

India's Energy Overview

October 2023

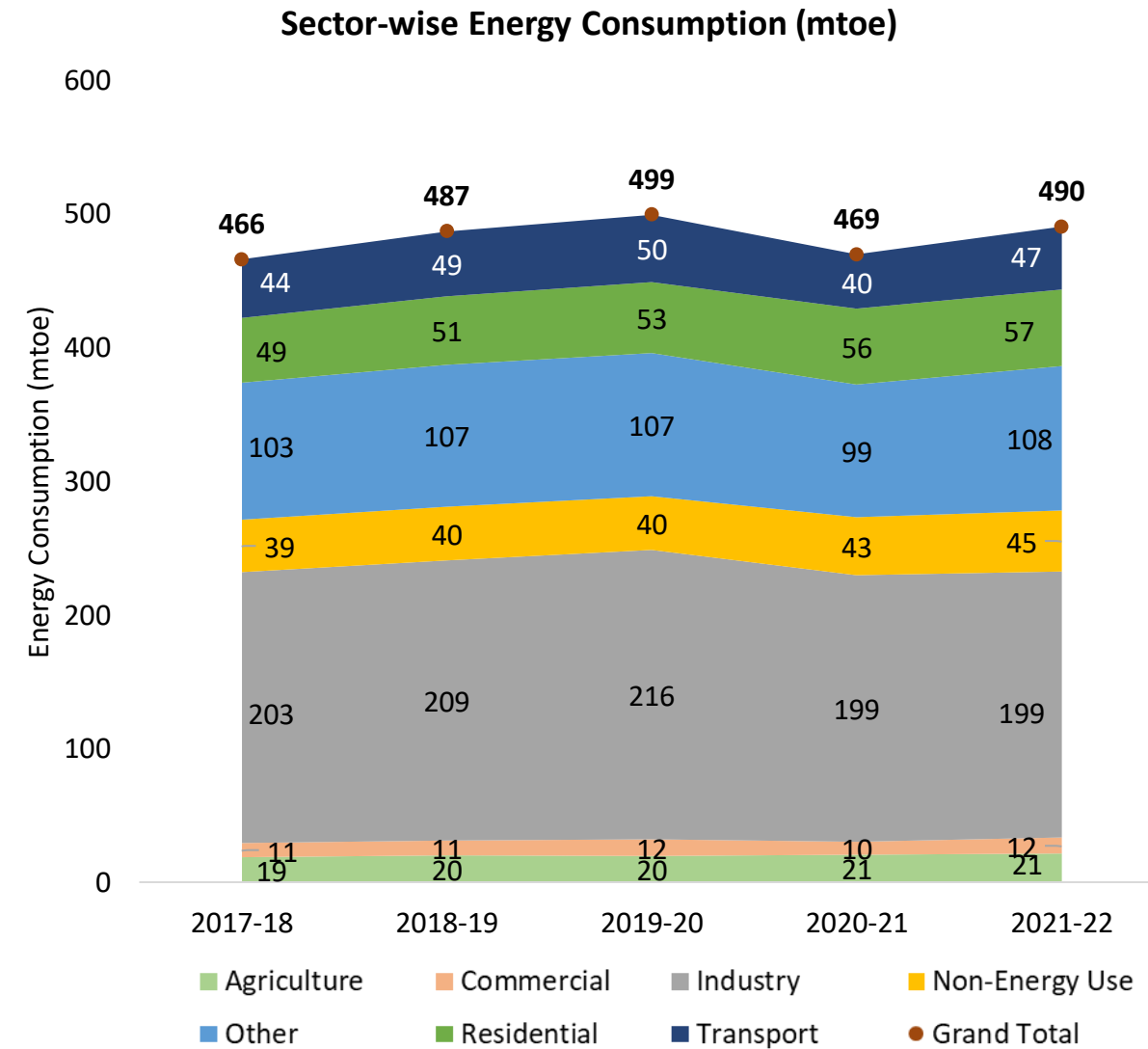
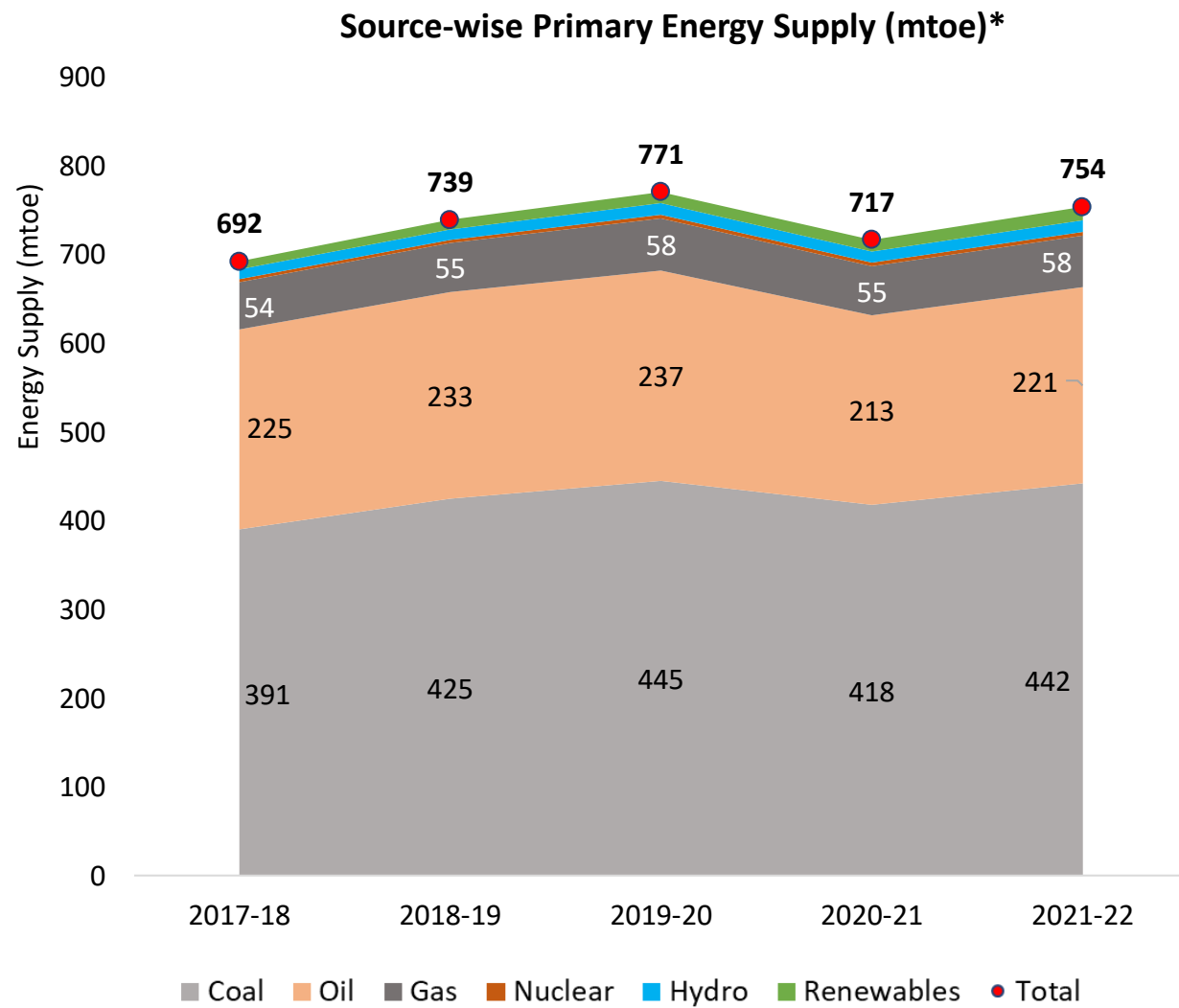


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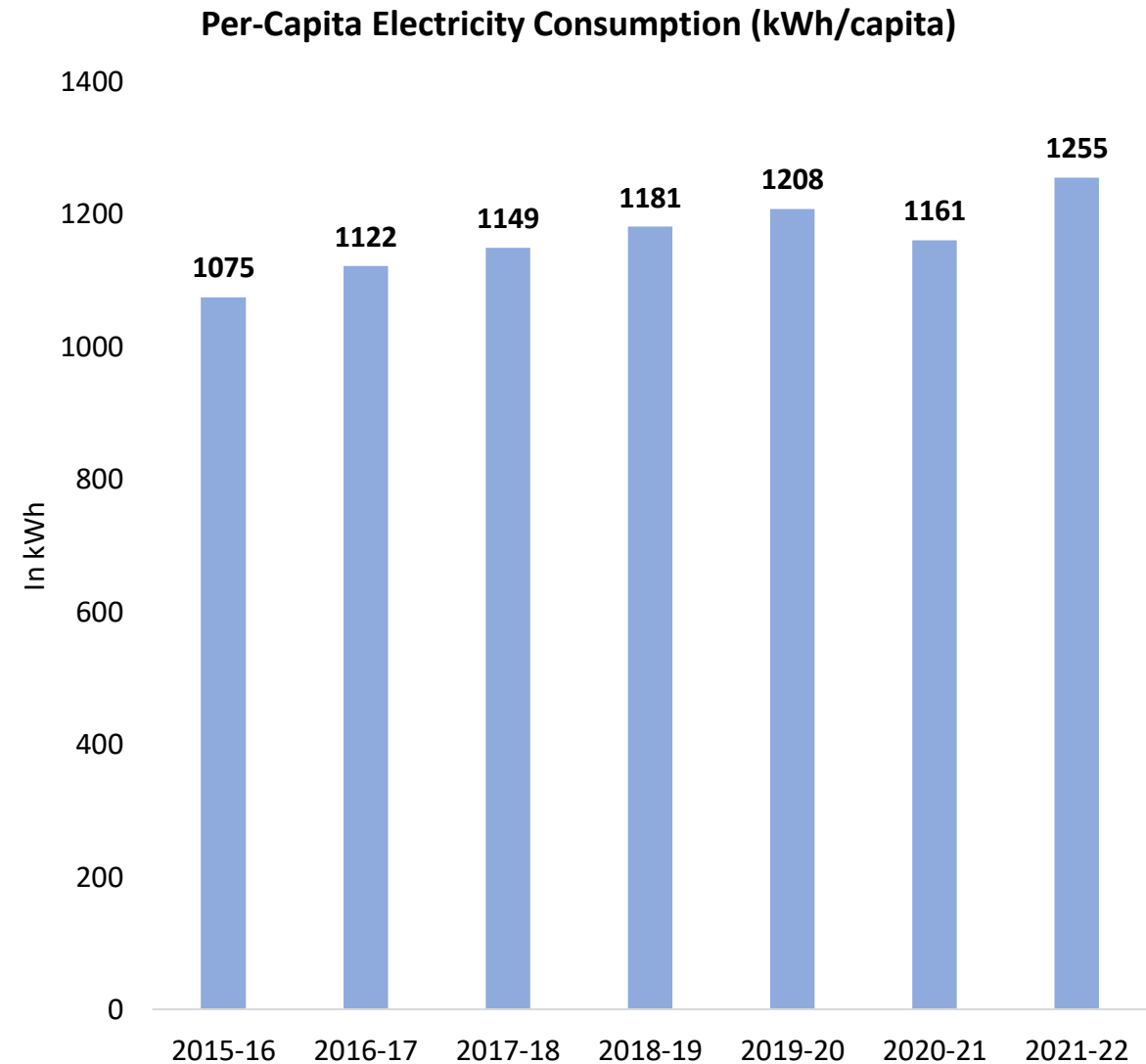
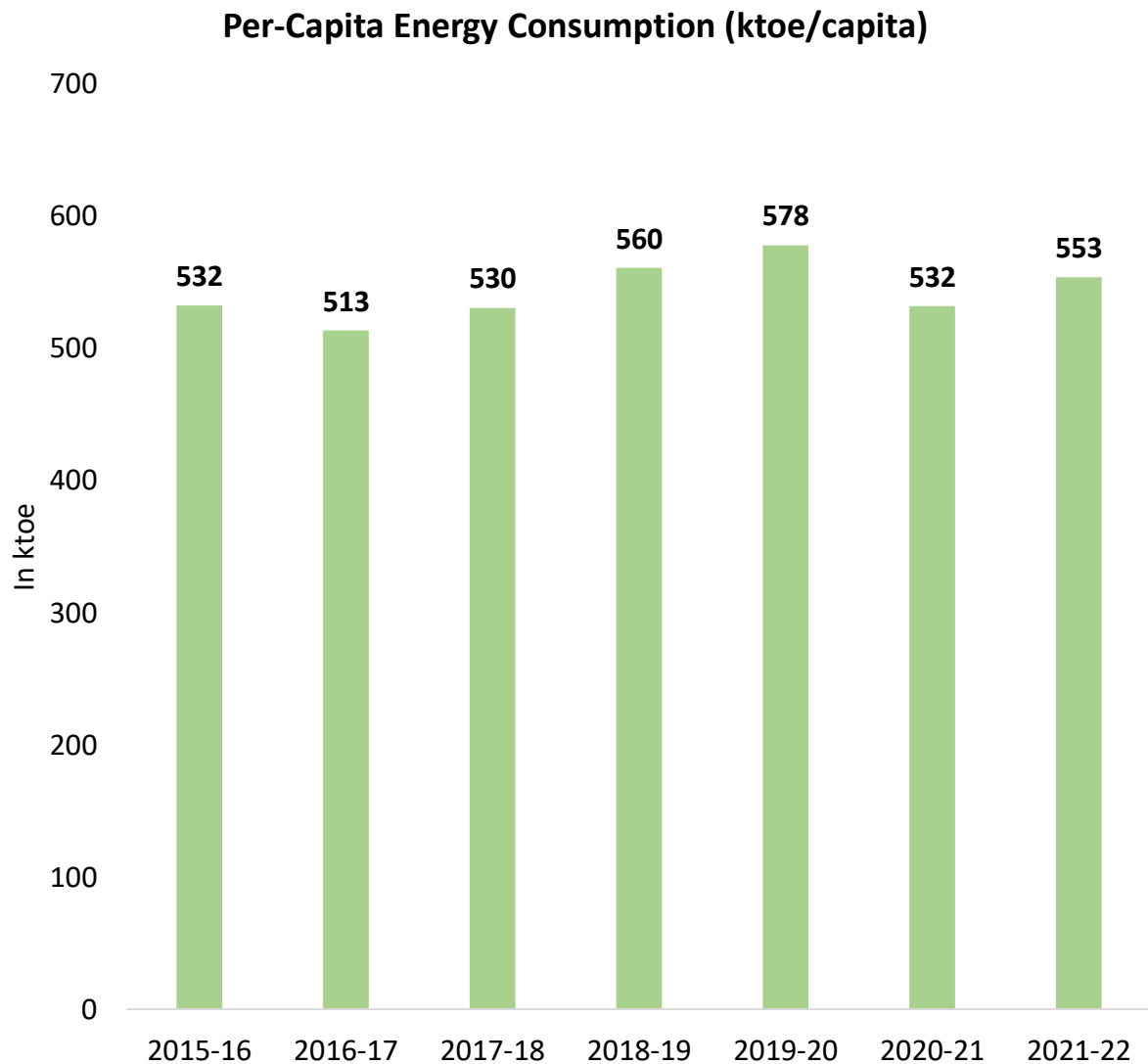
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Primary Energy Mix* in India



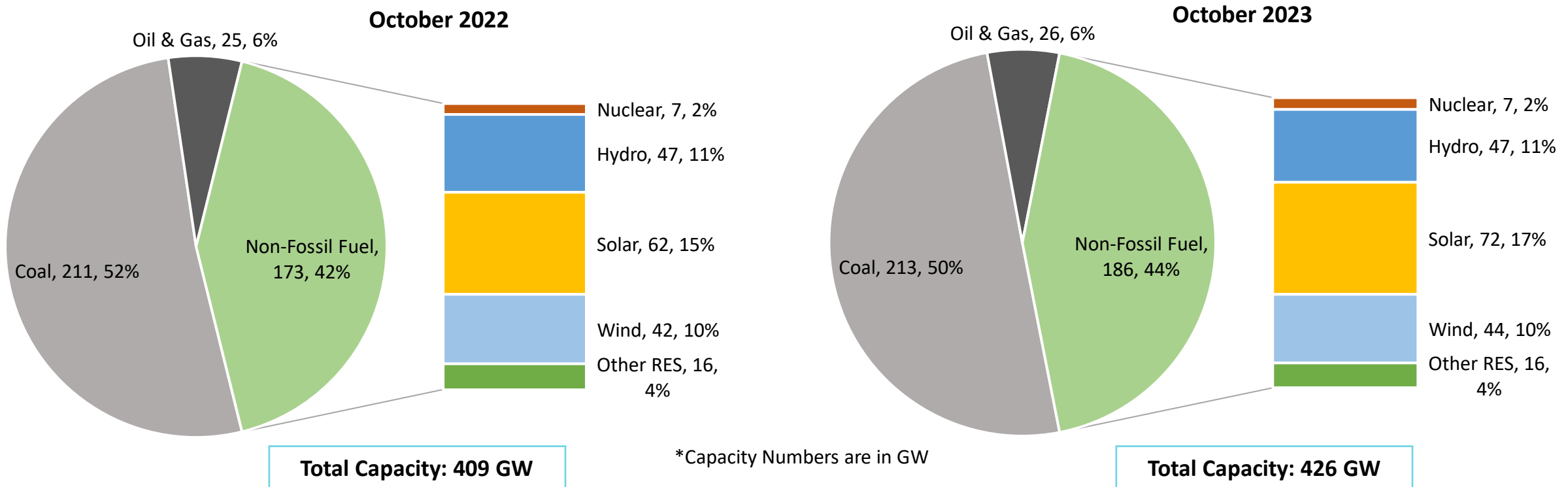
*Excluding biofuels, waste, and other non-commercial source of energy

Per-Capita Energy and Electricity Consumption



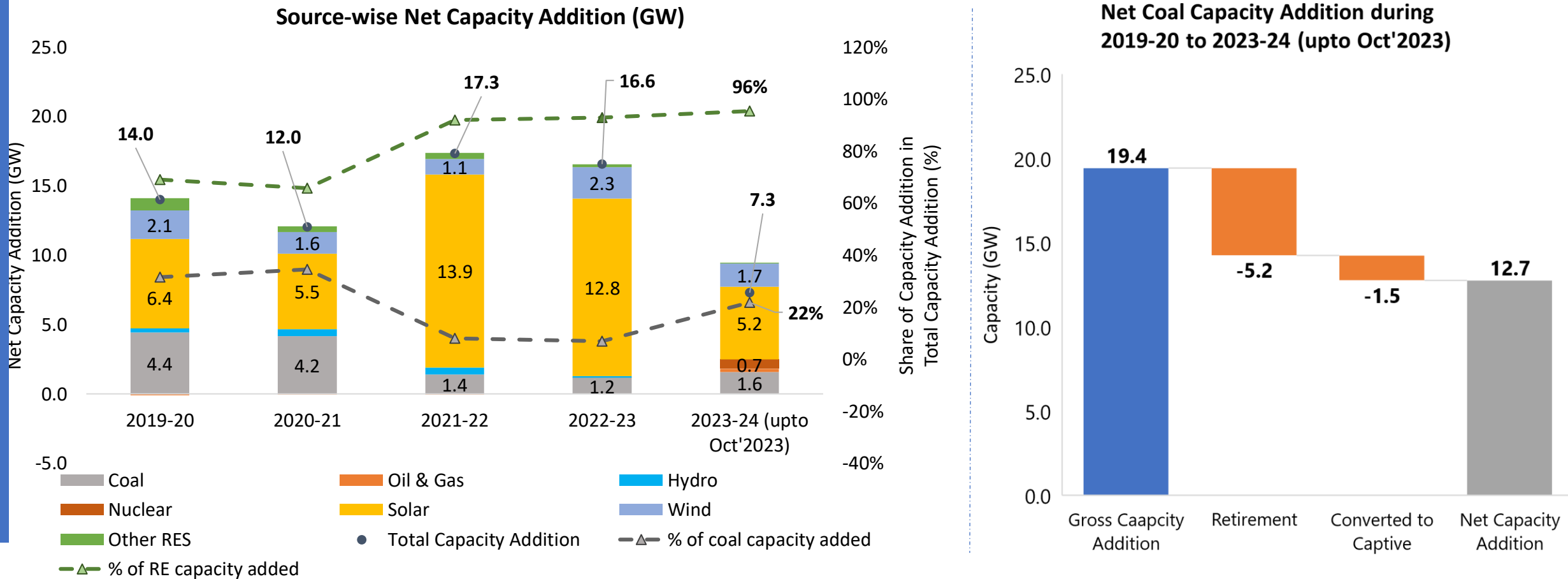
Note: Per Capita energy consumption is calculated on energy supply basis.

India's Electricity Capacity Mix (Utility-scale)



- India's electricity generating capacity is 426 GW as on Oct'2023 [coal 213 GW (50%), solar 72 GW (17%), hydro 47 GW (11%), and wind 44 (10%)].
- As on Oct'2023, the share of non-fossil-based electricity capacity is 44% against the set target of 50% non-fossil capacity by 2030.
- As on Oct'2023, India's renewable energy capacity (including large hydro) stood at 179 GW out of 426 GW.

India's Electricity Capacity Addition in last 5 years



- A total of 56 GW of generation capacity has been added in RE (Hydro, solar, wind, and other RES) over the past 5 years, whereas the net coal capacity addition during the same period was 13 GW, mostly in the central sector.
- The share of RE addition in total capacity has shown an increasing trend (from 69% in 2019-20 to 93% in 2022-23).

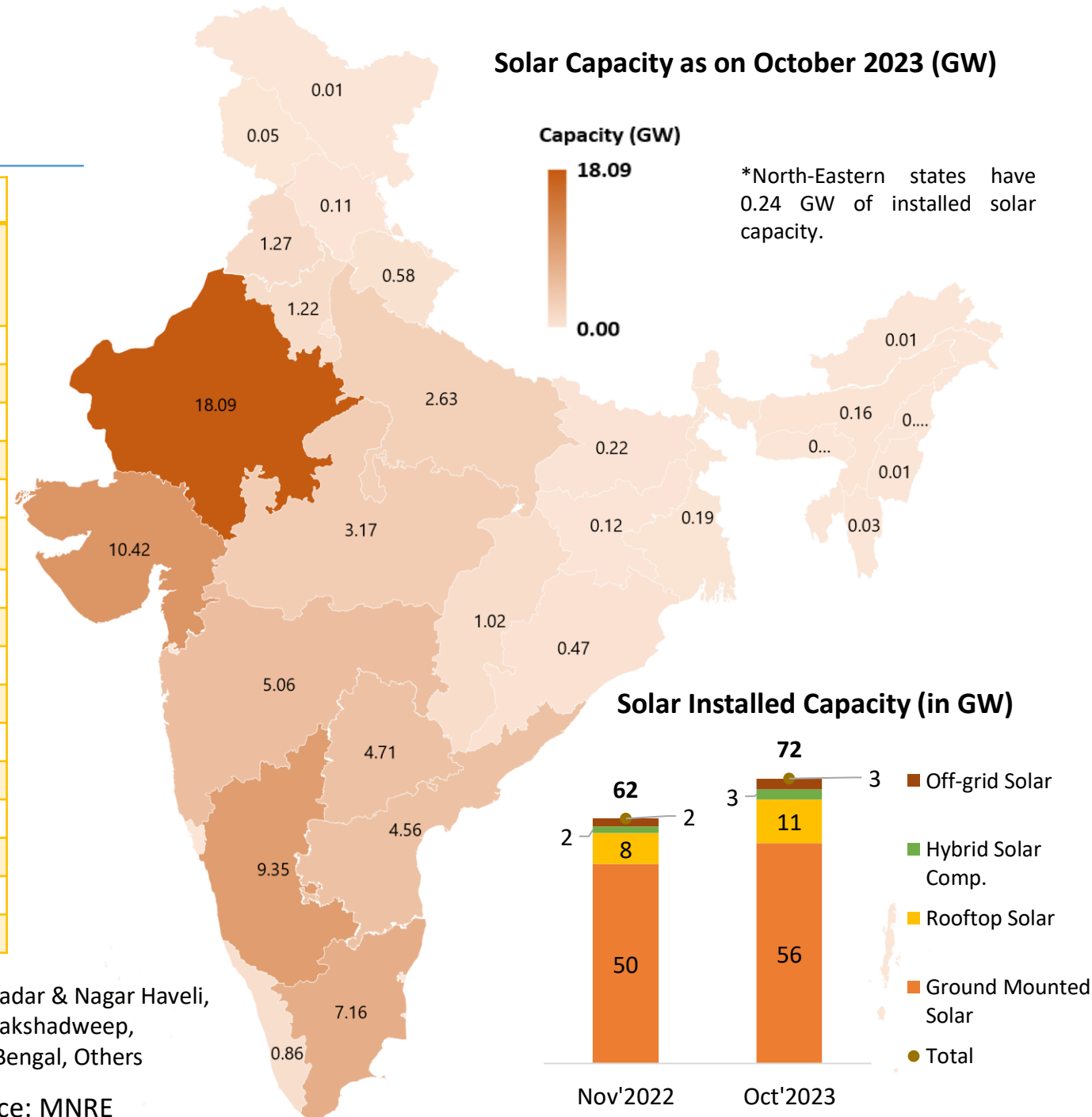
State-wise Solar Capacity

as on October 2023

State-wise installed capacity of Solar Power (GW)					
States	Ground Mounted	Rooftop	Solar Component in Hybrid	Off Grid	Total Solar Power
Rajasthan	14.5	1.0	2.0	0.6	18.1
Gujarat	6.9	2.9	0.6	0.1	10.4
Karnataka	7.8	1.6	0.0	0.0	9.3
Tamil Nadu	6.6	0.4	0.0	0.1	7.2
Maharashtra	3.1	1.7	0.0	0.3	5.1
Telangana	4.4	0.3	0.0	0.0	4.7
Andhra Pradesh	4.3	0.2	0.0	0.1	4.6
Madhya Pradesh	2.8	0.3	0.0	0.1	3.2
Uttar Pradesh	2.1	0.3	0.0	0.2	2.6
Punjab	0.9	0.3	0.0	0.1	1.3
Haryana	0.3	0.5	0.0	0.5	1.2
Chhattisgarh	0.6	0.1	0.0	0.4	1.0
Kerala	0.3	0.5	0.0	0.0	0.9
Uttarakhand	0.3	0.3	0.0	0.0	0.6
Others	0.9	0.7	0.0	0.3	1.9
All India	55.7	11.1	2.5	2.7	72.0

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

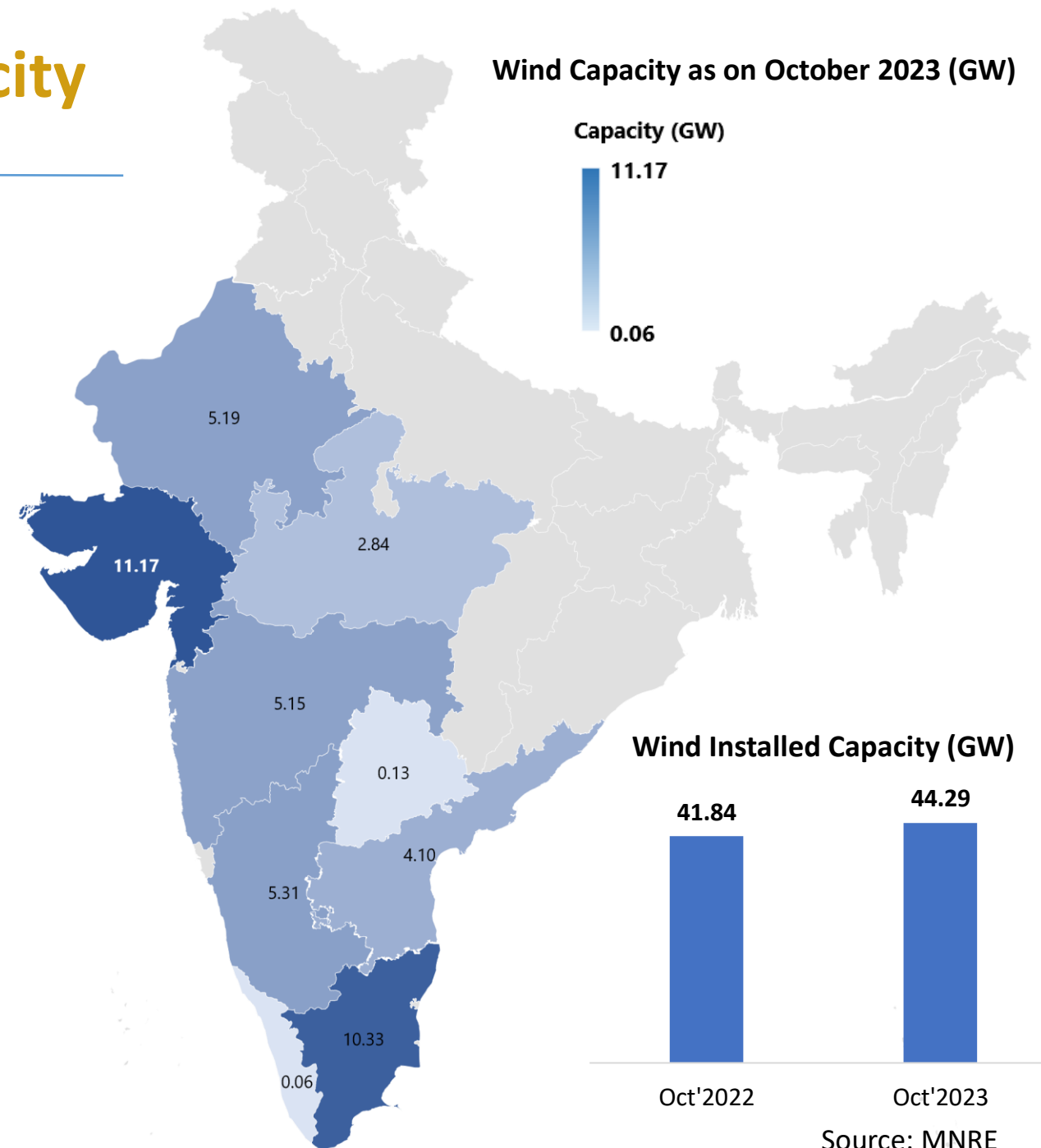
Solar Capacity as on October 2023 (GW)



State-wise Wind Onshore Capacity

as on October 2023

State-wise installed capacity of Wind (Onshore) Power	
States	Installed Capacity (GW)
Gujarat	11.17
Tamil Nadu	10.33
Karnataka	5.31
Rajasthan	5.19
Maharashtra	5.15
Andhra Pradesh	4.10
Madhya Pradesh	2.84
Telangana	0.13
Kerala	0.06
India Total	44.29

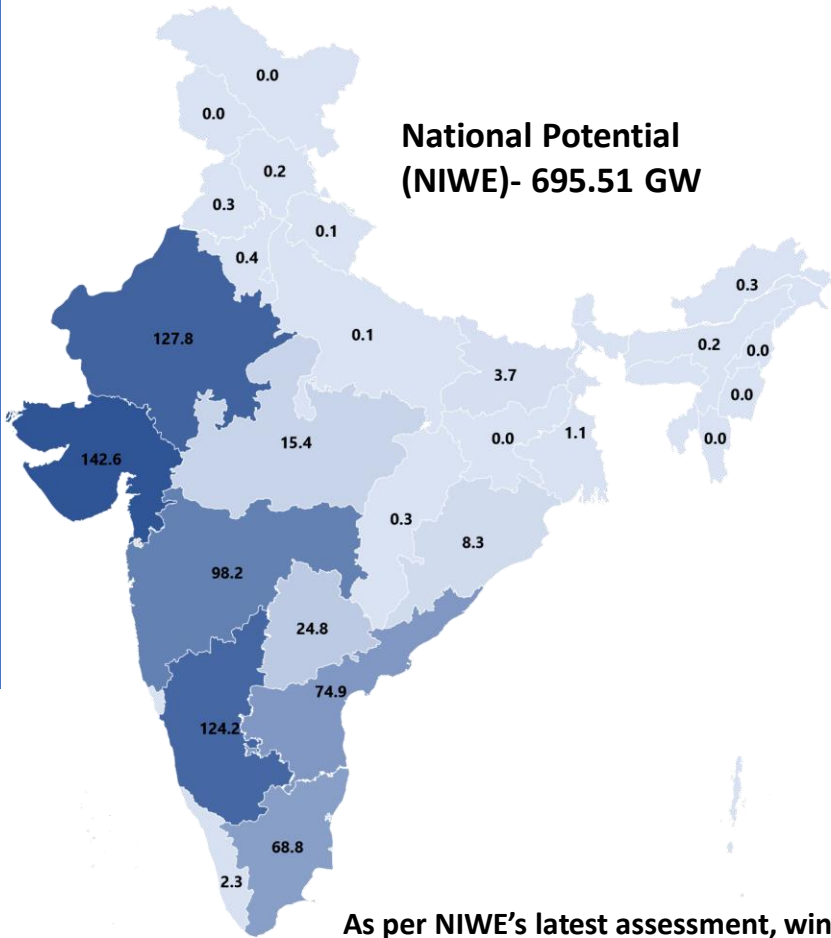


RE Potential and Installed Capacity (1/2)

RE potential in the state

Wind Onshore Potential at 120m agl

State Potential (GW) 0.0 142.6

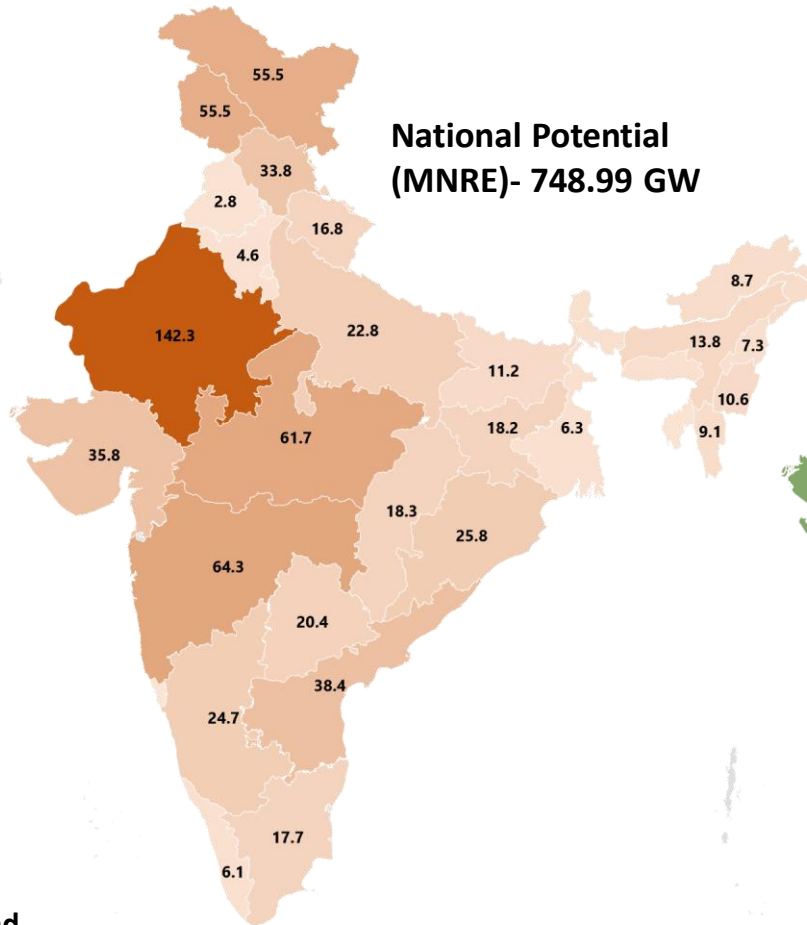


National Potential (NIWE)- 695.51 GW

As per NIWE's latest assessment, wind potential at 150m agl is 1164 GW.

Solar Potential

State Potential (GW) 0.9 142.3

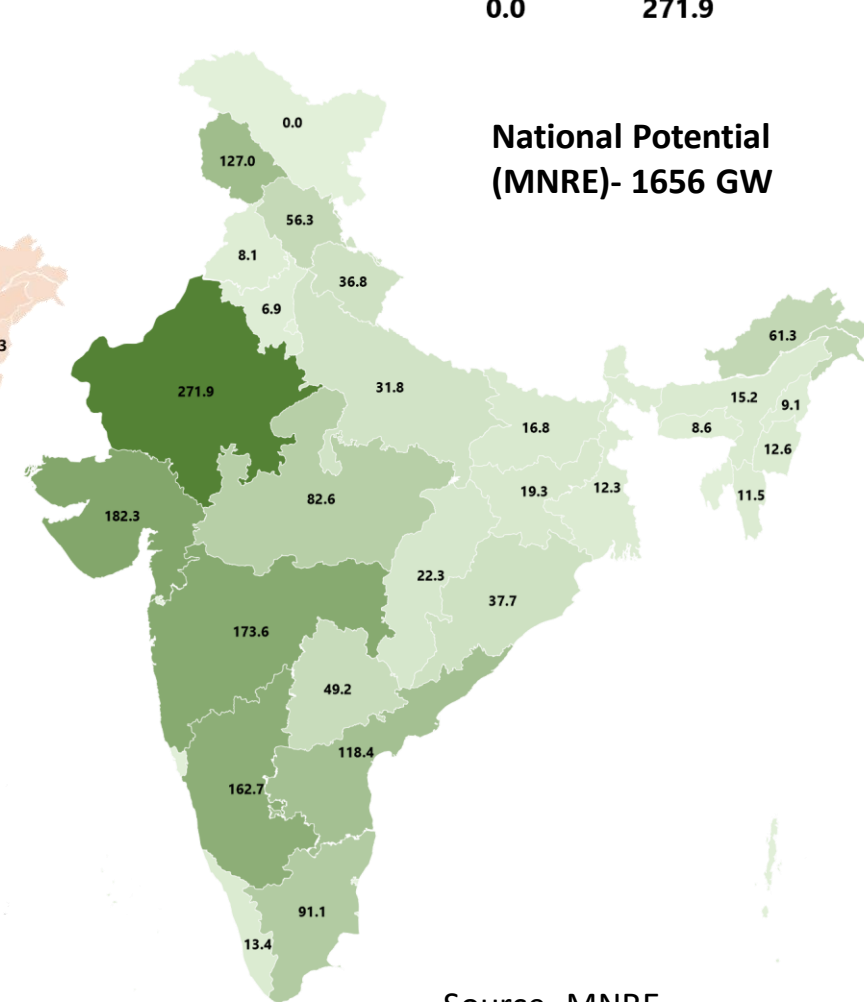


National Potential (MNRE)- 748.99 GW

Market potential for SPV rooftop is 124 GW.

Renewable Energy Potential (all sources including large Hydro)

State Potential (GW) 0.0 271.9

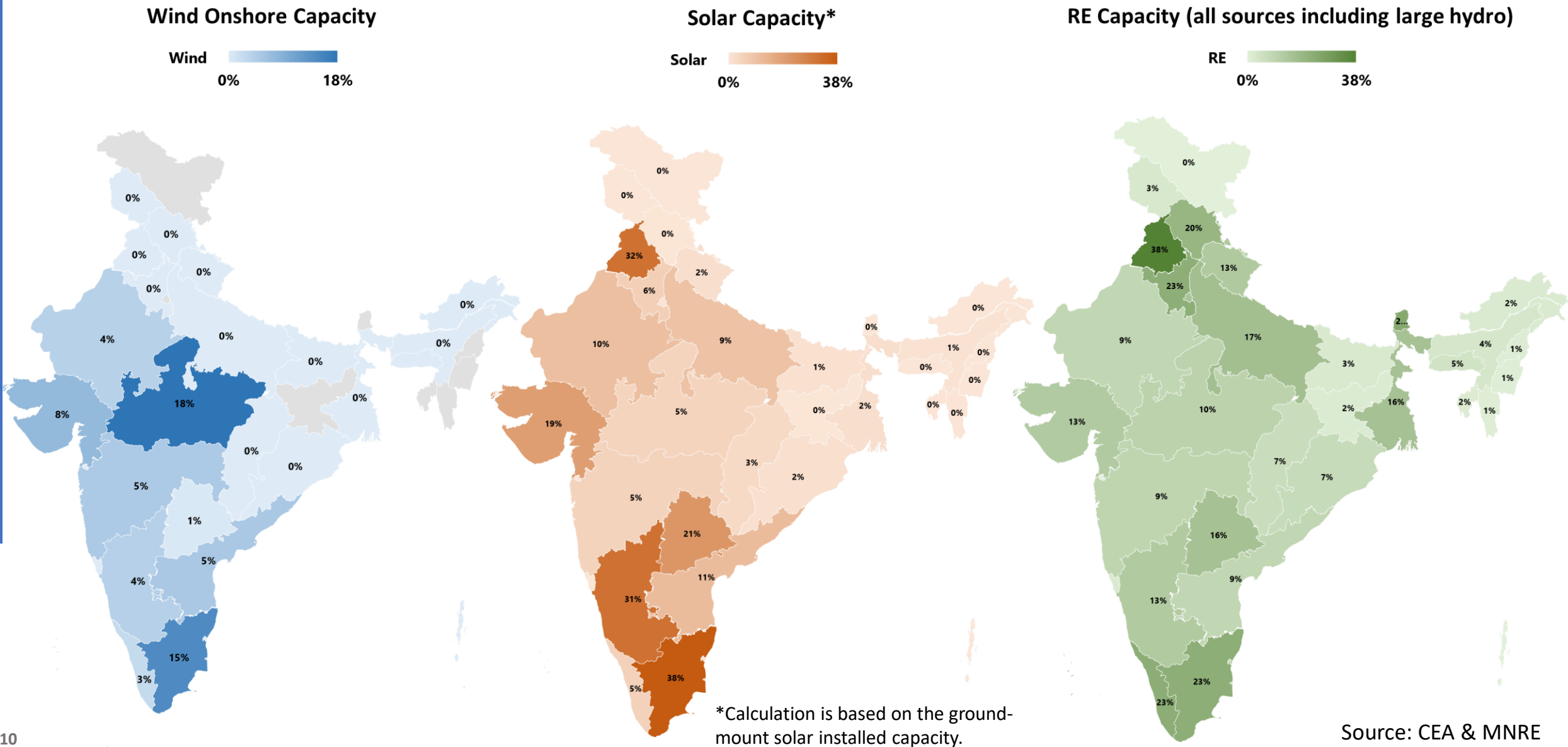


National Potential (MNRE)- 1656 GW

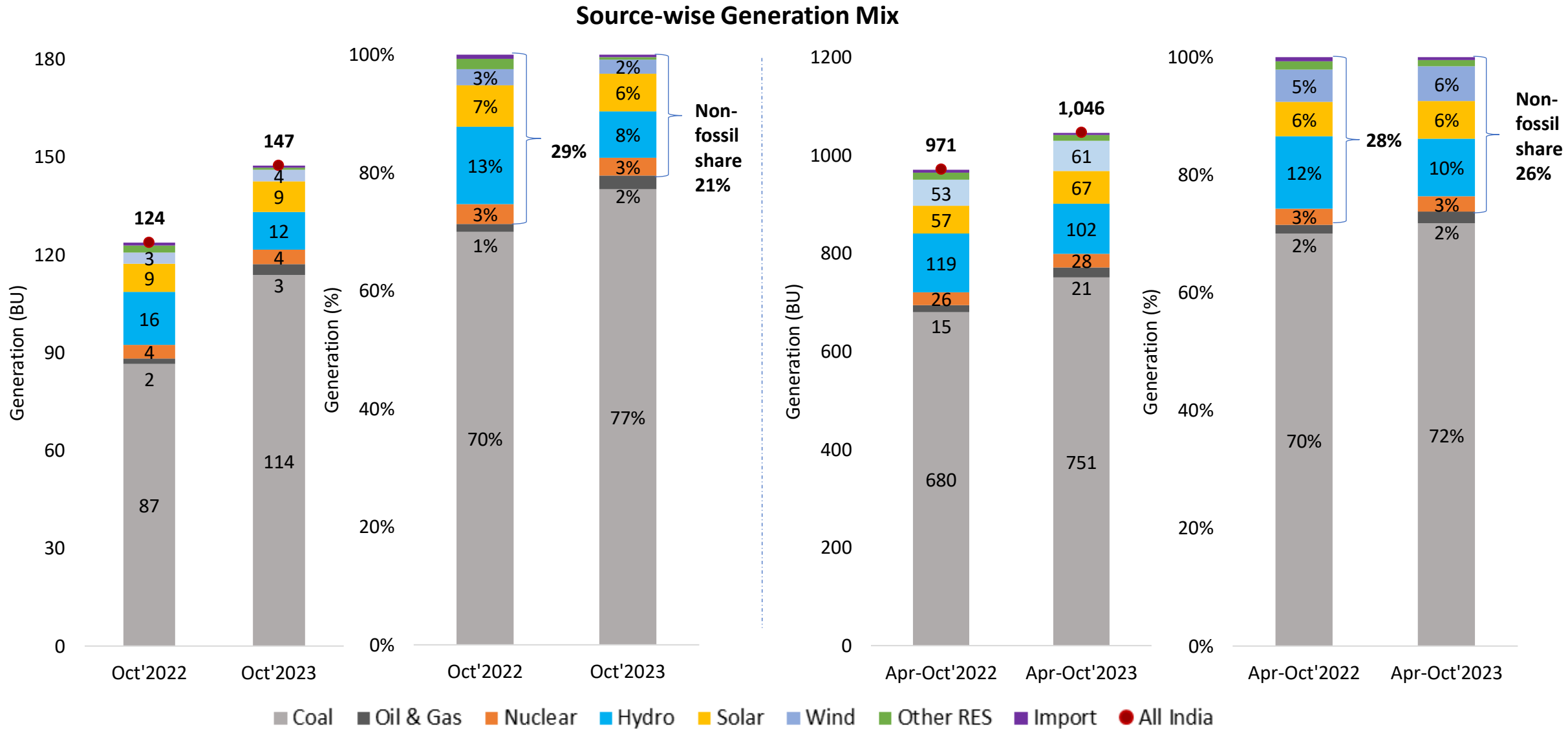
Source- MNRE

RE Potential and Installed Capacity (2/2)

RE Installed capacity as a Percentage of the total resource potential in the state as on October 2023



India's Electricity Generation Mix

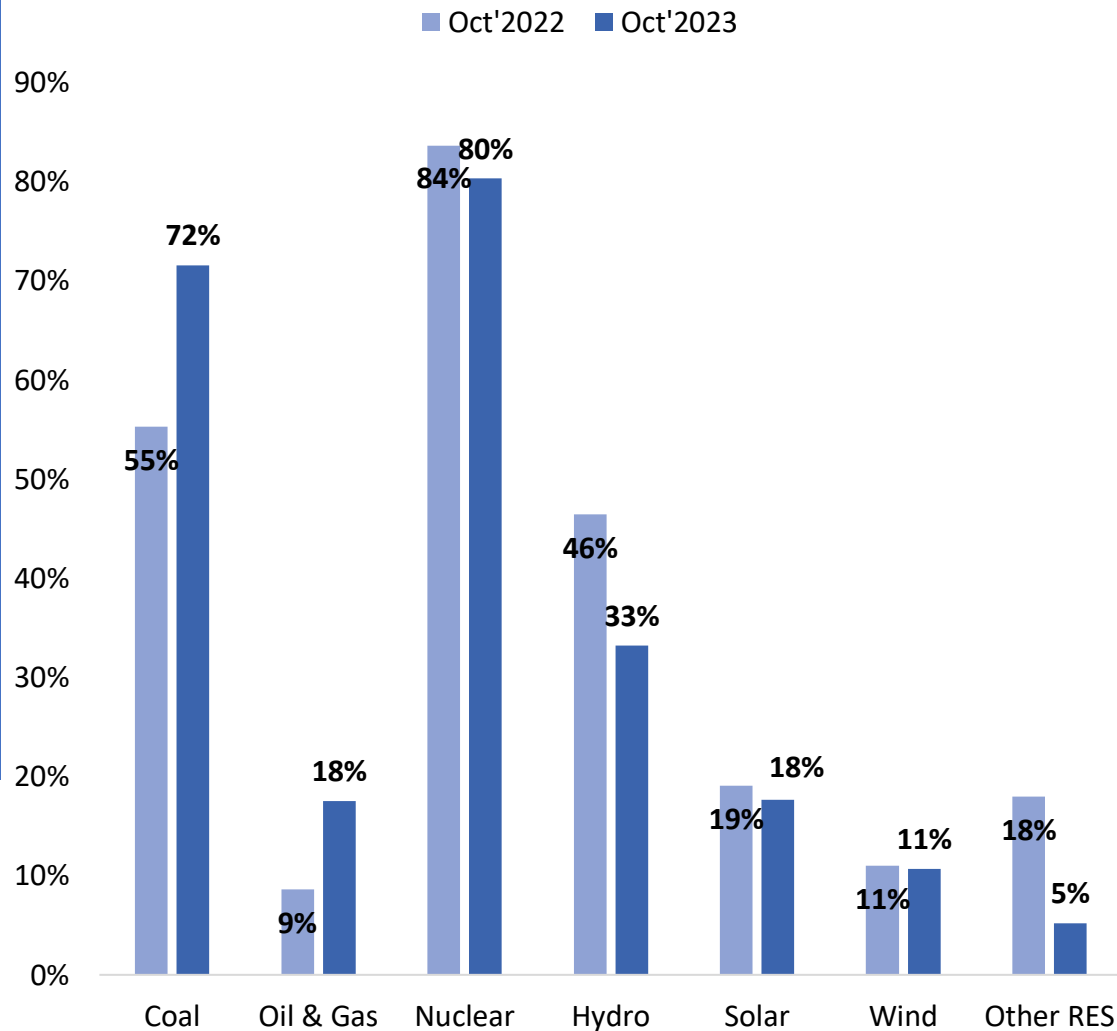


NOTE: The generation data for Oct'2023 is provisional.

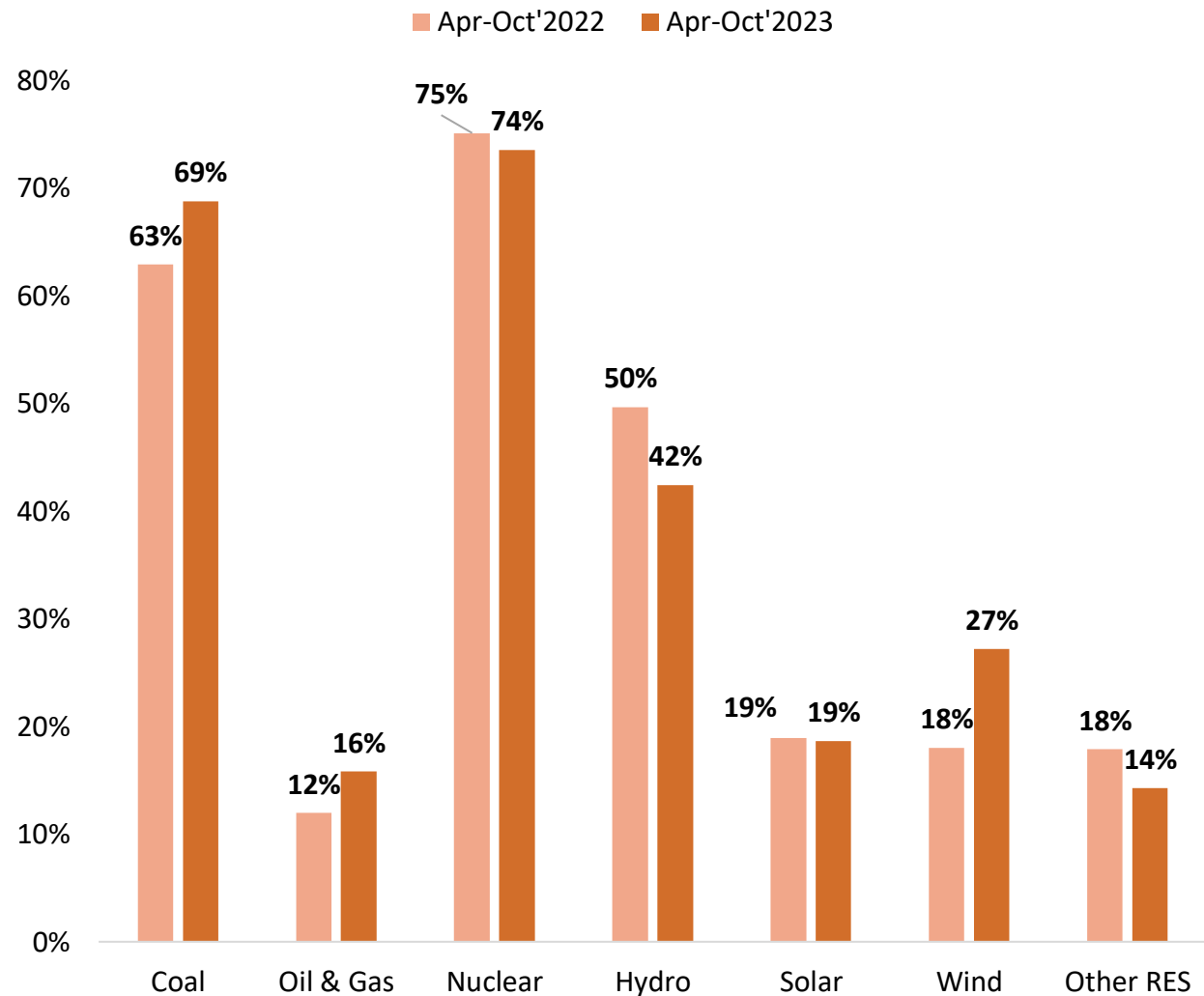
Source: CEA

Source-wise PLF/CUF

Source-wise PLF/ CUF in October (%)



Source-wise PLF/ CUF Comparison (%)

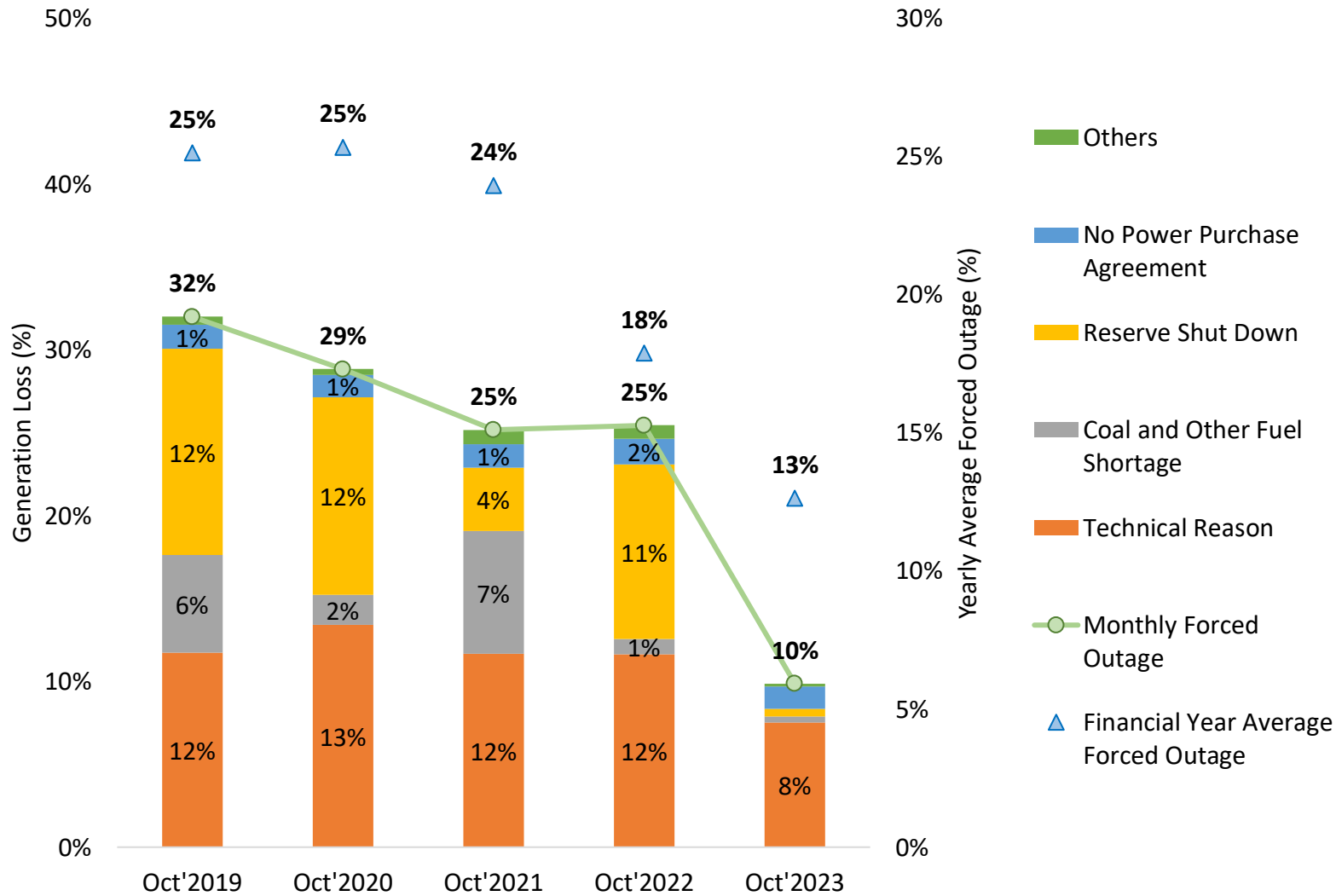


NOTE: The PLF/CUF data is based on provisional generation for Oct'2023.

Source: CEA & MNRE

Thermal Generation Loss and Reasons for Forced Outages

Forced Outages for October over the years



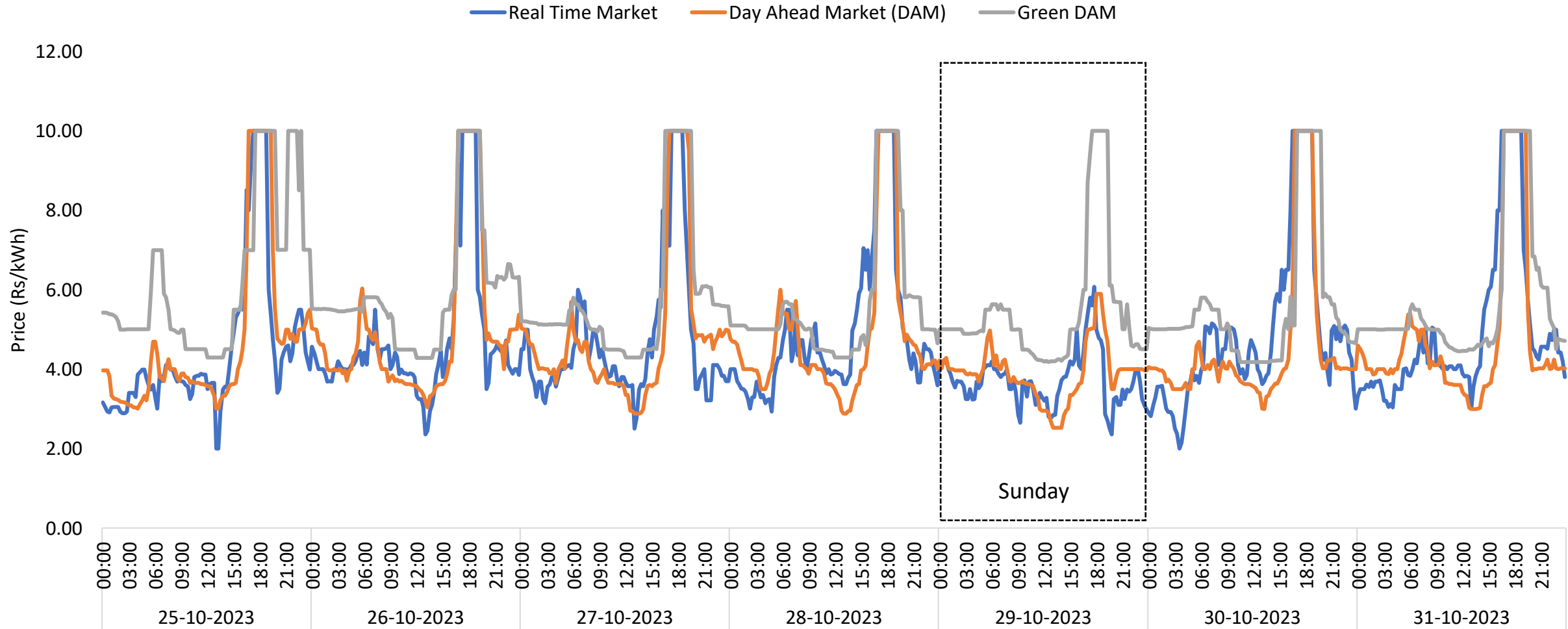
Year/ Month		Average Forced Outage Share
Yearly	FY 2021-22	24%
	FY 2022-23	18%
	FY 2023-24 (up to Oct'2023)	13%
Monthly	Oct'2021	25%
	Oct'2022	25%
	Oct'2023	10%

Thermal includes only Coal and Lignite Plants.

Source: ICED

Indian Electricity Exchange (IEX) Market Snapshot

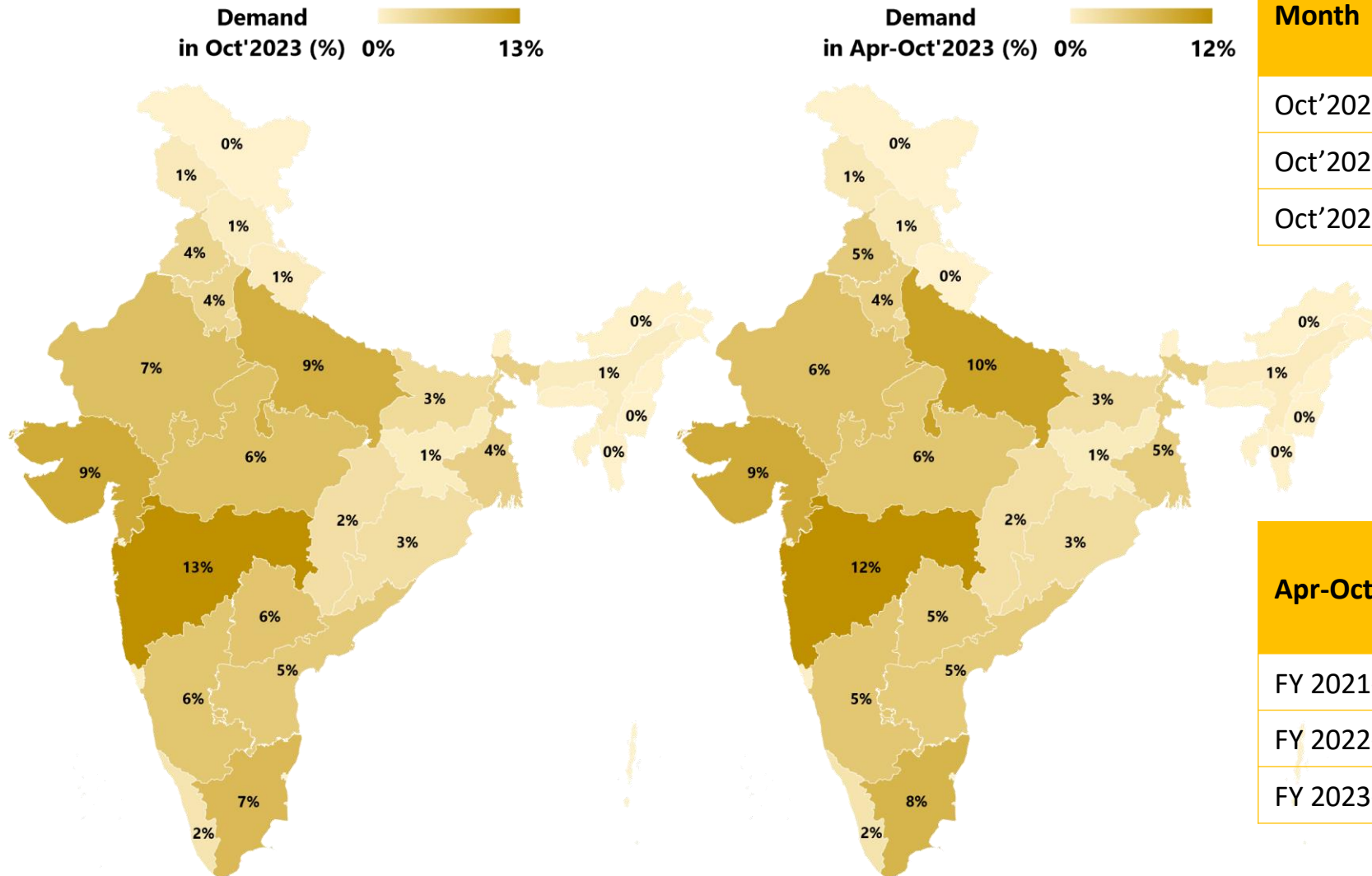
Market Clearing Prices of last 7 days of October 2023



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 (%)



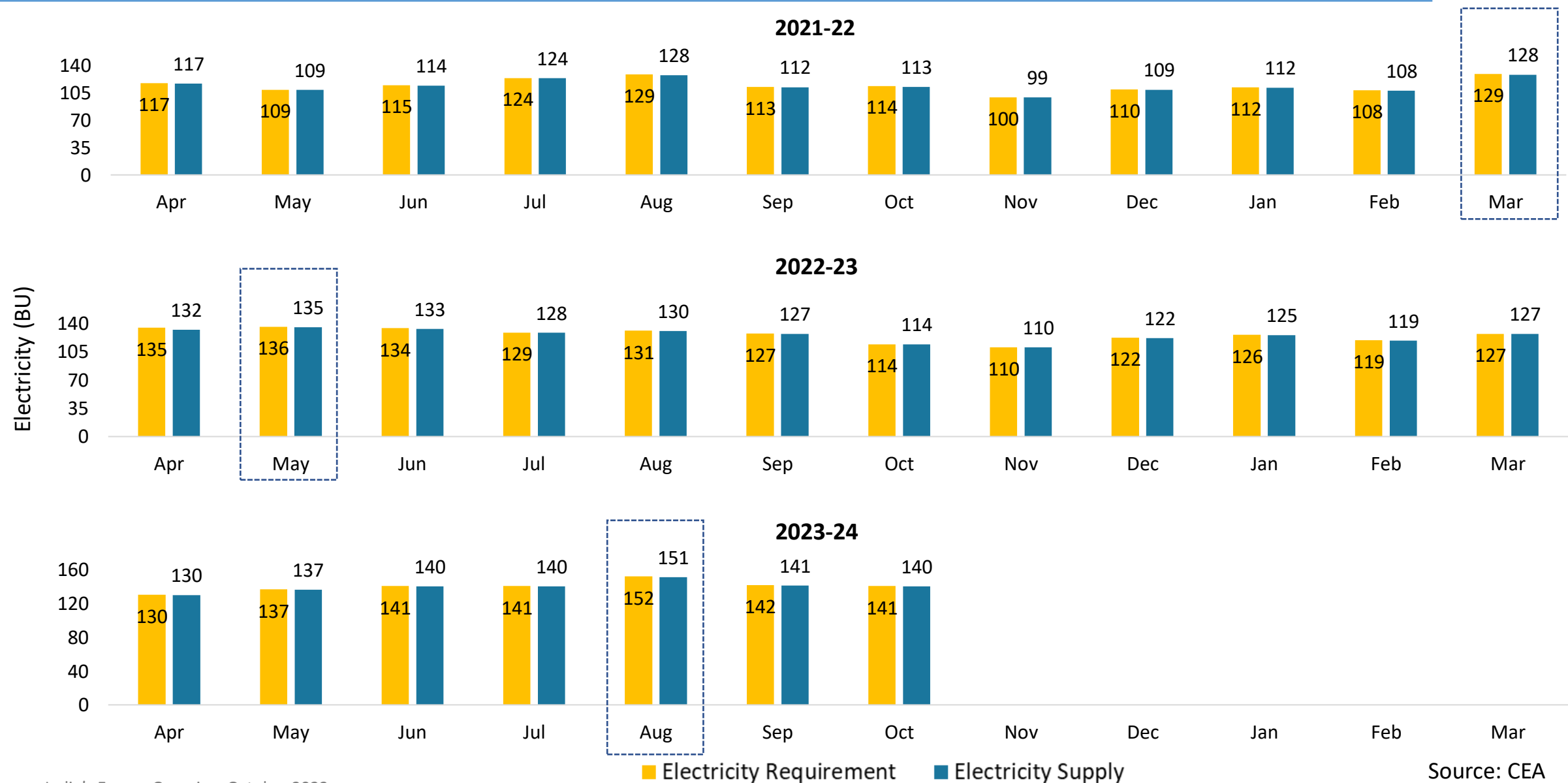
Month	Electricity Demand (BU)	Electricity Supply (BU)	Gap (BU) (+/-)
Oct'2021	114	113	1.2
Oct'2022	114	114	0.1
Oct'2023	141	140	0.4

Apr-Oct	Electricity Demand (BU)	Electricity Supply (BU)	Gap (BU) (+/-)
FY 2021-22	821	817	4
FY 2022-23	905	900	5
FY 2023-24	983	980	3

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

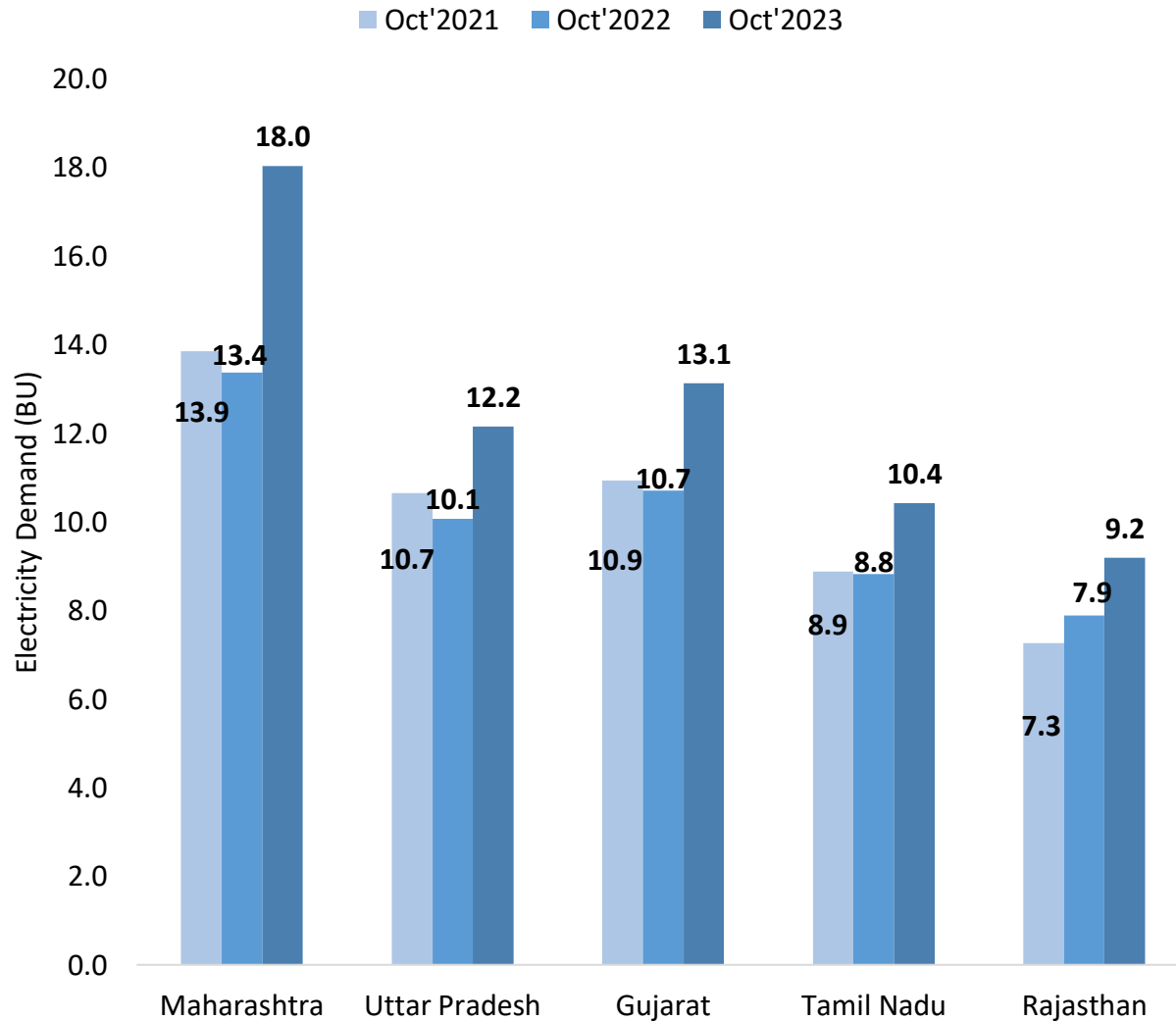
Source: CEA

India's Monthly Electricity Requirement and Supply

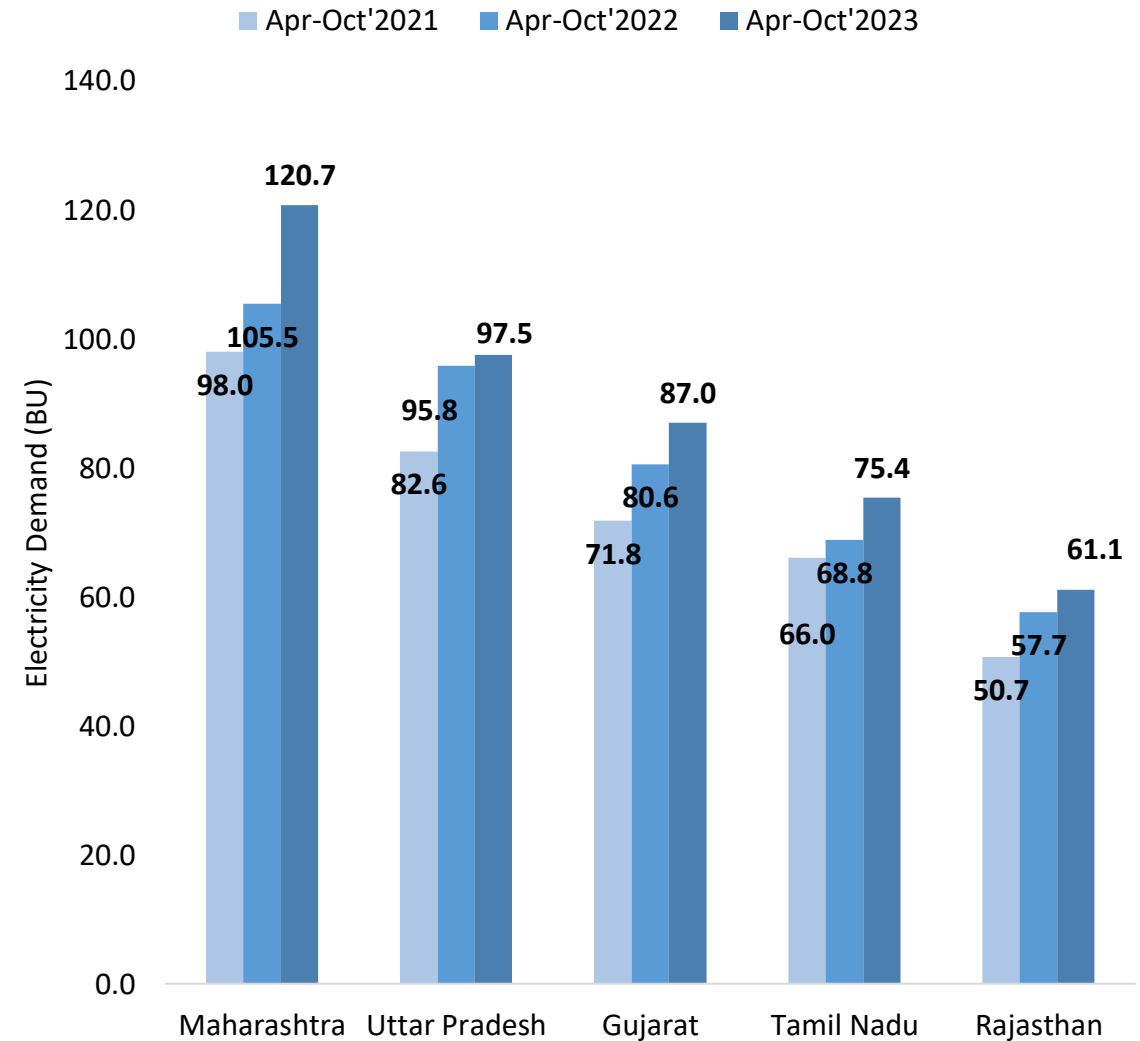


Monthly Electricity Demand of the top 5 states

States with Highest Electricity Demand in October (BU)

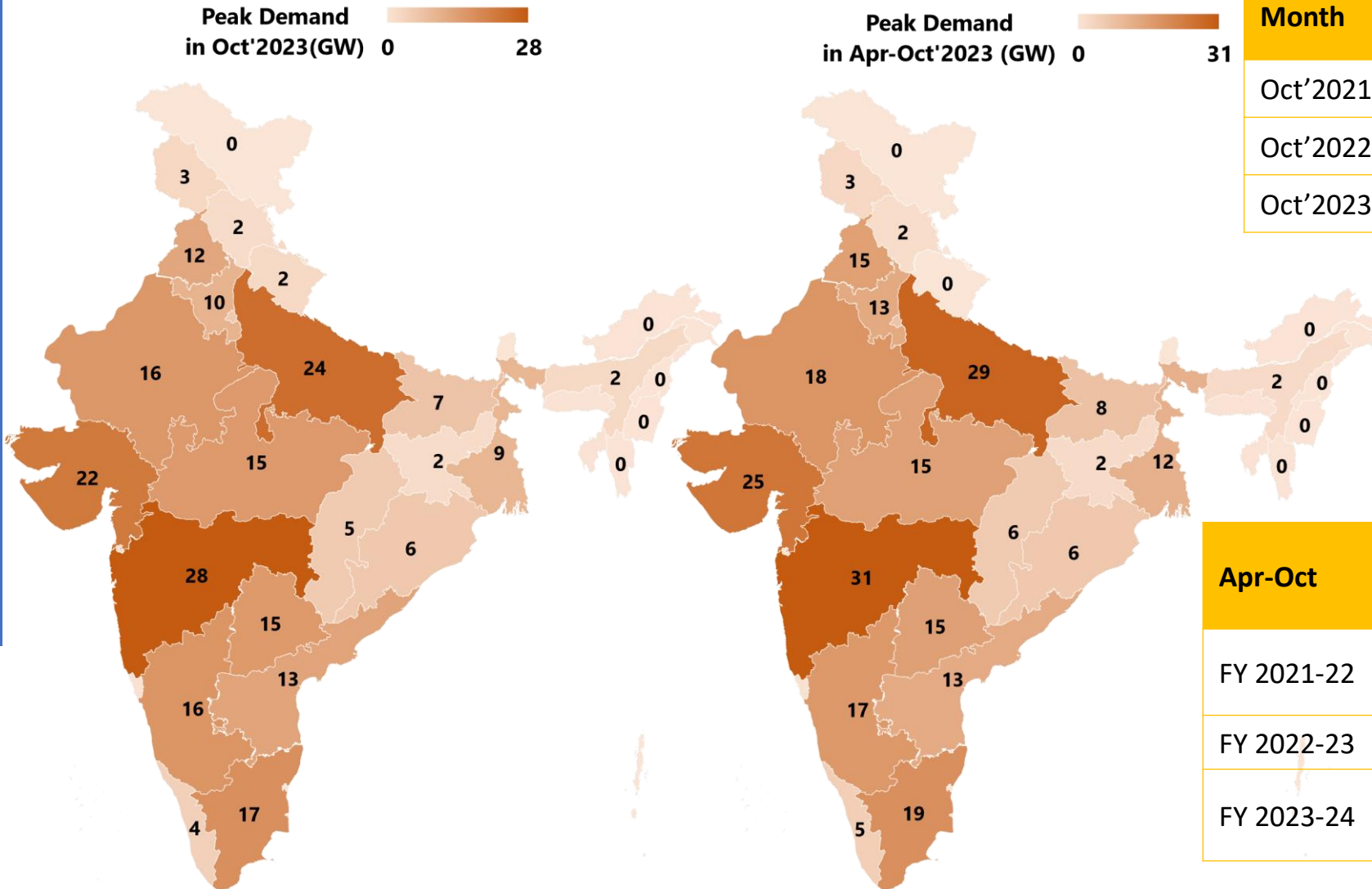


States with Highest Electricity Demand (BU)



National and State level Peak Electricity Demand

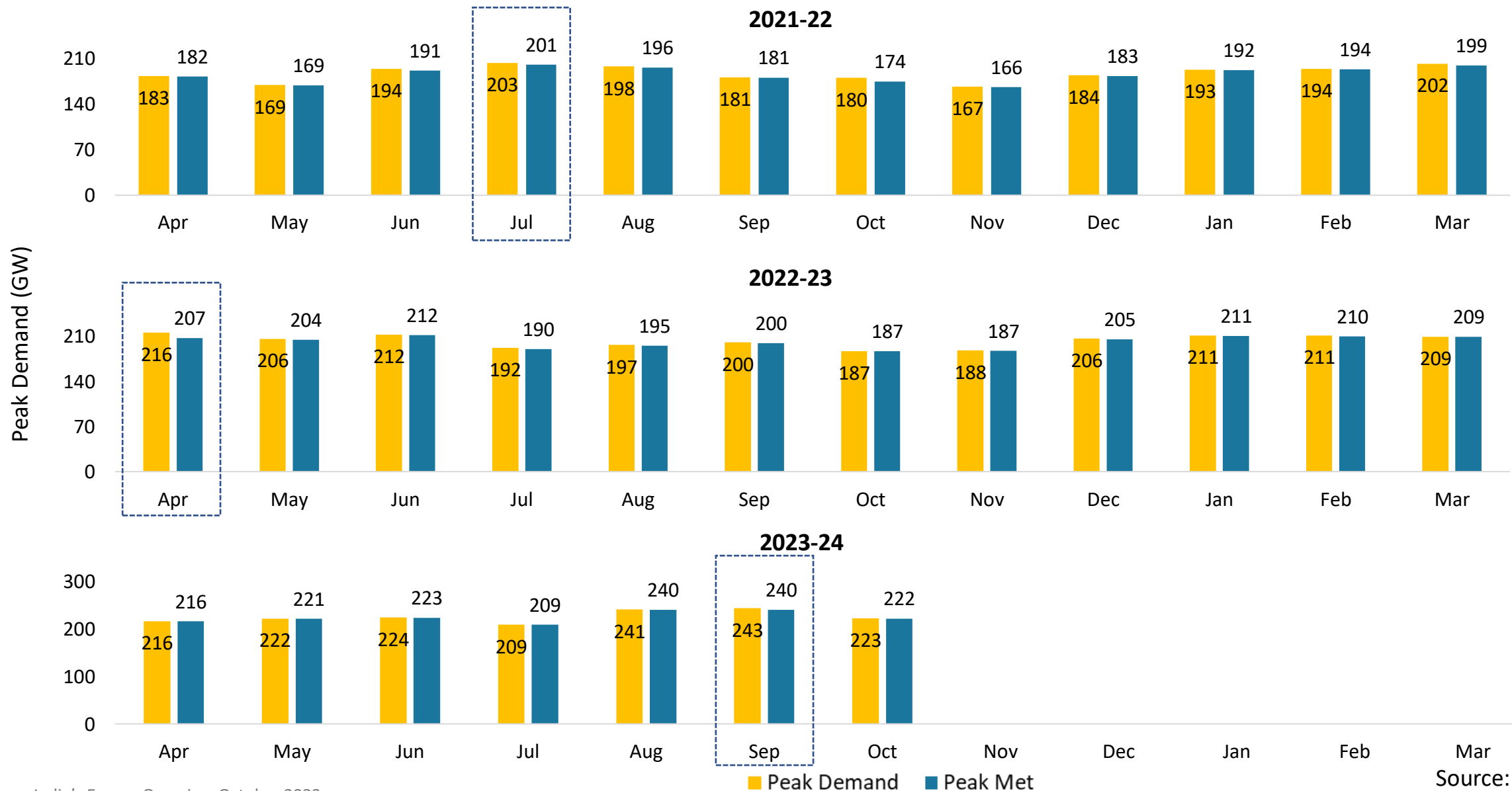
State-level Peak Electricity Demand (GW)



Month	Peak Demand (GW)	Peak Supply (GW)	Gap(BU) (+/-)
Oct'2021	180	174	5.8
Oct'2022	187	187	0.1
Oct'2023	223	222	1.0

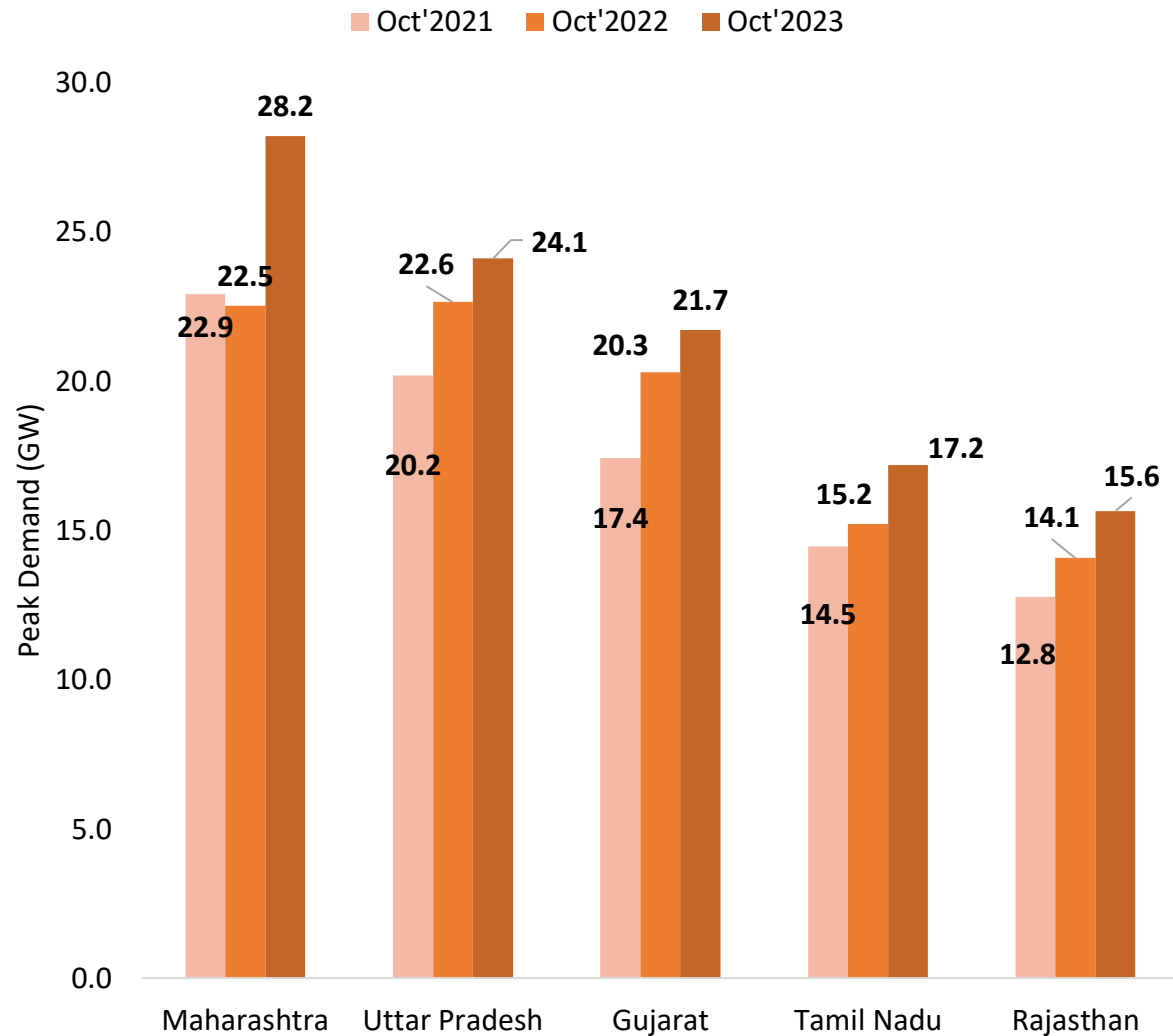
Apr-Oct	Peak Demand (GW)	Peak Supply (GW)	Gap (BU) (+/-)
FY 2021-22	203	201	3
FY 2022-23	216	207	9
FY 2023-24	243	240	3

India's Monthly Peak Electricity Demand and Supply

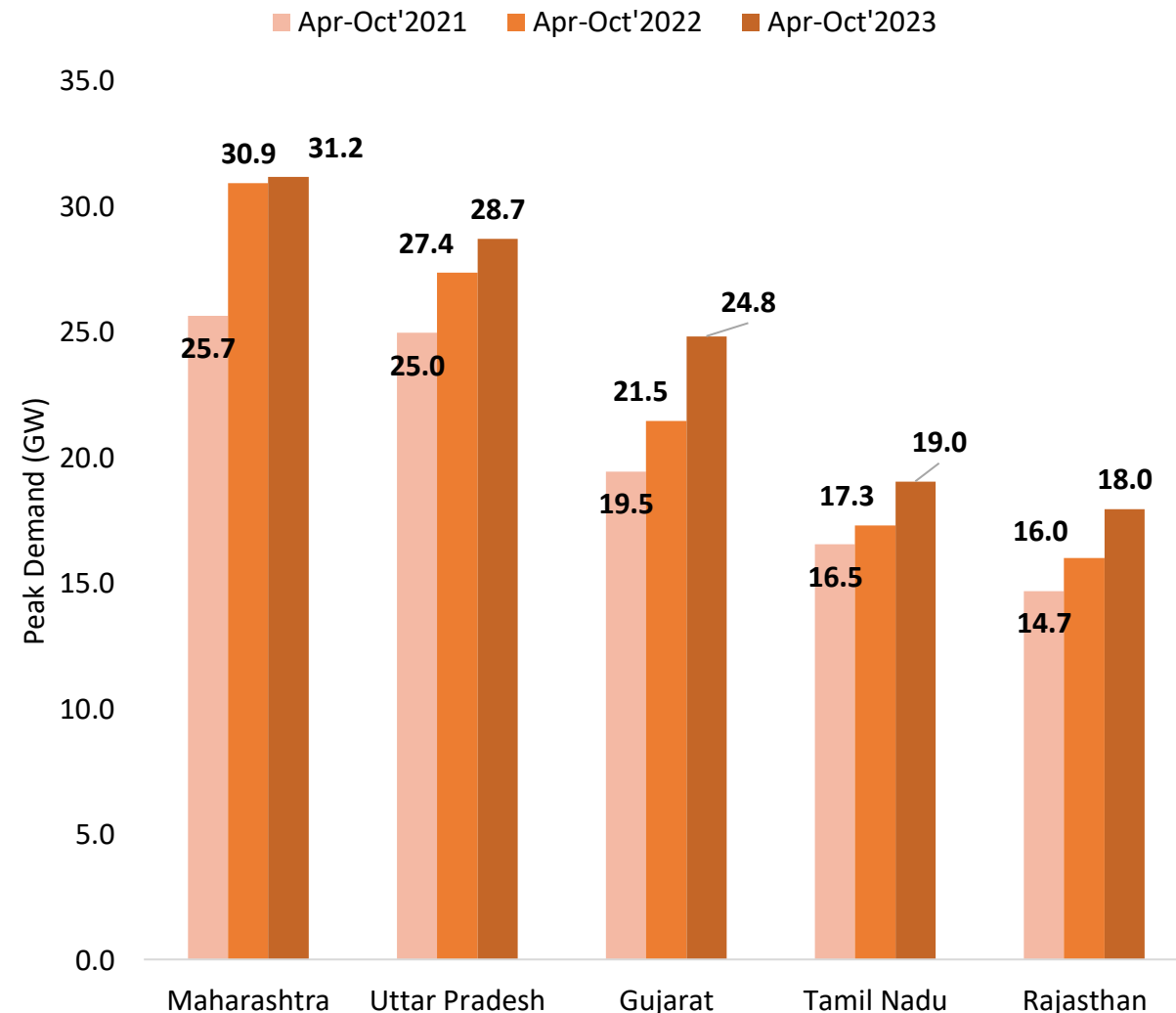


Monthly Peak Electricity Demand of the top 5 states

States with Highest Peak Electricity Demand in October (GW)

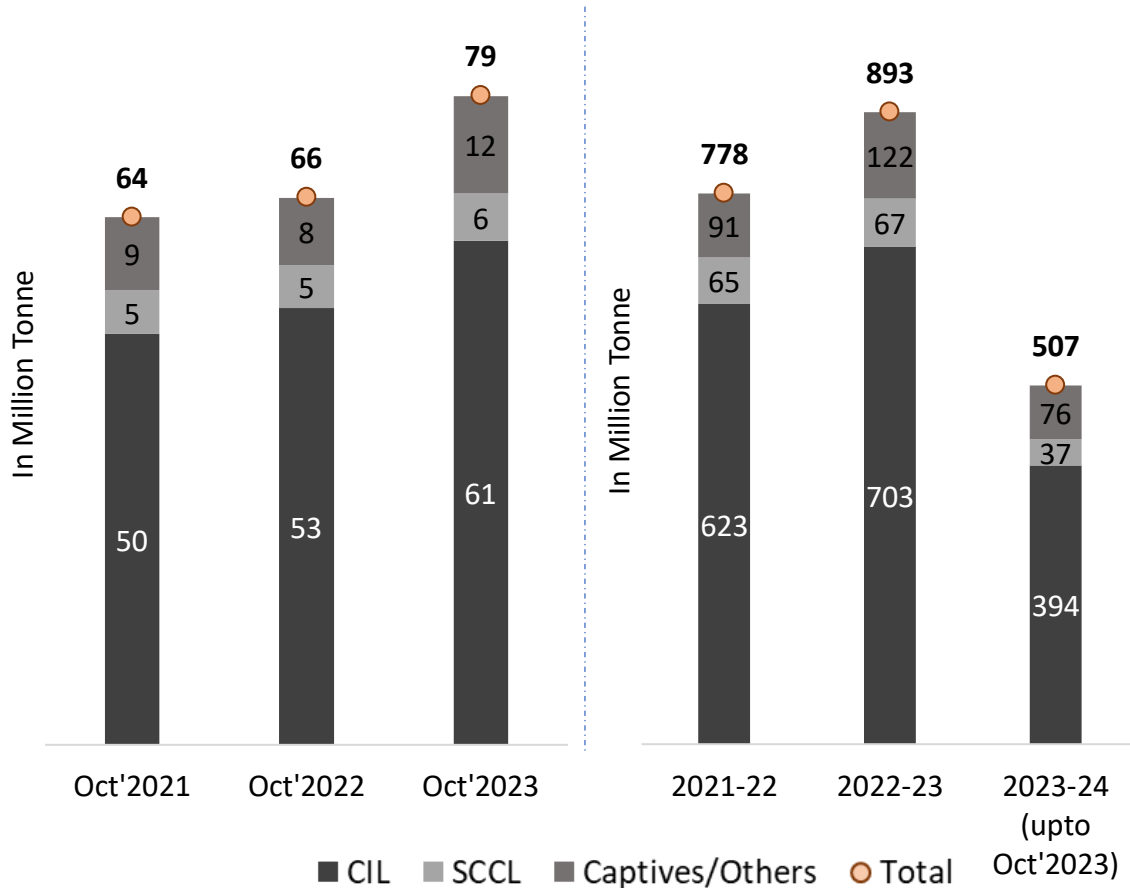


States with Highest Peak Electricity Demand (GW)



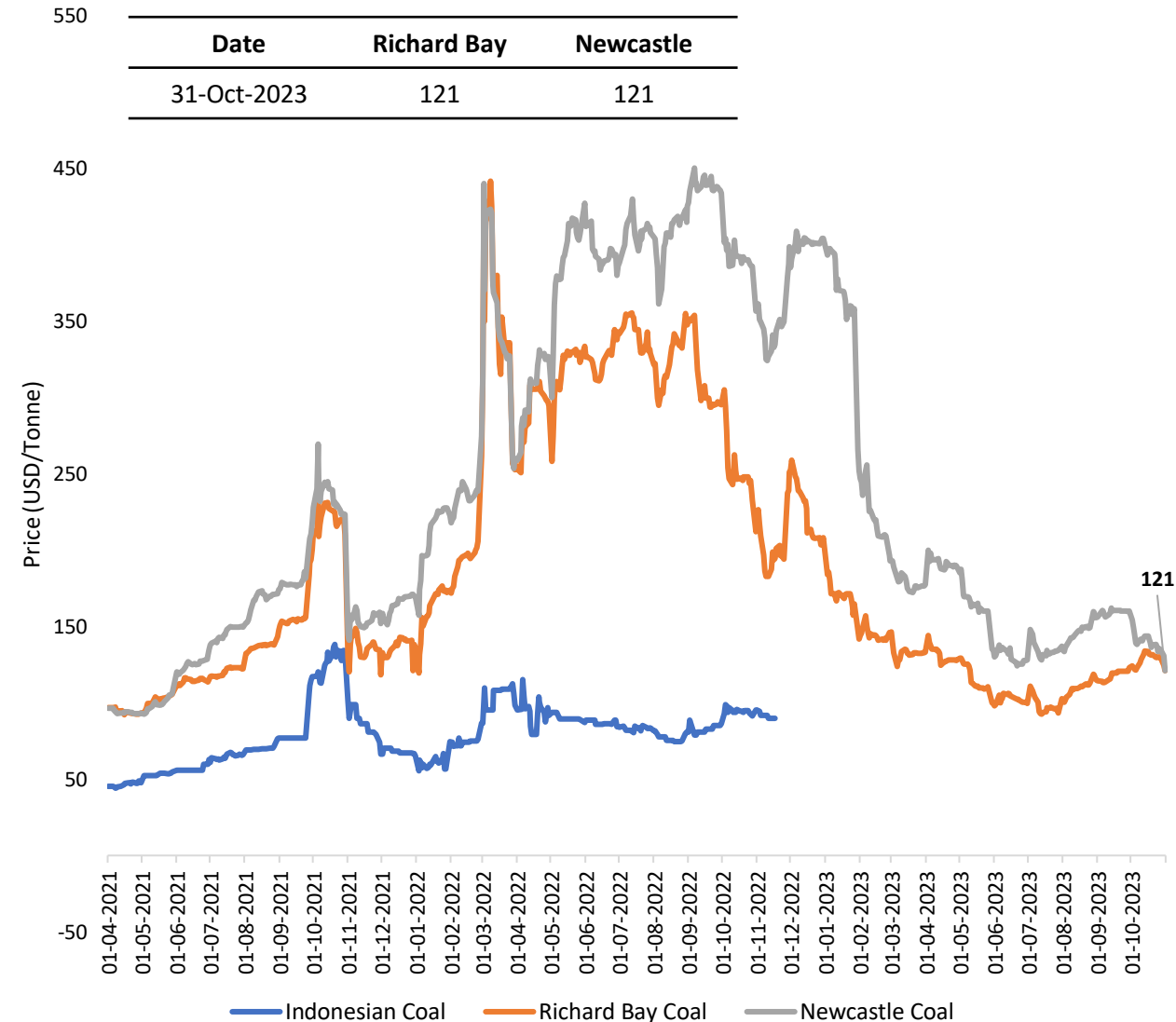
Monthly Coal Statistics

Monthly/ Annual Coal Production (in Million Tonnes)



India's coal production increased in Oct'2023 (79 MT) by 19% as compared to Oct'2022.

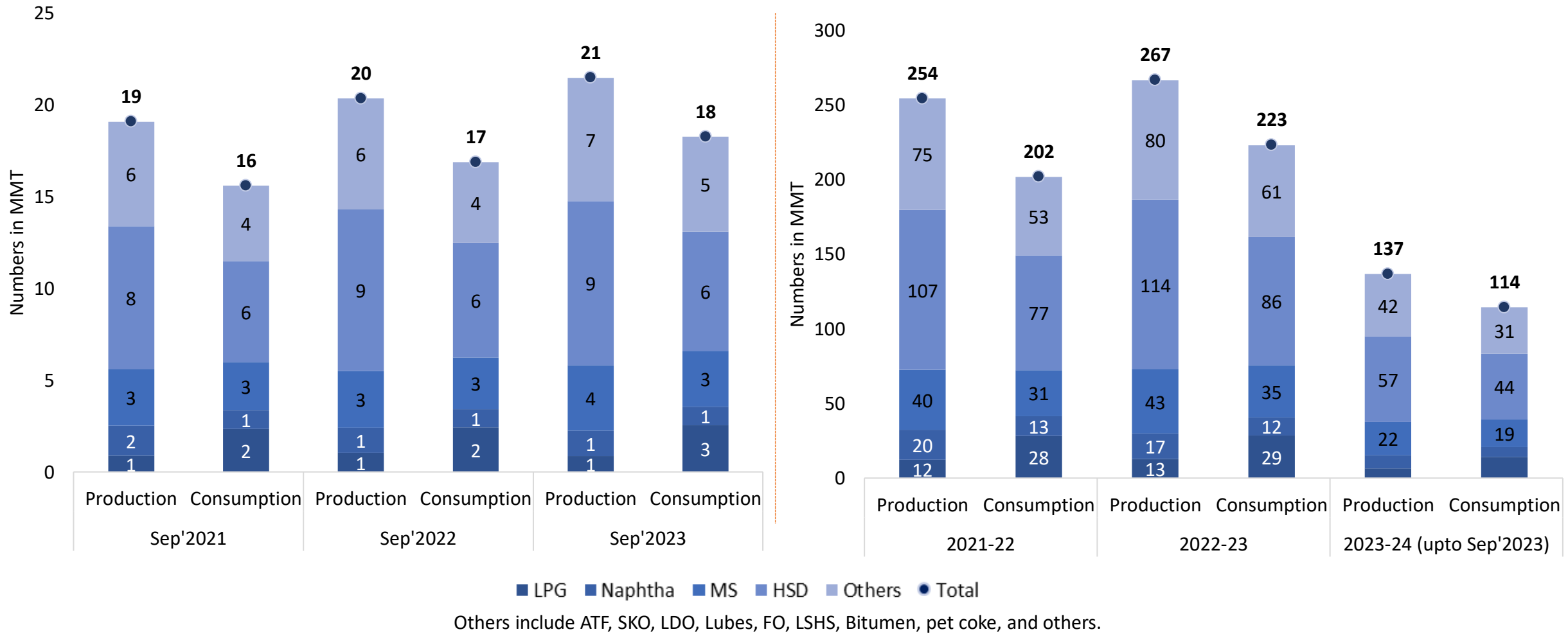
International Coal Prices



Source: Ministry of Coal

Petroleum Products Market Scenario (1/3)

Petroleum Product-wise Production & Consumption (MMT)



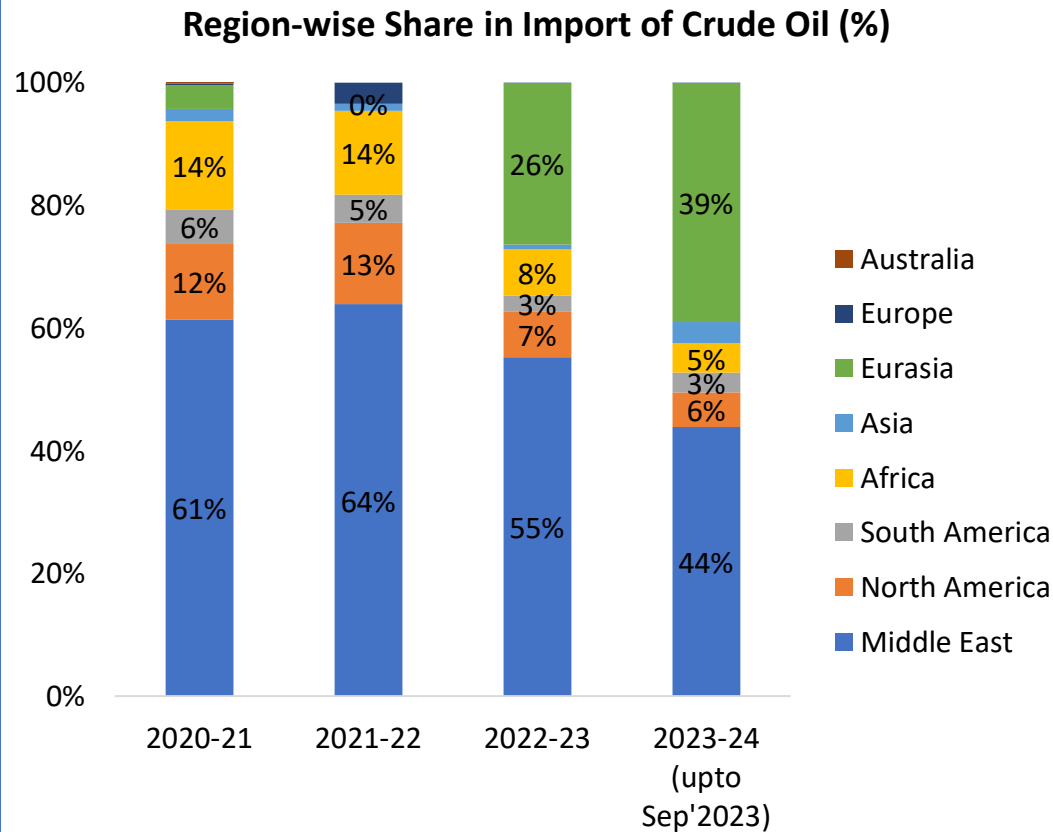
Abbreviations: ATF- Aviation Turbine Fuel, FO- Furnace Oil, HSD- High-Speed Diesel, LDO- Light Diesel Oil, MS- Motor Spirit (Petrol), SKO- Superior Kerosene Oil, LSHS- Low Sulphur Heavy Stock, LPG- Liquefied Petroleum Gas, MMT- Million Metric Tonne

Petroleum Products Market Scenario (2/3)

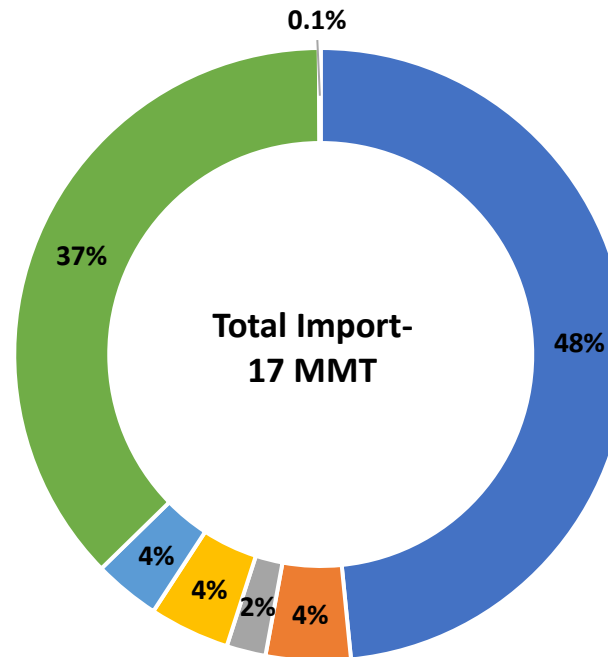
Import/Export of Crude Oil and Petroleum Products ('000 Tonnes)							
Petroleum Products	Import/ Export	Monthly			Yearly		
		Sep'21	Sep'22	Sep'23	2021-22	2022-23	2023-24 (upto Sep'2023)
Crude Oil	Import	17608	16772	17425	212382	232700	115825
	Export	0	0	0	0	0	0
	Net Import	17608	16772	17425	212382	232700	115825
LPG	Import	1563	1448	1615	17043	18335	8316
	Export	45	40	40	513	540	254
	Net Import	1518	1408	1575	16530	17796	8062
Diesel	Import	6	2	5	43	322	20
	Export	2795	2689	2324	32407	28494	13558
	Net Import	-2789	-2687	-2319	-32364	-28172	-13538
Petrol	Import	153	190	151	671	1069	446
	Export	851	672	993	13482	13127	7158
	Net Import	-698	-482	-842	-12812	-12058	-6712
Others	Import	1456	1627	2246	21259	24871	14071
	Export	1252	1818	1452	16352	18854	9706
	Net Import	203	-190	794	4907	6017	4365

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

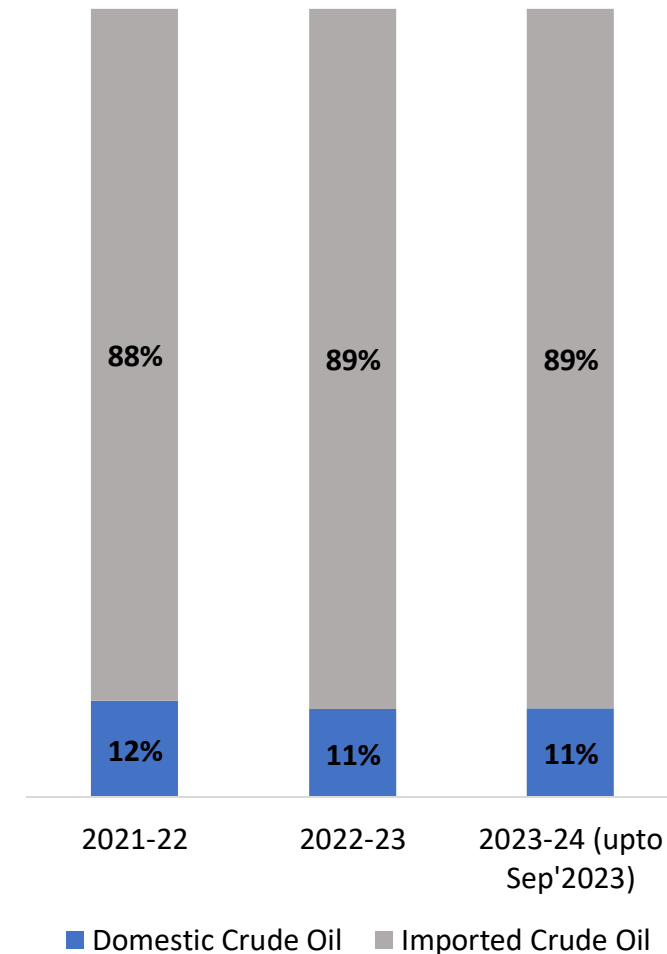
Petroleum Products Market Scenario (3/3)



Regional share of Imported Crude oil in September 2023



Domestic and Imported Crude Oil share in India (%)

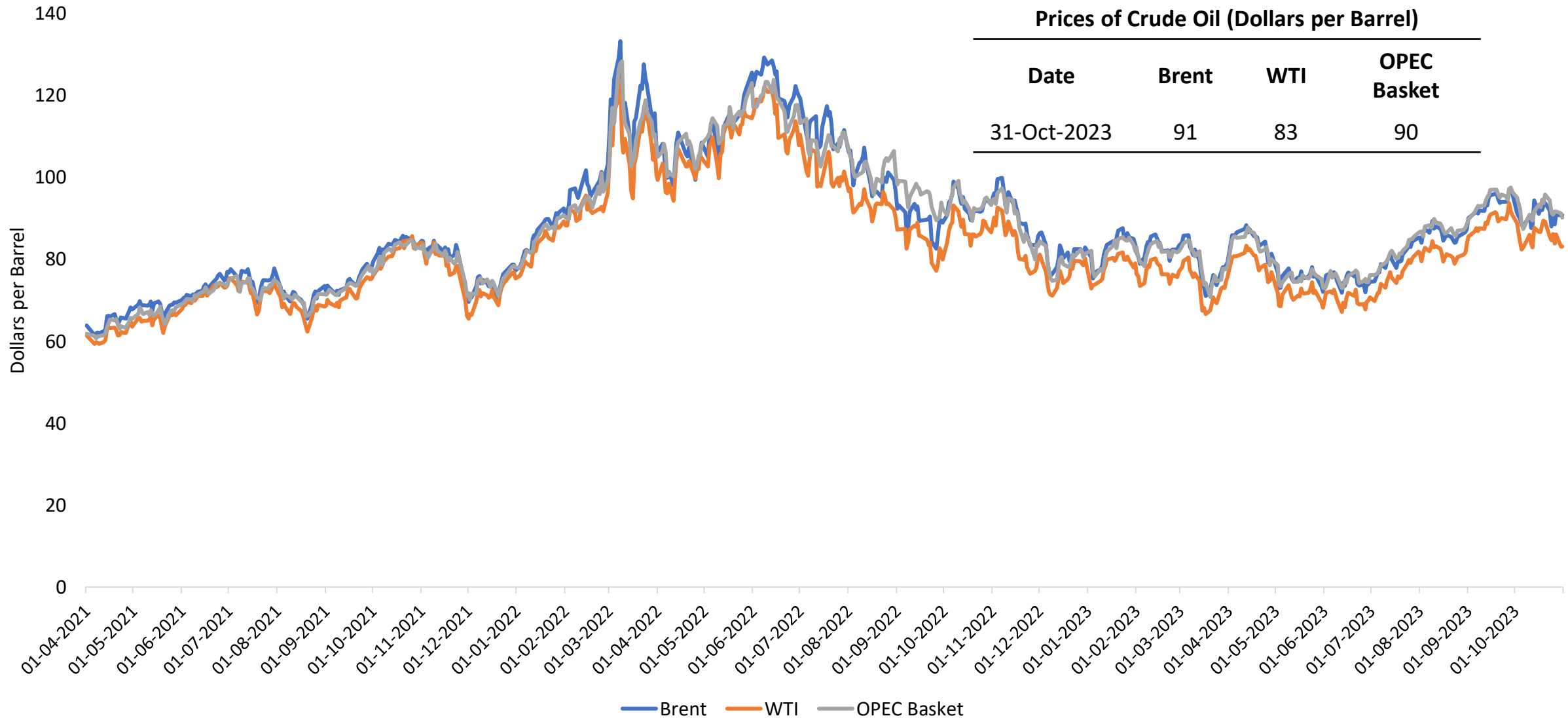


Total Import of Crude Oil (MMT)

Total Import	2021-22	2022-23	2023-24 (up to Sep'2023)
Crude Oil	212	233	116

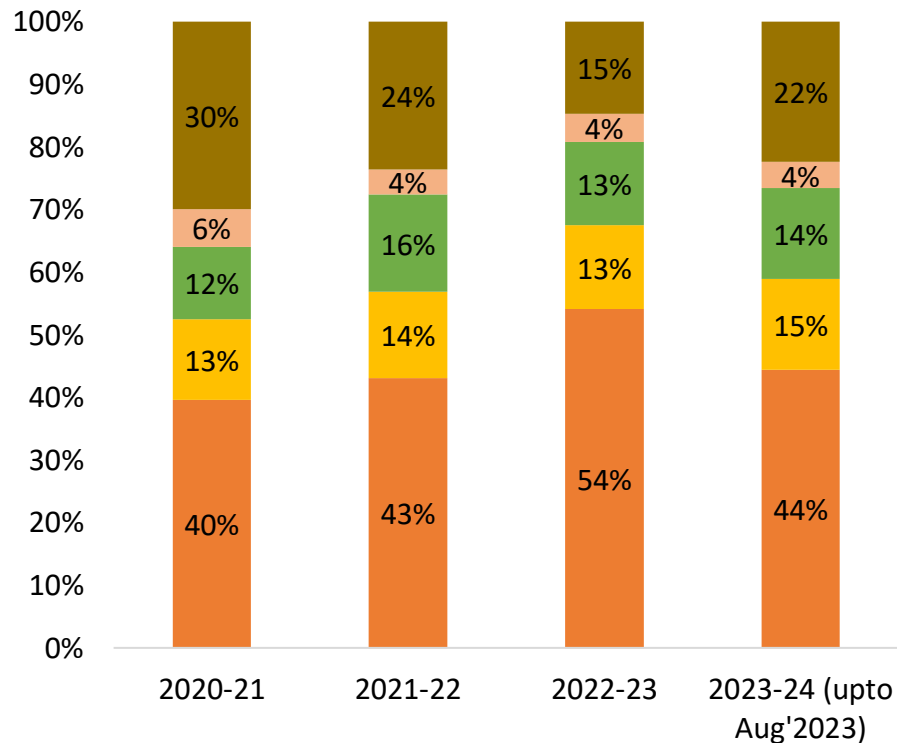
Daily Prices of Crude Oil

Daily Prices of Crude Oil

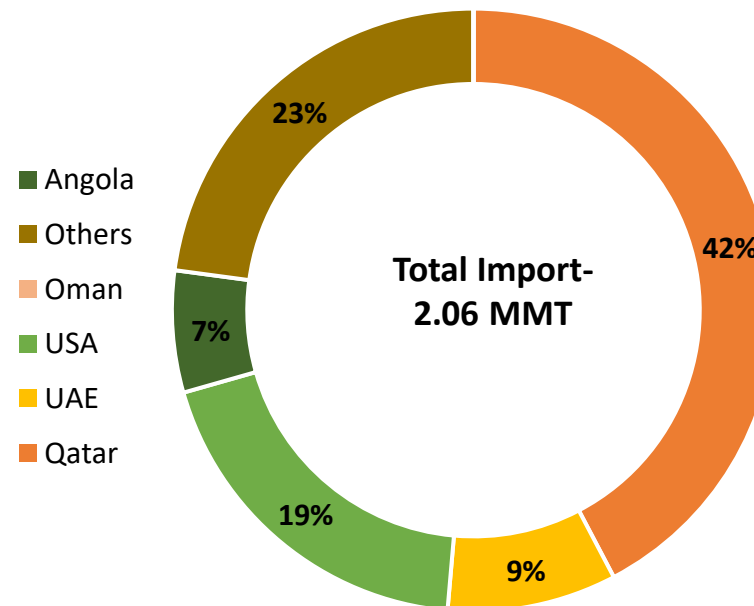


Gas Market Scenario

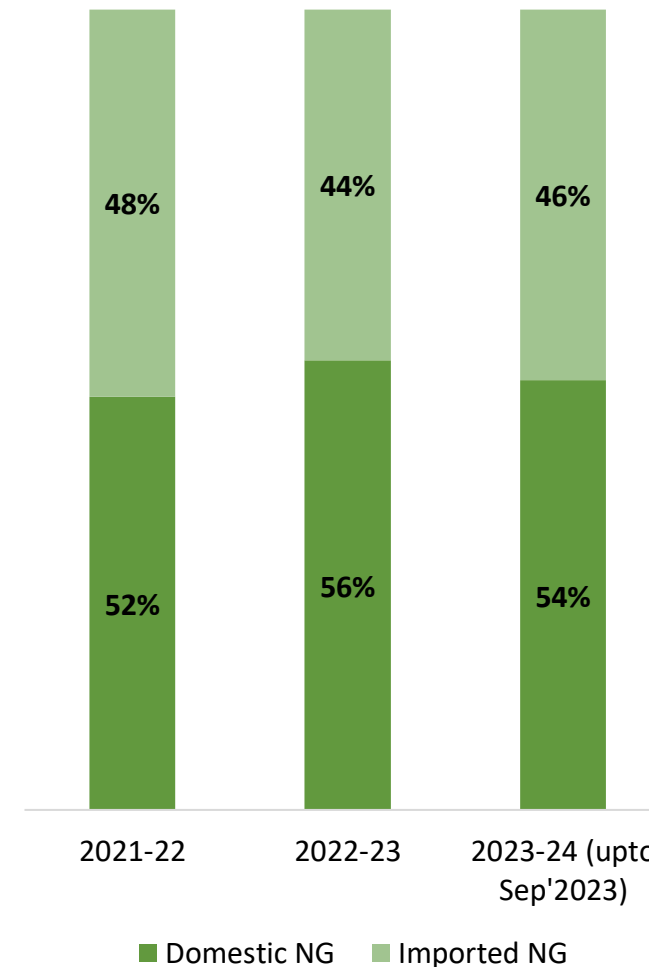
Region-wise Share in Import of LNG (%)



Country Share of Imported LNG in August 2023



Domestic and Imported Natural Gas share in India (%)



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

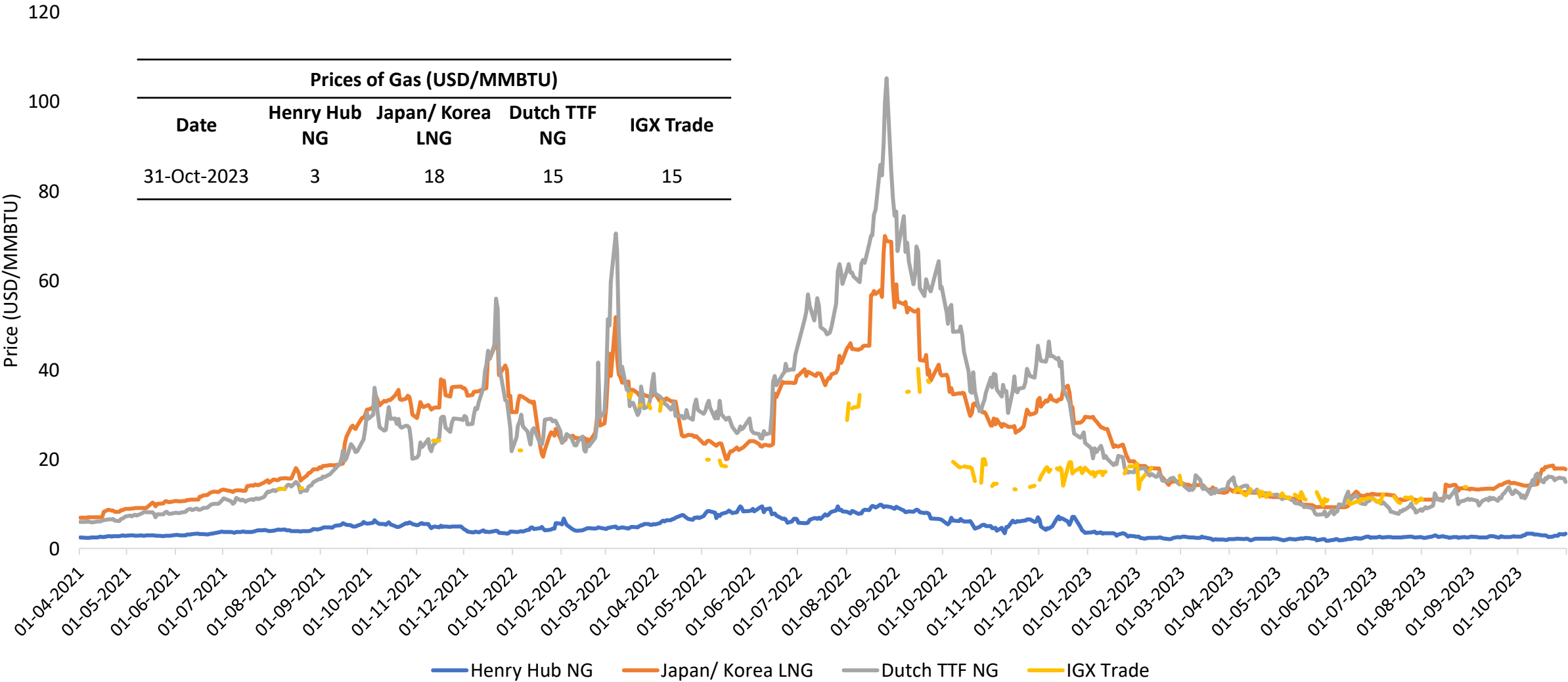
Total Import of Liquefied Natural Gas (LNG) (MMT)			
Total Import	2021-22	2022-23	2023-24 (upto Sep'2023)
LNG	23.42	19.85	11.40

NOTE: The data is latest available

Source: MoCI and PPAC

Daily Prices of Gas

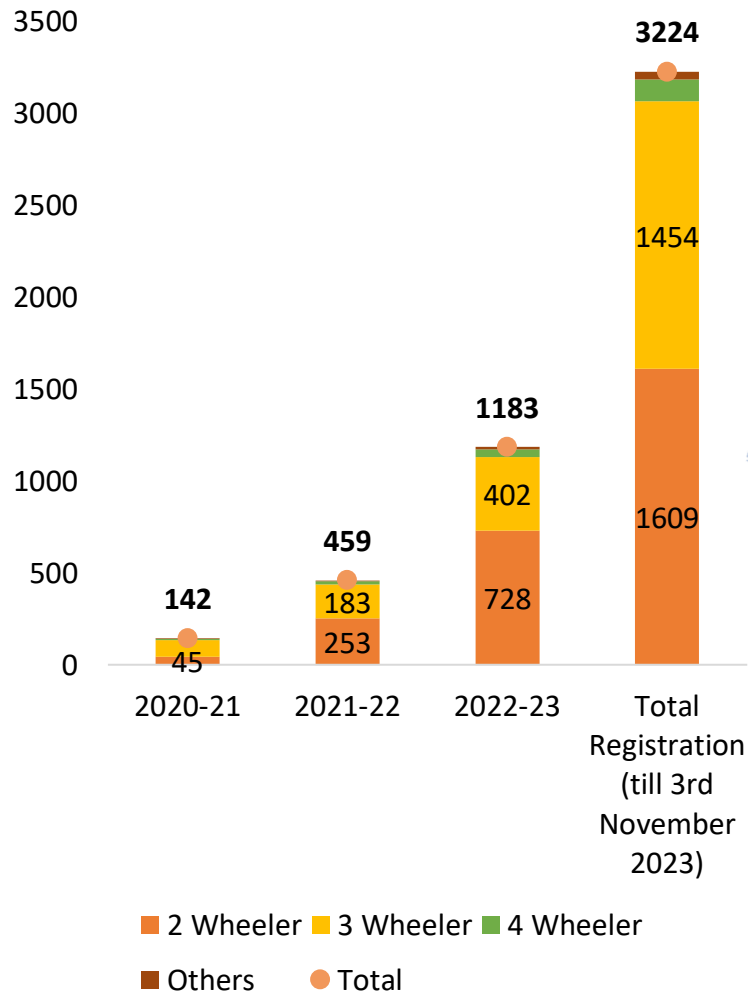
Gas Daily Market Price



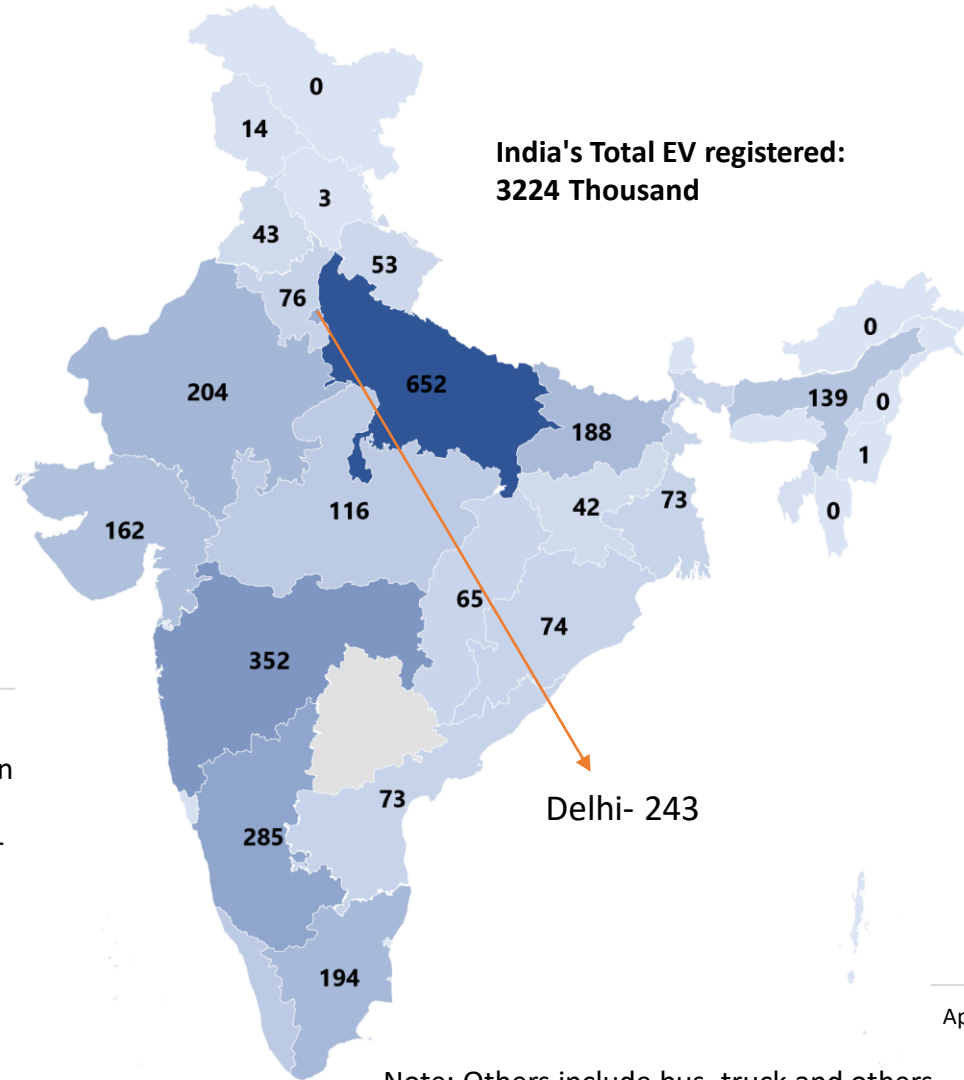
Prices of Gas (USD/MMBTU)				
Date	Henry Hub NG	Japan/ Korea LNG	Dutch TTF NG	IGX Trade
31-Oct-2023	3	18	15	15

Status of Electric Mobility in India

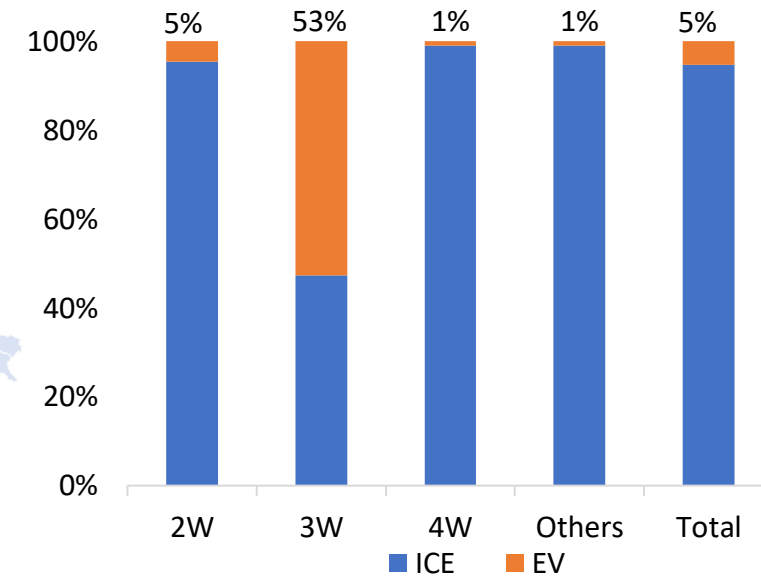
National EV registration (in Thousands)



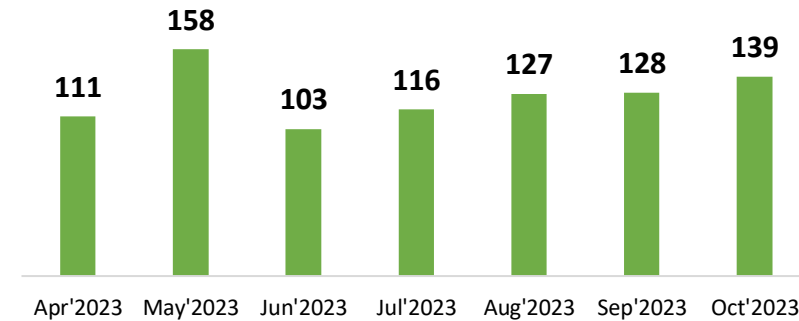
Cumulative State-wise EV registration as on 3rd November 2023 (in Thousands)



EV and ICE sale composition in 2022-23



Provisional Monthly EV registered (in Thousands)



Note: Others include bus, truck and others

Source: VAHAN Dashboard

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.

[CFA/ subsidy](#) is available for residential solar rooftop projects up to 10kW.

CFA is applicable under [RTS Phase II](#) for residential consumers in rural areas under the VNM arrangement up to 3kW.

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.

[Approved List of Models and Manufacturers](#) abeyance till 31 March 2024. MNRE has reduced the application fee by 80% and the inspection fee by 70%.

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 [draft National Repowering Policy](#) 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.

The [pilot projects](#) are:

- i. 1.4 MW SPV Project with 1.4 MWh BESS in Lakshadweep.
- ii. 50 MWp SPV Project with 20 MW/50 MWh BESS in Phyang, Ladakh
- iii. 100 MW SPV Project with 40 MW/120 MWh BESS in Chhattisgarh.

Green Hydrogen (H₂)

[National Green Hydrogen Mission](#) 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.

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

MNRE has proposed using [green H₂ in Direct Reduced Iron \(DRI\) production](#) by partly replacing natural gas with H₂ in gas-based DRI plants.

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.

The pilot projects are-

- i. 25kW AC hydrogen grid at NETRA that includes a 500kW PEM electrolyzer
- ii. 5MW PEM electrolyzer at NTPC Vindhyachal.

Key Highlights or Announcements of October 2023

- The Ministry of Power has revised the guideline for [blending of imported coal from 4% to 6%](#) (for all the central, state-generating companies, and IPPs till March 2024) due to the inadequate supply of domestic coal, variable monsoon rainfall, and recent floods in Sikkim affected approximately 2 GW of hydro capacity.
- Government of Gujarat released the [Gujarat Renewable Energy Policy 2023](#). The policy aims to achieve a 50% target of RE capacity by 2030 with investments of around Rs. 5 lakh crores by utilizing approximately 4 lakh acres of land.
- Government of Rajasthan unveils the [Rajasthan Renewable Energy Policy 2023](#). The new policy aims to achieve 90 GW of RE capacity by 2029-30, including 65GW of solar, 15 GW of wind and hybrid, and 10 GW of hydro and storage.
- The Ministry of Environment, Forest and Climate Change (MoEFCC) has released the [Green Credit Rules, 2023](#). The program will incentivize environmental positive actions through market-based mechanisms and generate green credit, which will be tradable and made available for trading on a domestic market platform. And will also encourage industries, companies, and other entities to meet their existing obligations, and to undertake voluntary environmental measures by generating or buying green credit.
- The MoEFCC released the [Battery Waste Management \(Amendment\) Rules, 2023](#) on 25th October 2023. The new amendment outlines the obligations and responsibilities of battery producers, recyclers, and refurbishers.
- The MoEFCC has notified the new [draft Ecomark Certification Rules, 2023](#) on 11 October 2023. These rules provide a comprehensive framework for developing and implementing the Ecomark certification scheme for labelling products which have lesser adverse impacts on the environment, with the objective to encourage the consumers to adopt such products, thereby supporting the principles of 'Lifestyle for Environment (LiFE)' and aiding manufacturers in transitioning to the production of Ecomark-certified products for promoting sustainability and a circular economy.
- The Ministry of Power notified the minimum [renewable energy consumption obligation](#) for the year 2024-2030. The obligation will have to be met directly, or through the purchase of renewable energy certificates (issued to those surpassing their target).

Key Highlights or Announcements of October 2023

- The government of Maharashtra has unveiled the [Maharashtra Green Hydrogen Policy 2023](#), aiming to produce a minimum of 0.5 million metric tons of green hydrogen annually in the state by 2030. The key highlights are:
 - 50% waiver in the electricity transmission and wheeling charges for 10 years.
 - 100% waiver in cross-subsidy, additional surcharge, and electricity duty for 15 years.
 - A subsidy of Rs 50 per kg will be provided for blending green hydrogen with CNG or PNG for 5 years.
 - First 20 green hydrogen refueling stations will receive a 30% capital cost subsidy, with a maximum limit of Rs 4.50 crore.
 - First 500 green hydrogen-based fuel cell passenger vehicles will be eligible for a capital cost subsidy of up to Rs 60 lakh per vehicle, subject to a 30% subsidy, with a maximum limit of 50 vehicles to each local bodies in the state.
 - Rs 4 crore per annum for ten years for recruitment of skilled manpower, their training, skill development, and single window facility.
- The Ministry of Power has issued a draft notification regarding the [renewable generation obligation for coal/lignite-based power plants](#), reducing the requirement from the existing 40% to a range of 6%-10%.

Commercial Operation Date (COD) of coal/lignite based generating station	Minimum RGO (%)	Due Date for RGO compliance
On or before 31 st March 2023	6%	1 st April 2026
	10 %	1 st April 2028
1 st April 2023 to 31 st March 2025	10%	1 st April 2025
1 st April 2025 onwards	10%	From COD of coal/lignite based generating station



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