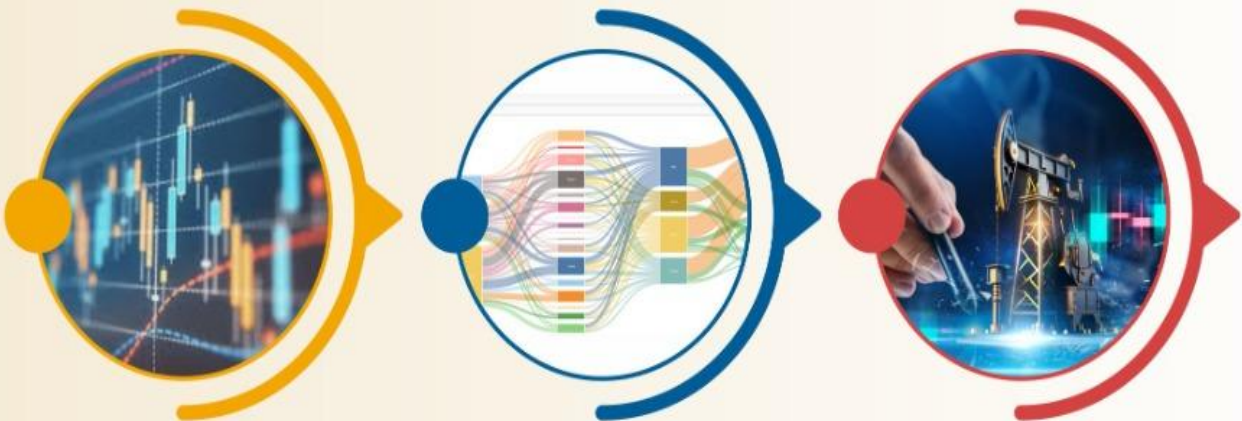
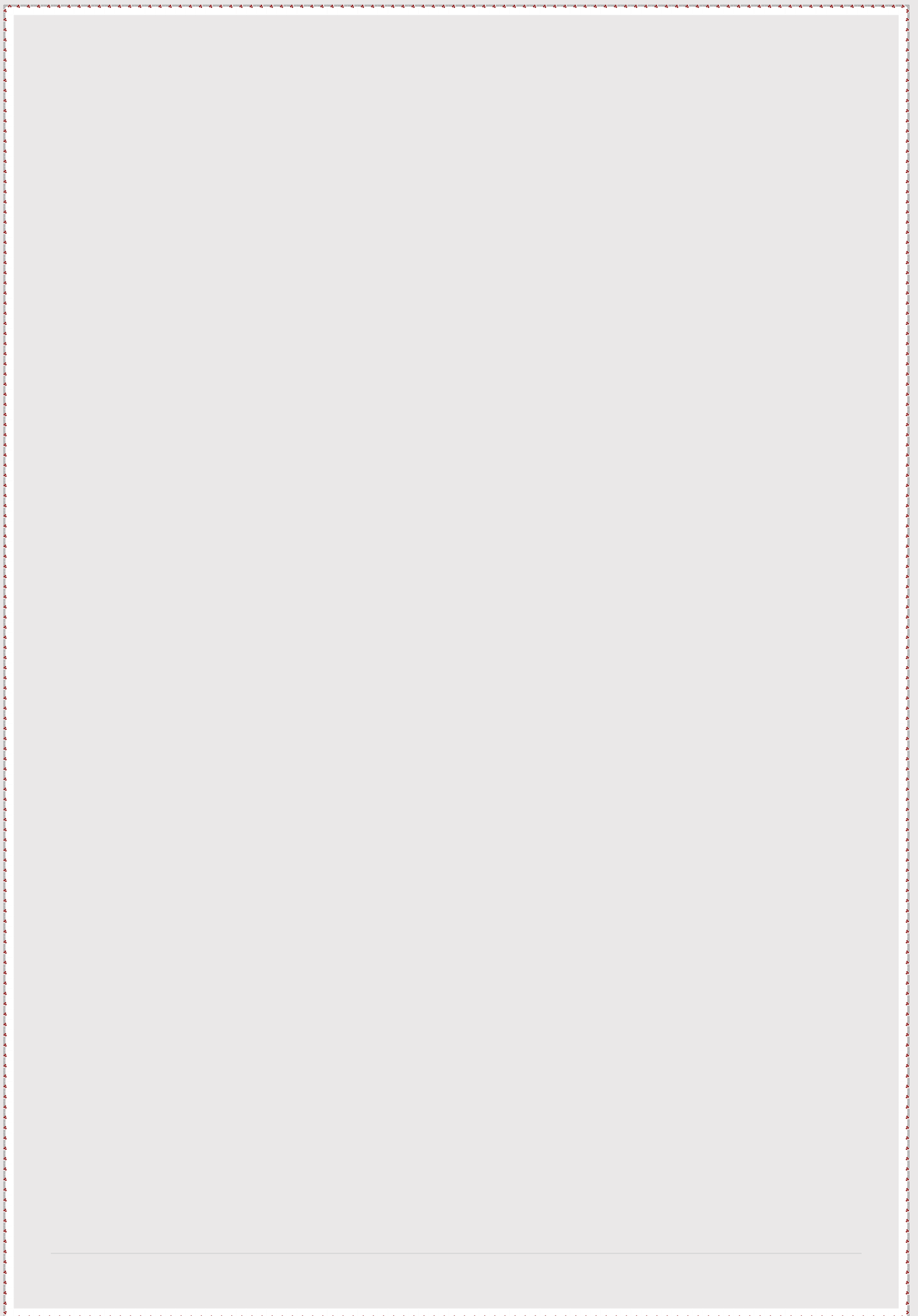


Chapter

Energy Balance and Sankey Diagram





CHAPTER 7

Energy Balance and Sankey Diagram

Introduction

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

Commodity Balance

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

Energy Balance

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

Chapter 7: Energy Balance and Sankey Diagram

The energy balance helps:

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

Methodology for Energy Balance Calculation

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

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

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

Sankey Diagram

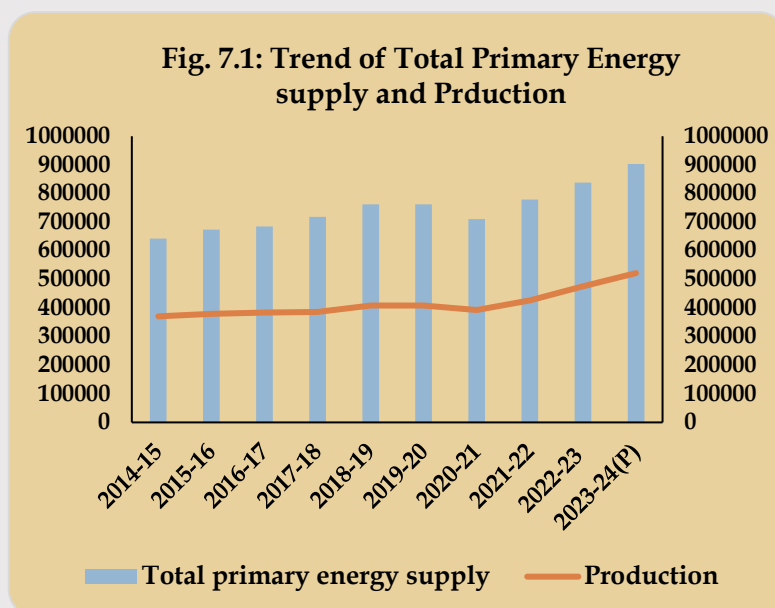
The concept of data visualization in the digital age has revived interest in a style of chart called a Sankey diagram. This style of diagram makes it easy to see the dominant flows within a system and highlights where losses occur. The Sankey diagram is very useful tool to represent an entire input and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

Chapter 7: Energy Balance and Sankey Diagram

7.1 Primary Energy Supply (PES)

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

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



7.2 Total Final Consumption (TFC)

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

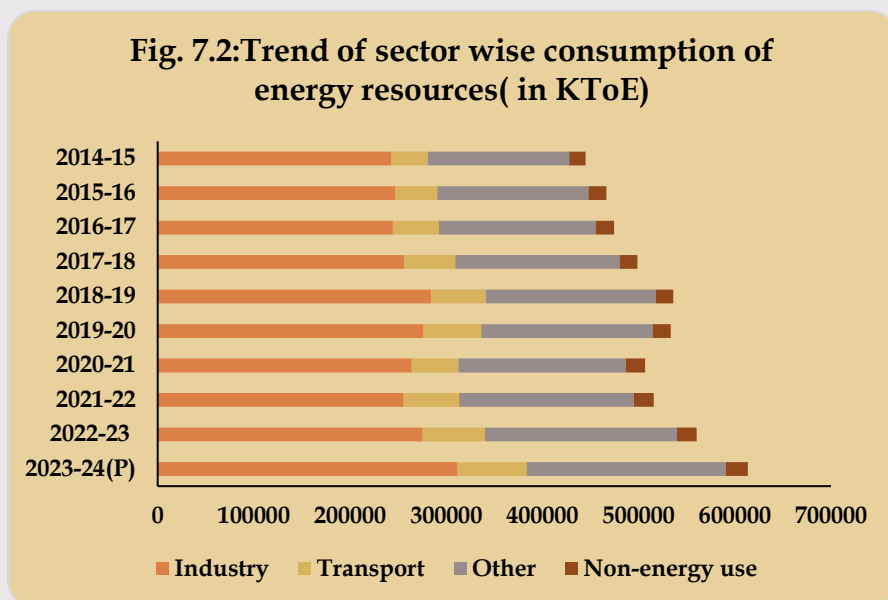


Figure 7.2 shows the industry consumption peaked in 2018-19 and has fluctuated since, while the transport sector shows a consistent upward trend. The other category has steadily increased and non-energy use has shown a rise in recent years.

Chapter 7: Energy Balance and Sankey Diagram

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

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

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

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

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

Chapter 7: Energy Balance and Sankey Diagram

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

Table-7.1 : Energy Commodity Balance for 2022-23 (Final)															
Supply	Coal	Lignite	LPG	Naphtha	Kerosene	Diesel (HSD+LDO)	Fuel Oil	Lubricants	Bitumin	Petrol/Motor Spirit	ATF	Petroleum Coke	Other Petroleum Products*	Natural Gas	Electricity
	(000 tonnes)													MMSCM	(GWh)
Production	893191	44029	12832	17036	948	114421	9242	1301	5144	42817	15000	16044	31756	34450	1617904
From Other Sources															211932
Imports	237668	23	18335	897	0	322	8563	2152	2797	1069	0	8664	1799	26304	7640
Exports	-1166	-333	-540	-5714	-11	-28496	-1841	-14	-9	-13127	-7264	-284	-3717	0	-13792
Stock changes	-15515	1833													
Domestic Supply	1114178	45552	30627	12219	937	86248	15964	3440	7933	30759	7737	24424	29838	60755	1823684
Transfer															
Statistical difference	1039	1293	-2124	-92	-448	378	-9006	298	108	4218	-359	-6081	-13995	3566	-18381
Transformation	785396	38948	1	19	0	427	437	0	0	0	0	0	0	8153	0
Electricity plants	785396	38948	1	19		427	437							8153	
Energy industry own use	0	0	0	0	0	0	0	0	0	0	0	0	0	17954	93429
Oil and Gas extraction														5511	
Petroleum refineries														3909	
Own use in electricity, CHP and heat plants															93429
Other energy sector														8534	
Distribution losses														108	271563
Final Consumption	329821	7897	28503	12107	490	86200	6521	3737	8041	34976	7378	18343	15842	38106	1440311
Industry Sector	329821	7897	2839	12107	0	1738	2311	0	0	0	0	18343	15842	865	593895
Iron and steel	77528	122		0		158	871								
Chemical and petroleum	857			10402		86	525								
Non-ferrous metals						21	385								
Machinery						64	18								
Mining & Quarrying			5			1066	94								
Paper, pulp and print	1255	894													
Construction	9418	1445				179	193								
Textile and leather	92	1853				127	24								
Non-specified	240671	3583	2835	1705		39	200					18343	15842	865	593895
Transport Sector	0	0	108	0	0	2615	1561	0	0	34976	7378	0	0	13792	30028
Road			108			148	178			34976				12028	
Domestic Aviation						1									
Rail						1716	0								30028
Pipeline transport														1764	
Domestic navigation						750	1383				7378				
Non-specified							0								
Other Sectors	0	0	25555	0	490	81846	2649	3737	8041	0	0	0	0	1131	816388
Residential			25382		308										353156
Comm. And public services					62										117231
Agriculture/forestry			22			312	54							154	243852
Non-specified			152		119	81533	2595	3737	8041					976	102149
Non-Energy Use														22319	

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

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

* 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 2022-23 (Final)

All figures in KToE

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

Final consumption refers to End Use Consumption

Chapter 7: Energy Balance and Sankey Diagram

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

All figures in Peta Joule

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

Final consumption refers to End Use Consumption

Chapter 7: Energy Balance and Sankey Diagram

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

All figures in KToE

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

Final consumption refers to End Use Consumption

* 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 Commodity Balance for 2023-24(P)

Table 7.5 : Energy Commodity Balance for 2023-24(P)															
Supply	Coal	Lignite	LPG	Naphtha	Kerosene	Diesel (HSD+LDO)	Fuel Oil	Lubricants	Bitumin	Petrol/Motor Spirit	ATF	Petroleum Coke	Other Petroleum Products*	Natural Gas	Electricity
	(000 tonnes)													MMSCM	(GWh)
Production	997826	42921	12777	18736	983	116525	9021	1352	5492	45480	17113	15561	33050	36438	1734375
From Other Sources															214581
Imports	264531	52	18514	1211	0	42	9053	2412	3244	717	0	10956	2544	31795	6649
Exports	-1545	-2	-525	-5275	-11	-28204	-2103	-15	-18	-13472	-8579	-28	-4362	0	-11362
Stock changes	-24330	-327													
Domestic Supply	1236482	42644	30766	14671	972	88362	15970	3749	8718	32725	8533	26489	31232	68233	1944243
Transfer															
Statistical difference	1217	2	-1102	-859	-493	2046	-9450	338	89	4494	-286	-6171	-16536	6205	-19814
Transformation	859336	35695	0	0	0	492	208	0	0	0	0	0	0	9082	0
Electricity plants	859336	35695	0	0		492	208							9082	
Energy industry own use	0	0	0	0	0	0	0	0	0	0	0	0	0	22340	100073
Oil and Gas extraction														5565	
Petroleum refineries														5837	
Own use in electricity, CHP and heat plants															100073
Other energy sector														10938	
Distribution losses														111	281356
Final Consumption	378363	6951	29663	13812	479	89916	6313	4087	8807	37219	8247	20319	14696	42906	1543000
Industry Sector	378363	6951	3140	13812	0	2806	1566	0	0	0	0	20319	14696	1458	645000
Iron and steel	88122	86		0		180	557								
Chemical and petroleum	800			10424		101	408								
Non-ferrous metals						20	233								
Machinery						96	15								
Mining & Quarrying			5			1339	115								
Paper, pulp and print	1027	1039													
Construction	9263	569				457	114								
Textile and leather	173	994				503	19								
Non-specified	278978	4263	3135	3388		111	106					20319	14696	1458	645000
Transport Sector	0	0	89	0	0	4516	1484	0	0	37219	8247	0	0	15415	33000
Road			89			2284	174			37219				13491	
Domestic Aviation						1									
Rail						1458	0								33000
Pipeline transport														1924	
Domestic navigation						773	1310				8247				
Non-specified							0								
Other Sectors	0	0	26434	0	479	82594	3262	4087	8807	0	0	0	0	1143	865000
Residential			26207		298										375000
Comm. And public services					62										125000
Agriculture/forestry			26			424	35							142	255000
Non-specified			200		118	82170	3228	4087	8807					1001	110000
Non-Energy Use														24890	

P: Provisional

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

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

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

Chapter 7: Energy Balance and Sankey Diagram

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

All figures in KToE

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

Final consumption refers to End Use Consumption

P: Provisional

Chapter 7: Energy Balance and Sankey Diagram

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

All figures in Peta Joule

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

Chapter 7: Energy Balance and Sankey Diagram

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

All figures in KToE

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

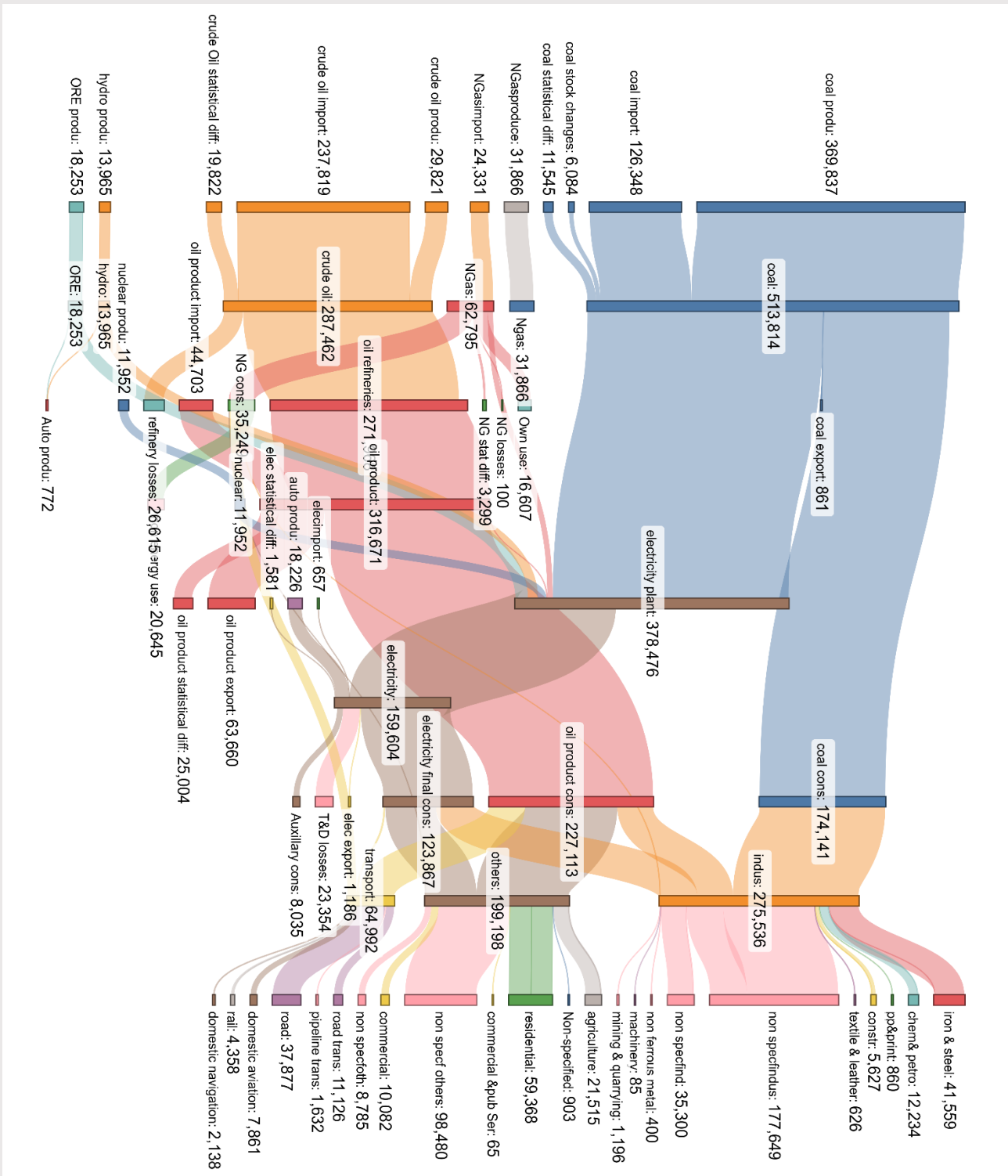
Final consumption refers to End Use Consumption

P: Provisional

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

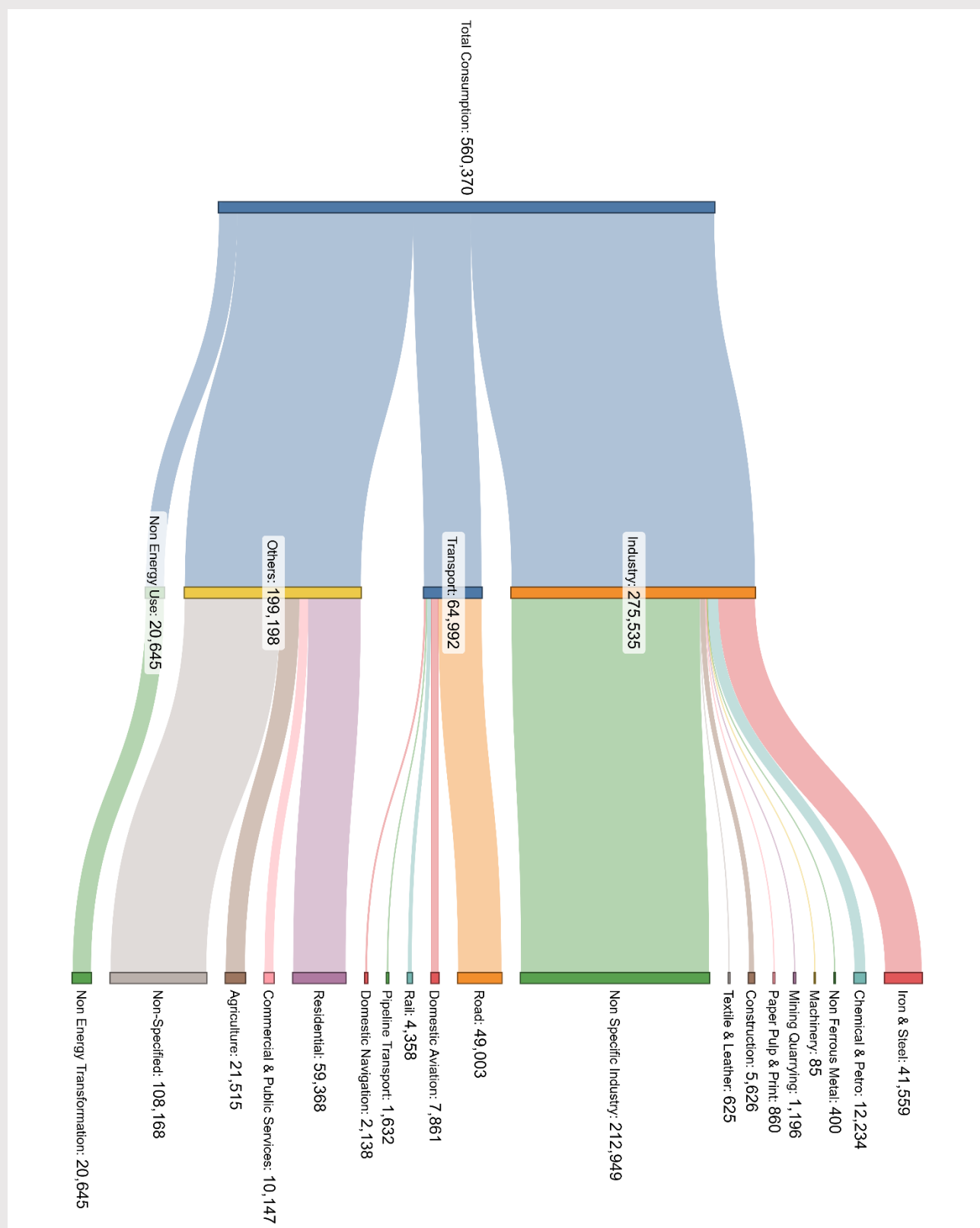
Chapter 7: Energy Balance and Sankey Diagram

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



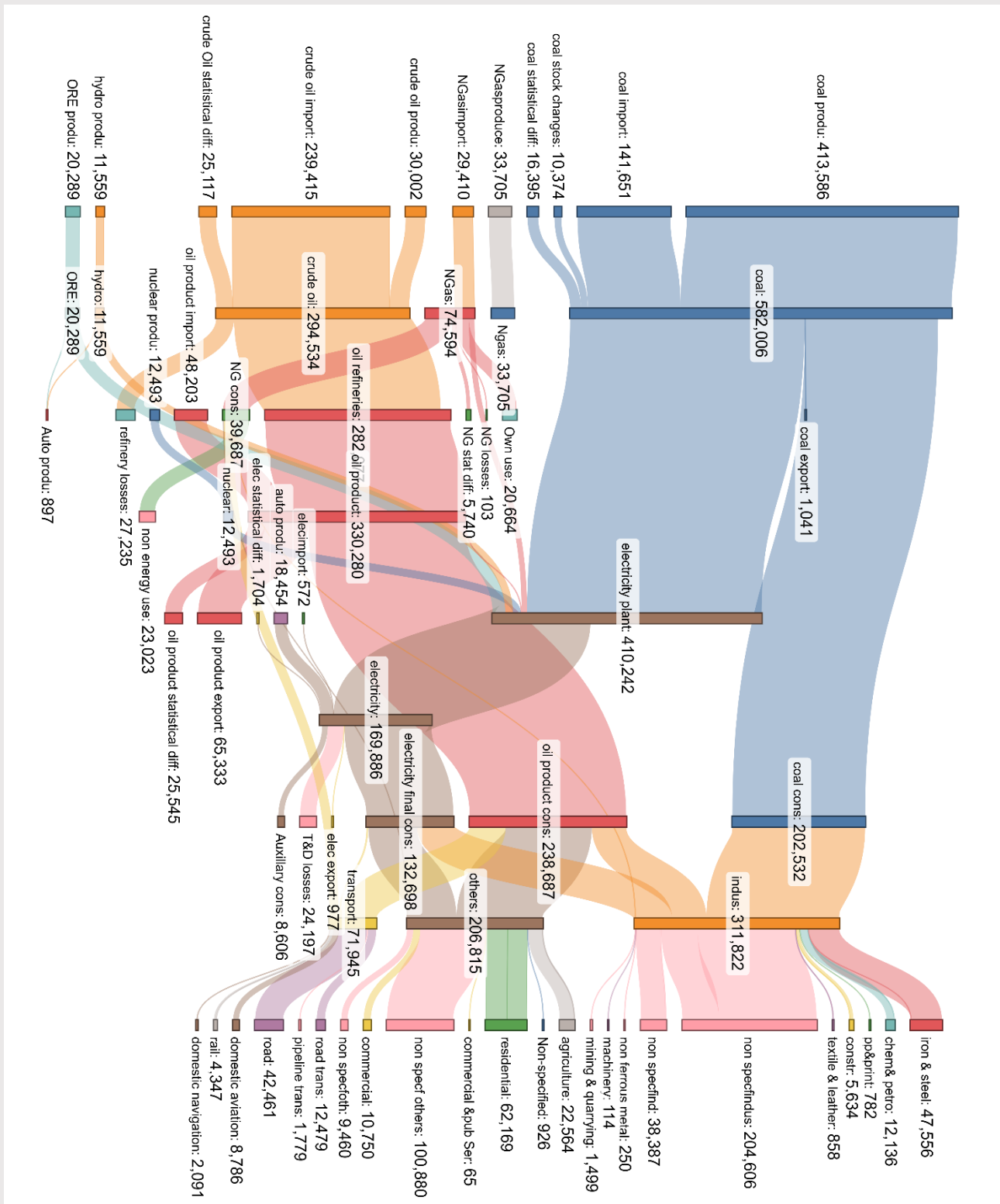
Chapter 7: Energy Balance and Sankey Diagram

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



Chapter 7: Energy Balance and Sankey Diagram

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



Chapter 7: Energy Balance and Sankey Diagram

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

