,490	228,944	264,162	287,039	258,147
B. Fugitive emission from fuels	**47,426**	**43,047**	**38,771**	**38,057**	**37,084**	**37,179**	**35,559**	**36,572**	**35,898**	**26,896**
1. Solid fuels	16,388	16,086	15,568	16,547	16,614	17,121	16,065	16,862	17,017	16,709
2. Oil and natural gas	31,037	26,961	23,203	21,511	20,470	20,058	19,494	19,710	18,880	10,187
Total Energy (A+B)	**1,651,928**	**1,747,686**	**1,813,559**	**1,909,766**	**2,092,102**	**2,129,428**	**2,204,263**	**2,344,325**	**2,374,330**	**2,238,409**

Source: India Fourth Biennial Update Report to The United Nations Framework Convention on Climate Change, Ministry of Environment, Forest and Climate Change, December 2024

*GgCO2 Equivalent : Gigagrams of carbon dioxide equivalent

Table 8.3 Energy Indicators (Economic Dimension) for Sustainability from FY : 2014-15 to FY : 2023-24(P)

Theme	Sub-theme	Indicator	Category	Unit	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24(P)
Use and Production Pattern	Overall Use	Energy use per capita	TPES	toe/person	0.5067	0.5245	0.5267	0.5467	0.5733	0.5676	0.5233	0.5680	0.6058	0.6472
			TFC	toe/person	0.3507	0.3633	0.3650	0.3797	0.4035	0.3973	0.3734	0.3763	0.4052	0.4397
			Electricity	Kwh/person	747.86	779.53	816.65	855.09	910.98	929.61	906.58	960.92	1041.52	1105.71
	Overall Productivity	Energy use per unit of GDP	TPES	toe/000'rupees	0.0061	0.0059	0.0056	0.0055	0.0054	0.0052	0.0052	0.0052	0.0052	0.0051
			TFC	toe/000'rupees	0.00422	0.00410	0.00385	0.00379	0.00383	0.00367	0.00370	0.00343	0.00347	0.00348
			Electricity	Kwh/000'rupees	9.01	8.81	8.62	8.55	8.65	8.59	8.98	8.77	8.91	8.74
	Supply Efficiency	Efficiency of energy conversion and distribution	All	%	21.50	20.63	20.17	19.90	19.69	19.57	19.83	18.35	16.78	16.22
	Production	Reserves-to-production ratio	All	years	175	178	180	182	180	190	211	194	195	187
			coal	years	216	216	217	220	214	224	247	228	224	213
			lignite	years	128	141	145	140	153	161	195	155	171	186
		Resources-to-production ratio	All	years	420	411	410	404	391	414	435	399	382	356
			Crude oil	years	17	17	17	17	18	19	19	20	23	23
			Natural Gas	years	37	38	40	41	42	44	48	40	33	30
			Coal	years	503	483	479	472	448	471	492	452	423	390
			Lignite	years	914	1017	988	979	1033	1093	1214	969	1076	1102
	End Use	Sectoral Energy Intensities	Industry	toe/000'rupees	0.00863	0.00801	0.00736	0.00732	0.00772	0.00764	0.00731	0.00630	0.00666	0.00679
			Agriculture	toe/000'rupees	0.00096	0.00098	0.00100	0.00098	0.00103	0.00096	0.00096	0.00094	0.00093	0.00095
			Transport	toe/000'rupees	0.00785	0.00828	0.00875	0.00899	0.00920	0.00955	0.01010	0.00943	0.00988	0.01043
		Sectoral Electricity Intensities	Industry	Kwh/000'rupees	14.90	13.72	13.26	13.38	14.10	14.72	14.07	13.69	14.35	14.04
			Agriculture	Kwh/000'rupees	10.52	10.72	11.07	10.83	11.36	10.59	10.67	10.53	10.57	10.77
			Transport	Kwh/000'rupees	3.30	3.17	2.87	2.96	3.04	3.05	3.05	3.60	4.56	4.79
	Diversification (Fuel Mix)	Fuel shares in TPES	Crude Oil	%	36.08	36.38	37.32	36.44	34.99	34.75	32.67	31.79	31.95	29.83
			Natural Gas	%	7.48	7.32	7.63	7.70	7.44	7.85	8.04	7.73	6.71	6.99
			Coal	%	59.27	57.56	55.97	56.70	57.31	55.79	56.30	58.57	58.40	60.21
			Nuclear	%	1.46	1.45	1.44	1.39	1.29	1.59	1.58	1.58	1.43	1.38
			Renewable Energy	%	2.75	2.42	2.59	2.76	3.00	3.39	3.69	3.64	3.85	3.53
		Fuel share in TFC	Oil Products	%	37.58	39.88	41.21	41.55	40.23	40.62	39.03	40.01	40.53	38.90
			Natural Gas	%	5.32	5.47	5.83	5.72	5.39	5.76	5.99	6.60	6.29	6.47
			Coal	%	38.76	36.19	33.73	33.36	34.97	33.49	34.11	31.43	31.08	33.01
			Electricity	%	18.34	18.45	19.24	19.37	19.41	20.12	20.88	21.96	22.10	21.63
		Fuel share in electricity	Thermal	%	81.10	83.03	82.64	81.88	80.86	78.61	78.22	77.75	77.02	78.54
			Nuclear	%	2.82	2.80	2.69	2.59	2.39	2.86	2.69	2.78	2.51	2.46
			Hydro	%	10.12	9.09	8.71	8.51	8.53	9.62	9.43	8.97	8.87	6.90
			RE (other than Hydro)	%	5.96	5.08	5.96	7.02	8.23	8.91	9.66	10.49	11.60	12.10
Security	Imports	Net energy import dependency	Overall	%	36.96	37.95	38.85	39.61	40.35	42.53	42.12	40.31	39.37	40.27
			Crude Oil	%	83.49	84.59	85.59	86.07	86.88	87.59	86.56	87.73	88.86	88.86
			Natural gas	%	35.60	39.88	43.79	45.66	46.65	52.08	53.53	47.70	43.30	46.60
			Coal	%	28.71	27.34	26.10	26.84	28.14	30.64	28.40	25.25	25.65	25.86
			Electricity	%	0.04	0.01	-0.08	-0.14	-0.26	-0.19	0.00	-0.08	-0.34	-0.24
	Strategic Fuel Stocks	Stocks of critical fuels per corresponding fuel consumption	Coal	%	7.22	7.81	9.18	6.90	5.95	8.52	12.03	10.61	7.57	8.79

Note: The difference in the figures (net energy import dependency- crude oil) computed by MoPNG and MoSPI arises due to methodolgical differences - MoSPI using data from supply side and MoPNG using consumption side.

Table 8.4: Energy Use per Capita in India			
Year	**TPES (in Mega Joule)/Capita**	**TFEC (in Mega Joule)/Capita**	**Electricity Consumption per capita (Kwh)***
2014-15	21216	14682	748
2015-16	21959	15212	780
2016-17	22053	15284	817
2017-18	22890	15896	855
2018-19	24004	16896	911
2019-20	23766	16635	930
2020-21	21908	15634	907
2021-22	23780	15754	961
2022-23	25364	16966	1042
2023-24(P)	27097	18410	1106
*End use			

Table 8.5: Energy Consumption per 000'rupees of GDP			
Year	**TPES (Mega Joule) / '000 Rs. of GDP**	**TFEC(Mega Joule) / '000 Rs. of GDP**	**Electricity use KwH / '000 Rs. of GDP**
2014-15	255.59	176.88	9.01
2015-16	248.06	171.84	8.81
2016-17	232.83	161.36	8.62
2017-18	228.79	158.88	8.55
2018-19	227.85	160.37	8.65
2019-20	219.53	153.66	8.59
2020-21	217.08	154.91	8.98
2021-22	216.93	143.71	8.77
2022-23	216.98	145.14	8.91
2023-24(P)	214.23	145.55	8.74

Table 8.6: Efficiency of energy conversion and distribution

Year	Percentage of Losses (w.r.t. Production) in Electricity
2014-15	21.50
2015-16	20.63
2016-17	20.17
2017-18	19.90
2018-19	19.69
2019-20	19.57
2020-21	19.83
2021-22	18.35
2022-23	16.78
2023-24(P)	16.22

Table 8.7 Reserves to Production Ratio of Coal, Lignite and All

Year	Coal	Lignite	All
2014-15	216	128	175
2015-16	216	141	178
2016-17	217	145	180
2017-18	220	140	182
2018-19	214	153	180
2019-20	224	161	190
2020-21	247	195	211
2021-22	228	155	194
2022-23	224	171	195
2023-24(P)	213	186	187
Note : All incudes Coal, Lignite, Crude Oil and Natural Gas			

Table 8.8: Resources to Production Ratio of all Energy Commodities

Year	Coal	Lignite	Crude Oil	Natural Gas	All
2014-15	503	914	17	37	420
2015-16	483	1017	17	38	411
2016-17	479	988	17	40	410
2017-18	472	979	17	41	404
2018-19	448	1033	18	42	391
2019-20	471	1093	19	44	414
2020-21	492	1214	19	48	435
2021-22	452	969	20	40	399
2022-23	423	1076	23	33	382
2023-24(P)	390	1102	23	30	356

Note: All includes coal, lignite, Crude Oil and Natural Gas

Table 8.9 Energy Intensity (in MJ/'000 Rs. of GVA) of major sectors

Year	Industry	Agriculture	Transport
2014-15	361.47	40.02	328.72
2015-16	335.33	40.88	346.76
2016-17	308.23	41.95	366.52
2017-18	306.57	40.99	376.60
2018-19	323.28	43.04	385.37
2019-20	319.72	40.11	399.66
2020-21	305.87	40.20	422.84
2021-22	263.71	39.48	395.01
2022-23	278.76	39.06	413.52
2023-24(P)	284.20	39.91	436.85

Table 8.10: Electricity Intensity (in Kwh/'000 Rs. of GVA) of major sectors			
Year	**Industry**	**Agriculture**	**Transport**
2014-15	14.90	10.52	3.30
2015-16	13.72	10.72	3.17
2016-17	13.26	11.07	2.87
2017-18	13.38	10.83	2.96
2018-19	14.10	11.36	3.04
2019-20	14.72	10.59	3.05
2020-21	14.07	10.67	3.05
2021-22	13.69	10.53	3.60
2022-23	14.35	10.57	4.56
2023-24(P)	14.04	10.77	4.79

Table 8.11 Fuel Share of major Energy Commodities in Total Primary Energy Supply (TPES)					
Year	**Coal**	**Crude Oil**	**Natural Gas**	**Renewable Energy**	**Nuclear Energy**
2014-15	59.27	36.08	7.48	2.75	1.46
2015-16	57.56	36.38	7.32	2.42	1.45
2016-17	55.97	37.32	7.63	2.59	1.44
2017-18	56.70	36.44	7.70	2.76	1.39
2018-19	57.31	34.99	7.44	3.00	1.29
2019-20	55.79	34.75	7.85	3.39	1.59
2020-21	56.30	32.67	8.04	3.69	1.58
2021-22	58.57	31.79	7.73	3.64	1.58
2022-23	58.40	31.95	6.71	3.85	1.43
2023-24(P)	60.21	29.83	6.99	3.53	1.38

Table 8.12: Fuel share of different energy commodities in Total Final Energy Consumption (TFEC)				
Year	**Oil Products**	**Coal (includes Lignite)**	**Electricity**	**Natural Gas**
2014-15	37.58	38.76	18.34	5.32
2015-16	39.88	36.19	18.45	5.47
2016-17	41.21	33.73	19.24	5.83
2017-18	41.55	33.36	19.37	5.72
2018-19	40.23	34.97	19.41	5.39
2019-20	40.62	33.49	20.12	5.76
2020-21	39.03	34.11	20.88	5.99
2021-22	40.01	31.43	21.96	6.60
2022-23	40.53	31.08	22.10	6.29
2023-24(P)	38.90	33.01	21.63	6.47

Table 8.13: Share of different fuel in Total Generation of Electricity (in percentage)						
	Non-Renewable			**Renewable**		
Year	**Thermal**	**Nuclear**	**Total**	**Hydro**	**RE (other than hydro)**	**Total**
2014-15	81.10	2.82	83.92	10.12	5.96	16.08
2015-16	83.03	2.80	85.83	9.09	5.08	14.17
2016-17	82.64	2.69	85.34	8.71	5.96	14.66
2017-18	81.88	2.59	84.47	8.51	7.02	15.53
2018-19	80.86	2.39	83.24	8.53	8.23	16.76
2019-20	78.61	2.86	81.47	9.62	8.91	18.53
2020-21	78.22	2.69	80.91	9.43	9.66	19.09
2021-22	77.75	2.78	80.53	8.97	10.49	19.47
2022-23	77.02	2.51	79.53	8.87	11.60	20.47
2023-24(P)	78.54	2.46	81.00	6.90	12.10	19.00

Table 8.14: Net Energy Import Dependency of energy commodities					
Year	**Crude oil (%)**	**Coal (%)**	**Natural Gas (%)**	**Electricity (%)**	**Overall (%)**
2014-15	83.49	28.71	35.60	0.04	36.96
2015-16	84.59	27.34	39.88	0.01	37.95
2016-17	85.59	26.10	43.79	-0.08	38.85
2017-18	86.07	26.84	45.66	-0.14	39.61
2018-19	86.88	28.14	46.65	-0.26	40.35
2019-20	87.59	30.64	52.08	-0.19	42.53
2020-21	86.56	28.40	53.53	0.00	42.12
2021-22	87.73	25.25	47.70	-0.08	40.15
2022-23	88.86	25.65	43.30	-0.34	39.37
2023-24(P)	88.86	25.86	46.60	-0.24	40.27

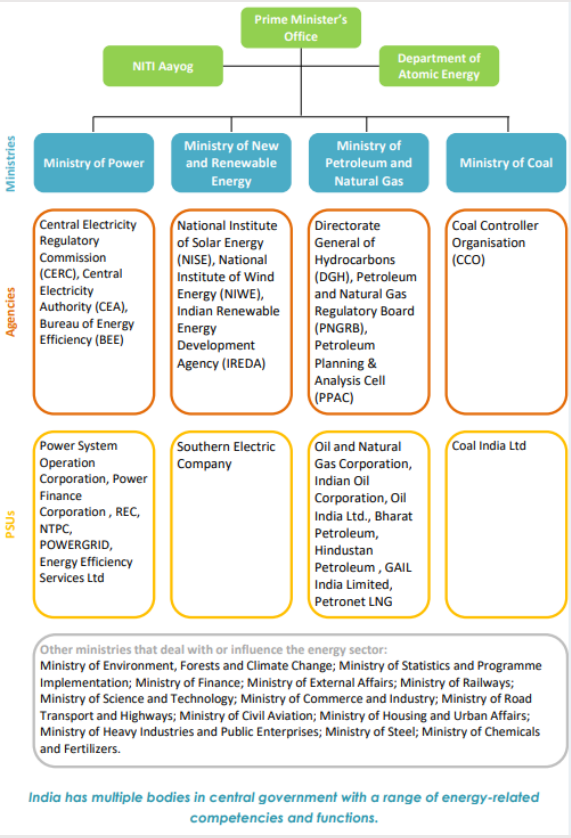
9 Chapter

Energy Accounts

CHAPTER 9
Energy Accounts

9.1 India's Energy Scenario

India is a major force in the global energy economy. There has been a rapid increase in energy consumption due to a growing population and rapid economic growth. The growing demand is met through various energy sources, such as coal, oil and solid biomass. Coal[1] has underpinned the expansion of electricity generation and industry, and remains the largest single fuel in the energy mix. Oil consumption[2] and imports have grown rapidly on account of rising vehicle ownership and road transport use. Natural gas and modern renewable sources of energy have started to gain ground, and the rise of solar photovoltaic (PV), in particular, has been spectacular. India is currently the world's 3rd largest consumer of oil, 3rd largest LPG consumer, 4th largest LNG importer, 4th largest refiner and 4th largest automobile market[3]. As far as the governance of the energy sector by the central government is concerned, the following figure provides a snapshot.



India has multiple bodies in central government with a range of energy-related competencies and functions.

India's announcement[4] that it aims to reach net-zero emissions by 2070 and to meet fifty percent of its electricity requirements from renewable energy sources by 2030 is a significant moment for the global fight against climate change. India is pioneering a new model of economic development that could avoid the carbon-intensive approaches.

India is constantly endeavoring towards sustainable and clean energy. In line with the Prime Minister's announcement at COP-26[5], M/o New and Renewable Energy is working towards achieving 500 GW of Non-Fossil based electricity generation capacity by 2030. India stands 4th globally in Renewable Energy Installed capacity, 4th in Wind Power capacity and 5th in Solar Power capacity (as per the International Renewable Energy Agency – Renewable Capacity Statistics 2024).

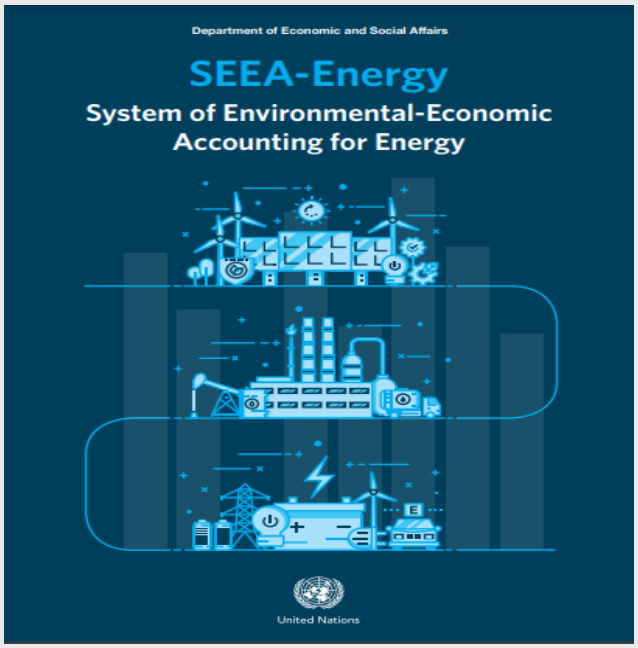
[1] https://www.iea.org/countries/india
[2] https://iea.blob.core.windows.net/assets/1de6d91e-e23f-4e02-b1fb-51fdd6283b22/India_Energy_Outlook_2021.pdf
[3] https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1992767
[4] https://www.iea.org/commentaries/india-s-clean-energy-transition-is-rapidly-underway-benefiting-the-entire-world
[5] https://pib.gov.in/PressReleasePage.aspx?PRID=1992732

In addition, some of other program/schemes that are also being implemented are:

i. National Green Hydrogen Mission
ii. Green Energy Corridor-Inter State Transmission System for 13 GW RE Projects in Ladakh
iii. Production Linked Incentive (PLI) Scheme for High Efficiency Solar PV Modules
iv. Offshore Wind Energy, Bioenergy
v. Solar Parks, Pradhan Mantri Kisan Urja Suraksha evam Utthaan Mahabhiyan (PM KUSUM), Rooftop Solar etc.

Energy is the most important sector for adaptation as it is responsible for 75-80% of the emissions. India has emerged as a world leader in energy transition. Solar energy contributes to more than 45% in the total renewable energy segment, making it the largest contributor amongst all RE sources (excluding large hydro projects). Installed capacity of solar energy in India has increased by more than 30 times from 2.82 GW in March 2014 to 97.86 GW in December 2024[6].

9.2 SEEA-Energy



With the enormous potential of India's energy sector, comes a sense of responsibility towards the nation and the globe, at large. Tapping into energy resources while ignoring the environmental concerns will serve good to none. Therefore, the effect of energy supply and use on the environment has emerged as a critical policy issue. Hence, it becomes pertinent to know the proper supply and usage of energy especially in the context of sustainable development. The SEEA-Energy provides the framework for the compilation of the physical and monetary supply and use tables and also for having an idea about the stock of energy available in the country at a particular point of time.

[6] https://pib.gov.in/PressReleaseIframePage.aspx?PRID=2092429

Chapter 9: Energy Accounts

For the purpose of compiling Energy Accounts for the country, the standard framework accepted internationally is the SEEA-Energy Framework. It is entirely consistent with the SEEA Central Framework and follows a similar accounting structure to the System of National Accounts (SNA). By doing so, the SEEA-Energy allows us to develop indicators and conduct analysis on the economy-environment nexus, with a focus on energy.

The System of Environmental Economic Accounting for Energy (SEEA-Energy[7]) is a multipurpose conceptual framework for organizing energy-related statistical information. It supports analysis of both the role of energy within the economy and the relationship between energy-related activities and the environment. At the core of SEEA-Energy is an accounting approach that records the stocks and flows of energy within the territory of reference. The value added of SEEA-Energy lies in its ability to bring a broader and more structured perspective to bear on the already available energy related information. Through their coherence with the SNA, the data in the Energy Accounts can be easily linked with other information collected for national accounts, which allows for a more detailed and policy-relevant analysis of energy information.

The capacity of SEEA-Energy to link energy accounts with economic and other environmental accounts underlines its power. Essential to the formulation of a policy response to an environmental issue such as climate change, which is affected by energy-related emissions of carbon into the air, is understanding both human impacts on the physical environment (through determining, for example, which industry is generating the carbon emissions and the energy products involved and energy needs and possible constraints and solutions (through determining, for example, ongoing energy requirements and what kind of low-carbon energy sources can be utilized). Indicators/statistics generated from SEEA-Energy Accounts can also enhance the understanding of issues related to the effects of using economic instruments (such as tradable carbon emission permits) on both the economy and the environment. Those effects may include impacts on energy prices, household spending and business profitability and, crucially, on emissions of carbon generated by domestic producers and as embodied in imports.

SEEA-Energy has a close relationship with IRES (International Recommendation on Energy Statistics)[7], which contributes valuable inputs into the production of the tables and accounts of SEEA-Energy. In particular, IRES supports the use of the harmonized definitions of energy products in accordance with the Standard International Energy Product Classification (SIEC)[8] and offer guidance regarding data sources and data compilation.

[7] https://unstats.un.org/unsd/energystats/methodology/documents/IRES-web.pdf
[8] https://unstats.un.org/unsd/classifications/Family/Detail/2007

Chapter 9: Energy Accounts

The Energy Accounts, as described in SEEA, comprise three types of accounts, namely: Asset Accounts, Physical Supply and Use Tables (PSUT) and Monetary Supply and Use Tables (MSUT).

9.2.1 Asset Accounts for Energy

The purpose of an asset account is to record the opening and closing stock of the assets and the various types of changes in stock over an accounting period. The asset accounts in SEEA-Energy are compiled only for minerals and energy resources. These accounts provide valuable information to assess the fact whether the current patterns of economic activity are depleting and/or degrading the available mineral and energy resources. In addition, the information on the asset accounts can help in the management of mineral and energy resources.

Mineral and energy resources within SEEA-Energy include known deposits of oil resources, natural gas resources, coal and peat resources, and uranium and thorium resources, including those with no current economic value. These resources are defined more broadly than in the SNA 2008, which includes only those inputs that meet the definition of an economic asset. In the SEEA Central Framework, mineral and energy resources include known deposits of oil resources, natural gas resources, coal and peat resources, non-metallic minerals and metallic minerals. In SEEA-Energy, mineral and energy resources are restricted to those resources that can become energy products.

Known deposits of minerals and energy resources are categorized into three classes, based on criteria from the United Nations Framework Classification (UNFC) 2009[9]:

(a) **Class A**: Commercially Recoverable Resources which includes on-production projects, projects approved for development and projects justified for development;
(b) **Class B:** Potentially Commercially Recoverable Resources which includes economic and marginal development projects pending and development projects on hold; and
(c) **Class C:** Non-Commercial and other known deposits which includes unclarified development projects, non-viable development projects, additional quantities in place.

The basic form of the Asset Account is shown in Figure 9.1. It begins with the opening stock of resources and ends with the closing stock of resources. In physical terms, the changes between the beginning and the end of the accounting period are recorded either as additions to or as reductions in the stock. Wherever possible, the nature of the addition or reduction is recorded.

[9] https://unece.org/fileadmin/DAM/energy/se/pdfs/UNFC/unfc2009/UNFC2009_ES39_e.pdf

Fig 9.1: Basic Form of an Asset Account

Basic Form of Asset Account
Opening stock of resources
Additions to the stock of resources
Growth in stock
Discoveries of new stock
Upward reappraisals
Reclassifications
Total additions to stock
Reductions in the stock of resources
Extractions
Normal loss of stock
Catastrophic losses
Downward reappraisals
Reclassifications
Total reductions in stock
Revaluation of the stock of resources*
Closing stock of resources

**Applicable only for Asset Accounts in monetary terms. Source: SEEA-Energy*

According to SEEA-Energy, there are three types of additions to the stock of the Energy Assets:

- **Discoveries:** Discoveries should incorporate estimates of the quantity of new deposits found during an accounting period. To be regarded as a discovery, the new deposit must be a known deposit – i.e., in Class A, B or C. In situations, in which a quantity of potential deposits becomes known to a higher degree of confidence, this increase should be treated as discoveries. Discoveries should be recorded by type of resource and by category of resource.

- **Upward reappraisals:** Reappraisals should only pertain to known deposits. They will relate to additions in the estimated available stock of a specific deposit, or to changes in the categorization of specific deposits between Class A, B or C based on changes in geological information, technology, resource price or a combination of these factors.

- **Reclassifications:** Reclassifications may occur if certain deposits are opened or closed to mining operations due to a government decision concerning the access rights to a deposit. All other changes in the quantity of known deposits should be treated as

reappraisals. Reclassifications may conceivably be recorded if asset accounts for energy resources are being compiled by institutional sector.

There are four types of reductions in the stock of energy assets:

- **Extraction:** Estimates of extraction should reflect the quantity of the resource physically removed from the deposit. It should exclude mining overburden, i.e., the quantity of soil and other material moved in order to extract the resource. The quantity should also be estimated before any refinement or processing of the resource is undertaken. Estimates of extraction should include estimates of illegal extraction, either by residents or non-residents, as these amounts reduce the availability of the resource.

- **Catastrophic losses:** Catastrophic losses are rare for most energy resources. While flooding and collapsing of mines do occur, the deposits continue to exist and can, in principle, be recovered. The issue in this case is one of economic viability of extraction rather than of actual loss of the resource itself. An exception to this general principle concerns oil wells that can be destroyed by fire or become unstable for other reasons, resulting in significant losses of oil resources. Losses of oil and related resources in this situation should be treated as catastrophic losses.

- **Downward reappraisals:** Reappraisals should only pertain to known deposits. They will relate to reductions in the estimated available stock of a specific deposit, or to changes in the categorization of specific deposits between Class A, B or C based on changes in geological information, technology, resource price or a combination of these factors; and

- **Reclassifications:** Reclassifications may occur if certain deposits are opened or closed to mining operations due to a government decision concerning the access rights to a deposit. All other changes in the quantity of known deposits should be treated as reappraisals. Reclassifications may conceivably be recorded if asset accounts for energy resources are being compiled by institutional sector.

Monetary asset accounts for mineral and energy resources provide a market-based valuation of the physical stock of mineral and energy resources and the changes in the value of these stocks over time. The same entries are made in monetary terms, although an additional entry recording revaluations of resource stocks is included. This entry accounts for changes in the value of assets over an accounting period due to movements in the price of the resources.

9.2.2 Physical Supply and Use Tables (PSUT)

SEEA-Energy records the physical flows, measured in physical units of energy content, through the compilation of Supply and Use tables. These tables are used to assess how an economy supplies and uses energy products, as well as to examine the changes in production and consumption patterns over time. These tables help in the presentation of how energy flows into the economy, how they are used within, and how they leave a country's national economy for a given period of time. The PSUT are expressed in a common energy unit such as joules and expresses the relationship between inputs to and outputs from energy transformation processes. The general structure of the PSUT is shown in the Figure 9.2.

Fig 9.2: Basic Form of a Physical Supply and Use Table for Energy

Basic form of a physical supply and use table for energy (joules)

Supply table

	Industries	Households	Accumulation	Rest of the world	Environment	Total
Energy from natural inputs					A. Energy inputs from the environment	Total supply of energy from natural inputs
Energy products	C. Output			D. Imports		Total supply of energy products
Energy residuals	I. Energy residuals generated by industry	J. Energy residuals generated by household consumption	K. Energy residuals from accumulation	L. Energy residuals received from the rest of the world	M. Energy residuals recovered from the environment	Total supply of energy residuals

Use table

	Industries	Households	Accumulation	Rest of the world	Environment	Total
Energy from natural inputs	B. Extraction of energy from natural inputs					Total use of energy from natural inputs
Energy products	E. Intermediate Consumption	F. Household Consumption	G. Change in inventories	H. Exports		Total use of energy products
Energy residuals	N. Collection and treatment of energy residuals		O. Accumulation of energy residuals	P. Energy residuals sent to the rest of the world	Q. Energy residual flows direct to environment	Total use of energy residuals

Note: Dark grey cells are null by definition.

Source: SEEA-Energy

9.2.3 Monetary Supply and Use Tables (MSUT)

MSUT fully articulates, in monetary terms, the flows of energy products in an economy between different economic units. MSUT for energy provides information on the energy sector and the level of activity in this sector. They also provide detailed information on the industries within the economy that are using these energy products. Monetary supply and use tables for energy can readily be linked with PSUT for energy to create a powerful analytical tool.

Monetary supply and use tables have their roots in economic accounting and utilize the same organizational principles and display the same characteristics as physical supply and use tables. Nevertheless, while the physical supply and use table for energy contains three main types of flows, namely, energy from natural inputs, energy products and energy residuals, the monetary supply and use table for energy records only those flows related to energy products.

Fig 9.3: Basic Form of a Monetary Supply and Use Table for Energy

	Industries	**Households**	**Government**	**Accumulation**	**Rest of the world**	**Total**
Supply Table						
Products	Output				Imports	Total Supply
Use table						
Products	Immediate consumption	Household final consumption expenditure	Government final consumption expenditure	Gross capital formation (including changes in inventories)	Exports	Total Use
Value added						

Note: Dark Grey cells are null by definition

9.3 Physical Asset Accounts for Energy for India

The Asset Accounts for the year 2023-24 (P) is provided in Table 9.1. The Opening Stock (Inventory) data as given in the Coal Directory differs from what has been computed in the Asset Accounts. The reason for this is the deduction of the extraction and sterilization loss in the Asset Accounts which is not considered in the geological resources by the GSI.

Chapter 9: Energy Accounts

Table 9.1: Physical Asset Accounts for Energy: 2023-24(P)

	Types of Energy Resource			
	Coal (Proved Category)	Lignite (Proved Category)	Crude Oil (2P Reserve)	Natural Gas (2P Reserve)
	Million tonnes	Million tonnes	Million BBL	MMSCM
Opening stock of mineral and energy resources (Closing for last FY)	**110,776**	**2,138**	**3,295**	**650,626**
Additions in stock:				
Discoveries	12,303	453	104	35,600
Upward appraisals				
TOTAL ADDITION TO THE STOCK	**12,303**	**453**	**104**	**35,600**
Reduction in Stock:				
Extraction	998	41	215	36,438
Sterilization Loss	3,693	142		
Downwards reappraisals			0	6,387
TOTAL REDUCTION IN STOCK	**4,691**	**183**	**216**	**42,825**
Closing Stock of mineral and energy resources	**118,388**	**2,408**	**3,183**	**643,401**
Source: Geological Survey of India, Ministry of Petroleum and Natural Gas				
*Sterilization Loss for Coal = Extraction*3.7*				
*Sterilization Loss for Lignite = Extraction*3.46*				
2P is the sum of proved and probable reserves.				

9.4 Physical Supply and Use Table for Energy

'Physical Supply and Use Tables for Energy' aims at comprehensiveness that entails recording all energy flows both within the economy, between the economy and the environment. These accounts along with the Asset accounts, provide necessary granular level information to help identifying the policy concern areas.

In the chapter, the PSUT for Energy has been compiled following the structure of SEEA-Energy. Following accounting identities have been adhered to while compiling the PSUT for Energy.

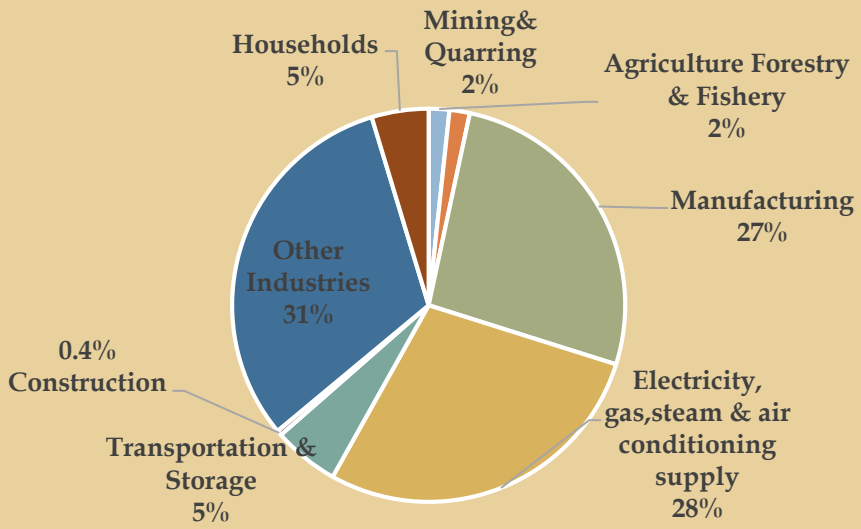
(i) Total Supply of Energy from Natural Inputs =Total Use of Energy from Natural Inputs

(ii) Total Supply of Energy Products=Total Use of Energy Products (Transformation + End Use)

(iii) Total Supply of Energy Residuals=Total Use of Energy Residual

The PSUT for energy for the year 2023-24(P) has been presented in **Tables 9.3 (A)** and **9.3 (B)**. The Energy Accounts compiled in the current publication is at a preliminary stage and has scope for further improvement with the availability of granular information from the source agencies, especially NIC-wise disaggregated data, data on residuals and losses, data on the accumulations, etc.

Fig 9.4: Industry-wise use (Transformation and End Use) of Energy for 2023-24 (P)



Based on the available data, **Figure 9.4** shows the industry-wise use of energy for the year 2023-24 (P). The highest share of use can be seen in the other industries, Manufacturing and the Electricity sector for the year 2023-24 (P).

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Table 9.2 (A) Physical Supply Table for Energy for the year 2022-23

PHYSICAL SUPPLY TABLE (Unit:PJ)	Production (Incl. household own account) & generaion of residuals										
	Industries (by ISIC)						Households				
	Agriculture Forestry & Fishery	Mining& Quarring	Manufacturing	Electricity, gas,steam & air conditioning supply	Transportation & Storage	Other Industries		Accumulation	Flows from the rest of the world (Imports)	Flows from the Environment	Total
	(ISIC A)	(ISIC B)	(ISIC C)	(ISIC D)	(ISIC M)						
Energy from natural inputs:											
Natural resource inputs											
Coal										15064	15064
Lignite										420	420
Crude Oil										1249	1249
Natural Gas										1334	1334
Nuclear										500	500
Inputs from RES										764	764
Hydro										585	585
Total										**19916**	**19916**
Energy Products:											
Production of energy products by SIEC class:											
Coal		15064							5290		20354
Lignite		420							0		421
Crude Oil		1249							9957		11206
Oil Products			11387						1872		13258
Natural Gas		1334							1019		2353
Electricity				6589					**28**		6616
Total	**0**	**18067**	**11387**	**6589**	**0**	**0**			**18165**		**54207**
Energy Residuals:											
Distribution		1118		978							2096
Extraction											0
Other Losses (Coal Reject/other residuals)											0
Other Energy Residuals	901	745	3199	336	2721	15966	2486				26354
Total energy residuals	**901**	**1864**	**3199**	**1314**	**2721**	**15966**	**2486**				**28450**
Other Residual Flows:											
Residuals from end-use for non-energy purposes											0
Energy from solid waste											
TOTAL SUPPLY	**901**	**19931**	**14586**	**7903**	**2721**	**15966**	**2486**		**18165**	**19916**	**102574**

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Table 9.2 (B) Physical Use Table for Energy for the year 2022-23

PHYSICAL USE TABLE (Unit:PJ)	Intermediate consumption, Use of energy resources, receipt of energy losses							Final Consumption	Accumulation	Export	Statsitical diff	Flows to the Environment	Total
	Industries (by ISIC)							Households					
	Agriculture Forestry & Fishery	Mining& Quarring	Manufacturing	Electricity, gas,steam & air conditioning supply (ISIC D)	Transportation & Storage	Construction	Other Industries						
	(ISIC A)	(ISIC B)	(ISIC C)	(ISIC D)	(ISIC M)								
Energy from natural inputs:													
Natural resource inputs													
Coal		15064											15064
Lignite		420											420
Crude Oil		1249											1249
Natural Gas		1334											1334
Nuclear				500									500
Inputs from RES				764									764
Hydro				585									585
Total	**0**	**18067**	**0**	**1849**	**0**		**0**						**19916**
Energy Products:													
Transformaton of energy products by SIEC class													
Coal				13304									13304
Lignite				372									372
Crude Oil			10921										10921
Oil Products				37									37
Natural Gas				316									316
Electricity													0
Total Transformed Energy	**0**	**0**	**10921**	**14029**	**0**		**0**						**24950**
End-use of energy products by SIEC class:													
Coal	0	0	1744		0	206	5265	0	-272	33	73		7050
Lignite	0	0	27		0	14	34	0	17	3	-47		49
Crude Oil							1114				-830		284
Oil Products	17	50	563		2079	16	5570	1214		2665	1047		13221
Natural Gas	**6**	695	864		534	0	75	0		**0**	**-138**		2037
Electricity	878	0	0	336	108	0	3906	1272		50	66		6616
Total End Use for Energy purpose	**901**	**745**	**3199**	**336**	**2721**	**236**	**15966**	**2486**	**-255**	**2751**	**171**		**29257**
End-use of energy products for non-energy purposes													0
Energy Residuals:													
Distribution												2096	2096
Extraction												0	0
Other Losses (Coal Reject/other residuals)												0	0
Other Energy Residuals												26354	26354
Total energy residuals												**28450**	**28450**
Other Residual Flows:													
Residuals from end-use for non-energy purposes									0				**0**
Energy from solid waste													**0**
TOTAL USE	**901**	**18812**	**14120**	**16215**	**2721**	**236**	**15966**	**2486**	**-255**	**2751**	**171**	**28450**	**102574**

Chapter 9: Energy Accounts

Table 9.3 (A) Physical Supply Table for Energy for the year 2023-24 (P)

PHYSICAL SUPPLY TABLE (Unit:PJ)	Production (Incl. household own account) & generaion of residuals										
	Industries (by ISIC)						Households				
	Agriculture Forestry & Fishery	Mining& Quarring	Manufacturing	Electricity, gas,steam & air conditioning supply	Transportation & Storage	Other Industries		Accumulation	Flows from the rest of the world (Imports)	Flows from the Environment	Total
	(ISIC A)	(ISIC B)	(ISIC C)	(ISIC D)	(ISIC M)						
Energy from natural inputs:											
Natural resource inputs											
Coal										16906	16906
Lignite										410	410
Crude Oil										1256	1256
Natural Gas										1411	1411
Nuclear										523	523
Inputs from RES										849	849
Hydro										484	484
Total										**21840**	**21840**
Energy Products:											
Production of energy products by SIEC class:											
Coal		16906							5930		22836
Lignite		410							0		410
Crude Oil		1256							10024		11280
Oil Products			11810						2018		13828
Natural Gas		1411							1231		2643
Electricity				7018					**24**		7041
Total	**0**	**19983**	**11810**	**7018**	**0**	**0**			**19228**		**58039**
Energy Residuals:											
Distribution		1145		1013							2158
Extraction											0
Other Losses (Coal Reject/other residuals)											0
Other Energy Residuals	945	928	3547	360	3012	17443	2603				28838
Total energy residuals	**945**	**2073**	**3547**	**1373**	**3012**	**17443**	**2603**				**30995**
Other Residual Flows:											
Residuals from end-use for non-energy purposes											0
Energy from solid waste											
TOTAL SUPPLY	**945**	**22056**	**15357**	**8391**	**3012**	**17443**	**2603**		**19228**	**21840**	**110874**

Table 9.3 (B) Physical Use Table for Energy for the year 2023-24 (P)

PHYSICAL USE TABLE (Unit:PJ)	Intermediate consumption, Use of energy resources, receipt of energy losses							Final Consumption	Accumulation	Export	Statsitical diff	Flows to the Environment	Total
	Industries (by ISIC)							Households					
	Agriculture Forestry & Fishery	Mining& Quarring	Manufacturing	Electricity, gas,steam & air conditioni	Transportation & Storage	Construction	Other Industries						
	(ISIC A)	(ISIC B)	(ISIC C)	(ISIC D)	(ISIC M)								
Energy from natural inputs:													
Natural resource inputs													
Coal		16906											16906
Lignite		410											410
Crude Oil		1256											1256
Natural Gas		1411											1411
Nuclear				523									523
Inputs from RES				849									849
Hydro				484									484
Total	**0**	**19983**	**0**	**1856**	**0**		**0**						**21840**
Energy Products:													
Transformaton of energy products by SIEC class													
Coal				14635									14635
Lignite				341									341
Crude Oil			11191										11191
Oil Products				30									30
Natural Gas				352									352
Electricity													0
Total Transformed Energy	**0**	**0**	**11191**	**15357**	**0**		**0**						**26548**
End-use of energy products by SIEC class:													
Coal	0	0	2004		0	206	6203	0	-431	44	176		8202
Lignite	0	0	20		0	5	41	0	-3	0	6		69
Crude Oil							1140				-1052		89
Oil Products	21	63	559		2296	24	5777	1253		2735	1070		13798
Natural Gas	**5**	865	964		597	0	100	0		**0**	**-240**		2291
Electricity	918	0	0	360	119	0	4182	1350		41	71		7041
Total End Use for Energy purpose	**945**	**928**	**3547**	**360**	**3012**	**236**	**17443**	**2603**	**-434**	**2820**	**31**		**31490**
End-use of energy products for non-energy purposes													0
Energy Residuals:													
Distribution												2158	2158
Extraction												0	0
Other Losses (Coal Reject/other residuals)												0	0
Other Energy Residuals												28838	28838
Total energy residuals												**30995**	**30995**
Other Residual Flows:													
Residuals from end-use for non-energy purposes									0				**0**
Energy from solid waste													**0**
TOTAL USE	**945**	**20911**	**14738**	**17574**	**3012**	**236**	**17443**	**2603**	**-434**	**2820**	**31**	**30995**	**110874**

Annexure-I

Definitions of Energy Products and associated concepts

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

vii. 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/Oil** A mineral oil of fossil origin extracted by conventional means from underground reservoirs, and comprises liquid or near-liquid hydrocarbons and associated impurities such as sulphur and metals.
Remark: Conventional crude oil exists in the liquid phase under normal surface temperature and pressure, and usually flows to the surface under the pressure of the reservoir. This is termed "conventional" extraction. Crude oil includes condensate from condensate fields, and "field" or "lease" condensate extracted with the crude oil.

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

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

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

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

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

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

Remark: Different naphtha are distinguished by their density and the content of paraffins, isoparaffins, olefins, naphthenes and aromatics. The main uses for naphtha are as feedstock for high octane gasolines and the manufacture of olefins in the petrochemical industry.

v. **Kerosene** Mixtures of hydrocarbons in the range C9 to C16 and distilling over the temperature interval 145°C to 300°C, but not usually above 250°C and with a flash point above 38°C.
Remark: The chemical compositions of kerosenes depend on the nature of the crude oils from which they are derived and the refinery processes that they have undergone. Kerosenes obtained from crude oil by atmospheric distillation are known as straight-run kerosenes. Such streams may be treated by a variety of processes to produce kerosenes that are acceptable for blending as jet fuels. Kerosenes are primarily used as jet fuels. They are also used as domestic heating and cooking fuels, and as solvents. Kerosenes may include components or additives derived from biomass.

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

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

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

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

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

Remark: Other names commonly used to describe fuel oil include: bunker fuel, bunker C, fuel oil No. 6, industrial fuel oil, marine fuel oil and black oil. Residual and heavy fuel oil are used

in medium to large industrial plants, marine applications and power stations in combustion equipment such as boilers, furnaces and diesel engines. Residual fuel oil is also used as fuel within the refinery.

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

Remark: Lubricant base stocks are obtained from vacuum distillates which result from further distillation of the residue from atmospheric distillation of crude oil. The lubricant base stocks are then further processed to produce lubricants with the desired properties.

x. **Petroleum coke** Petroleum coke is a black solid obtained mainly by cracking and carbonizing heavy hydrocarbon oils, tars and pitches. It consists mainly of carbon (90 to 95 per cent) and has 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 percent by weight.

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

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

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

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

3. Gaseous fuels

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

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

5. **Production of Energy Products** 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.

6. **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**.**

7. **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**.**

8. **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.

9. **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.

10. Non-commercial Energy Sources

i. **Fuelwood, wood residues and by-products:** Fuelwood or firewood (in log, brushwood, pellet or chip form) obtained from natural or managed forests or isolated trees. Also included are wood residues used as fuel and in which the original composition of wood is retained.

Remark: Charcoal and black liquor are excluded.

ii. **Charcoal** The solid residue from the carbonisation of wood or other vegetal matter through slow pyrolysis.

iii. **Bagasse** The fuel obtained from the fiber which remains after juice extraction in sugar cane processing.

11. 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 is referred as transformation/conversion losses.

Annexure-I

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%
WasheryGr.I	18%<=Ash content<21%
WasheryGr.II	21%<=Ash content<24%
WasheryGr.III	24%<=Ash content<28%
WasheryGr.IV	28%<=Ash content<35%
WasheryGr.V	35%<=Ash content<42%
WasheryGr.VI	42%<=Ash content<49%

Grades of Semi Coking Coal based on Ash and Moisture content

Grade	Ash + Moisture content
Semi coking Gr. I	less than 19%
Semi coking Gr. II	Between 19% and 24%

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: Coal Controller's Organisation, Ministry of Coal.

Annexure-II

Measurement Units in Energy Statistics

Physical Units

Energy products are measured in physical units by their mass, volume, and energy content. The measurement units that are specific to an energy product and employed at the point of measurement of an energy flow are often referred to as "original" or "natural" units. Coal, for example, is generally measured by its mass and crude oil by its volume. On the other hand, cross-fuel tabulations, such as the energy balances, are displayed in a "common" unit to allow comparison across energy products. These "common" units are usually energy units and require the conversion from an original unit through the application of an appropriate conversion factor.

Typical examples of original units are: mass units (e.g., kilograms or metric tons) for solid fuels; volume units (e.g., barrels or litres) or mass units (metric tons) for oil; and volume units (e.g., cubic metres) for gases.

Solid fuels, such as coal and coke, are generally measured in mass units. The SI unit for mass is the kilogram (kg). Metric tons (tons) are most commonly used to measure coal and their derivatives. One metric ton corresponds to 1000 kg.

Volume units are original units for most liquid and gaseous fuels, as well as some traditional fuels. The SI unit for volume is the cubic metre, which is equivalent to a kilolitre or one thousand litres. Other volume units include the British or Imperial gallon (approximately 4.546 litres), United States gallon (approximately 3.785 litres), the barrel (approximately 159 litres), and the cubic foot, which is also used to measure volumes of gaseous fuels.

Energy Units

In the realms of Energy Statistics, the terms - Energy, heat and work are considered to be three facets of the same concept. The coherent derived SI unit of energy, heat and work is the joule (J)- defined as the work done when a constant force of 1 Newton is exerted on a body with mass of 1 gram to move it a distance of 1 metre. Common multiples of the joule are the megajoule, gigajoule, terajoule and petajoule. Other units include: the kilogram calorie in the metric system, or kilocalorie (kcal) or one of its multiples; the British thermal unit (Btu) or one of its multiples; ton of coal equivalent (tce), ton of oil equivalent (toe); and the kilowatt hour (kWh).

Power is the rate at which work is done (or heat released, or energy converted, often measured in the kilowatt hour (kWh), which refers to the energy equivalent of 1000 watt (joules per second) over a one-hour period. Thus, 1 kilowatt-hour equals 3.6x106 joules. Electricity is usually measured in kWh. Heat quantities, on the other hand, are usually measured in calories or joules.

Annexure- 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	=	16.94 petajoules of energy
One million tonnes of Lignite	=	9.546 petajoules of energy
One million tonnes of oil equivalent (MTOE)	=	42.789 petajoules of energy
One billion cubic meter of natural gas	=	38.735 petajoules of energy
One million cubic meter of natural gas	=	38.735 terajoules of energy
One billion-kilowatt hour of electricity	=	3.60 petajoules of energy

Annexure- II

Net Calorific Value (NCV) used in the publicaltion (kJ/Kg)												
	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24
Coal Production	18299	18267	18096	18051	17819	17316	17273	17131	16905	16822	16865	16943
Coal Import	21331	20889	21183	21978	22183	22182	22005	22065	22473	23277	22257	22418
Coal Export	28200	28200	28200	28200	28200	28200	28200	28200	28200	28200	28200	28200
Stock Changes	24283	24283	24283	24283	24283	24283	24283	24283	17637	17637	17545	17723
Coal Dispatched/Consumption to Power Sector	17411	17411	17411	17411	17411	17411	17424	17342	17001	16846	16939	17030
Coal Dispatched/Consumption to Non-Power Sector (Industry)	22029	22029	22029	22029	22029	22029	22413	22510	22093	21027	21877	22236
Lignite	9546	9546	9546	9546	9546	9546	9546	9546	9546	9546	9546	9546
Note: NCV=GCV*.95												

Conversion Factors of Crude Oil/Petroleum Products used in the publication				
	2012-13 to 2020-21		2021-22 to 2023-24	
Products	KJ/Kg	Toe/Metric Tonnes	KJ/Kg	Toe/Metric Tonnes
Crude Oil	42789	1.022	42789	1.022
LPG	47300	1.130	47300	1.130
Naphtha	45000	1.075	45000	1.075
Kerosene	41564.4	0.993	43752	1.045
Diesel Oil(HSD+ LDO)	43300	1.034	43334	1.035
Fuel Oil	39178	0.936	41240	0.985
Lubricants	42000	1.003	42000	1.003
Bitumin	39000	0.931	39000	0.931
Petrol/Motor Spirit	44800	1.070	44800	1.070
ATF	44600	1.065	44600	1.065
Petroleum Coke	32000	0.764	32000	0.764
Other Petroleum Products	40000	0.955	40193	0.960

Conversion Factor for Natural Gas used in the publication		
	BCM to Joule	Toe/TJ
2012-13 to 2019-20	1 BCM=38520 TJ or 38.52 PJ	0.02388
2020-21 to 2023-24	1 BCM =38735 TJ or 38.735 PJ	0.02388
Electricity/Electricity from hydro and RES, 1 Gwh= .086 Ktoe		
Electricity from Nuclear, 1 Gwh=(.086÷.33) Ktoe		

Annexure III

Metadata: Publication

1. Contact	
1.1. Contact organization	National Statistical Office (NSO), Ministry of Statistics & Programme Implementation (MOSPI)
1.2. Contact organization unit	Economic Statistics Division
1.3. Contact mail address	K. L Bhawan, Janpath, New Delhi – 110001
1.4. Contact emails	adg-esd-mospi@nic.in energyunit-esd@mospi.gov.in
1.5. Homepage	http:// www.mospi.gov.in

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 the Coal Controller, Ministry of New and Renewable Energy and Office of the Economic Adviser, Ministry of Commerce and Industry, National Accounts Division, Ministry of Statistics and Programme Implementation and Geological Survey of India, Ministry of Mines.
2.2. Data description
The statistics represent information about the reserves, installed capacity, potential for generation, production, consumption, import, export and wholesale price of different energy commodities, Energy Indicators on Economic Dimension and Energy Accounts.
2.3. Sector coverage
Coal & Lignite, Petroleum & Natural Gas, Renewable Energy Resources and Electricity. The indicators are based on the guidelines/approach followed by International Atomic Energy Agency in their publication "Energy Indicators for Sustainable Development: Guidelines and Methodologies", which was brought out in collaboration with United Nations Department of Economic and Social Affairs (UNDESA), International Energy Agency (IEA), Eurostat and European Environmental Agency (EEA). Also, the choice of indicators was made as per the availability of data from the subject ministries.
2.4. Data content
The Statistics are given by type of fuel and energy source. The publication includes analytical indicators viz. Growth Rates, Compound Annual Growth Rates (CAGR), Percentage Distributions and Economic Energy Indicators.

Annexure- III

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 2014-15 to 2023-24 and is based on statistics compiled by the Ministry of Petroleum and Natural Gas, Central Electricity Authority, Office of Coal Controller, Ministry of New and Renewable Energy. The data for Office of the Economic Advisor, Ministry of Commerce and Industry and National Accounts Division has been sourced for the year 2014-15 to 2023-24. Energy Indicators on Economic Dimensions have been compiled for the year 2023-24.
2.9. Base period
2011-12 for WPI and GDP data
2.10. Statistical concepts and definitions
The main Concepts and Definitions and certain Conversion Factors are given in Annex: I & Annex: II respectively. Annex III gives categorization of coal in India.

3. Unit of measure
Energy quantities data are recorded in physical units relevant to the product in question; Giga Watt hour (GWh) for electricity, Thousand Metric Tonne (TMT) for petroleum products etc. Prices are indicated by Wholesale Price Index. The Energy Balance is given in Kilo Tonne of oil equivalent (KToE). Consumption and Production of the Energy resources is also given in Petajoules (PJ).

4. Reference period
Reference period of the Publication of "Energy Statistics -2025" is the financial year 2023-24 and the previous financial years since 2014-15. For Energy Indicators reference period is Financial Year 2023-24.

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

Annexure- III

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 end of March every year.
7.2. User access
MOSPI disseminates Energy 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 data dissemination policy of Government of India.
8. Dissemination format
8.1. News release
Publication on Energy Statistics is released annually.
8.2. Publications
Annual publication in pdf format is available on the website of MOSPI.
9. Accessibility of documentation
9.1. Documentation on methodology
Information on the relevant Energy indicators methodology can be found in the publication in Chapter 8.

10. Accuracy and reliability
10.1. Overall accuracy
Data on energy is published on the basis of information received from the source agencies. ESD, NSO compiles and analyses data received from the source agencies and then presents in the form of publication.

11. Timeliness and punctuality

Annexure- III

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 2023-24 is published in current publication. Final data will be given in the next publication in March 2026.
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 publications brought out by 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.

Annexure- IV

Energy Balance Table of India from 2012-13 to 2021-22

Table-I : Energy Balance of India for 2012-13 (Final)

All figures in KToE

	Coal #	Crude Oil	Oil Products	Natural Gas	Nuclear	Hydro	Solar, Wind, Others	Electricity	Total
Production	253,773	38,693	0	37,420	8,565	9,790	5,091	0	353,332
Imports	74,275	188,860	16,426	16,203	0	0	0	412	296,176
Exports	-1,661	0	-60,505	0	0	0	0	-13	-62,180
Stock changes	6,274	0	0	0	0	0	0	0	6,274
Total primary energy supply	**332,660**	**227,553**	**-44,080**	**53,623**	**8,565**	**9,790**	**5,091**	**399**	**593,601**
Statistical differences	3,973	15,231	-17,207	966	0	0	0	-1,075	1,889
Main activity producer electricity plants	-194,267	0	-1,696	-14,789	-8,565	-9,780	-4,941	82,946	-151,092
Autoproducer electricity plants	0	0	0	0	0	-10	-151	12,385	12,224
Oil refineries	0	-224,034	221,619	0	0	0	0	0	-2,415
Energy industry own use	0	0	0	-15,883	0	0	0	-5,513	-21,396
Losses	0	-18,751	0	-28	0	0	0	-18,252	-37,030
Final consumption	**142,366**	**0**	**158,636**	**23,889**	**0**	**0**	**0**	**70,890**	**395,782**
Industry	**142,366**	**0**	**32,835**	**248**	**0**	**0**	**0**	**31,475**	**206,924**
Iron and steel	38,213	0	943	0	0	0	0	0	39,156
Chemical and petrochemical	1,505	0	12,581	0	0	0	0	0	14,086
Non-ferrous metals	0	0	249	0	0	0	0	0	249
Machinery	0	0	275	0	0	0	0	0	275
Mining and quarrying	0	0	1,124	0	0	0	0	0	1,124
Paper, pulp and print	1,273	0	0	0	0	0	0	0	1,273
Construction	8,403	0	834	0	0	0	0	0	9,237
Textile and leather	951	0	287	0	0	0	0	0	1,237
Non-specified (industry)	92,022	0	16,543	248	0	0	0	31,475	140,288
Transport	**0**	**0**	**28,302**	**5,672**	**0**	**0**	**0**	**1,213**	**35,187**
Road	0	0	19,373	5,317	0	0	0	0	24,690
Domestic aviation	0	0	5,616	0	0	0	0	0	5,616
Rail	0	0	2,628	0	0	0	0	1,213	3,841
Pipeline transport	0	0	0	356	0	0	0	0	356
Domestic navigation	0	0	685	0	0	0	0	0	685
Non-specified (transport)	0	0	0	0	0	0	0	0	0
Other	**0**	**0**	**97,499**	**1,112**	**0**	**0**	**0**	**38,202**	**136,814**
Residential	0	0	22,624	0	0	0	0	15,798	38,422
Commercial and public services	0	0	37	0	0	0	0	6,260	6,297
Agriculture/forestry	0	0	718	168	0	0	0	12,682	13,567
Non-specified (other)	0	0	74,120	945	0	0	0	3,462	78,527
Non-energy use	**0**	**0**	**0**	**16,856**	**0**	**0**	**0**	**0**	**16,856**
Non-energy use industry/transformation/energy	0	0	0	16,856	0	0	0	0	16,856
Non-energy use in transport	0	0	0	0	0	0	0	0	0
Non-energy use in other	0	0	0	0	0	0	0	0	0
Elect. output in GWh	**0**	**0**	**0**	**0**	**32,866**	**113,838**	**59,199**	**0**	**205,904**
Elec output-main activity producer ele plants	0	0	0	0	32,866	113,720	57,449	0	204,035
Elec output-autoproducer electricity plants	0	0	0	0	0	118	1,750	0	1,869

Final consumption refers to End Use Consumption

Includes lignite

Annexure-IV

Table-II: Energy Balance of India for 2013-14 (Final)

All figures in KToE

	Coal #	Crude Oil	Oil Products	Natural Gas	Nuclear	Hydro	Solar, Wind, Others	Electricity	Total
Production	256,931	38,620	0	32,569	8,920	11,608	5,798	0	354,446
Imports	83,250	193,401	16,637	16,374	0	0	0	481	310,144
Exports	-1,474	0	-69,891	0	0	0	0	-142	-71,507
Stock changes	4,481	0	0	0	0	0	0	0	4,481
Total primary energy supply	**343,188**	**232,021**	**-53,254**	**48,943**	**8,920**	**11,608**	**5,798**	**339**	**597,564**
Statistical differences	6,308	13,632	-9,923	1,325	0	0	0	-1,091	10,251
Main activity producer electricity plants	-194,980	0	-1,390	-10,379	-8,920	-11,597	-5,635	88,292	-144,609
Autoproducer electricity plants	0	0	0	0	0	-11	-164	12,813	12,638
Oil refineries	0	-227,391	224,632	0	0	0	0	0	-2,760
Energy industry own use	0	0	0	-15,669	0	0	0	-6,034	-21,703
Losses	0	-18,261	0	-62	0	0	0	-19,137	-37,460
Final consumption	**154,516**	**0**	**160,065**	**24,158**	**0**	**0**	**0**	**75,182**	**413,921**
Industry	**154,516**	**0**	**31,466**	**240**	**0**	**0**	**0**	**33,060**	**219,282**
Iron and steel	37,649	0	771	0	0	0	0	0	38,419
Chemical and petrochemical	1,389	0	11,431	0	0	0	0	0	12,820
Non-ferrous metals	0	0	250	0	0	0	0	0	250
Machinery	0	0	122	0	0	0	0	0	122
Mining and quarrying	0	0	943	0	0	0	0	0	943
Paper, pulp and print	1,297	0	0	0	0	0	0	0	1,297
Construction	8,957	0	390	0	0	0	0	0	9,346
Textile and leather	357	0	104	0	0	0	0	0	460
Non-specified (industry)	104,869	0	17,457	240	0	0	0	33,060	155,625
Transport	**0**	**0**	**28,023**	**5,773**	**0**	**0**	**0**	**1,336**	**35,133**
Road	0	0	18,767	5,431	0	0	0	0	24,198
Domestic aviation	0	0	5,865	0	0	0	0	0	5,865
Rail	0	0	2,724	0	0	0	0	1,336	4,060
Pipeline transport	0	0	0	342	0	0	0	0	342
Domestic navigation	0	0	667	0	0	0	0	0	667
Non-specified (transport)	0	0	0	0	0	0	0	0	0
Other	**0**	**0**	**100,575**	**1,083**	**0**	**0**	**0**	**40,786**	**142,444**
Residential	0	0	23,239	0	0	0	0	17,186	40,426
Commercial and public services	0	0	107	0	0	0	0	6,385	6,492
Agriculture/forestry	0	0	520	180	0	0	0	13,136	13,836
Non-specified (other)	0	0	76,710	903	0	0	0	4,078	81,691
Non-energy use	**0**	**0**	**0**	**17,062**	**0**	**0**	**0**	**0**	**17,062**
Non-energy use industry/transformation/energy	0	0	0	17,062	0	0	0	0	17,062
Non-energy use in transport	0	0	0	0	0	0	0	0	0
Non-energy use in other	0	0	0	0	0	0	0	0	0
Elect. output in GWh	**0**	**0**	**0**	**0**	**34,228**	**134,977**	**67,422**	**0**	**236,627**
Elec output-main activity producer ele plants	0	0	0	0	34,228	134,848	65,520	0	234,595
Elec output-autoproducer electricity plants	0	0	0	0	0	129	1,903	0	2,032

Final consumption refers to End Use Consumption

Includes lignite

Annexure- IV

Table-III: Energy Balance of India for 2014-15 (Final)

All figures in KToE

	Coal #	Crude Oil	Oil Products	Natural Gas	Nuclear	Hydro	Solar, Wind, Others	Electricity	Total
Production	274,301	38,285	0	30,960	9,408	11,127	6,555	0	370,637
Imports	110,187	193,602	20,887	17,115	0	0	0	431	342,222
Exports	-835	0	-66,210	0	0	0	0	-381	-67,426
Stock changes	-2,742	0	0	0	0	0	0	0	-2,742
Total primary energy supply	**380,911**	**231,887**	**-45,323**	**48,075**	**9,408**	**11,127**	**6,555**	**49**	**642,690**
Statistical differences	7,464	14,323	-11,424	645	0	0	0	-1,255	9,753
Main activity producer electricity plants	-215,967	0	-1,187	-9,861	-9,408	-11,115	-6,326	96,049	-157,815
Autoproducer electricity plants	0	0	0	0	0	-12	-228	13,937	13,696
Oil refineries	0	-228,153	225,063	0	0	0	0	0	-3,090
Energy industry own use	0	0	0	-15,109	0	0	0	-6,559	-21,668
Losses	0	-18,058	0	-93	0	0	0	-20,649	-38,800
Final consumption	**172,407**	**0**	**167,129**	**23,657**	**0**	**0**	**0**	**81,573**	**444,767**
Industry	**172,407**	**0**	**33,543**	**490**	**0**	**0**	**0**	**35,978**	**242,418**
Iron and steel	38,943	0	823	0	0	0	0	0	39,766
Chemical and petrochemical	1,421	0	11,251	0	0	0	0	0	12,672
Non-ferrous metals	0	0	244	0	0	0	0	0	244
Machinery	0	0	112	0	0	0	0	0	112
Mining and quarrying	0	0	1,078	0	0	0	0	0	1,078
Paper, pulp and print	1,015	0	0	0	0	0	0	0	1,015
Construction	6,466	0	433	0	0	0	0	0	6,899
Textile and leather	877	0	127	0	0	0	0	0	1,004
Non-specified (industry)	123,686	0	19,473	490	0	0	0	35,978	179,627
Transport	**0**	**0**	**31,798**	**5,304**	**0**	**0**	**0**	**1,391**	**38,493**
Road	0	0	22,243	4,981	0	0	0	0	27,224
Domestic aviation	0	0	6,098	0	0	0	0	0	6,098
Rail	0	0	2,787	0	0	0	0	1,391	4,178
Pipeline transport	0	0	0	322	0	0	0	0	322
Domestic navigation	0	0	670	0	0	0	0	0	670
Non-specified (transport)	0	0	0	0	0	0	0	0	0
Other	**0**	**0**	**101,788**	**1,091**	**0**	**0**	**0**	**44,204**	**147,083**
Residential	0	0	24,989	0	0	0	0	18,697	43,685
Commercial and public services	0	0	60	0	0	0	0	6,742	6,801
Agriculture/forestry	0	0	655	166	0	0	0	14,527	15,347
Non-specified (other)	0	0	76,085	925	0	0	0	4,239	81,249
Non-energy use	**0**	**0**	**0**	**16,772**	**0**	**0**	**0**	**0**	**16,772**
Non-energy use industry/transformation/energy	0	0	0	16,772	0	0	0	0	16,772
Non-energy use in transport	0	0	0	0	0	0	0	0	0
Non-energy use in other	0	0	0	0	0	0	0	0	0
Elect. output in GWh	**0**	**0**	**0**	**0**	**36,102**	**129,388**	**76,220**	**0**	**241,710**
Elec output-main activity producer ele plants	0	0	0	0	36,102	129,244	73,563	0	238,908
Elec output-autoproducer electricity plants	0	0	0	0	0	145	2,656	0	2,801

Final consumption refers to End Use Consumption

Includes lignite

Annexure- IV

Table-IV: Energy Balance of India for 2015-16 (Final)

All figures in KToE

	Coal #	Crude Oil	Oil Products	Natural Gas	Nuclear	Hydro	Solar, Wind, Others	Electricity	Total
Production	285,600	37,754	0	29,665	9,750	10,448	5,833	0	379,050
Imports	107,058	207,313	28,362	19,674	0	0	0	451	362,859
Exports	-1,061	0	-62,952	0	0	0	0	-443	-64,456
Stock changes	-3,836	0	0	0	0	0	0	0	-3,836
Total primary energy supply	**387,761**	**245,067**	**-34,590**	**49,339**	**9,750**	**10,448**	**5,833**	**8**	**673,617**
Statistical differences	4,999	12,106	-14,566	144	0	0	0	-1,264	1,421
Main activity producer electricity plants	-223,875	0	-898	-10,017	-9,750	-10,438	-5,657	100,412	-160,223
Autoproducer electricity plants	0	0	0	0	0	-9	-176	14,480	14,295
Oil refineries	0	-237,987	236,171	0	0	0	0	0	-1,817
Energy industry own use	0	0	0	-13,812	0	0	0	-6,820	-20,632
Losses	0	-19,186	0	-108	0	0	0	-20,714	-40,008
Final consumption	**168,885**	**0**	**186,117**	**25,547**	**0**	**0**	**0**	**86,102**	**466,651**
Industry	**168,885**	**0**	**41,446**	**502**	**0**	**0**	**0**	**36,423**	**247,256**
Iron and steel	34,122	0	962	0	0	0	0	0	35,085
Chemical and petrochemical	1,379	0	12,239	0	0	0	0	0	13,618
Non-ferrous metals	0	0	226	0	0	0	0	0	226
Machinery	0	0	188	0	0	0	0	0	188
Mining and quarrying	0	0	1,276	0	0	0	0	0	1,276
Paper, pulp and print	735	0	0	0	0	0	0	0	735
Construction	4,907	0	732	0	0	0	0	0	5,640
Textile and leather	534	0	113	0	0	0	0	0	647
Non-specified (industry)	127,208	0	25,710	502	0	0	0	36,423	189,843
Transport	**0**	**0**	**36,562**	**5,403**	**0**	**0**	**0**	**1,427**	**43,392**
Road	0	0	26,376	5,026	0	0	0	0	31,402
Domestic aviation	0	0	6,672	0	0	0	0	0	6,672
Rail	0	0	2,821	0	0	0	0	1,427	4,249
Pipeline transport	0	0	0	377	0	0	0	0	377
Domestic navigation	0	0	693	0	0	0	0	0	693
Non-specified (transport)	0	0	0	0	0	0	0	0	0
Other	**0**	**0**	**108,109**	**866**	**0**	**0**	**0**	**48,252**	**157,227**
Residential	0	0	26,012	0	0	0	0	20,543	46,555
Commercial and public services	0	0	63	0	0	0	0	7,399	7,463
Agriculture/forestry	0	0	714	172	0	0	0	14,894	15,780
Non-specified (other)	0	0	81,320	694	0	0	0	5,416	87,430
Non-energy use	**0**	**0**	**0**	**18,776**	**0**	**0**	**0**	**0**	**18,776**
Non-energy use industry/transformation/energy	0	0	0	18,776	0	0	0	0	18,776
Non-energy use in transport	0	0	0	0	0	0	0	0	0
Non-energy use in other	0	0	0	0	0	0	0	0	0
Elect. output in GWh	**0**	**0**	**0**	**0**	**37,414**	**121,487**	**67,827**	**0**	**226,727**
Elec output-main activity producer ele plants	0	0	0	0	37,414	121,377	65,781	0	224,571
Elec output-autoproducer electricity plants	0	0	0	0	0	110	2,046	0	2,156

Final consumption refers to End Use Consumption

Includes lignite

Annexure- IV

Table-V: Energy Balance of India for 2016-17 (Final)

All figures in KToE

	Coal #	Crude Oil	Oil Products	Natural Gas	Nuclear	Hydro	Solar, Wind, Others	Electricity	Total
Production	290,296	36,801	0	29,340	9,881	10,537	7,209	0	384,064
Imports	101,178	218,638	34,412	22,858	0	0	0	483	377,568
Exports	-1,195	0	-68,246	0	0	0	0	-577	-70,018
Stock changes	-7,159	0	0	0	0	0	0	0	-7,159
Total primary energy supply	**383,119**	**255,439**	**-33,833**	**52,198**	**9,881**	**10,537**	**7,209**	**-94**	**684,456**
Statistical differences	8,210	15,832	-18,052	-36	0	0	0	-1,280	4,674
Main activity producer electricity plants	-231,348	0	-816	-10,685	-9,881	-10,524	-7,013	106,241	-164,027
Autoproducer electricity plants	0	0	0	0	0	-12	-196	14,796	14,588
Oil refineries	0	-250,760	248,176	0	0	0	0	0	-2,584
Energy industry own use	0	0	0	-13,777	0	0	0	-6,970	-20,747
Losses	0	-20,511	0	-66	0	0	0	-21,431	-42,008
Final consumption	**159,981**	**0**	**195,475**	**27,634**	**0**	**0**	**0**	**91,262**	**474,352**
Industry	**159,981**	**0**	**45,881**	**730**	**0**	**0**	**0**	**37,858**	**244,449**
Iron and steel	30,282	0	1,146	0	0	0	0	0	31,428
Chemical and petrochemical	1,288	0	12,308	0	0	0	0	0	13,596
Non-ferrous metals	0	0	271	0	0	0	0	0	271
Machinery	0	0	183	0	0	0	0	0	183
Mining and quarrying	0	0	1,335	0	0	0	0	0	1,335
Paper, pulp and print	741	0	0	0	0	0	0	0	741
Construction	3,557	0	741	0	0	0	0	0	4,298
Textile and leather	422	0	107	0	0	0	0	0	530
Non-specified (industry)	123,691	0	29,789	730	0	0	0	37,858	192,067
Transport	**0**	**0**	**39,347**	**7,194**	**0**	**0**	**0**	**1,349**	**47,890**
Road	0	0	28,455	6,761	0	0	0	0	35,216
Domestic aviation	0	0	7,456	0	0	0	0	0	7,456
Rail	0	0	2,742	0	0	0	0	1,349	4,091
Pipeline transport	0	0	0	433	0	0	0	0	433
Domestic navigation	0	0	694	0	0	0	0	0	694
Non-specified (transport)	0	0	0	0	0	0	0	0	0
Other	**0**	**0**	**110,247**	**867**	**0**	**0**	**0**	**52,055**	**163,170**
Residential	0	0	26,486	0	0	0	0	22,001	48,487
Commercial and public services	0	0	77	0	0	0	0	7,725	7,801
Agriculture/forestry	0	0	687	169	0	0	0	16,439	17,294
Non-specified (other)	0	0	82,998	699	0	0	0	5,890	89,587
Non-energy use	**0**	**0**	**0**	**18,842**	**0**	**0**	**0**	**0**	**18,842**
Non-energy use industry/transformation/energy	0	0	0	18,842	0	0	0	0	18,842
Non-energy use in transport	0	0	0	0	0	0	0	0	0
Non-energy use in other	0	0	0	0	0	0	0	0	0
Elect. output in GWh	**0**	**0**	**0**	**0**	**37,916**	**122,521**	**83,825**	**0**	**244,262**
Elec output-main activity producer ele plants	0	0	0	0	37,916	122,378	81,548	0	241,842
Elec output-autoproducer electricity plants	0	0	0	0	0	144	2,277	0	2,421

Final consumption refers to End Use Consumption

Includes lignite

Annexure- IV

Table-VI: Energy Balance of India for 2017-18 (Final)

All figures in KToE

	Coal #	Crude Oil	Oil Products	Natural Gas	Nuclear	Hydro	Solar, Wind, Others	Electricity	Total
Production	289,971	36,469	0	30,033	9,993	10,856	8,958	0	386,280
Imports	110,334	225,282	33,920	25,240	0	0	0	436	395,212
Exports	-1,014	0	-69,568	0	0	0	0	-619	-71,201
Stock changes	7,997	0	0	0	0	0	0	0	7,997
Total primary energy supply	**407,287**	**261,751**	**-35,647**	**55,273**	**9,993**	**10,856**	**8,958**	**-183**	**718,288**
Statistical differences	11,439	17,355	-15,525	-1,246	0	0	0	-1,389	10,634
Main activity producer electricity plants	-252,328	0	-745	-11,064	-9,993	-10,847	-8,758	112,097	-181,639
Autoproducer electricity plants	0	0	0	0	0	-10	-200	15,461	15,251
Oil refineries	0	-257,477	259,169	0	0	0	0	0	1,692
Energy industry own use	0	0	0	-14,320	0	0	0	-7,065	-21,385
Losses	0	-21,630	0	-87	0	0	0	-22,306	-44,022
Final consumption	**166,397**	**0**	**207,252**	**28,556**	**0**	**0**	**0**	**96,615**	**498,820**
Industry	**166,397**	**0**	**48,907**	**919**	**0**	**0**	**0**	**40,301**	**256,524**
Iron and steel	35,269	0	1,123	0	0	0	0	0	36,392
Chemical and petrochemical	1,137	0	12,011	0	0	0	0	0	13,147
Non-ferrous metals	0	0	273	0	0	0	0	0	273
Machinery	0	0	176	0	0	0	0	0	176
Mining and quarrying	0	0	1,368	0	0	0	0	0	1,368
Paper, pulp and print	967	0	0	0	0	0	0	0	967
Construction	4,452	0	853	0	0	0	0	0	5,305
Textile and leather	685	0	78	0	0	0	0	0	763
Non-specified (industry)	123,888	0	33,025	919	0	0	0	40,301	198,132
Transport	**0**	**0**	**43,121**	**8,353**	**0**	**0**	**0**	**1,499**	**52,973**
Road	0	0	31,063	7,897	0	0	0	0	38,959
Domestic aviation	0	0	8,134	0	0	0	0	0	8,134
Rail	0	0	2,726	0	0	0	0	1,499	4,226
Pipeline transport	0	0	0	456	0	0	0	0	456
Domestic navigation	0	0	1,199	0	0	0	0	0	1,199
Non-specified (transport)	0	0	0	0	0	0	0	0	0
Other	**0**	**0**	**115,224**	**907**	**0**	**0**	**0**	**54,815**	**170,946**
Residential	0	0	26,599	0	0	0	0	23,525	50,124
Commercial and public services	0	0	96	0	0	0	0	8,063	8,159
Agriculture/forestry	0	0	705	173	0	0	0	17,135	18,014
Non-specified (other)	0	0	87,823	734	0	0	0	6,092	94,649
Non-energy use	**0**	**0**	**0**	**18,377**	**0**	**0**	**0**	**0**	**18,377**
Non-energy use industry/transformation/energy	0	0	0	18,377	0	0	0	0	18,377
Non-energy use in transport	0	0	0	0	0	0	0	0	0
Non-energy use in other	0	0	0	0	0	0	0	0	0
Elect. output in GWh	**0**	**0**	**0**	**0**	**38,346**	**126,235**	**104,168**	**0**	**268,749**
Elec output-main activity producer ele plants	0	0	0	0	38,346	126,123	101,839	0	266,308
Elec output-autoproducer electricity plants	0	0	0	0	0	112	2,328	0	2,441

Final consumption refers to End Use Consumption

Includes lignite

Annexure- IV

Table-VII: Energy Balance of India for 2018-19 (Final)

All figures in KToE

	Coal #	Crude Oil	Oil Products	Natural Gas	Nuclear	Hydro	Solar, Wind, Others	Electricity	Total
Production	310,731	34,956	0	30,239	9,854	11,624	11,217	0	408,621
Imports	123,696	231,480	33,120	26,437	0	0	0	378	415,111
Exports	-898	0	-63,507	0	0	0	0	-728	-65,134
Stock changes	2,900	0	0	0	0	0	0	0	2,900
Total primary energy supply	**436,430**	**266,436**	**-30,388**	**56,676**	**9,854**	**11,624**	**11,217**	**-350**	**761,499**
Statistical differences	18,321	18,353	-20,292	-1,532	0	0	0	-1,484	13,365
Main activity producer electricity plants	-267,302	0	-849	-11,043	-9,854	-11,601	-10,901	117,973	-193,577
Autoproducer electricity plants	0	0	0	0	0	-23	-316	18,324	17,985
Oil refineries	0	-262,863	267,135	0	0	0	0	0	4,272
Energy industry own use	0	0	0	-15,136	0	0	0	-7,171	-22,308
Losses	0	-21,926	0	-86	0	0	0	-23,234	-45,246
Final consumption	**187,449**	**0**	**215,606**	**28,879**	**0**	**0**	**0**	**104,058**	**535,991**
Industry	**187,449**	**0**	**51,252**	**999**	**0**	**0**	**0**	**44,651**	**284,351**
Iron and steel	41,103	0	1,175	0	0	0	0	0	42,279
Chemical and petrochemical	958	0	12,635	0	0	0	0	0	13,592
Non-ferrous metals	0	0	407	0	0	0	0	0	407
Machinery	0	0	192	0	0	0	0	0	192
Mining and quarrying	0	0	1,589	0	0	0	0	0	1,589
Paper, pulp and print	1,014	0	0	0	0	0	0	0	1,014
Construction	5,325	0	1,078	0	0	0	0	0	6,403
Textile and leather	705	0	77	0	0	0	0	0	782
Non-specified (industry)	138,344	0	34,100	999	0	0	0	44,651	218,094
Transport	**0**	**0**	**46,479**	**8,966**	**0**	**0**	**0**	**1,620**	**57,065**
Road	0	0	33,398	8,468	0	0	0	0	41,866
Domestic aviation	0	0	8,845	0	0	0	0	0	8,845
Rail	0	0	2,809	0	0	0	0	1,620	4,429
Pipeline transport	0	0	0	497	0	0	0	0	497
Domestic navigation	0	0	1,427	0	0	0	0	0	1,427
Non-specified (transport)	0	0	0	0	0	0	0	0	0
Other	**0**	**0**	**117,875**	**980**	**0**	**0**	**0**	**57,787**	**176,642**
Residential	0	0	27,755	0	0	0	0	24,789	52,544
Commercial and public services	0	0	97	0	0	0	0	8,448	8,544
Agriculture/forestry	0	0	782	177	0	0	0	18,353	19,312
Non-specified (other)	0	0	89,241	804	0	0	0	6,197	96,241
Non-energy use	**0**	**0**	**0**	**17,934**	**0**	**0**	**0**	**0**	**17,934**
Non-energy use industry/transformation/energy	0	0	0	17,934	0	0	0	0	17,934
Non-energy use in transport	0	0	0	0	0	0	0	0	0
Non-energy use in other	0	0	0	0	0	0	0	0	0
Elect. output in GWh	**0**	**0**	**0**	**0**	**37,813**	**135,164**	**130,433**	**0**	**303,409**
Elec output-main activity producer ele plants	0	0	0	0	37,813	134,894	126,759	0	299,465
Elec output-autoproducer electricity plants	0	0	0	0	0	270	3,674	0	3,944

Final consumption refers to End Use Consumption

Includes lignite

Annexure- IV

Table-VIII: Energy Balance of India for 2019-20 (Final)

All figures in KToE

	Coal #	Crude Oil	Oil Products	Natural Gas	Nuclear	Hydro	Solar, Wind, Others	Electricity	Total
Production	308,652	32,877	0	28,685	12,111	13,426	12,440	0	408,191
Imports	130,997	231,947	43,047	31,171	0	0	0	546	437,708
Exports	-715	0	-68,496	0	0	0	0	-816	-70,027
Stock changes	-13,759	0	0	0	0	0	0	0	-13,759
Total primary energy supply	**425,175**	**264,824**	**-25,449**	**59,856**	**12,111**	**13,426**	**12,440**	**-270**	**762,113**
Statistical differences	21,116	19,290	-24,702	-2,262	0	0	0	-1,527	11,916
Main activity producer electricity plants	-267,636	0	-877	-10,192	-12,111	-13,396	-11,897	118,974	-197,135
Autoproducer electricity plants	0	0	0	0	0	-30	-543	20,603	20,030
Oil refineries	0	-259,982	267,734	0	0	0	0	0	7,752
Energy industry own use	0	0	0	-16,600	0	0	0	-7,164	-23,764
Losses	0	-24,132	0	-62	0	0	0	-23,280	-47,475
Final consumption	**178,656**	**0**	**216,706**	**30,740**	**0**	**0**	**0**	**107,335**	**533,437**
Industry	**178,656**	**0**	**51,332**	**644**	**0**	**0**	**0**	**45,822**	**276,455**
Iron and steel	39,936	0	1,089	0	0	0	0	0	41,024
Chemical and petrochemical	948	0	12,593	0	0	0	0	0	13,541
Non-ferrous metals	0	0	336	0	0	0	0	0	336
Machinery	0	0	165	0	0	0	0	0	165
Mining and quarrying	0	0	1,688	0	0	0	0	0	1,688
Paper, pulp and print	837	0	0	0	0	0	0	0	837
Construction	4,903	0	1,092	0	0	0	0	0	5,995
Textile and leather	82	0	63	0	0	0	0	0	145
Non-specified (industry)	131,949	0	34,306	644	0	0	0	45,822	212,722
Transport	**0**	**0**	**47,806**	**10,494**	**0**	**0**	**0**	**1,647**	**59,947**
Road	0	0	35,135	10,011	0	0	0	0	45,146
Domestic aviation	0	0	8,524	0	0	0	0	0	8,524
Rail	0	0	2,627	0	0	0	0	1,647	4,273
Pipeline transport	0	0	0	483	0	0	0	0	483
Domestic navigation	0	0	1,520	0	0	0	0	0	1,520
Non-specified (transport)	0	0	0	0	0	0	0	0	0
Other	**0**	**0**	**117,568**	**973**	**0**	**0**	**0**	**59,866**	**178,408**
Residential	0	0	28,228	0	0	0	0	26,552	54,780
Commercial and public services	0	0	86	0	0	0	0	9,120	9,206
Agriculture/forestry	0	0	751	184	0	0	0	18,171	19,107
Non-specified (other)	0	0	88,503	789	0	0	0	6,023	95,315
Non-energy use	**0**	**0**	**0**	**18,628**	**0**	**0**	**0**	**0**	**18,628**
Non-energy use industry/transformation/energy	0	0	0	18,628	0	0	0	0	18,628
Non-energy use in transport	0	0	0	0	0	0	0	0	0
Non-energy use in other	0	0	0	0	0	0	0	0	0
Elect. output in GWh	**0**	**0**	**0**	**0**	**46,472**	**156,117**	**144,647**	**0**	**347,237**
Elec output-main activity producer ele plants	0	0	0	0	46,472	155,769	138,337	0	340,579
Elec output-autoproducer electricity plants	0	0	0	0	0	348	6,310	0	6,659

Final consumption refers to End Use Consumption

Includes lignite

Annexure- IV

Table-IX: Energy Balance of India for 2020-21 (Final)

All figures in KToE

	Coal #	Crude Oil	Oil Products	Natural Gas	Nuclear	Hydro	Solar, Wind, Others	Electricity	Total
Production	297,775	31,165	0	26,522	11,214	12,955	13,279	0	392,909
Imports	115,541	200,783	42,915	30,554	0	0	0	821	390,614
Exports	-2,026	0	-59,090	0	0	0	0	-823	-61,939
Stock changes	-11,521	0	0	0	0	0	0	0	-11,521
Total primary energy supply	**399,768**	**231,947**	**-16,174**	**57,076**	**11,214**	**12,955**	**13,279**	**-2**	**710,062**
Statistical differences	16,570	18,012	-23,136	194	0	0	0	-1,285	10,356
Main activity producer electricity plants	-243,521	0	-769	-10,023	-11,214	-12,926	-12,663	118,094	-173,021
Autoproducer electricity plants	0	0	0	0	0	-29	-616	19,335	18,690
Oil refineries	0	-226,652	237,827	0	0	0	0	0	11,175
Energy industry own use	0	0	0	-16,844	0	0	0	-6,921	-23,765
Losses	0	-23,308	0	-62	0	0	0	-23,424	-46,794
Final consumption	**172,818**	**0**	**197,748**	**30,341**	**0**	**0**	**0**	**105,798**	**506,704**
Industry	**172,818**	**0**	**47,051**	**513**	**0**	**0**	**0**	**43,755**	**264,137**
Iron and steel	36,805	0	984	0	0	0	0	0	37,790
Chemical and petrochemical	806	0	12,923	0	0	0	0	0	13,729
Non-ferrous metals	0	0	348	0	0	0	0	0	348
Machinery	0	0	149	0	0	0	0	0	149
Mining and quarrying	0	0	1,792	0	0	0	0	0	1,792
Paper, pulp and print	680	0	0	0	0	0	0	0	680
Construction	3,860	0	1,256	0	0	0	0	0	5,116
Textile and leather	108	0	57	0	0	0	0	0	165
Non-specified (industry)	130,558	0	29,542	513	0	0	0	43,755	204,368
Transport	**0**	**0**	**38,331**	**8,944**	**0**	**0**	**0**	**1,261**	**48,537**
Road	0	0	31,608	8,538	0	0	0	0	40,146
Domestic aviation	0	0	3,941	0	0	0	0	0	3,941
Rail	0	0	1,264	0	0	0	0	1,261	2,526
Pipeline transport	0	0	0	406	0	0	0	0	406
Domestic navigation	0	0	1,517	0	0	0	0	0	1,517
Non-specified (transport)	0	0	0	0	0	0	0	0	0
Other	**0**	**0**	**112,365**	**996**	**0**	**0**	**0**	**60,782**	**174,143**
Residential	0	0	29,963	0	0	0	0	28,450	58,413
Commercial and public services	0	0	68	0	0	0	0	7,478	7,546
Agriculture/forestry	0	0	719	164	0	0	0	19,032	19,915
Non-specified (other)	0	0	81,615	832	0	0	0	5,822	88,269
Non-energy use	**0**	**0**	**0**	**19,887**	**0**	**0**	**0**	**0**	**19,887**
Non-energy use industry/transformation/energy	0	0	0	19,887	0	0	0	0	19,887
Non-energy use in transport	0	0	0	0	0	0	0	0	0
Non-energy use in other	0	0	0	0	0	0	0	0	0
Elect. output in GWh	**0**	**0**	**0**	**0**	**43,029**	**150,639**	**154,405**	**0**	**348,073**
Elec output-main activity producer ele plants	0	0	0	0	43,029	150,300	147,248	0	340,576
Elec output-autoproducer electricity plants	0	0	0	0	0	339	7,158	0	7,497

Final consumption refers to End Use Consumption

Includes lignite

Annexure-IV

Table-X: Energy Balance of India for 2021-22 (Final)

All figures in KToE

	Coal	Lignite	Crude Oil	Oil Products	Natural Gas	Nuclear	Hydro	Solar, Wind, Others	Electricity	Total
Production	312,681	10,828	30,344	0	31,471	12,278	13,071	15,284	0	425,957
Imports	115,989	3	217,054	39,912	28,701	0	0	0	686	402,343
Exports	-886	-4	0	-65,588	0	0	0	0	-795	-67,274
Stock changes	16,917	363	0	0	0	0	0	0	0	17,280
Total primary energy supply	**444,701**	**11,190**	**247,397**	**-25,677**	**60,172**	**12,278**	**13,071**	**15,284**	**-110**	**778,307**
Statistical differences	688	2	24,500	-26,525	2,128	0	0	0	-1,424	-632
Main activity producer electricity plants	-285,689	-8,837	0	-863	-9,395	-12,278	-13,040	-14,698	127,664	-217,136
Autoproducer electricity plants	0	0	0	0	0	0	-31	-586	18,001	17,384
Oil refineries	0	0	-247,021	259,358	0	0	0	0	0	12,337
Energy industry own use	0	0	0	0	-18,784	0	0	0	-7,461	-26,246
Losses	0	0	-24,876	0	-87	0	0	0	-23,428	-48,392
Final consumption	**159,700**	**2,355**	**0**	**206,293**	**34,033**	**0**	**0**	**0**	**113,242**	**515,623**
Industry	**159,700**	**2,355**	**0**	**45,286**	**767**	**0**	**0**	**0**	**47,857**	**255,964**
Iron and steel	37,820	60	0	1,136	0	0	0	0	0	39,016
Chemical and petrochemical	656	0	0	13,507	0	0	0	0	0	14,163
Non-ferrous metals	0	0	0	413	0	0	0	0	0	413
Machinery	0	0	0	164	0	0	0	0	0	164
Mining and quarrying	0	0	0	1,731	0	0	0	0	0	1,731
Paper, pulp and print	625	480	0	0	0	0	0	0	0	1,105
Construction	3,681	612	0	965	0	0	0	0	0	5,258
Textile and leather	40	474	0	280	0	0	0	0	0	794
Non-specified (industry)	116,877	729	0	27,091	767	0	0	0	47,857	193,321
Transport	**0**	**0**	**0**	**43,912**	**11,712**	**0**	**0**	**0**	**1,886**	**57,510**
Road	0	0	0	35,073	11,262	0	0	0	0	46,335
Domestic aviation	0	0	0	5,338	0	0	0	0	0	5,338
Rail	0	0	0	1,810	0	0	0	0	1,886	3,696
Pipeline transport	0	0	0	0	450	0	0	0	0	450
Domestic navigation	0	0	0	1,691	0	0	0	0	0	1,691
Non-specified (transport)	0	0	0	0	0	0	0	0	0	0
Other	**0**	**0**	**0**	**117,096**	**1,134**	**0**	**0**	**0**	**63,498**	**181,728**
Residential	0	0	0	30,160	0	0	0	0	29,221	59,381
Commercial and public services	0	0	0	67	0	0	0	0	8,352	8,419
Agriculture/forestry	0	0	0	671	144	0	0	0	19,647	20,462
Non-specified (other)	0	0	0	86,198	990	0	0	0	6,278	93,466
Non-energy use	**0**	**0**	**0**	**0**	**20,421**	**0**	**0**	**0**	**0**	**20,421**
Non-energy use industry/transformation/energy	0	0	0	0	20,421	0	0	0	0	20,421
Non-energy use in transport	0	0	0	0	0	0	0	0	0	0
Non-energy use in other	0	0	0	0	0	0	0	0	0	0
Elect. output in GWh	**0**	**0**	**0**	**0**	**0**	**47,112**	**151,984**	**177,725**	**0**	**376,821**
Elec output-main activity producer ele plants	0	0	0	0	0	47,112	151,627	170,912	0	369,652
Elec output-autoproducer electricity plants	0	0	0	0	0	0	357	6,813	0	7,170

Final consumption refers to End Use Consumption

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