



सत्यमेव जयते



Data for Development

ENERGY STATISTICS INDIA 2024



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



कल सिंह
महानिदेशक
Kal Singh
Director General



भारत सरकार
Government of India
सांख्यिकी एवं कार्यक्रम कार्यान्वयन मंत्रालय
Ministry of Statistics & Programme Implementation
खुरशीद लाल भवन, जनपथ, नई दिल्ली-110001
Khurshid Lal Bhawan, Janpath, New Delhi-110001
फोन / Tel (O) : +91-11-23742026 मोबा / Mob : 9953021881
ईमेल / Email : dg-es.cso@mospi.gov.in



FOREWORD

Energy is fundamental to human development—from industrial revolution to contribution to near-continuous economic growth of the recent times; the part played by energy as an enabler of modern development and growth can only be described as 'Foundational'.

In 2015, 193 Member States of the United Nations including India, committed to the Post-2015 Development Agenda, adopted with the motto of "No one left behind" and pledging to make our world more prosperous, inclusive, sustainable and resilient. The Goal-7 thereof acknowledges the role of access to affordable, reliable and modern energy services for sustainable path to prosperity and welfare of the most vulnerable.

Deploying renewables and energy-efficient technologies can spur innovation and reinforce local, regional and national industrial and employment objectives. In India, ensuring Indian citizens have access to power and clean cooking by shifting to renewable and efficient modern energy systems; has been at the top of the Country's policy initiatives. Hon'ble Prime Minister of India echoed this sentiment at the UN Summit 2015 recognizing that "We are focusing on the basics: housing, power, water and sanitation for all – important not just for welfare, but also human dignity".

This publication of Energy Statistics, the 31st in the series, presents an integrated database on Energy Statistics in the country against the financial year 2022-23. Keeping in view the importance of collated statistics of energy resources, this repository serves as a vital instrument in providing a holistic picture of the changing energy scenario of the country. The data in the publication is sourced from different source Ministries/Departments of the Government of India including Ministry of Power, Ministry of Coal, Ministry of Petroleum & Natural Gas and Ministry of New and Renewable Energy etc.

The publication presents a wide portfolio of data on reserves, capacity, production, trade, prices, consumption and energy efficiency parameters and also incorporates environmental impacts of energy systems from the combustion of fuels and fugitive emissions which impact climate changes and stability of different ecosystems.

I hope the publication provides enough evidence to the policy makers in the field of Energy for formulation of key approaches and the needed course corrections on the pathway to sustainable and reliable energy for all.

New Delhi
14th March 2024


(Kal Singh)



डॉ दलीप सिंह, भा.सां.से.
अपर महानिदेशक
आर्थिक सांख्यिकी प्रभाग
Dr. Dalip Singh, ISS
Additional Director General
Economic Statistics Division



भारत सरकार
Government of India
सांख्यिकी एवं कार्यक्रम कार्यान्वयन मंत्रालय
Ministry of Statistics and Programme
Implementation
कमरा नं. 116, खुर्शीद लाल भवन, जनपथ
Room No. 116, Khurshid Lal Bhawan, Janpath
नई दिल्ली-110001 / New Delhi-110001
फोन /Tel.: 011-23455116
ई-मेल / Emails: daleep.s@nic.in
adg.esd@mospi.gov.in



FOREWORD

In the era of rapid development, the need of Energy is indispensable. The growth story of India from being a developing country to becoming a developed country signifies the dynamic economic evolution over time. Energy statistics play a pivotal role in shaping policies, strategies, and investments in the energy sector. They provide valuable insights into the production, consumption, and distribution of energy resources, helping governments, industries, and researchers make informed decisions.

Starting from formation of policies, market analysis, measuring the environmental impact, the resource analysis, international comparison for meeting different commitments; the systematic capturing and dissemination of Energy Statistics of a nation is considered to be the integral part for shaping its' economic prosperity.

The 31st Edition of the publication *Energy Statistics India - 2024*, which has been bought out by the Economic Statistics Division (ESD) under Ministry of Statistics and Programme Implementation, contains a detailed information related to reserve, potential for energy generations, production, international trade and sectoral end-use consumption of all the energy commodities. The required statistics have been sourced from the concerned energy Ministries like Ministry of Power, Ministry of Coal, Ministry of Petroleum & Natural Gas and Ministry of New and Renewable Energy etc. The publication also contains *Energy Commodity Balance*, *Energy Balance*, *Sankey Diagram* which are as per the International Guidelines mentioned under IRES (International Recommendation for Energy Statistics). Also, different *Sustainable Energy Indicators* against *Economic Dimension* are computed as per the International standards.

I firmly believe that, this publication will be of great use for all the stakeholders for planning their future policies and understanding the flow of energy in India. Also, the indicators like *Sectoral Energy Intensity*, *Fuel Share in Consumption/Supply* etc. will help us to understand the existing energy flow pattern and to guide our way to sustainability.

I personally congratulate all the officers who were involved in the process of finalizing the 31st edition of the publication and also would like to extend my thanks to all the stakeholders for providing valuable inputs for the improvement of the publication *Energy Statistics India -2024*.

--- 14th March 2024


Dr. Dalip Singh

Officers associated with the publication

Dr. Dalip Singh	Additional Director General
Janab Syed Iqbal Shuja Naqvi	Deputy Director General
Shri Indradeep Roy Chowdhury	Director
Shri Vijay Kumar	Junior Statistical Officer
Shri Pramod Ram	Junior Statistical Officer
Miss Parul Arora	Media Cell

Abbreviations and Acronyms

ATF	Aviation Turbine Fuel
BCM	Billion Cubic Metres
BT	Billion Tonne
CAGR	Compound Annual Growth Rate
CBFS	Carbon Black Feed Stock
CPEs	Centrally Planned Economies
EMEs	Emerging Market Economies (includes countries of South & Central America, Africa, Middle-east, Non-OECD Asia & Non-OECD Europe)
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
N.C.W.	Non-communist World
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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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.

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.

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.

Introduction

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/corncocks 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.

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.

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

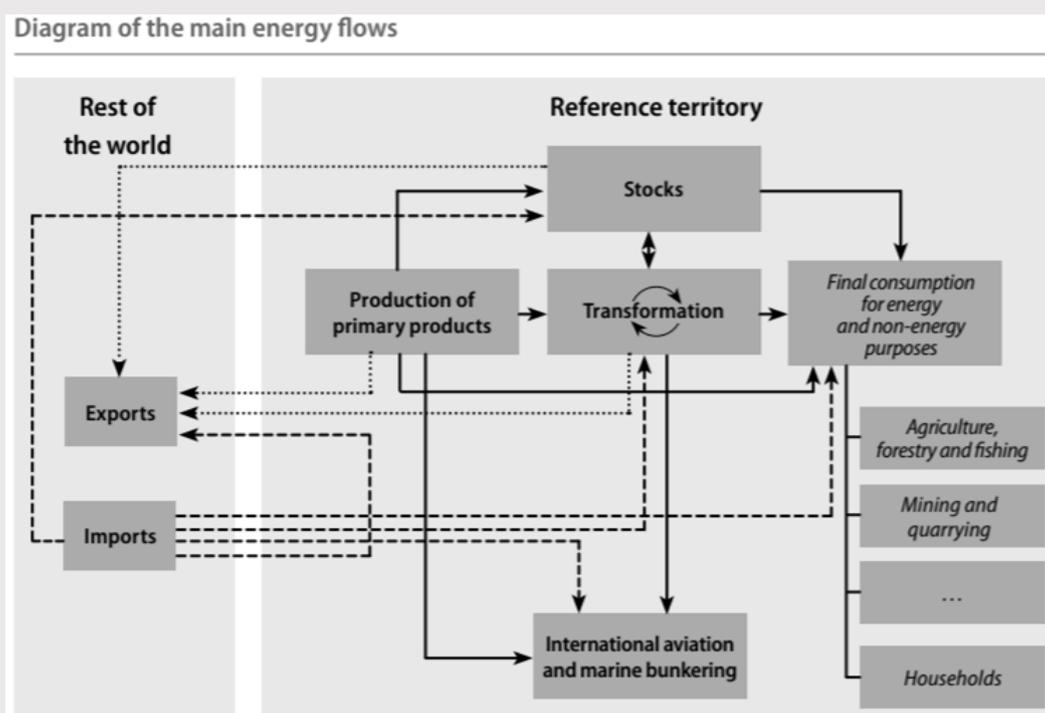
Energy products	Dimension	Unit
Solid fossil fuels	Mass	Thousand metric tons
Liquid fossil fuels	Mass	Thousand metric tons
(Liquid) Biofuels	Mass/Volume	Thousand metric tons/ Thousand cubic metres
Gases	Energy	Terajoules
Wastes	Energy	Terajoules
Fuelwood	Volume/ Energy	Thousand cubic metres/ Terajoules
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

Introduction

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.



Source: IRES, 2011, United Nations

The present publication, Energy Statistics India 2024, is fully compliant with the IRES 2011 and follows the practices prescribed therein.

The publication in its various chapters presents the concepts of production, consumption, trade, energy balance etc. The data is collected from various line Ministries/Departments of Government of India including Ministry of Coal, Ministry of Petroleum and Natural Gas, Ministry of Power, Ministry of New and Renewable Energy etc. Chapter 1 presents the reserves and potential for generation in the country, Chapter 2 focuses on Installed Capacity and capacity utilization, Chapter 3 gives the production statistics of various energy resources and products, Chapter 4 adds up the statistics on imports-exports and prices in the scenario, the final availability of energy in the country is then given in Chapter 5, and Chapter 6 highlights the consumption of energy sector/industry wise. The overall energy balance combining information of

Introduction

all the previous chapters are presented in Chapter 7 of the publication while chapter 8 looks at sustainability in energy.

This publication, the 31st in the series, is an updated and integrated repository of statistics on energy resources and highlights the India's commitment and the progress made so far in the area of reliable, sustainable and efficient energy systems in the country.

Chapter

Reserves and potential for generation

1



CHAPTER 1

Reserves and potential for generation

Reserves and Potential

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 of resources in focus.

Globally, the United Nations Framework Classification for Fossil Energy and Mineral Reserves and Resources (UNFC 2009) provides a scheme for classifying and evaluating these resources according to three dimensions, namely, their economic and social viability, the field project status and feasibility, and the geological knowledge about these resources. 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:

Categorization of mineral and energy resources relevant for energy

Class A: Commercially recoverable resources

Class B: Potentially commercially recoverable resources

Class C: Non - commercial and other known deposits

Thus, primary energy production relies on 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 mostly when extraction and sale have been confirmed to be economically viable.

A good measure of the overall resource and the geographical and technical potential of what can be produced is also often represented by the potential in case of renewable power.

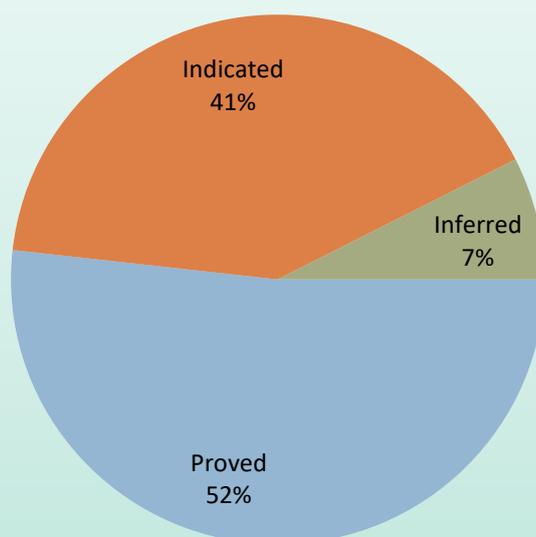
India has one of the largest proven coal reserves in the world. However, one of the objectives of India's energy mix has been to promote the production of energy through the use of renewable energy sources in accordance with climate, environment and macroeconomic considerations in order to reduce dependence on fossil fuels, ensure security of supply and reduce emissions of CO₂ and other greenhouse gases.

This chapter presents data on these reserves and potential in a concise form.

Highlights

- India has rich deposits of coal in the world. Total estimated reserves of coal as on 01-04-2022 were 361.41 billion tonnes, an addition of 9.29 billion tonnes over the corresponding period of previous year. In terms of percentage, there has been a growth of 2.64% in the total estimated coal reserves during the year 2022-23 over 2021-22 (Table 1.1.).
- The top three states with highest coal reserves in India are Odisha, Jharkhand, Chhattisgarh, which account for approximately 69% of the total coal reserves in the country.
- Out of the total reserves in the country, proven reserves i.e. those available for extraction in terms of i.e. economically viability, feasibility study and geologically exploration level, account for almost 52% of the total as depicted below in Fig 1.1.

Fig 1.1 Estimated Reserves of Coal in India as on 01.04.2022

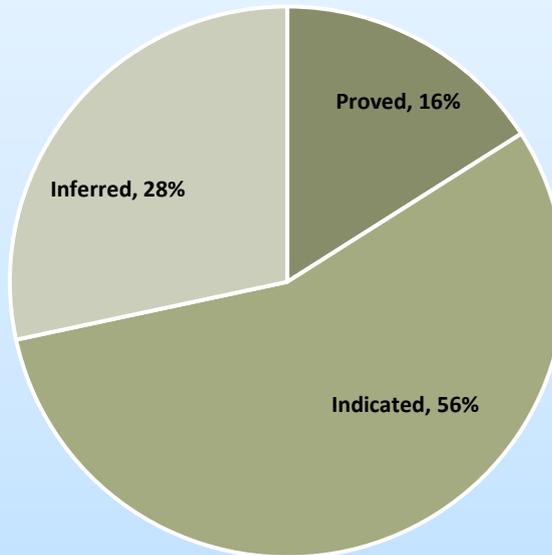


Total Estimated Reserves = 361.41 Billion

- Total estimated of lignite as on 01-04-2022 were 46.20 billion tonnes, an addition of 0.19 billion tonnes over the corresponding period of previous year. In terms of percentage, there has been a growth of 0.40% in the total estimated lignite reserves during the year 2022-23 over 2021-22 (Table 1.1A). The highest reserves of lignite are found in the state of Tamil Nadu. Out of the total Lignite reserves in the country, proven reserves account for almost only 16% of the total as depicted below in Fig 1.2.

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

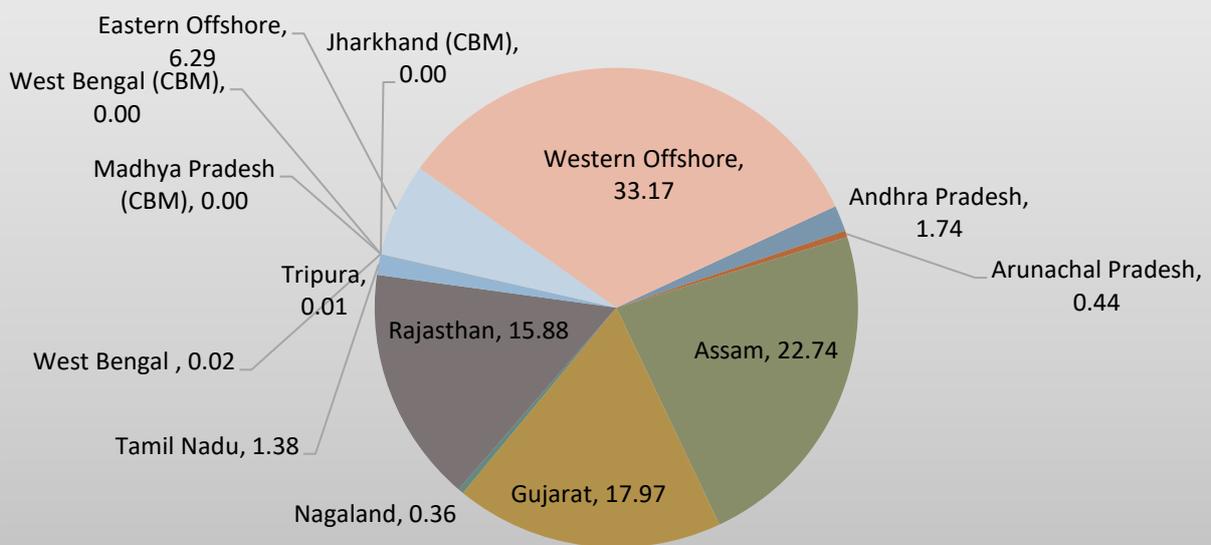
Fig 1.2 Estimated Reserves of Lignite in India as on 01.04.2022



Total Estimated Reserves = 46.20 Billion Tonnes

- The estimated reserves of crude oil in India as on 01-04-2022 stood at 653.02 million tonnes against 591.92 million tonnes in the previous year. An increase of over 10% over last year. Geographical distribution of Crude Oil indicates that the maximum reserves are in the Western Offshore (33%) followed by Assam (23%) (Table 1.2).

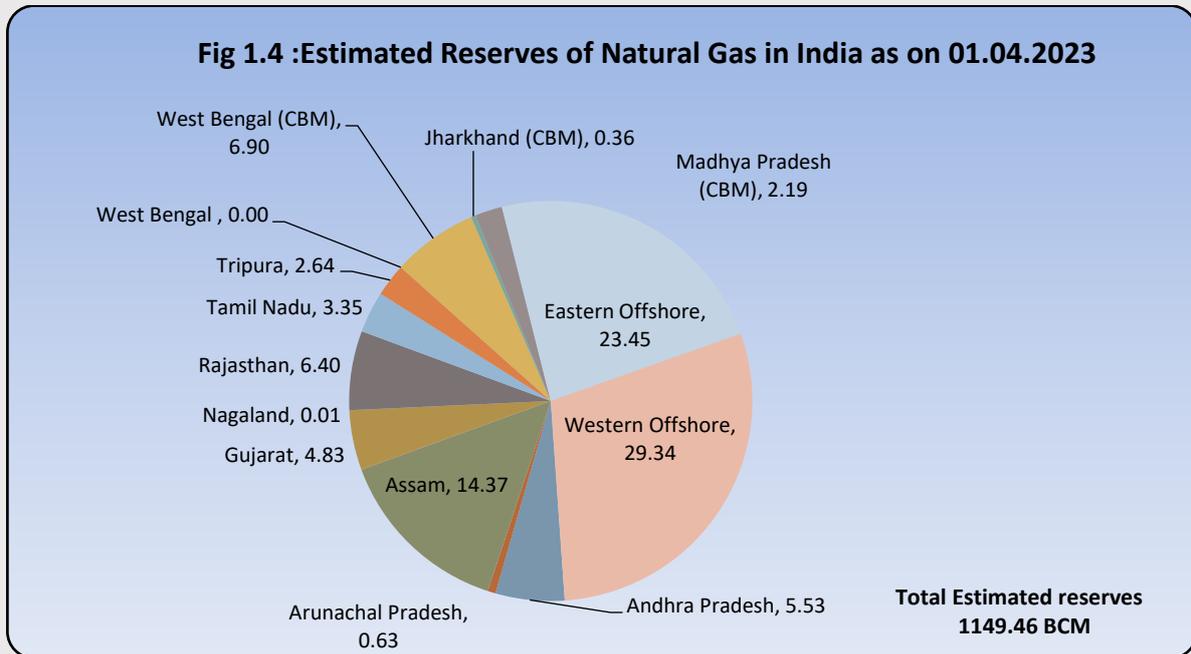
Fig 1.3: Estimated Reserves of Crude Oil in India as on 01.04.2023



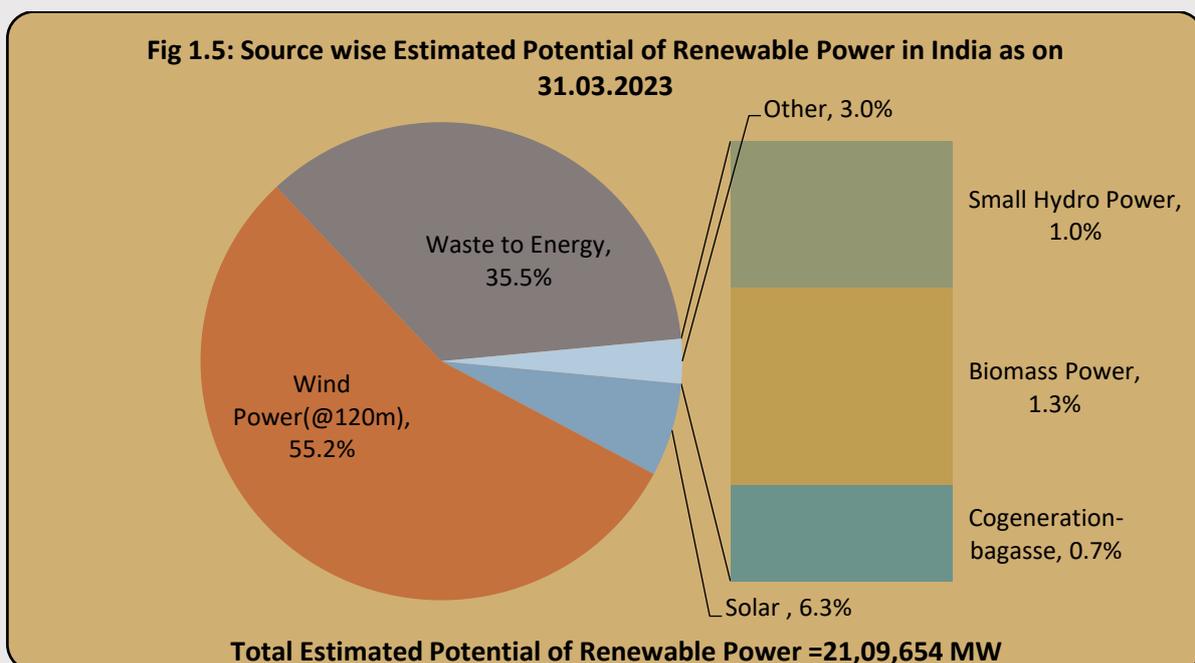
Total Estimated reserves 651.77 Million

Chapter 1: Reserves and Potential for Generation

- The estimated reserves of Natural Gas as on 01-04-2022 was at 1149.46 Billion Cubic Meters. The maximum reserves of Natural Gas are in the Western Offshore (29.3%) followed by Eastern offshore (23.4%).



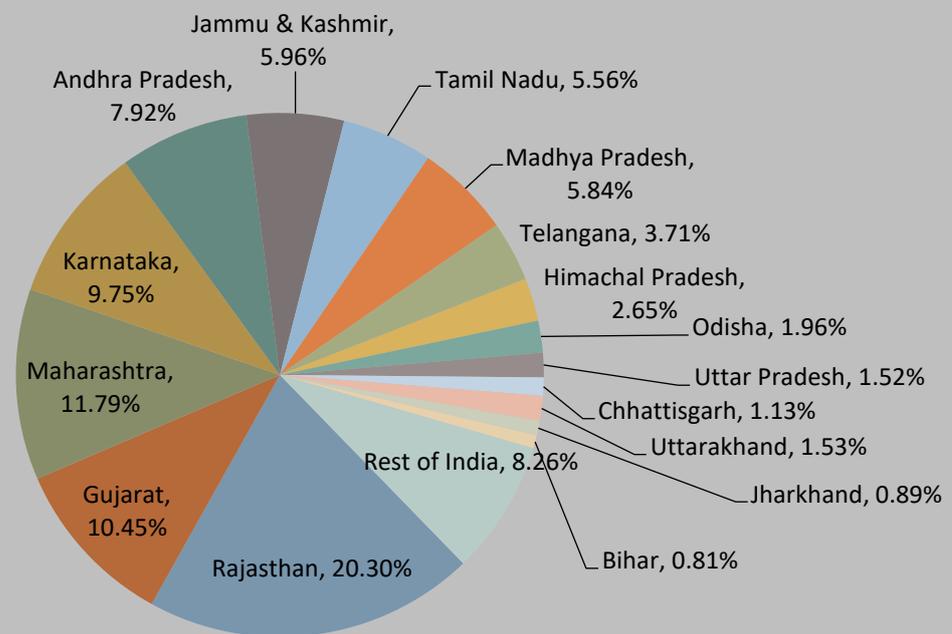
- There is a high potential for generation of renewable energy from various sources like wind, solar, biomass, small hydro and cogeneration bagasse in India. The total potential for renewable power generation in the country as on 31.03.2023 is estimated at 2,109,654 MW This includes solar power potential of 7,48,990 MW (35.50%), wind power potential of 1,163,856 MW (55.17%) at 150m hub height, large hydro power of 133,410MW (6.32%), SHP (small-hydro power) potential of 21,134 MW (1%), Biomass power of 28,447 MW (1.35%) and 13,818 MW (0.66%) from bagasse-based cogeneration in sugar mills (Table 1.3).



Chapter 1: Reserves and Potential for Generation

- The geographic distribution of the estimated potential of renewable power as on 31.03.2023 shows that Rajasthan has the highest share of about 20.3% (428322 MW). This is followed by Maharashtra with 11.79% (share 248665MW). Gujarat and Karnataka come next with a 10.45% and 9.75% share (220505 MW and 205648 MW respectively). These four (4) states are having more than 52% of the total potential of Renewable Power in India.

Fig 1.6: Statewise Estimated Potential of Renewable Power in India as on 31.03.2023



Total Estimated Potential of Renewable Power =21,09,654 MW

Chapter 1: Reserves and Potential for Generation

Table 1.1: Statewise Estimated Reserves of Coal (as on 01st April)

(in Million Tonnes)

States/ UTs	Proved		Indicated		Inferred		Total		Distribution (%)	
	2021-22	2022-23	2021-22	2022-23	2021-22	2022-23	2021-22	2022-23	2021-22	2022-23
Andhra Pradesh	921	921	901	2,443	425	778	2,247	4,142	0.64	1.15
Arunachal Pradesh	31	31	40	40	19	19	90	90	0.03	0.02
Assam	465	465	57	57	3	3	525	525	0.15	0.15
Bihar	310	310	3,143	4,080	11	48	3,464	4,437	0.98	1.23
Chhattisgarh	31,562	32,053	40,425	40,701	1,437	1,437	73,424	74,192	20.85	20.53
Jharkhand	52,046	53,245	28,882	28,260	5,288	5,155	86,217	86,660	24.48	23.98
Madhya Pradesh	13,479	14,052	13,060	12,723	3,678	4,142	30,217	30,917	8.58	8.55
Maharashtra	7,770	7,984	3,320	3,390	1,847	1,847	12,936	13,221	3.67	3.66
Meghalaya	89	89	17	17	471	471	576	576	0.16	0.16
Nagaland	9	9	22	22	416	448	446	478	0.13	0.13
Odisha	43,326	48,573	35,222	34,080	6,330	5,452	84,878	88,105	24.10	24.38
Sikkim	0	0	58	58	43	43	101	101	0.03	0.03
Uttar Pradesh	884	884	178	178	0	0	1,062	1,062	0.30	0.29
West Bengal	15,199	17,234	13,296	12,859	4,597	3,779	33,092	33,871	9.40	9.37
Telangana	11,089	11,257	8,328	8,344	3,433	3,433	22,851	23,034	6.49	6.37
All India Total	1,77,179	1,87,105	1,46,949	1,47,252	27,998	27,054	3,52,126	3,61,411	100	100
Distribution (%)	50.32	51.77	41.73	40.74	7.95	7.49	100	100		

Total may not tally due to rounding off

Source: Ministry of Coal

Table 1.1(A): Statewise Estimated Reserves of Lignite (as on 01st April)

(in Million Tonnes)

States/ UTs	Proved		Indicated		Inferred		Total		Distribution (%)	
	2021-22	2022-23	2021-22	2022-23	2021-22	2022-23	2021-22	2022-23	2021-22	2022-23
Gujarat	1279	1279	284	284	1160	1160	2722	2722	5.92	5.89
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	NA	0	NA	0	NA	6	NA	6	NA	0.01
Puducherry	0	0	406	406	11	11	417	417	0.91	0.90
Rajasthan	1169	1169	3030	3030	2151	2259	6349	6458	13.80	13.98
Tamil Nadu	4927	4927	21910	21981	9653	9653	36490	36561	79.29	79.13
West Bengal	0	0	1	1	3	3	4	4	0.01	0.01
All India	7374	7374	25651	25722	12994	13108	46018	46204	100	100
Distribution (%)	16.02	15.96	55.74	55.67	28.24	28.37	100	100		

Total may not tally due to rounding off

Source: Ministry of Coal

Chapter 1: Reserves and Potential for Generation

Table 1.2: Statewise Estimated Reserves of Crude Oil and Natural Gas (as on 01st April)

States/ UTs/ Region	Crude Oil (Million Tonnes)				Natural Gas (Billion Cubic Metres)			
	2021-22		2022-23		2021-22		2022-23	
	Estimated Reserves	Distribution (%)	Estimated Reserves	Distribution (%)	Estimated Reserves	Distribution (%)	Estimated Reserves	Distribution (%)
Andhra Pradesh	7.33	1.24	11.39	1.74	64.80	4.72	63.58	5.53
Arunachal Pradesh	3.64	0.61	2.89	0.44	3.14	0.23	7.30	0.63
Assam	153.05	25.86	148.47	22.74	166.55	12.14	165.13	14.37
Gujarat	115.41	19.50	117.37	17.97	57.22	4.17	55.55	4.83
Nagaland	2.38	0.40	2.38	0.36	0.09	0.01	0.09	0.01
Rajasthan	35.26	5.96	103.67	15.88	59.07	4.30	73.57	6.40
Tamil Nadu	9.01	1.52	8.98	1.38	37.90	2.76	38.46	3.35
Tripura	0.07	0.01	0.07	0.01	29.27	2.13	30.35	2.64
West Bengal	0.02	0.00	0.11	0.02	32.17	2.34	-	-
West Bengal (CBM)	-	-	-	0.00	-	-	79.33	6.90
Jharkhand (CBM)	-	-	-	-	8.56	0.62	4.12	0.36
Madhya Pradesh (CBM)	-	-	-	-	30.88	2.25	25.18	2.19
Eastern Offshore	42.96	7.26	41.07	6.29	557.07	40.59	269.50	23.45
Western Offshore	222.79	37.64	216.63	33.17	325.65	23.73	337.29	29.34
Total	591.92	100	653.02	100	1372.37	100	1149.46	100

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 1.3: Sourcewise and Statewise Estimated Potential of Renewable Power in India (as on 31.03.2023)

(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	Jammu & Kashmir	1 (Ladakh)	1707	83	0	111050	12972	125812	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		11,63,856	21,134	28,447	13,818	7,48,990	1,33,410	21,09,654	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

Source: Ministry of New and Renewable Energy

Chapter

2

Installed Capacity and Capacity Utilization



CHAPTER 2

Installed capacity and capacity utilization

Installed capacity

The world in its commitment to sustainability has pledged to expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries (SDG Target 7.B).

Development of an Energy systems which is capable of delivering to the ever growing and emerging needs of developing economies, is the need of the hour. Growing energy demands world over and in the densely populated regions of Asia including India have driven the need to shift to cleaner fuels and larger energy systems.

Thus, in India, there has been a thrust to increase installed generating capacity of power and to decrease the reliance on primary fossil fuels to cater to these needs. Generating and providing reliable power at competitive prices in a sustainable manner by optimising the use of multiple energy resource with innovative eco-friendly technologies has been at the core of policy planning in India. Also, the environmental and health burdens arising out of the use of hydrocarbons force the world towards adopting energy efficiency and clean energy systems.

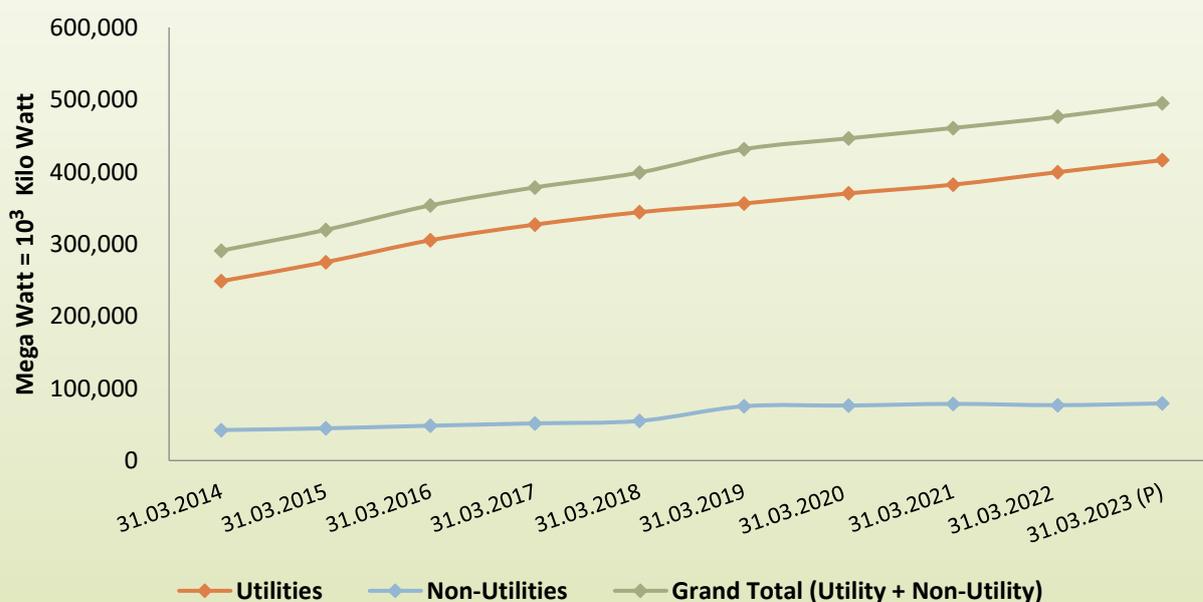
It is worthy to note here that not all potential is viable to be transformed into capacity, and overall capacity does not lead to an equal amount of generation due to production losses etc. Power plants have a capacity to produce a certain amount of power during a given time, but if they are taken offline (i.e. for maintenance or refuelling) then they are not actually generating power.

This chapter presents the capacity of coal washeries, oil refineries and electricity.

Highlights

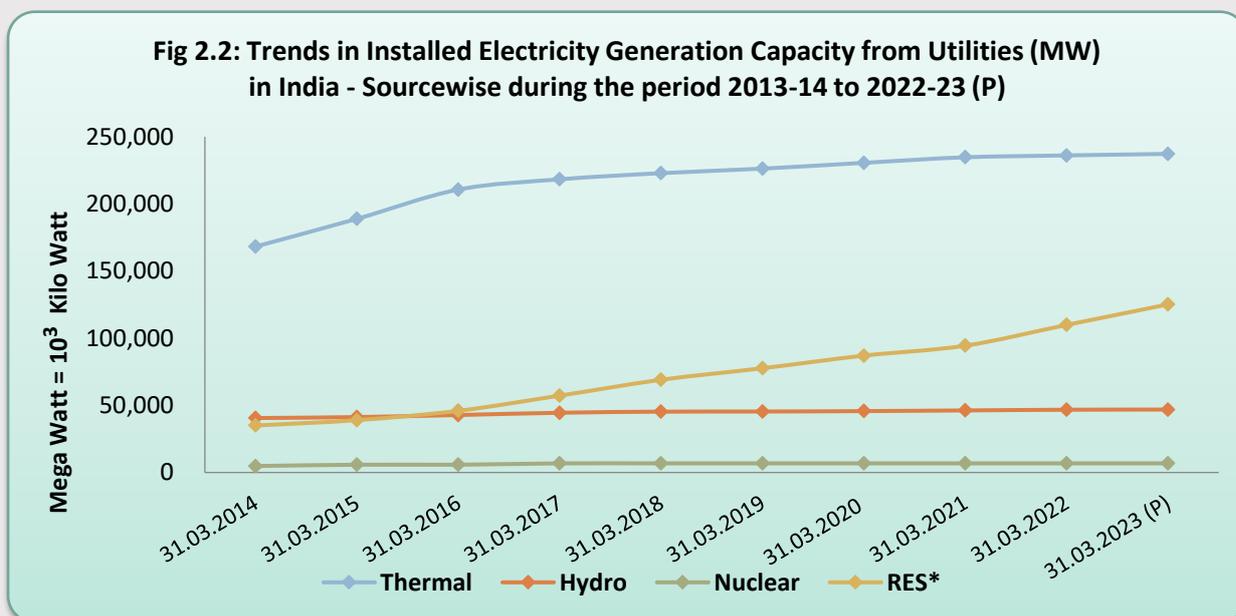
- Total installed capacity of coal washeries in India is 214.02 Million Tonne per year (MTY) as on 31.03.2022 (P) (Table 2.1).
- Similarly, as on 31.03.2023, there were a total of 23 refineries in the country, 19 in the Public Sector, 4 in the Private sector and Joint Venture (Table 2.2).
- The refining capacity of the country is 2,53,916 TMTPA on 31.03.2023 which is 2700 TMTPA more than from the last year. Public sector refineries have the dominance of over 61% of the total capacity in India.
- The Refinery production (crude throughput) achievement was 2,41,704 TMT during 2021-22 which has increased to 2,55,233 TMT during 2022-23 i.e. a net increase of 0.1% over 2021-22.
- Hence, the overall Capacity utilization of the refineries which was 96.99% during 2021-22 has increased to 101.60% in 2022-23. In the Public Sector, Indian Oil Corporation (IOC) increased its capacity utilization from 96.60% in 2021-22 to 103.37% in 2022-23. The Private and Joint venture, have also experienced negative growth rate of 2.49% during FY:2022-23 over the previous year.
- In absolute terms, the installed capacity of electricity generation increased by 3.98% to 4,95,199 MW in 2022-23 over 4,76,229 MW in 2021-22 with the major share of installed capacity existing with utilities i.e. 84.02% (Table 2.3).

Fig 2.1:Trends in Installed Electricity Generation Capacity (MW) in India during the period 2013-14 to 2022-23 (P)

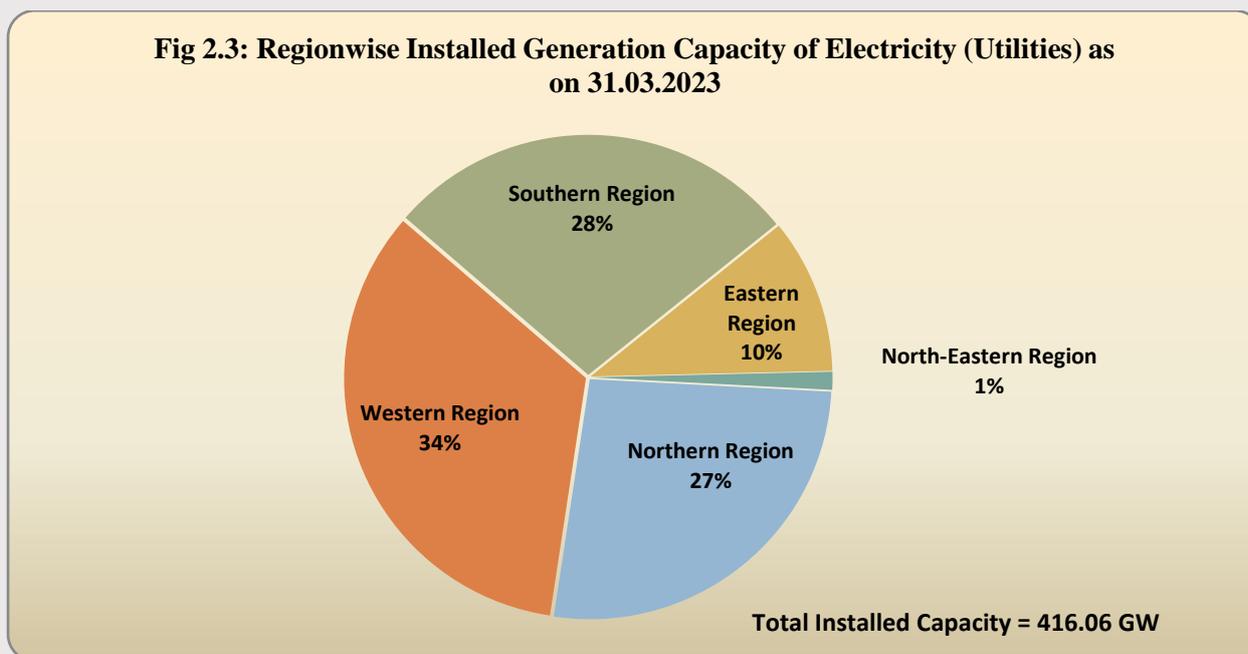


Chapter 2: Installed capacity and capacity utilization

- India's Energy mix has been seeing a shift from more conventional resources of energy to renewable sources. The financial year 2022-23 has witnessed a growth of 12.20% over last year in the installed capacity of RES (Renewable Energy Sources, other than Hydro) under utility; while that of thermal sources grew only at 0.49%.



- The geographical distribution of installed capacity of electricity generating as on 31.03.2023 indicates that Western Region accounted for the highest share (34%) followed by Southern Region (28%) and Northern Region (27%). Northern Region also accounted for the highest share of hydro energy. Among states, the state of Karnataka has the highest share of hydro installed capacity of 3.63 GW and Rajasthan has the highest share of Other renewable resources of 22.05 GW. (Table 2.4).



Chapter 2: Installed capacity and capacity utilization

- Region wise growth in the installed capacity during 2021-22 reveals that North Region (NR) registered highest annual growth of about 5.71%. The NR has also registered a growth of over 21.95% in the RES (Renewable Energy Sources) sector. Amongst all the major states Rajasthan registered highest annual growth (18.63%) in the installed capacity.
- The total installed capacity of grid interactive renewable power, which was 1,09,885 MW in 2022 increased to 1,25,160 MW (a growth of 13.90%) during a year (2023) (Table 2.5).
- Out of the total installed generation capacity of renewable sources of power in 2023, installed capacity of Solar power including roof tops accounted for about 53.4%, followed by Wind power (34.1%) and Bio Power & Waste to Energy (8.2%). However, in terms of growth rates year on year, Solar power installed capacity has a growth rate of 23.68% from FY: 2021-22 to FY: 2022-23.
- Rajasthan had the highest installed capacity of grid connected renewable power (22,398 MW) in 2023 followed closely by Gujarat (19,436MW) mainly on account of wind and solar power.

Fig 2.4 : Sectorwise percentage distribution of Installed Grid-Interactive Renewable Power Capacity during 2022-23(P)

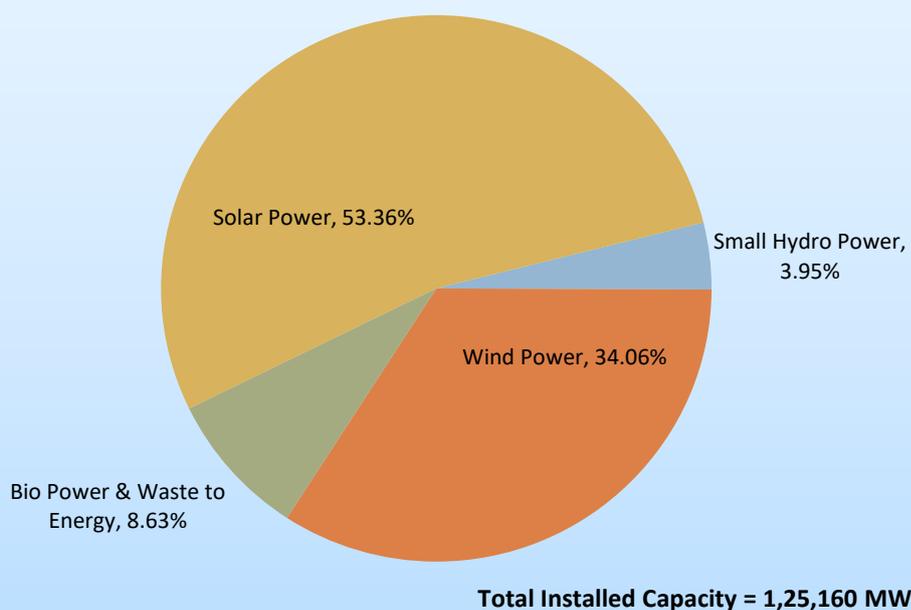
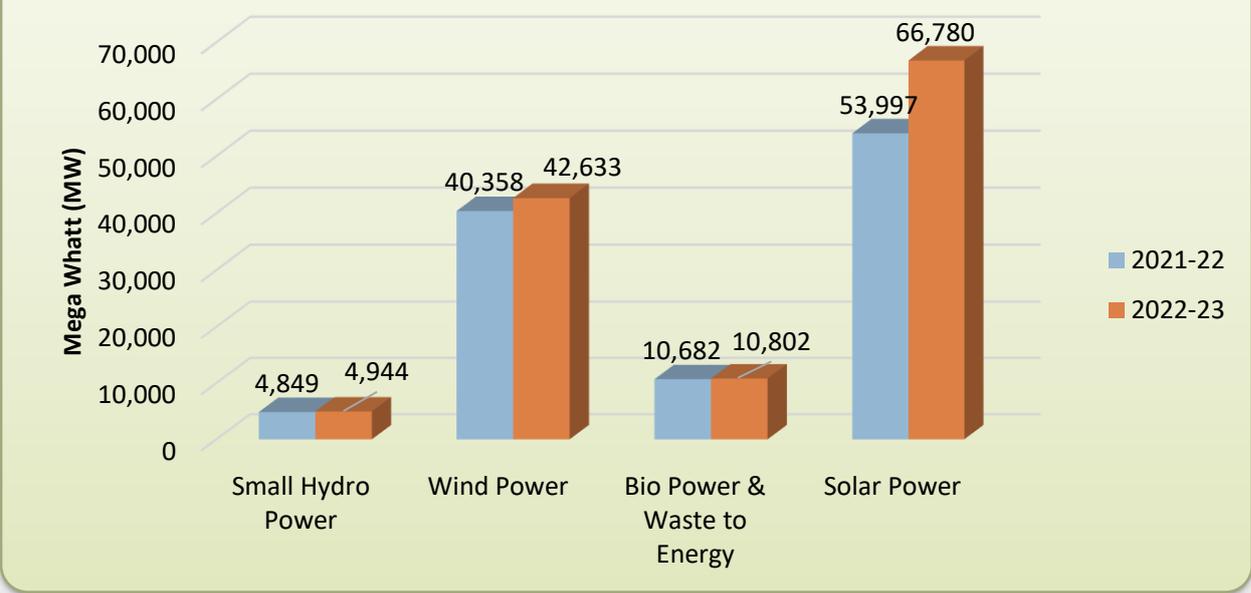
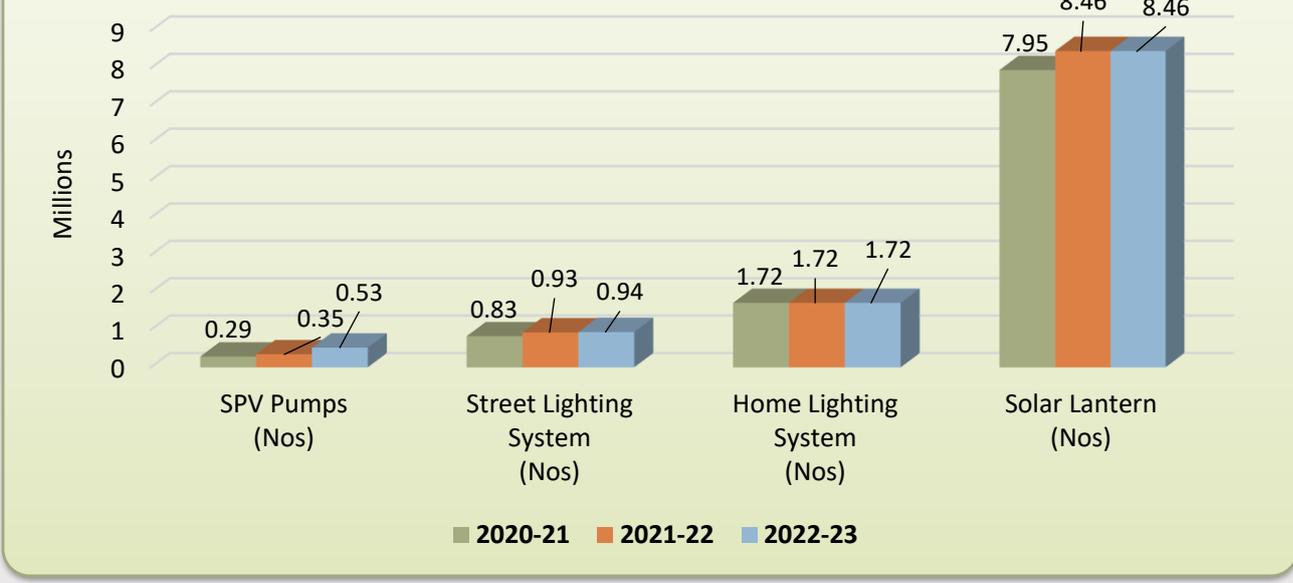


Fig 2.5 : Installed Capacity of Grid-Interactive Renewable Power During 2021-22 and 2022-23(P)



- Again, in case of Off-Grid/De-centralized Renewable Energy System, India has shown a steady growth over periods of time. Installation of solar Street Lightening System (SLS) has experienced a growth of 1.1% over last year. Also, the Solar Photovoltaic Plants (SPV) has registered a growth of 50.6% over last year (Figure 2.6).

Fig 2.6 : Installation of Off-grid / Decentralised Renewable Energy Systems/ Devices during last 3 years



Chapter 2: Installed capacity and capacity utilization

Table 2.1: Installed Capacity of Coal Washeries during 2022-23

Sl.No.	Name of Washery	Owner Company	State of Location	Raw Coal Capacity (MTPA)
1	ACB (India)Ltd, Chakabura washery	Aryan Coal Benefication (India) Ltd.	Chhattisgarh	7.50
2	ACB (India)Ltd, Dipka washery	Aryan Coal Benefication (India) Ltd.	Chhattisgarh	14.00
3	ACB (India)Ltd., Gevra washery	Aryan Coal Benefication (India) Ltd.	Chhattisgarh	6.25
4	Maruti Clean Coal and Power Ltd.(MPPCL), Ratija washery	Aryan Coal Benefication (India) Ltd.	Chhattisgarh	6.60
5	ACB (India) Ltd,Ratija washery (formerly Spectrum Coal & Power Ltd.)	Aryan Coal Benefication (India) Ltd.	Chhattisgarh	11.00
6	ACB (India)Ltd, Binjhari washery	Aryan Coal Benefication (India) Ltd.	Chhattisgarh	4.80
7	ACB(India) Ltd,Renki washery (formerly S.V.Power Pvt Ltd.)	Aryan Coal Benefication (India) Ltd.	Chhattisgarh	2.50
8	Chattisgarh Power & Coal Benefication Ltd.	CPCBL	Chhattisgarh	1.25
9	Hind Energy & Coal Benefication (India) Ltd, Baloda	Hind Energy & Coal Benefication (India)	Chhattisgarh	0.96
10	Hind Energy & Coal Benefication (India) Ltd.,Gatora	Hind Energy & Coal Benefication (India)	Chhattisgarh	0.96
11	Hind Energy & Coal Benefication (India) Ltd.,Hindadih	Hind Energy & Coal Benefication (India)	Chhattisgarh	3.60
12	Hind Energy & Coal Benefication (India) Ltd	Hind Energy & Coal Benefication (India)	Chhattisgarh	0.96
13	Clean Coal Enterprises Pvt. Ltd.,Baloda	Hind Energy & Coal Benefication (India)	Chhattisgarh	0.90
14	Clean Coal Enterprises Pvt. Ltd.,Gatora	Hind Energy & Coal Benefication (India)	Chhattisgarh	0.96
15	Hind Multi Services Private Limited,Gatora	Hind Energy & Coal Benefication (India)	Chhattisgarh	2.50
16	Jindal Power Ltd, Coal washery	Jindal	Chhattisgarh	4.75
17	Jindal Power Ltd, (Coal washery No.-2)	Jindal	Chhattisgarh	3.20
18	Jindal Power Ltd, (Coal washery No.-3)	Jindal	Chhattisgarh	3.60
19	Sambhavi and Coal Benefication Pvt. Ltd.,Gatora	KJSL	Chhattisgarh	0.90
20	Bhatia Energy Ranjan Coal washery,Kharsia	KJSL	Chhattisgarh	0.90
21	KJSL Coal & Power Pvt. Ltd.(Dipka Gevra)	KJSL	Chhattisgarh	4.10
22	K L Energy & Coal Beneficiation Pvt. Ltd.	KJSL	Chhattisgarh	0.90
23	Mahavir Coal Washeries Pvt. Ltd., Baloda (Unit I)	Mahavir Coal Washeries Pvt. Ltd.	Chhattisgarh	0.95
24	Mahavir Coal Washeries Pvt. Ltd,Baloda. (Unit II)	Mahavir Coal Washeries Pvt. Ltd.	Chhattisgarh	0.96
25	Mahavir Coal Washeries Pvt. Ltd.,Sakri Belmundi	Mahavir Coal Washeries Pvt. Ltd.	Chhattisgarh	0.95
26	Paras Power & Coal Benefication Ltd., Ghutku	Paras Power & Coal beneficiation	Chhattisgarh	0.96
27	Paras Power & Coal Benefication Ltd., Ghutku	Paras Power & Coal beneficiation	Chhattisgarh	2.50
28	Phil Coal Benefication Pvt. Ltd, Ghutku washery	Phil Coal	Chhattisgarh	2.50
29	Phil Coal Benefication Pvt. Ltd, Tenda Washery	Phil Coal	Chhattisgarh	0.90
30	Parsa East and Kanta Basan Coal washery	RRVUNL	Chhattisgarh	15.00
31	SEML-Gare Palma IV/1, Karwahi	Sarda Energy and Minerals Ltd.	Chhattisgarh	0.96
32	Dugda	Bharat Coking Coal Ltd.	Jharkhand	2.00
33	Sudamdih	Bharat Coking Coal Ltd.	Jharkhand	1.60
34	Moonidih	Bharat Coking Coal Ltd.	Jharkhand	1.60
35	Mahuda	Bharat Coking Coal Ltd.	Jharkhand	0.63
36	Madhuband	Bharat Coking Coal Ltd.	Jharkhand	2.50

Contd....

Chapter 2: Installed capacity and capacity utilization

Table 2.1(Contd.): Installed Capacity of Coal Washeries during 2022-23

Sl.No.	Name of Washery	Owner Company	State of Location	Raw Coal Capacity (MTPA)
37	Patherdih Old	Bharat Coking Coal Ltd.	Jharkhand	1.60
38	Patherdih NLW	Bharat Coking Coal Ltd.	Jharkhand	5.00
39	Dahibari	Bharat Coking Coal Ltd.	Jharkhand	1.60
40	Piparwar Washery	Central Coalfields Ltd.	Jharkhand	6.50
41	Kathara	Central Coalfields Ltd.	Jharkhand	3.00
42	Rajrappa	Central Coalfields Ltd.	Jharkhand	3.00
43	Sawang	Central Coalfields Ltd.	Jharkhand	0.75
44	Kedla	Central Coalfields Ltd.	Jharkhand	2.60
45	Monnet Daniels Coal washery Ltd.	Monnet Daniels Coal washery Ltd.	Jharkhand	3.50
46	Chasnala	Steel Authority of India Ltd.	Jharkhand	2.04
47	W.Bokaro-II	Tata Steel Ltd.	Jharkhand	2.50
48	W.Bokaro-III	Tata Steel Ltd.	Jharkhand	4.50
49	Jamadoba	Tata Steel Ltd.	Jharkhand	2.00
50	Bhelatand	Tata Steel Ltd.	Jharkhand	1.50
51	Nandan	Western Coalfield Ltd.	Madhya Pradesh	1.20
52	ACB(India) Ltd,Pandharpouni washery	Aryan Coal Benefication (India) Ltd.	Maharashtra	2.62
53	Kartikay Coal washery Pvt. Ltd,Wani washery	Aryan Coal Benefication (India) Ltd.	Maharashtra	2.50
54	Hind Maha Mineral LLP,Gondegaon washery	Hind Maha Mineral LLP	Maharashtra	2.40
55	Hind Maha Mineral LLP,Ghugus washery	Hind Maha Mineral LLP	Maharashtra	2.40
56	Hind Maha Mineral LLP,Pimpalgaon washery	Hind Maha Mineral LLP	Maharashtra	2.40
57	Rukhmai Coal Washery LLP, Nimbala Washery (Formerly M/s Bhatia Coal Washery Ltd.)	Rukhmai infrastructure pvt. Ltd.	Maharashtra	3.73
58	Indo Unique Flame Ltd,Punwat	Rukhmai infrastructure pvt. Ltd.	Maharashtra	2.40
59	Maha Mineral & Beneficiation Pvt. Ltd.	Rukhmai infrastructure pvt. Ltd.	Maharashtra	2.40
60	ALPS Mining Services (Formerly Bhatia Coal Washery)	ALPS	Odisha	2.00
61	Aryan Energy Pvt. Ltd.,Talcher	Aryan Coal Benefication (India) Ltd.	Odisha	2.34
62	ACB (india) Ltd,Talcher Unit.	Aryan Coal Benefication (India) Ltd.	Odisha	7.00
63	Aryan Ispat and Power Pvt Ltd.	Aryan Coal Benefication (India) Ltd.	Odisha	0.70
64	Hemgir	Aryan Coal Benefication (India) Ltd.	Odisha	5.00
65	Global Coal & Mining Pvt. Ltd.,Talcher Unit	GCMPL	Odisha	4.00
66	Global Coal & Mining Pvt. Ltd.,Jharsuguda Unit, IB Valley	GCMPL	Odisha	4.00
67	Utkal Energy Ltd.	Utkal	Odisha	1.08
68	Manuguru Washery, SCCL (Through Global Coal & Mining Pvt. Ltd. Manuguru)	Singareni Collieries Company Ltd.	Telangana	0.96
69	Bina Deshaling Plant	Northen Coalfield Ltd.	Uttar Pradesh	4.50
70	Bhjudih	Bharat Coking Coal Ltd.	West Bengal	1.70
71	Sarshatali Coal Washery	CESC Ltd.	West Bengal	1.50
Total				214.02

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 (%)		
		31.03.2021	31.03.2022	31.03.2023	2021-22	2022-23(P)	2021-22	2022-23(P)	Change in Utilisation
1	2	3	4	5	6	7	8	9	10
(a)	PUBLIC SECTOR	1,49,716	1,51,716	1,54,416	1,45,491	1,61,500	97.18	106.45	9.27
	IOCL, Guwahati, Assam	1,000	1,000	1,000	730	1,080	73.02	107.97	34.95
	IOCL, Barauni, Bihar	6,000	6,000	6,000	5,620	6,785	93.66	113.09	19.43
	IOCL, Koyali, Gujarat	13,700	13,700	13,700	13,474	15,567	98.35	113.63	15.28
	IOCL, Haldia, West Bengal	8,000	8,000	8,000	7,305	8,506	91.32	106.33	15.01
	IOCL, Mathura, Uttar Pradesh	8,000	8,000	8,000	9,123	9,573	114.04	119.66	5.63
	IOCL, Digboi, Assam	650	650	650	708	713	108.90	109.68	0.78
	IOCL, Panipat, Haryana	15,000	15,000	15,000	14,849	13,810	98.99	92.07	-6.92
	IOCL, Bongaigaon, Assam	2,700	2,700	2,700	2,639	2,775	97.72	102.78	5.06
	IOCL, Paradip, Odisha	15,000	15,000	15,000	13,217	13,599	88.12	90.66	2.54
	Total IOC	70,050	70,050	70,050	67,665	72,408	96.60	103.37	6.77
(b)	BPCL, Mumbai, Maharashtra	12,000	12,000	12,000	14,437	14,546	120.30	121.22	0.91
	BPCL, Kochi, Kerala	15,500	15,500	15,500	15,402	16,017	99.36	103.33	3.97
	BPCL, Bina, Madhya Pradesh	7,800	7,800	7,800	7,410	7,841	95.00	100.52	5.52
	Total BPCL	35,300	35,300	35,300	37,248	38,404	105.52	108.79	3.27
	HPCL, Mumbai, Maharashtra	7,500	9,500	9,500	5,558	9,804	74.10	103.20	29.10
HPCL, Visakh, Andhra Pradesh	8,300	8,300	11,000	8,410	9,287	101.32	111.89	10.56	
Total HPCL	15,800	17,800	20,500	13,968	19,091	88.40	107.25	18.85	
(b)	CPCL, Manali, Tamil Nadu	10,500	10,500	10,500	9,040	11,316	86.10	107.77	21.67
	CPCL, Narimanam, Tamil Nadu	-	-	-	-	-	-	-	-
Total CPCL	10,500	10,500	10,500	9,040	11,316	86.10	107.77	21.67	
(b)	NRL, Numaligarh, Assam	3,000	3,000	3,000	2,624	3,091	87.48	103.05	15.57
	MRPL, Mangalore, Karnataka	15,000	15,000	15,000	14,871	17,116	99.14	114.11	14.97
	ONGC, Tatipaka, Andhra Pradesh	66	66	66	75	74	113.84	111.40	-2.44
	PRIVATE SECTOR & JVs SECTOR	99,500	99,500	99,500	96,213	93,733	96.70	94.20	-2.49
	RIL, Jamnagar, Gujarat	33,000	33,000	33,000	34,757	34,433	105.32	104.34	-0.98
	RIL, SEZ-Jamnagar, Gujarat	35,200	35,200	35,200	28,264	27,872	80.30	79.18	-1.12
	Nyara Energy Ltd. Vadinar	20,000	20,000	20,000	20,164	18,692	100.82	93.46	-7.36
HMEL, GGS, Bathinda, Punjab	11,300	11,300	11,300	13,027	12,735	115.28	112.70	-2.58	
Total (a+b)	2,49,216	2,51,216	2,53,916	2,41,704	2,55,233	96.99	101.60	4.61	

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 processed in current year divided by refining capacity at the end of previous year*100

Source: M/o Petroleum & Natural

Gas

Chapter 2: Installed capacity and capacity utilization

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

(in Mega Watt = 10³ Kilo Watt)

As on	Utilities							
	Thermal				Hydro	Nuclear	RES*	Total
	Steam	Diesel	Gas	Total				
1	2	3	4	5	6	7	8	9
31.03.2014	1,45,273	1,200	21,782	1,68,255	40,531	4,780	34,988	2,48,554
31.03.2015	1,64,636	1,200	23,062	1,88,898	41,267	5,780	38,959	2,74,904
31.03.2016	1,85,173	994	24,509	2,10,675	42,783	5,780	45,924	3,05,162
31.03.2017	1,92,163	838	25,329	2,18,330	44,478	6,780	57,244	3,26,833
31.03.2018	1,97,172	838	24,897	2,22,907	45,293	6,780	69,022	3,44,002
31.03.2019	2,00,705	638	24,937	2,26,279	45,399	6,780	77,642	3,56,100
31.03.2020	2,05,135	510	24,955	2,30,600	45,699	6,780	87,028	3,70,106
31.03.2021	2,09,295	510	24,924	2,34,728	46,209	6,780	94,434	3,82,151
31.03.2022	2,10,700	510	24,900	2,36,109	46,723	6,780	1,09,885	3,99,497
31.03.2023 (P)	2,11,856	589	24,824	2,37,269	46,850	6,780	1,25,160	4,16,059
Growth rate of 2022-23 over 2021-22(%)	0.55	15.56	-0.30	0.49	0.27	0.00	13.90	4.15
CAGR 2013-14 to 2022-23(%)	4.28	-7.60	1.46	3.89	1.62	3.96	15.21	5.89

(P):
Provisional

* RES= Renewable Energy Sources excluding Hydro

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 Electricity Generation in Utilities and Non-utilities

(in Mega Watt = 10³ x Kilo Watt)

As on	Non-Utilities							Grand Total (Utility + Non-Utility)
	Thermal				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	2,90,812
31.03.2015	26,089	12,009	5,193	43,291	65	1,301	44,657	3,19,561
31.03.2016	28,688	12,347	5,819	46,853	59	1,368	48,279	3,53,442
31.03.2017	30,572	13,350	6,109	50,031	65	1,433	51,529	3,78,362
31.03.2018	32,854	13,145	7,156	53,155	51	1,726	54,933	3,98,935
31.03.2019	47,679	15,571	8,787	72,037	103	3,067	75,207	4,31,307
31.03.2020	51,543	12,775	7,316	71,633	131	4,475	76,239	4,46,346
31.03.2021	47,760	17,563	7,361	72,683	131	5,694	78,508	4,60,659
31.03.2022	45,303	18,649	5,685	69,637	135	6,961	76,732	4,76,229
31.03.2023 (P)	47,000	19,200	5,700	71,900	140	7,100	79,140	4,95,199
Growth rate of 2022-23 over 2021-22(%)	3.75	2.96	0.26	3.25	4.01	2.00	3.14	3.98
CAGR 2013-14 to 2022-23(%)	7.39	5.93	2.04	6.46	9.16	21.19	7.22	6.09

(P): Provisional

* RES= Renewable Energy Sources excluding Hydro

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)

States/UTs	(in GW)										
	Hydro		Thermal		Nuclear		RES*		Total		Growth Rate (2021-22 to 2022-23) (%)
	31.03.2022	31.03.2023	31.03.2022	31.03.2023	31.03.2022	31.03.2023	31.03.2022	31.03.2023	31.03.2022	31.03.2023	
Chandigarh	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.06	0.06	0.06	6.38
Delhi	0.00	0.00	2.36	2.36	0.00	0.00	0.27	0.30	2.63	2.66	1.22
Haryana	0.20	0.20	4.82	4.82	0.00	0.00	1.24	1.36	6.26	6.38	1.92
Himachal Pradesh	2.91	2.91	0.00	0.00	0.00	0.00	1.04	1.07	3.96	3.98	0.68
Jammu & Kashmir	1.23	1.23	0.18	0.18	0.00	0.00	0.24	0.24	1.64	1.65	0.36
Punjab	1.24	1.24	6.92	6.92	0.00	0.00	1.77	1.87	9.94	10.03	0.98
Rajasthan	0.43	0.43	11.63	11.63	0.00	0.00	16.70	22.05	28.76	34.12	18.63
Uttar Pradesh	0.72	0.72	13.43	13.34	0.00	0.00	4.45	4.75	18.61	18.82	1.09
Uttarakhand	2.08	2.20	0.55	0.55	0.00	0.00	0.93	0.93	3.56	3.68	3.42
Central Sector NR	11.53	11.53	15.54	15.54	1.62	1.62	0.38	0.38	29.08	29.08	0.00
Sub-Total (NR)	20.36	20.48	55.44	55.34	1.62	1.62	27.07	33.01	104.49	110.46	5.71
Chhattisgarh	0.12	0.12	16.01	16.01	0.00	0.00	0.87	1.30	17.00	17.43	2.53
Gujarat	0.77	0.77	20.23	20.23	0.00	0.00	16.34	19.19	37.35	40.19	7.63
Madhya Pradesh	1.70	1.70	11.80	11.80	0.00	0.00	5.17	5.61	18.67	19.10	2.34
Maharashtra	3.33	3.33	22.26	22.26	0.00	0.00	10.53	12.63	36.12	38.22	5.81
Daman & Diu	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.04	0.04	0.04	0.71
D. & N. Haveli	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.00
Goa	0.00	0.00	0.05	0.05	0.00	0.00	0.02	0.03	0.07	0.07	9.57
Central Sector WR	1.52	1.52	22.28	22.28	1.84	1.84	0.67	0.67	26.31	26.31	0.00
Sub-Total (WR)	7.45	7.45	92.62	92.62	1.84	1.84	33.65	39.47	135.55	141.38	4.30
Andhra Pradesh	1.67	1.67	12.30	13.10	0.00	0.00	8.96	9.11	22.94	23.89	4.14
Telangana	2.48	2.48	7.46	7.46	0.00	0.00	4.95	5.10	14.89	15.04	0.98
Karnataka	3.63	3.63	7.11	7.11	0.00	0.00	15.90	16.72	26.64	27.46	3.06
Kerala	1.86	1.86	0.33	0.33	0.00	0.00	0.62	1.04	2.81	3.24	15.29
Tamil Nadu	2.18	2.18	9.03	9.03	0.00	0.00	15.92	17.74	27.13	28.95	6.71
Puducherry	0.00	0.00	0.03	0.03	0.00	0.00	0.01	0.04	0.05	0.07	47.28
Lakshadweep	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.03	820.49
Central Sector SR #	0.00	0.00	13.25	13.25	3.32	3.32	0.54	0.54	17.11	17.11	0.00
Sub-Total (SR)	11.82	11.83	49.52	50.35	3.32	3.32	46.91	50.29	111.57	115.78	3.77
Bihar	0.00	0.00	0.00	0.00	0.00	0.00	0.39	0.39	0.39	0.39	0.58
Jharkhand	0.13	0.13	2.25	2.25	0.00	0.00	0.10	0.11	2.48	2.49	0.69
Odisha	2.07	2.07	4.94	4.94	0.00	0.00	0.61	0.62	7.62	7.63	0.14
West Bengal	0.99	0.99	6.95	6.93	0.00	0.00	0.59	0.62	8.52	8.53	0.17
Sikkim	0.87	0.87	0.00	0.00	0.00	0.00	0.06	0.06	0.93	0.93	0.32
A. & N. Islands	0.00	0.00	0.04	0.09	0.00	0.00	0.03	0.03	0.07	0.12	76.18
Central Sector ER \$	1.01	1.01	21.85	22.30	0.00	0.00	0.02	0.02	22.87	23.32	1.97
Sub-Total (ER)	5.07	5.07	36.03	36.51	0.00	0.00	1.78	1.85	42.87	43.43	1.29
Arunachal Pradesh	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.14	0.14	0.14	1.69
Assam	0.10	0.10	0.33	0.31	0.00	0.00	0.13	0.16	0.56	0.57	1.25
Manipur	0.00	0.00	0.04	0.04	0.00	0.00	0.02	0.02	0.05	0.05	0.06
Meghalaya	0.32	0.32	0.00	0.00	0.00	0.00	0.05	0.05	0.37	0.37	0.00
Mizoram	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.07	0.04	0.07	65.63
Nagaland	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.04	0.03	0.04	5.93
Tripura	0.00	0.00	0.14	0.11	0.00	0.00	0.03	0.03	0.16	0.13	-17.98
Central Sector NER	1.61	1.61	2.00	2.00	0.00	0.00	0.03	0.03	3.64	3.64	0.00
Sub-Total (NER)	2.03	2.03	2.51	2.45	0.00	0.00	0.47	0.54	5.01	5.02	0.22
Total States	31.06	31.19	161.18	161.89	0.00	0.00	108.25	123.53	300.49	316.60	5.36
Total Central	15.66	15.66	74.93	75.38	6.78	6.78	1.63	1.63	99.00	99.45	0.45
Total All India	46.72	46.85	236.11	237.27	6.78	6.78	109.89	125.16	399.50	416.06	4.15

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

* RES: Renewable Energy Sources excluding hydro

Includes NLC-Central capacity also

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

Source : Central Electricity Authority.

Chapter 2: Installed capacity and capacity utilization

Table 2.5: State-wise cumulative Installed Capacity of Renewable Power as on 31st March

S. No.	STATES / UTs	Small Hydro Power		Wind Power		Bio-Power-BM Power/Cogen		Waste to Energy		Solar Power		Total Capacity		Growth Rate(2021-22 to 2022-23)
		(MW)		(MW)		(MW)		(MW)		(MW)		(MW)		
		2021-22	2022-23	2021-22	2022-23	2021-22	2022-23	2021-22	2022-23	2021-22	2022-23	2021-22	2022-23	
1	Andhra Pradesh	162.11	163.31	4096.65	4096.65	483.67	483.67	82.37	82.36	4386.76	4534.19	9212	9360	1.61
2	Arunachal Pradesh	131.11	133.11			0.00	0.00	0.00	0.00	11.23	11.64	142	145	1.70
3	Assam	34.11	34.11			2.00	2.00	0.00	0.00	117.94	147.93	154	184	19.47
4	Bihar	70.70	70.70			124.70	124.70	1.32	1.32	190.63	192.88	387	390	0.58
5	Chhatisgarh	76.00	76.00			274.59	274.59	0.41	0.41	518.08	948.82	869	1300	49.56
6	Goa	0.05	0.05			0.00	0.00	0.34	0.34	19.95	26.49	20	27	32.15
7	Gujarat	89.39	91.64	9209.22	9978.92	77.30	77.30	31.96	33.43	7180.03	9254.56	16588	19436	17.17
8	Haryana	73.50	73.50			240.66	240.66	17.34	18.77	910.63	1029.16	1242	1362	9.66
9	Himachal Pradesh	954.11	969.71			9.20	9.20	1.00	1.00	76.16	87.49	1040	1067	2.59
10	Jammu & Kashmir	184.32	146.68			0.00	0.00	0.00	0.00	54.73	49.44	239	196	-17.96
11	Jharkhand	4.05	4.05			4.30	4.30	0.00	0.00	88.79	105.84	97	114	17.55
12	Karnataka	1280.73	1280.73	5130.90	5294.95	1887.30	1887.30	14.85	14.85	7590.81	8241.40	15905	16719	5.12
13	Kerala	242.52	266.52	62.50	62.50	2.27	2.27	0.23	0.23	363.18	761.43	671	1093	62.96
14	Ladakh		40.99					0.00	0.00		7.80	-	49	-
15	Madhya Pradesh	99.71	123.71	2519.89	2844.29	107.35	107.35	23.98	27.59	2717.95	2802.14	5469	5905	7.98
16	Maharashtra	381.08	381.08	5012.83	5012.83	2584.40	2584.40	47.75	56.29	2631.02	4722.90	10657	12758	19.71
17	Manipur	5.45	5.45			0.00	0.00	0.00	0.00	12.25	12.28	18	18	0.17
18	Meghalaya	32.53	32.53			13.80	13.80	0.00	0.00	4.15	4.15	50	50	0.00
19	Mizoram	36.47	45.47			0.00	0.00	0.00	0.00	7.90	28.02	44	73	65.63
20	Nagaland	30.67	32.67			0.00	0.00	0.00	0.00	3.04	3.04	34	36	5.93
21	Odisha	106.63	115.63			59.22	59.22	0.00	0.00	451.24	453.17	617	628	1.77
22	Punjab	176.10	176.10			473.45	496.15	18.20	26.12	1100.07	1167.26	1768	1866	5.53
23	Rajasthan	23.85	23.85	4326.82	5193.42	121.25	121.25	3.83	3.83	12564.87	17055.70	17041	22398	31.44
24	Sikkim	52.11	55.11			0.00	0.00	0.00	0.00	4.68	4.69	57	60	5.30
25	Tamil Nadu	123.05	123.05	9866.37	10017.17	1012.65	1012.65	30.05	31.05	5067.18	6736.43	16099	17920	11.31
26	Telangana	90.87	90.87	128.10	128.10	160.10	160.10	59.64	60.27	4520.48	4666.03	4959	5105	2.95
27	Tripura	16.01	16.01			0.00	0.00	0.00	0.00	14.89	17.60	31	34	8.77
28	Uttar Pradesh	49.10	49.10			2117.26	2118.26	72.73	98.47	2244.43	2515.22	4484	4781	6.64
29	Uttarakhand	218.82	218.82			130.22	130.22	9.22	9.22	573.54	575.53	932	934	0.21
30	West Bengal	98.50	98.50			319.92	338.62	2.53	4.48	166.00	179.97	587	622	5.90
31	Andaman & Nicobar	5.25	5.25			0.00	0.00	0.00	0.00	29.49	29.91	35	35	1.21
32	Chandigarh					0.00	0.00	0.00	0.00	55.17	58.69	55	59	6.38
32	Dadar & Nagar Haveli					0.00	0.00	0.00	0.00	5.46	5.46	5	5	0.00
34	Daman & Diu					0.00	0.00	0.00	0.00	40.72	41.01	41	41	0.71
35	Delhi					0.00	0.00	59.00	84.00	211.12	218.26	270	302	11.90
36	Lakshwadeep					0.00	0.00	0.00	0.00	3.27	3.27	3	3	0.00
37	Puducherry					0.00	0.00	0.00	0.00	13.69	35.53	14	36	159.53
38	Others			4.30	4.30	0.00	0.00	0.00	0.00	45.01	45.01	49	49	0.00
Total (MW)		4849	4944	40358	42633	10206	10248	477	554	53997	66780	109885	125160	13.90
% Distribution		4.4	4.0	36.7	34.1	9.3	8.2	0.4	0.4	49.1	53.4	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 31.03.2023

Sl. No.	State/UT	Biogas Plants (Nos)	SPV Pumps (Nos.)	Solar Photovoltaic (SPV) Systems				Waste to Energy (MW)
				SLS	HLS	SL	PP	
				(Nos.)	(Nos.)	(Nos.)	(KWP)	
1	2	3	4	5	6	7	8	10
1	Andhra Pradesh	268628	34,045	16,460	22,972	77,803	3,816	29.20
2	Arunachal Pradesh	3621	148	25,008	35,065	2,18,551	963	
3	Assam	139414	45	29,538	46,879	6,47,761	1,605	
4	Bihar	130081	2,813	54,147	12,303	17,35,227	6,905	1.32
5	Chhattisgarh	60368	1,19,282	4,538	42,232	3,311	31,373	0.41
6	Goa	4245	45	707	393	1,093	33	
7	Gujarat	435862	13,981	5,004	9,253	31,603	13,577	25.93
8	Haryana	64056	46,260	34,625	56,727	93,853	4,571	7.57
9	Himachal Pradesh	47718	507	98,800	22,592	33,909	21,606	1.00
10	Jammu & Kashmir	3201	568	39,076	1,44,316	51,224	8,130	
11	Jharkhand	7890	17,231	14,344	9,450	7,90,515	3,770	
12	Karnataka	515243	7,734	5,694	52,638	7,781	7,854	13.85
13	Kerala	154349	900	1,735	41,912	54,367	16,268	0.23
14	Ladakh	0	-	-	-	-	-	
15	Madhya Pradesh	381237	25,138	16,808	7,920	5,29,101	7,654	12.19
16	Maharashtra	935480	50,623	10,420	3,497	2,39,297	3,858	43.70
17	Manipur	2128	68	32,767	24,583	69,722	1,581	
18	Meghalaya	11156	54	5,800	14,874	97,360	2,004	
19	Mizoram	5857	37	20,325	12,060	1,55,217	3,895	
20	Nagaland	7953	3	16,045.0	1,045.0	30,766.0	1,506.0	
21	Odisha	271848	10,856	19,109.0	5,274.0	99,843.0	2,321.5	
22	Punjab	187980	17,446	43,758	8,626	17,495	2,066	15.37
23	Rajasthan	72906	1,13,841	8,934.0	1,87,968.0	2,25,851.0	1,04,449.0	3.83
24	Sikkim	9044	-	504	15,059	45,200	850	
25	Tamil Nadu	224083	8,503	41,419	2,98,641	16,818	13,053	24.65
26	Telangana	316727	424	2,458	-	1,42,000	7,450	14.47
27	Tripura	3744	1,846	15,517	32,723	3,64,012	867	
28	Uttar Pradesh	441306	48,695	3,02,532	2,35,909	23,51,205	10,638	98.47
29	Uttarakhand	365352	344	43,803	91,595	1,65,071	4,060	9.22
30	West Bengal	1216	673	18,203	1,45,332	17,662	1,730	4.48
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	-	-	-	-	-	
34	Daman & Diu	0	-	-	-	-	-	
35	Delhi	578	90	301	-	4,807	1,269	
36	Lakshadweep	0	-	4,465	600	5,289	2,190	
37	Puducherry	17541	21	417	25	1,637	121	
38	Others*		4,621	9,150	1,40,273	1,25,797	23,885	
	Total	50,91,759	5,26,859	9,44,802	17,23,479	84,59,119	3,16,813	306

* 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

Chapter

3

Production of Energy Resources



CHAPTER 3

Production of Energy Resources

Production

Energy production and consequently its' availability directly affects future production, imports, exports and investment, all of which have a significant impact on a country's economy. Detailed and high-quality energy statistics provide policy makers with the information needed to make informed decisions and evaluate possible trade-offs including planning for global price shocks in energy commodities.

Data on production of energy commodities, and stock changes are also required for monitoring national energy security. In a rapidly changing energy scenario of the world in terms of trade, consumption and stock levels, problems with national energy supply often are perceived threatening to national independence, especially if national energy resources do not meet energy demands.

In Energy Statistics, production is defined as the capture, extraction or manufacture of fuels or energy informs that are ready for general use. Two types of production are distinguished, primary and secondary.

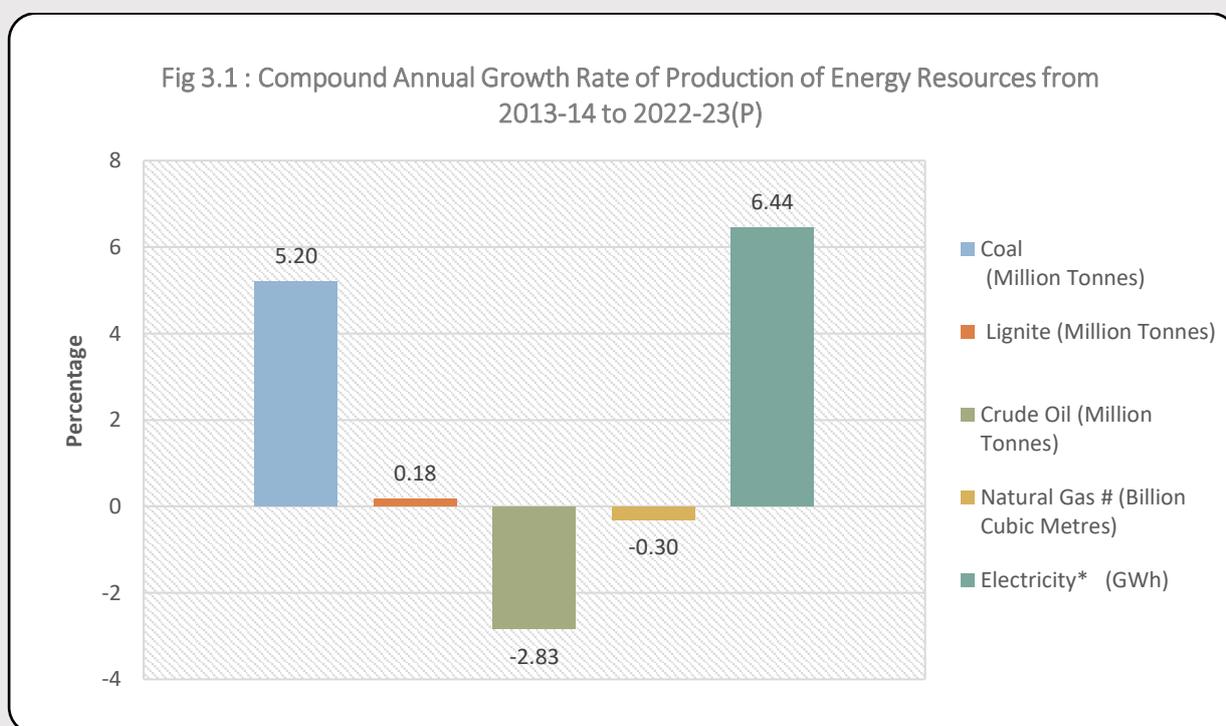
Primary production is the capture or extraction of fuels or energy from natural energy flows, the biosphere and natural reserves of fossil fuels within the national territory in a form suitable for use. Inert matter removed from the extracted fuels and quantities reinjected, flared or vented are not 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 presents the production of different energy resources and electricity.

Highlights

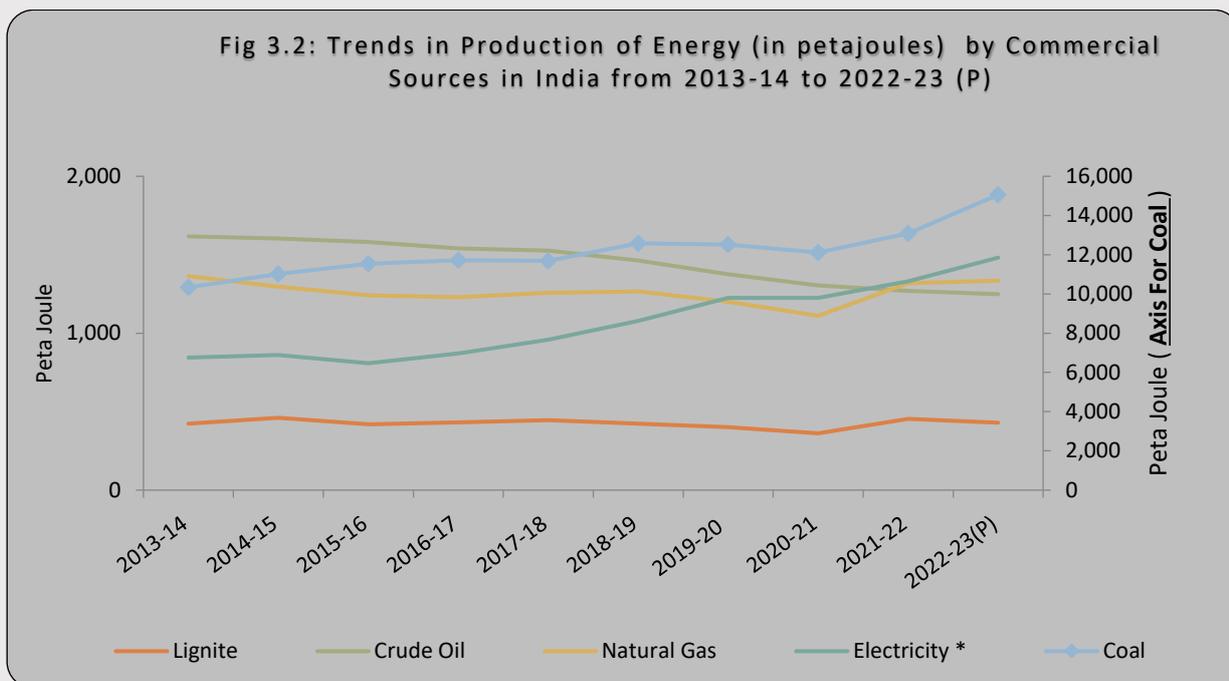
- Coal production in the country during the year 2022-23(P) was 893.19 million tonnes as compared to 778.21 million tonnes during 2021-22. There is an increase of 14.77%. The overall trend of production in the last ten years i.e. 2013-14 to 2022-23(P) has shown a steady increase, except 2020-21, with a CAGR of 5.20% (Table 3.1).
- The Lignite production during 2022-23(P) has been increased to 44.99 million tonnes from the figure of 47.49 million tonnes in 2021-22; a decrease of 5.27% over 2021-22 (Table 3.1).
- However, the production of crude oil for 2022-23 (P) came out to be 29.18 MT as compared to 29.69 MT during FY: 2022-23 which is a decline of 1.72% (Table 3.1).
- The CAGRs for Crude Oil and Natural Gas, w.r.t FY: 2013-14, are having negative CAGR of -2.83% and -0.30% respectively. Electricity (generated from Hydro, Nuclear and other Renewable energy sources) is having the highest CAGR of 6.44%, showing the remarkable growth of Renewable Energy in India (Table 3.1).



- To allow comparison among and aggregation of production by different sources of energy, production has been converted in terms of energy units, Petajoules. It may be seen that the total production of energy resources has increased from 17,464 petajoules during 2021-22 to 19,549 petajoules during 2022-23(P), an increase of 11.94% (Table 3.2).

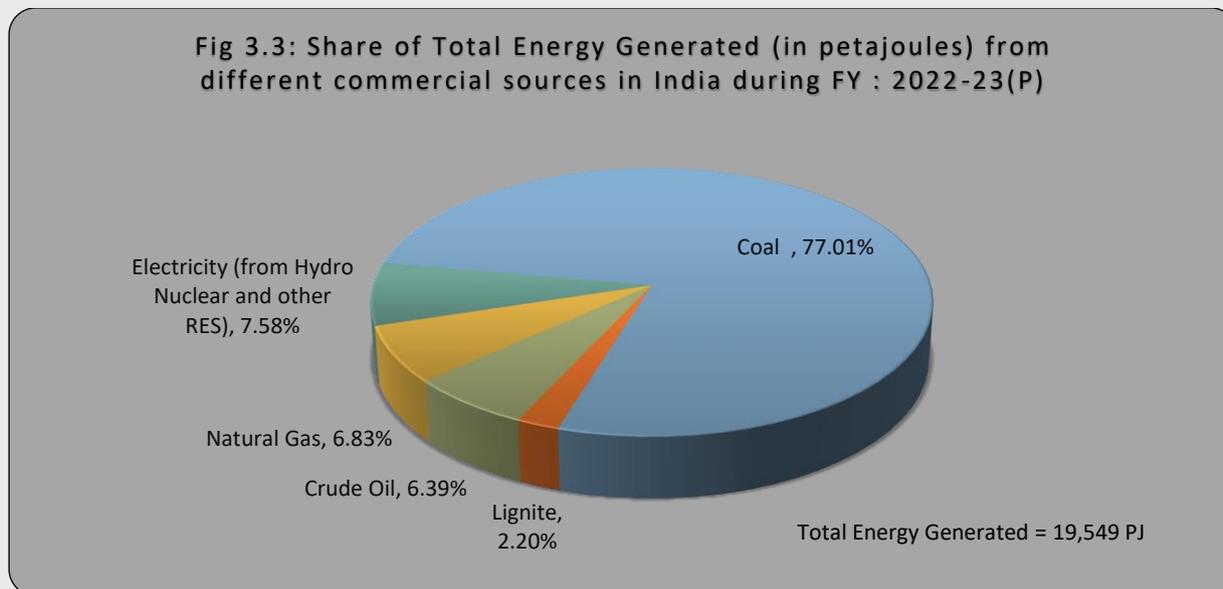
Chapter 3: Production of Energy Resources

Fig 3.2: Trends in Production of Energy (in petajoules) by Commercial Sources in India from 2013-14 to 2022-23 (P)



- India still depends heavily on Coal as the major source of energy. During the FY:2022-23(P) energy generated from Coal accounted for about 77.01% of the total generation of energy followed by Electricity (from Hydro, Nuclear and other Renewable energy sources) (7.58%) and Natural Gas (6.83%).

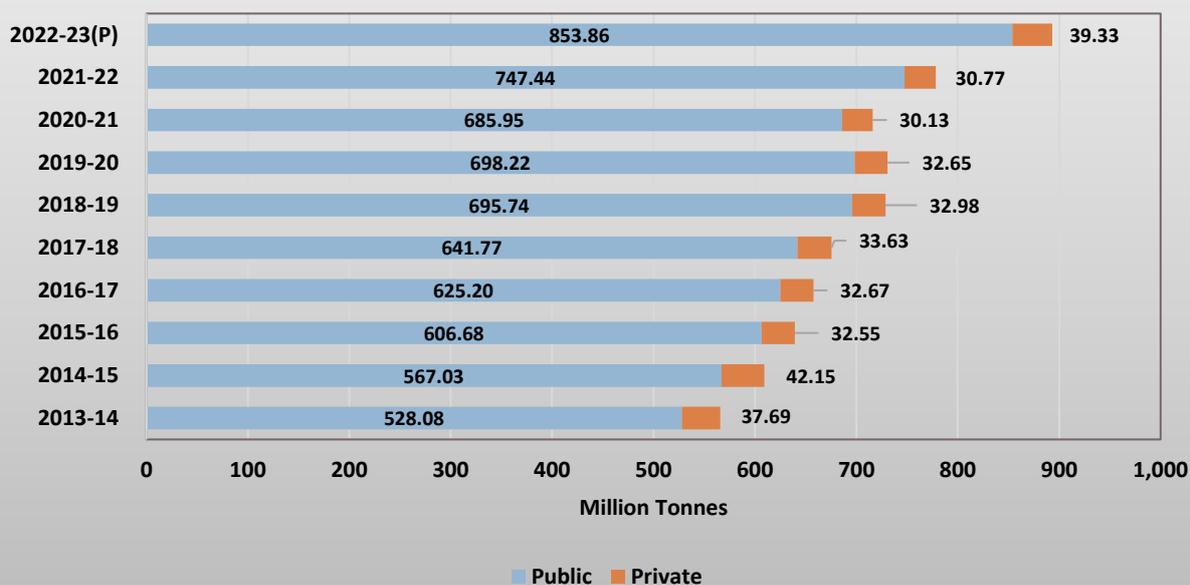
Fig 3.3: Share of Total Energy Generated (in petajoules) from different commercial sources in India during FY : 2022-23(P)



- Within Coal, Public sector has the dominating share in production. During FY: 2022-23(P) almost 96% of total production has come from public sector. A scenario of performance made by Public and Private sector during past 10 years has been given below,

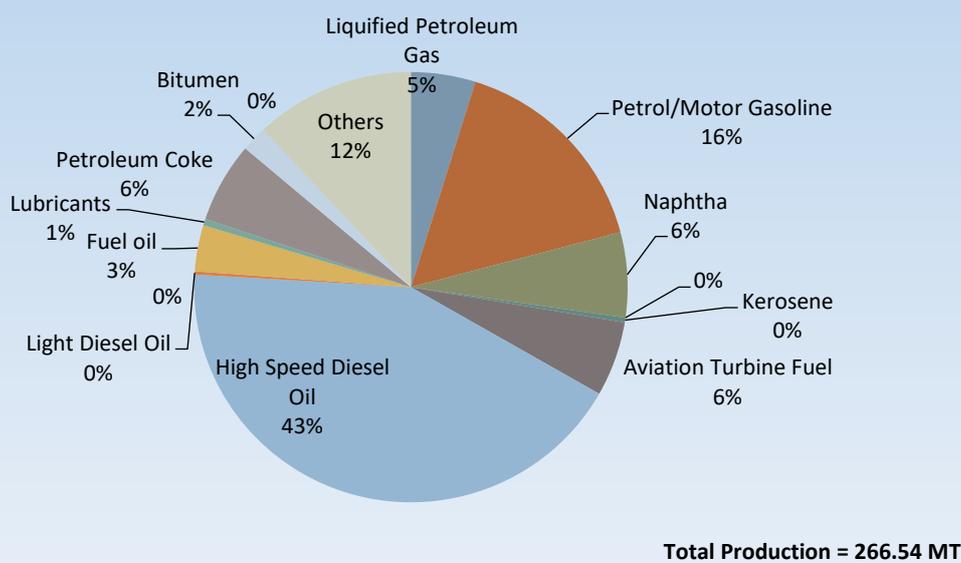
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Fig 3.4: Share of Private and Public sector in Production of Coal in India during FY : 2013-14 to FY : 2022-23(P)



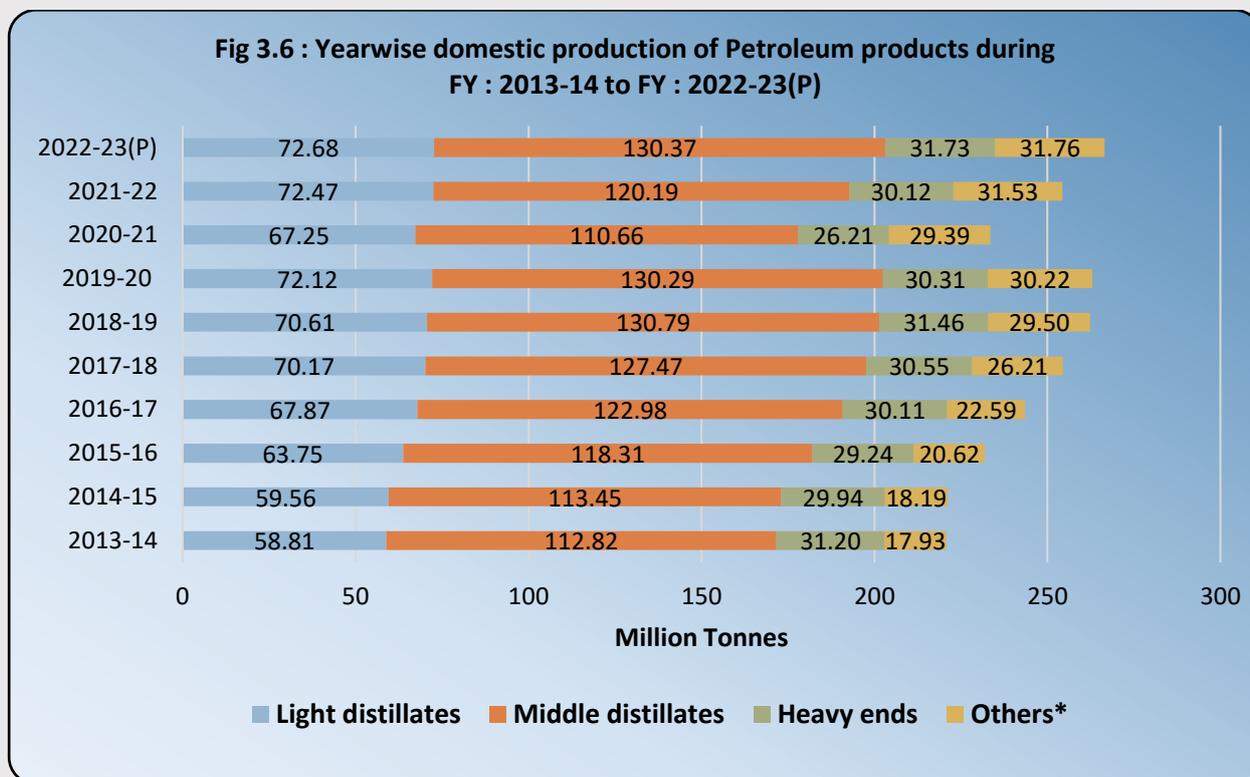
- In the year 2022-23(P), the production of Petroleum Products in the country was 266.54 MT as against 254.31 MT during 2021-22, an increase of 4.81%. In the total production of Petroleum Products during 2022-23 (P), High Speed Diesel Oil accounted for the maximum share (43%), followed by Motor Gasoline (16%). (Table 3.4).

Fig 3.5 : Production of Petroleum Products by type during 2022-23 (P)



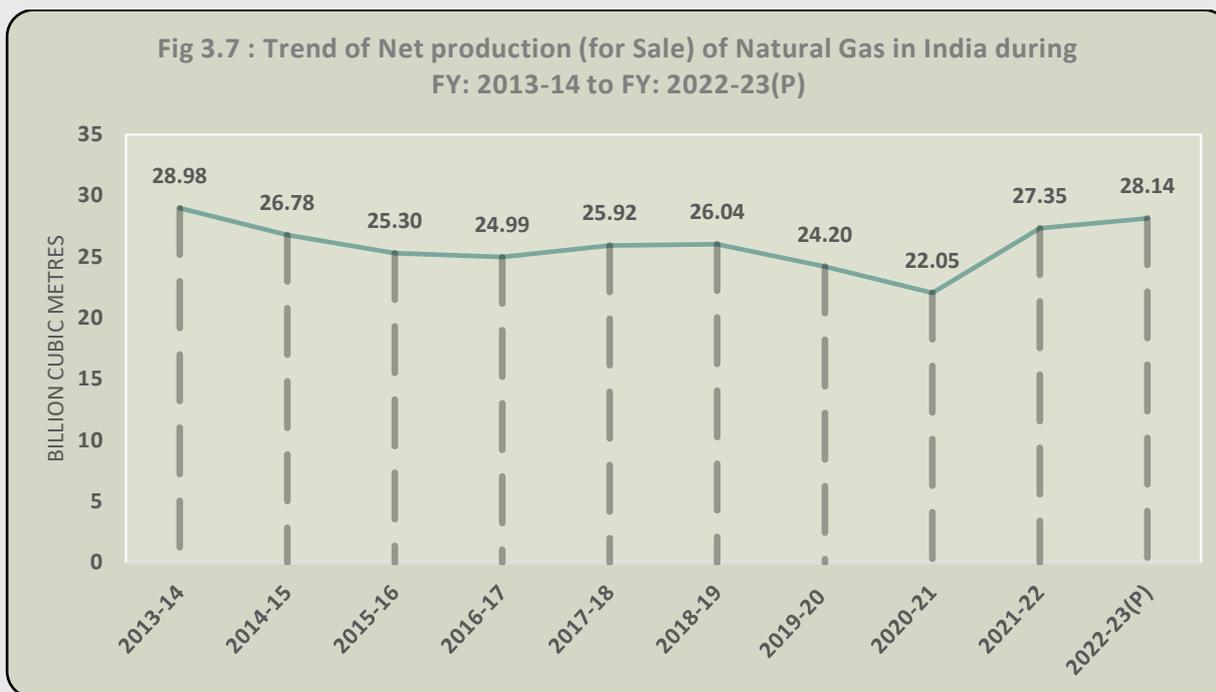
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- Again, within the three (3) major categories of Petroleum Products, the *Middle Distillates* (which is having the dominant share of 48.91%, contains items like ATF, Diesel, Kerosene etc.) has experienced a growth of 8.47% during 2022-23, over past year. A sectorial-overview during last 10 years is given below,

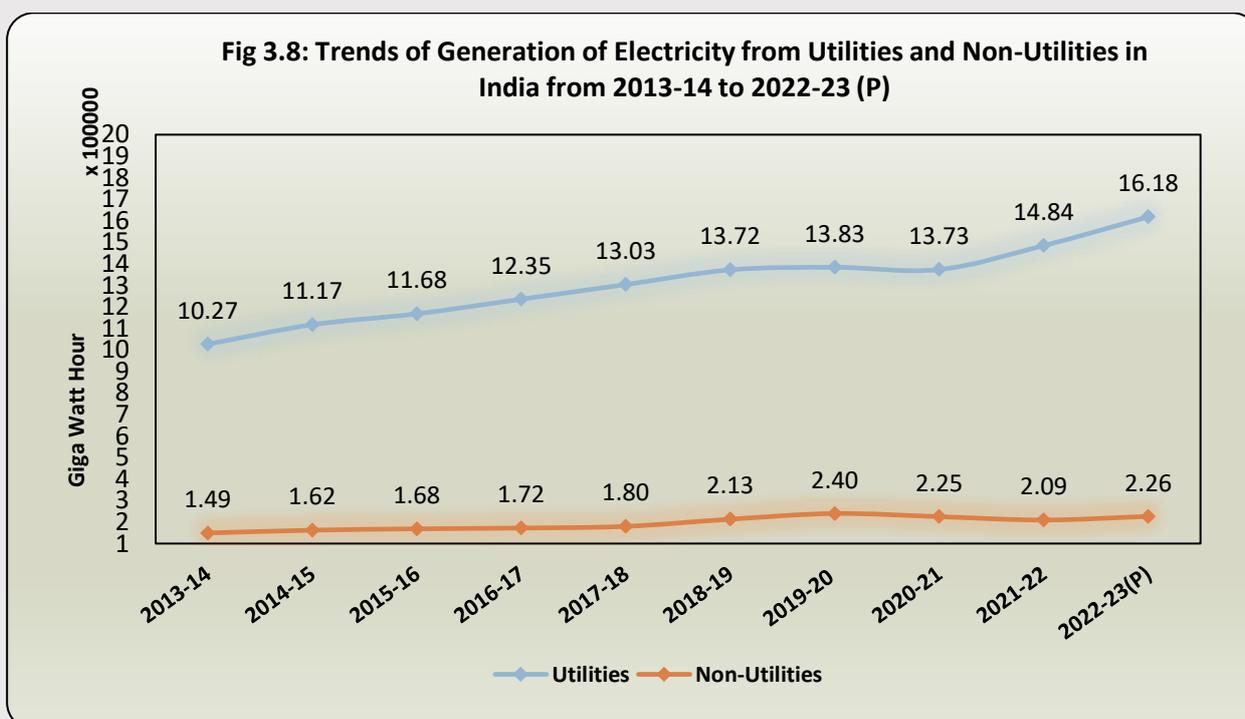


- Net production of Natural Gas for consumption increased from to 33.12 Billion Cubic Meters (BCM) in 2021-22 to 33.65 BCM in 2022-23(P) registering an increase of 1.61%. The Net-Production for sale has also experienced a growth of over 2.88% in comparison to the last FY. After having a steady decline from the FY: 2013-14 to 2016-17, the Net-Production for sale of Natural Gas has increased to 28.14 BCM during FY: 2022-23(P) as compared to 27.35 BCM during FY: 2021-22.

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- 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 5.18% in the last ten years from 2013-14 to 2022-23(P).
- The generation of electricity in India still depends heavily on Coal. During FY:2022-23(P) close to 75% of the electricity has been generated from Steam. However, the RES (Renewable Energy Resources other than Hydro) has shown some good signs as it has registered a growth of 19.54% during FY: 2022-23(P), as compared to 2021-22.



Chapter 3: Production of Energy Resources

Table 3.1 : Year wise Production of 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
2013-14	565.77	44.27	37.79	35.41	2,34,595
2014-15	609.18	48.27	37.46	33.66	2,38,908
2015-16	639.23	43.84	36.94	32.25	2,24,571
2016-17	657.87	45.23	36.01	31.90	2,41,842
2017-18	675.40	46.64	35.68	32.65	2,66,308
2018-19	728.72	44.28	34.20	32.87	2,99,465
2019-20	730.87	42.10	32.17	31.18	3,40,579
2020-21	716.08	37.90	30.49	28.67	3,40,576
2021-22	778.21	47.49	29.69	34.02	3,69,652
2022-23(P)	893.19	44.99	29.18	34.45	4,11,512
Growth rate of 2022-23 over 2021-22 (%)	14.77	-5.27	-1.72	1.25	11.32
CAGR 2013-14 to 2022-23(%)	5.20	0.18	-2.83	-0.30	6.44

(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

Chapter 3: Production of Energy Resources

Table 3.2 : Yearwise Production of Energy Resources in Energy Units

(in Petajoules) @

Year	Coal	Lignite	Crude Oil	Natural Gas	Electricity *	Total
1	2	3	4	5	6	7= 2 to 6
2011-12	10,401	404	1,630	1,832	770	15,037
2012-13	10,182	443	1,620	1,567	735	14,546
2013-14	10,335	423	1,617	1,364	845	14,583
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(P)	15,055	429	1,249	1,334	1,481	19,549
Growth rate of 2022-23 over 2021-22 (%)	15.00	-5.27	-1.72	1.25	11.32	11.94
CAGR 2013-14 to 2022-23(%)	4.27	0.18	-2.83	-0.24	6.44	3.31

(P): Provisional

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

@ Conversion factors have been applied to convert production of primary sources 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 – Type-wise and Sector-wise

(Million Tonnes)

Year	Coal			Public	Private	Total
	Coking	Non-coking	Total			
1	2	3	4=2+3	5	6	7=5+6
2013-14	56.82	508.95	565.77	528.08	37.69	565.77
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(P)	60.76	832.43	893.19	853.86	39.33	893.19
Growth rate of 2022-23 over 2021-22 (%)	17.52	14.58	14.77	14.24	27.82	14.77
CAGR 2013-14 to 2022-23(%)	0.75	5.62	5.20	5.48	0.48	5.20

(P): Provisional Source: Ministry of Coal

Chapter 3: Production of Energy Resources

Table 3.3 A: Grade Wise Production of Coking Coal by Sector during 2021-22 & 2022-23

(Million Tonnes)

Grade of Coaking Coal	Public		Private		All India		Change in production (%)
	2021-22	2022-23 (P)	2021-22	2022-23 (P)	2021-22	2022-23 (P)	
Steel-I	0.23	0.00	0.00	0.00	0.23	0.00	-
Steel-II	0.00	0.06	0.00	0.00	0.00	0.06	-
SC-1	0.00	0.25	0.00	0.00	0.00	0.25	-
Wash-I	0.23	0.17	0.00	0.00	0.23	0.17	-26.56
Wash-II	1.90	3.45	0.60	0.34	2.50	3.78	51.27
Wash-III	1.27	2.31	0.27	0.33	1.54	2.64	71.32
Wash-IV	21.93	26.10	3.81	5.11	25.74	31.21	21.26
Wash-V	20.17	22.48	0.00	0.00	20.17	22.48	11.46
Wash-VI	1.29	0.17	0.00	0.00	1.29	0.17	-87.23
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	47.02	54.99	4.68	5.77	51.70	60.76	17.52
Met.Coal	32.23	37.60	4.68	5.77	36.91	43.37	17.50
Non Met	14.80	17.40	0.00	0.00	14.80	17.40	17.57
All India Total	47.02	54.99	4.68	5.77	51.70	60.76	17.52

(P): Provisional

Source: Ministry of Coal

Table 3.3 B: Grade Wise Production of Non-Coking Coal by Sector during 2020-21 & 2021-22

(Million Tonnes)

Grade of Non-Coaking Coal	Public		Private		All India		Change in production (%)
	2021-22	2022-23 (P)	2021-22	2022-23 (P)	2021-22	2022-23 (P)	
G1	0.00	0.02	0.00	0.00	0.00	0.02	-
G2	0.01	0.08	0.00	0.00	0.01	0.08	-
G3	2.01	1.70	0.00	0.00	2.01	1.70	-15.47
G4	13.05	16.10	0.00	0.00	13.05	16.10	23.39
G5	8.66	9.90	0.00	0.00	8.66	9.90	14.37
G6	5.13	6.43	0.37	0.13	5.49	6.55	19.35
G7	40.21	45.80	0.53	0.61	40.74	46.41	13.90
G8	46.24	53.20	0.17	0.46	46.40	53.66	15.64
G9	43.60	51.52	0.00	0.00	43.60	51.52	18.18
G10	53.15	64.88	9.27	9.95	62.43	74.83	19.87
G11	209.27	236.81	13.82	12.64	223.09	249.45	11.82
G12	76.93	88.78	0.70	2.32	77.63	91.09	17.35
G13	99.99	102.58	0.37	1.82	100.36	104.40	4.03
G14	80.68	92.79	0.50	5.36	81.18	98.15	20.89
G15	14.05	23.70	0.00	0.00	14.05	23.70	68.69
G16	7.44	4.28	0.00	0.00	7.44	4.28	-42.53
G17	0.01	0.23	0.36	0.28	0.37	0.51	35.79
UNG	0.00	0.09	0.00	0.00	0.00	0.09	-
All India Total	700.42	798.87	26.09	33.56	726.51	832.43	14.58

(P): Provisional

Source: Ministry of Coal

Table 3.4 : Yearwise Domestic Production of Petroleum Products

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	
	2	3	4	5	6	7	8	9	10	11	12	13			14	15
2011-12	9.55	27.19	18.83	55.57	7.86	10.06	82.88	0.50	101.30	18.43	1.03	7.84	4.61	31.91	14.43	203.21
2012-13	9.82	30.12	19.02	58.96	7.97	10.09	91.10	0.40	109.56	15.05	0.90	10.94	4.67	31.56	17.65	217.73
2013-14	10.03	30.28	18.51	58.81	7.42	11.22	93.76	0.42	112.82	13.41	0.94	12.07	4.79	31.20	17.93	220.76
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(P)	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
Growth rate of 2022-23 over 2021-22(%)	4.85	6.41	-14.79		-50.53	45.72	6.16	-19.72		10.99	10.90	3.45	0.65		0.73	4.81
CAGR 2013-14 to 2022-23 (%)	2.77	3.93	-0.91		-20.44	3.28	2.17	4.83		-4.05	3.67	3.22	0.81		6.56	2.12

Lubes= Lubricant, Pet.Coke= Petroleum Coke

(P): Provisional LPG=Liquidified Petroleum Gas, MG= Motor Gasoline, ATF= Aviation Turbine Fuel

* 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)
2013-14	35.41	5.59	0.77	0.07	34.57	28.98
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(P)	34.45	5.51	0.69	0.11	33.65	28.14
Growth rate of 2022-23 over 2021-22(%)	1.25	-4.43	-14.48	13.52	1.61	2.88
CAGR 2013-14 to 2022-23 (%)	-0.30	-0.15	-1.12	5.40	-0.30	-0.33

(P) : Provisional

Total may not tally due to rounding off.

Source : Ministry of Petroleum & Natural Gas.

Chapter 3: Production of Energy Resources

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

(Giga Watt hour=10⁶ Kilo Watt hour)

Year	Utilities							
	Thermal				Hydro	Nuclear	RES*	Total
	Steam	Diesel	Gas	Total				
1	2	3	4	5	6	7	8	9
2011-12	6,12,497	2,649	93,281	7,08,427	1,30,511	32,287	51,226	9,22,451
2012-13	6,91,341	2,448	66,664	7,60,454	1,13,720	32,866	57,449	9,64,489
2013-14	7,45,533	1,998	44,522	7,92,054	1,34,848	34,228	65,520	10,26,649
2014-15	8,35,291	1,576	41,075	8,77,941	1,29,244	36,102	73,563	11,16,850
2015-16	8,95,340	551	47,122	9,43,013	1,21,377	37,414	65,781	11,67,584
2016-17	9,44,022	401	49,094	9,93,516	1,22,378	37,916	81,548	12,35,358
2017-18	9,86,591	348	50,208	10,37,146	1,26,123	38,346	1,01,839	13,03,455
2018-19	10,22,265	215	49,834	10,72,314	1,34,894	37,813	1,26,759	13,71,779
2019-20	9,94,197	199	48,443	10,42,838	1,55,769	46,472	1,38,337	13,83,417
2020-21	9,81,443	224	50,944	10,32,611	1,50,300	43,029	1,47,248	13,73,187
2021-22	10,78,581	214	36,016	11,14,811	1,51,627	47,112	1,70,912	14,84,463
2022-23(P)	11,82,096	320	23,885	12,06,301	1,62,099	45,861	2,03,552	16,17,813
Growth rate of 2022-23 over 2021-22(%)	9.60	49.53	-33.68	8.21	6.91	-2.66	19.10	8.98
CAGR 2013-14 to 2022-23(%)	5.26	-18.42	-6.69	4.79	2.07	3.30	13.42	5.18

* RES: Renewable Energy Sources excluding hydro
(P):Provisional
Source : Central Electricity Authority.

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

(Giga Watt hour= 10⁶ x Kilo Watt hour)

Year	Non-Utilities							Grand Total
	Thermal				Hydro	RES*	Total	
	Steam	Diesel	Gas	Total				
1	10	11	12	13	14	15	16	
2011-12	1,04,863	6,244	21,972	1,33,079	131	1,178	1,34,388	10,56,839
2012-13	1,13,167	8,205	20,769	1,42,141	118	1,750	1,44,010	11,08,499
2013-14	1,18,178	8,866	19,912	1,46,957	129	1,903	1,48,988	11,75,637
2014-15	1,28,401	9,720	21,135	1,59,256	145	2,656	1,62,057	12,78,907
2015-16	1,36,721	8,412	21,083	1,66,216	110	2,046	1,68,372	13,35,956
2016-17	1,37,588	9,182	22,855	1,69,625	144	2,277	1,72,046	14,07,404
2017-18	1,43,868	8,107	25,362	1,77,337	112	2,328	1,79,777	14,83,232
2018-19	1,84,250	5,334	19,545	2,09,130	270	3,674	2,13,074	15,84,853
2019-20	2,05,546	1,919	25,443	2,32,908	348	6,310	2,39,567	16,22,983
2020-21	1,93,143	2,504	21,684	2,17,330	339	7,158	2,24,827	15,98,014
2021-22	1,79,235	2,105	20,801	2,02,141	357	6,813	2,09,311	16,93,774
2022-23(P)	1,92,900	2,300	21,500	2,16,700	400	8,900	2,26,000	18,43,813
Growth rate of 2022-23 over 2021-22(%)	7.62	9.29	3.36	7.20	12.15	30.63	7.97	8.86
CAGR 2013-14 to 2022-23(%)	5.60	-13.92	0.86	4.41	13.39	18.70	4.74	5.13

(P): Provisional * RES: Renewable Energy Sources excluding hydro
Source : Central Electricity Authority.

Chapter

Foreign Trade and Prices of Energy Resources

4



CHAPTER 4

Foreign Trade and Prices

Trade and Prices

Many challenges are faced by the developing countries and the international community including ensuring, through national and international measures, that energy is (a) accessible to households and industries; (b) affordable for all, especially the poor; (c) sustainably produced and consumed; and (d) available for promoting development locally and globally.

These challenges coupled with the imperative to mitigate climate change, i.e. “decarbonization” of energy generation and use by households and industries, further intensifies high volatility present in the international energy market, and thus impacts energy importers/exporters countries equally.

Countries need to encourage a more efficient management of energy resources, coupled with an accelerated growth of renewable and sustainable sources of energy. The need of the hour, thus, being an increased investment, development of necessary infrastructure and also improvement in trade regimes in order to achieve self-sufficiency in terms of import dependency.

To holistically mitigate the effects of the situation, Energy policies in India in the recent years have been designed to address the country’s growing energy deficit and to focus on developing alternative sources of energy, particularly nuclear, solar, and wind energy. India has been focusing on reducing its dependence on energy imports and diversifying its energy basket. The aim is to achieve Energy security - the continuous availability of energy in varied forms, in sufficient quantities, at reasonable prices, to fuel economic growth in the coming years. Moreover, the international community should promote an enabling environment for the development and utilization of financing mechanisms for exchange of new energy technology and infrastructure for an enabling environment in this sector to thrive.

Highlights

- There has been an increasing trend in the net import of coal in the recent years. Over the last ten years, the Net Import of coal steadily increased from 143.34 MTs in 2012-13 to 216.54 MTs in 2014-15. This was followed by a marginal decline in the succeeding 2 years but again have started increasing and reached to 247.51 MTs in 2019-20. However, during 2022-23(P), there is a sharp increase of 14.08% in the Net Import of Coal w.r.t the FY: 2021-22. During FY:2022-23(P), the net-Import of Coal came out to be 236.51 MTs as compared to 207.31 MTs during FY:2021-22.
- India is also highly dependent on imports of crude oil to meet domestic consumption. Imports of crude oil have increased from 184.80 MTs during 2012-13 to 226.95 MTs during 2019-20. But during FY: 2020-21 the same has been reduced to 196.46 MTs, a reduction of 13% over the FY: 2019-20. The same may be due to COVID-19 pandemic. However, during FY:2022-23(P) the fuel import has again experienced a growth of 2.33% over previous year and reached at 232.73 MTs.
- India is an exporter of Petroleum Products. The export of petroleum products has increased rather slowly from 60.40 MT during 2011-12 to 65.69 MT during 2019-20. But during FY:2020-21 the same has been reduced to 56.77 MTs which again rose to 62.75 MTs during FY:2021-22. During FY:2022-23(P) the same stood at 61.04 MTs registering a negative growth of close to -2.73%.
- The import of Natural Gas has experienced a steady increase over time. From a figure of 17.61 BCM (Billion Cubic Meter) during 2012-13 to 33.89 BCM during 2019-20 i.e. an increase of over 92% in a span of 7 years. However, the same stood at 26.30 BCM for the year 2022-23(P) as compared to 31.03 BCM in the 2021-22 recording a decline of (-)15.22%. The CAGR of import of natural gas between 2013-14 and 2022-23(P) is having a positive growth rate of 4.43%.
- India's exports of electricity started rising as compared to gross imports since 2016-17. The export of electricity has increased from 1651.00 GWh in 2013-14 to 10252.77 GWh in 2022-23(P) with a CAGR of 22.50%.
- India, however also imports a decent amount of electricity to meet its' domestic demand. The Import figure during FY:2012-13 was 4,795 GWh which, after having a decline during FY:2018-19 (4,396 GWh), has displayed a steady growth upto FY:2020-21 having a figure of 9547.70 GWh. However, during FY:2022-23(P) the same has been found to be reduced to 7842.53 GWh, a decline of -1.65% over FY:2020-21. (Table 4.1(Contd.))

Fig 4.1: Trends of Import of Coal, Crude oil, Petroleum products in India during FY : 2013-14 to 2022-23(P)

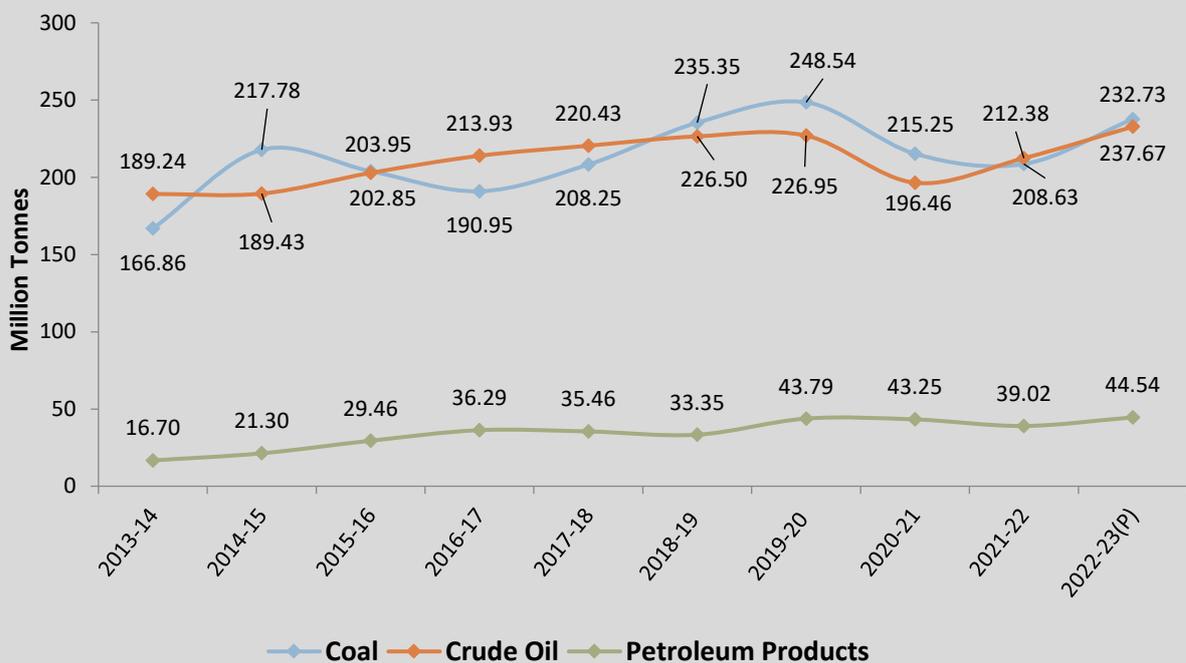


Fig 4.2: Trends of Import of Natural Gas and Electricity in India during FY : 2013-14 to 2022-23(P)

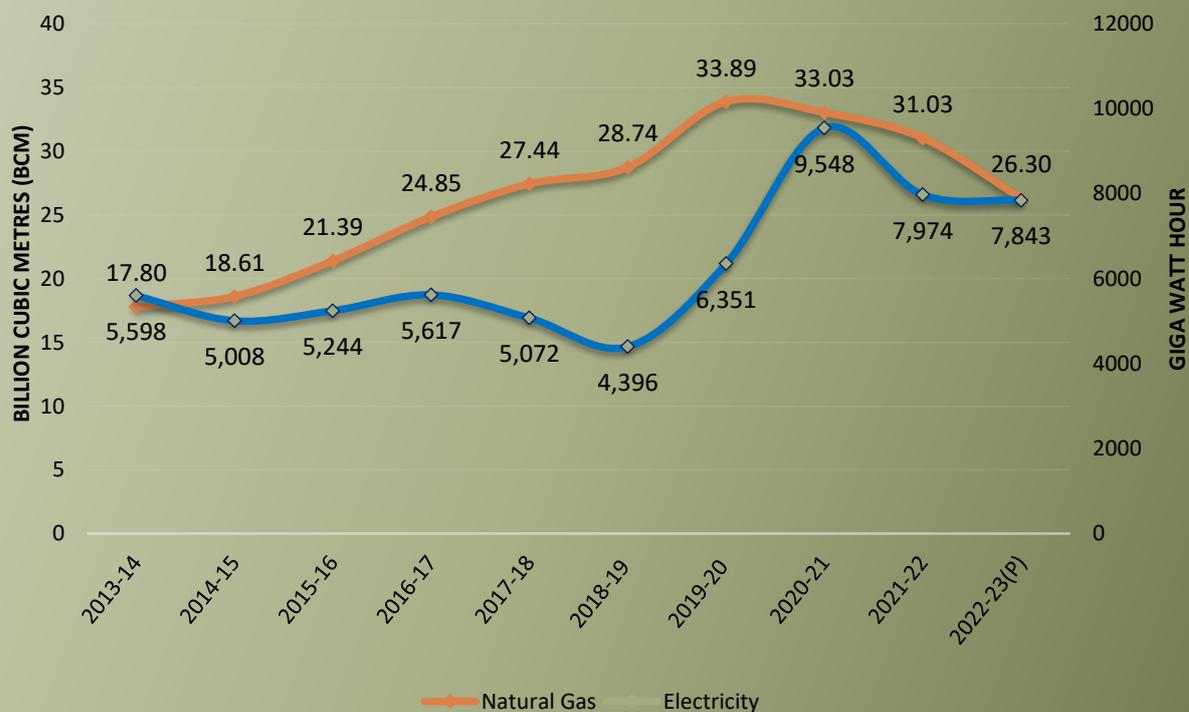


Fig 4.3: Yearwise Wholesale Price Indices (base : 2011-12) of Energy Commodities

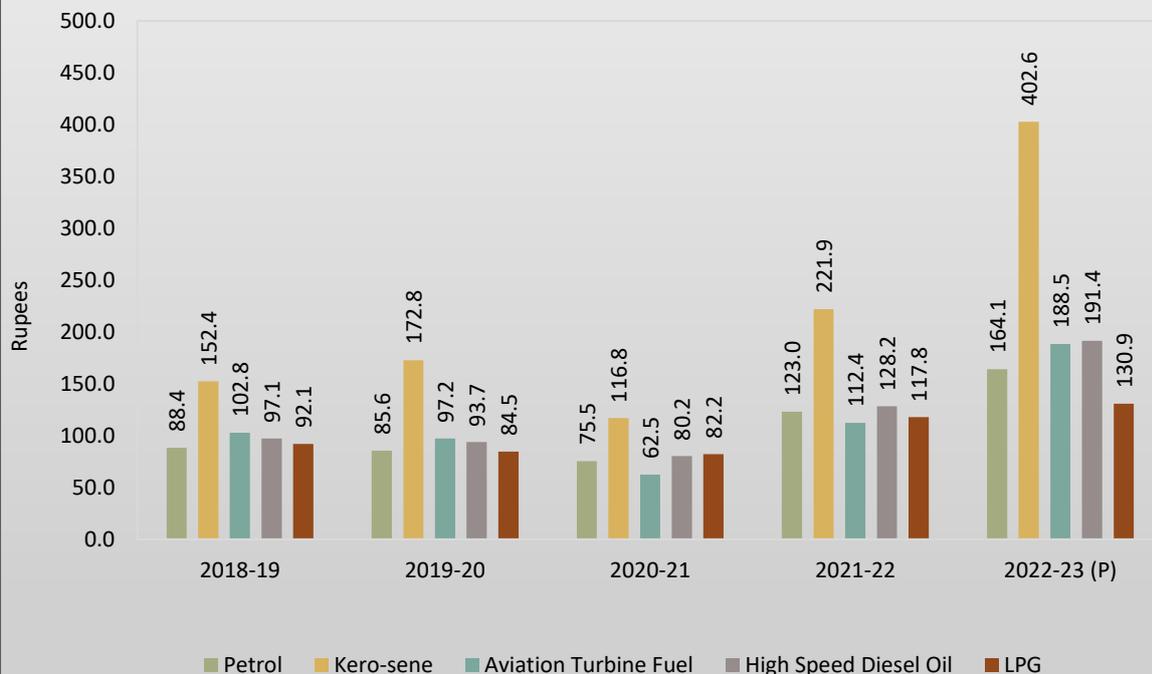
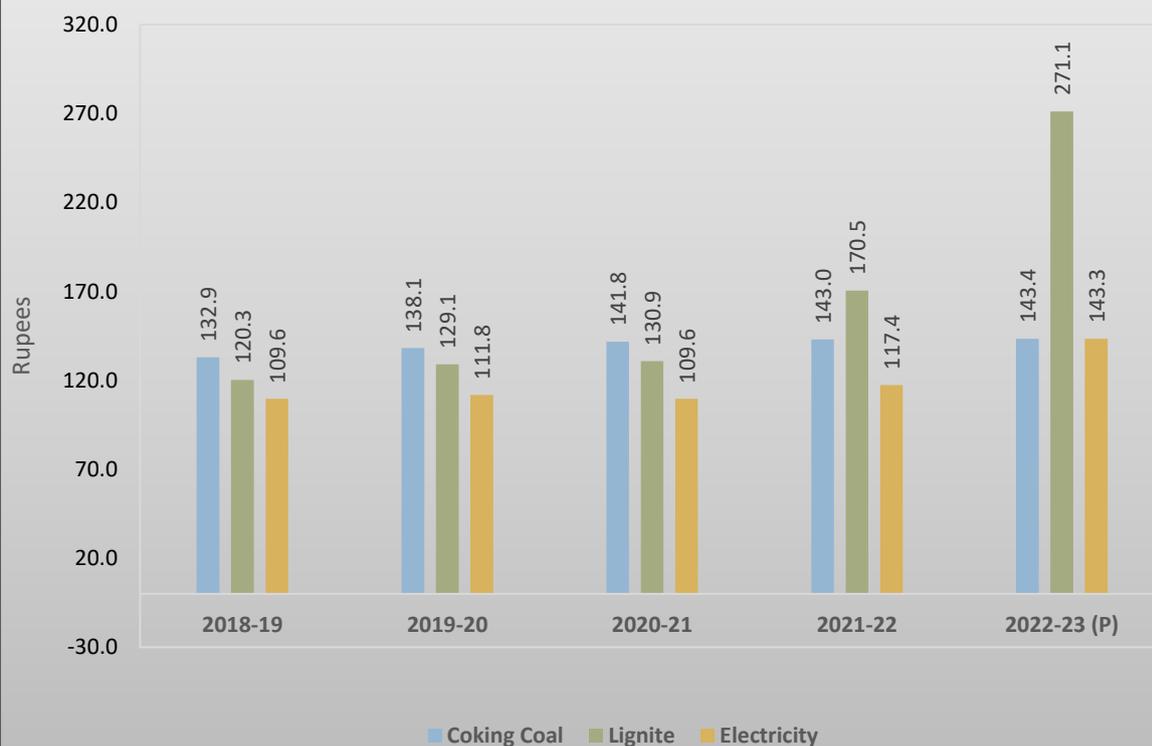


Fig 4.4: Yearwise Wholesale Price Indices (base 2011-12) of Energy Commodities



Chapter 4: Foreign Trade and Prices

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 Impor	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
2013-14	166.86	2.19	164.67	0.00	0.00	0.00	189.24	0.00	189.24	16.70	67.86	-51.17
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(P)	237.67	1.16	236.51	0.02	0.00	0.02	232.73	0.00	232.73	44.54	61.04	-16.50
Growth rate of 2022-23 over 2021-22(%)	13.92	-11.63	14.08	-	-	-	9.58	-	9.58	14.16	-2.73	-30.50
CAGR 2013-14 to 2022-23 (%)	4.01	-6.78	4.10	-	-2.79	-	2.33	-	2.33	11.52	-1.17	-11.82

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
2012-13	17.61	0.00	17.61	4794.50	153.53	4640.97
2013-14	17.80	0.00	17.80	5597.90	1651.00	3946.90
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(P)	26.30	0.00	26.30	7842.53	10252.77	-2410.24
Growth rate of 2022-23 over 2021-22(%)	-15.22	-	-15.22	-1.65	10.85	-
CAGR 2013-14 to 2022-23 (%)	4.43	-	4.43	3.82	22.50	-

(P): Provisional.

Sources:

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

Chapter 4: Foreign Trade and Prices

Table 4.2 : Year wise 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	Petroleu m Coke	Lignit e	Electricit y
1	2	3	4	5	6	7	8	9	10	11	12	13
2013-14	124.6	109.3	119.7	126.3	112.1	111.5	114.2	118.6	101.2	92.8	99.2	103.6
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 (P)	164.1	402.6	188.5	191.4	131.4	127.2	180.0	130.9	143.4	293.6	271.1	143.3
Increase in 2022-23 over 2021-22 (%)	33.41	81.43	67.70	49.30	16.08	17.56	11.11	11.12	0.28	33.39	59.00	22.06

* Annual average of monthly index, Financial Year wise

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

Chapter

Availability of Energy Resources

5



CHAPTER 5

Availability of Energy Resources

Availability

The availability of and access to energy and energy sources are particularly essential for poverty reduction and further improvements in standards of living.

Data on availability of energy resources within the national territory of a given country during a reference period along with reliable and timely monitoring of the supply and use of energy becomes indispensable for sound decision-making.

Data items, particularly, on mineral and energy resources are important for the assessment of their availability in the environment, as well as for the assessment of their depletion. This information is often used in the compilation of asset accounts in the SNA, as well as in SEEA-Energy accounts to assess their availability in the long run.

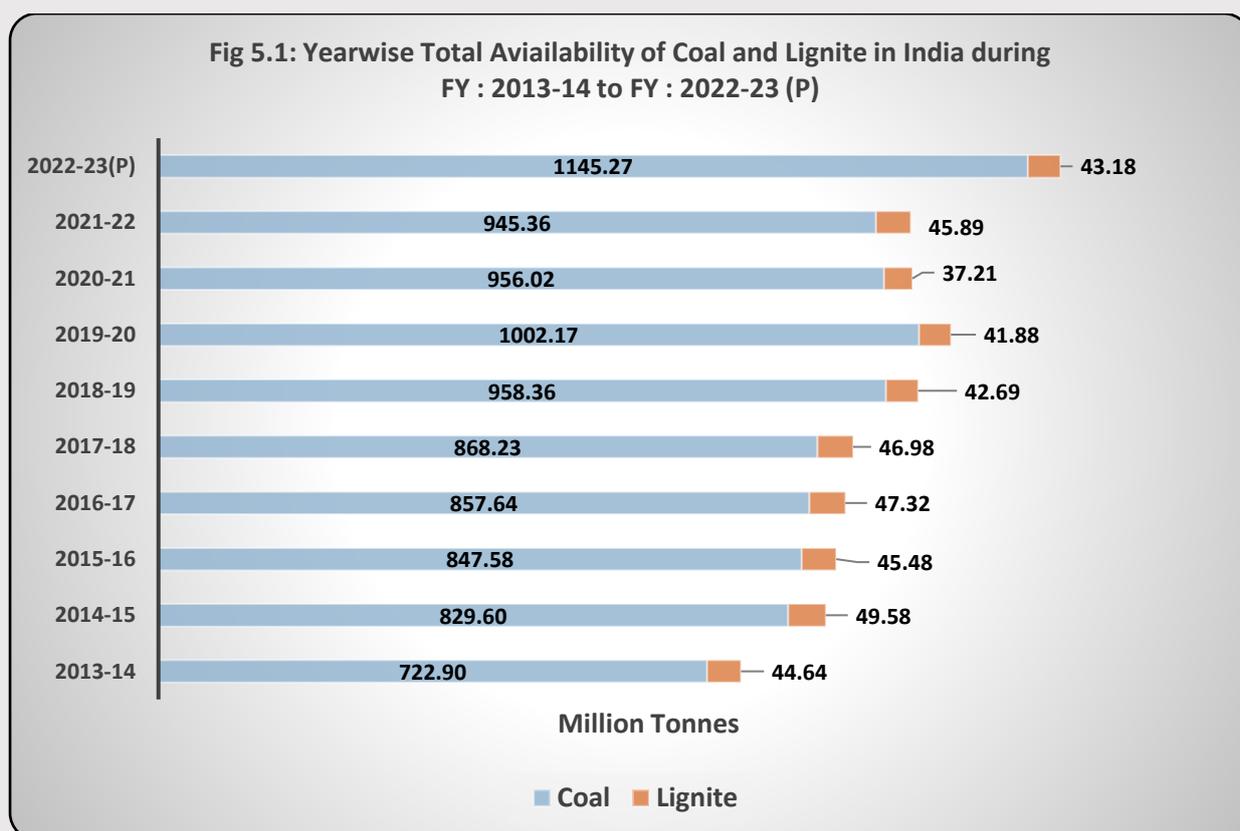
More importantly, it is essential for countries to track their depletion of energy related natural resources, as this directly affects their availability for future generations and increasing dependence of an economy on trade to balance the deficit. Thus, there has been a thrust to rely on renewable and cleaner forms of energy in the recent years, world over, - to bridge the gap between demand and supply without affecting the environment drastically.

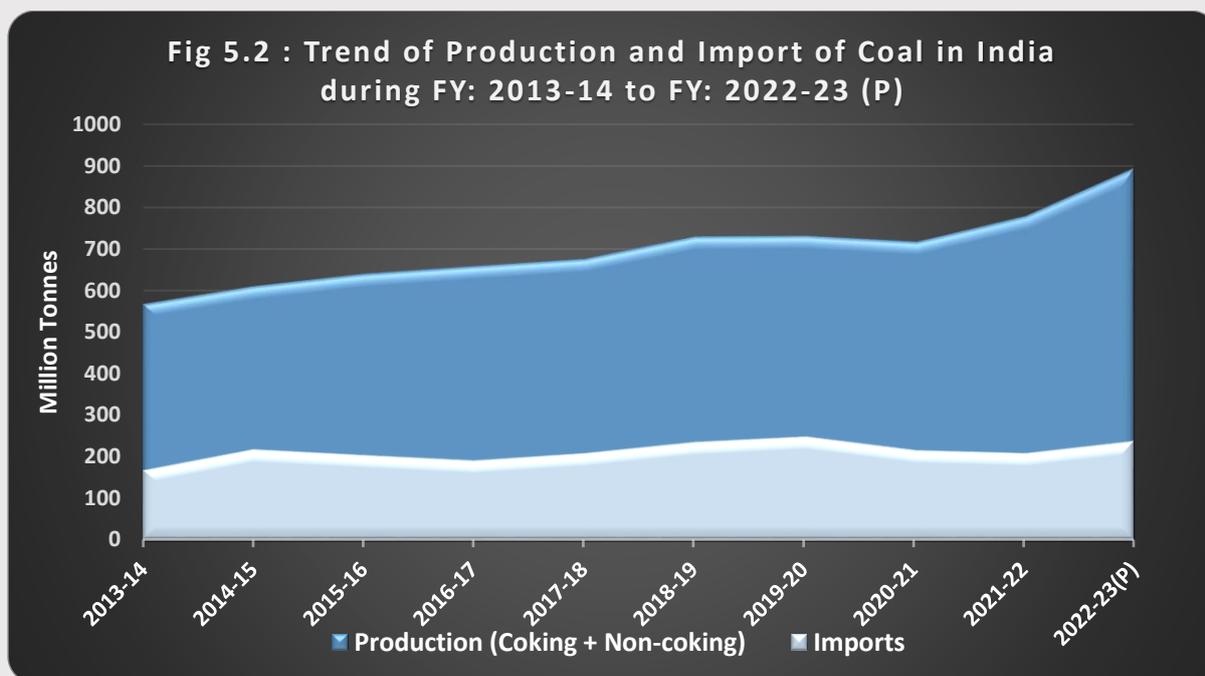
The necessity of Energy security in the current world and availability of energy being an enabler of life improvement, access and availability of Clean Energy for all has been recognized as an agenda point of the Sustainable Development Goals which are to be achieved by countries till 2030.

This chapter presents the availability of primary energy resources, petroleum products and electricity in the economy.

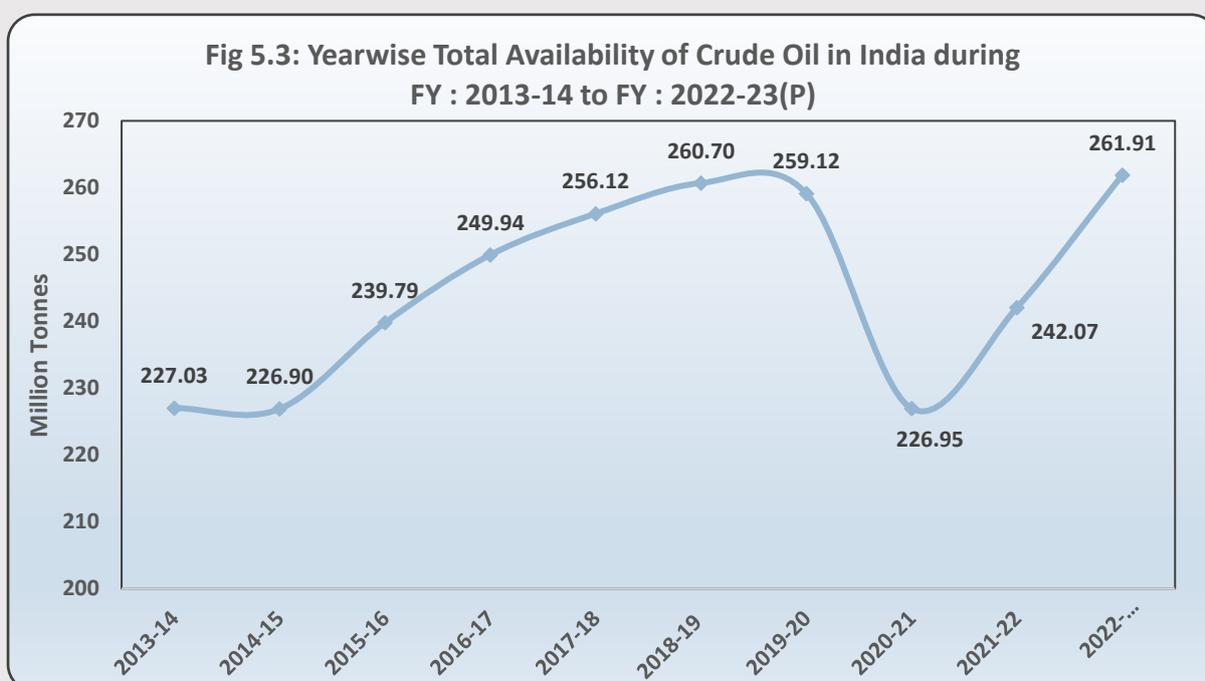
Highlights

- Over the year 2022-23 (P), in comparison to the year 2021-22, the availability of energy resources has experienced an increase for both Coal and Crude Oil. The availability of Coal has increased by 21.15% during FY:2022-23(P), in comparison with previous Financial year. The availability of Lignite, Crude Oil and Natural Gas oil have experienced a growth of -5.92%, 8.20% and -6.54% respectively during FY:2022-23 (P), w.r.t FY:2021-22. (Table 5.1).
- India, being one of the largest reservoirs of Coal, has displayed a steady increase in availability of Coal during the period from 2013-14 to 2022-23(P) with a CAGR of about 5.25%, except for small decline of 4.61% from 2019-20 and 1.07% from 2020-21. The total availability of Coal in 2022-23(P) stood at 1145.27 MT as compared to 945.36 MT in 2021-22 indicating a significant increase of close to 200 MT over a year. Out of the 1145.27 MT available for consumption in 2022-23(P), a major portion (78%) is produced domestically and 237.67 MT of Coal has been imported (Table 5.1 & 5.2). An overview of availability of Coal and Lignite in India is given below,





- The total availability of crude oil experienced a steep downfall of 32.17 MT during FY:2020-21 w.r.t FY:2019-20; a decline of close to 12% over previous year, primarily because of COVID-19 pandemic. The same, however has bounced back and registered a growth of 8.20% during FY:2022-23(P) over last year (from 242.07 MT in 2021-22 to 261.91 MT during 2022-23(P)). The overall CAGR between 2013-14 to 2022-23(P) has also remained positive (1.60%).

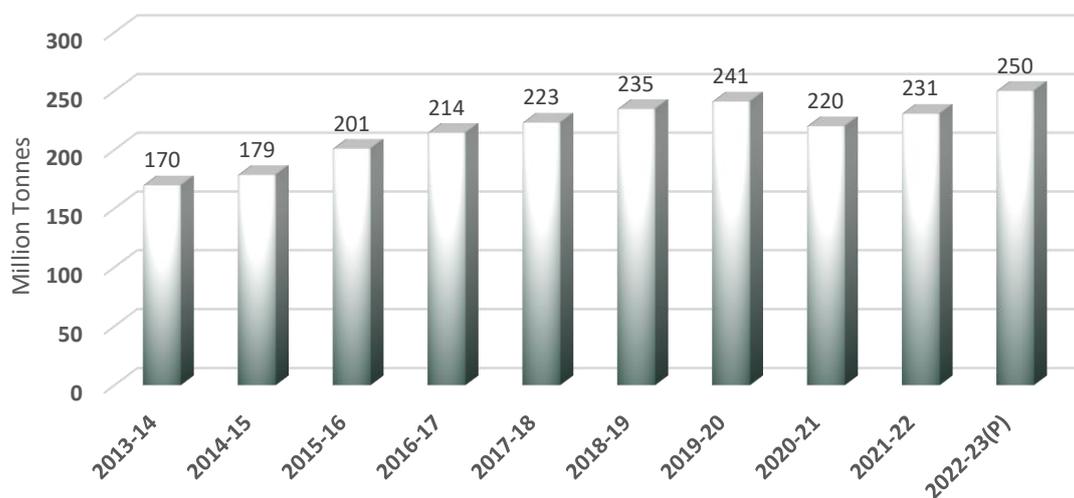


- Like in all developing countries, India has also experienced a steady growth rate of Petroleum Products over time. A production of 203.20 MTs in 2011-12 to 262.94 MTs in 2019-20 i.e. an increase of over 29% has been registered. But during 2020-21,

Chapter 5: Availability of Energy Resources

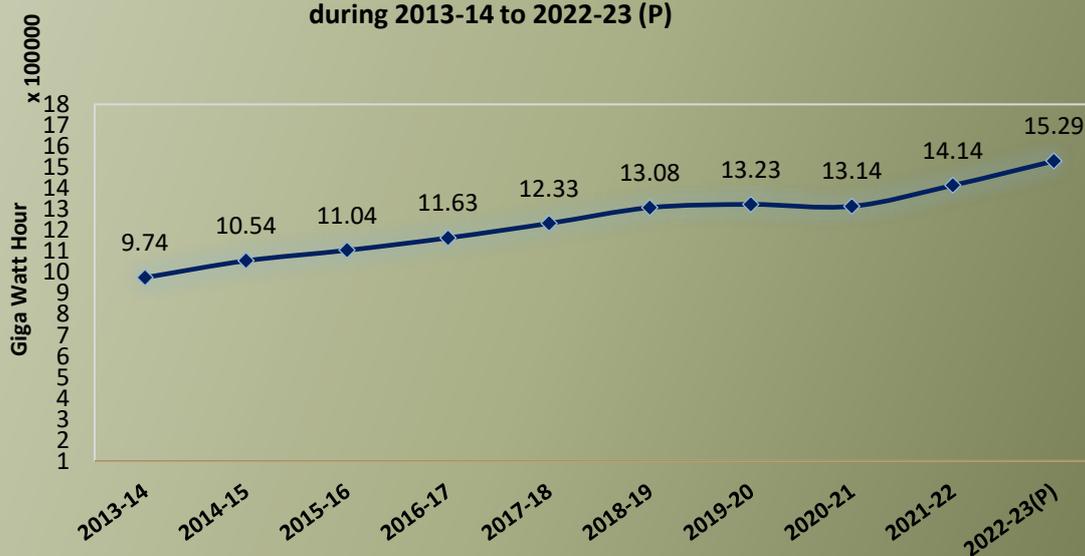
primarily because of COVID-19, the same has been decreased to 233.51 MTs, a decline of 11.19% over 2019-20. The total availability of Petroleum Products, however, has experience a healthy growth of close to 8.45% during FY:2022-23(P) and has reached to 250.04. The CAGR of total availability of Petroleum products between 2013-14 to 2022-23(P) has shown a growth of 4.41% (Table 5.3).

Fig 5.4: Yearwise Total Availability of petroleum products in India during FY : 2013-14 to FY : 2021-22(P)



- Electricity available for supply has increased from 9,74,436 GWh in 2013-14 to 15,29,471 GWh in 2022-23(P), thus recording a CAGR of 5.14% during this period. There is also a healthy increase of 8.17% in the availability of electricity (from 14,13,903 GWh during 2021-22 to 15,29,471 GWh) during 2022-23(P).

Fig 5.5: Trends of Net availability of Electricity in India during 2013-14 to 2022-23 (P)



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)
2013-14	722.90	44.64	227.03	52.37
2014-15	829.60	49.58	226.90	51.30
2015-16	847.58	45.48	239.79	52.51
2016-17	857.64	47.32	249.94	55.70
2017-18	868.23	46.98	256.12	59.17
2018-19	958.36	42.69	260.70	60.79
2019-20	1002.17	41.88	259.12	64.14
2020-21	956.02	37.21	226.95	60.82
2021-22	945.36	45.89	242.07	64.14
2022-23(P)	1145.27	43.18	261.91	59.95
Growth rate of 2022-23 over 2021-22(%)	21.15	-5.92	8.20	-6.54
CAGR 2013-14 to 2022-23 (%)	5.25	-0.37	1.60	1.51

(P): Provisional
 Note: Availability is defined as below:
 Coal/lignite: Production Net Imports change in stocks
 Crude Oil: Production +Net Imports
 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
2013-14	565.77	166.86	2.19	-7.54	722.90	44.27	0.00	0.00	0.37	44.64
2014-15	609.18	217.78	1.24	3.88	829.60	48.27	0.00	0.00	1.32	49.58
2015-16	639.23	203.95	1.58	5.97	847.58	43.84	0.00	0.00	1.63	45.48
2016-17	657.87	190.95	1.77	10.59	857.64	45.23	0.02	0.01	2.07	47.32
2017-18	675.40	208.25	1.50	-13.92	868.23	46.64	0.01	0.00	0.33	46.98
2018-19	728.72	235.35	1.31	-4.40	958.36	44.28	0.02	0.08	-1.54	42.69
2019-20	730.87	248.54	1.03	23.79	1002.17	42.10	0.05	0.09	-0.18	41.88
2020-21	716.08	215.25	2.95	27.63	956.02	37.90	0.02	0.19	-0.51	37.21
2021-22	778.21	208.63	1.32	-40.16	945.36	47.49	0.01	0.02	-1.59	45.89
2022-23(P)	893.19	237.67	1.16	15.57	1145.27	44.99	0.02	0.00	-1.83	43.18
Growth rate of 2022-23 over 2021-22(%)	14.77	13.92	-11.63	-	21.15	-5.27	-	-	-	-5.92

(P): Provisional

Total may not tally due to rounding off

Source : Ministry of Coal

Chapter 5: Availability of Energy Resources

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
2013-14	37.79	189.24	227.03	220.76	-51.17	169.59	34.57	17.80	52.37
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(P)	29.18	232.73	261.91	266.54	-16.50	250.04	33.65	26.30	59.95
Growth rate of 2022-23 over 2021-22(%)	-1.72	9.58	8.20	4.81	-30.50	8.45	1.61	-15.22	-6.54
CAGR 2013-14 to 2022-23 (%)	-2.83	2.33	1.60	2.12	-11.82	4.41	-0.30	4.43	1.51

* : 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 = 10⁶ Kilo Watt hour)

Year	Gross Electricity Generated from Utilities	Consumption in Power Station Auxiliaries	Net Electricity Generated from Utilities	Purchases from Non-Utilities + Net Import from Other Countries	Net Electricity Available for Supply
1	2	3	4=2-3	5	6=4+5
2013-14	10,26,649	70,161	9,56,488	17,948	9,74,436
2014-15	11,16,850	76,268	10,40,582	13,773	10,54,355
2015-16	11,67,584	79,302	10,88,282	15,947	11,04,228
2016-17	12,35,358	81,044	11,54,314	8,977	11,63,290
2017-18	13,03,455	82,148	12,21,307	11,198	12,32,505
2018-19	13,71,779	83,386	12,88,393	19,291	13,07,685
2019-20	13,83,417	83,301	13,00,116	22,932	13,23,048
2020-21	13,73,187	80,472	12,92,715	21,310	13,14,025
2021-22	14,84,463	86,756	13,97,707	16,197	14,13,903
2022-23(P)	16,17,813	1,02,919	15,14,894	14,577	15,29,471
Growth rate of 2022-23 over 2021-22(%)	8.98	18.63	8.38	-10.00	8.17
CAGR 2013-14 to 2022-23 (%)	5.18	4.35	5.24	-2.28	5.14

(P): Provisional

Source: Central Electricity Authority.

Chapter

Consumption of Energy Resources

6



CHAPTER 6

Consumption of Energy Resources

Consumption

The study of consumption patterns of energy in any economy is vital to understand how final demand drives energy use or consumption. SEEA - Energy states that “resource uses and environmental pressures, which occur at the level of production, can in fact be viewed as determined by final use, which initiated the production chain”.

Moreover, to fully understand the climate-change process, the data on many consumption activities, such as heating of houses and buildings, usage of electricity, various industrial processes and transportation, which entail combustion processes are required.

Energy-related air emissions are being measured and tracked by global economies, because most economic activities are linked to combustion/consumption that is needed for energy production.

With the increasing focus on sustainable consumption and production patterns world over, resource uses and environmental pressures are being viewed as determinants or drivers of the final use and consumption of products.

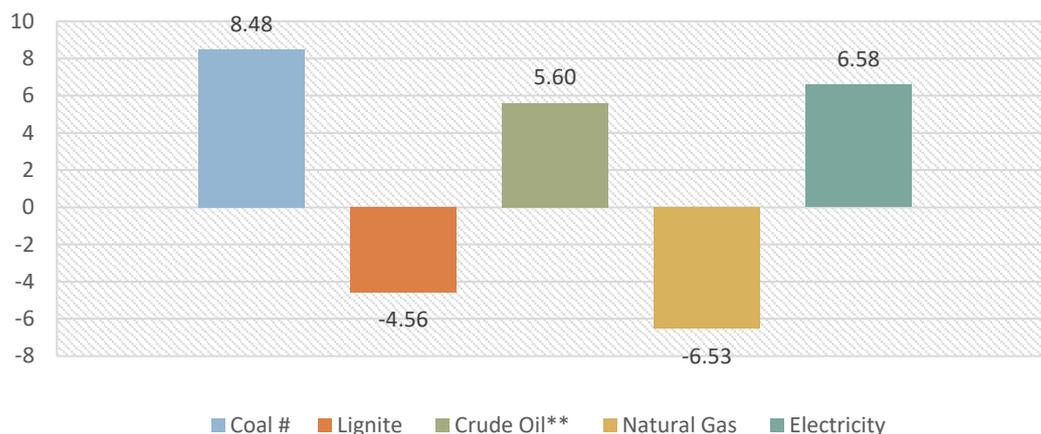
According to the International Energy Agency, where India is an Association country since March 2017, Total Energy Consumption (TEC) in an economy is a good indicator of efficient or non-efficient end-use in economic activities and may indicate course-correction measures to sustainability. It is defined to include the sum of the consumption in the end-use sectors and for non-energy use. Energy used for transformation processes and for own use of the energy producing industries is excluded. Thus, final consumption reflects for the most part, deliveries to consumers and represents the quantity of all energy necessary to satisfy inland consumption.

This chapter presents the total consumption of energy resources along with sector wise end use of different energy resources and products in India.

Highlights

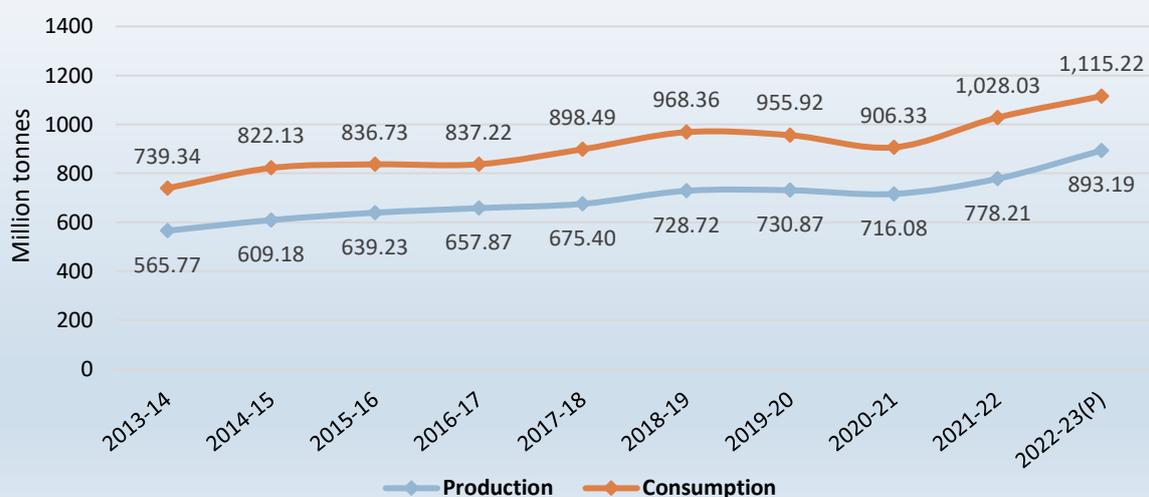
- During the FY: 2022-23, India has experienced a rather steady growth rate of consumption. Surmounting over the grappling moments of global pandemic, all the sectors have experienced with a healthy growth rates displaying a steady recovery of the Indian Economy.

Fig 6.1 : Growth rate of consumption during FY : 2022-23(P) w.r.t 2021-22



- India is one of the largest producers and consumer of coal. After registering a significant growth during FY: 2021-22 over 2019-20 (13.4%), the story of the increasing demand and consumption continues during FY:2022-23 (8.5%) over FY:2021-22 (Table 6.1).

Fig 6.2 : Yearwise Trend of Production and Consumption of Coal in India during FY:2013-14 to FY:2021-22(P)



Chapter 6: Consumption of Energy Resources

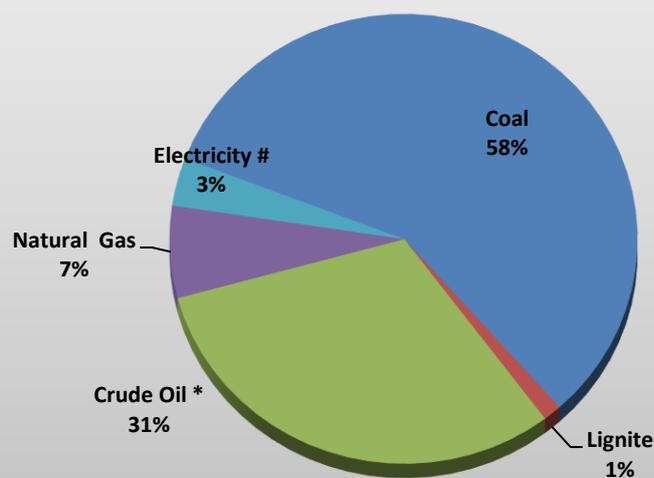
India has experienced a healthy growth in consumption of Energy. A growth from a figure of 26,822 Petajoule (PJ) during 2013-14 to 35,159 Petajoule (PJ) in 2022-23 (P). The total consumption of energy has increased from 33,018 PJ in 2021-22 to 35,159 PJ in 2022-23(P), an increase of 6.48%. Coal and Lignite together has registered the highest growth of close to 8.63% during FY:2022-23(P) over last year

Fig 6.3 : Trend of total consumption of Energy in India during FY: 2013-14 to FY: 2022-23 (P)



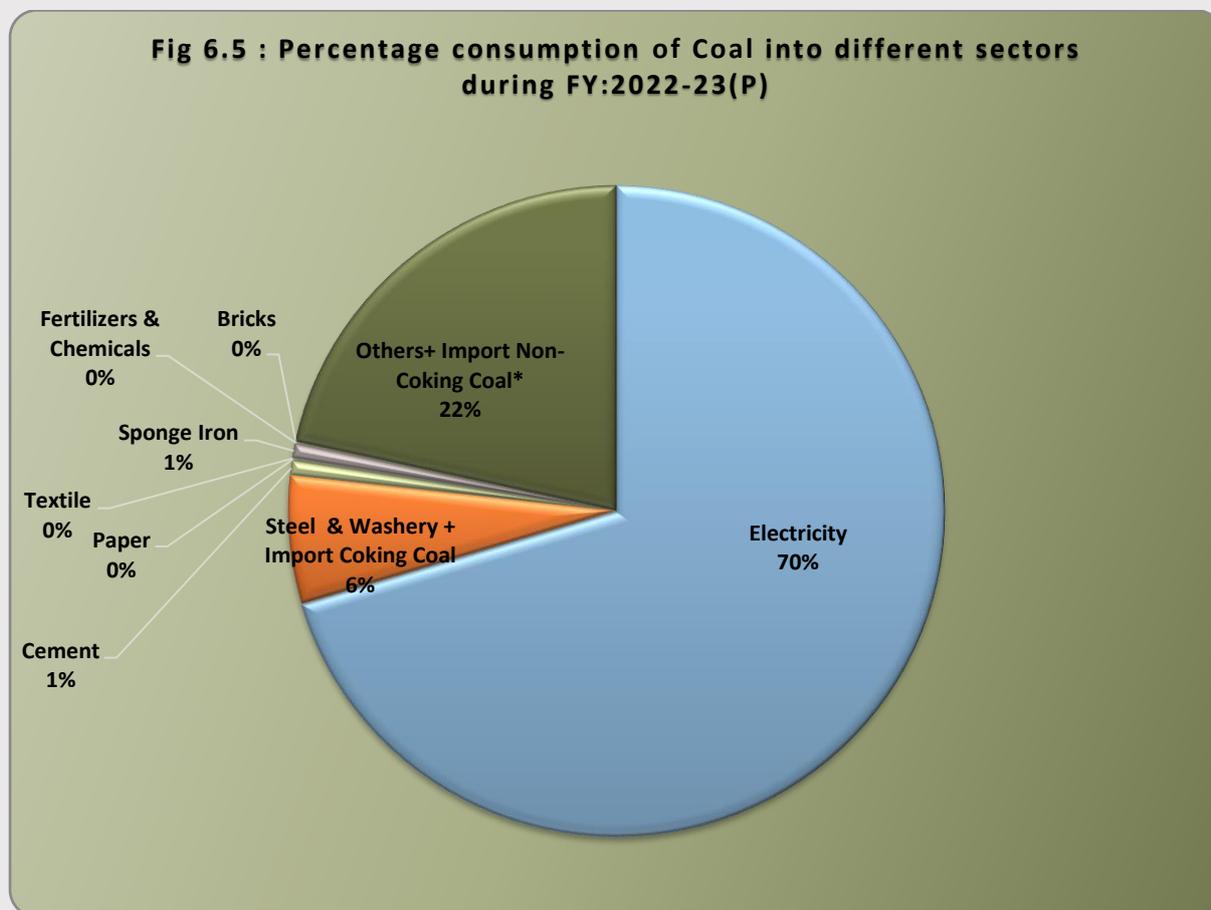
- The consumption of energy in petajoules from Coal and Lignite was highest which accounted for about 59% of the total consumption during 2022-23(P) followed by Crude Oil (31%) and Natural Gas (7%) (Table 6.2).

Fig 6.4: Sourcewise Consumption of Energy during 2022-23 (P)



Total Energy Consumption = 35,159 PJ

- Electricity Sector remains the biggest consumer of Raw Coal and Lignite in India with this sector consuming as much as 70.40% of the total consumption of coal and 83.16% of total consumption of lignite in India in 2022-23(P). (Table 6.3 & Table 6.4)

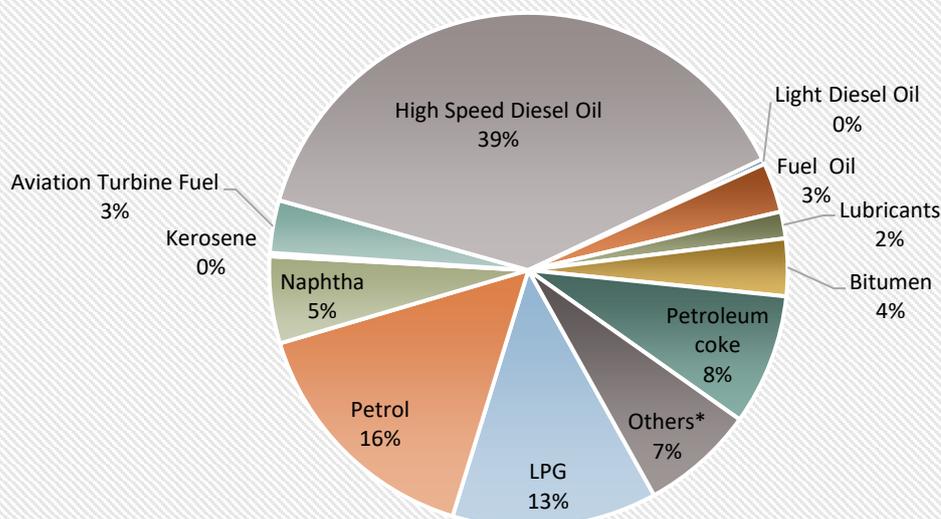


- Consumption of Lignite was increased from 32.94 MT in 2020-21 to 49.08 MT in 2021-22 which is almost 17.67%. The sharp increase can be attributed to the higher demand in Electricity/Power sector during FY: 2021-22 which has continued its' increasing trend even during FY: 2022-23.
- Petroleum products have experienced a steady growth over time. From a figure of 157.06 MTs during 2012-13 to 214.13 MTs during 2019-20 i.e. a growth of 36% over a span of 7 years. However, during FY:2020-21 the same has been decreased by 9.26% and stood at 194.30 MTS primarily because of COVID-19 pandemic. During FY:2022-23(P) the same has registered a positive growth rate of 10.57% over last year and stood at 223.01 MTs. Among all the products the High-Speed Diesel Oil (HSDO) accounted for 38.52% of total consumption, followed by Petrol (15.68%), LPG (12.78%) and Pet Coke (8.23%) (Table 6.5).

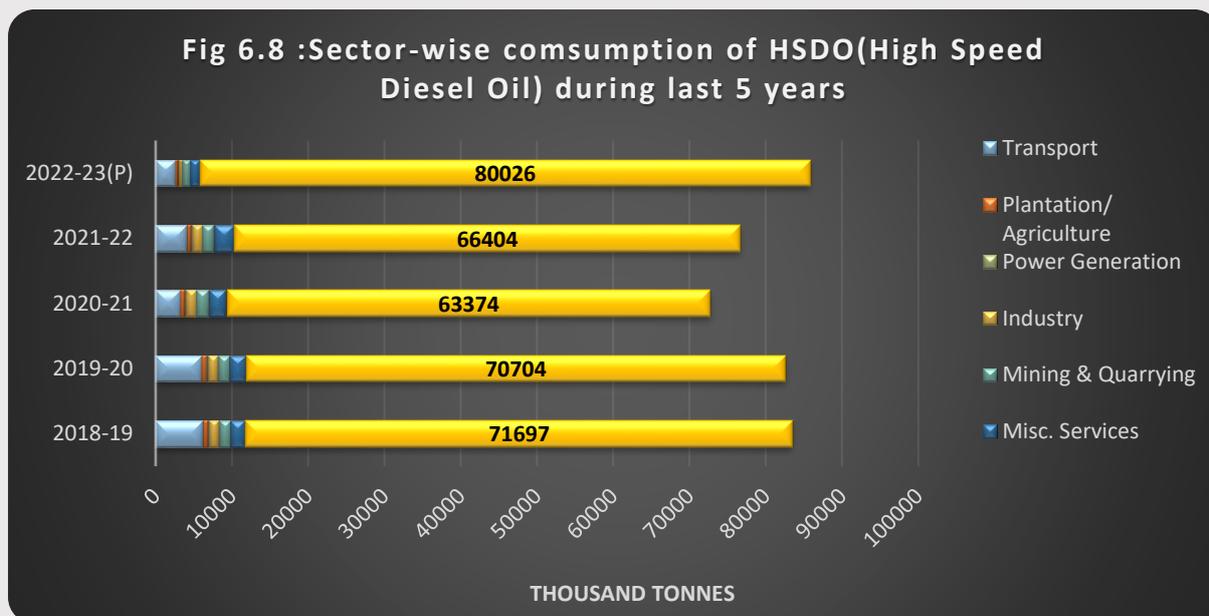
Fig 6.6 : Trend of total consumption of Petroleum Products in India during FY: 2013-14 to FY: 2022-23 (P)



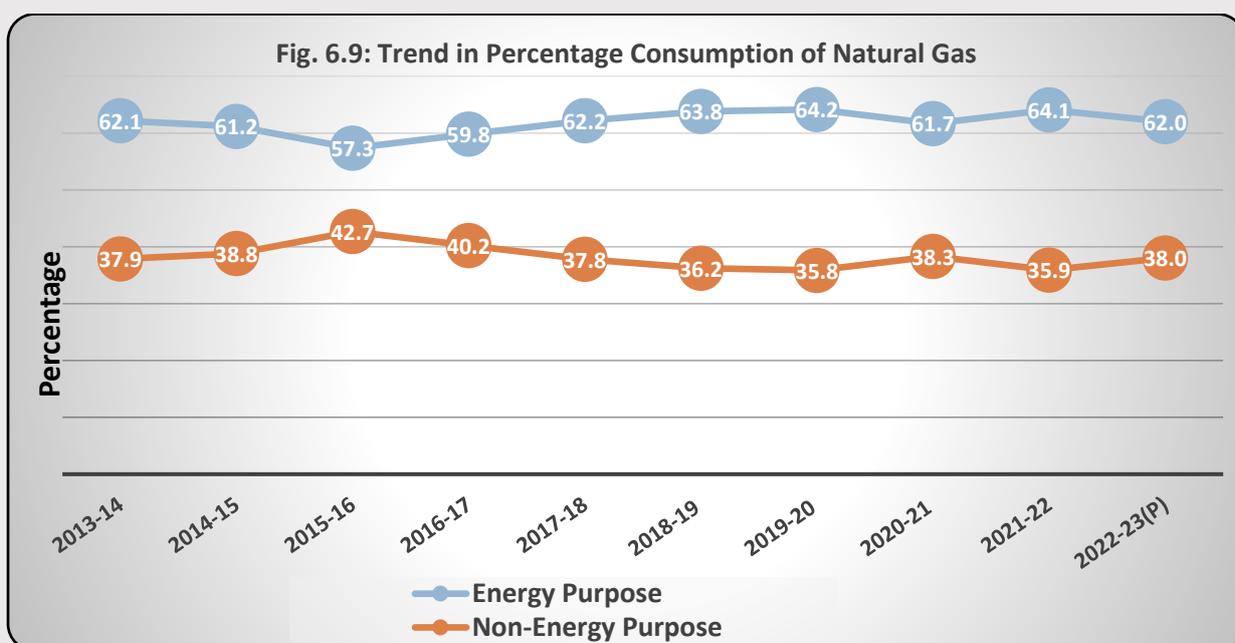
Fig 6.7 : Consumption of Petroleum Products- By type during FY:2022-23 (P)



- Among all the Petroleum Products the HSDO, which has the highest share of consumption (38.52%) during FY: 2022-23(P), experienced a positive growth of 12.05% over last year. The Petrol and Pet-Coke are also having a growth of 13.38% and 28.68% respectively over last year. The HSD has also registered a positive growth during FY:2022-23(P); with a growth of 12.05% over last year it has stood at a figure of 85.90 MTs in 2022-23(P), as compared to 76.66 MTs during 2021-22(Table 6.5).



- The impact of energy policies of recent time is evident on the consumption of kerosene as a fuel in the country. the consumption of Kerosene has seen a steady decreasing trend with a CAGR of (-) 25.78% from 2013-14 to 2022-23(P) (Table 6.5).
- The consumption of Natural Gas has experienced a fluctuation over time. During FY: 2022-23(P) the consumption against the *Energy Purpose* has experienced a negative growth of -7.7% (from 39,414 BCM during 2021-22 to 36,383 BCM during 2022-23(P)); the *Non-Energy Purpose* however has experienced a meagre growth of 1.1% (from 22,077 BCM during 2021-22 to 22,319 BCM during 2022-23(P)).



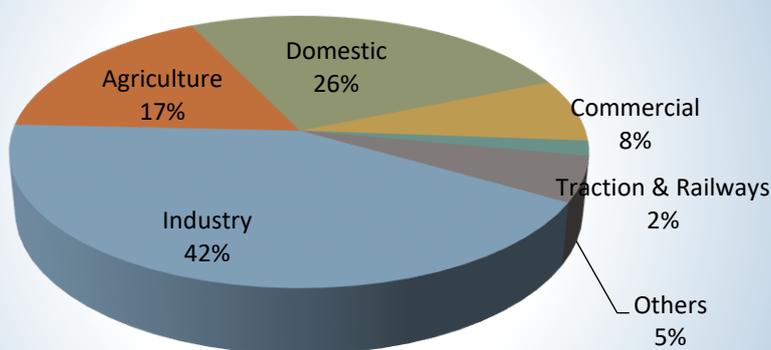
- The maximum use of Natural Gas is in fertilizers industry (32.35%) followed by *City or Local Natural Gas Distribution Network incl. Road Transport* (20.06%). Industry wise off-take of natural gas shows that, out of the Total Consumption (*Availability Basis (Net*

Chapter 6: Consumption of Energy Resources

Production + LNG Imports)), while 62% of natural gas has been used for Energy purposes, 38% is used for Non-energy purposes (Table 6.7).

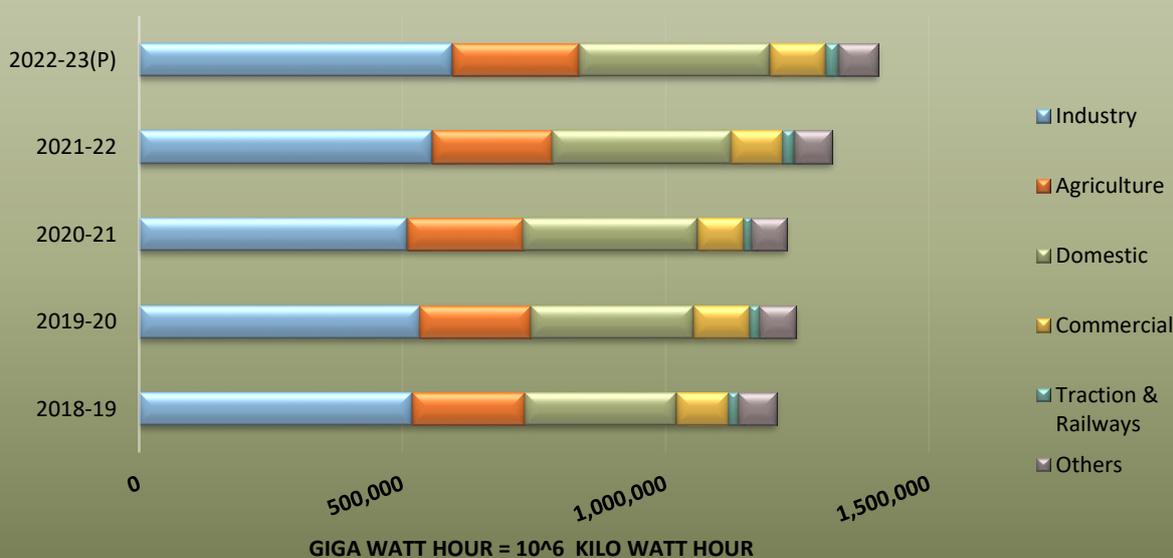
- The estimated electricity consumption increased from 8,24,301 GWh during 2012-13 to 12,96,300 GWh during 2021-22(P), showing a CAGR of 5.16%. Out of the total consumption of electricity in 2021-22(P), industry sector accounted for the largest share (41.16%), followed by domestic (25.77%), agriculture (17.67%) and commercial sectors (8.29%). The Domestic sector has experienced the highest CAGR of 6.87 between FY:2012-13 to FY:2021-22(P) (Table 6.8).

Fig 6.10: Consumption of Electricity by Sectors during 2022-23(P)



Total Electricity Consumption = 14,03,400 GWh

Fig 6.11: Sector-wise consumption of Electricity during last 5 years



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
2013-14	739	44	222	52	8,74,209
2014-15	822	47	223	51	9,48,522
2015-16	837	42	233	53	10,01,191
2016-17	837	43	245	56	10,61,183
2017-18	898	46	252	59	11,23,427
2018-19	968	46	257	61	12,09,972
2019-20	956	42	254	64	12,48,086
2020-21	906	38	222	61	12,30,208
2021-22	1,028	49	242	64	13,16,765
2022-23(P)	1,115	47	255	60	14,03,400
Growth rate of 2022-23 over 2021-22(%)	8.48	-4.56	5.60	-6.53	6.58
CAGR 2013-14 to 2022-23 (P) (%)	4.67	0.72	1.54	1.52	5.40

P: Provisional

GWh = Giga Watt hour = 10⁶ x Kilo Watt hour

**Crude oil in terms of refinery crude throughput.

Does not include Lignite

Sources:

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

Table 6.2: Yearwise Consumption of Energy Resources in Energy Units

(In Petajoules)

Year	Coal	Lignite	Crude Oil *	Natural Gas	Electricity #	Total
1	2	3	4	5	6	7
2013-14	14,214	419	9,520	2,017	652	26,822
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(P)	20,257	447	10,921	2,323	1,211	35,159
% Share in total consumption for 2022-23 (P)	57.6	1.3	31.1	6.6	3.4	100.0
CAGR 2013-14 to 2022-23(%)	4.02	0.72	1.54	1.58	7.12	3.05

*: Crude oil in terms of refinery crude processed.

P: Provisional.

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

Note: The figure against electricity has been calculated using the following formula:

Generation 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
2011-12	410.37	47.86	13.18	2.03	0.26	21.69	3.19	0.13	140.04	638.73
2012-13	446.76	51.70	13.11	2.12	0.30	20.90	2.86	2.01	173.62	713.39
2013-14	448.95	53.05	11.94	1.91	0.36	18.49	2.64	4.01	198.00	739.34
2014-15	497.70	56.24	11.36	1.65	0.42	17.77	2.70	0.09	234.22	822.13
2015-16	517.77	57.08	8.99	1.21	0.27	7.76	2.62	0.07	240.95	836.73
2016-17	535.04	51.98	6.36	1.18	0.24	5.56	2.45	0.10	234.31	837.22
2017-18	585.49	58.45	7.71	1.51	0.24	8.53	2.16	0.12	234.30	898.49
2018-19	621.64	64.65	8.82	1.64	0.20	12.09	1.79	0.09	257.44	968.36
2019-20	626.15	63.74	8.57	1.33	0.10	10.53	1.76	0.03	243.72	955.92
2020-21	581.23	60.17	6.75	1.05	0.08	9.57	1.53	0.03	245.93	906.33
2021-22	710.05	66.28	7.31	1.24	0.08	9.02	1.31	0.02	232.72	1,028.03
2022-23(P)	785.13	70.84	8.12	1.20	0.09	8.06	0.95	0.11	240.72	1,115.22
Percentage Distribution (in 2022-23)	70.40	6.35	0.73	0.11	0.01	0.72	0.09	0.01	21.58	100.00
Growth rate of 2022-23 over 2021-22(%)	10.57	6.87	11.12	-3.30	15.00	-10.69	-	-	3.44	8.48
CAGR 2013-14 to 2022-23(%)	6.41	3.27	-4.19	-4.98	-	-8.82	-10.75	-	2.19	4.67

(P): Provisional

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

Source: Ministry of Coal

Table 6.4: Year wise 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
2013-14	36.34	0.03	1.49	1.29	0.73	1.00	3.02	43.90
2014-15	39.47	0.02	1.27	0.65	2.89	0.67	1.98	46.95
2015-16	37.56	0.01	0.23	0.43	1.73	0.39	1.87	42.21
2016-17	38.82	0.04	0.29	0.53	1.29	0.42	1.77	43.16
2017-18	38.84	0.12	1.09	0.76	2.46	0.38	2.67	46.32
2018-19	37.73	0.09	1.80	0.60	2.61	0.63	2.34	45.81
2019-20	36.33	0.02	1.00	0.55	0.16	0.47	3.75	42.27
2020-21	32.94	0.02	0.81	0.57	0.29	0.43	3.44	38.49
2021-22	38.76	0.26	1.55	2.11	2.08	1.13	3.20	49.08
2022-23(P)	38.96	0.12	0.84	0.92	2.62	0.61	2.78	46.84
Distribution (%) in 2022-23	83.16	0.26	1.79	1.96	5.60	1.30	5.93	100.00
Growth rate of 2022-23 over 2021-22(%)	0.52	-	-	-	-	-	-13.17	-4.56
CAGR 2013-14 to 2022-23(%)	0.78	16.97	-6.20	-3.69	-	-5.41	-0.92	0.72

(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
2013-14	16.29	17.13	11.31	7.16	5.50	68.36	0.39	6.24	3.31	5.01	11.76	5.96	158.41	17.87	176.27
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	24.34	226.04
2022-23(P)	28.50	34.98	12.16	0.49	7.37	85.90	0.72	6.95	3.74	8.04	18.34	15.81	223.01	25.95	248.96
% Distribution in 2022-23(P)	12.78	15.68	5.45	0.22	3.30	38.52	0.33	3.12	1.68	3.61	8.23	7.09	100.00	-	-
Growth rate of 2022-23 over 2021-22 (%)	0.88	13.38	-8.21	-	-	12.05	-	11.06	-	2.87	-	-	10.57	6.59	10.14
CAGR 2013-14 to 2022-23(%)	6.41	8.26	0.81	-	3.29	2.57	7.24	1.22	1.38	5.40	5.07	11.46	3.87	4.23	3.91

(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.

Chapter 6: Consumption of Energy Resources

Table 6.6 (A): Yearwise Consumption of Selected Petroleum Products – Sector-wise(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	2011-12	5529	684	168	1649	1181	53208	2262	70	64750
	2012-13	5160	617	214	1628	1073	58021	2320	47	69080
	2013-14	3203	429	204	687	873	61465	1426	77	68364
	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(P)	2607	299	166	439	1053	80026	1242	67	85898	
Growth rate of 2022-23 over 2021-22(%)		-36.24	-43.70	-22.28	-65.97	-31.64	20.51	-51.34	72.89	12.05
CAGR 2013-14 to 2022-23 (%)		-2.26	-3.95	-2.30	-4.85	2.10	2.98	-1.52	-1.55	2.57

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(P)	62,260	640	1,681	3,841	1,280	5,042	5,282	80,026

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)*.

Chapter 6: Consumption of Energy Resources

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	2013-14	3.85	1.35	131.77	63.66	3.44	0.69	181.56	0.00	386.32
	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(P)	7.48	13.76	260.59	232.97	12.52	60.64	131.75	5.24	724.95
Growth rate of 2022-23 over 2021-22(%)	-	-	-9.70	-21.51	21.82	-70.56	-29.62	6.69	-28.75	
CAGR 2013-14 to 2022-23(%)	7.66	29.45	7.87	15.51	15.43	64.43	-3.50	-	7.24	

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	2013-14	315	75	536	1833	38	309	1985	696	5787
	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(P)	1561	50	418	1964	94	153	1404	537	6181
Growth rate of 2022-23 over 2021-22(%)	29.11	-22.30	34.20	-6.12	-25.98	-27.48	1.15	30.48	6.30	
CAGR 2013-14 to 2022-23(%)	19.45	-4.27	-2.72	0.77	10.47	-7.51	-3.77	-2.84	0.74	

Source: Ministry of Petroleum & Natural Gas

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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	2013-14	0.00	328.14	76.32	0.00	0.00	44.25	0.00	448.71
	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(P)	3.51	18.86	250.30	0.00	83.62	416.70	0.00	773.00	
Growth rate of 2022-23 over 2021-22(%)	-	-36.41	30.87	-	24.09	-	-	-	73.05
CAGR 2013-14 to 2022-23 (%)	-	-27.19	14.11	-	-	28.30	-	-	6.23

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	2013-14	194.97	3.95	2.57	134.75	0.00	14411.60	1073.60	57.77	45.95	368.50	16293.65
	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(P)	108.43	21.71	0.61	228.53	4.90	25381.60	2606.06	1.83	149.75	0.08	28503.50	
Growth rate of 2022-23 over 2021-22(%)	-11.84	-26.58	-	26.94	-	-0.47	16.40	-	-13.97	-	-	0.88
CAGR 2013-14 to 2022-23 (%)	-6.31	20.84	-14.75	6.05	-	6.49	10.36	-	14.03	-	-	6.41

Source: Ministry of Petroleum & Natural Gas

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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	2013-14	516	9464	215	0	240	870	11305
	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(P)	0	10434	19	0	714	991	12158
Growth rate of 2022-23 over 2021-22(%)		-	-12.35	-	-	-10.73	-	-8.21
CAGR 2013-14 to 2022-23 (%)		-	1.09	-	-	12.86	1.46	0.81
<i>Source: Ministry of Petroleum & Natural Gas</i>								

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)	2013-14	7009	107	49	7165
	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(P)	308	54	127	490
Growth rate of 2022-23 over 2021-22(%)		-76.14	-14.93	-7.81	-67.22
CAGR 2013-14 to 2022-23 (%)		-29.33	-7.30	11.27	-25.78
<i>Source: Ministry of Petroleum & Natural Gas</i>					

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Table 6.7: Yearwise Consumption of Natural Gas - Sectorwise

(Figures in MMSCM)

Sector	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23(P)	% Share of Total
	1	2	3	4	5	6	7	8	9	10	11
(a) Energy Purpose											
Power	11,284	10,720	10,889	11,616	12,028	12,005	11,080	10,836	10,157	8,153	13.59
Industrial & Manufacturing	261	533	545	794	999	1,086	701	555	829	865	1.44
City or Local Natural Gas Distribution Network incl. Road Transport	5,904	5,416	5,464	7,350	8,585	9,206	10,883	9,230	12,175	12,028	20.06
Agriculture (Tea Plantation)	196	180	187	183	189	192	200	177	156	154	0.26
Internal Consumption for Pipeline System	372	351	410	471	496	541	525	439	486	1,764	2.94
Refinery	3,968	4,575	5,077	5,374	6,533	7,047	7,786	7,911	5,312	3,909	6.52
LPG Shrinkage	982	1,005	754	759	798	874	858	900	1,070	976	1.63
Miscellaneous	7,479	5,941	4,111	3,929	3,226	3,393	4,209	4,569	9,229	8,534	14.23
Total (a)	30,446	28,721	27,437	30,478	32,854	34,343	36,241	34,617	39,414	36,383	61
(b) Non-Energy Purpose											
Fertilizer Industry	15,869	15,190	16,135	15,429	14,676	14,987	16,115	17,781	18,079	19,400	32.35
Petrochemical	2,405	2,890	3,733	4,170	4,024	3,386	3,569	3,072	2,864	1,959	3.27
Sponge Iron	274	154	544	885	1,278	1,124	567	647	1,134	960	1.60
Total (b)	18,548	18,234	20,412	20,484	19,978	19,497	20,251	21,500	22,077	22,319	37
Total Sectorial Sales (a+b)	48,994	46,955	47,849	50,961	52,832	53,840	56,492	56,117	61,491	58,702	98
Total Consumption **	52,375	51,300	52,517	55,697	59,170	60,796	64,144	60,981	64,159	59,969	100
Total Consumption in MMSCMD	143	141	143	153	162	167	175	167	176	164	

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 requirements.

Source: Ministry of Petroleum and Natural Gas

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Table 6.8: Yearwise Consumption of Electricity - Sectorwise

(in Giga Watt Hour = 10⁶ Kilo Watt Hour)

Year	Industry	Agriculture	Domestic	Commercial	Traction & Railways	Others	Total Electricity Consumed
1	2	3	4	5	6	7	8=2 to 7
2011-12	3,52,291	1,40,960	1,71,104	65,381	14,206	41,252	7,85,194
2012-13	3,65,989	1,47,462	1,83,700	72,794	14,100	40,256	8,24,301
2013-14	3,84,418	1,52,744	1,99,842	74,247	15,540	47,418	8,74,209
2014-15	4,18,346	1,68,913	2,17,405	78,391	16,177	49,289	9,48,522
2015-16	4,23,523	1,73,185	2,38,876	86,037	16,594	62,976	10,01,191
2016-17	4,40,206	1,91,151	2,55,826	89,825	15,683	68,493	10,61,183
2017-18	4,68,613	1,99,247	2,73,545	93,755	17,433	70,834	11,23,427
2018-19	5,19,196	2,13,409	2,88,243	98,228	18,837	72,058	12,09,972
2019-20	5,32,820	2,11,295	3,08,745	1,06,047	19,148	70,031	12,48,086
2020-21	5,08,776	2,21,303	3,30,809	86,950	14,668	67,701	12,30,208
2021-22	5,56,481	2,28,451	3,39,780	97,121	21,935	72,996	13,16,765
2022-23(P)	5,95,000	2,40,800	3,62,000	1,05,100	25,000	75,500	14,03,400
% share in 2022-23(%)	42.40	17.16	25.79	7.49	1.78	5.38	100.00
Growth rate of 2022-23 over 2021-22(%)	6.92	5.41	6.54	8.22	13.97	3.43	6.58
CAGR 2013-14 to 2022-23 (%)	4.97	5.19	6.82	3.94	5.43	5.30	5.40

(P): Provisional

Source : Central Electricity Authority.

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

(in Giga Watt hour =10⁶ Kilo Watt hour)

Year	Net Electricity Generated from Utilities	Purchases from Non-Utilities + Net Import from Other Countries	Net Electricity Available for Supply	Sold to Ultimate Consumers	Loss in transmission & distribution	Loss in transmission & distribution (%)
1	2	3	4=2+3	5	6=4-5	7
2013-14	9,56,488	17,948	9,74,436	7,51,908	2,22,528	22.84%
2014-15	10,40,582	13,773	10,54,355	8,14,250	2,40,105	22.77%
2015-16	10,88,282	15,947	11,04,228	8,63,364	2,40,864	21.81%
2016-17	11,54,314	8,977	11,63,290	9,14,093	2,49,197	21.42%
2017-18	12,21,307	11,198	12,32,505	9,73,131	2,59,375	21.04%
2018-19	12,88,393	19,291	13,07,685	10,37,518	2,70,167	20.66%
2019-20	13,00,116	22,932	13,23,048	10,52,346	2,70,701	20.46%
2020-21	12,92,715	21,310	13,14,025	10,41,656	2,72,369	20.73%
2021-22	13,97,707	16,197	14,13,903	11,41,485	2,72,418	19.27%
2022-23(P)	15,14,894	14,577	15,29,471	12,49,926	2,79,545	18.28%
Growth rate of 2022-23 over 2021-22(%)	8.38	-10.00	8.17	9.50	2.62	-5.14
CAGR 2013-14 to 2022-23 (%)	5.24	-2.28	5.14	5.81	2.57	-2.44

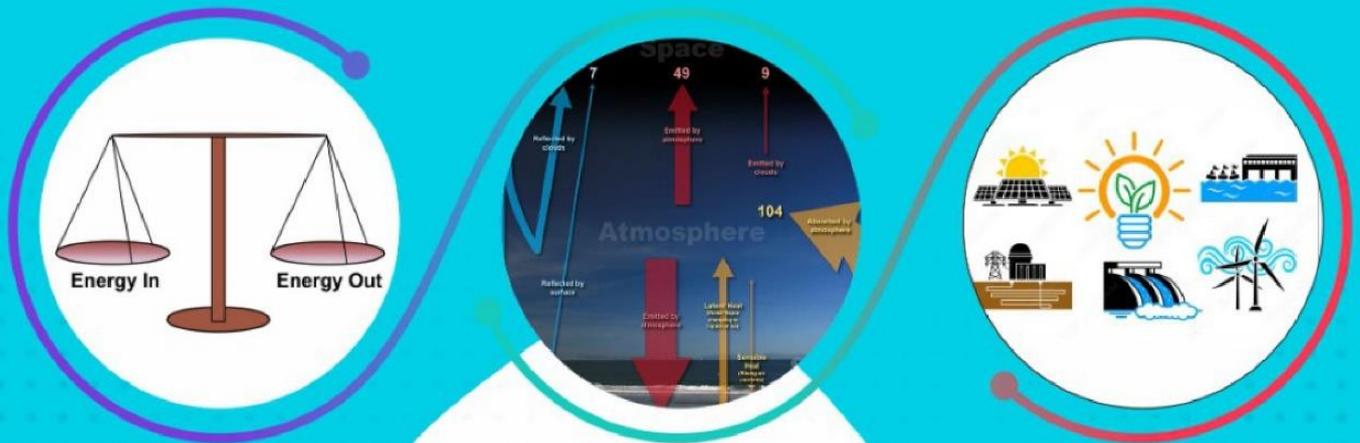
(P): Provisional

Source : Central Electricity Authority.

Chapter

7

Energy Balance and Sankey Diagram



CHAPTER 7

Energy Balance and Sankey Diagram

Commodity Balance

The purpose of commodity balance is to show the sources of supply and various uses of particular energy product with reference to national territory of the compiling country. The balance is compiled for any energy commodity provided that the commodity remains homogeneous at each point in the balance.

International Recommendations on Energy Statistics (IRES) recommends that the format of energy balance and all applicable concepts are consistently used in the compilation of a commodity balance to ensure data consistency. The major sources for commercial energy in India are coal, oil products, natural gas and electricity. Non-energy producing sectors derive energy from the resources available in primary form such as coal, crude oil, natural gas, hydro-power and nuclear power. Some of the energy resources are converted into other (final) energy products that are used for purposes other than energy generation.

Coal is also used as a final product or intermediate for power generation. Similarly, natural gas is also used directly or as an intermediate in power generation. Many petroleum products, such as HSDO, Naphtha etc. are used as a final product by the non-energy producing sectors and also used for power generation. This indicates that the same energy source can be used in various forms at various stages of consumption. This creates a possibility of over-estimation or under-estimation of energy consumption in totality as well as for different sources.

Energy Balance

An energy balance is a framework to complete data on all energy products entering, existing and used within a given country during a reference period (e.g. a year). It expresses all data in common energy units, which makes it possible to define a “total” product.

The purpose of compiling an energy balance starting from the various commodity balances are numerous; they are to:

- Provide a comprehensive overview of the energy profile of a country, to monitor energy security, energy markets, relevant policy goals and to formulate adequate energy policies;
- Provide the basis for aggregate socio-economic indicators, as well as for estimates of CO₂ emissions;
- Compare data of different reference periods and different countries;
- Provide a tool to ensure completeness, consistency and comparability of basic statistics;

Chapter 7: Energy Balance and Sankey Diagram

- Calculate efficiencies of transformation processes, as well as relative shares of different sectors or products in the country's total supply or consumption

An energy balance generally takes the form of a matrix of products and flows, with varying levels of disaggregation, although graphical formats also exist (e.g. sankey diagram).

Two major components of the energy balance statistics are Total Primary Energy Supply (TPES) and Total Final Consumption (TFC) of energy commodity. Within a balance, the total final consumption is disaggregated into sectors, like industry, transport, residential, services and others. However, the level of disaggregation of such energy data is not enough to monitor energy efficiency, as no information is available, for example on the residential or services end uses, nor on the transport vehicle types or segments. The energy balance will therefore be useful to assess the largest consuming sectors within a country where the energy saving potential will have more impact, before starting more detailed collection programmes on data for energy efficiency indicators.

A note on Methodology used for Energy Balance

Energy (in KToe) = Quantity of Commodity * Conversion factor

where 1 Toe = 41868 MJ

Therefore, Conversion factor = $\frac{\text{Net Calorific Value (NCV)}}{\text{Mega joules per ton of oil equivalent}}$

where Net Calorific Value (NCV) is in kj per kg and

Net Calorific Value (NCV) = Gross calorific value (GCV) - (% Moisture Content)

The difference between net and gross calorific values are typically about 5% to 6% of the gross value of solid and liquid fuels and about 10% for Natural gas.

Net Calorific Values are, as recommended by IEA for all commodities.

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.

Highlights

- In this 31st edition of Energy Statistics, attempt has been made to generate the Energy Balance table of India using the domestic conversion factors (especially for Coal). Since Coal has always having the dominant share of Energy resources in India, thus a shift of conversion factors from IEA to Domestic, results in a significant reduction of Energy supplied and consumed in India. The final version of Energy Balance table of India from 2012-13 to 2020-21 have also been computed and added based, on the audited final database, received from all the source Ministries and using the domestic conversion factors.
- In 2022-23 (P), Primary Energy Supply added up to 8,50,349 Kilo Tonne of Oil equivalent (ktoe) (Table 7.2) an increase of 14.33% over previous year.
- Two major contributors to the total energy supply in the country were Coal which accounted for 57.82% of the total and Crude Oil which accounted for 31.48%.
- In 2022-23 (P), the Total Final Consumption (TFC) was 5,51,550 ktoe. An increase of close to 7% over last year, which clearly signifies the growth story of India. The industrial sector was the largest consumer of energy in the country with this sector itself using almost half (49%) of the total final energy consumption.
- Within the industry sector, the most energy intensive industries were iron and steel, which accounted for 15.15% of the industrial energy use followed by Chemicals and petrochemicals 4.56 % and construction 1.08%.
- The consumption of the residential, agriculture, commercial & public sectors, Non-specified(others) and non-energy purpose represented 39.3% of the total final consumption in the country, whereas, transport sector accounted for 11.7% of Total Final Consumption.
- The Energy Balance table of India, based on the final audited figures as available from different Ministries and on Domestic conversion factors have been computed from the FY: 2012-13 to FY: 2020-21. The same can be found in *Annexure – IV*.

Chapter 7: Energy Balance and Sankey Diagram

Table-7.1 : Energy Commodity Balance for 2021-22 (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	778210	47492	12238	19994	1916	107980	8327	1173	5111	40238	10294	15508	31525	34024	1484463
From Other Sources															209311
Imports	208627	11	17043	237	0	43	8980	3058	2581	671	0	4213	2189	31028	7974
Exports	-1316	-17	-513	-6861	-14	-32407	-1757	-10	-6	-13482	-5186	-187	-2330	0	-9249
Stock changes	-40159	-1592													
Domestic Supply	945362	45894	28769	13370	1902	75616	15550	4221	7685	27426	5108	19535	31385	65052	1692498
Transfer															
Statistical difference	82669	3191	-515	-124	-409	2060	-9289	319	131	3423	-100	-5279	-19088	2301	-16559
Transformation	710049	38757	0	6	0	502	341	0	0	0	0	0	0	10157	0
Electricity plants	710049	38757	0	6	0	502	341	0	0	0	0	0	0	10157	0
Energy industry own use	0	0	0	0	0	0	0	0	0	0	0	0	0	20308	86756
Oil and Gas extraction														5767	
Petroleum refineries														5312	
Own use in electricity, CHP and heat plants															86756
Other energy sector														9229	
Distribution losses														95	272418
Final Consumption	317982	10328	28253	13240	1493	77174	5921	4540	7816	30849	5008	14255	12297	36793	1316765
Industry Sector	317982	10328	2422	13240	0	3138	2410	0	0	0	0	14255	12297	829	556481
Iron and steel	75305	262		0		228	913								
Chemical and petroleum	1307			11904		136	581								
Non-ferrous metals						27	390								
Machinery						140	19								
Mining & Quarrying			3			1551	127								
Paper, pulp and print	1244	2106													
Construction	7329	2684				758	184								
Textile and leather	80	2080				239	33								
Non-specified	232717	3197	2419	1336		60	162					14255	12297	829	556481
Transport Sector	0	0	123	0	0	4095	1209	0	0	30849	5008	0	0	12661	21935
Road			123			1696	172			30849				12175	
Domestic Aviation						3									
Rail						1749	0								21935
Pipeline transport														486	
Domestic navigation						648	1036				5008				
Non-specified							0								
Other Sectors	0	0	25708	0	1493	69941	2301	4540	7816	0	0	0	0	1226	738349
Residential			25502			1292									339780
Comm. And public services						64									97121
Agriculture/forestry			30			548	71							156	228451
Non-specified			177			138	69393	2230	4540	7816				1070	72996
Non-Energy Use														22077	

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

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

Chapter 7: Energy Balance and Sankey Diagram

Table-7.2 : 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	3,12,681	10,828	30,344	0	31,471	12,278	13,071	15,284	0	4,25,957
Imports	1,15,989	3	2,17,054	39,912	28,701	0	0	0	686	4,02,343
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	4,10,867	10,464	2,47,397	-25,677	60,172	12,278	13,071	15,284	-110	7,43,747
Statistical differences	34,522	727	24,500	-26,525	2,128	0	0	0	-1,424	33,928
Main activity producer electricity plants	-2,85,689	-8,837	0	-863	-9,395	-12,278	-13,040	-14,698	1,27,664	-2,17,136
Autoproducer electricity plants	0	0	0	0	0	0	-31	-586	18,001	17,384
Oil refineries	0	0	-2,47,021	2,59,358	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	1,59,700	2,355	0	2,06,293	34,033	0	0	0	1,13,242	5,15,623
Industry	1,59,700	2,355	0	45,286	767	0	0	0	47,857	2,55,964
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)	1,16,877	729	0	27,091	767	0	0	0	47,857	1,93,321
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	1,17,096	1,134	0	0	0	63,498	1,81,728
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	1,51,984	1,77,725	0	3,76,821
Elec output-main activity producer ele plants	0	0	0	0	0	47,112	1,51,627	1,70,912	0	3,69,652
Elec output-autoproducer electricity plants	0	0	0	0	0	0	357	6,813	0	7,170
Final consumption refers to End Use Consumption										

Chapter 7: Energy Balance and Sankey Diagram

Table 7.3: Energy Balance of Petroleum Products for 2021-22(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	13,826	21,490	2,002	1,11,761	8,202	1,177	4,761	43,056	10,965	11,853	30,264	2,59,358
Imports	19,255	255	0	45	8,846	3,068	2,404	718	0	3,220	2,102	39,912
Exports	-579	-7,374	-15	-33,542	-1,731	-10	-6	-14,427	-5,524	-143	-2,237	-65,588
Stock changes	0	0	0	0	0	0	0	0	0	0	0	0
Total primary energy supply	32,501	14,370	1,987	78,264	15,317	4,235	7,159	29,347	5,442	14,931	30,129	2,33,681
Statistical differences	-586	-134	-427	2,132	-9,150	320	122	3,662	-107	-4,035	-18,324	-26,525
Main activity producer electricity plants	0	-7	0	-520	-336	0	0	0	0	0	0	-863
Autoproducer electricity plants	0	0	0	0	0	0	0	0	0	0	0	0
Oil refineries	13,826	21,490	2,002	1,11,761	8,202	1,177	4,761	43,056	10,965	11,853	30,264	2,59,358
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	31,915	14,230	1,561	79,876	5,831	4,555	7,281	33,009	5,335	10,896	11,805	2,06,293
Industry	2,733	14,230	0	3,248	2,374	0	0	0	0	10,896	11,805	45,286
Iron and steel	0	0	0	236	900	0	0	0	0	0	0	1,136
Chemical and petrochemical	0	12,794	0	140	572	0	0	0	0	0	0	13,507
Non-ferrous metals	0	0	0	28	384	0	0	0	0	0	0	413
Machinery	0	0	0	144	19	0	0	0	0	0	0	164
Mining and quarrying	0	0	0	1,605	125	0	0	0	0	0	0	1,731
Paper, pulp and print	0	0	0	0	0	0	0	0	0	0	0	0
Construction	0	0	0	784	181	0	0	0	0	0	0	965
Textile and leather	0	0	0	247	33	0	0	0	0	0	0	280
Non-specified (industry)	2,733	1,436	0	62	159	0	0	0	0	10,896	11,805	27,091
Transport	139	0	0	4,238	1,190	0	0	33,009	5,335	0	0	43,912
Road	139	0	0	1,755	170	0	0	33,009	0	0	0	35,073
Domestic aviation	0	0	0	3	0	0	0	0	5,335	0	0	5,338
Rail	0	0	0	1,810	0	0	0	0	0	0	0	1,810
Pipeline transport	0	0	0	0	0	0	0	0	0	0	0	0
Domestic navigation	0	0	0	671	1,021	0	0	0	0	0	0	1,691
Non-specified (transport)	0	0	0	0	0	0	0	0	0	0	0	0
Other	29,043	0	1,561	72,390	2,267	4,555	7,281	0	0	0	0	1,17,096
Residential	28,810	0	1,350	0	0	0	0	0	0	0	0	30,160
Commercial and public services	0	0	67	0	0	0	0	0	0	0	0	67
Agriculture/forestry	33	0	0	567	70	0	0	0	0	0	0	671
Non-specified (other)	200	0	144	71,823	2,196	4,555	7,281	0	0	0	0	86,198
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

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

Chapter 7: Energy Balance and Sankey Diagram

Table 7.4 : Energy Commodity Balance for 2022-23(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	893190	44990	12832	17036	948	114421	9242	1301	5144	42817	15000	16044	31756	34450	1617813
From Other Sources															226000
Imports	237668	23	18309	897	0	328	8563	2152	2787	1069	0	8664	1774	26304	7843
Exports	-1163	-2	-534	-5714	-11	-28536	-1841	-12	-9	-13118	-7264	-284	-3717	0	-10253
Stock changes	15572	-1833													
Domestic Supply	1145268	43178	30607	12219	937	86214	15964	3441	7922	30768	7737	24424	29813	60754	1841403
Transfer															
Statistical difference	-30052	3666	-2103	-61	-448	409	-9010	299	119	4208	-371	-6079	-13998	3566	-55539
Transformation	785128	38957	1	19	0	426	437	0	0	0	0	0	0	8153	0
Electricity plants	785128	38957	1	19		426	437								8153
Energy industry own use	0	0	0	0	0	0	0	0	0	0	0	0	0	17954	102919
Oil and Gas extraction															5511
Petroleum refineries															3909
Own use in electricity, CHP and heat plants															102919
Other energy sector															8534
Distribution losses														107	279545
Final Consumption	330088	7888	28503	12139	490	86196	6517	3740	8041	34976	7366	18345	15814	38106	1403400
Industry Sector	330088	7888	2839	12139	0	1738	2308	0	0	0	0	18345	15814	865	595000
Iron and steel	78898	123		0		158	871								
Chemical and petroleum	948			10434		86	525								
Non-ferrous metals						20	382								
Machinery						64	18								
Mining & Quarrying			5			1066	94								
Paper, pulp and print	1203	920													
Construction	8228	1445				179	193								
Textile and leather	92	2624				126	24								
Non-specified	240719	2776	2835	1705		39	200					18345	15814	865	595000
Transport Sector	0	0	108	0	0	2615	1561	0	0	34976	7366	0	0	13792	25000
Road			108			148	178			34976					12028
Domestic Aviation						1									
Rail						1715	0								25000
Pipeline transport															1764
Domestic navigation						750	1382				7366				
Non-specified							0								
Other Sectors	0	0	25555	0	490	81844	2648	3740	8041	0	0	0	0	1131	783400
Residential			25382		308										362000
Comm. And public services					54										105100
Agriculture/forestry			22			312	54							154	240800
Non-specified			152		127	81532	2594	3740	8041					976	75500
Non-Energy Use														22319	

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

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

Chapter 7: Energy Balance and Sankey Diagram

Table 7.5: Energy Balance of India for 2022-23 (P)

All figures in KToE

	Coal	Lignite	Crude Oil	Oil Products	Natural Gas	Nuclear	Hydro	Solar, Wind, Others	Electricity	Total
Production	3,59,590	10,258	29,821	0	31,866	11,952	13,975	18,271	0	4,75,732
Imports	1,26,343	5	2,37,852	44,645	24,331	0	0	0	674	4,33,851
Exports	-783	0	0	-63,684	0	0	0	0	-882	-65,349
Stock changes	6,533	-418	0	0	0	0	0	0	0	6,115
Total primary energy supply	4,91,683	9,845	2,67,673	-19,039	56,197	11,952	13,975	18,271	-207	8,50,349
Statistical differences	-7,851	836	19,691	-24,933	3,299	0	0	0	-4,776	-13,735
Main activity producer electricity plants	-3,17,124	-8,882	0	-893	-7,541	-11,952	-13,941	-17,505	1,39,132	-2,38,707
Autoproducer electricity plants	0	0	0	0	0	0	-34	-765	19,436	18,636
Oil refineries	0	0	-2,60,847	2,71,968	0	0	0	0	0	11,121
Energy industry own use	0	0	0	0	-16,607	0	0	0	-8,851	-25,458
Losses	0	0	-26,516	0	-99	0	0	0	-24,041	-50,657
Final consumption	1,66,708	1,798	0	2,27,103	35,248	0	0	0	1,20,692	5,51,550
Industry	1,66,708	1,798	0	49,524	800	0	0	0	51,170	2,70,000
Iron and steel	39,846	28	0	1,021	0	0	0	0	0	40,896
Chemical and petrochemical	479	0	0	11,820	0	0	0	0	0	12,299
Non-ferrous metals	0	0	0	398	0	0	0	0	0	398
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	608	210	0	0	0	0	0	0	0	817
Construction	4,155	329	0	376	0	0	0	0	0	4,861
Textile and leather	46	598	0	155	0	0	0	0	0	800
Non-specified (industry)	1,21,573	633	0	34,474	800	0	0	0	51,170	2,08,650
Transport	0	0	0	49,638	12,758	0	0	0	2,150	64,545
Road	0	0	0	37,877	11,126	0	0	0	0	49,002
Domestic aviation	0	0	0	7,848	0	0	0	0	0	7,848
Rail	0	0	0	1,776	0	0	0	0	2,150	3,926
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	1,27,941	1,046	0	0	0	67,372	1,96,360
Residential	0	0	0	28,997	0	0	0	0	31,132	60,129
Commercial and public services	0	0	0	57	0	0	0	0	9,039	9,095
Agriculture/forestry	0	0	0	401	143	0	0	0	20,709	21,253
Non-specified (other)	0	0	0	98,487	903	0	0	0	6,493	1,05,883
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	1,62,499	2,12,452	0	4,20,812
Elec output-main activity producer ele plants	0	0	0	0	0	45,861	1,62,099	2,03,552	0	4,11,512
Elec output-autoproducer electricity plants	0	0	0	0	0	0	400	8,900	0	9,300
Final consumption refers to End Use Consumption										
P: Provisional										

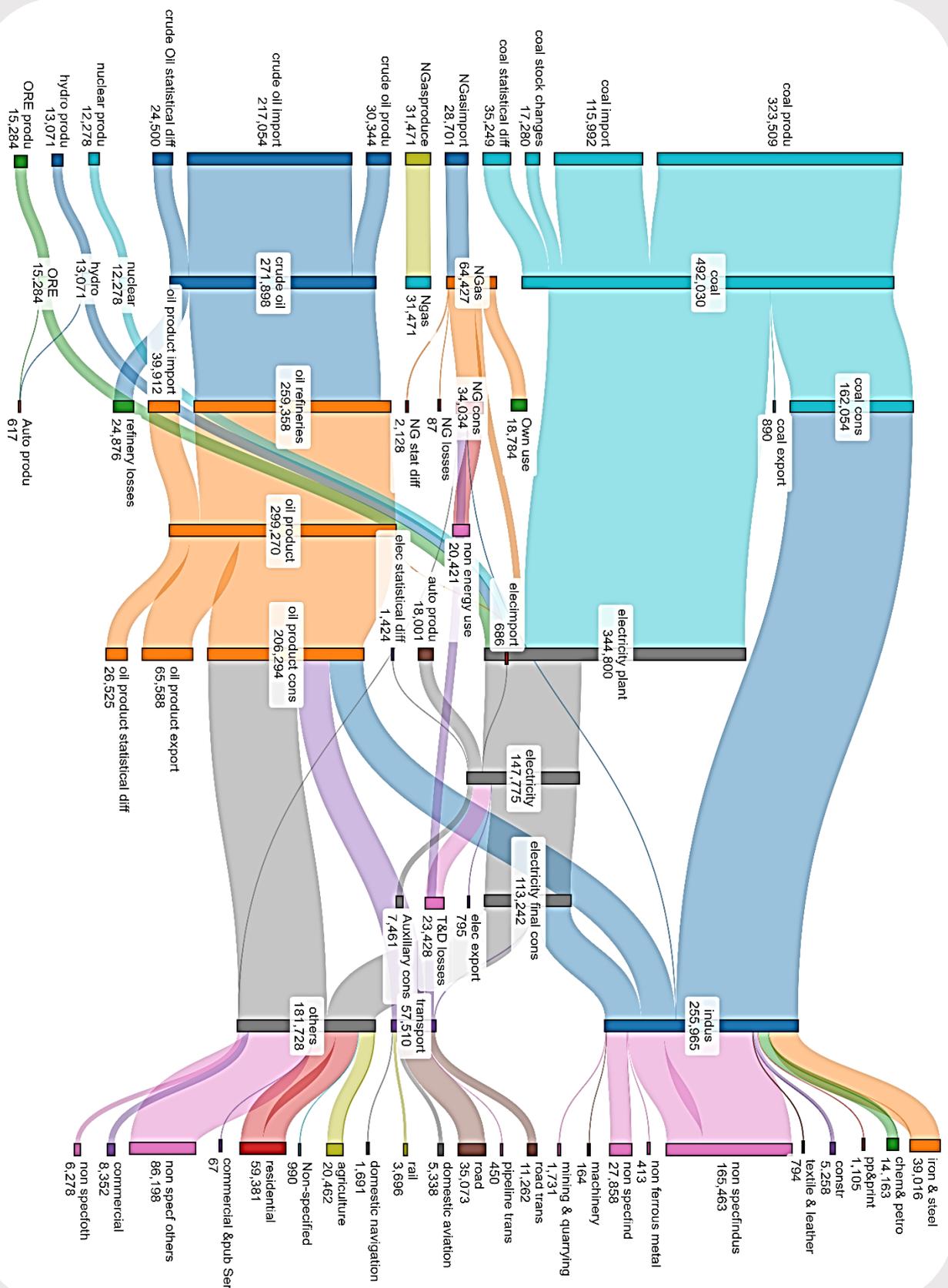
Chapter 7: Energy Balance and Sankey Diagram

Table 7.6 : Energy Balance of Petroleum Products for 2022-23(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	14,496	18,311	991	1,18,428	9,104	1,305	4,792	45,815	15,979	12,263	30,485	2,71,968
Imports	20,685	964	0	340	8,434	2,159	2,596	1,144	0	6,622	1,703	44,645
Exports	-603	-6,142	-11	-29,535	-1,813	-12	-8	-14,036	-7,738	-217	-3,568	-63,684
Stock changes	0	0	0	0	0	0	0	0	0	0	0	0
Total primary energy supply	34,578	13,133	979	89,232	15,725	3,452	7,380	32,922	8,242	18,667	28,620	2,52,929
Statistical differences	-2,382	-65	-468	424	-8,875	299	110	4,503	-395	-4,646	-13,438	-24,933
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	1,18,428	9,104	1,305	4,792	45,815	15,979	12,263	30,485	2,71,968
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	32,195	13,047	512	89,214	6,419	3,751	7,490	37,425	7,847	14,021	15,182	2,27,103
Industry	3,202	13,047	0	1,799	2,274	0	0	0	0	14,021	15,182	49,524
Iron and steel	0	0	0	163	858	0	0	0	0	0	0	1,021
Chemical and petrochemical	0	11,215	0	89	517	0	0	0	0	0	0	11,820
Non-ferrous metals	0	0	0	21	376	0	0	0	0	0	0	398
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	14,021	15,182	34,474
Transport	123	0	0	2,706	1,537	0	0	37,425	7,847	0	0	49,638
Road	123	0	0	153	176	0	0	37,425	0	0	0	37,877
Domestic aviation	0	0	0	1	0	0	0	0	7,847	0	0	7,848
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	1,361	0	0	0	0	0	0	2,138
Non-specified (transport)	0	0	0	0	0	0	0	0	0	0	0	0
Other	28,870	0	512	84,710	2,608	3,751	7,490	0	0	0	0	1,27,941
Residential	28,675	0	322	0	0	0	0	0	0	0	0	28,997
Commercial and public services	0	0	57	0	0	0	0	0	0	0	0	57
Agriculture/forestry	25	0	0	323	53	0	0	0	0	0	0	401
Non-specified (other)	171	0	133	84,386	2,555	3,751	7,490	0	0	0	0	98,487
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												
* Include Paraffin waxes, petroleum jelly, LSWR, MTBE and reformate, BGO, Benzene, MTO, CBFS and Sulfur etc.												

Fig. 7.1: Sankey Diagram on Overall Energy Flow of Energy in India during FY: 2021-22 (Final) (in KToe)



Chapter 7: Energy Balance and Sankey Diagram

Fig. 7.2: Sankey Diagram on Final Consumption by sectors in India during FY: 2021-22(Final) (in KToe)

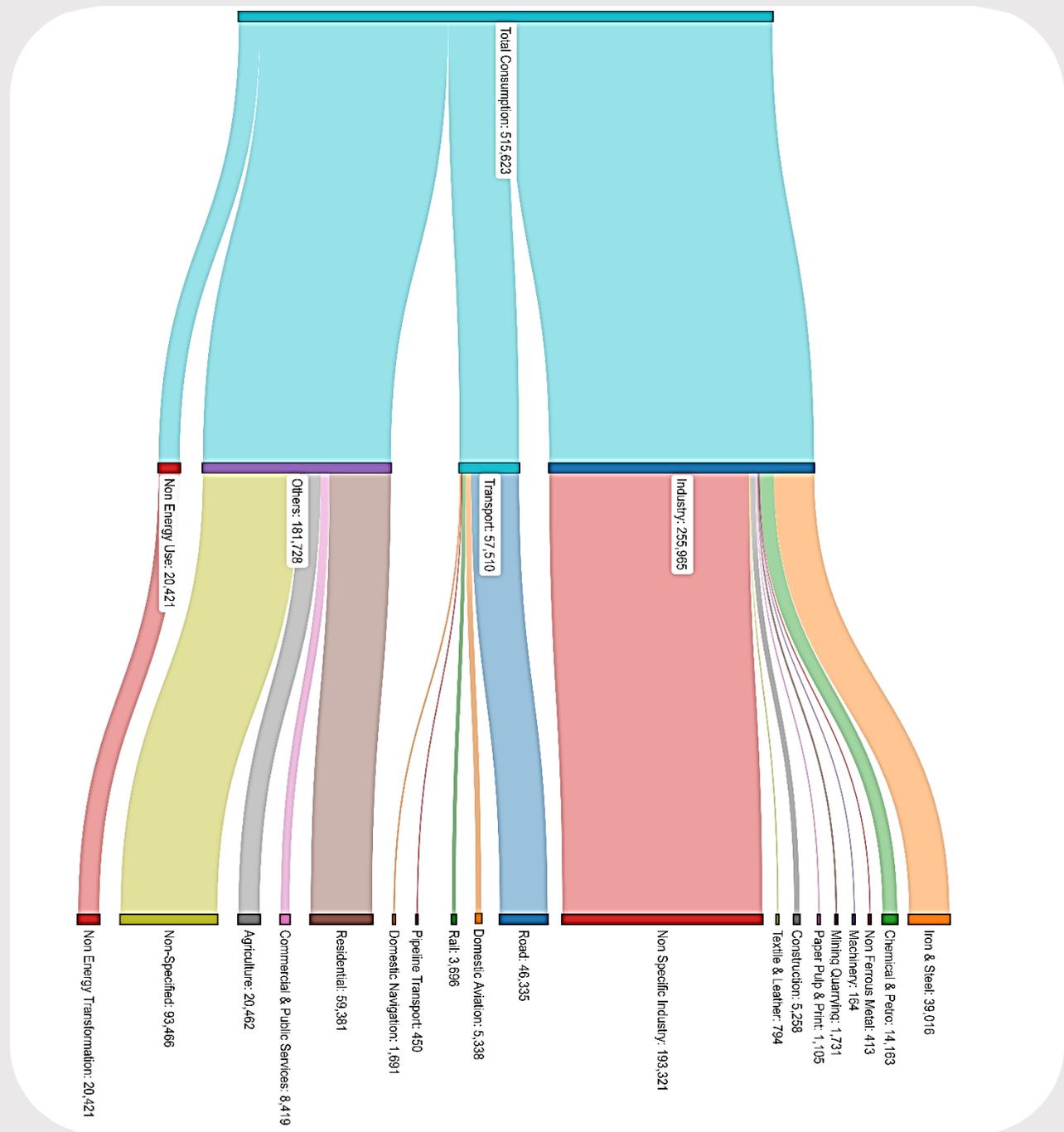
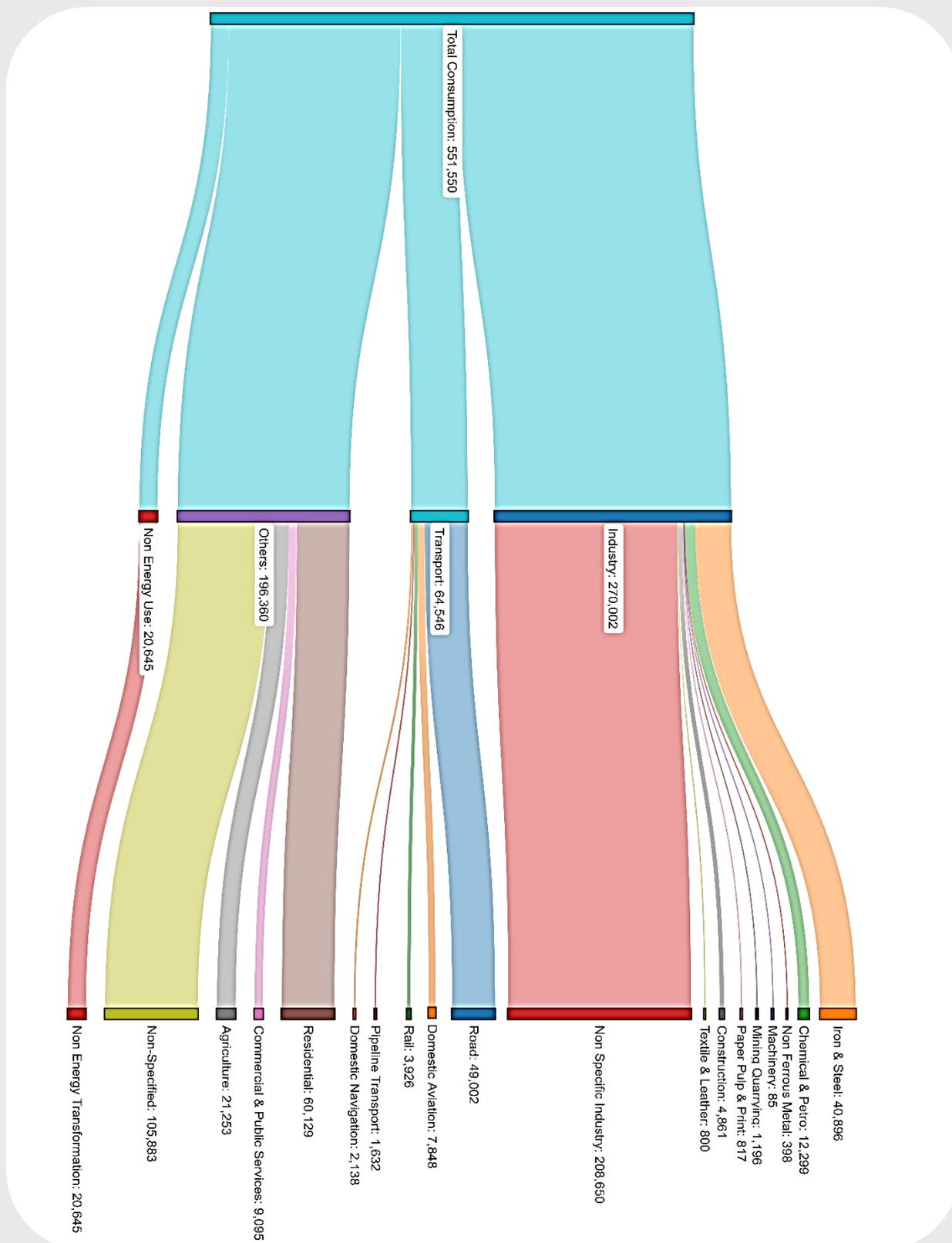


Fig. 7.4: Sankey Diagram on Final Consumption by sectors in India during FY: 2022-23 (P) (in KToe)



Chapter

8

Sustainability and Energy



CHAPTER 8

Sustainability and Energy

Sustainability

The United Nations (UN) General Assembly, in its 70th Session held on 25th September 2015, adopted the document titled “Transforming our World: The 2030 Agenda for Sustainable Development” consisting of 17 Sustainable Development Goals (SDGs) and associated 169 targets. The SDGs are a comprehensive list of global goals integrating social, economic and environmental dimensions of development.

Realizing that Energy is critical for people deprived of the opportunity of access to sustainable energy, Goal 7 with the aim to ensure access to affordable, reliable, sustainable and modern energy to all was adopted as one of the 17 SDGs. The goal also stresses more focused attention to improve access to clean and safe cooking fuels and technologies, improve energy efficiency, increase use of renewable sources and promotion of sustainable and modern energy for all. Energy from renewable resources – wind, water, solar, biomass and geothermal energy – is inexhaustible and clean.

The targets adopted as a part of the Goal 7 of SDGs 2030 Agenda are as follows:

- I. By 2030, ensure universal access to affordable, reliable and modern energy services.
- II. By 2030, increase substantially the share of renewable energy in the global energy mix.
- III. By 2030, double the global rate of improvement in energy efficiency.
- IV. By 2030, enhance international co-operation 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.
- V. 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.

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.

Further, “Energy Indicators for Sustainable Development: Guidelines and Methodology, 2005” by the International Atomic Energy Agency, United Nations Department of Economic And Social Affairs, International Energy Agency, Eurostat And European Environment Agency, has identified a core set of energy indicators, also called Energy Indicators for Sustainable Development, which are designed to provide information on current energy related trends in a format that aids decision making at the national level in order to help countries assess effective energy policies for action on sustainable development. While the importance of these various indicators is recognized and since Social and Environmental indicators require additional levels

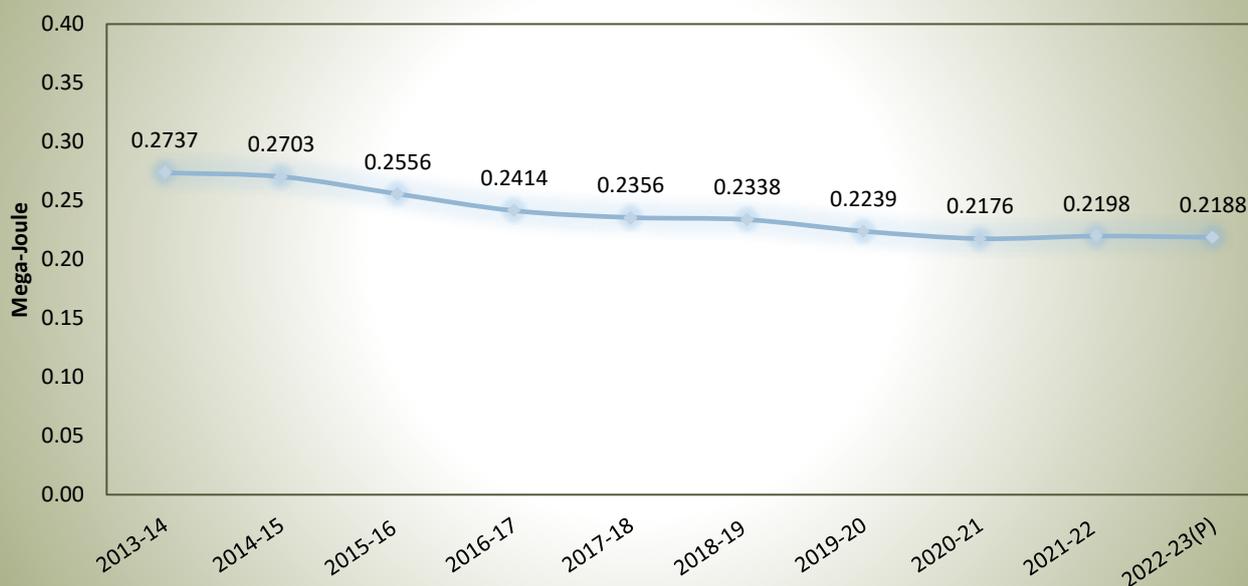
Chapter-8: Sustainability and Energy

of detail than that are presented in Energy Statistics this report is restricted to the economic dimension only and presents some of these indicators in this chapter. The details of the indicators - theme, definition, purpose and measurement method etc. are provided in the Annexures.

Highlights

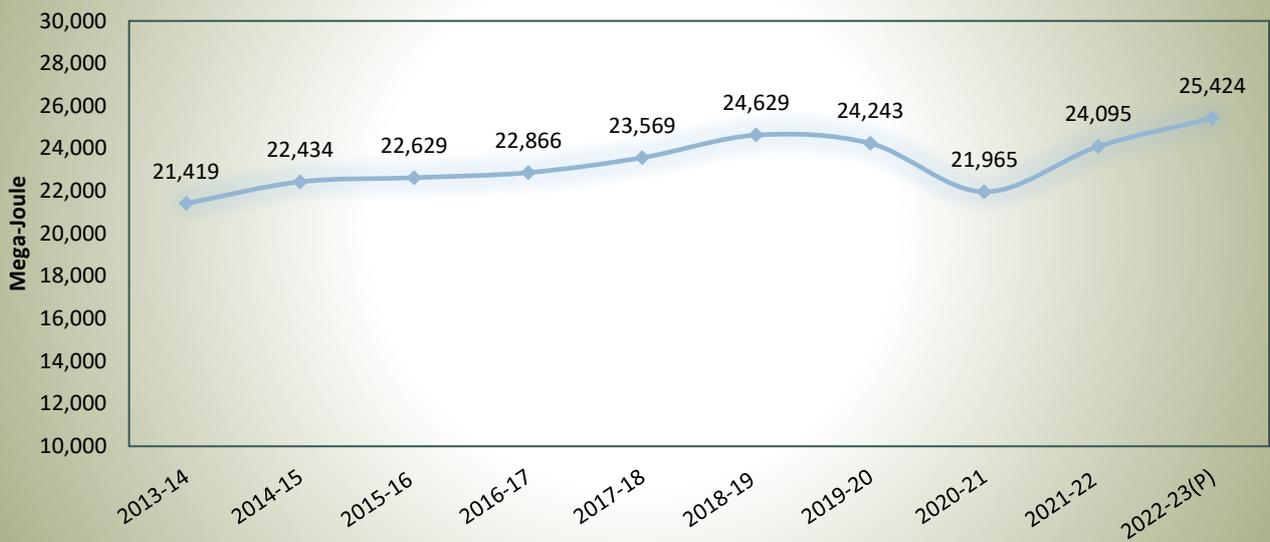
- One of the Targets identified by the Sustainable Development Goals focuses on making affordable, reliable and modern energy accessible to all people universally. To ensure the same India has been focusing on availability of electricity to all citizens of the country. As seen, state-wise number of villages electrified as on 31.03.2022 has reached 100% coverage (relative to 2011 census figures for total number of villages in the country). (Table 8.1).
- Sustainable energy systems also focus on increasing energy efficiency in the long run by improving energy intensity besides shifting to cleaner technologies, improving share of renewable energy in a countries energy mix etc.
- Energy Intensity is defined as the amount of energy consumed for generating one unit of Gross Domestic Product (at constant prices). Along with Energy Intensity, the indicator “Per Capita Energy Consumption (PEC)” is the most used policy indicator, both at national and international levels for this purpose. Per-capita Energy Consumption during a year is computed as the ratio of the estimate of total energy consumption during the year to the mid-year population of that year. In the absence of data on consumption of non-conventional energy from various sources, particularly in rural areas these two indicators are generally computed on the basis of consumption of conventional energy (Table 8.2).
- The Energy Intensity (at 2011-12 prices) decreased from 0.2198 Mega joules per rupee in 2013-14 to 0.2188 Mega Joules in 2022-23 (P).

Fig 8.1 : Energy Intensity in Megajoule per rupee from 2013-14 to 2022-23(P)



- Similarly, Per-capita Energy Consumption increased from 24,095 Mega joules in 2013-14 to 25,424 Mega joules in 2022-23(P).

Fig 8.2 :Per Capita Energy Consumption in India (Megajoule/Person) from 2013-14 to 2022-23(P)



- India's Total Emissions from the Energy Sector have increased from 16,51,928 GgCO₂ Equivalent in 2011 to 21,29,428 GgCO₂ Equivalent in 2016 as per the latest estimates by MoEFCC in February 2021. The major sector contributing to total emissions remains Energy Industries with its share increasing marginally from 55.95% in 2011 to 56.66 in 2016 (Table 8.3).

Table 8.1 : State-wise Number of Villages Electrified

Sl. No.	States/ UTs	No. of villages as per 2011 Census	Villages Electrified as on 31.3.2022	Villages Electrified as on 31.03.2023
1	Andhra Pradesh	16158	All Villages have been Electrified	
2	Arunachal Pradesh	5258		
3	Assam	25372		
4	Bihar	39073		
5	Chhatisgarh	19567		
6	Goa	320		
7	Gujarat	17843		
8	Haryana	6642		
9	Himachal Pradesh	17882		
10	Jammu & Kashmir	6337		
11	Jharkhand	29492		
12	Karnataka	27397		
13	Kerala	1017		
14	Madhya Pradesh	51929		
15	Maharashtra	40956		
16	Manipur	2379		
17	Meghalaya	6459		
18	Mizoram	704		
19	Nagaland	1400		
20	Odisha	47677		
21	Punjab	12168		
22	Rajasthan	43264		
23	Sikkim	425		
24	Tamil Nadu	15049		
25	Telangana	10128		
26	Tripura	863		
27	Uttar Pradesh	97813		
28	Uttarakhand	15745		
29	West Bengal	37463		
30	Andaman & Nicobar	396		
31	Chandigarh	5		
32	Dadar & Nagar Haveli	65		
33	Daman & Diu	19		
34	Delhi	103		
35	Lakshwadeep	6		
36	Puducherry	90		
Total		597464		

Source: Central Electricity Authority

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Table 8.2: Per-Capita 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)
2013-14	26,822	12,52,267	98,01,370	21,419	0.2737
2014-15	28,453	12,68,310	1,05,27,674	22,434	0.2703
2015-16	29,063	12,84,350	1,13,69,493	22,629	0.2556
2016-17	29,713	12,99,434	1,23,08,193	22,866	0.2414
2017-18	30,966	13,13,815	1,31,44,582	23,569	0.2356
2018-19	32,712	13,28,206	1,39,92,914	24,629	0.2338
2019-20	32,548	13,42,586	1,45,34,641	24,243	0.2239
2020-21	29,807	13,56,980	1,36,94,869	21,965	0.2176
2021-22	33,018	13,70,311	1,50,21,846	24,095	0.2198
2022-23(P)	35,159	13,82,894	1,60,71,429	25,424	0.2188
Growth rate of 2022-23 over 2021-22 (%)	6.48	0.92	6.99	5.52	-0.47
CAGR 2013-14 to 2022-23 (P) (%)	3.05	1.11	5.65	1.92	-2.46

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.

Table 8.3 India's Total Emissions related to Energy Sector

GHG sources and removals	(GgCO ₂ Equivalent)*					
	2011	2012	2013	2014	2015	2016
A. Fuel Combustion activities	16,04,503	17,04,639	17,74,788	18,71,709	20,55,017	20,92,250
1. Energy Industries	9,24,258	10,05,813	10,53,981	11,40,983	11,97,123	12,06,587
2. Manufacturing industries & construction	3,38,816	3,43,603	3,56,771	3,51,910	3,94,092	3,97,739
3. Transport	2,21,202	2,36,020	2,41,253	2,50,173	2,61,517	2,74,434
4. Other sectors	1,20,228	1,19,202	1,22,783	1,28,643	2,02,286	2,13,490
B. Fugitive emission from fuels	47,426	43,047	38,771	38,057	37,084	37,179
1. Solid fuels	16,388	16,086	15,568	16,547	16,614	17,121
2. Oil and natural gas	31,037	26,961	23,203	21,511	20,470	20,058
Total Energy (A+B)	16,51,928	17,47,686	18,13,559	19,09,766	20,92,102	21,29,428

Source: India Third Biennial Update Report to The United Nations Framework Convention on Climate Change, Ministry of Environment, Forest and Climate Change, February 2021

*GgCO₂ Equivalent : Gigagrams of carbon dioxide equivalent

Energy Indicators:

- 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.

- 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.

Sustainability Energy Indicators of Economic Dimension:

- 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 is useful,

- i) To determine the sectorial energy intensity of all the major sectors of economic growth;
- ii) To determine the fuel-specific energy dependency of a nation;
- iii) To evaluate the efficiency of the supply system of energy;
- iv) To determine the import dependency of the nations for catering the energy need;
- v) 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

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

- An overview of each of the Sustainable Energy Indicators are given below:

THEME: Use and Production Pattern

1. SUB THEME: OVERALL USE

A. Energy Indicator: Energy Use per Capita:

Purpose and Measurement methodology: 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:

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

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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 Consumption (TFC) of energy per capita
- c) Electricity consumption per capita

Table 8.4: Energy Use per Capita in India during last 10 years.

Year	TPES per capita (Mega Joule)	Total Final Consumption per capita (Mega Joule)	Electricity consumption per capita (KwH)
2013-14	19,679	13,839	698
2014-15	21,397	14,682	748
2015-16	22,209	15,212	780
2016-17	22,515	15,284	817
2017-18	22,380	15,896	855
2018-19	23,821	16,896	911
2019-20	24,624	16,635	930
2020-21	22,619	15,634	907
2021-22	22,724	15,754	961
2022-23(P)	25,745	16,699	1015

Figure 8.3: Total Primary Energy Supply (TPES) Per Capita in India during last 10 years

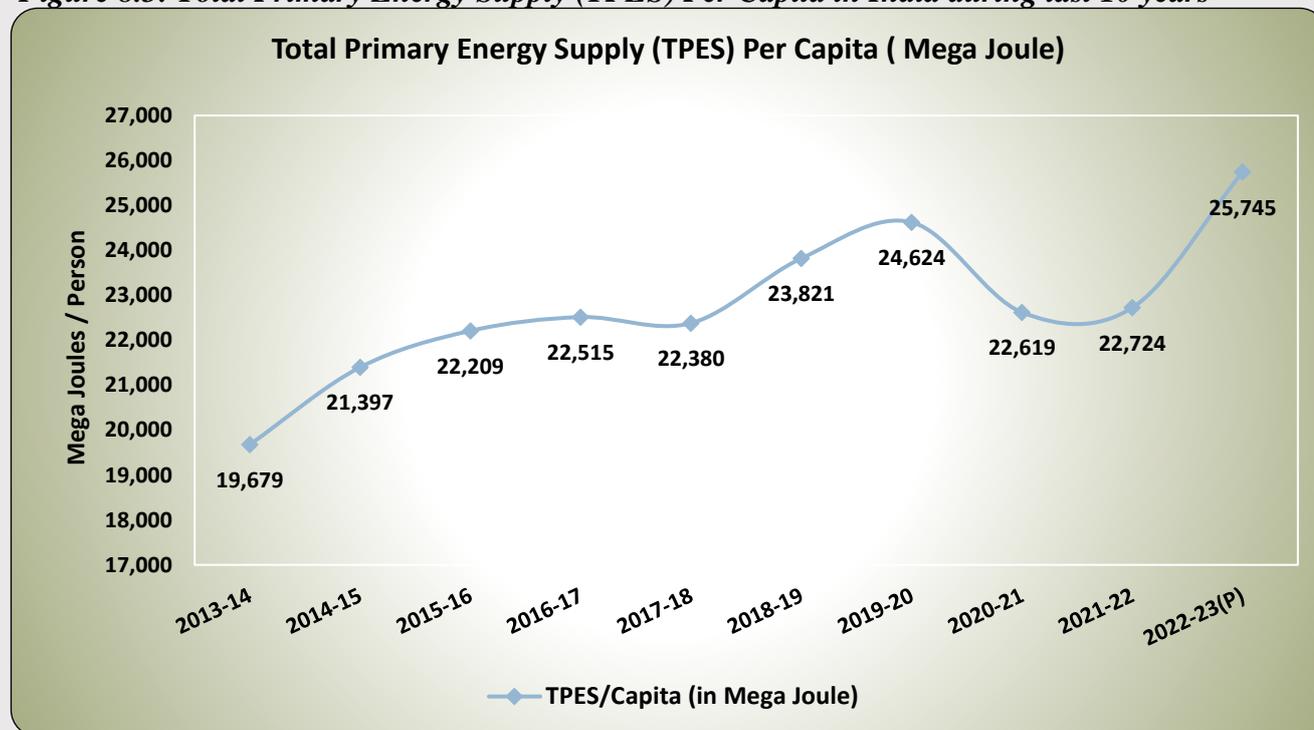


Figure 8.4: Total Final Consumption (TFC) per Capita in India during last 10 years

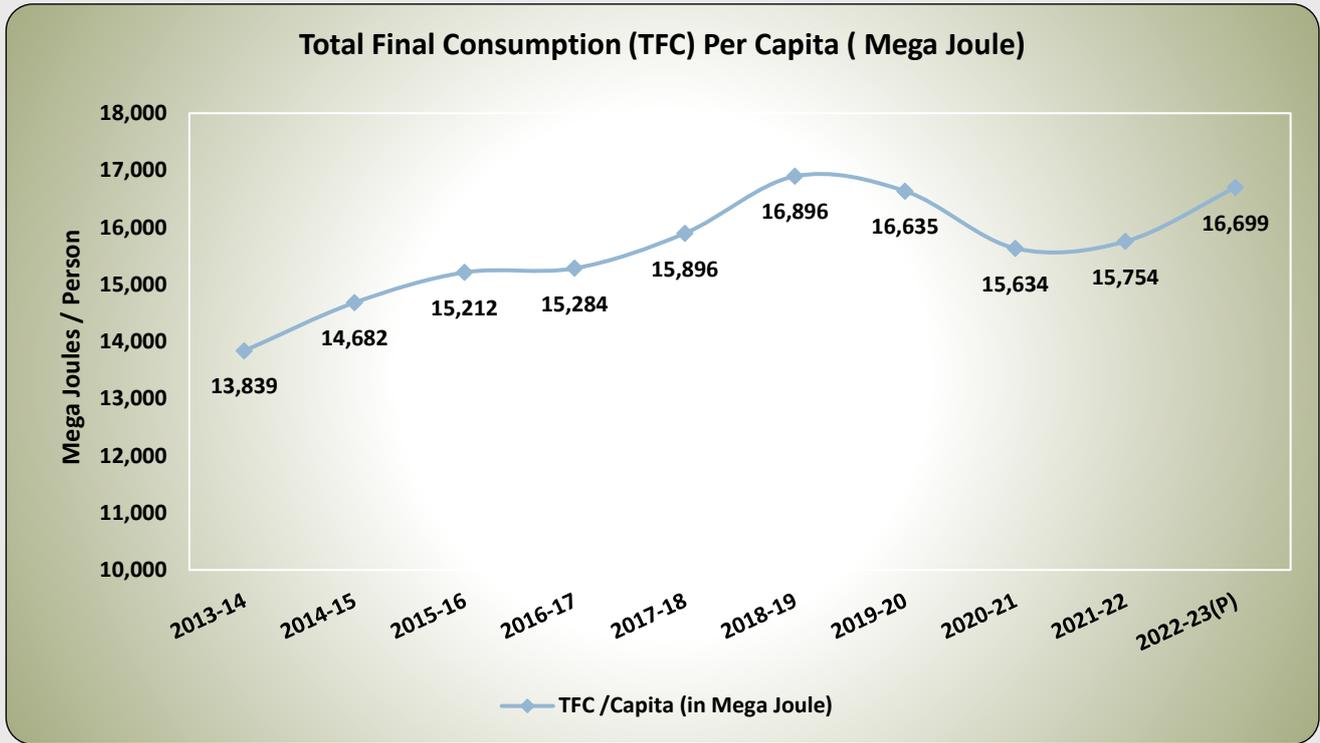
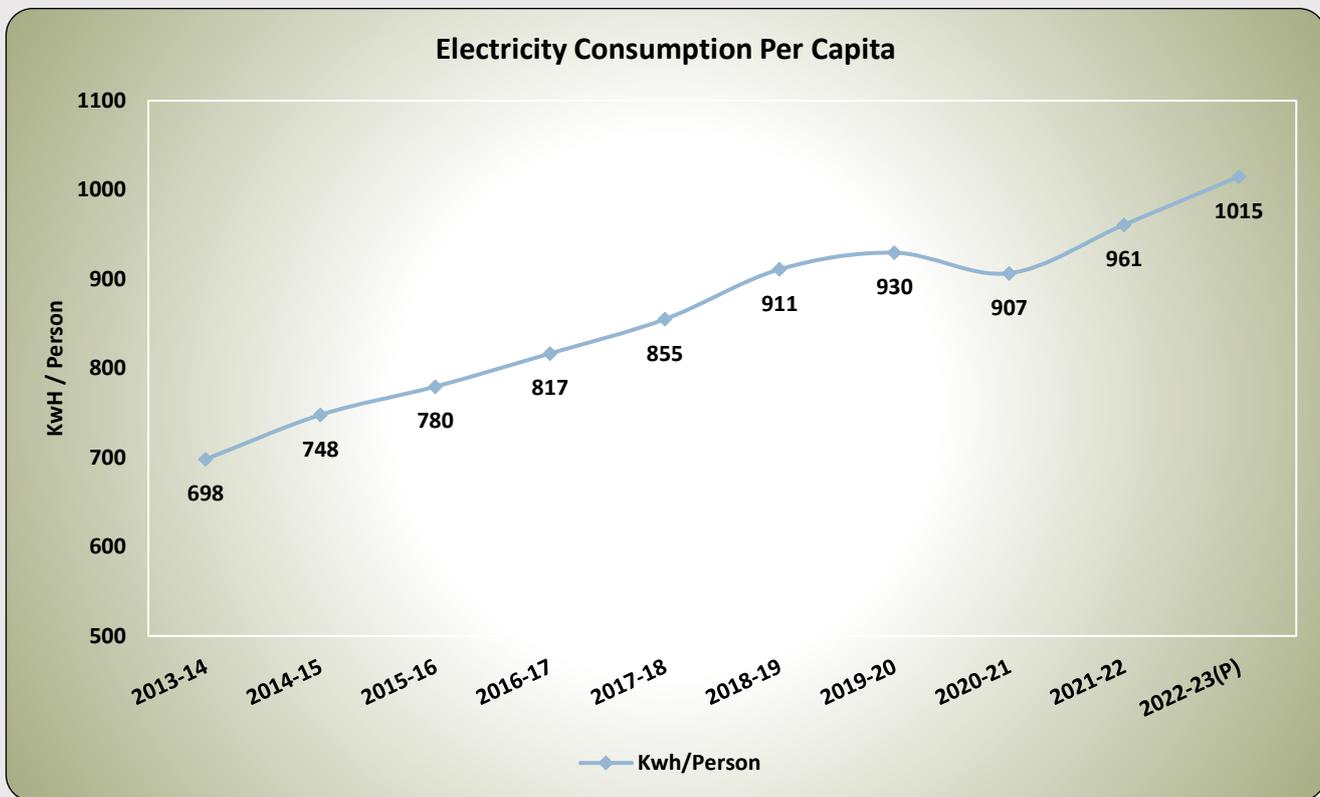


Figure 8.5: Electricity Consumption per Capita in India during last 10 years



2. SUB THEME: OVERALL PRODUCTIVITY:

A. Energy Indicator: Energy Use per Unit of GDP:

Purpose and Measurement methodology: 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:

- Total Primary Energy Supply (TPES) per 000' rupees of GDP
- Total Final Consumption (TFC) of energy per 000' rupees of GDP
- Electricity Use per 000' rupees of GDP

Table 8.5: Energy Consumption per 000' rupees of GDP during last 10 years

Year	TPES (Mega Joule) / '000 Rs.	TFC (Mega Joule) / '000 Rs	Electricity Consumption (Kwh)/ '000 Rs
2013-14	251.43	176.81	8.92
2014-15	257.78	176.88	9.01
2015-16	250.88	171.84	8.81
2016-17	237.70	161.36	8.62
2017-18	223.69	158.88	8.55
2018-19	226.11	160.37	8.65
2019-20	227.46	153.66	8.59
2020-21	224.13	154.91	8.98
2021-22	207.29	143.71	8.77
2022-23(P)	221.53	143.69	8.73

Figure 8.6: Total Primary Energy Supply (TPES) per '000 Rs. of GDP during last 10 years

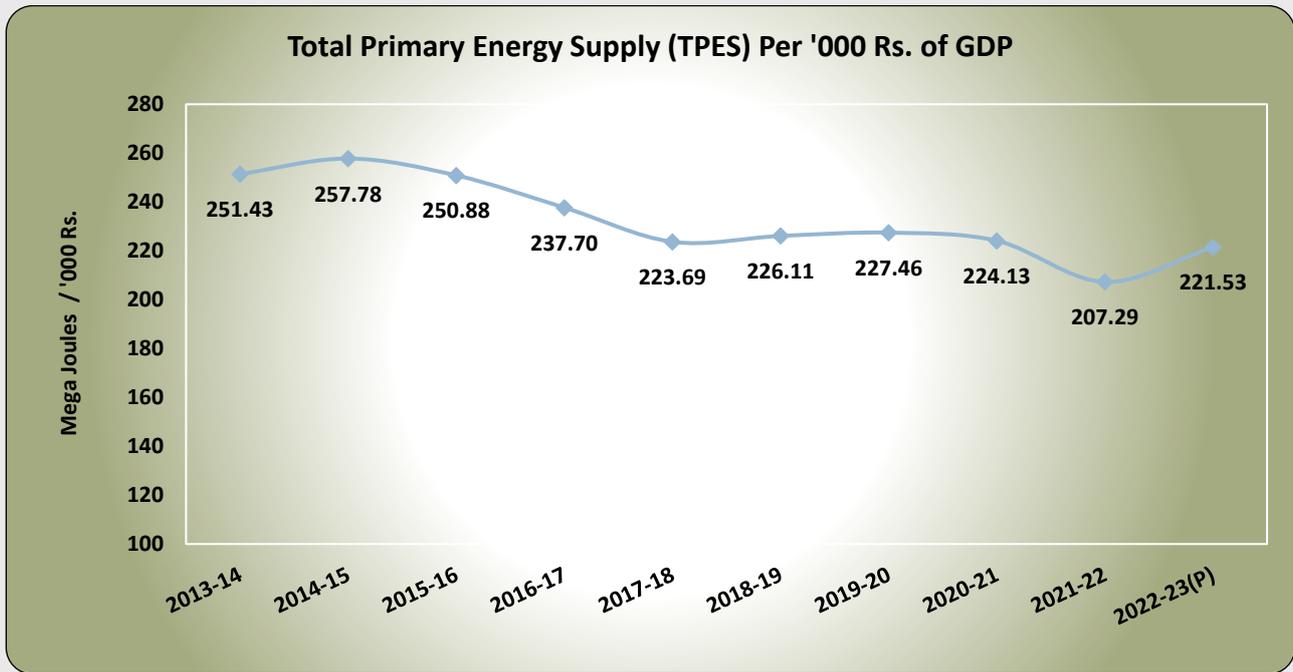
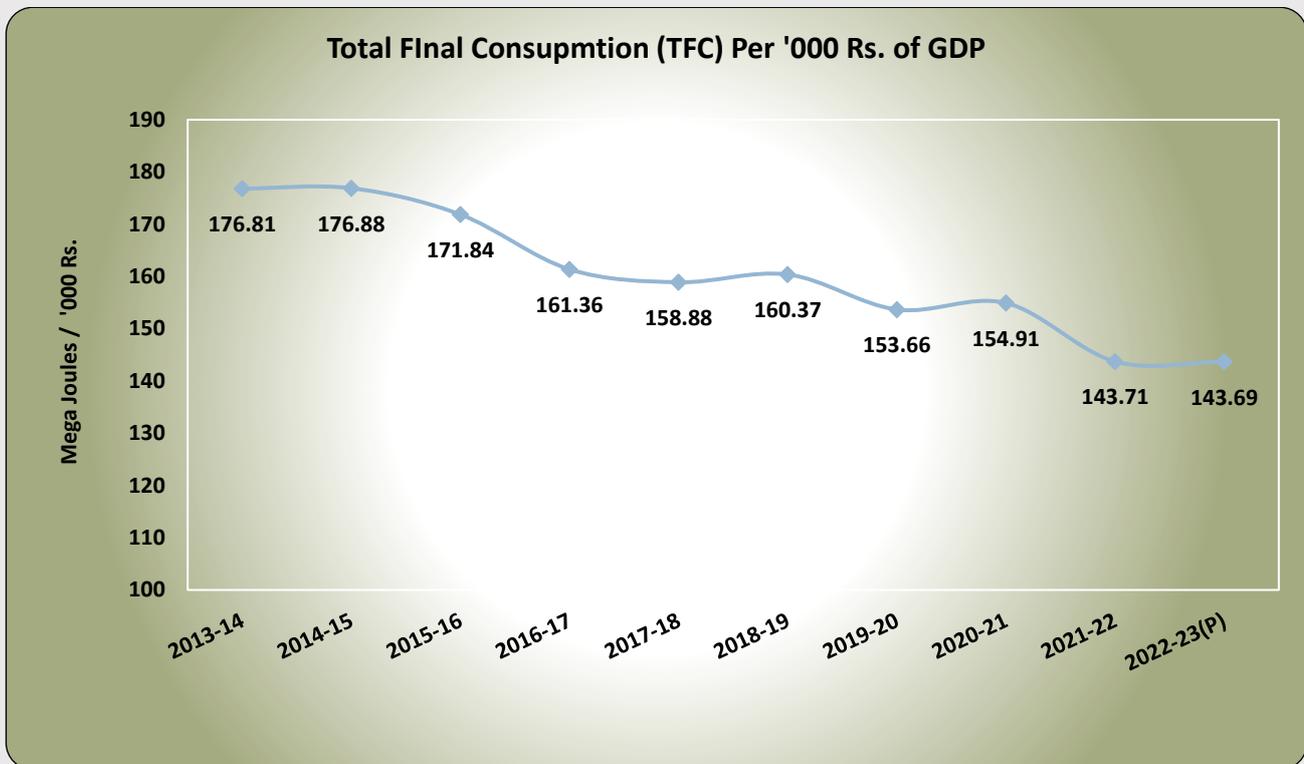


Figure 8.7: Total Final Consumption (TFC) per '000 Rs. of GDP during last 10 years



3. SUB THEME: SUPPLY EFFICIENCY

A. Energy Indicator: Efficiency of energy conversion and distribution:

Purpose and Measurement methodology: – 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.

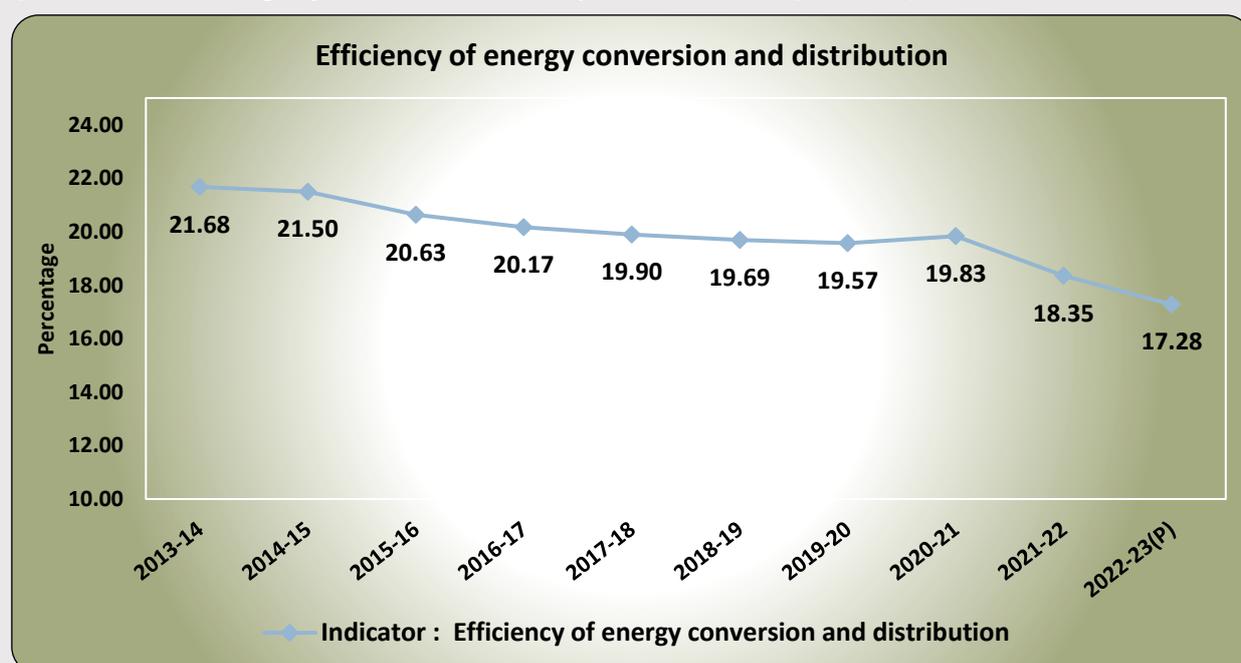
The indicator is calculated as:

$$\left(\frac{\text{Losses in transmission of electricity}}{\text{Gross generation of electricity}} \right)$$

Table 8.6: Efficiency in energy conversion and distribution

Year	Percentage of Losses (w.r.t Production) in Electricity
2013-14	21.68
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(P)	17.28

Figure 8.8: Percentage of ‘Loss’ in Electricity in India during last 10 years.



4. SUB THEME: PRODUCTION

A. Energy Indicator: Reserve-to-Production Ratio:

Purpose and Measurement methodology: – 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.

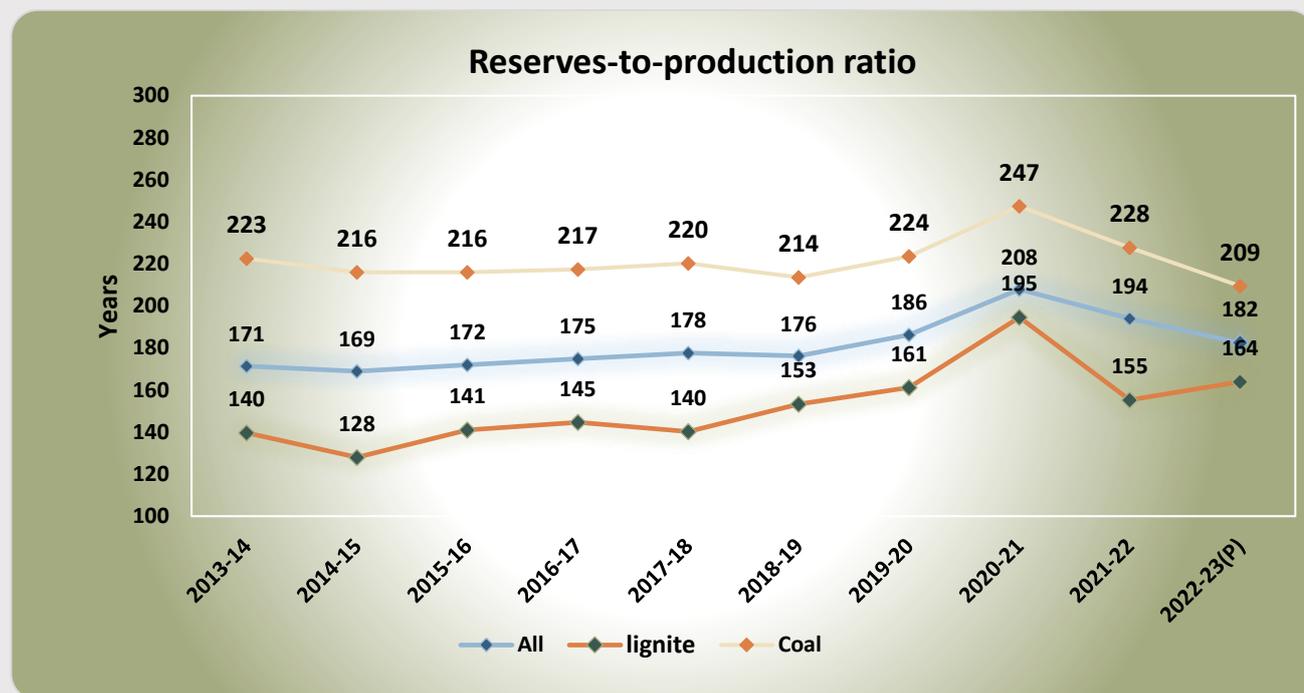
The indicator is computed as:

$$\left(\frac{\text{Proven energy reserves of a commodity at the end of a year}}{\text{Total production of that commodity in that year}} \right)$$

Table 8.7: Reserve to Production Ration of Coal, Lignite and All (Coal, lignite, Crude Oil and Natural Gas) during last 10 years (in Year)

Year	Reserves to Production Ratio (Coal)	Reserves to Production Ratio (Lignite)	Reserves to Production Ratio (All)
2013-14	223	140	171
2014-15	216	128	169
2015-16	216	141	172
2016-17	217	145	175
2017-18	220	140	178
2018-19	214	153	176
2019-20	224	161	186
2020-21	247	195	208
2021-22	228	155	194
2022-23(P)	209	164	182

Figure 8.9: Reserve to Production Ratio during last 10 years



B. Energy Indicator: Resources to Production Ratio:

Purpose and Measurement methodology: – 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:

$$\left(\frac{\text{Proven energy resources of a commodity at the end of a year}}{\text{Total production of that commodity in that year}} \right)$$

Table 8.8: Resource to Production Ratio of all Energy Commodities during last 10 years (in Year)

Year	Resources to Production Ratio (Crude Oil)	Resources to Production Ratio (Natural Gas)	Resources to Production Ratio (Coal)	Resources to Production Ratio (Lignite)	Reserves to Production Ratio (All)
2013-14	20	40	533	977	423
2014-15	17	37	503	914	408
2015-16	17	38	483	1017	400
2016-17	17	40	479	988	400
2017-18	17	41	472	979	397
2018-19	18	42	448	1033	385
2019-20	19	44	471	1093	408
2020-21	19	48	492	1214	429
2021-22	20	40	452	969	399
2022-23(P)	22	33	405	1027	366

5. SUB THEME: END USE

A. Energy Indicator: Sectoral Energy Intensities

This indicator aims to measure 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:

$$\left(\text{Amount of energy consumed against a sector} / \text{GVA of that sector} \right)$$

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

I. 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.

II. 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.

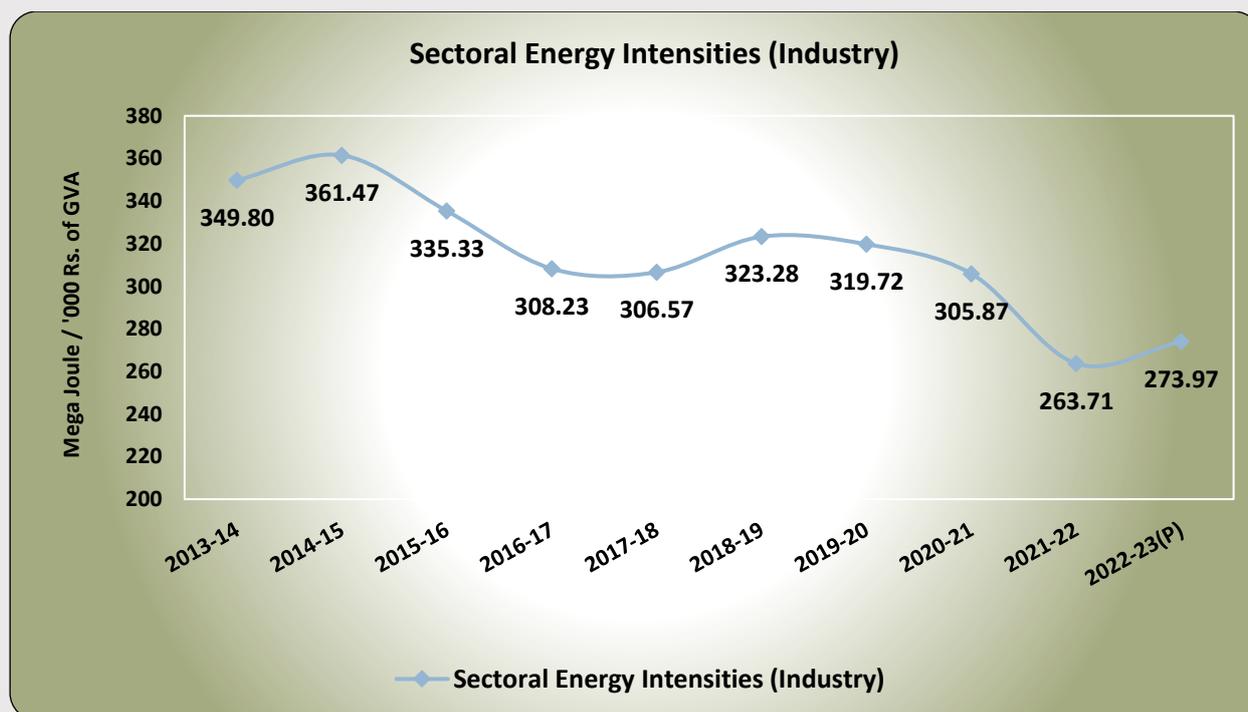
II. Agricultural Energy Intensities:

This indicator is a 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.

Table 8.9: Energy Intensity (in MJ/'000 Rs. of GVA) of major sectors during last 10 years

Year	Industry	Agriculture	Transport
2013-14	349.80	36.00	322.35
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(P)	273.97	39.16	410.13

Figure 8.10: Sectoral Energy Intensity of Industry Sector during last 10 years



B. Energy Indicator: Sectoral Electricity Intensities

This indicator aims to measure 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:

I. Industrial Electricity Intensities:

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

II. Agricultural Electricity Intensities:

This Indicator aims to measure 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.

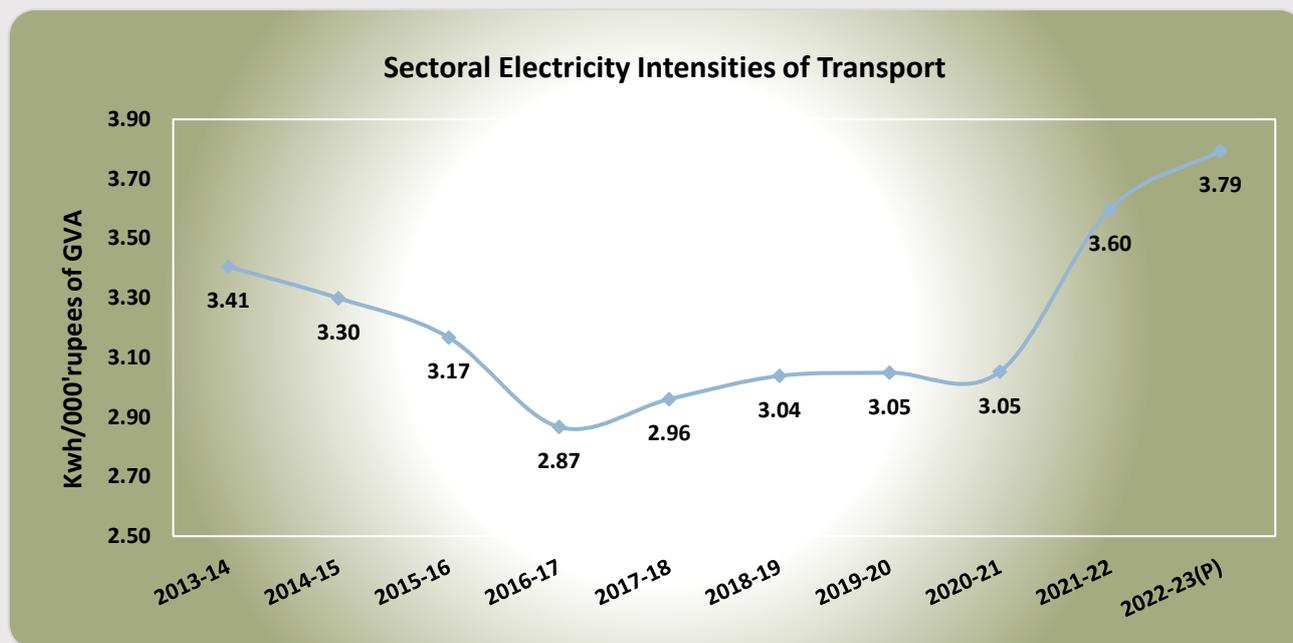
III. Transport Energy Intensities:

This Indicator aims to measure 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 Agriculture over time can be measures using this Indicator.

Table 8.10: Electricity Intensity (in Kwh / '000 Rs. of GVA) of major sectors of Economy during last 10 years

Year	Industry	Agriculture	Transport
2013-14	14.65	9.49	3.41
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(P)	14.42	10.60	3.79

Figure 8.11: Sectoral Electricity Intensity of Transport sector during last 10 years



6. SUB THEME: DIVERSIFICATION (FUEL MIXED)

A. Energy Indicator: Fuel share in Total Primary Energy Supply (TPES):

This indicator aims to measure 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.

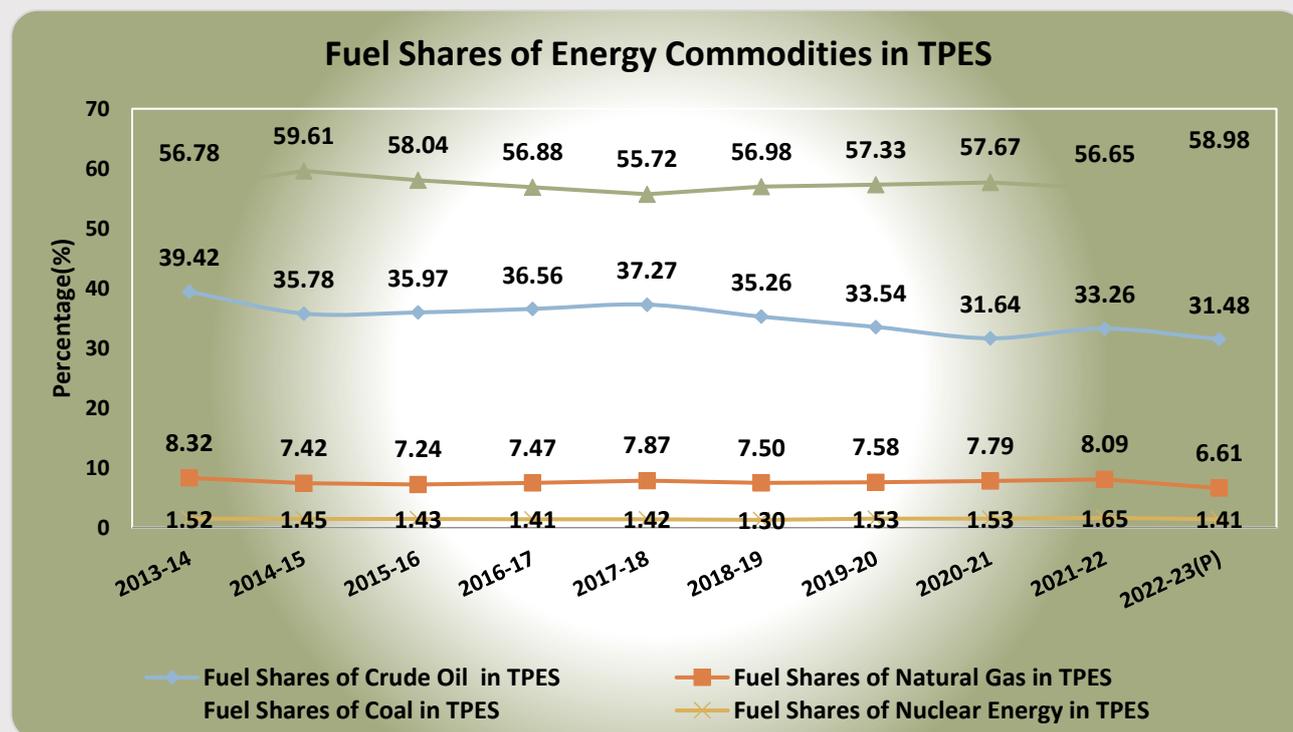
This indicator is measured as:

$$\text{(Energy supplied by a particular energy-commodity / Total Primary Energy Supply (TPES))}$$

Table 8.11: Fuel share of major Energy Commodities in TPES during last 10 years (in percentage)

Year	Crude Oil	Natural Gas	Coal	Nuclear	Renewable Energy
2013-14	39.42	8.32	56.78	1.52	2.96
2014-15	35.78	7.42	59.61	1.45	2.73
2015-16	35.97	7.24	58.04	1.43	2.39
2016-17	36.56	7.47	56.88	1.41	2.54
2017-18	37.27	7.87	55.72	1.42	2.82
2018-19	35.26	7.50	56.98	1.30	3.02
2019-20	33.54	7.58	57.33	1.53	3.28
2020-21	31.64	7.79	57.67	1.53	3.58
2021-22	33.26	8.09	56.65	1.65	3.81
2022-23(P)	31.48	6.61	58.98	1.41	3.79

Figure 8.12: Fuel share of energy commodities in TPES during last 10 years



B. Energy Indicator: Fuel share in Total Final Consumption (TFC):

This indicator aims to measure the share of different energy-commodities in the total 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.

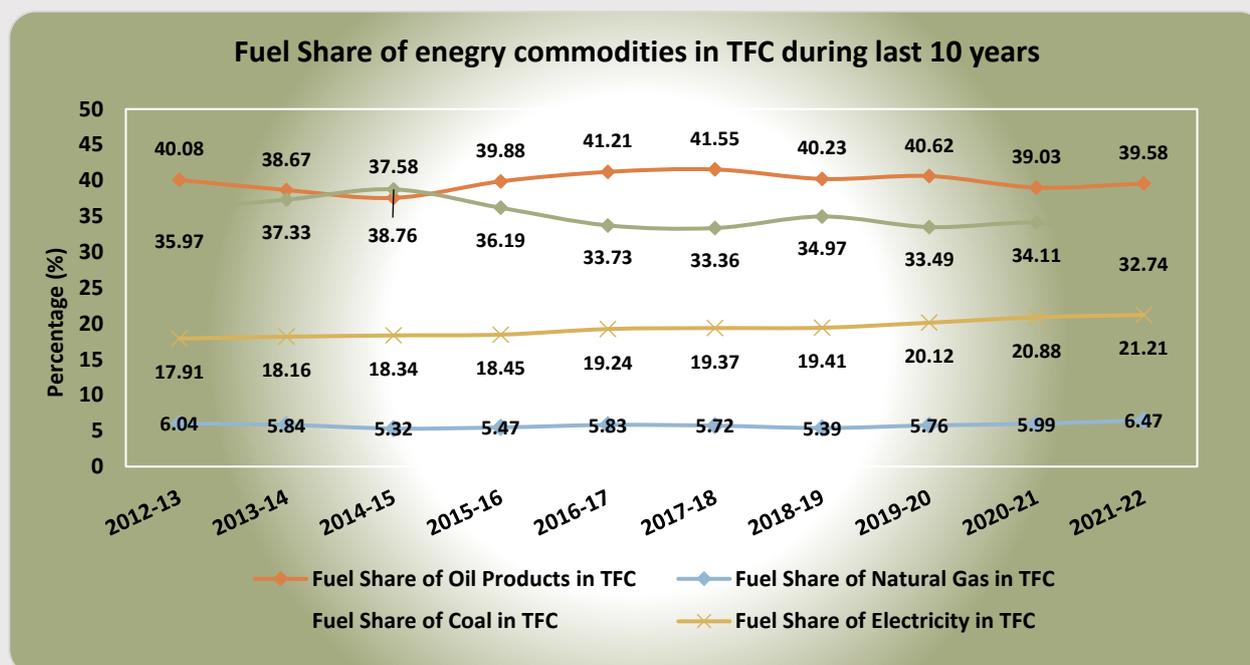
This indicator is measured as:

$$\left(\frac{\text{Energy consumed from a particular energy-commodity}}{\text{Total Final Consumption (TFC)}} \right)$$

Table 8.12: Fuel share different energy commodities in TFC during last 10 years (in Percentage)

Year	Oil Products	Coal	Natural Gas	Electricity
2013-14	38.67	37.33	5.84	18.16
2014-15	37.58	38.76	5.32	18.34
2015-16	39.88	36.19	5.47	18.45
2016-17	41.21	33.73	5.83	19.24
2017-18	41.55	33.36	5.72	19.37
2018-19	40.23	34.97	5.39	19.41
2019-20	40.62	33.49	5.76	20.12
2020-21	39.03	34.11	5.99	20.88
2021-22	40.01	31.43	6.60	21.96
2022-23(P)	41.18	30.55	6.39	21.88

Figure 8.13: Fuel share of energy commodities in TFC during last 10 years



C. Energy Indicator: Fuel share in Electricity:

This indicator aims to measure 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.

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Table 8.13: Share of different fuel in Total Generation of Electricity (in percentage)

Year	Thermal	Nuclear	Hydro #	RE (Other than Hydro)
2013-14	79.87	2.91	11.48	5.73
2014-15	81.10	2.82	10.12	5.96
2015-16	83.03	2.80	9.09	5.08
2016-17	82.64	2.69	8.71	5.96
2017-18	81.88	2.59	8.51	7.02
2018-19	80.86	2.39	8.53	8.23
2019-20	78.61	2.86	9.62	8.91
2020-21	78.22	2.69	9.43	9.66
2021-22	77.75	2.78	8.97	10.49
2022-23(P)	77.18	2.49	8.81	11.52

Note: # Large Hydro

Table 8.14: Share of Renewable and Non-Renewable energy resources in total Electricity

Year	Non-Renewable (%)	Renewable (%)
2013-14	82.78	17.22
2014-15	83.92	16.08
2015-16	85.83	14.17
2016-17	85.34	14.66
2017-18	84.47	15.53
2018-19	83.24	16.76
2019-20	81.47	18.53
2020-21	80.91	19.09
2021-22	80.53	19.47
2022-23(P)	79.66	20.34

8. SUB THEME: IMPORTS

A. Energy Indicator: Net energy import dependency

Purpose and Measurement method: – This indicator measures the extent to which a country relies on imports to meet its energy requirements.

This indicator is computed as:

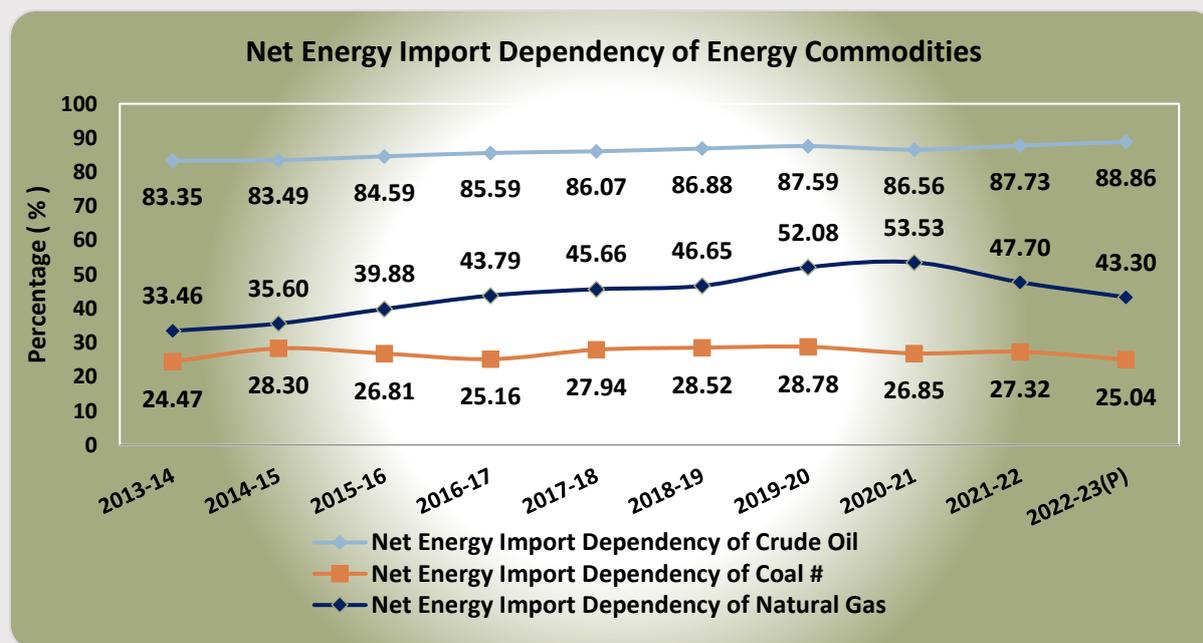
$$\left(\frac{\text{Net imports of the energy commodity}}{\text{Total Supply of that energy commodity}} \right)$$

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.

Table 8.15: Net Energy Import dependency of energy commodities during last 10 years

Year	Crude Oil (%)	Coal (%)	Natural Gas (%)
2013-14	83.35	24.47	33.46
2014-15	83.49	28.30	35.60
2015-16	84.59	26.81	39.88
2016-17	85.59	25.16	43.79
2017-18	86.07	27.94	45.66
2018-19	86.88	28.52	46.65
2019-20	87.59	28.78	52.08
2020-21	86.56	26.85	53.53
2021-22	87.73	27.32	47.70
2022-23(P)	88.86	25.04	43.30

Figure 8.14: Net Import dependency of all energy commodities during last 10 years



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Table 8.16 : Energy Indicators (Economic Dimension) for Sustainability from FY : 2012-13 to FY : 2022-23(P)

Theme	Sub-theme	Indicator	Category	Unit	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23(P)
Use and Production Pattern	Overall Use	Energy use per capita	TPES	toe/person	0.4700	0.4700	0.5111	0.5305	0.5378	0.5345	0.5690	0.5881	0.5402	0.5428	0.6149
			TFC	toe/person	0.3202	0.3305	0.3507	0.3633	0.3650	0.3797	0.4035	0.3973	0.3734	0.3763	0.3988
			Electricity	Kwh/person	666.79	698.10	747.86	779.53	816.65	855.09	910.98	929.61	906.58	960.92	1014.83
	Overall Productivity	Energy use per unit of GDP	TPES	toe/000rupees	0.00631	0.00601	0.00616	0.00599	0.00568	0.00534	0.00540	0.00543	0.00535	0.00495	0.00529
			TFC	toe/000rupees	0.00430	0.00422	0.00422	0.00410	0.00385	0.00379	0.00383	0.00367	0.00370	0.00343	0.00343
			Electricity	Kwh/000rupees	8.95	8.92	9.01	8.81	8.62	8.55	8.65	8.59	8.98	8.77	8.73
	Supply Efficiency	Efficiency of energy conversion and distribution	All	%	22.00	21.68	21.50	20.63	20.17	19.90	19.69	19.57	19.83	18.35	17.28
	Production	Reserves-to-production ratio	All	years	167	171	169	172	175	178	176	186	208	194	182
			coal	years	221	223	216	216	217	220	214	224	247	228	209
			lignite	years	133	140	128	141	145	140	153	161	195	155	164
		Resources-to-production ratio	All	years	416	423	408	400	400	397	385	408	429	399	366
			Crude oil	years	20	20	17	17	17	17	18	19	19	20	22
			Natural Gas	years	33	40	37	38	40	41	42	44	48	40	33
			Coal	years	537	533	503	483	479	472	448	471	492	452	405
	Lignite	years	930	977	914	1017	988	979	1033	1093	1214	969	1027		
	End Use	Sectoral Energy Intensities	Industry	toe/000rupees	0.00818	0.00835	0.00863	0.00801	0.00736	0.00732	0.00772	0.00764	0.00731	0.00630	0.00654
			Agriculture	toe/000rupees	0.00089	0.00086	0.00096	0.00098	0.00100	0.00098	0.00103	0.00096	0.00096	0.00094	0.00094
			Transport	toe/000rupees	0.00820	0.00770	0.00785	0.00828	0.00875	0.00899	0.00920	0.00955	0.01010	0.00943	0.00980
		Sectoral Electricity Intensities	Industry	Kwh/000rupees	14.47	14.65	14.90	13.72	13.26	13.38	14.10	14.72	14.07	13.69	14.42
			Agriculture	Kwh/000rupees	9.67	9.49	10.52	10.72	11.07	10.83	11.36	10.59	10.67	10.53	10.60
			Transport	Kwh/000rupees	3.28	3.41	3.30	3.17	2.87	2.96	3.04	3.05	3.05	3.60	3.79
	Diversification (Fuel Mix)	Fuel shares in TPES	Crude Oil	%	39.16	39.42	35.78	35.97	36.56	37.27	35.26	33.54	31.64	33.26	31.48
			Natural Gas	%	9.23	8.32	7.42	7.24	7.47	7.87	7.50	7.58	7.79	8.09	6.61
			Coal	%	55.09	56.78	59.61	58.04	56.88	55.72	56.98	57.33	57.67	56.65	58.98
			Nuclear	%	1.47	1.52	1.45	1.43	1.41	1.42	1.30	1.53	1.53	1.65	1.41
			Renewable Energy	%	2.56	2.96	2.73	2.39	2.54	2.82	3.02	3.28	3.58	3.81	3.79
		Fuel share in TFC	Oil Products	%	40.08	38.67	37.58	39.88	41.21	41.55	40.23	40.62	39.03	40.01	41.18
Natural Gas			%	6.04	5.84	5.32	5.47	5.83	5.72	5.39	5.76	5.99	6.60	6.39	
Coal			%	35.97	37.33	38.76	36.19	33.73	33.36	34.97	33.49	34.11	31.43	30.55	
Electricity			%	17.91	18.16	18.34	18.45	19.24	19.37	19.41	20.12	20.88	21.96	21.88	
Fuel share in electricity		Thermal	%	81.42	79.87	81.10	83.03	82.64	81.88	80.86	78.61	78.22	77.75	77.18	
		Nuclear	%	2.96	2.91	2.82	2.80	2.69	2.59	2.39	2.86	2.69	2.78	2.49	
		Hydro	%	10.27	11.48	10.12	9.09	8.71	8.51	8.53	9.62	9.43	8.97	8.81	
		RE (other than Hydro)	%	5.34	5.73	5.96	5.08	5.96	7.02	8.23	8.91	9.66	10.49	11.52	
Security	Imports	Net energy import dependency	Overall	%	34.08	35.40	36.86	37.82	38.62	39.88	40.45	42.06	41.74	40.67	39.27
			Crude Oil	%	83.00	83.35	83.49	84.59	85.59	86.07	86.88	87.59	86.56	87.73	88.86
			Natural gas	%	30.22	33.46	35.60	39.88	43.79	45.66	46.65	52.08	53.53	47.70	43.30
			Coal	%	22.68	24.47	28.30	26.81	25.16	27.94	28.52	28.78	26.85	27.32	25.04
			Electricity	%	0.42	0.33	0.04	0.01	-0.08	-0.14	-0.26	-0.19	0.00	-0.08	-0.13
	Strategic Fuel Stocks	Stocks of critical fuels per corresponding fuel consumption	Coal	%	8.84	7.51	7.22	7.81	9.18	6.90	5.95	8.52	12.03	10.61	7.57

Note: The difference in the figures computed by MoPNG and MoSPI arises due to methodological differences - MoSPI using data from supply side and MoPNG using consumption side.

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 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° 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°C to 220°C.

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

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

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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.

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- 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 630°C. It contains 4-15 per cent by weight of matter that can be released as volatiles during subsequent heat treatment at temperatures up to approximately 1330°C.

Calcined coke is a petroleum coke or coal-derived pitch coke obtained by heat treatment of green coke to about 1330°C. It will normally have a hydrogen content of less than 0.1 percent by weight.

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

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

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

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

3. Gaseous fuels

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

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

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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:

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- 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%
Washery Gr. I	18% <= Ash content < 21%
Washery Gr. II	21% <= Ash content < 24%
Washery Gr. III	24% <= Ash content < 28%
Washery Gr. IV	28% <= Ash content < 35%
Washery Gr. V	35% <= Ash content < 42%
Washery Gr. 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 and 3700
G14	GCV between 3101 and 3400
G15	GCV between 2801 and 3100
G16	GCV between 2501 and 2800
G17	GCV between 2201 and 2500

Source: Coal Controller's Organisation, Ministry of Coal.

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 3.6×10^6 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 = 238.84×10^3 calories
1 Giga Joule	=	10^9 joules = 238.84×10^6 calories
1 Tera Joule	=	10^{12} joules = 238.84×10^9 calories
1 Peta Joule	=	10^{15} joules = 238.84×10^{12} calories
One million tonnes of Coal	=	16.86 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 publication (kJ/Kg)											
	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23
Coal Production	18299	18267	18096	18051	17819	17316	17273	17131	16905	16822	16856
Coal Import	21331	20889	21183	21978	22183	22182	22005	22065	22473	23277	22257
Coal Export	28200	28200	28200	28200	28200	28200	28200	28200	28200	28200	28200
Stock Changes	24283	24283	24283	24283	24283	24283	24283	24283	17637	17637	17565
Coal Dispatched to Power Sector OR Coal Consumption in Power Sector	17411	17411	17411	17411	17411	17411	17424	17342	17001	16846	16911
Coal Dispatched to Non-Power Sector (Industry) OR Coal Consumption in Non-Power Sector (Industry)	22029	22029	22029	22029	22029	22029	22413	22510	22093	21027	21145
Lignite	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				
Products	2012-13 to 2020-21		2021-22 to 2022-23	
	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 2022-23	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		

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 and National Accounts Division, Ministry of Statistics and Programme Implementation.	
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 and Energy Indicators on Economic Dimension.	
2.3. Sector coverage	
Coal & Lignite, Petroleum & Natural Gas, Renewable Energy Resources and Electricity. (Data Collection Mechanism is given in Annex: V of this publication). 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.	
2.5. Statistical unit	
Data are aggregated appropriately at national and state level.	
2.6. Statistical population	
Data covers all the energy commodity sources.	

Annexure- III

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 2009-10 to 2018-19 and is based on statistics compiled by the Ministry of Petroleum and Natural Gas, Central Electricity Authority, Office of Coal Controller, Ministry of New and Renewable Energy. The data for Office of the Economic Advisor, Ministry of Commerce and Industry and National Accounts Division has been sourced for the year 2011-12 to 2018-19. Energy Indicators on Economic Dimensions have been compiled for the year 2018-19.

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. Annex IV gives details of Energy Data Collection Mechanism.

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 -2020" is the financial year 2018-19 and the previous financial years since 2009-10. For Energy Indicators reference period is Financial Year 2018-19.

5. Institutional mandate

5.1. Legal acts and other agreements

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

5.2. Data sharing

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

6. Confidentiality

6.1. Confidentiality - policy and data treatment

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

7. Release policy

7.1. Release calendar

Publication of Energy Statistics is released on MOSPI's web-site in 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 10.

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

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

Annexure- III

Preliminary data on energy production and consumption statistics for the year 2018-19 is published in current publication. Final data will be given in the next publication in March 2021.

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.

Energy Balance Table of India from 2012-13 to 2020-21

Table-I : Energy Balance of India for 2012-13 (Final)									
<i>All figures in KToE</i>									
	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	320,112	227,553	-44,080	53,623	8,565	9,790	5,091	399	581,054
Statistical differences	16,521	15,231	-17,207	966	0	0	0	-1,075	14,437
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	334,225	232,021	-53,254	48,943	8,920	11,608	5,798	339	588,601
Statistical differences	15,271	13,632	-9,923	1,325	0	0	0	-1,091	19,214
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	386,395	231,887	-45,323	48,075	9,408	11,127	6,555	49	648,175
Statistical differences	1,979	14,323	-11,424	645	0	0	0	-1,255	4,268
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	395,433	245,067	-34,590	49,339	9,750	10,448	5,833	8	681,289
Statistical differences	-2,673	12,106	-14,566	144	0	0	0	-1,264	-6,251
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	397,437	255,439	-33,833	52,198	9,881	10,537	7,209	-94	698,774
Statistical differences	-6,108	15,832	-18,052	-36	0	0	0	-1,280	-9,644
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	391,294	261,751	-35,647	55,273	9,993	10,856	8,958	-183	702,295
Statistical differences	27,432	17,355	-15,525	-1,246	0	0	0	-1,389	26,627
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	430,630	266,436	-30,388	56,676	9,854	11,624	11,217	-350	755,699
Statistical differences	24,121	18,353	-20,292	-1,532	0	0	0	-1,484	19,166
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	452,693	264,824	-25,449	59,856	12,111	13,426	12,440	-270	789,631
Statistical differences	-6,401	19,290	-24,702	-2,262	0	0	0	-1,527	-15,602
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	422,811	231,947	-16,174	57,076	11,214	12,955	13,279	-2	733,105
Statistical differences	-6,473	18,012	-23,136	194	0	0	0	-1,285	-12,687
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									

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Energy Statistics Division (ESD)

5th Floor, Khurshid Lal Bhawan

The Eastern Court, Janpath Road, HC Mathur Lane, New Delhi - 110001

Ministry of Statistics and Programme Implementation