

India's Energy Overview

December 2024

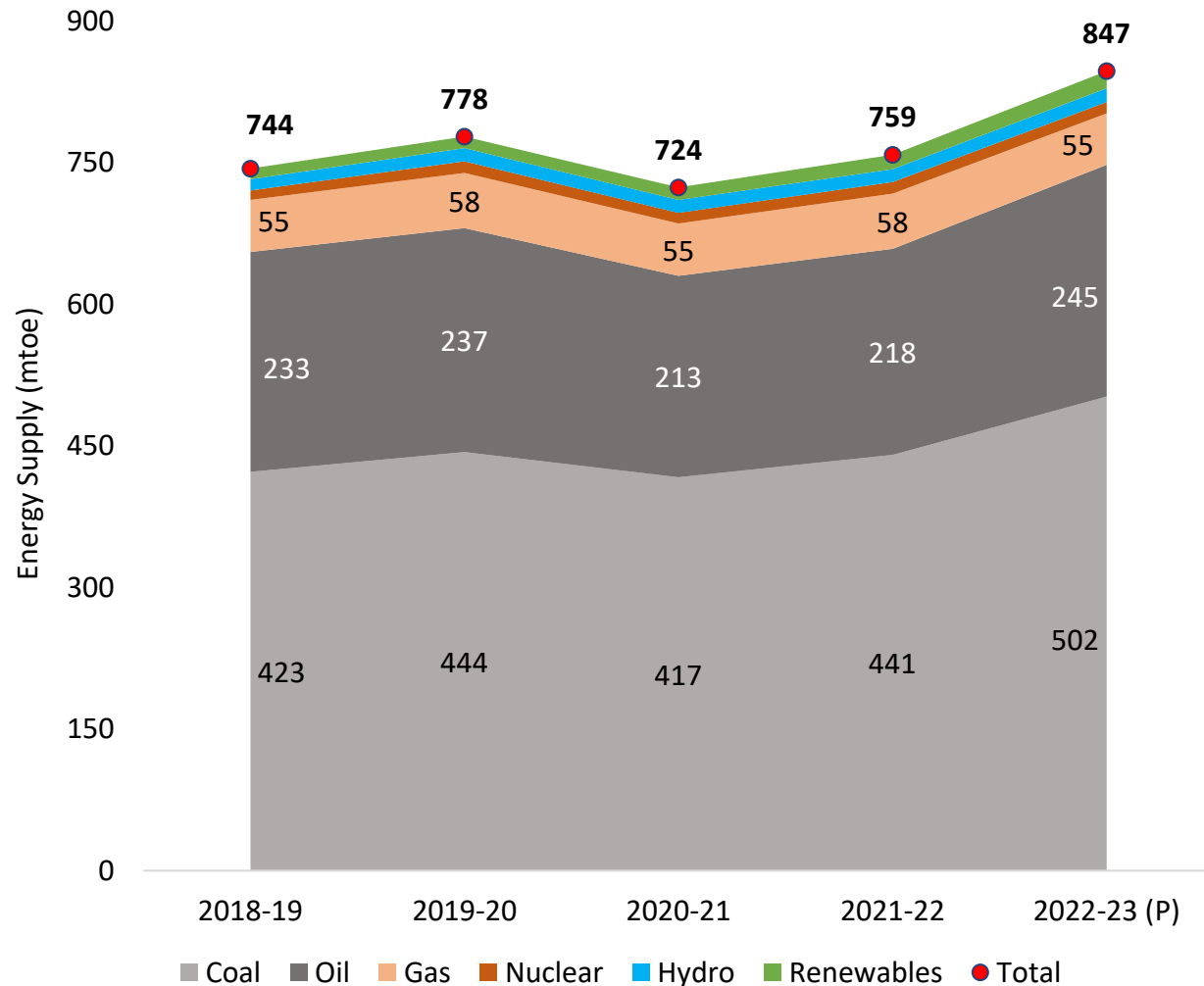


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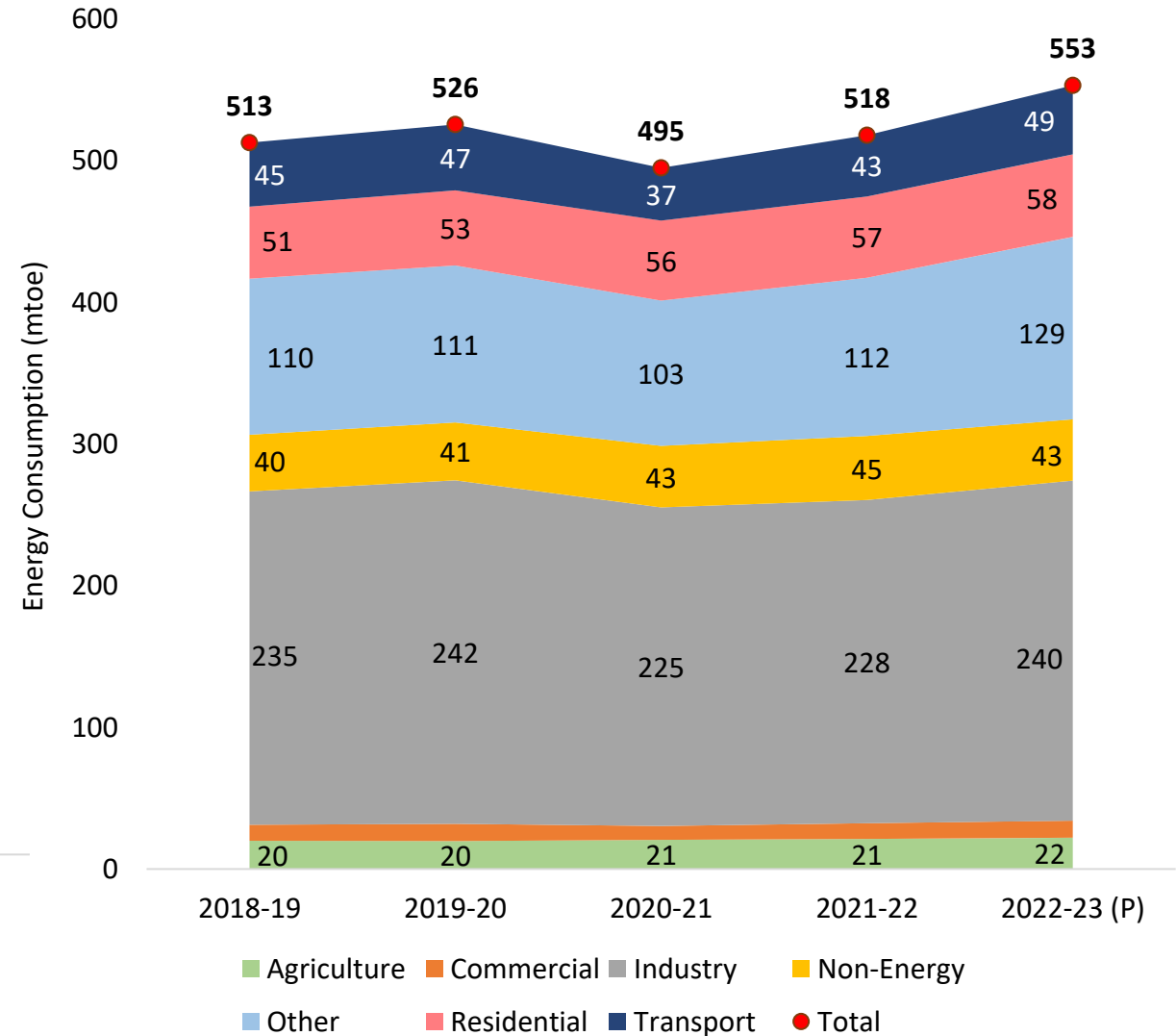
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Primary Energy Mix* in India

Source-wise Primary Energy Supply (mtoe)*

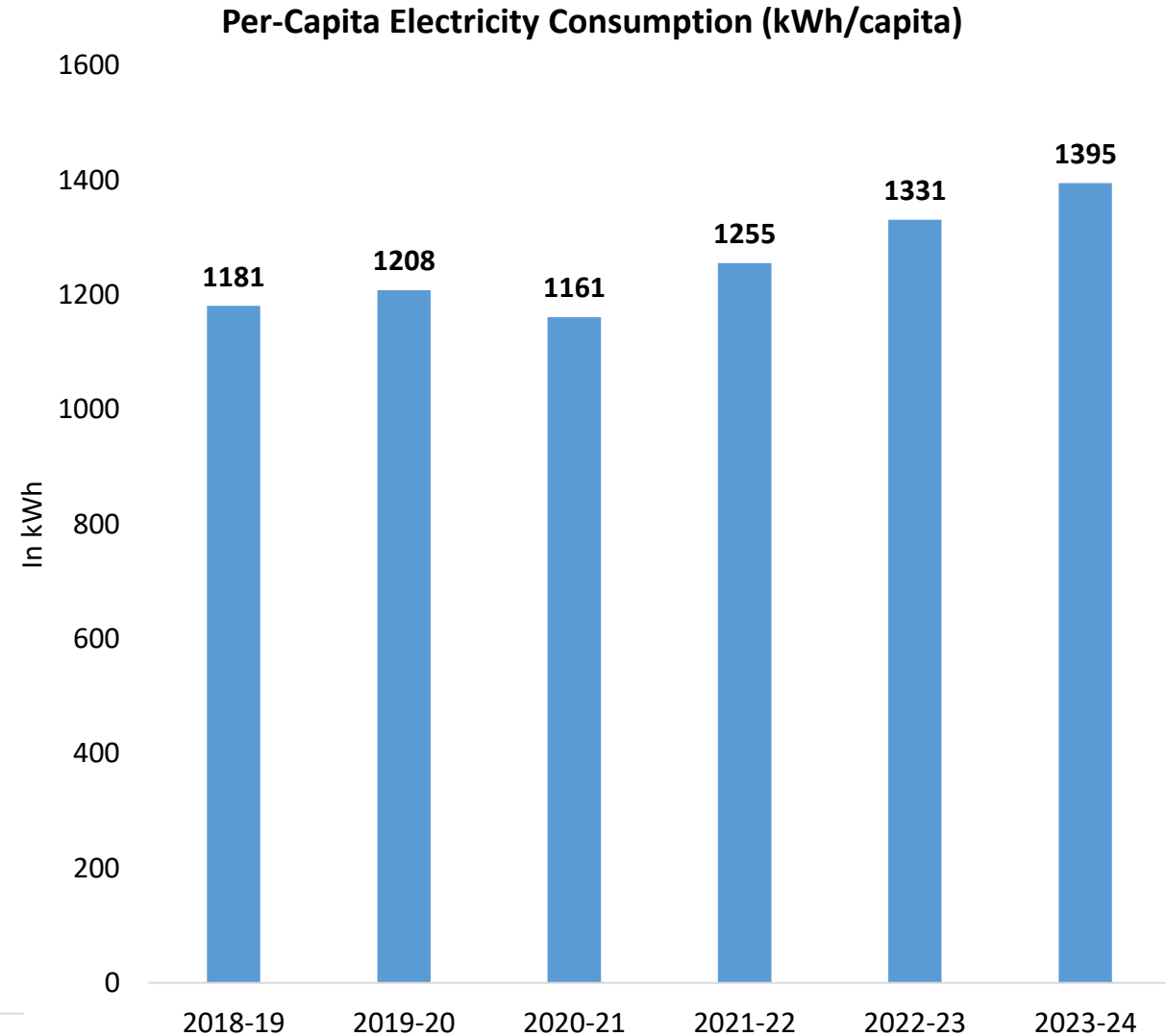
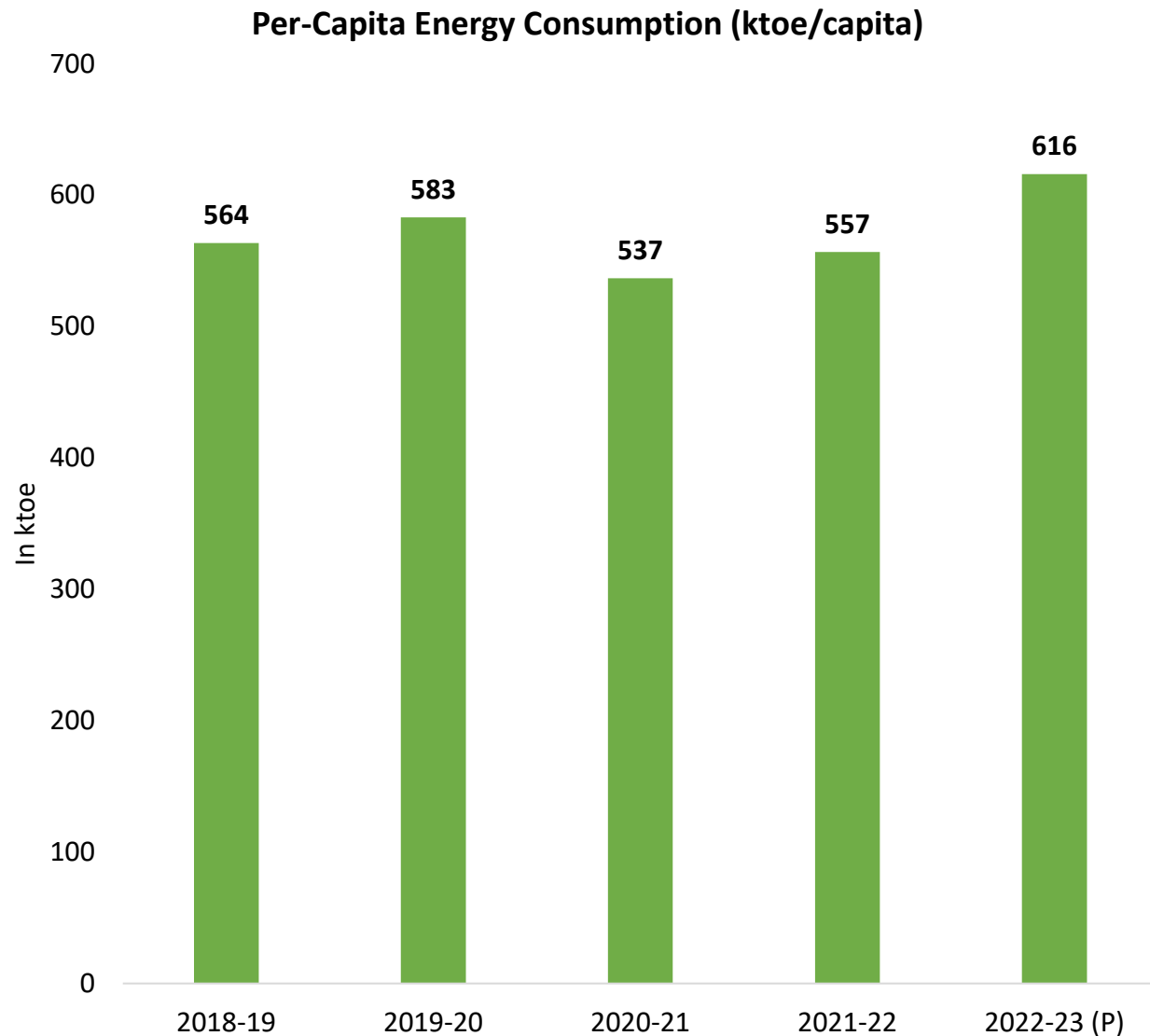


Sector-wise Energy Consumption (mtoe)



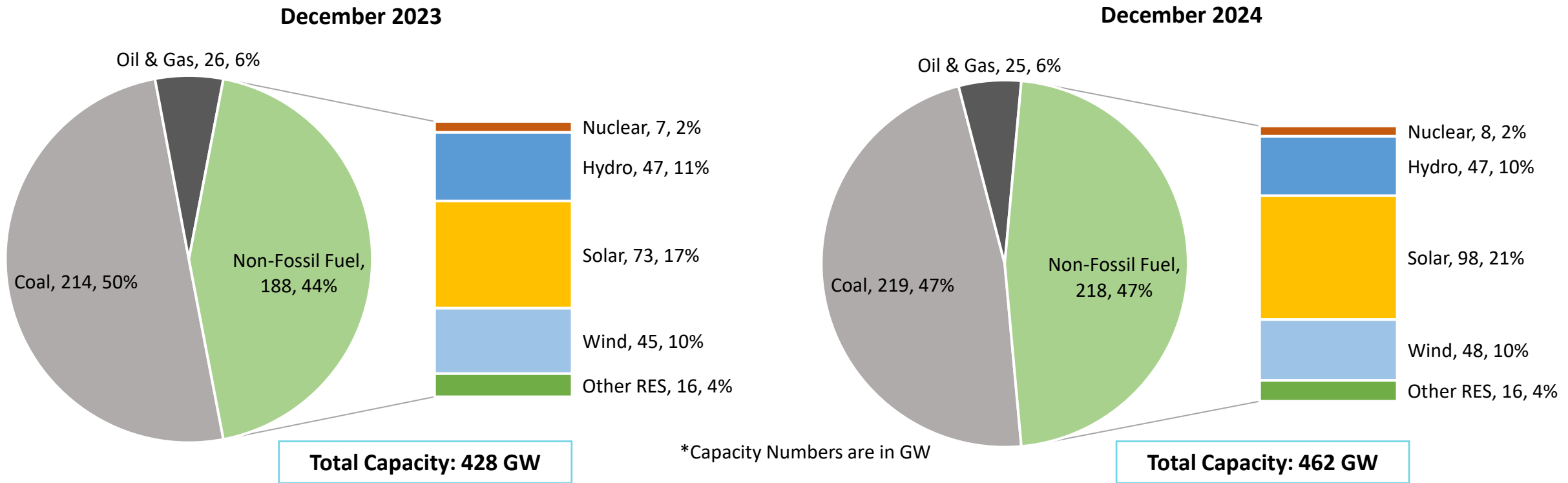
*Excluding biofuels, waste, and other non-commercial source of energy

Per-Capita Energy and Electricity Consumption



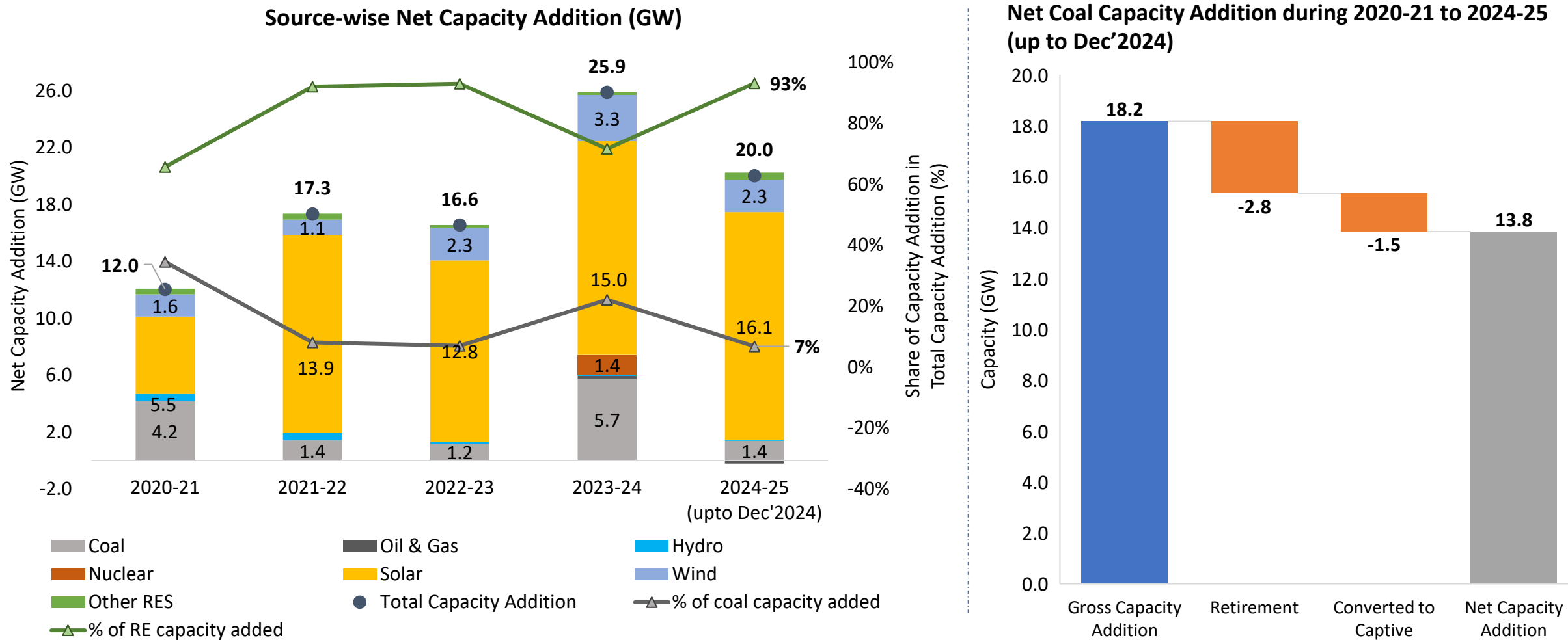
Note: Per Capita energy consumption is calculated on energy supply basis.

India's Electricity Capacity Mix (Utility-scale)



- India's electricity generating capacity is 462 GW as on Dec'2024 [coal 219 GW (47%), solar 98 GW (21%), wind 48 GW (10%), and hydro 47 (10%)].
- As on Dec'2024, the share of non-fossil-based electricity capacity is 47% against the set target of 50% non-fossil capacity by 2030.
- As on Dec'2024, India's renewable energy capacity (including large hydro) stood at 209 GW out of 462 GW.

India's Electricity Capacity Addition in last 5 years



- A total of 76.7 GW of generation capacity has been added in RE (Hydro, solar, wind, and other RES) over the past 5 years (2020-21 to 2024-25), whereas the net coal capacity addition during the same period was 13.8 GW, mostly in the central sector.

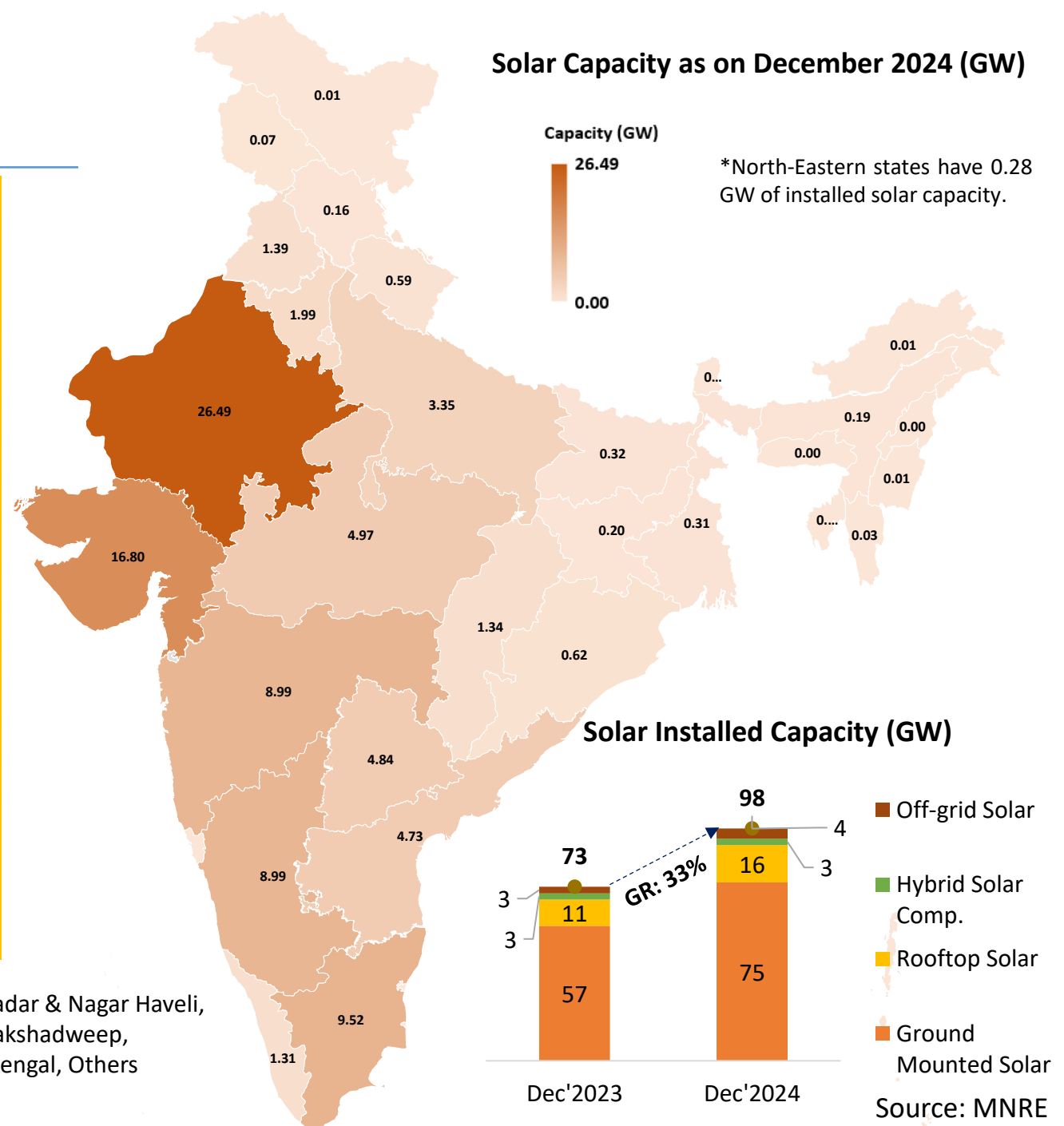
State-wise Solar Capacity

as on December 2024

State-wise installed capacity of Solar Power (GW)					
States	Ground Mounted	Rooftop	Solar Component in Hybrid	Off Grid	Total Solar Power
Rajasthan	22.29	1.41	1.98	0.81	26.49
Gujarat	11.09	4.82	0.79	0.09	16.80
Tamil Nadu	8.57	0.88	0.00	0.07	9.52
Maharashtra	5.21	2.85	0.00	0.93	8.99
Karnataka	8.29	0.66	0.00	0.04	8.99
Madhya Pradesh	4.40	0.47	0.00	0.10	4.97
Telangana	4.36	0.47	0.00	0.01	4.84
Andhra Pradesh	4.36	0.29	0.00	0.09	4.73
Uttar Pradesh	2.71	0.32	0.00	0.32	3.35
Haryana	0.27	0.78	0.00	0.94	1.99
Punjab	0.89	0.42	0.00	0.08	1.39
Chhattisgarh	0.84	0.10	0.00	0.39	1.34
Kerala	0.32	0.97	0.00	0.02	1.31
Odisha	0.51	0.06	0.00	0.04	0.62
Others	1.07	1.17	0.00	0.31	2.55
All India	75.19	15.67	2.77	4.23	97.86

Others include- Andaman & Nicobar, Arunachal Pradesh, Assam, Bihar, Chandigarh, Dadar & Nagar Haveli, Daman & Diu, Delhi, Goa, Himachal Pradesh, Jammu & Kashmir, Jharkhand, Ladakh, Lakshadweep, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Puducherry, Sikkim, Tripura, West Bengal, Others

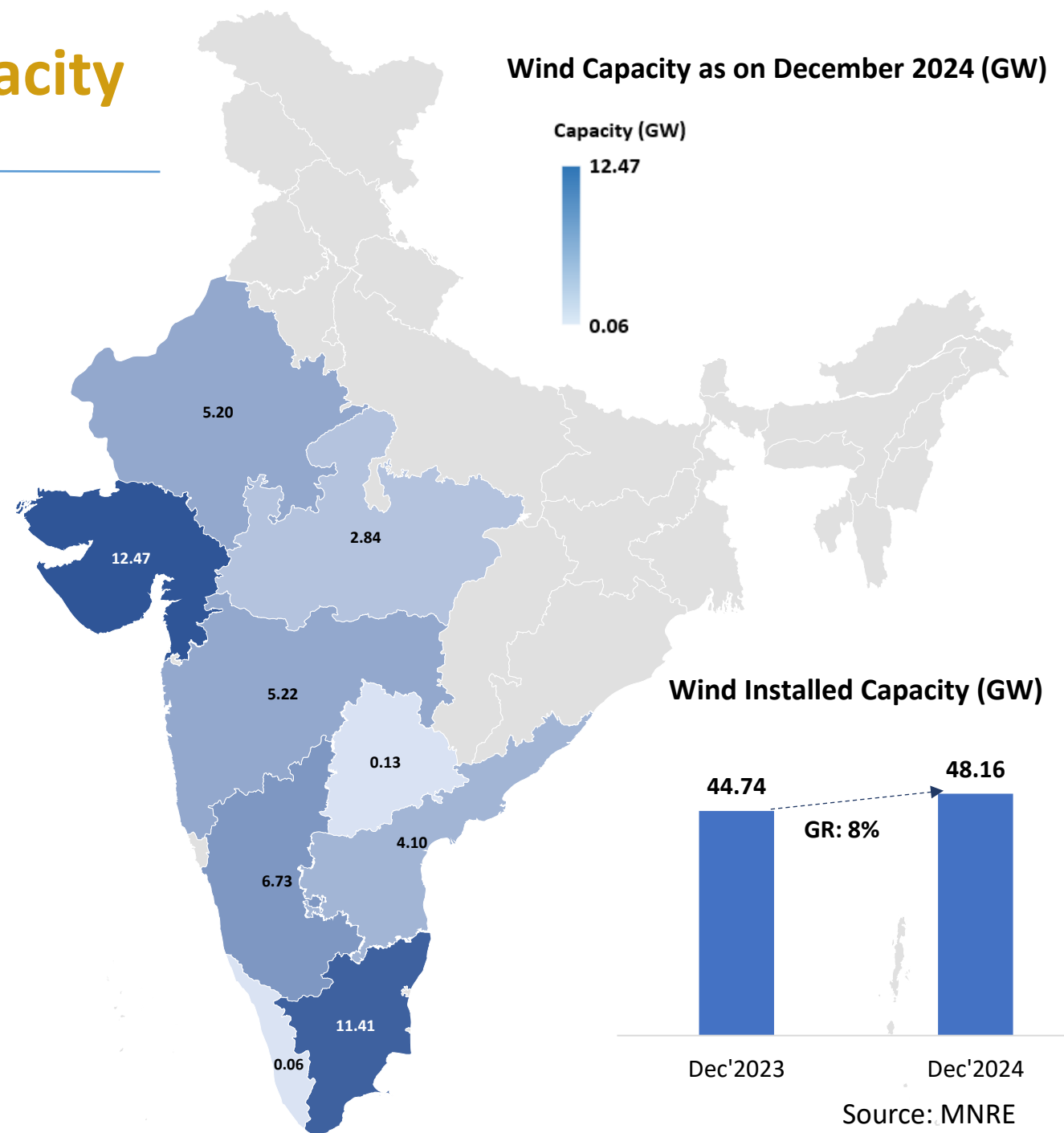
Solar Capacity as on December 2024 (GW)



State-wise Wind Onshore Capacity

as on December 2024

State-wise installed capacity of Wind (Onshore) Power	
States	Installed Capacity (GW)
Gujarat	12.47
Tamil Nadu	11.41
Karnataka	6.73
Maharashtra	5.22
Rajasthan	5.20
Andhra Pradesh	4.10
Madhya Pradesh	2.84
Telangana	0.13
Kerala	0.06
India Total	48.16



RE Potential and Installed Capacity (1/2)

RE potential in the state

Wind Onshore (at 150m agl) and Offshore Potential

Solar Potential

Renewable Energy Potential (all sources incl. large Hydro)

State Potential (GW)

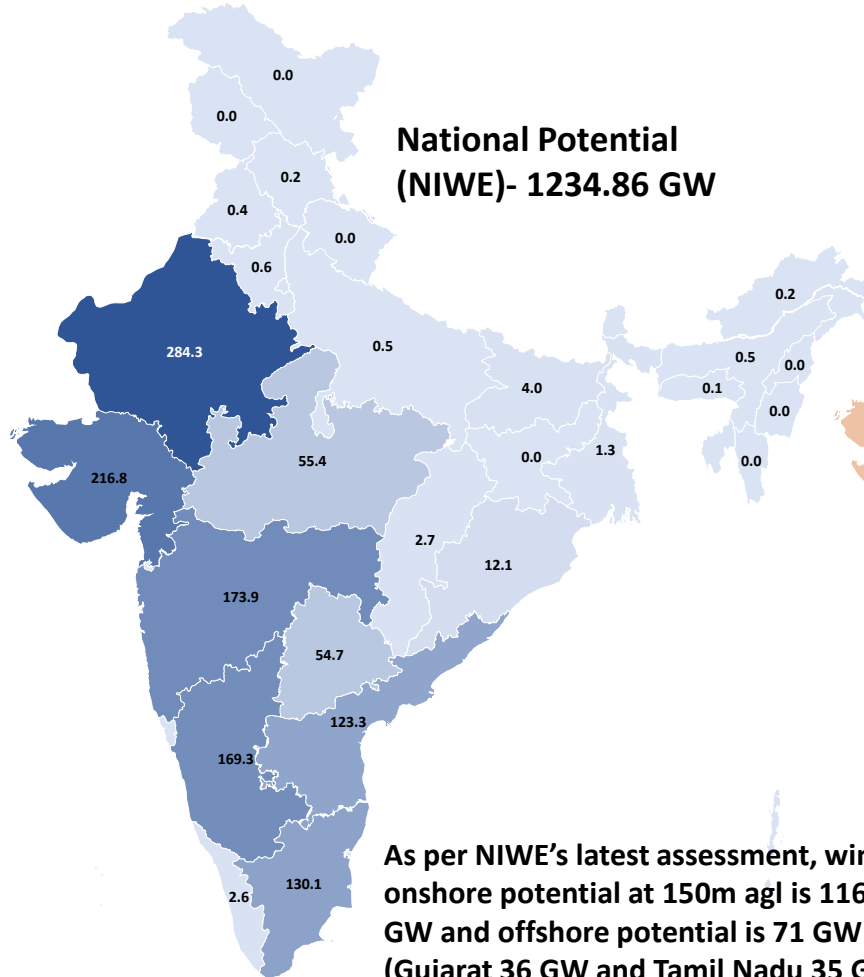
0.0 284.3

State Potential (GW)

0.9 142.3

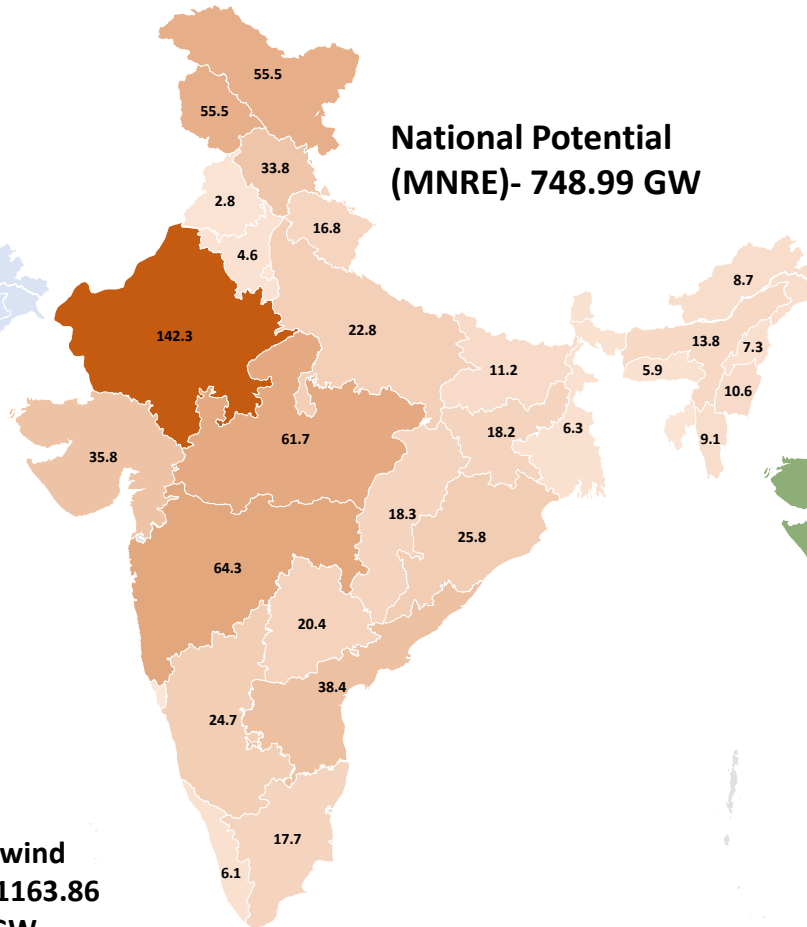
Potential (GW)

0 428



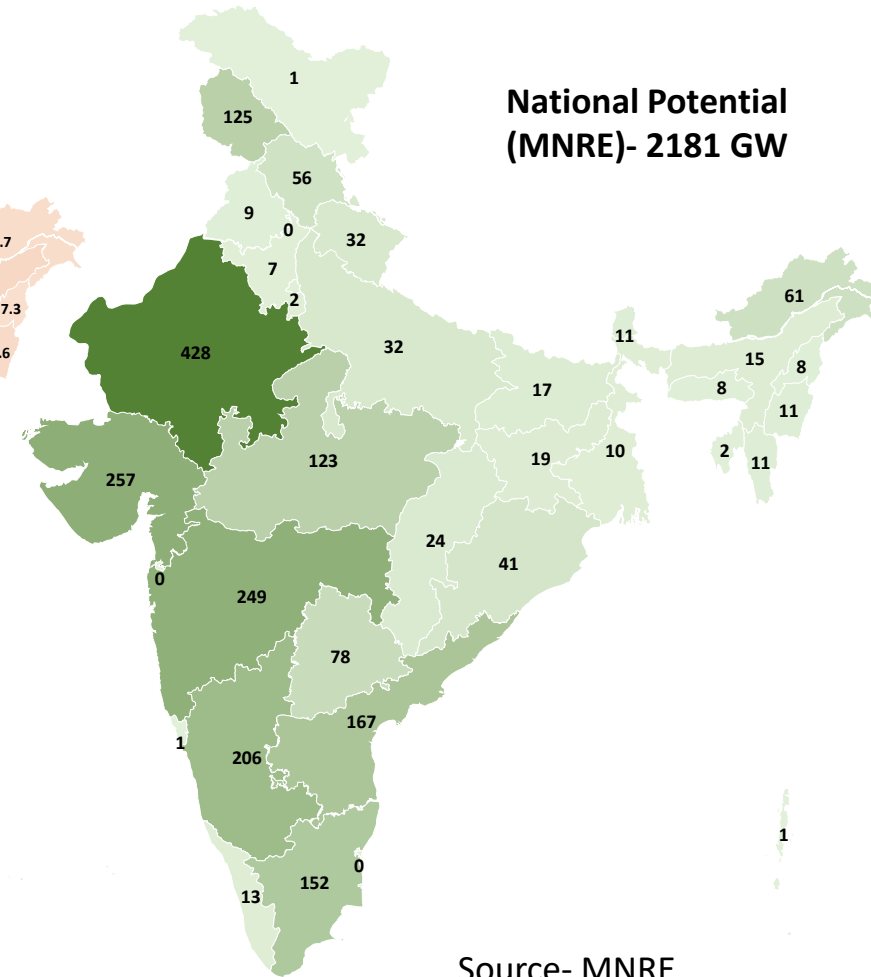
National Potential (NIWE)- 1234.86 GW

As per NIWE's latest assessment, wind onshore potential at 150m agl is 1163.86 GW and offshore potential is 71 GW (Gujarat 36 GW and Tamil Nadu 35 GW).



National Potential (MNRE)- 748.99 GW

Market potential for SPV rooftop is 124 GW.

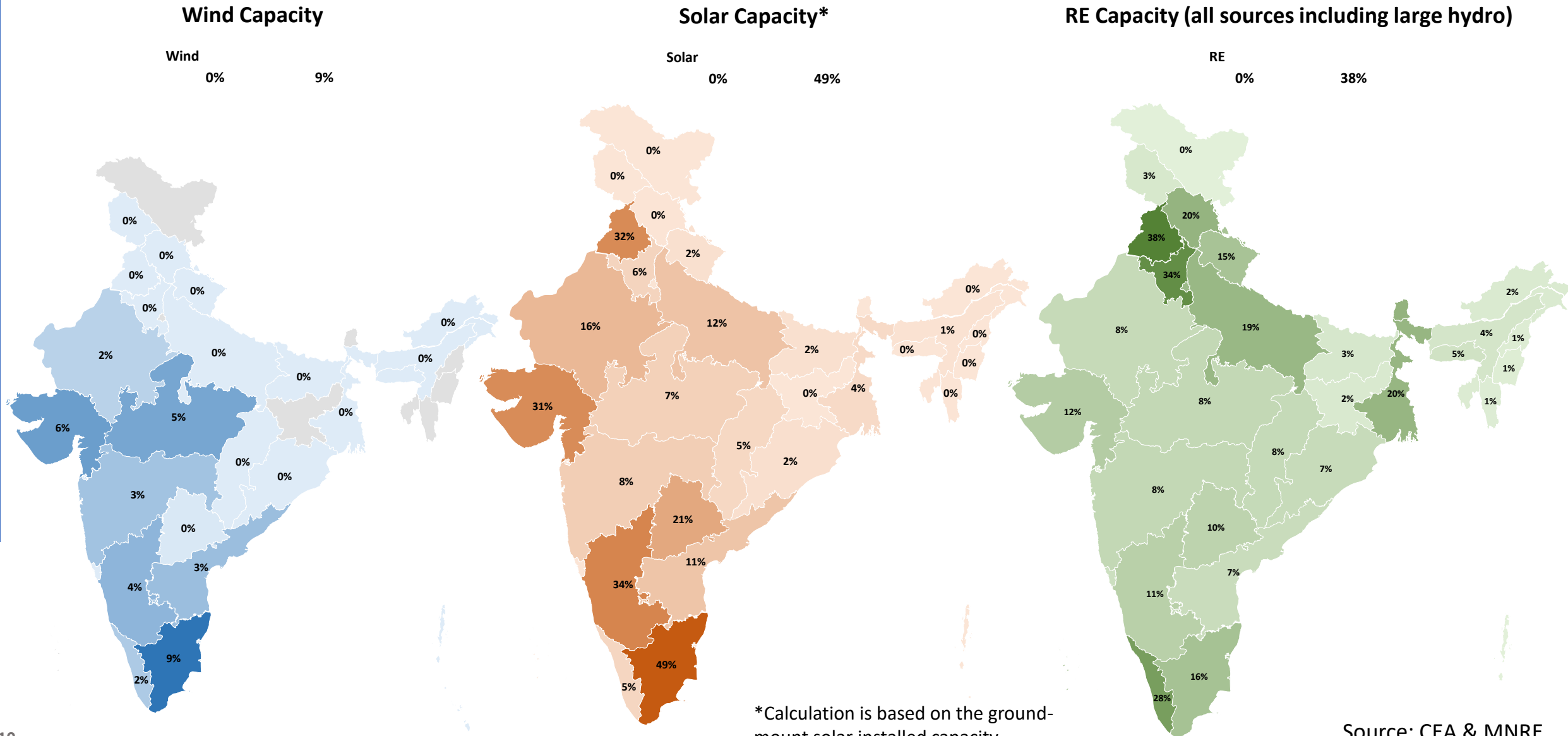


National Potential (MNRE)- 2181 GW

Source- MNRE

Renewable Energy (RE) Potential and Installed Capacity (2/2)

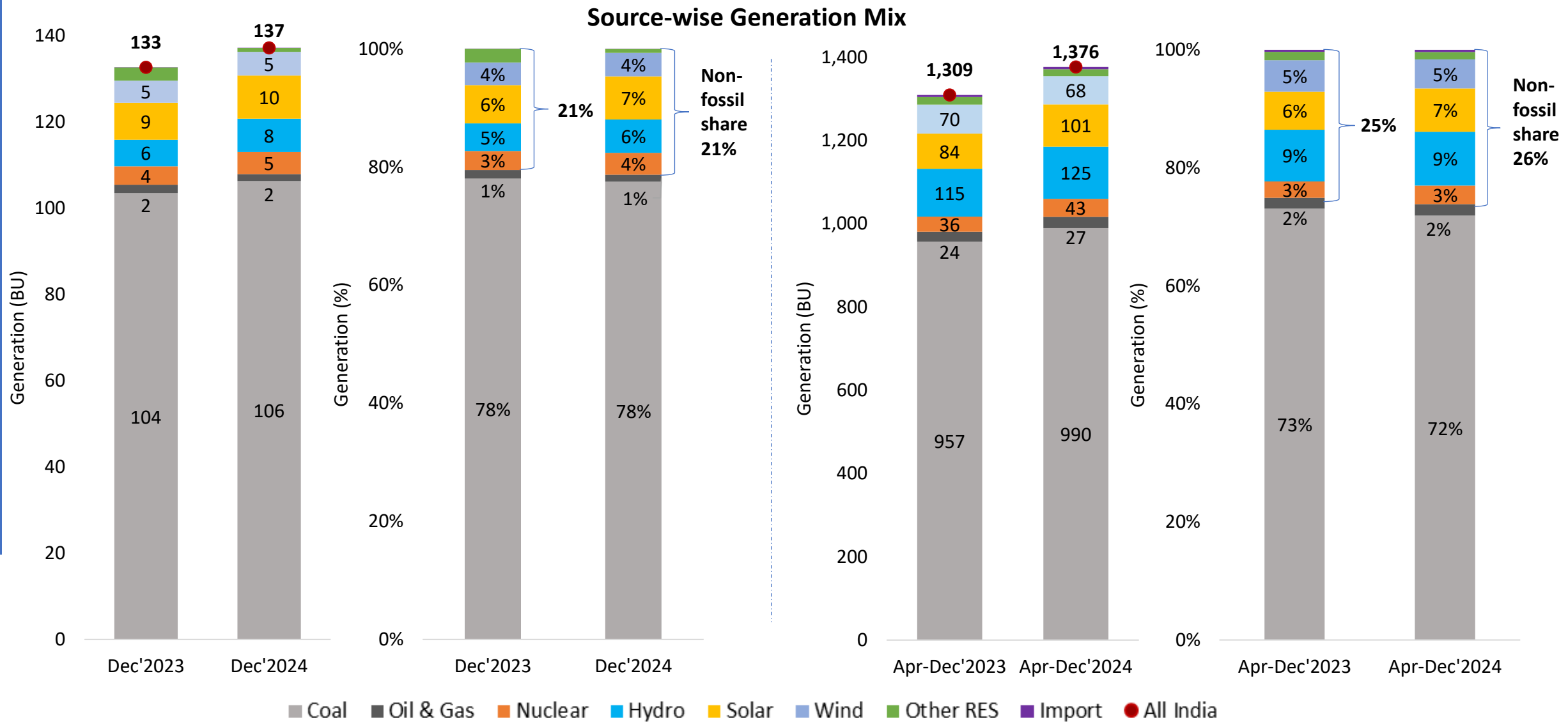
RE Installed capacity as a Percentage of the total resource potential in the state as on December 2024



*Calculation is based on the ground-mount solar installed capacity.

Source: CEA & MNRE

India's Electricity Generation Mix

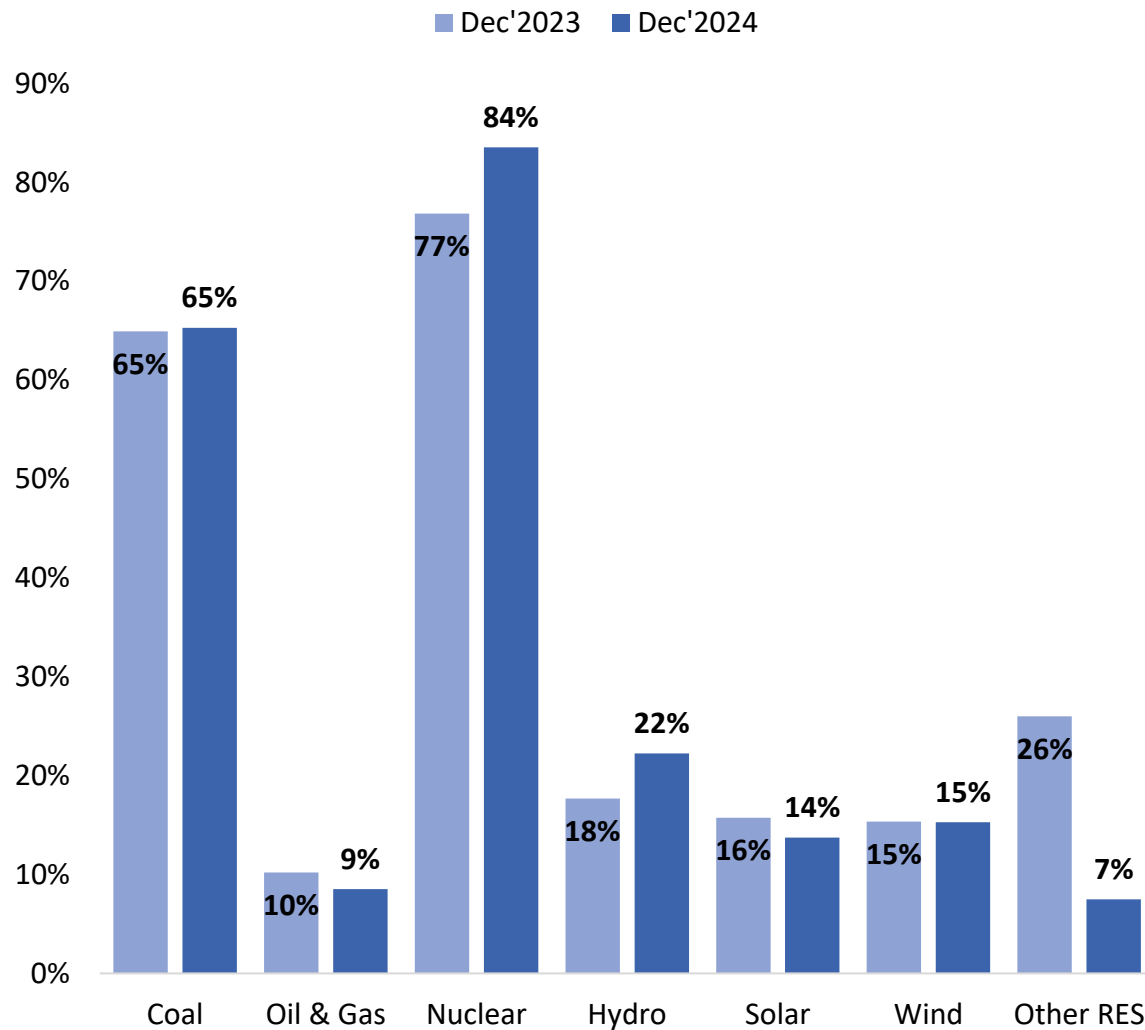


NOTE: The generation data for December'2024 is provisional.

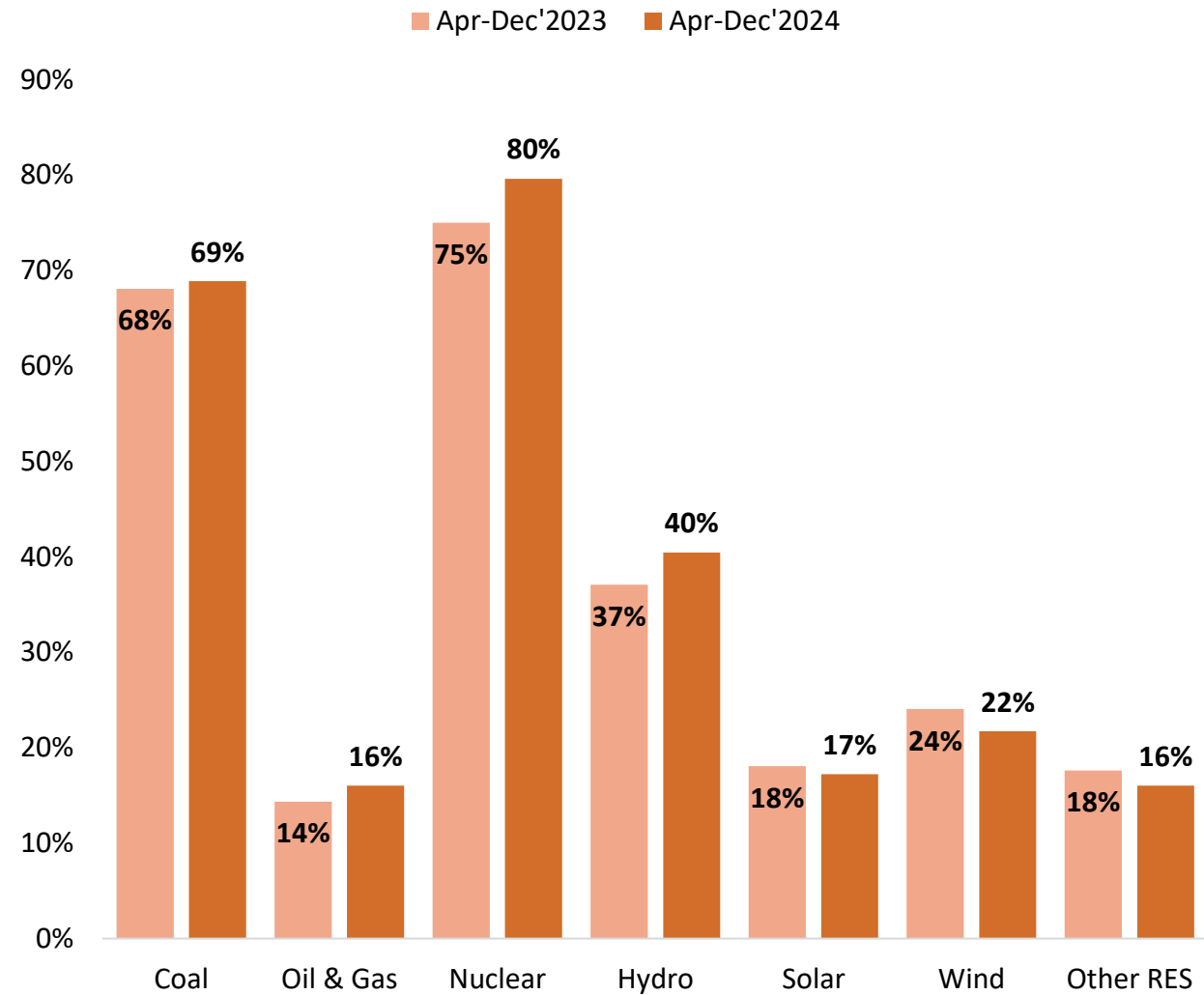
Source: CEA

Source-wise PLF/CUF

Source-wise PLF/ CUF in December (%)



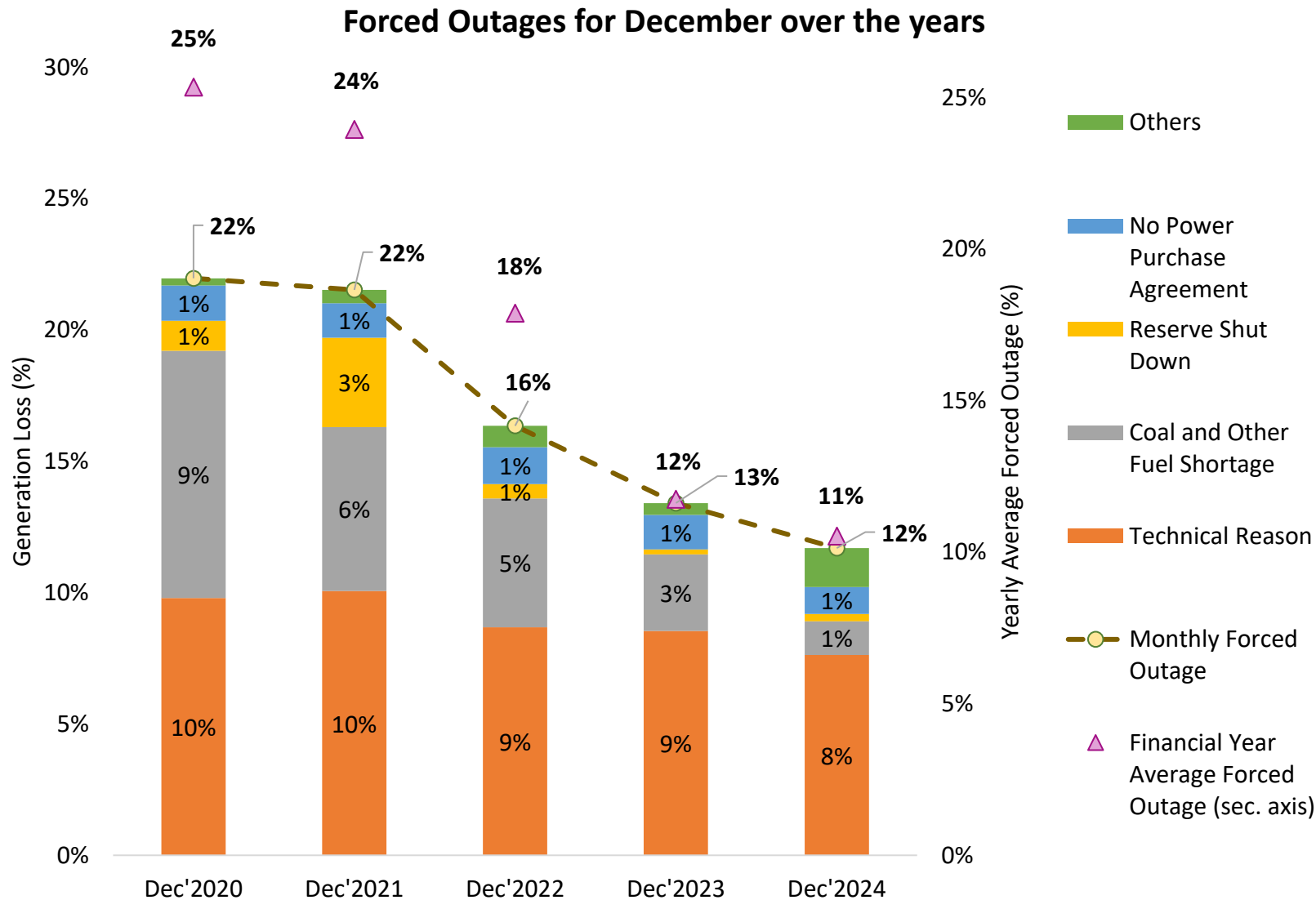
Source-wise PLF/ CUF Comparison (%)



NOTE: The PLF/CUF data is based on provisional generation for December'2024.

Source: CEA & MNRE

Thermal Generation Loss and Reasons for Forced Outages



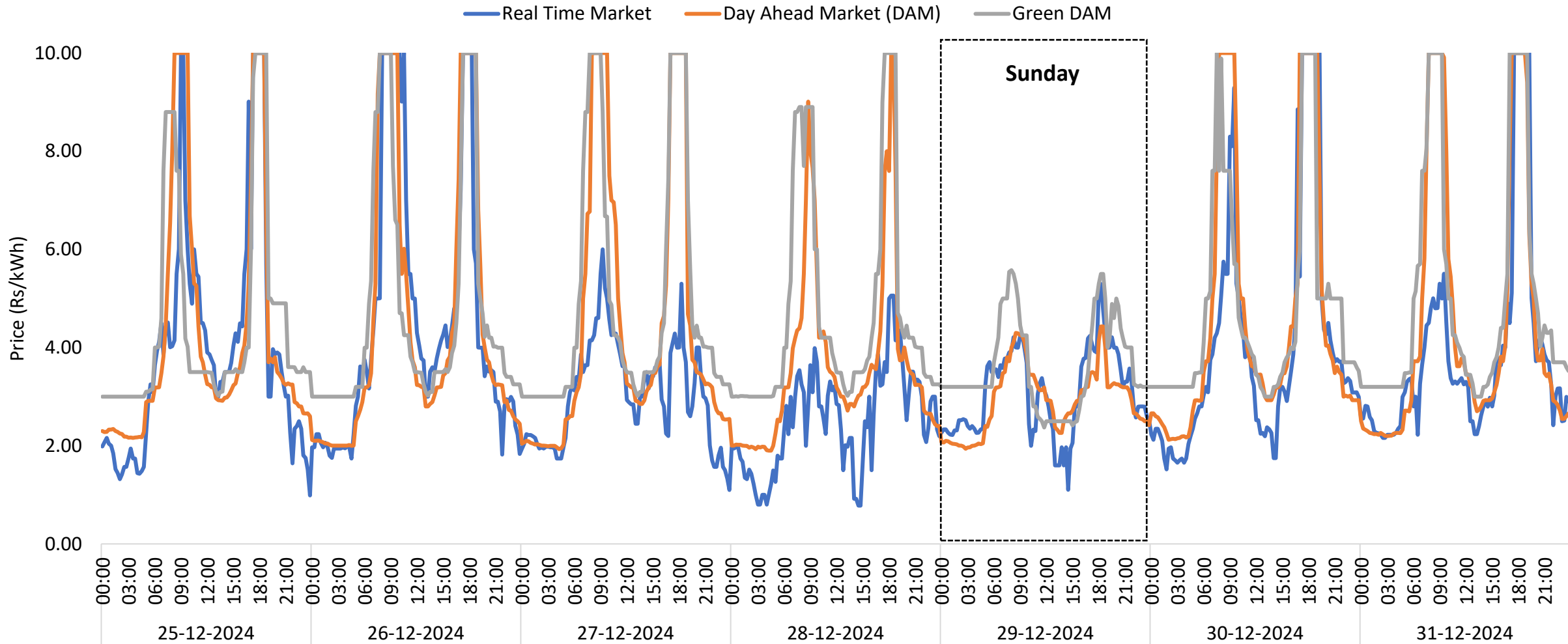
Year/ Month		Average Forced Outage Share
Yearly	FY 2022-23	18%
	FY 2023-24	12%
	FY 2024-25 (up to Dec'2024)	11%
Monthly	Dec'2022	16%
	Dec'2023	13%
	Dec'2024	12%

Thermal includes only Coal and Lignite Plants.

Source: ICED

Indian Electricity Exchange (IEX) Market Snapshot

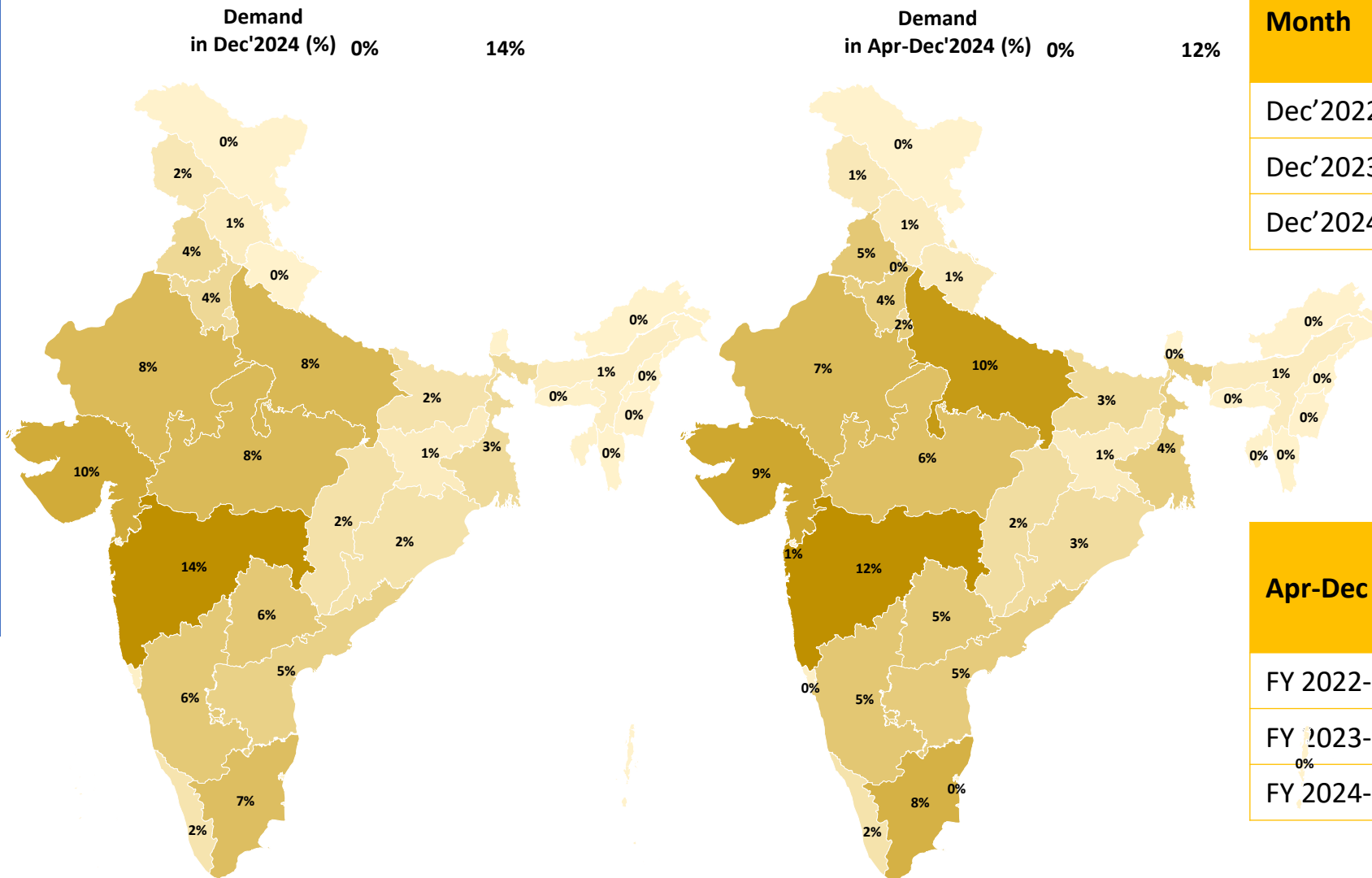
Market Clearing Prices of last 7 days of December 2024



In April 2023, CERC revised the price ceiling from ₹12/kWh to ₹10/kWh in the power exchange market.

National and State level Electricity Demand

State-level Electricity Demand as a percent of National Demand (%)



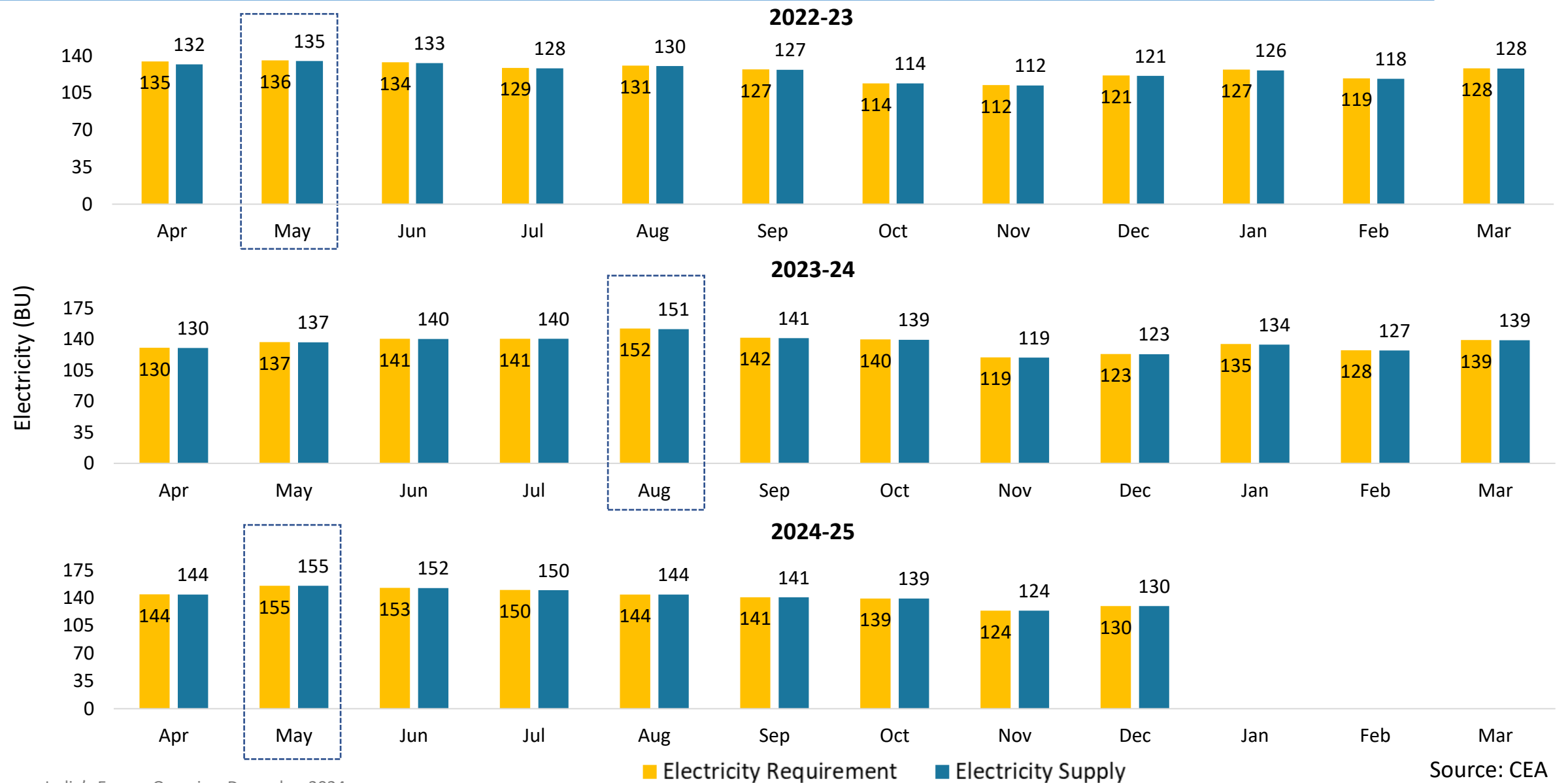
Month	Electricity Demand (BU)	Electricity Supply (BU)	Gap (BU) (+/-)
Dec'2022	121	121	0.4
Dec'2023	123	123	0.1
Dec'2024	130	130	0.1

Apr-Dec	Electricity Demand (BU)	Electricity Supply (BU)	Gap (BU) (+/-)
FY 2022-23	1,139	1,133	6
FY 2023-24	1,225	1,222	3
FY 2024-25	1,280	1,279	1

NOTE: The demand represented above includes intra state T&D losses.

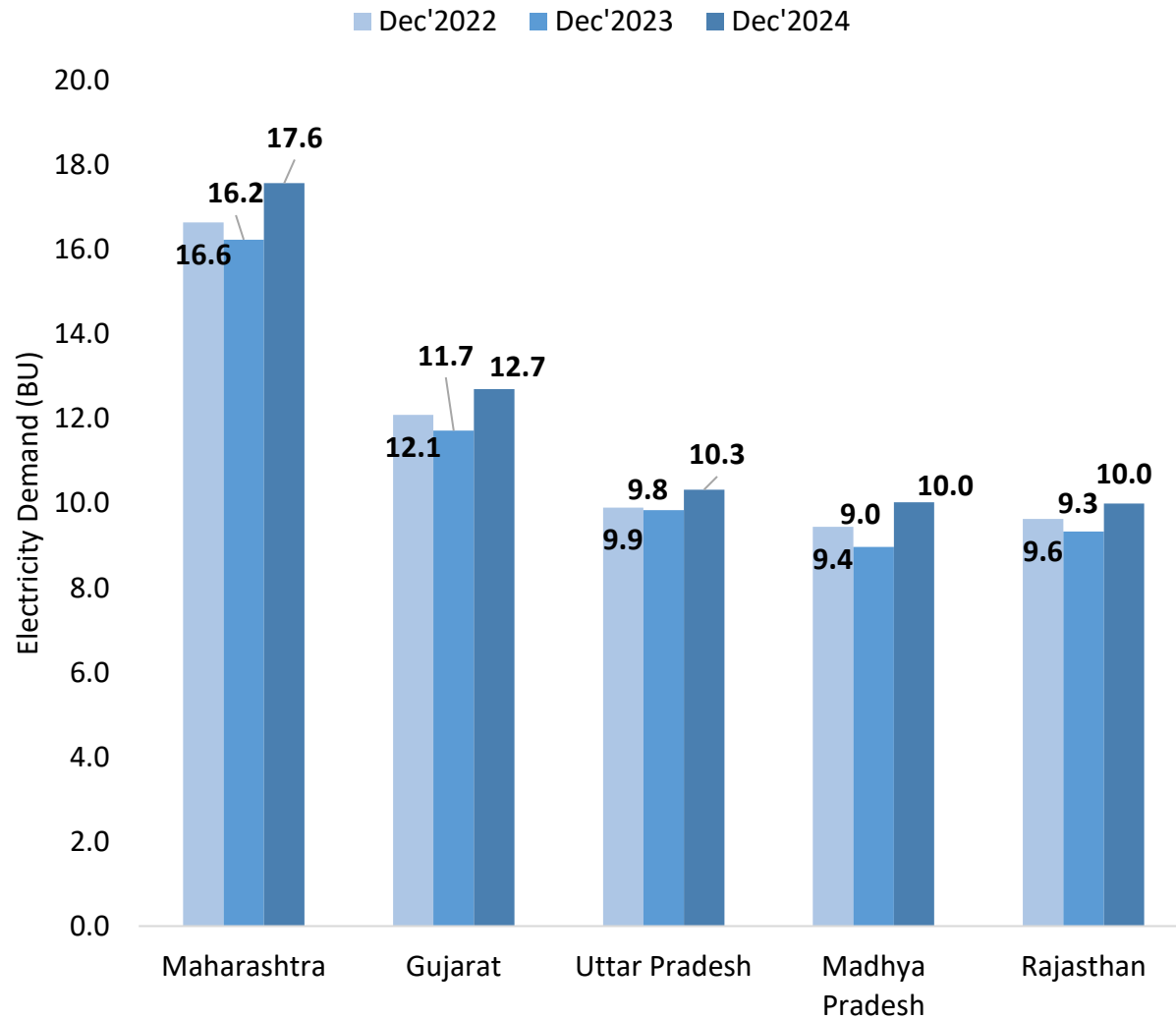
Source: CEA

India's Monthly Electricity Requirement and Supply

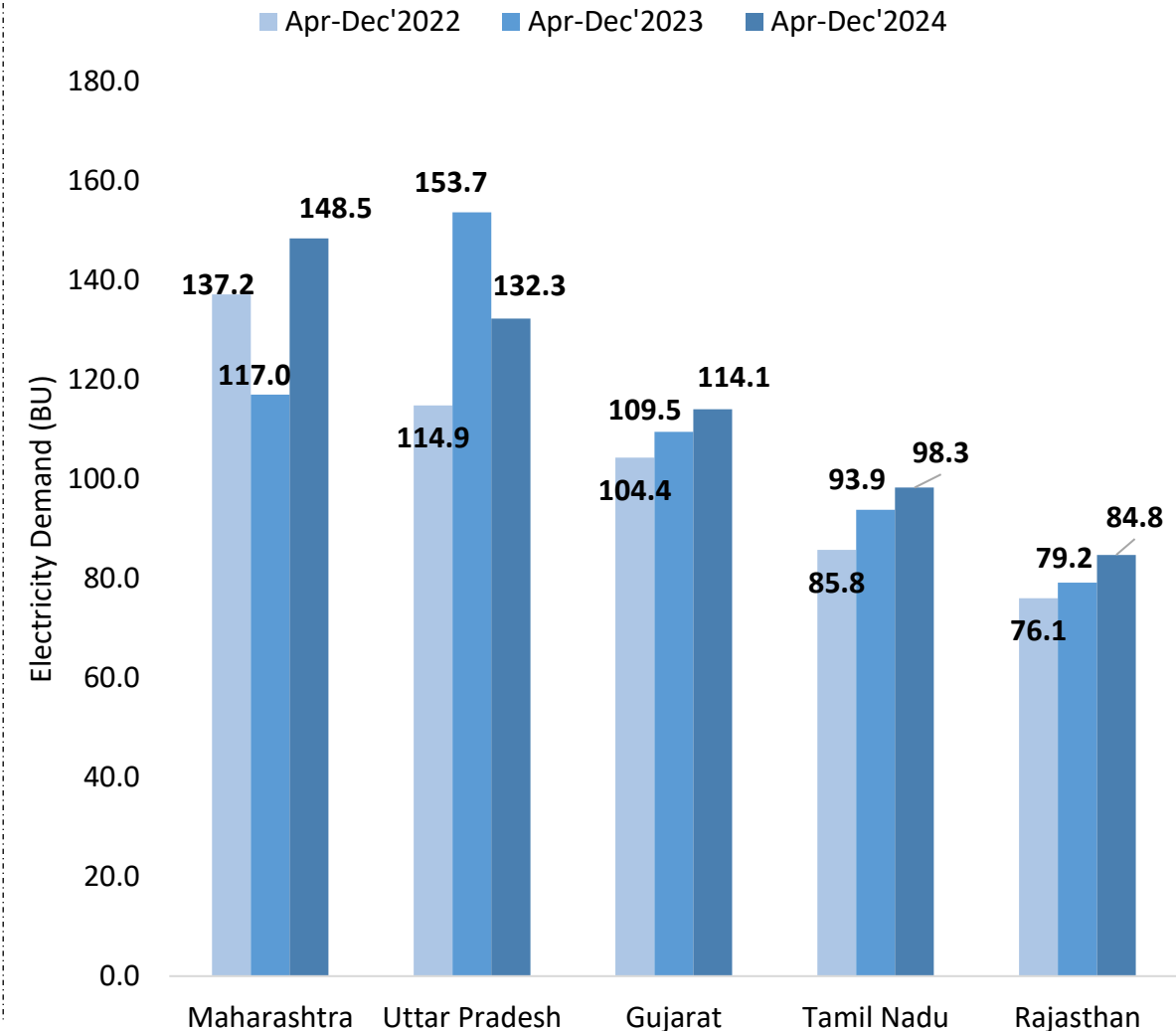


Monthly Electricity Demand of the top 5 states

States with Highest Electricity Demand in December (BU)



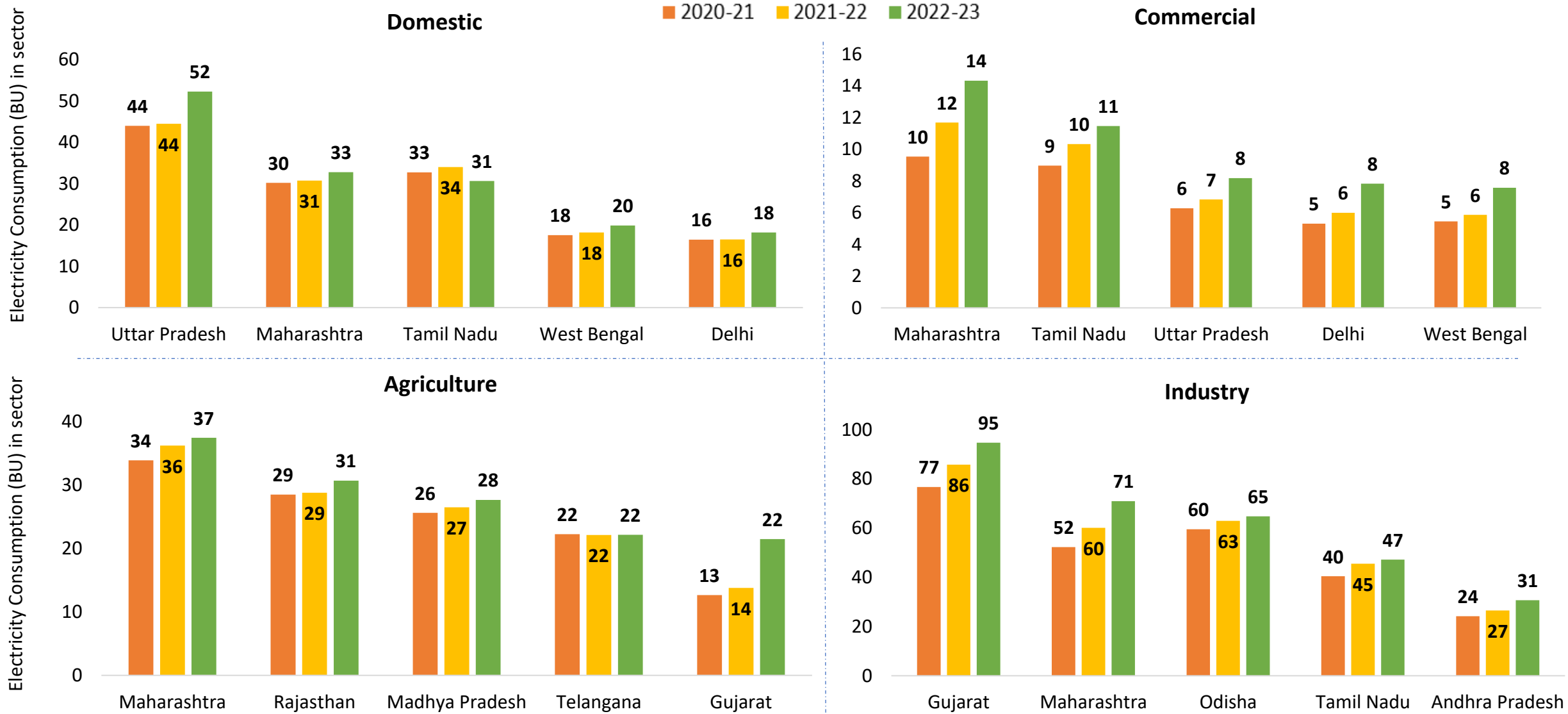
States with Highest Electricity Demand (BU)



Note: The electricity demand data for December'24 is Provisional.

Source: CEA

Electricity Consumer-category wise top 5 States

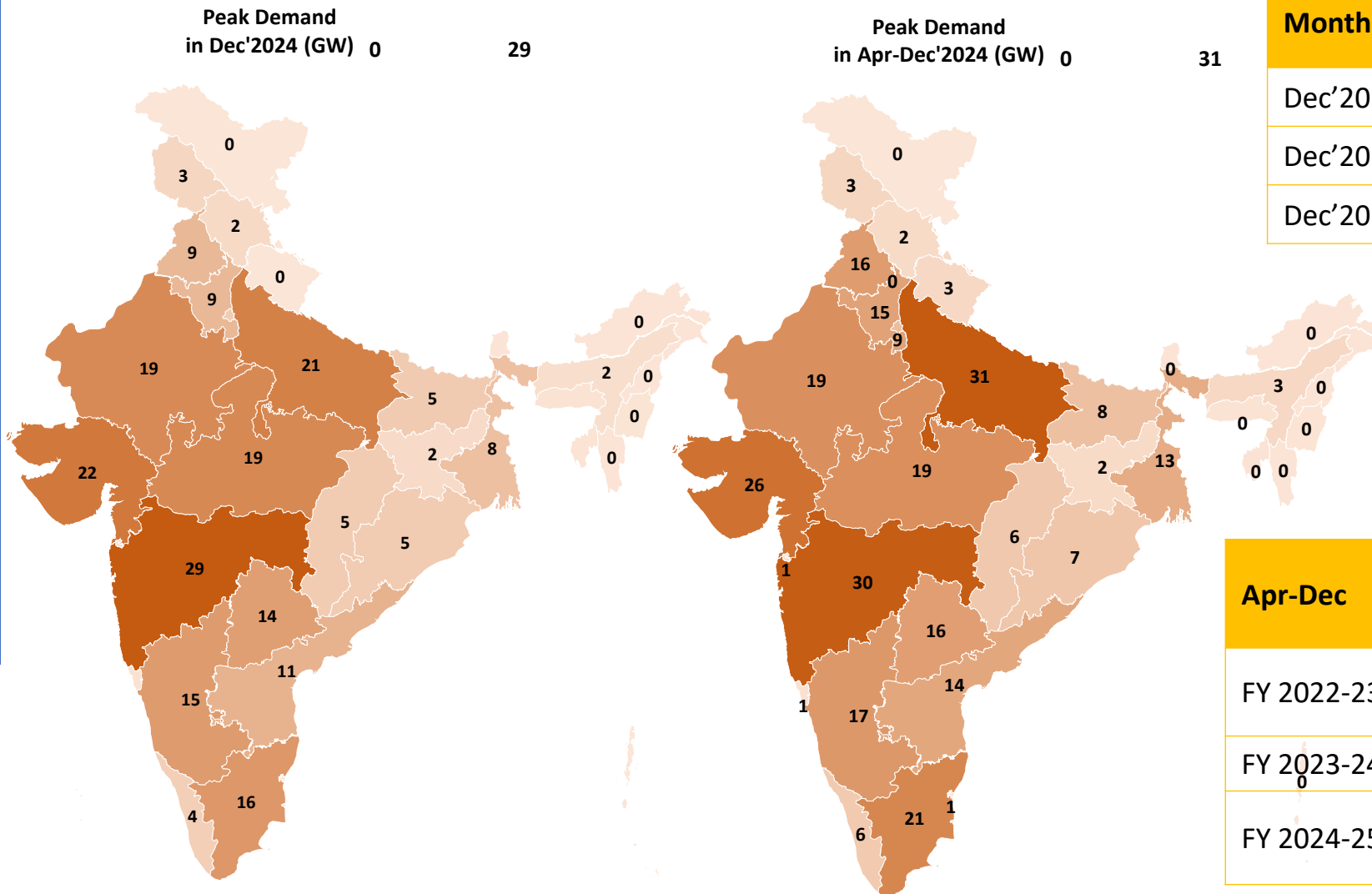


NOTE: Top 5 States under consumer-categories are selected on the basis of 2022-23

Source: CEA

National and State level Peak Electricity Demand

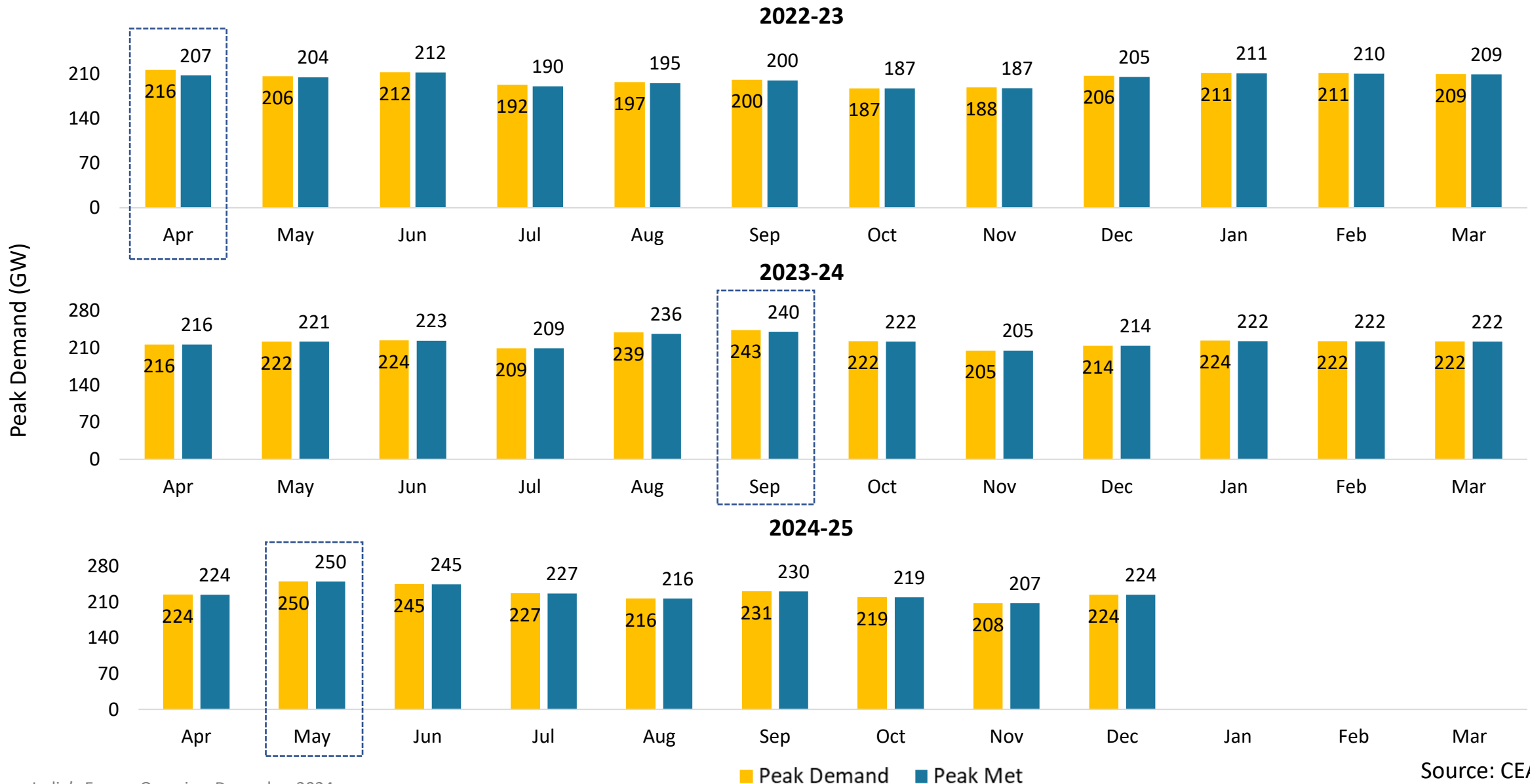
State-level Peak Electricity Demand (GW)



Month	Peak Demand (GW)	Peak Supply (GW)	Gap(GW) (+/-)
Dec'2022	206	205	1.4
Dec'2023	214	214	0.2
Dec'2024	224	224	0.02

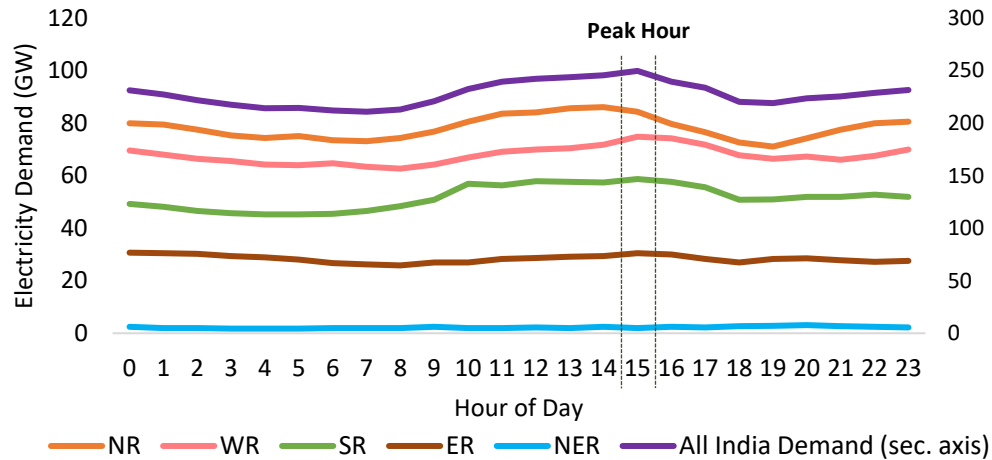
Apr-Dec	Peak Demand (GW)	Peak Supply (GW)	Gap (GW) (+/-)
FY 2022-23	216	207	8.7
FY 2023-24	243	240	3.3
FY 2024-25	250	250	0.0

India's Monthly Peak Electricity Demand and Supply

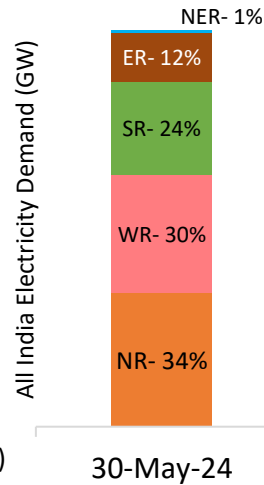


All India, Regional, and Seasonal Electricity Demand Curve of Peak Demand Day

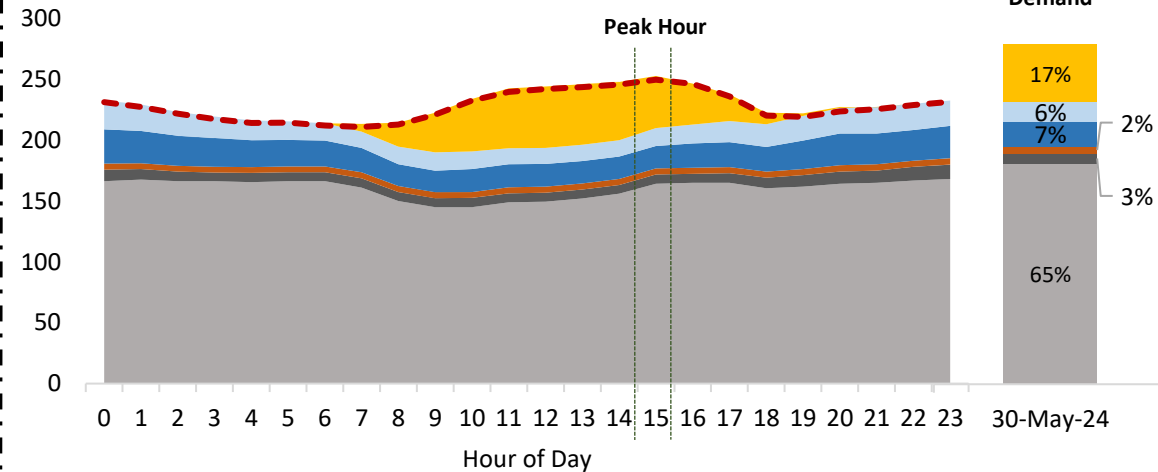
Hourly Demand Curve of Peak Demand Day in 2024-25
(30th May 2024)



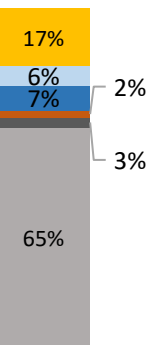
Share of Regions in All India Peak Demand



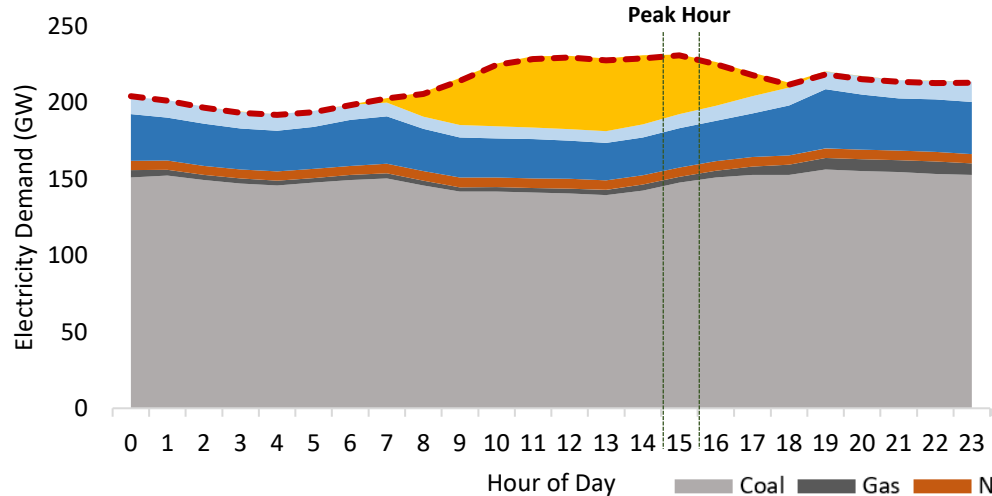
India's Electricity Demand Curve of Peak Demand Day in Summer Season (Mar-Jun'24) (30th May 2024)



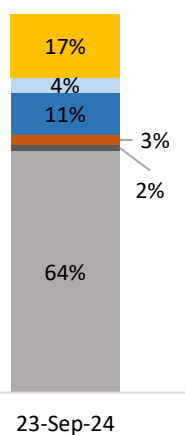
Share of Supply Sources in Peak Demand



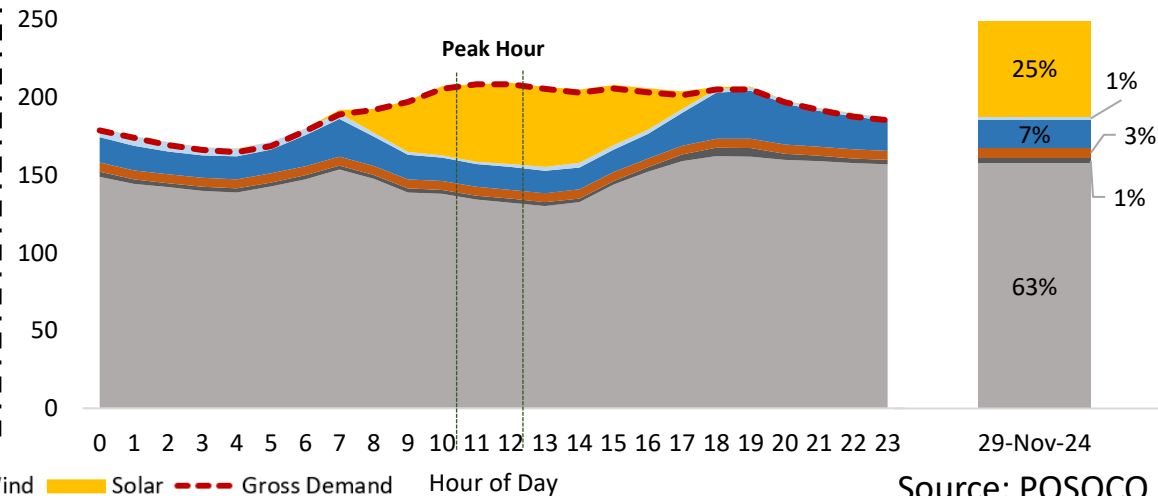
India's Electricity Demand Curve of Peak Demand Day in Monsoon Season (Jul-Oct'24) (23rd Sept 2024)



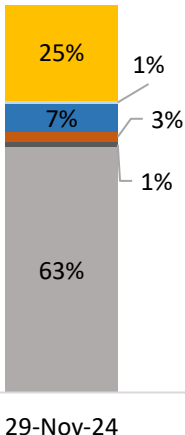
Share of Supply Sources in Peak Demand



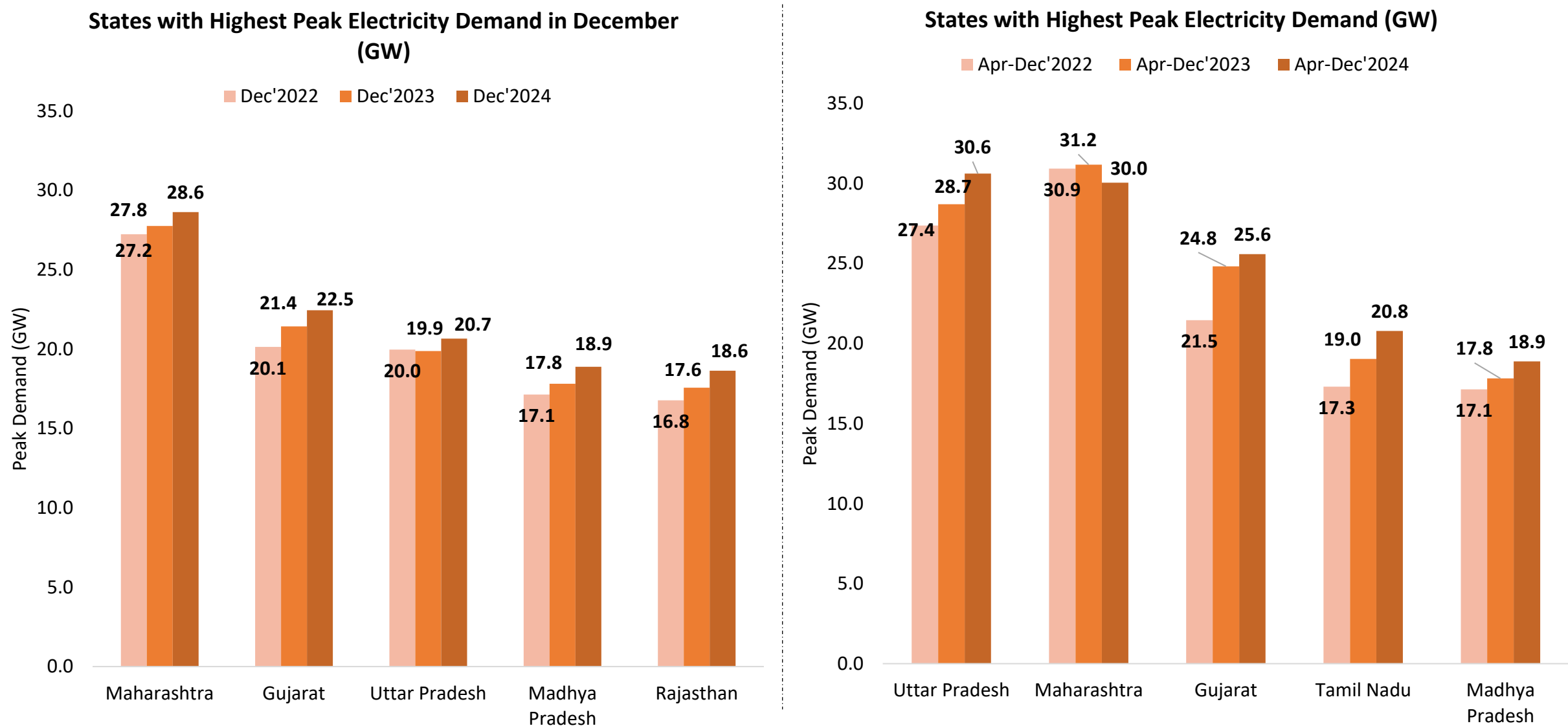
India's Electricity Demand Curve of Peak Demand Day in Winter Season (Nov'24) (29th Nov 2024)



Share of Supply Sources in Peak Demand



Monthly Peak Electricity Demand of the top 5 states

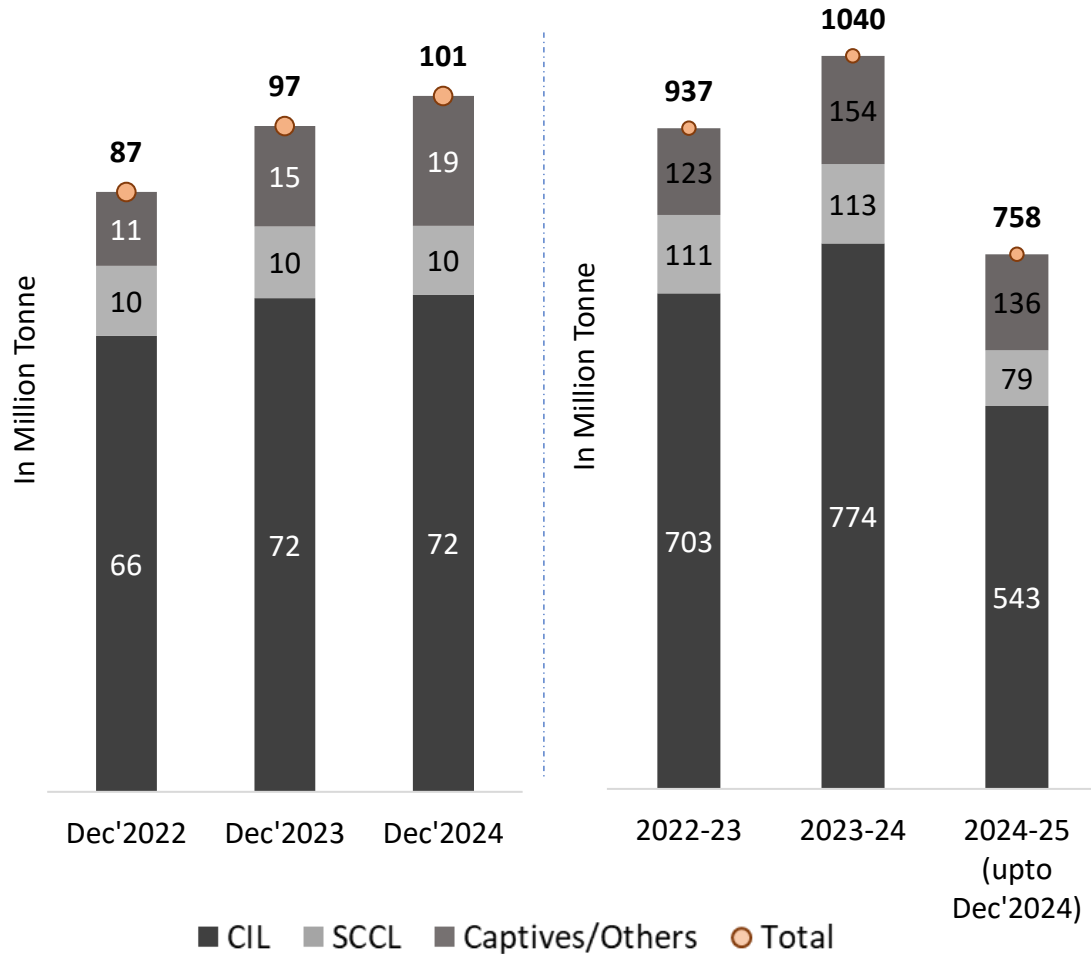


Note: The peak electricity demand data for December'24 is Provisional.

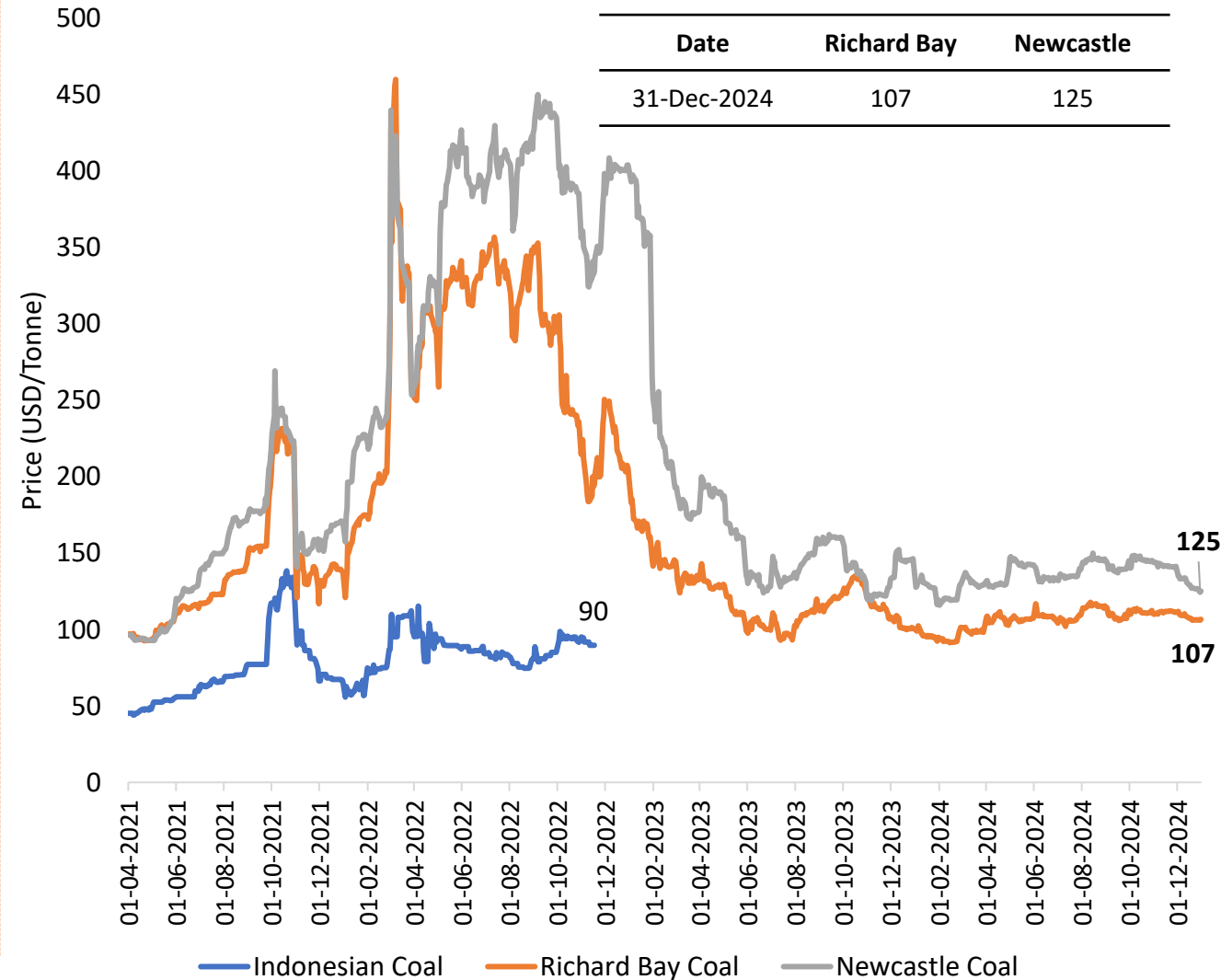
Source: CEA

Monthly Coal Statistics

Monthly/ Annual Coal (incl. Lignite) Production (in Million Tonnes)



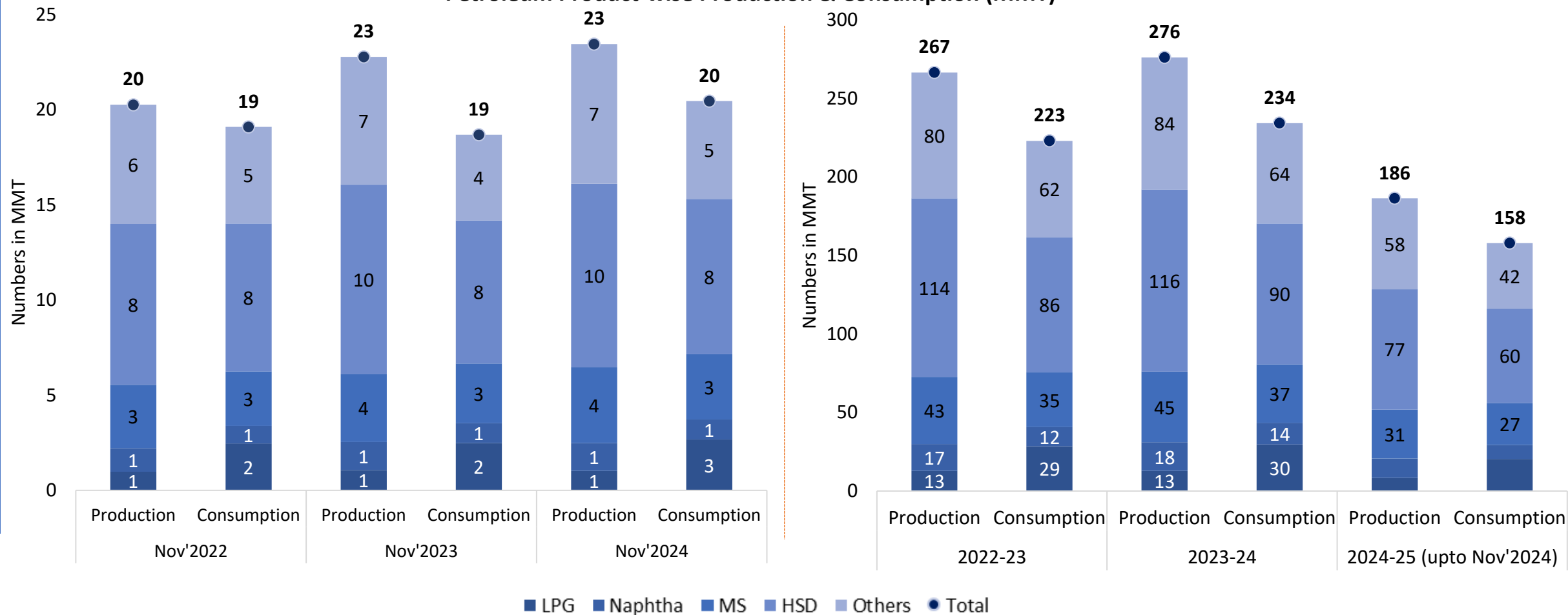
International Coal Prices



Source: Ministry of Coal

Petroleum Products Market Scenario (1/3)

Petroleum Product-wise Production & Consumption (MMT)



Others include ATF, SKO, LDO, Lubes, FO, LSHS, Bitumen, pet coke, and others.

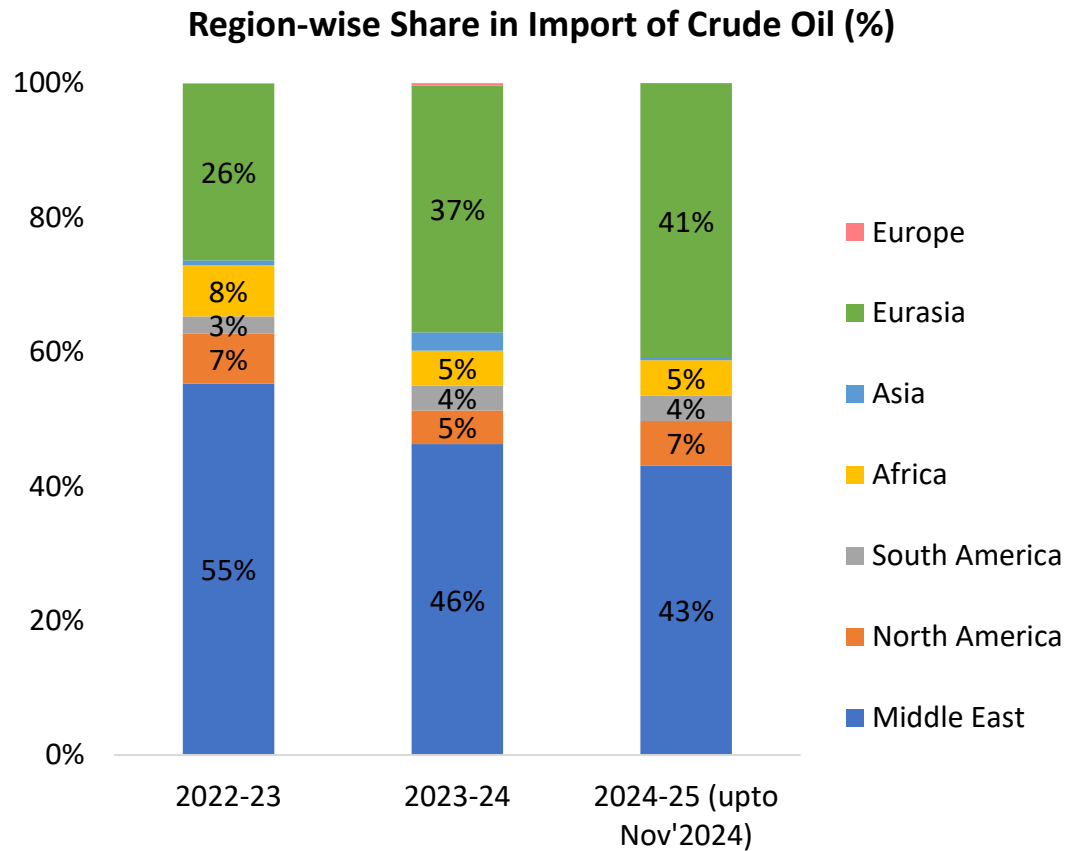
Abbreviations: ATF- Aviation Turbine Fuel, FO- Furnace Oil, HSD- High-Speed Diesel, LDO- Light Diesel Oil, MS- Motor Spirit (Petrol), SKO- Superior Kerosene Oil, LSHS- Low Sulphur Heavy Stock, LPG- Liquefied Petroleum Gas, MMT- Million Metric Tonne

Petroleum Products Market Scenario (2/3)

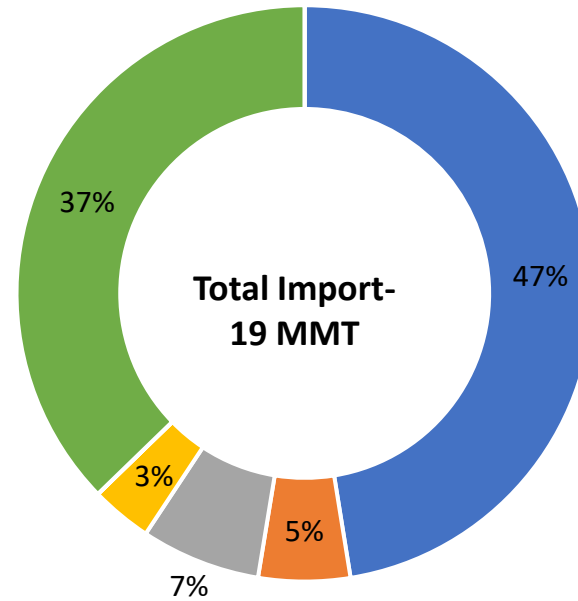
Import/Export of Crude Oil and Petroleum Products ('000 Tonnes)							
Petroleum Products	Import/ Export	Monthly			Yearly		
		Nov'22	Nov'23	Nov'24	2022-23	2023-24	2024-25 (upto Nov'2024)
Crude Oil	Import	19,003	18,593	19,072	2,32,700	2,34,262	1,59,438
	Export	0	0	0	0	0	0
	Net Import	19,003	18,593	19,072	2,32,700	2,34,262	1,59,438
LPG	Import	1,778	1,721	1,964	18,335	18,514	13,802
	Export	42	44	44	540	525	354
	Net Import	1,736	1,677	1,920	17,796	17,989	13,448
Diesel	Import	7	2	3	322	42	22
	Export	1,979	2,834	2,289	28,494	28,204	17,596
	Net Import	-1,972	-2,833	-2,285	-28,172	-28,162	-17,574
Petrol	Import	211	71	0	1,069	717	235
	Export	843	872	1,240	13,127	13,472	9,541
	Net Import	-631	-801	-1,240	-12,058	-12,755	-9,306
Others	Import	2,046	2,204	2,458	24,871	29,419	19,877
	Export	1,404	1,900	1,769	18,854	20,391	14,606
	Net Import	642	304	689	6,017	9,029	5,271

*Others include ATF, Naphtha, SKO, LDO, Lubes, FO, LSHS, Bitumen, pet coke, and others.

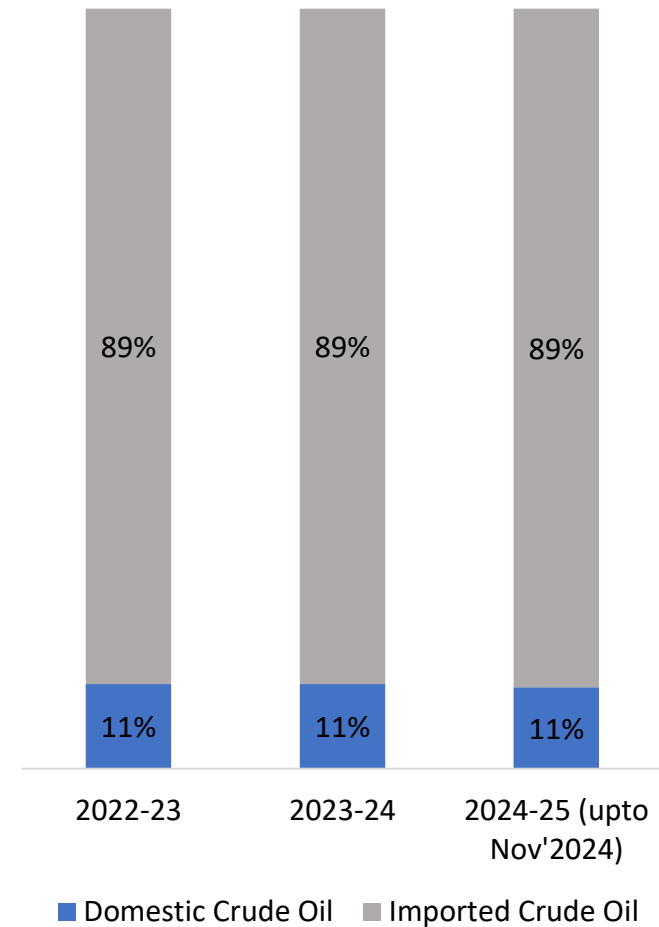
Petroleum Products Market Scenario (3/3)



Regional share of Imported Crude oil in November 2024 (P)



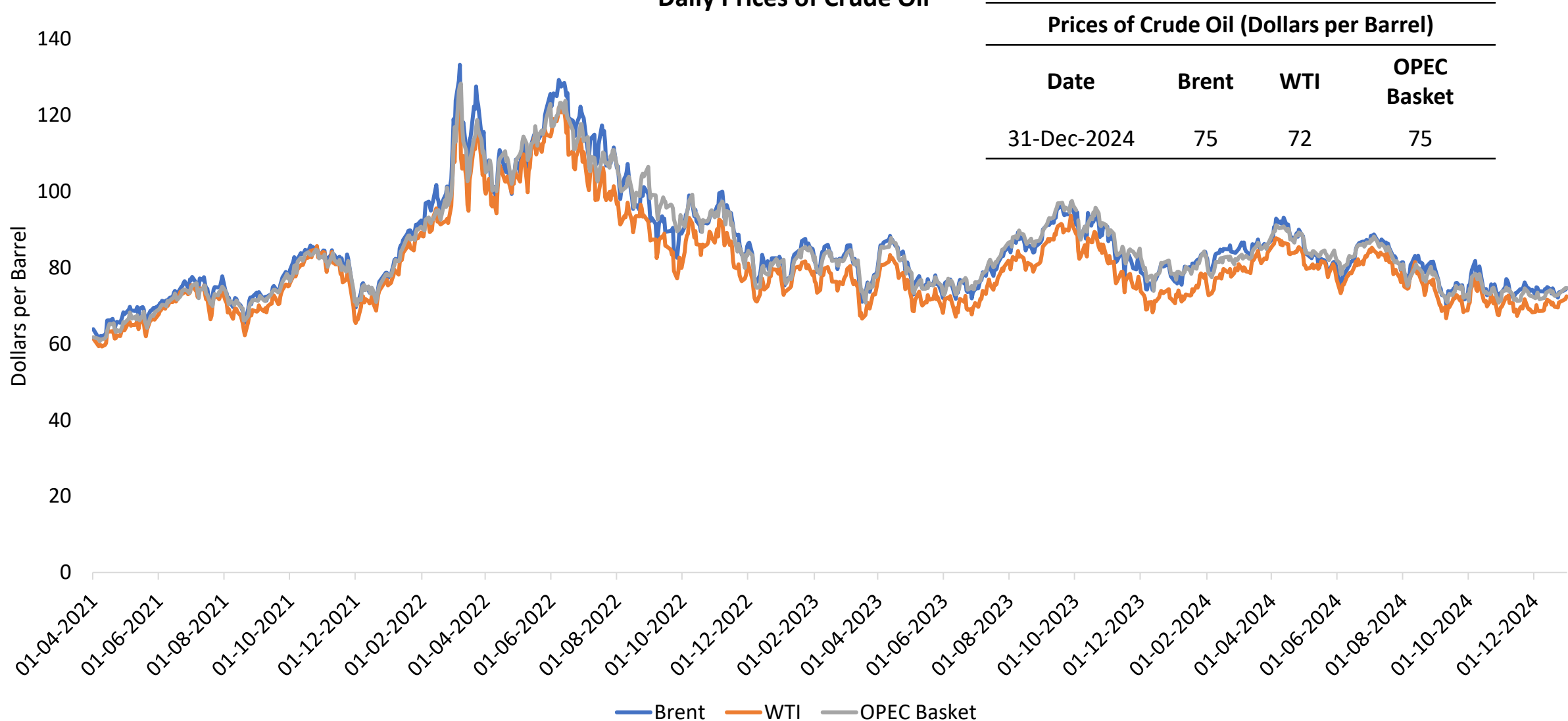
Domestic and Imported Crude Oil share in India (%)



Total Import of Crude Oil (MMT)			
Total Import	2022-23	2023-24	2024-25 (up to Nov'2024)
Crude Oil	233	234	159

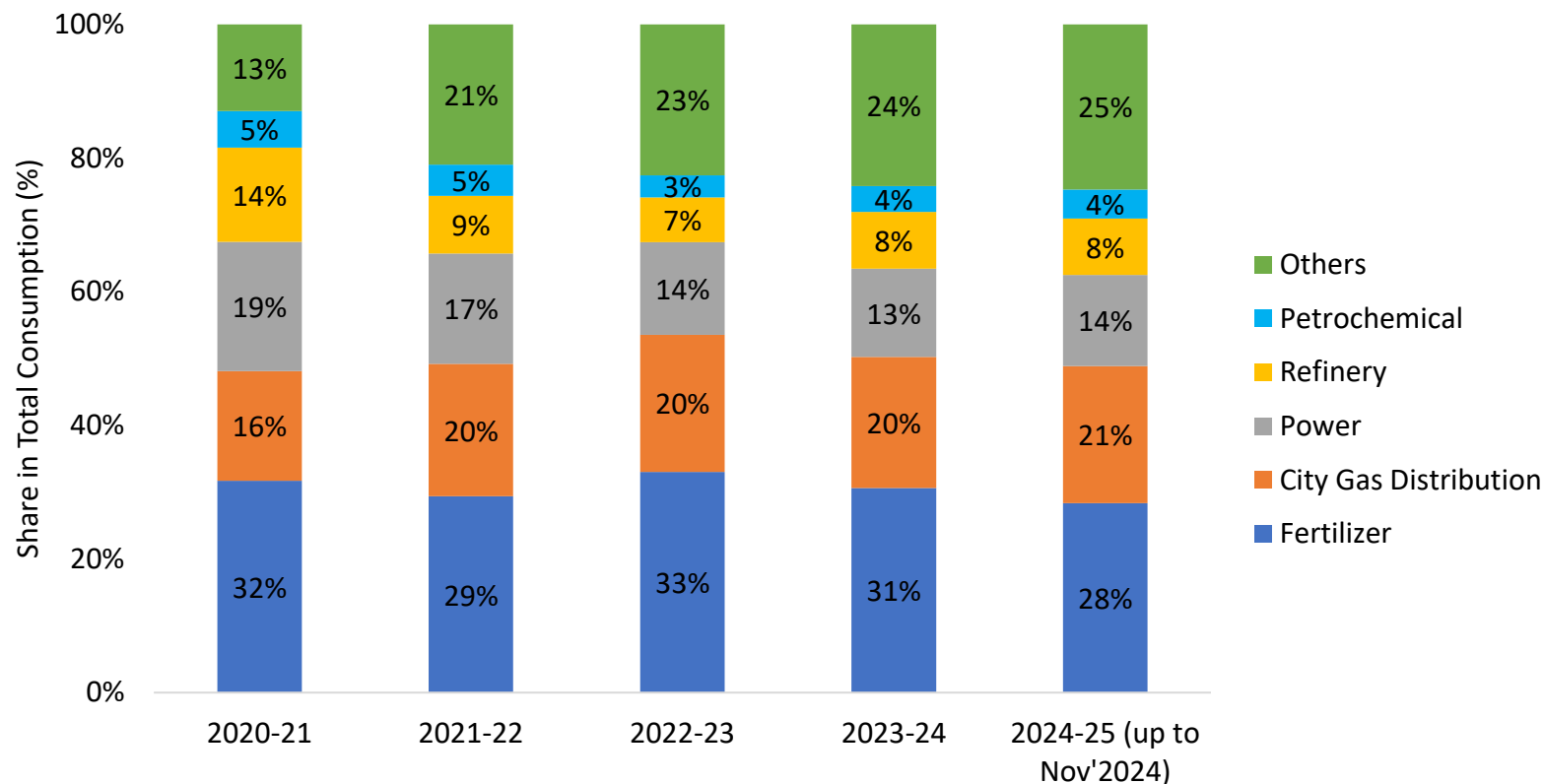
Daily Prices of Crude Oil

Daily Prices of Crude Oil

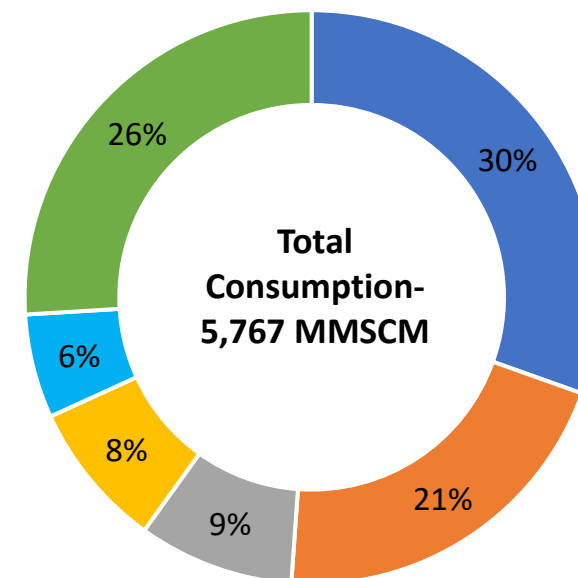


Gas Market Scenario (1/2)

Sector-wise Share in Natural Gas Consumption



Sector-wise share in Natural Gas Consumption in November 2024



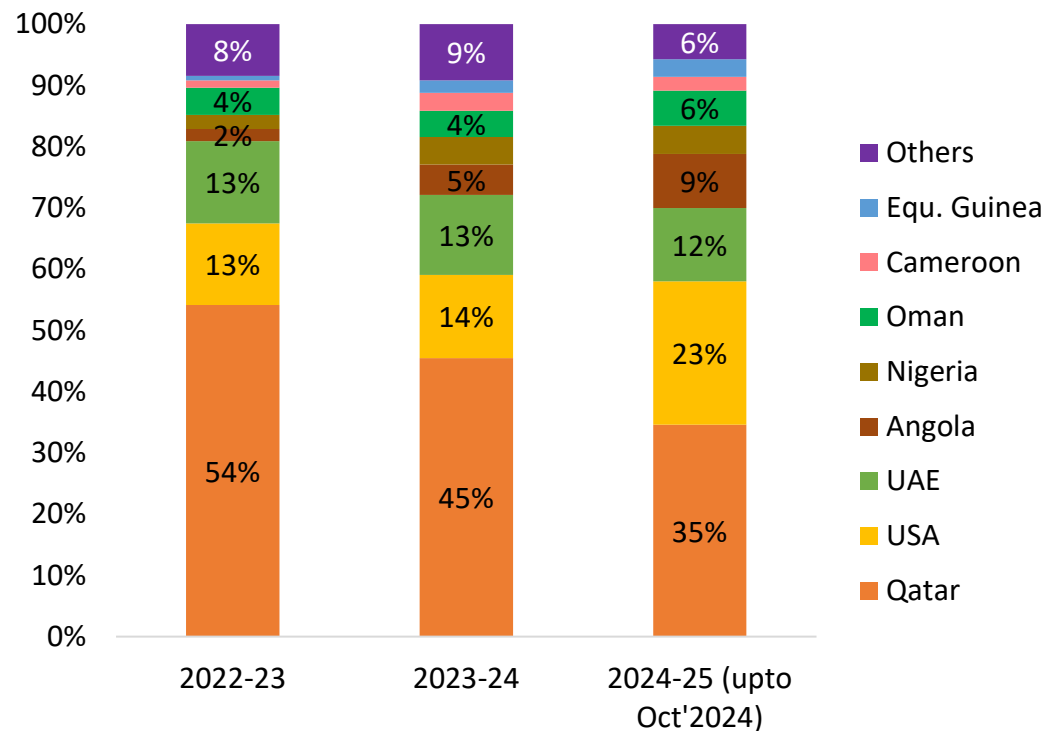
Others include- Internal Combustion of Pipeline System, Industrial, Sponge iron/steel, LPG shrinkage, Manufacturing, Agriculture (tea plantation), Others

Total Consumption of Natural Gas (NG) (MMSCM)

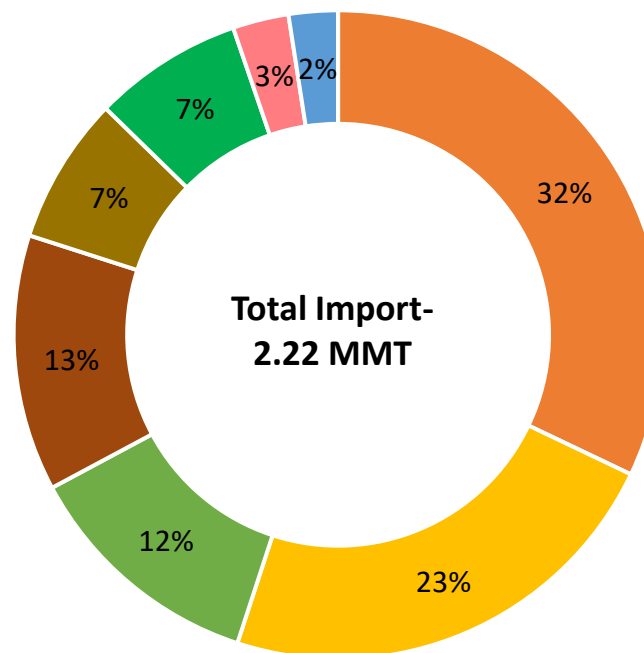
Total Consumption	2020-21	2021-22	2022-23	2023-24	2024-25 (up to Nov'2024)
NG	56,116	61,491	58,702	68,759	48,439

Gas Market Scenario (2/2)

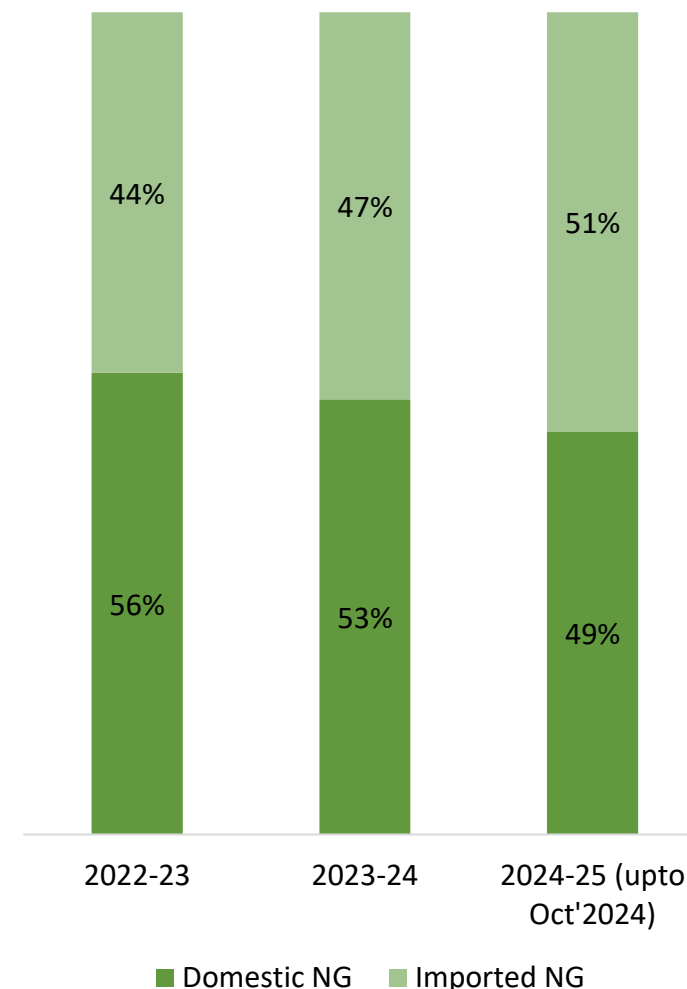
Region-wise Share in Import of LNG (%)



Country Share of Imported LNG in October'2024



Domestic and Imported Natural Gas share in India (%)



Others include- Trinidad, Cameroon, Egypt, France, Algeria, Belgium, Indonesia, Turkey, Russia, Spain, Malaysia, Brunei, Netherlands, Norway, and others.

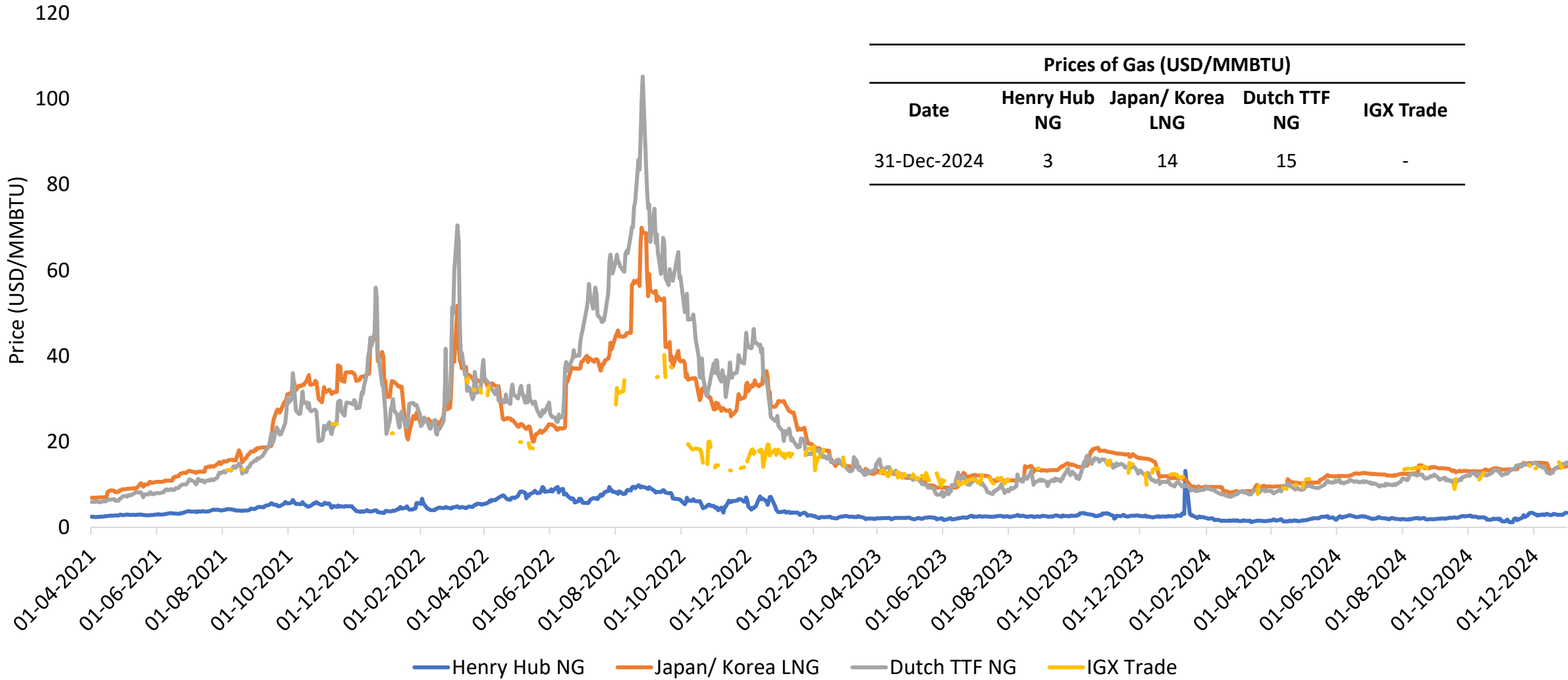
Total Import of Liquefied Natural Gas (LNG) (MMT)			
Total Import	2022-23	2023-24	2024-25 (up to Oct'2024)
LNG	19.85	24.00	16.50

NOTE: The data is based on the latest available information.

Source: MoCI and PPAC

Daily Prices of Gas

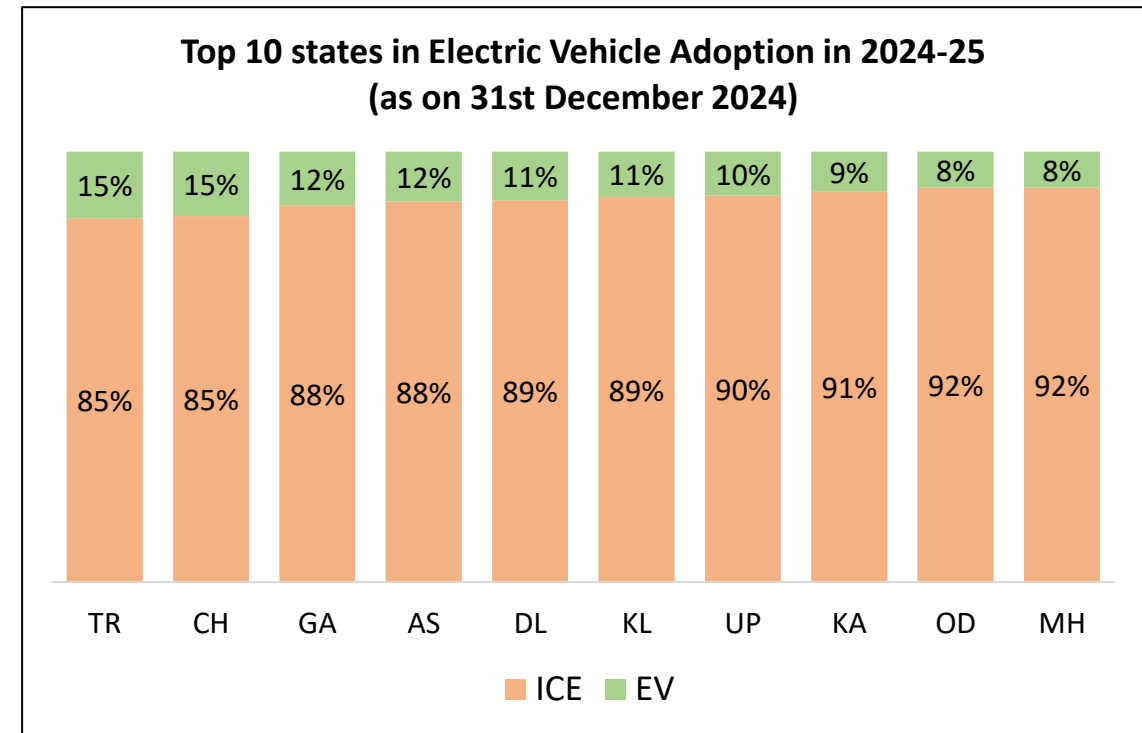
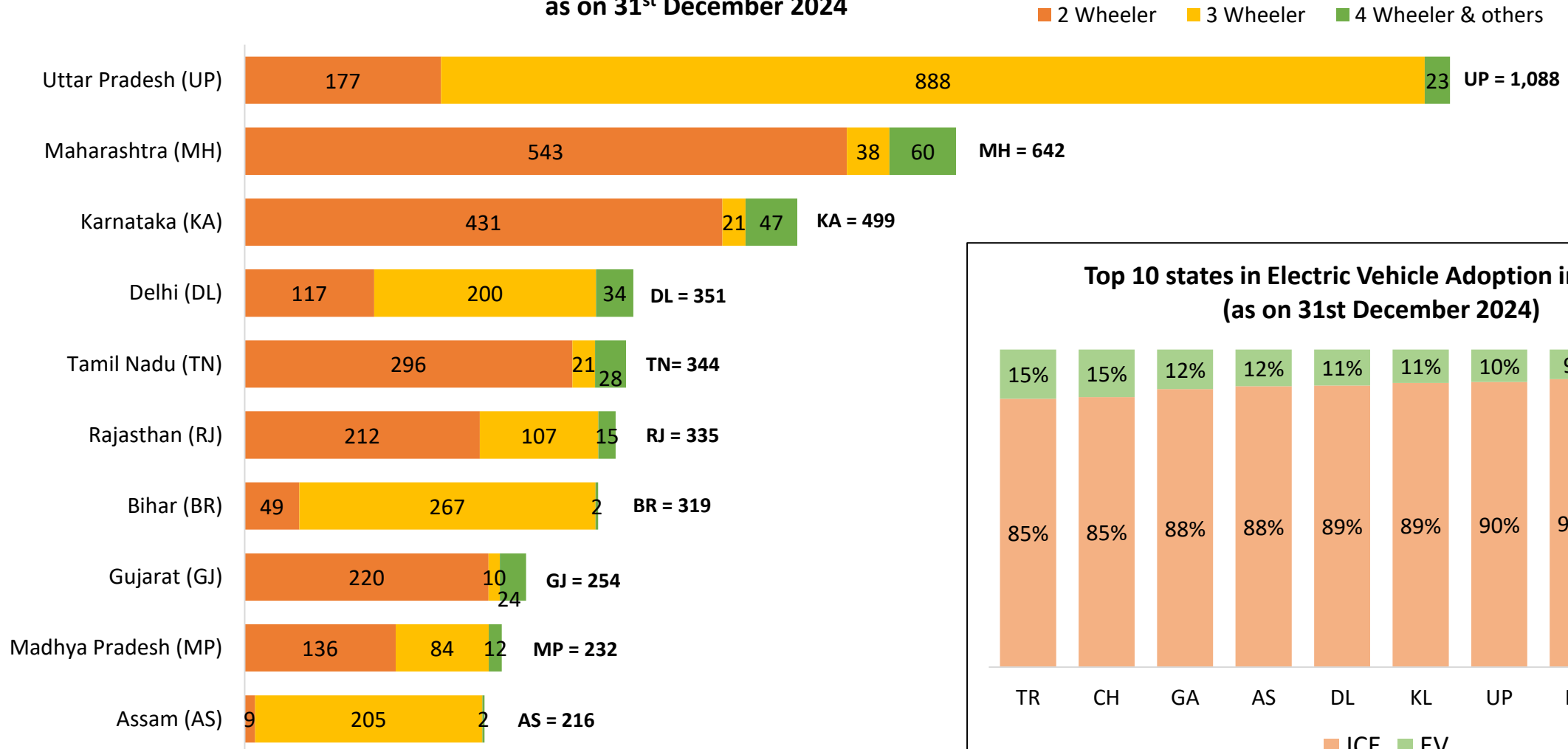
Gas Daily Market Price



Prices of Gas (USD/MMBTU)				
Date	Henry Hub NG	Japan/ Korea LNG	Dutch TTF NG	IGX Trade
31-Dec-2024	3	14	15	-

Status of Electric Mobility in India

**Top 10 States for Electric Vehicles (in Thousands)
as on 31st December 2024**



Recent Interventions to promote Renewable Energy

Solar

Under the [PLI scheme](#), the GOI has announced INR 19,500 crores to incentivize the manufacturing of domestic solar PV modules.

[PM-Surya Ghar: Muft Bijli Yojana](#) released with a total outlay of Rs. 75,021 crore for installing rooftop solar (RTS) for one crore households. The scheme provides a CFA of Rs 30,000 for a 1 kW RTS system, Rs 60,000 for a 2kW RTS system, and Rs 78,000 for a 3kW RTS system.

The [inter-state transmission charges](#) are waived for 25 years for the projects being commissioned before 30th June 2025.

The [updated RPO](#) compliance supports solar integration of up to 33.57% of the electricity purchased by DISCOMs/states till the year 2029-30.

[PM KUSUM scheme](#) has been extended till Mar'26 to install pump sets up to 15 HP in selected areas.

Wind

[Reverse auctions have been scrapped](#) for wind projects. A traditional two-part (technical and financial) bid system has been put in place.

To support [off-shore wind](#), SECI will invite bids for up to 4GW to set up offshore wind plants off the coast of Tamil Nadu and Gujarat.

The ISTS charges are waived for 25 years for the [onshore projects](#) being commissioned before 30th June 2025 and for [off-shore projects](#) on or before 31st December 2032.

The [updated RPO](#) compliance supports WIND integration of up to 6.94% of the electricity purchased by DISCOMs/states till the year 2029-30.

The [National Repowering & Life Extension Policy for Wind Power Projects- 2023](#), for wind power projects is released for the optimum utilization of wind energy resources by maximizing energy (kWh) yield per sq. km of the wind project areas.

The GOI has decided to invite bids for 50 GW of RE annually, which includes up to [10 GW of wind](#) capacity.

Energy Storage

Ministry of Power has released the [guidelines for the development of PSP](#) with the target of 26.7 GW of PSP and 47.2 GW of BESS to integrate with RE capacity till 2032.

[PLI scheme](#) unveiled for setting up 50 GWh ACC battery storage with an outlay of ₹18,100 crores.

Under the [Waste Management Rules 2022](#), the disposal of waste batteries in landfills and incineration is prohibited and the recycling of waste batteries is made mandatory.

[CERC](#), under RRAS regulation, has allowed the use of energy storage in secondary and tertiary ancillary support.

[The Energy Storage Obligation](#) of DISCOMs is pegged at 4.0% up to 2029-30.

Under the aegis of MNRE, SECI has successfully commissioned [India's largest BESS plant, featuring a 40 MW/120 MWh](#) BESS alongside a solar PV plant with a installed capacity of 152 MWh, located in Rajnandgaon, Chhattisgarh.

Green Hydrogen (H₂)

[National Green Hydrogen Mission](#) (NGHM) was approved by the Cabinet in January 2023. The mission aims to meet the target of 5 million metric tonnes of green hydrogen production by 2030. The initial outlay for the Mission will be INR 19,744 crores.

MNRE has released the scheme guidelines for the implementation of pilot projects for the use of Green Hydrogen in the [shipping](#), [steel](#), and [transport](#) sectors under the NGHM.

MOP has extended the [waiver of ISTS charges](#) from 30th June 2025 to 31st December 2030.

Indian Railways to run [35 Hydrogen trains under "Hydrogen for Heritage"](#) at an estimated cost of ₹ 80 crores per train and ground infrastructure of ₹ 70 crores per route on various heritage/hill routes.

Jindal Stainless Ltd., in collaboration with Hygenco commissioned [India's 1st green hydrogen plant in the stainless steel sector](#) at Hisar, Haryana, which aims to reduce CO₂ emission by 2,700 metric tonnes per annum.

Key Highlights or Announcements of December 2024

- India recently submitted its [Fourth Biennial Update Report \(BUR-4\)](#) to the United Nations Framework Convention on Climate Change (UNFCCC), outlining key initiatives undertaken to fulfil the country's commitments to global climate action. The key highlights are-
 - GHG Emissions was decreased by 7.93% in 2020 compared to 2019.
 - India has reduced the emission intensity of its GDP by 36% from 2005 to 2020, against the target of 45% by 2030.
 - Sector wise Emissions: The energy sector contributed 75.66% of total emissions, followed by agriculture at 13.72%, industrial processes and product use (IPPU) at 8.06%, and waste at 2.56%.
 - Establishment of powerful carbon sinks: Forests and tree cover, along with other land uses, removed 522 MtCO₂e in 2020, accounting for 22% of the country's total carbon dioxide emissions. From 2005 to 2021, an additional carbon sink of 2.29 billion tonnes of CO₂ equivalent was created.
 - Renewable energy capacity has experienced significant growth, with non-fossil fuel sources now making up 46.52%, close to the 50% target set for 2030.
- Government of Haryana has released the [Haryana Electric Vehicle Policy 2024 \(draft\)](#). The main highlights are-
 - Target to convert 100% of bus fleet owned by State Transport Undertakings in the state into electric buses by 2029, with the first phase-2-of 100% conversion of bus fleet in Gurugram and Faridabad by 2024.
 - Phase out all fossil fuel based commercial fleets and logistics vehicles in Gurugram and Faridabad by 2024 and all cities by 2030.

Key Highlights or Announcements of December 2024

- The Government of Rajasthan has unveiled the [Rajasthan Integrated Clean Energy Policy, 2024](#), which will remain effective until March 29, 2029, or until superseded by a subsequent policy. This policy targets achieving 125 GW of renewable energy capacity by 2030, comprising 90 GW of solar energy, 25 GW of wind and hybrid energy, and 10 GW from hydro, Pumped Storage Plants (PSP), and Battery Energy Storage Systems.
- The Government of Meghalaya has introduced the [Meghalaya Power Policy, 2024](#), which will remain effective until March 31, 2030. Key objectives of the policy include:
 - Establishing solar power projects with a cumulative capacity of at least 100 MW by 2030.
 - Maximizing the state's wind potential, targeting 44 MW at 50 meters and 82 MW at 80 meters by 2030.
 - Achieving a Renewable Purchase Obligation (RPO) target of 41.08% by 2029-30, comprising 3.48% from wind, 1.33% from hydro, 2.25% from distributed renewable energy, and 34.02% from other renewable energy sources.



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