

# India's Energy Overview

May 2023



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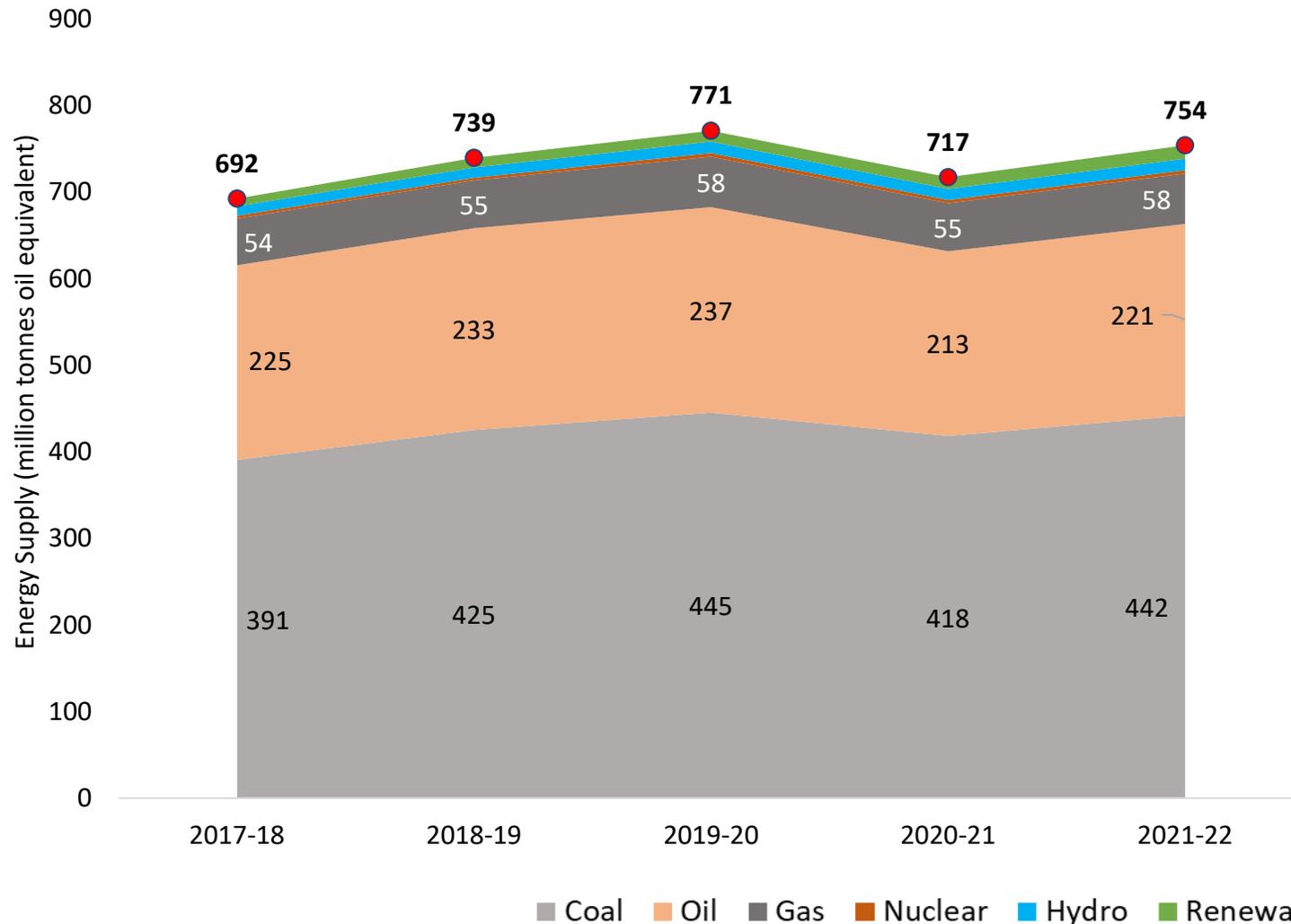
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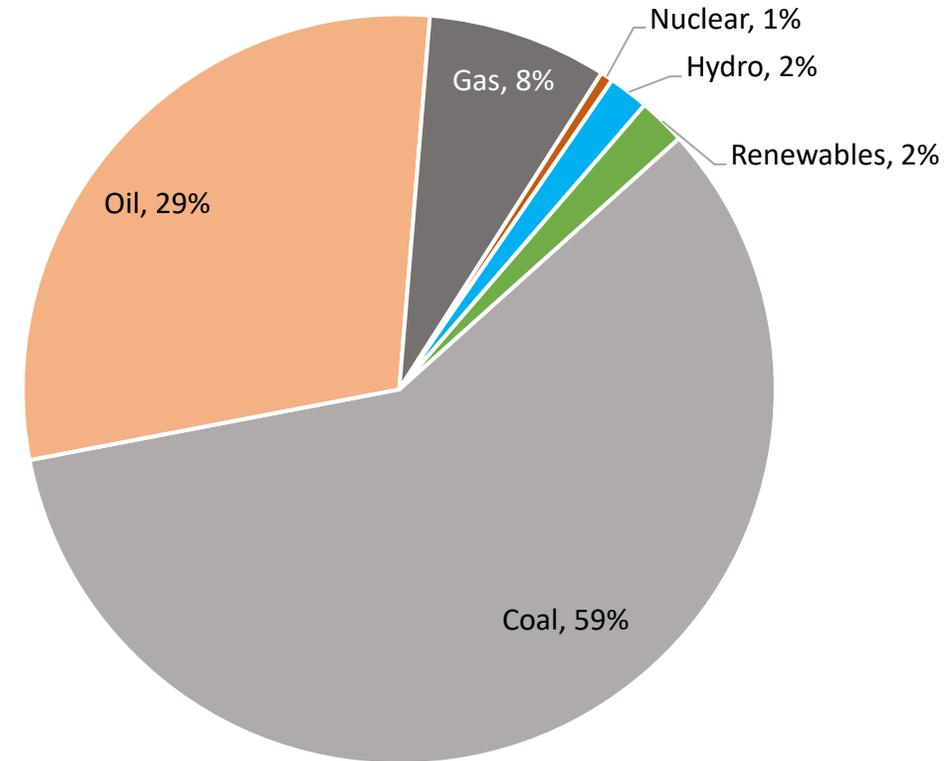
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# Primary Energy Mix\* in India

Source-wise Primary Energy Supply (mtoe)\*

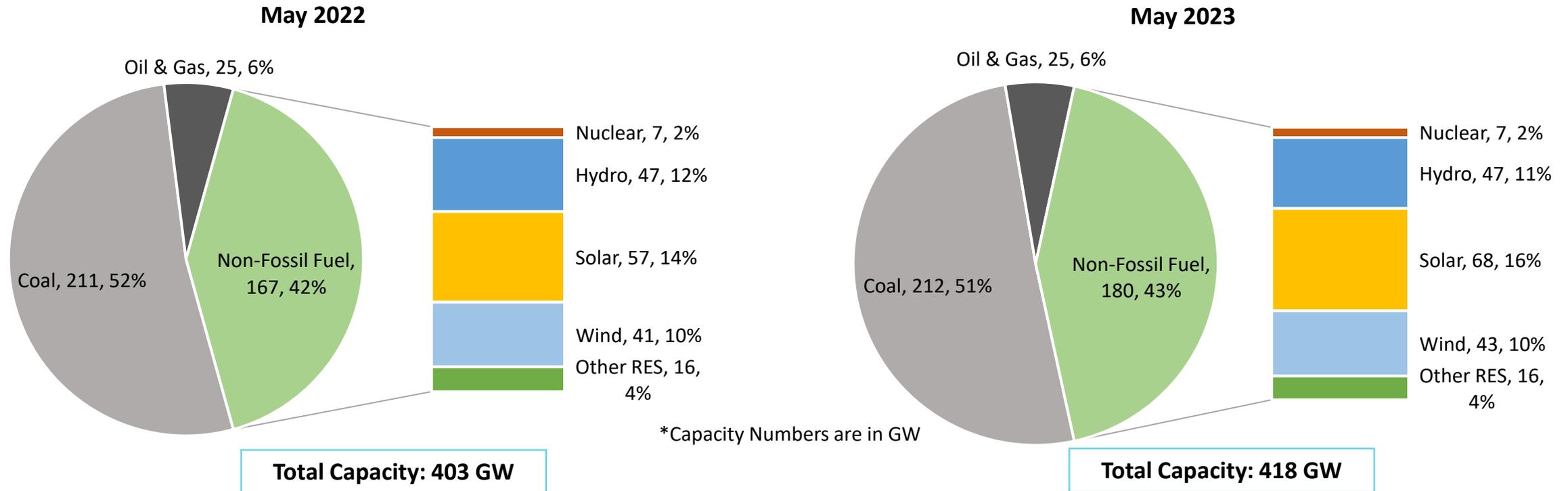


Share of Source-wise Primary Energy Supply\* in 2021-22 (%)



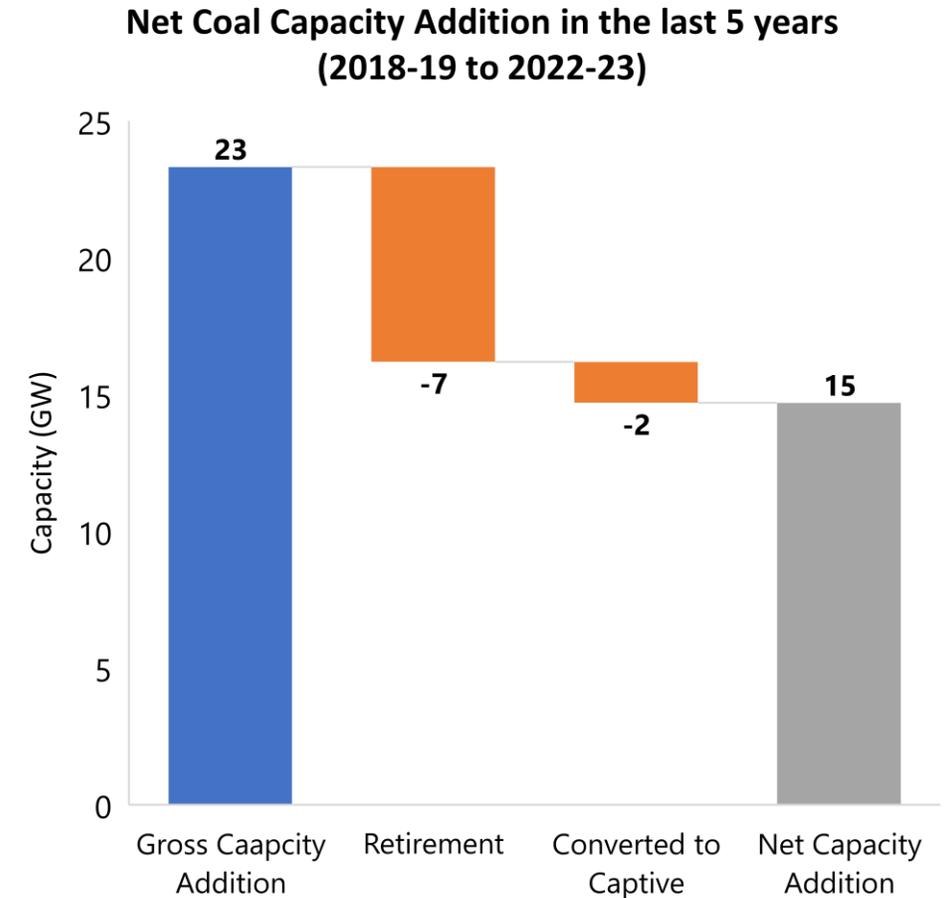
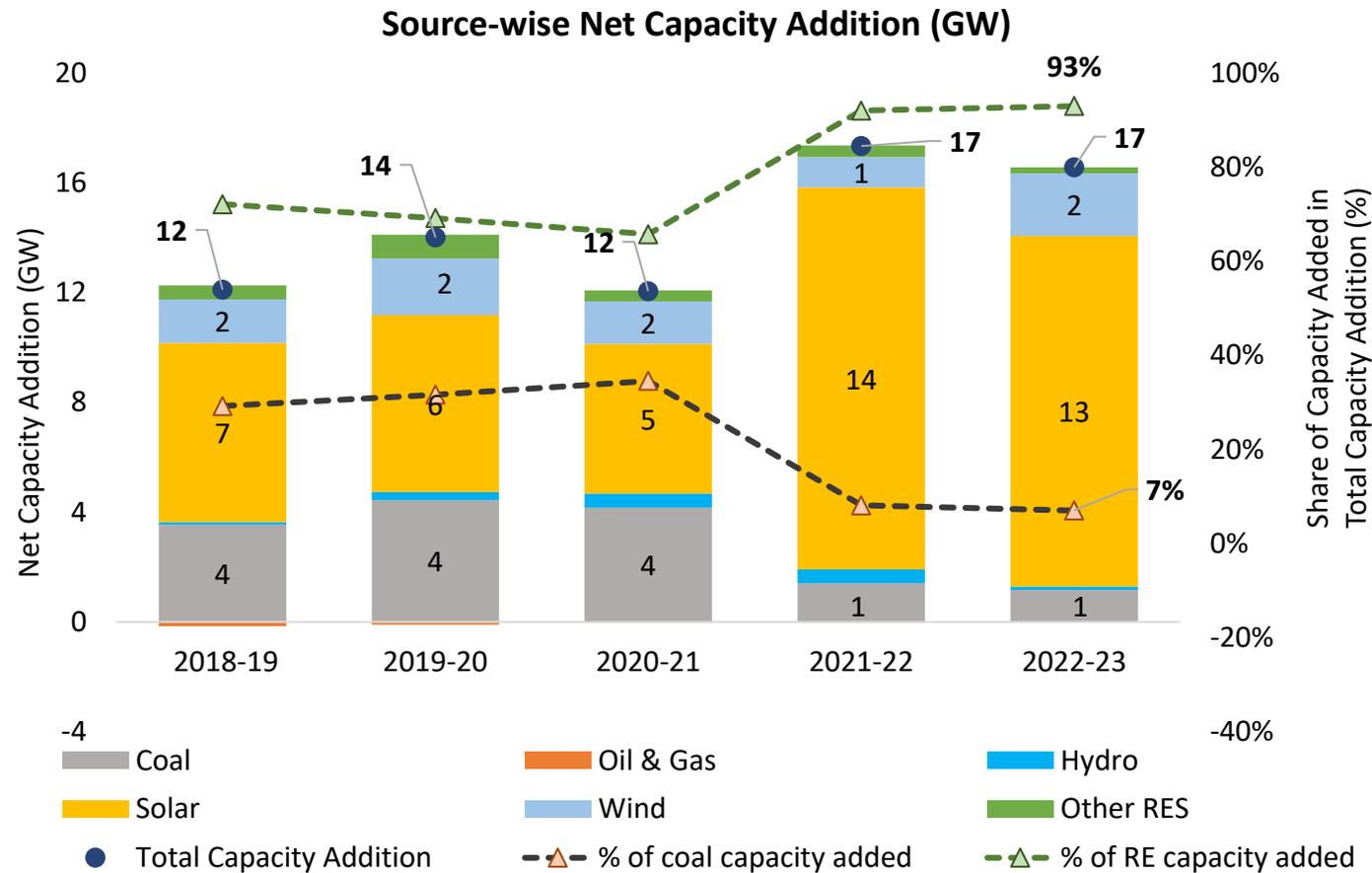
\*Excluding biofuels, waste, and other non-commercial source of energy

# India's Electricity Capacity Mix (Utility-scale)



- India's electricity generating capacity is 418 GW as on May'2023 [coal 212 GW (51%), solar 68 GW (16%), hydro 47 GW (11%), and wind 43 (10%)].
- As on May'2023, the share of non-fossil-based electricity capacity is 43% against the set target of 50% non-fossil capacity by 2030.
- As on May'2023, India's renewable energy capacity (including large hydro) stood at 174 GW out of 418 GW.

# India's Electricity Capacity Addition in last 5 years



- A total of 58 GW of generation capacity has been added in RE (Hydro, solar, wind, and other) over the past 5 years, whereas the net coal capacity addition during the same period was 15 GW, mostly in the central sector.
- The share of RE addition in total capacity has shown an increasing trend (from 72% in 2018-19 to 93% in 2022-23).

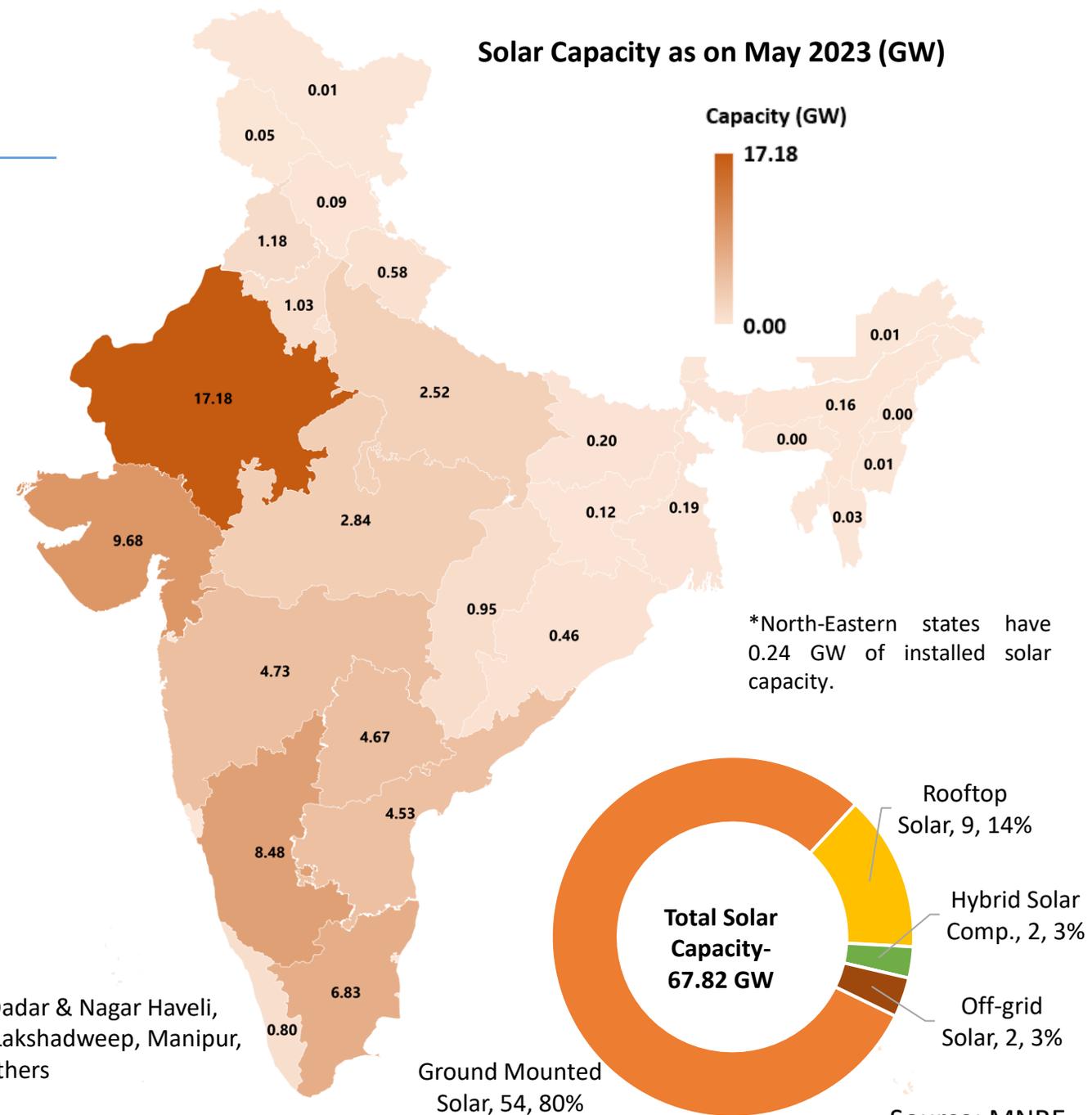
# State-wise Solar Capacity

as on May 2023

State-wise installed capacity of Solar Power (GW)					
States	Ground Mounted	Rooftop	Solar Component in Hybrid	Off Grid	Total Solar Power
Rajasthan	14.1	0.9	1.6	0.6	17.18
Gujarat	6.6	2.7	0.3	0.1	9.68
Karnataka	7.7	0.8	0.0	0.0	8.48
Tamil Nadu	6.3	0.4	0.0	0.1	6.83
Maharashtra	3.0	1.5	0.0	0.2	4.73
Telangana	4.4	0.3	0.0	0.0	4.67
Andhra Pradesh	4.3	0.2	0.0	0.1	4.53
Madhya Pradesh	2.5	0.3	0.0	0.1	2.84
Uttar Pradesh	2.1	0.3	0.0	0.2	2.52
Punjab	0.8	0.3	0.0	0.1	1.18
Haryana	0.3	0.4	0.0	0.3	1.03
Chhattisgarh	0.5	0.1	0.0	0.4	0.95
Kerala	0.3	0.5	0.0	0.0	0.80
Uttarakhand	0.3	0.3	0.0	0.0	0.58
Others	0.9	0.7	0.0	0.3	1.83
All India	54.02	9.50	1.89	2.41	67.82

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 May 2023 (GW)

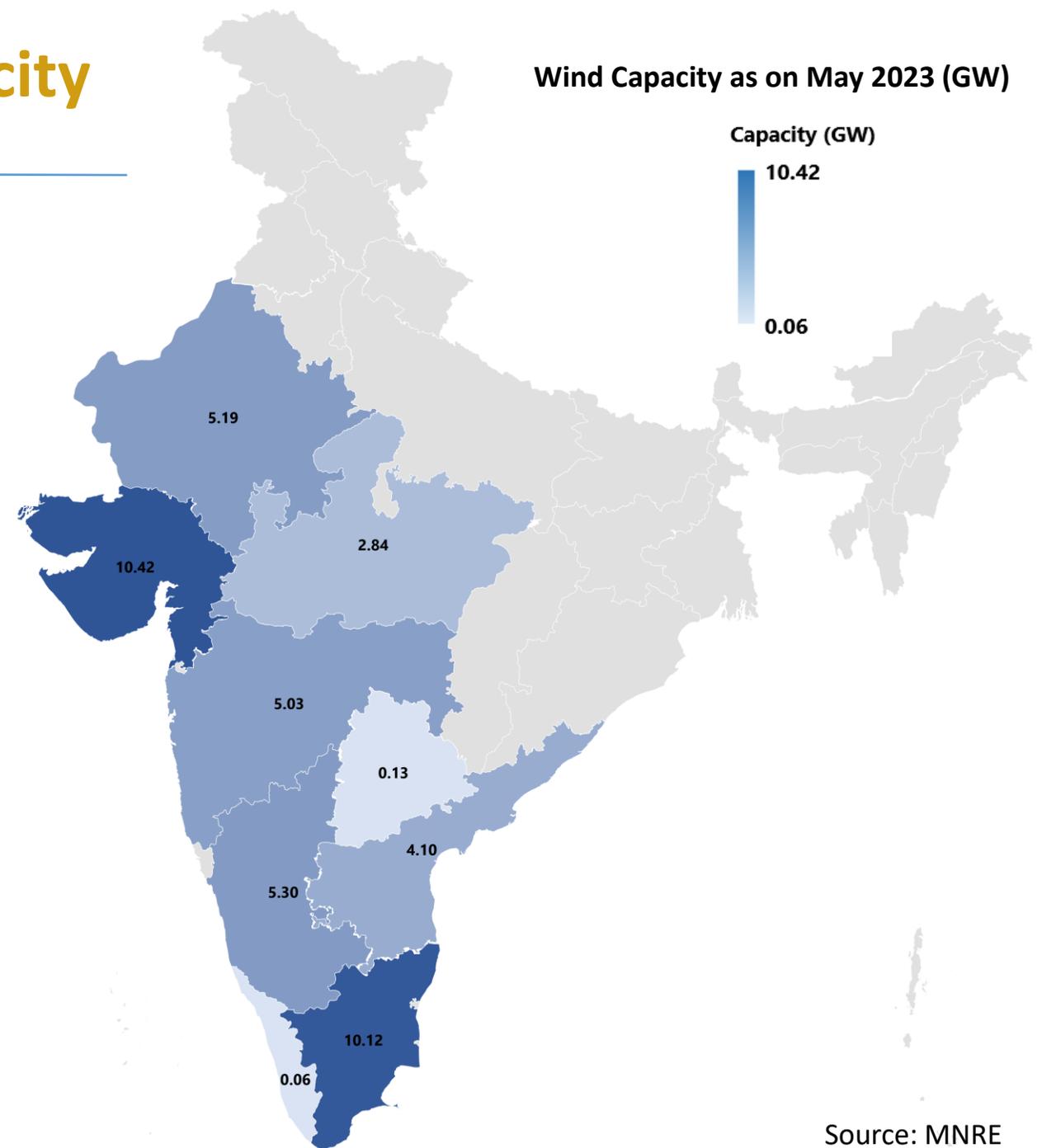


\*North-Eastern states have 0.24 GW of installed solar capacity.

# State-wise Wind Onshore Capacity

as on May 2023

State-wise installed capacity of Wind (Onshore) Power	
States	Installed Capacity (GW)
Gujarat	10.42
Tamil Nadu	10.12
Karnataka	5.30
Rajasthan	5.19
Maharashtra	5.03
Andhra Pradesh	4.10
Madhya Pradesh	2.84
Telangana	0.13
Kerala	0.06
<b>India Total</b>	<b>43.20</b>

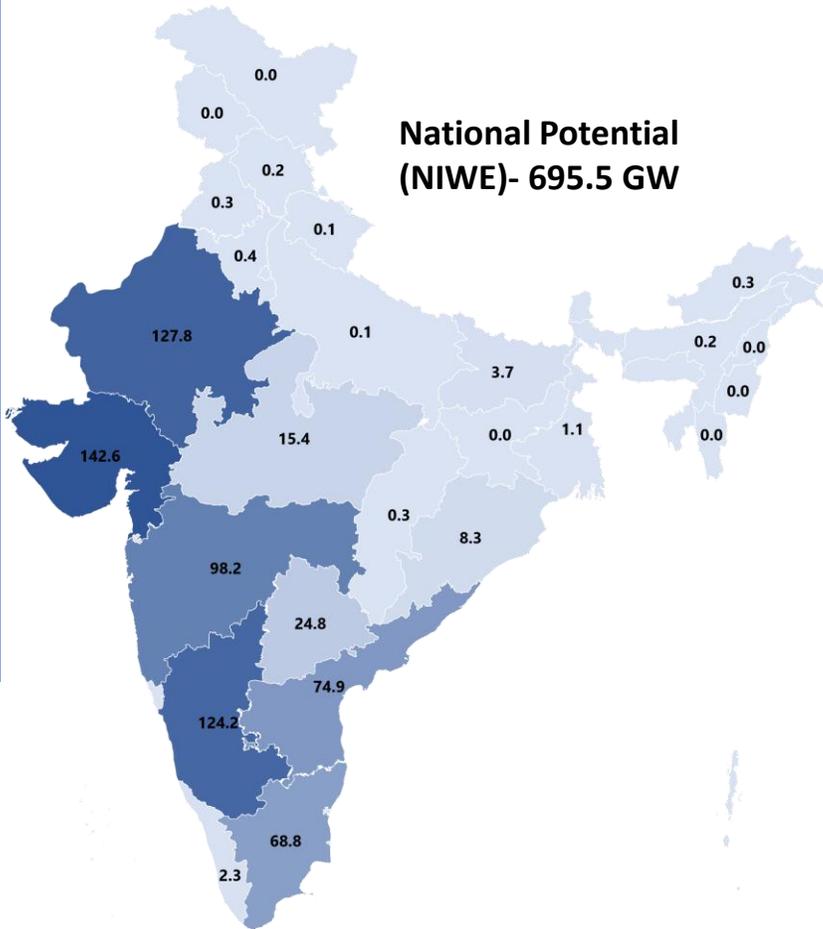


# RE Potential and Installed Capacity (1/2)

## RE potential in the state

Wind Onshore Potential at 120m agl

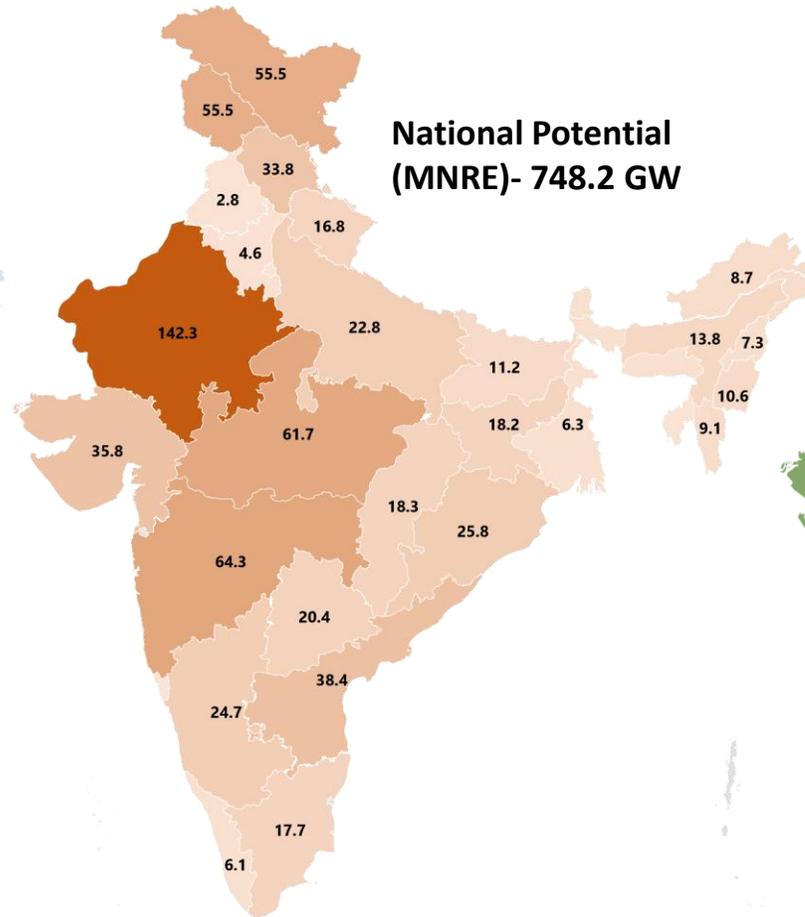
State Potential (GW) 0.0 142.6



National Potential (NIWE)- 695.5 GW

Solar Potential

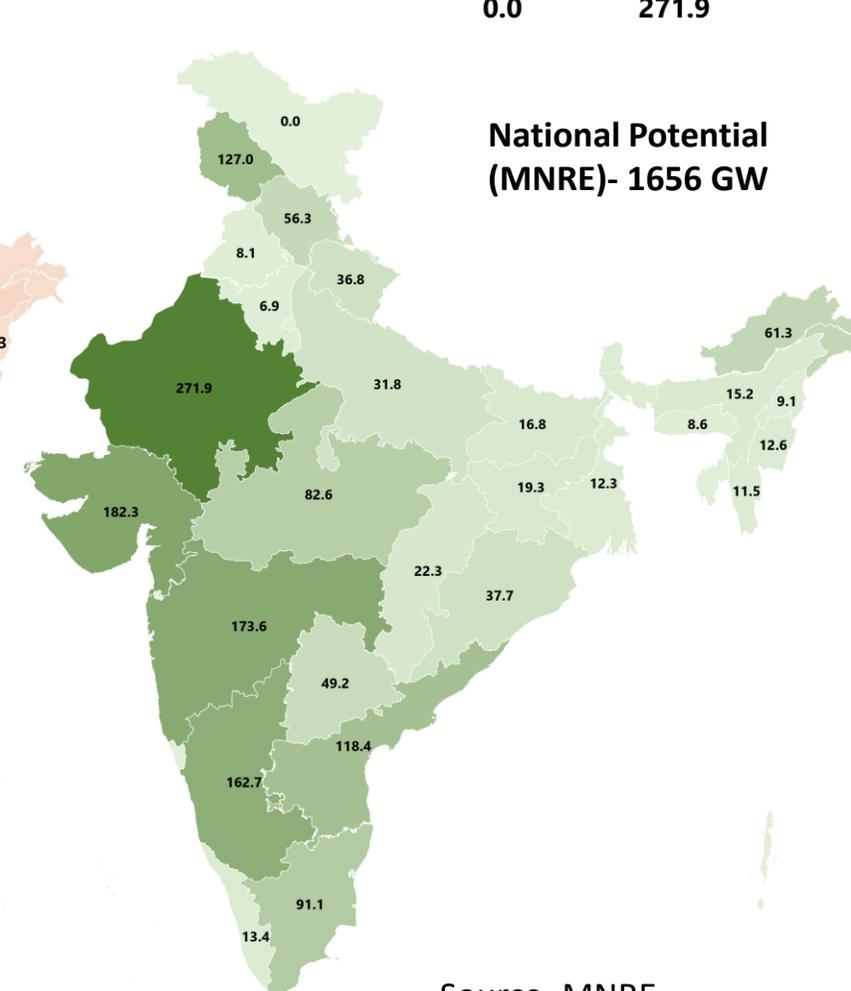
State Potential (GW) 0.9 142.3



National Potential (MNRE)- 748.2 GW

Renewable Energy Potential (all sources including large Hydro)

State Potential (GW) 0.0 271.9



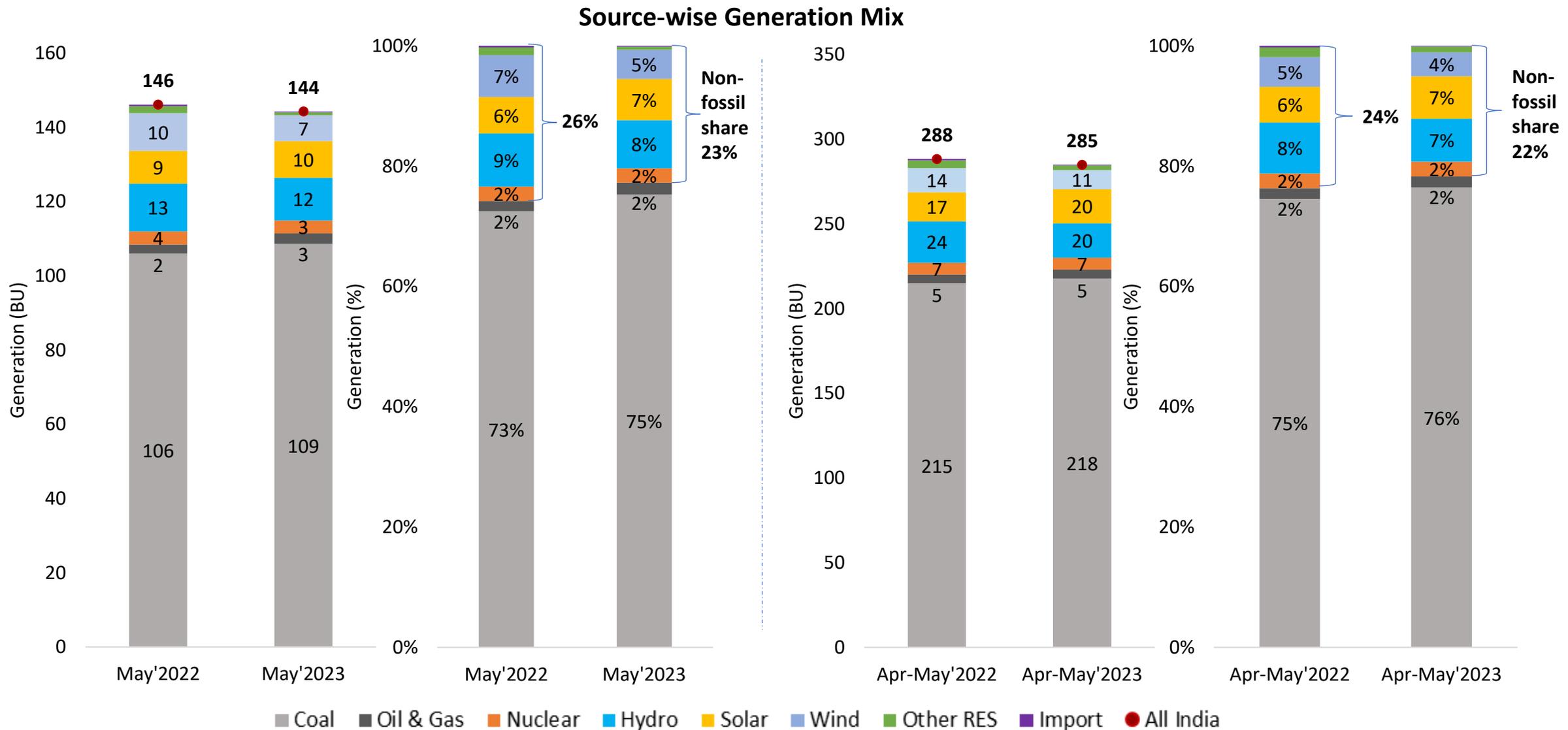
National Potential (MNRE)- 1656 GW

In India, market potential for SPV rooftop is 124 GW

Source- MNRE



# India's Electricity Generation Mix

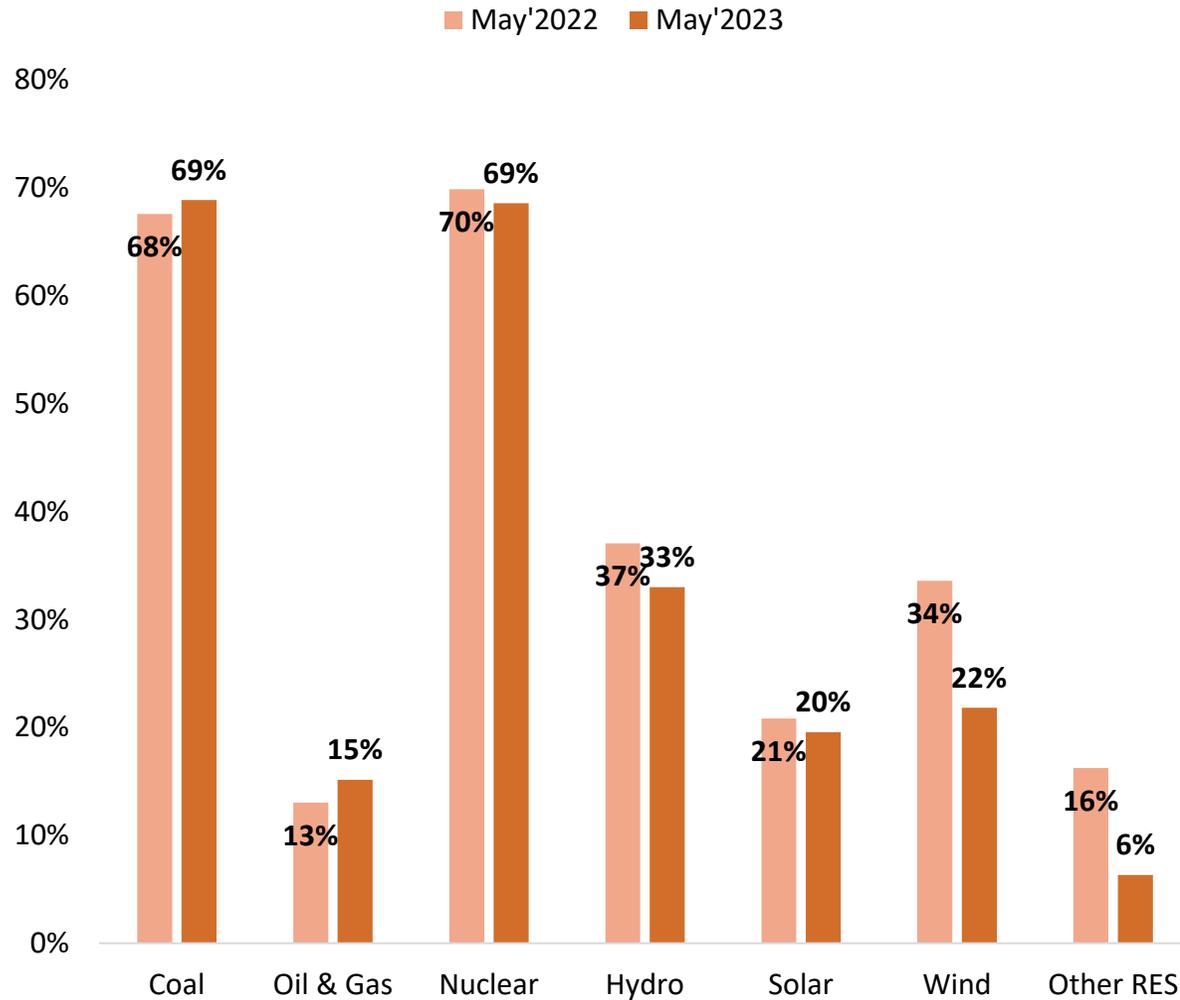


NOTE: The generation data for May'2023 is provisional.

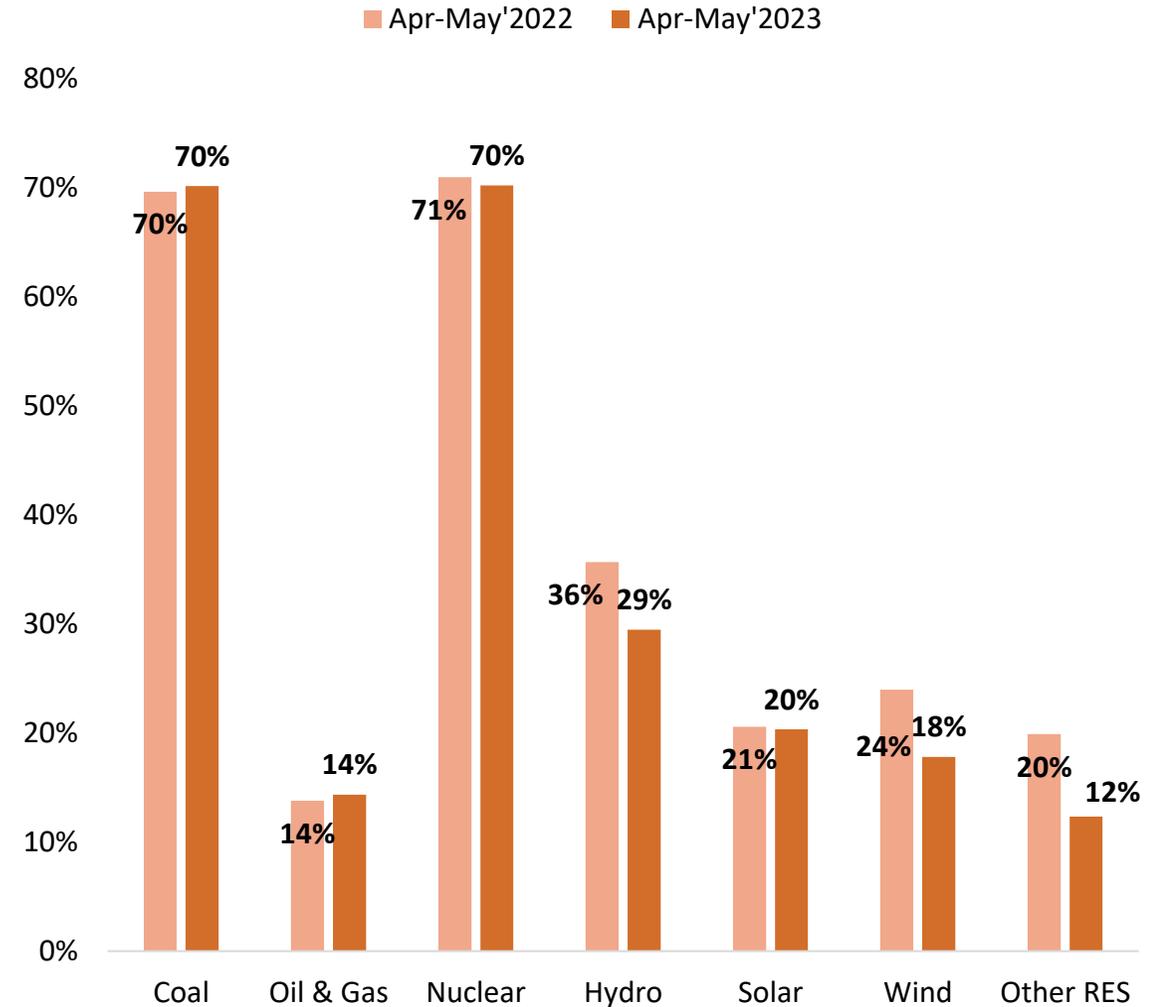
Source: CEA

# Source-wise PLF/CUF

Source-wise PLF/ CUF in April



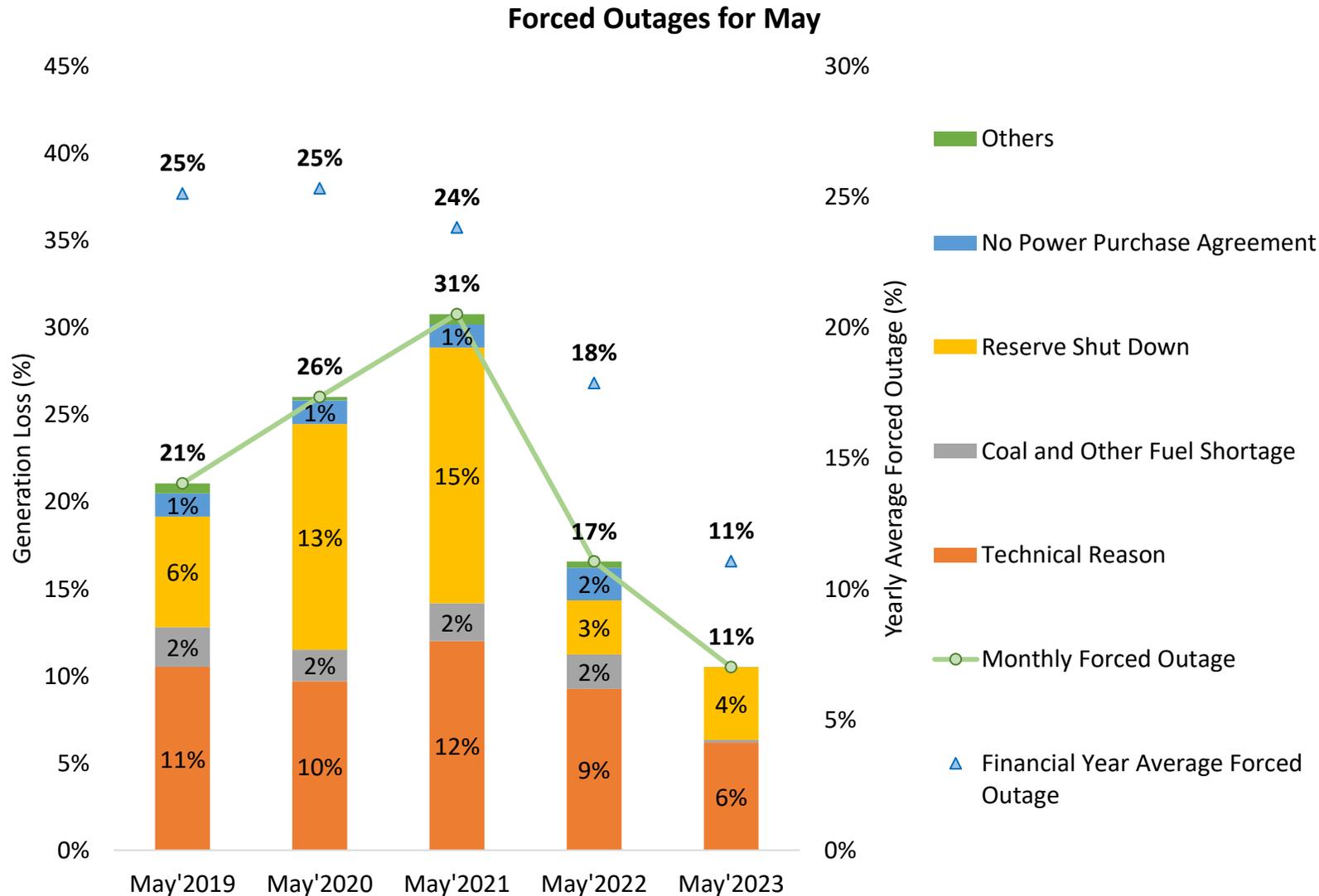
Source-wise PLF/ CUF Comparison (%)



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

Source: CEA & MNRE

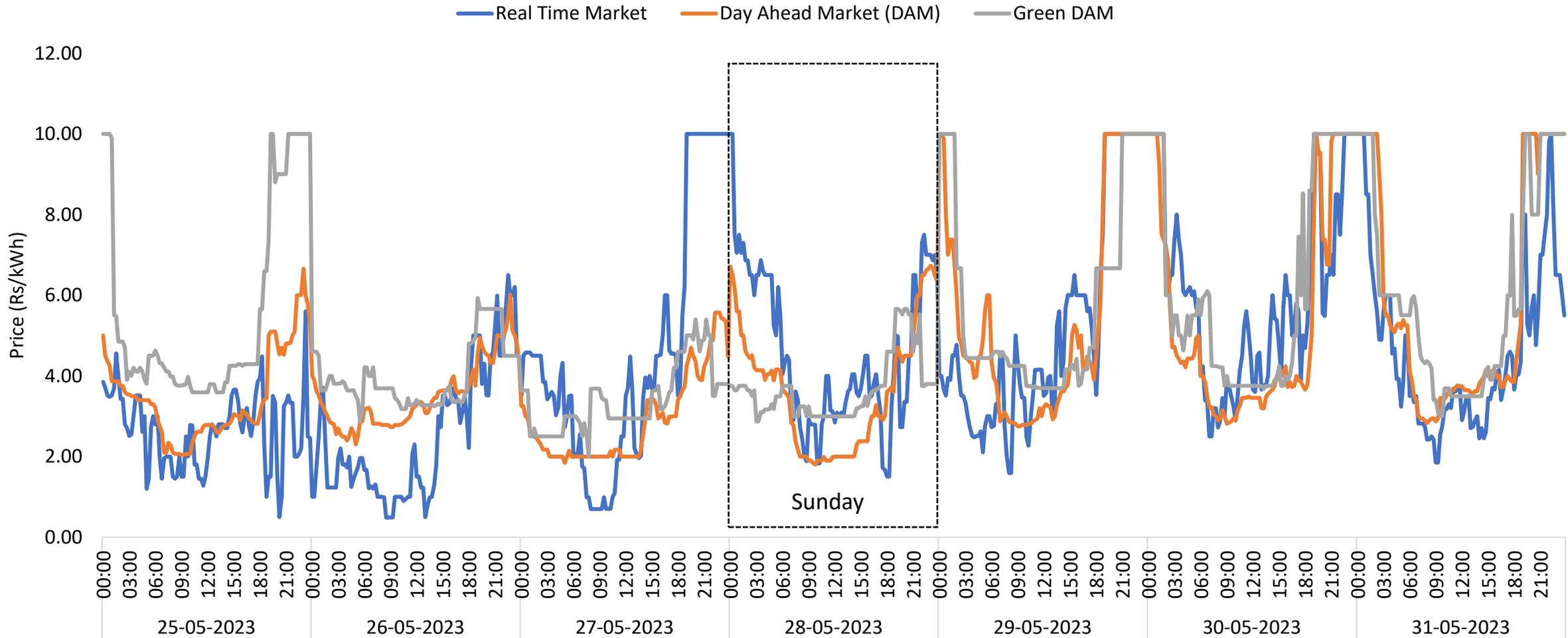
# Thermal Generation Loss and Reasons for Forced Outages



Year/ Month		Average Forced Outage Share
Yearly	FY 2021-22	24%
	FY 2022-23	18%
	FY 2023-24 (up to May'2023)	11%
Monthly	May'2021	31%
	May'2022	17%
	May'2023	11%

# Indian Electricity Exchange (IEX) Market Snapshot

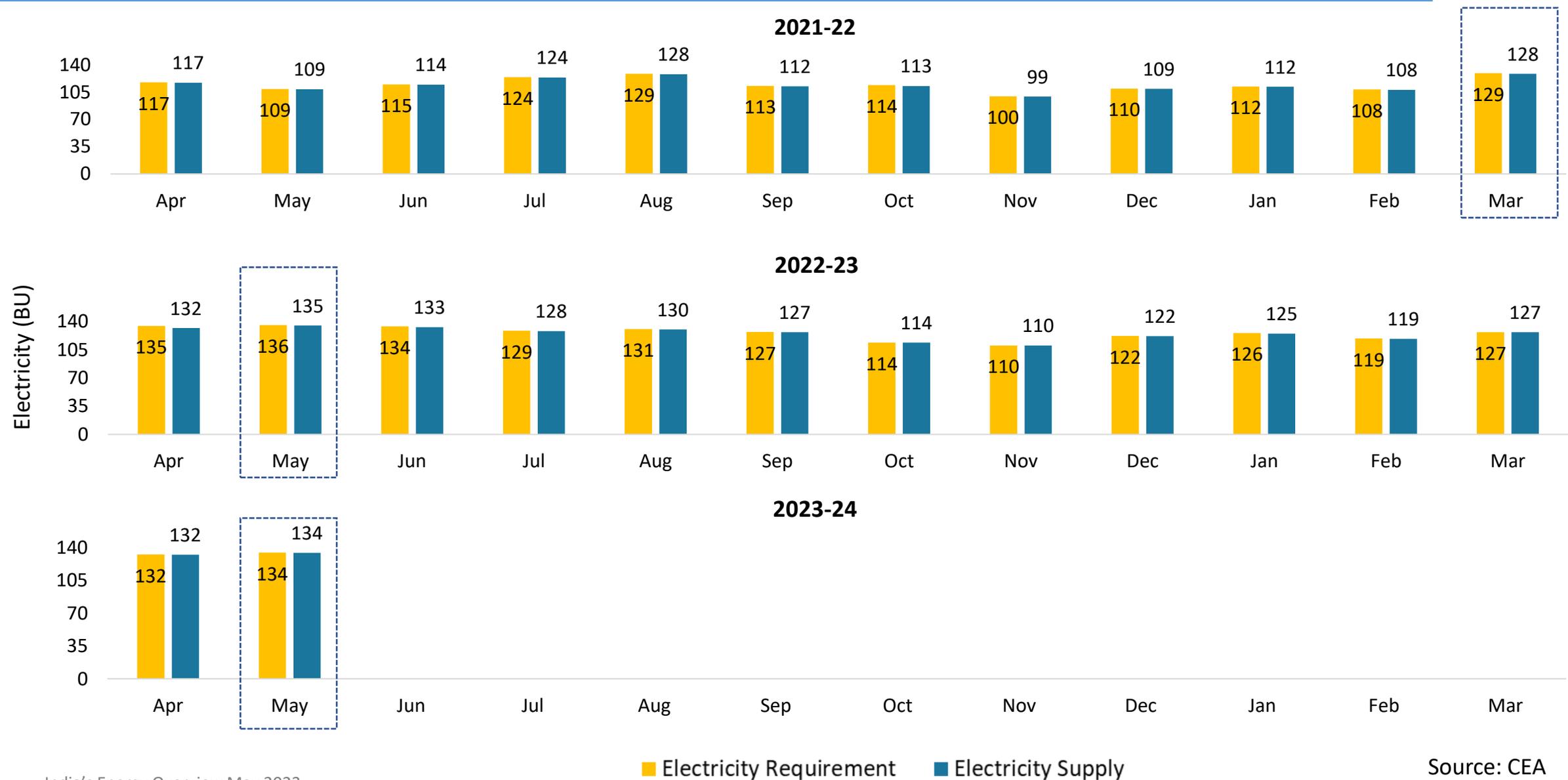
## Market Clearing Prices of last 7 days of May 2023



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

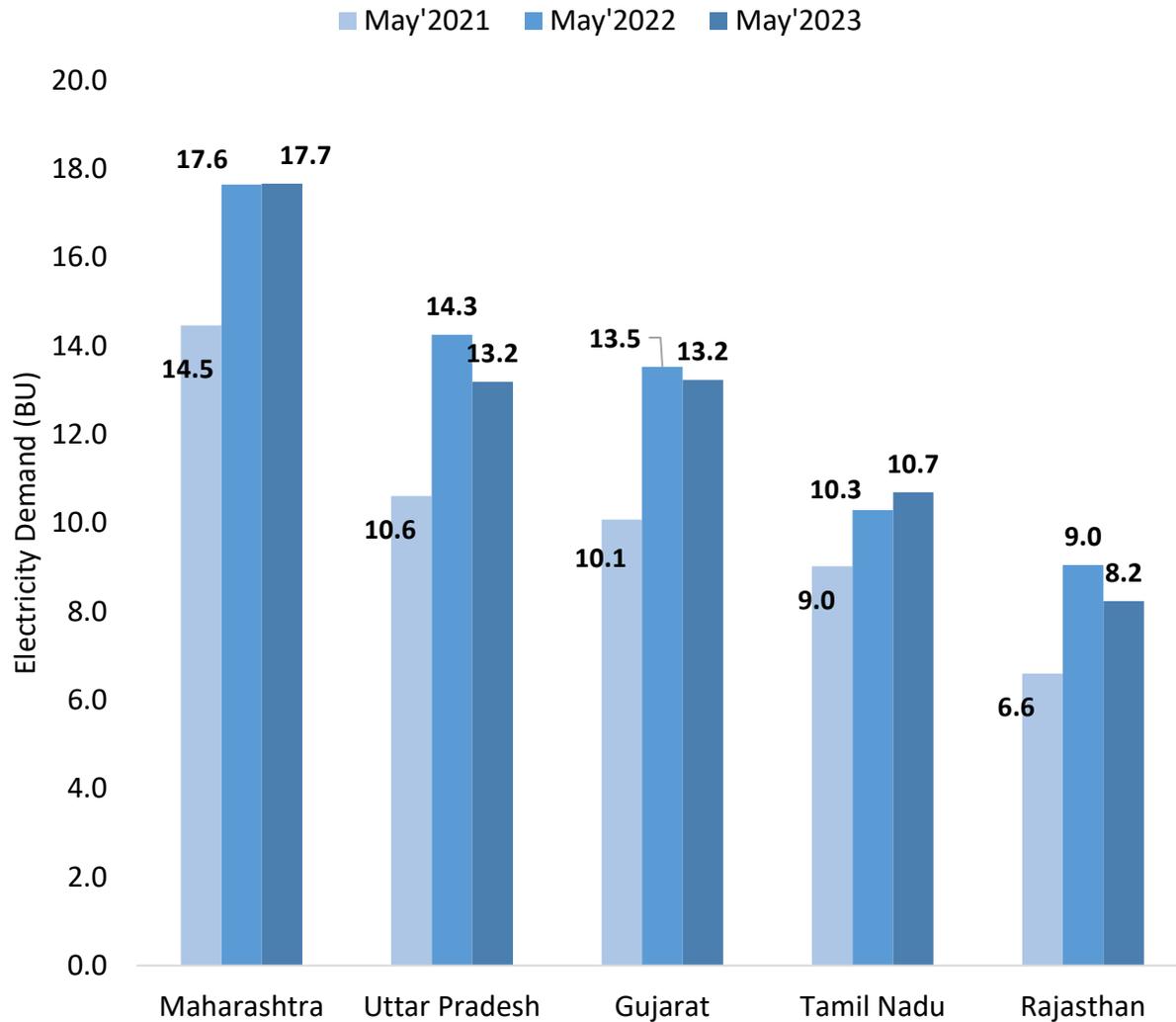


# India's Monthly Electricity Requirement and Supply

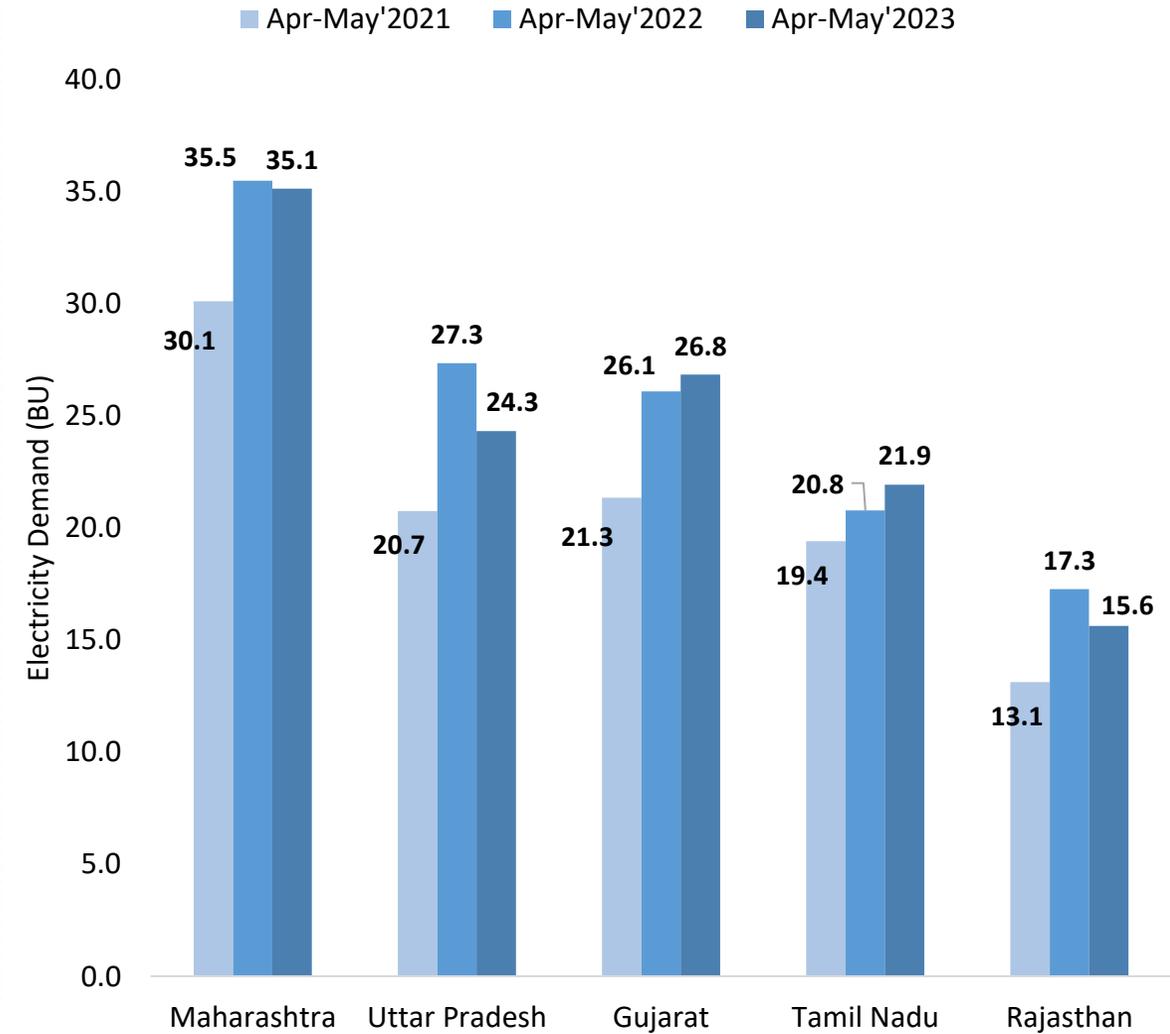


# Monthly Electricity Demand of the top 5 states

### States with Highest Electricity Demand in May (BU)

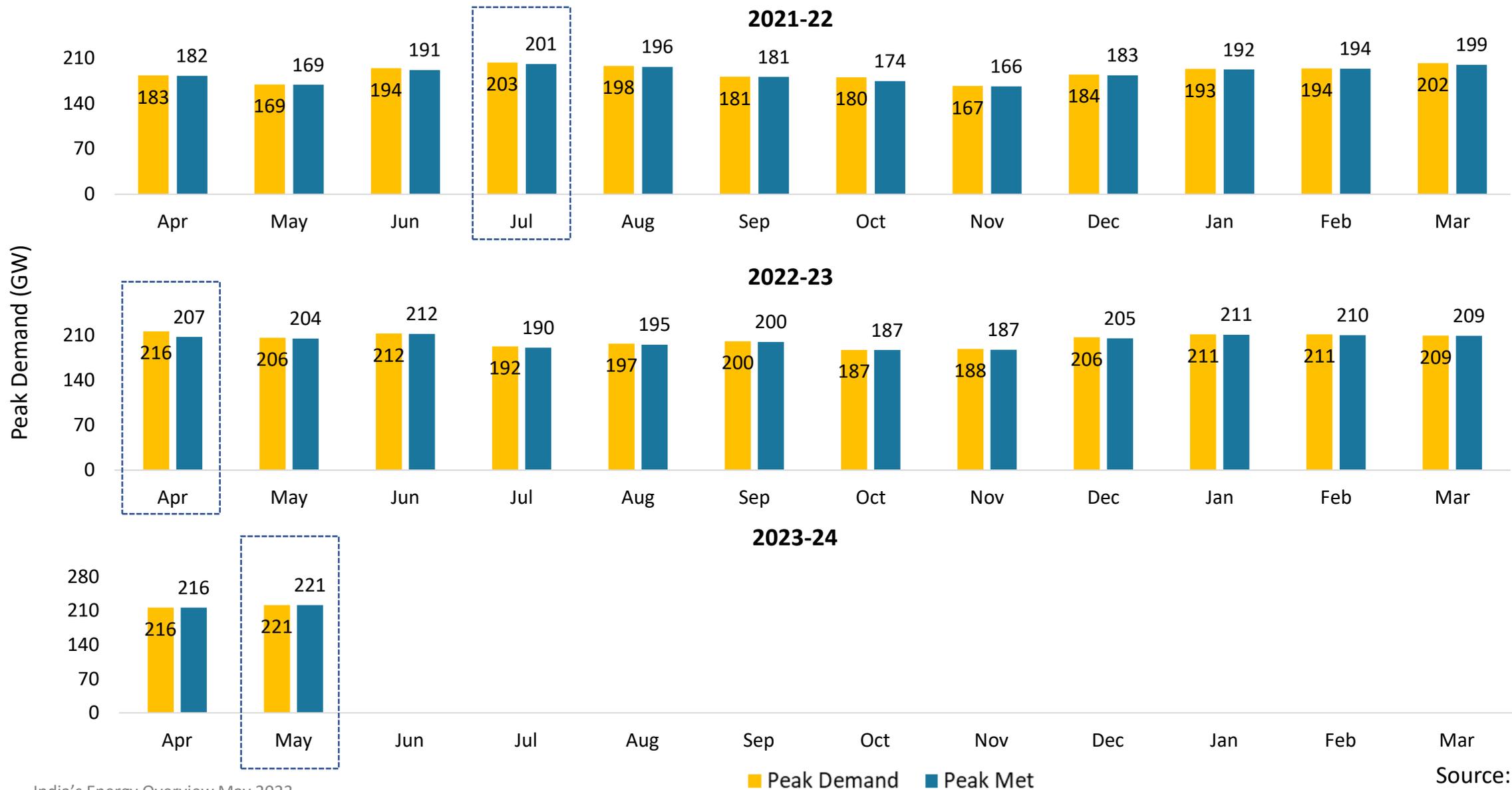


### States with Highest Electricity Demand (BU)

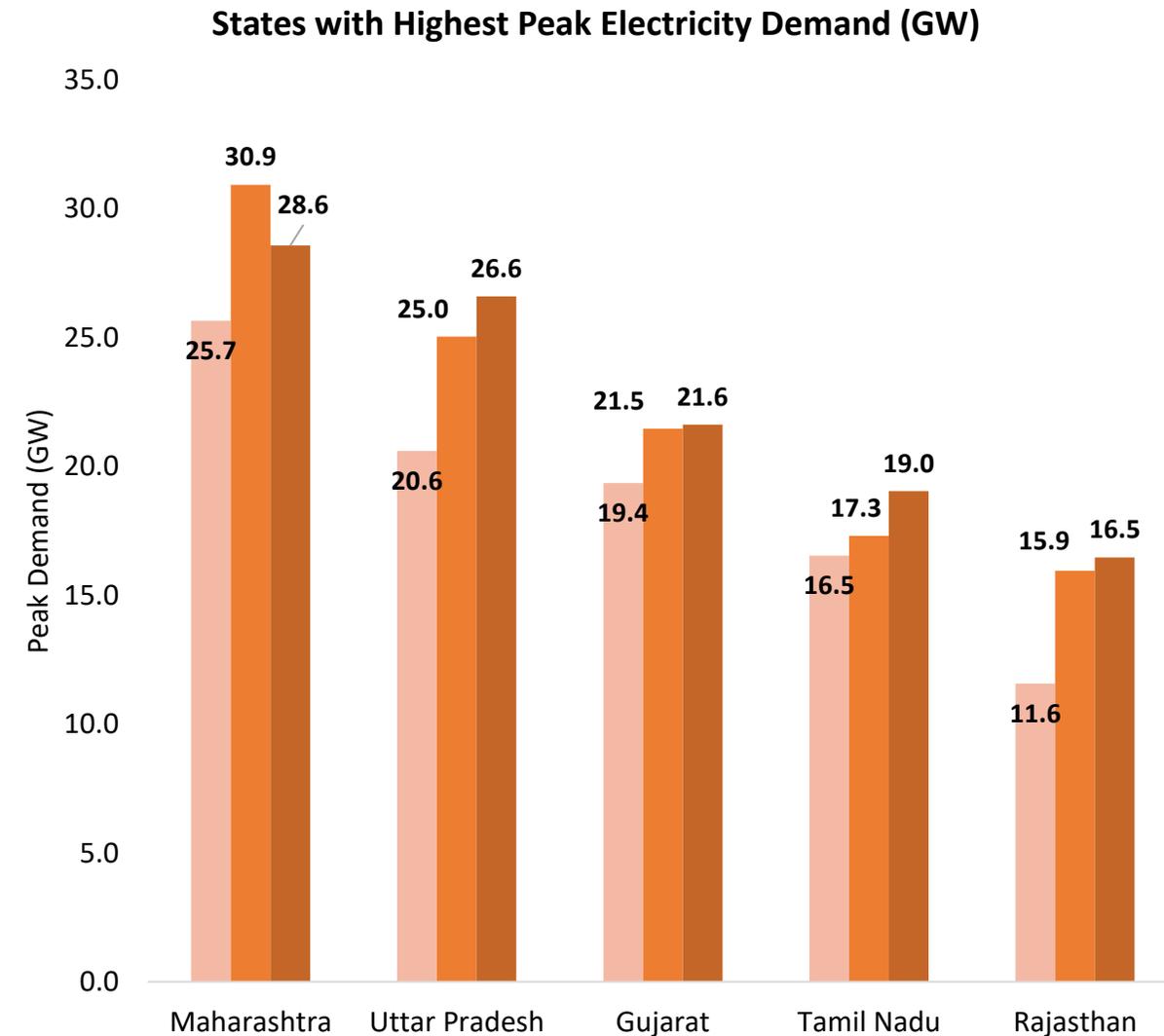
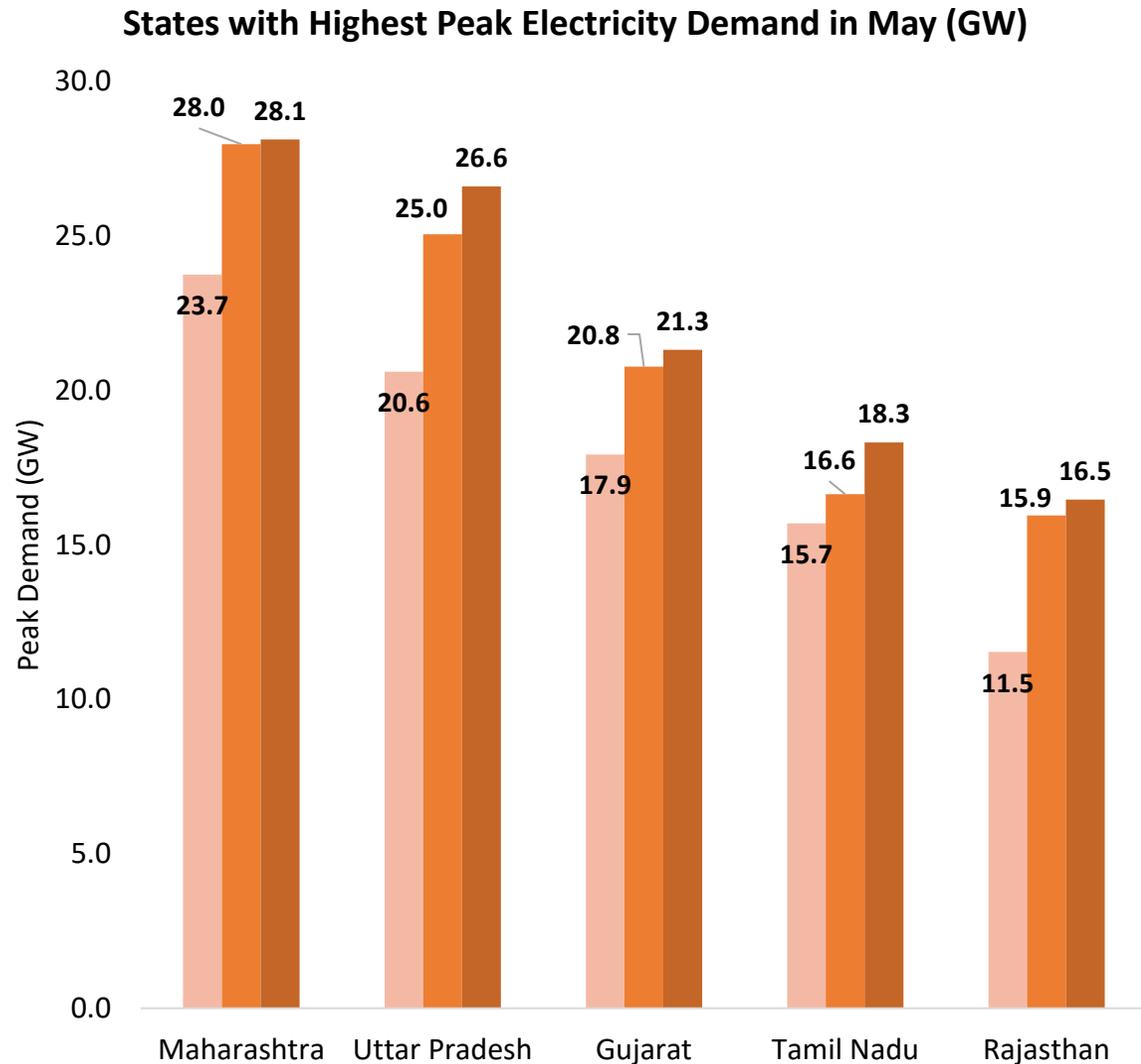




# India's Monthly Peak Electricity Demand and Supply

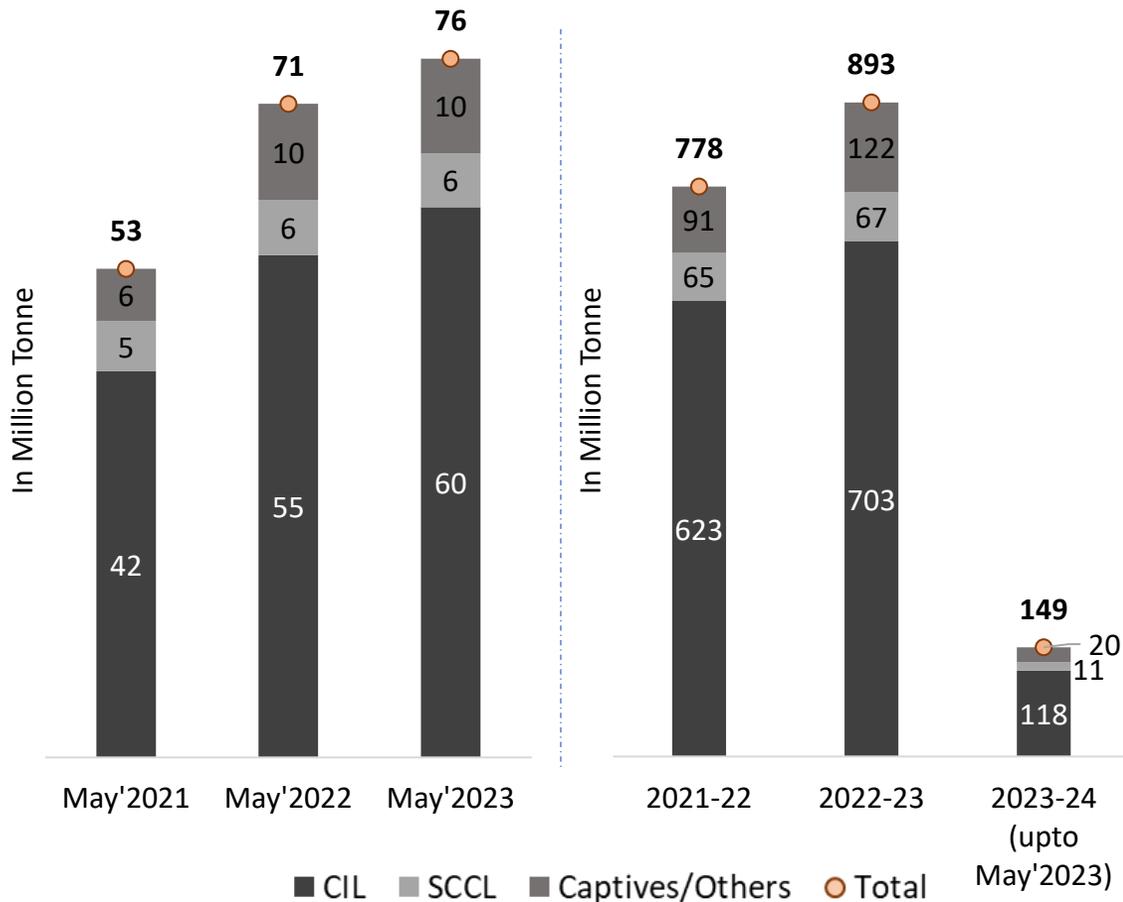


# Monthly Peak Electricity Demand of the top 5 states



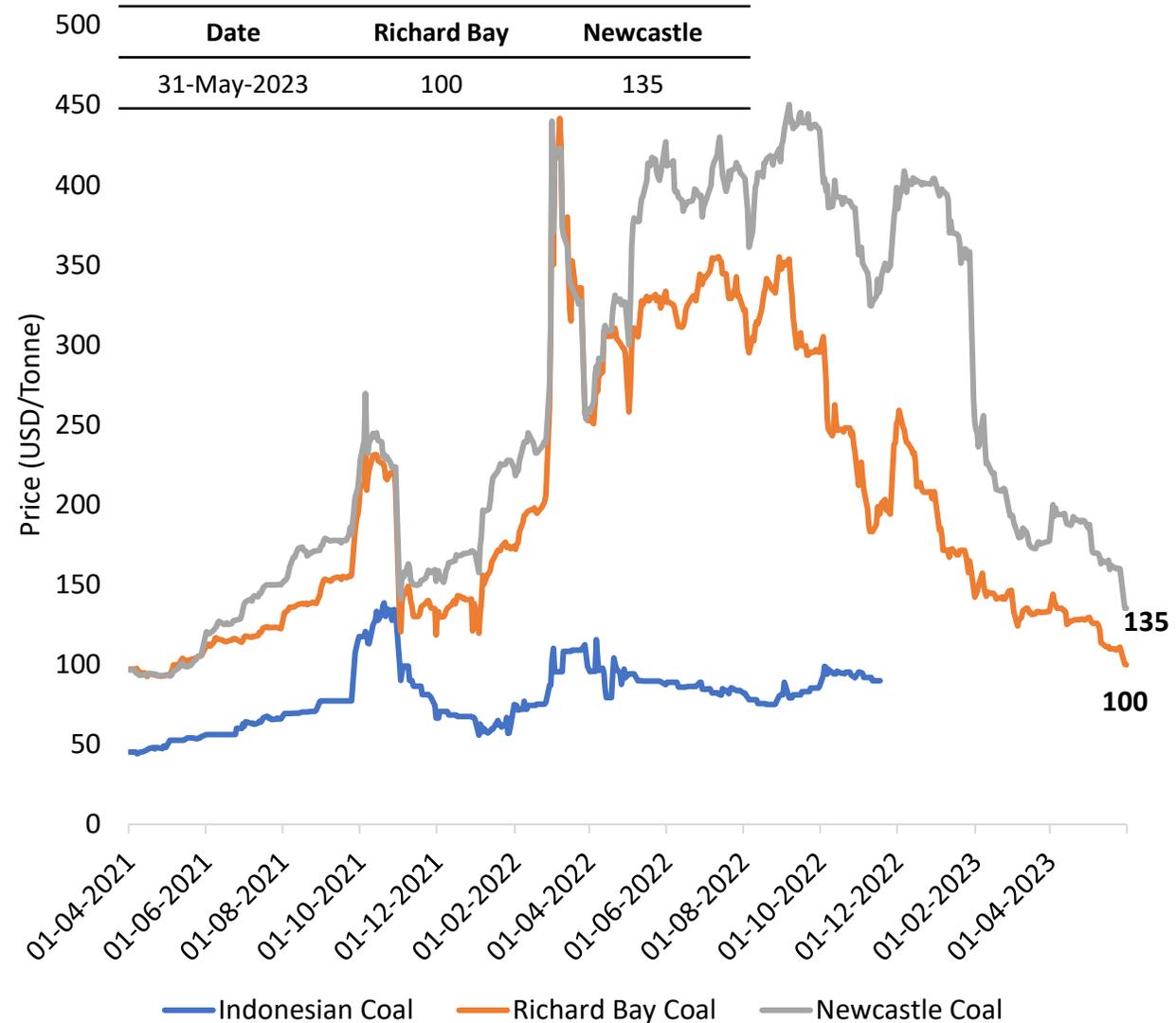
# Monthly Coal Statistics

Monthly/ Annual Coal Production (in Million Tonnes)



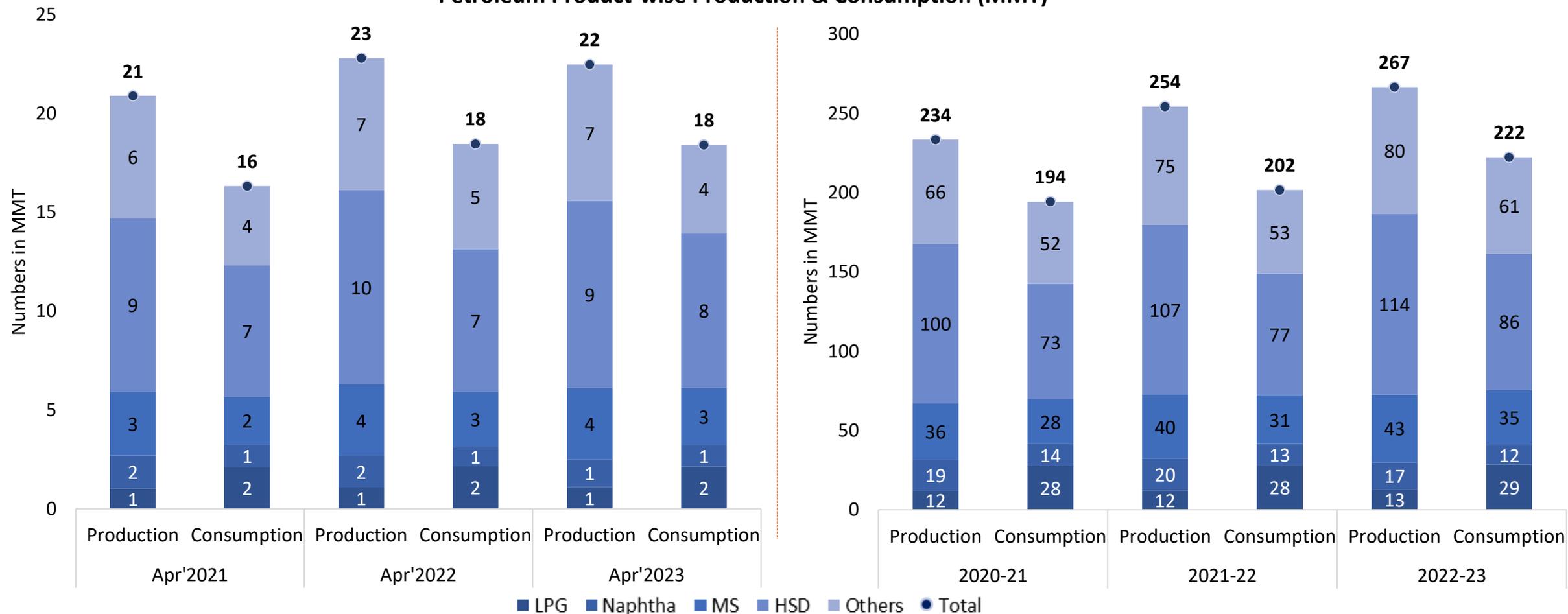
India's coal production increased in May'2023 (76 MT) by 7% as compared to May'2022.

International Coal Prices



# 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.

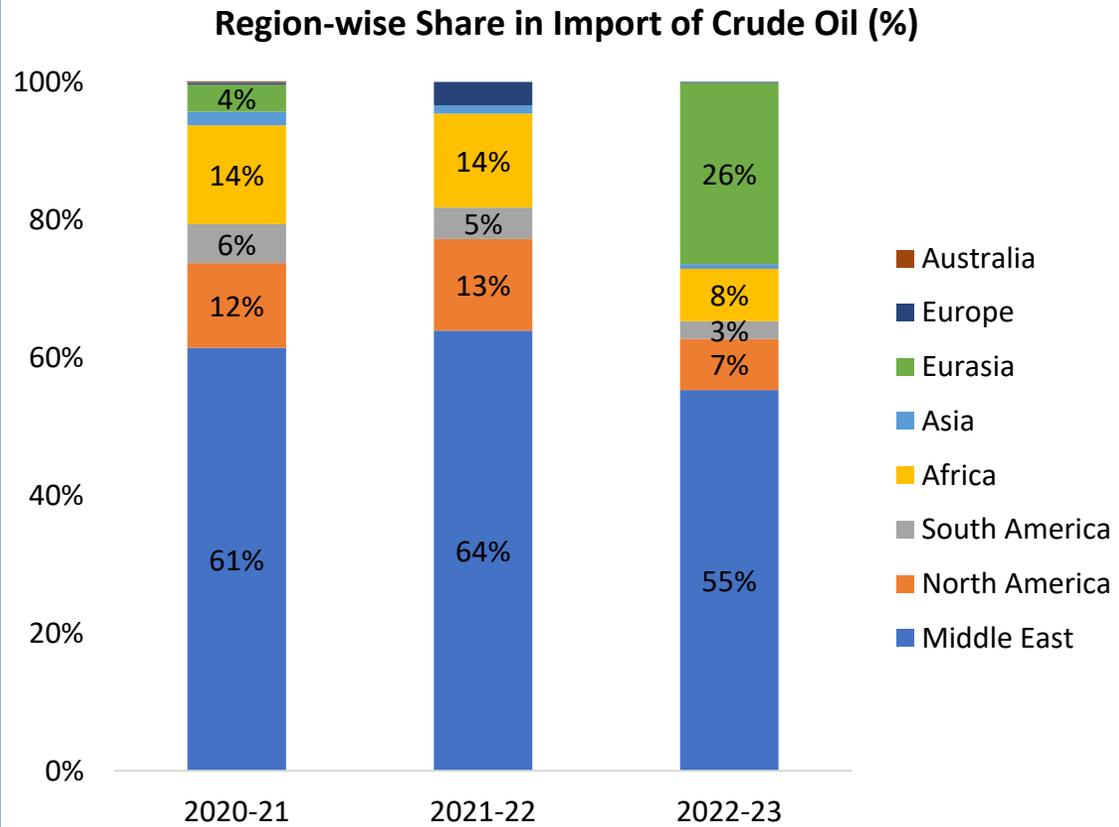
**Abbreviations:** ATF- Aviation Turbine Fuel, FO- Furnace Oil, HSD- High-Speed Diesel, LDO- Light Diesel Oil, MS- Motor Spirit (Petrol), SKO- Superior Kerosene Oil, LSHS- Low Sulphur Heavy Stock, LPG- Liquefied Petroleum Gas, MMT- Million Metric Tonne

# Petroleum Products Market Scenario (2/3)

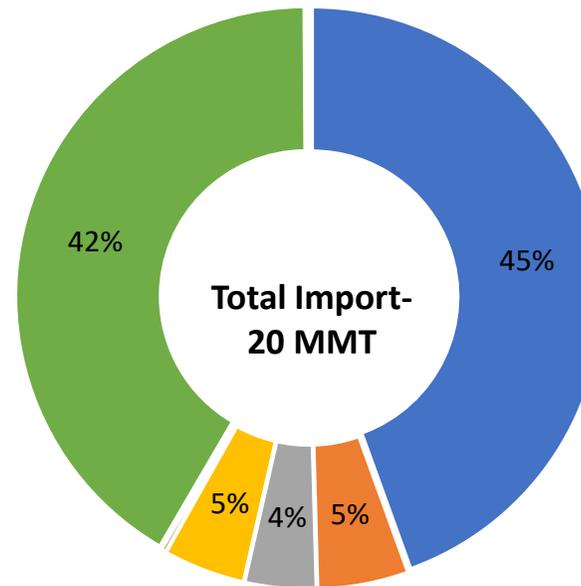
Import/Export of Crude Oil and Petroleum Products ('000 Tonnes)							
Petroleum Products	Import/ Export	Monthly			Yearly		
		Apr'2021	Apr'2022	Apr'2023	2020-21	2021-22	2022-23
Crude Oil	Import	18256	21626	19837	196461	212382	232561
	Export	0	0	0	0	0	0
	<b>Net Import</b>	<b>18256</b>	<b>21626</b>	<b>19837</b>	<b>196461</b>	<b>212382</b>	<b>232561</b>
LPG	Import	1043	1605	1004	16476	17043	18309
	Export	42	47	40	452	513	534
	<b>Net Import</b>	<b>1001</b>	<b>1558</b>	<b>965</b>	<b>16024</b>	<b>16530</b>	<b>17775</b>
Diesel	Import	3	3	6	648	43	327
	Export	1880	2698	1910	30576	32407	28535
	<b>Net Export</b>	<b>1877</b>	<b>2695</b>	<b>1904</b>	<b>29928</b>	<b>32364</b>	<b>28208</b>
Petrol	Import	74	0	0	1351	671	1069
	Export	934	1402	1257	11606	13482	13118
	<b>Net Export</b>	<b>860</b>	<b>1402</b>	<b>1257</b>	<b>10255</b>	<b>12812</b>	<b>12049</b>
Others*	Import	1634	2569	1984	24772	21259	24129
	Export	1061	1290	1158	14135	16352	18853
	<b>Net Import</b>	<b>573</b>	<b>1279</b>	<b>827</b>	<b>10637</b>	<b>4907</b>	<b>5276</b>

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

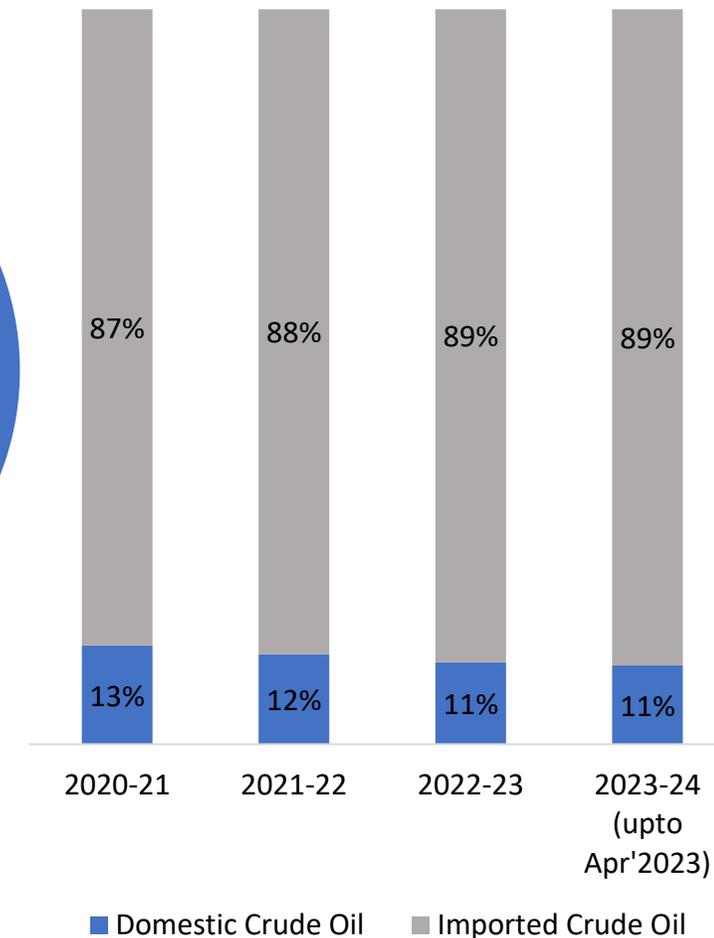
# Petroleum Products Market Scenario (3/3)



### Regional share of Imported Crude oil in Apr'2023



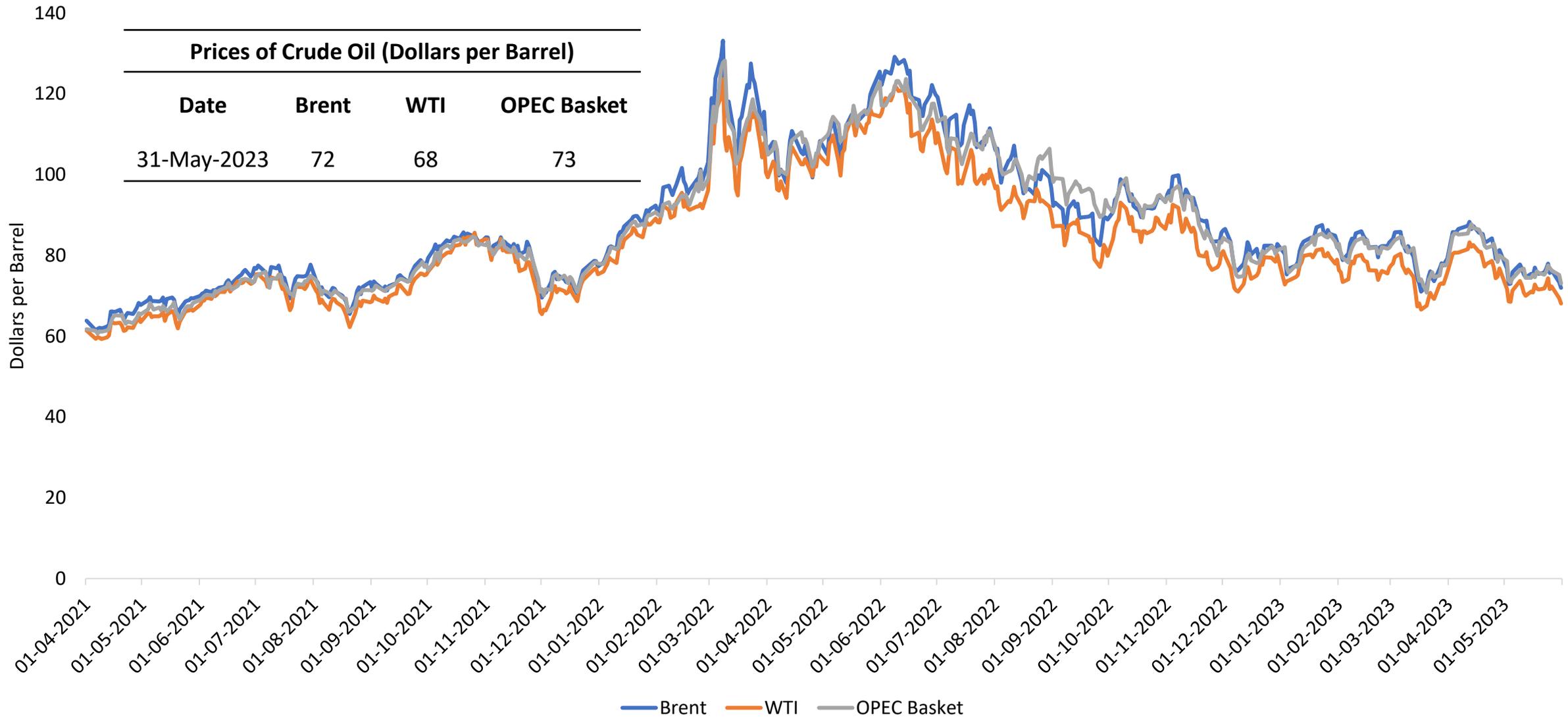
### Domestic and Imported Crude Oil share in India (%)



Total Import of Crude Oil (MMT)			
Total Import	2020-21	2021-22	2022-23
<b>Crude Oil</b>	<b>196</b>	<b>212</b>	<b>233</b>

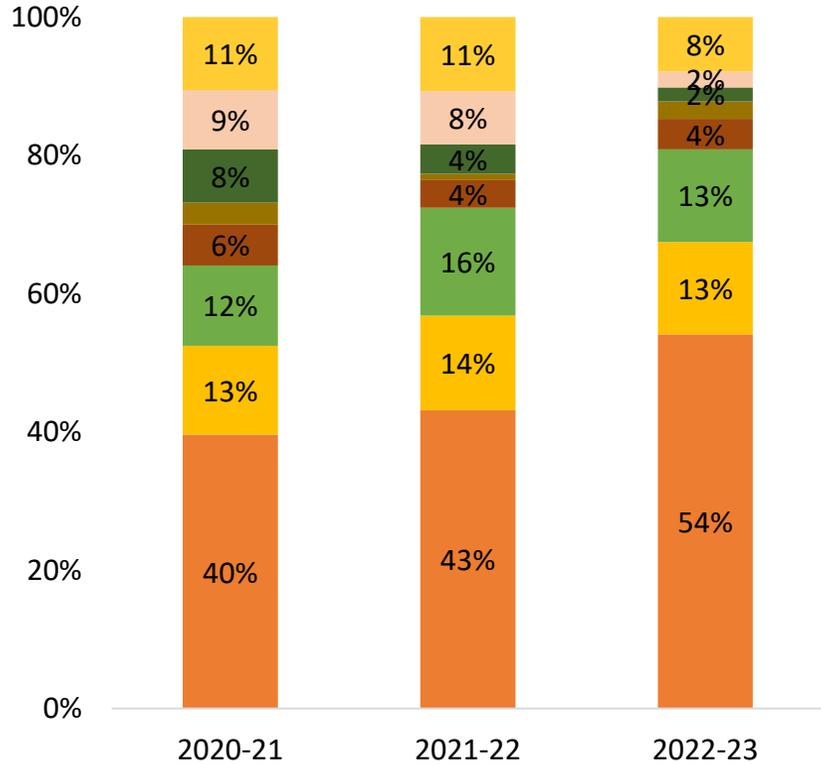
# Daily Prices of Crude Oil

Daily Prices of Crude Oil

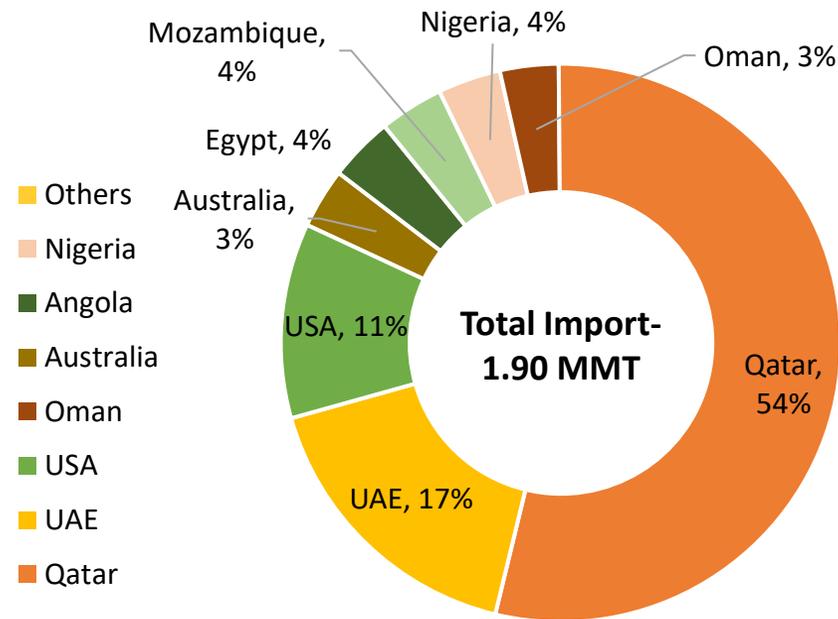


# Gas Market Scenario

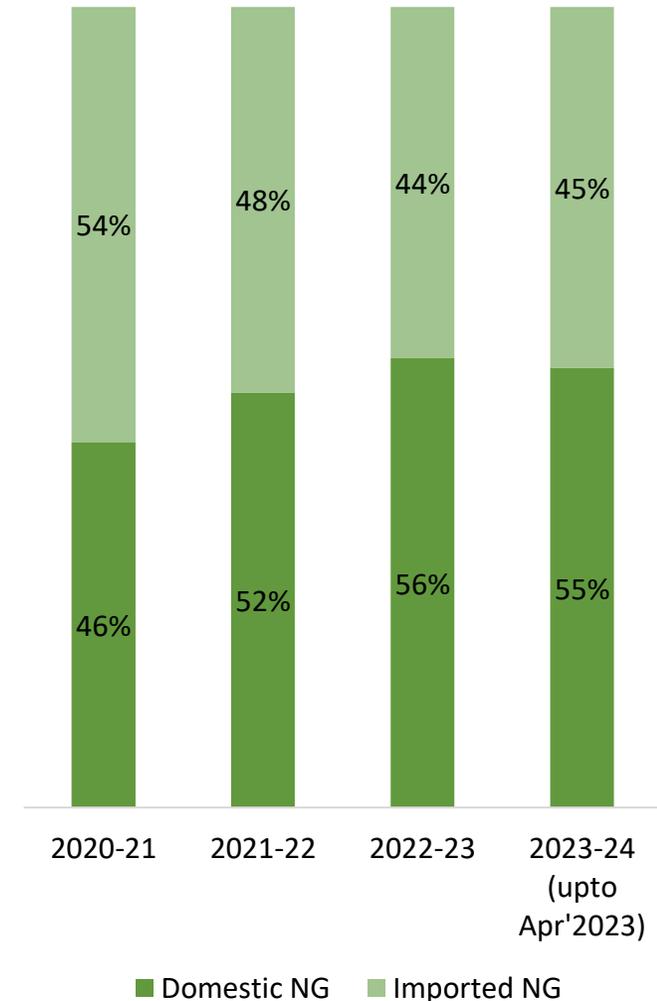
### Region-wise Share in Import of LNG (%)



### Country Share of Imported LNG in Apr'2023



### Domestic and Imported Natural Gas share in India (%)



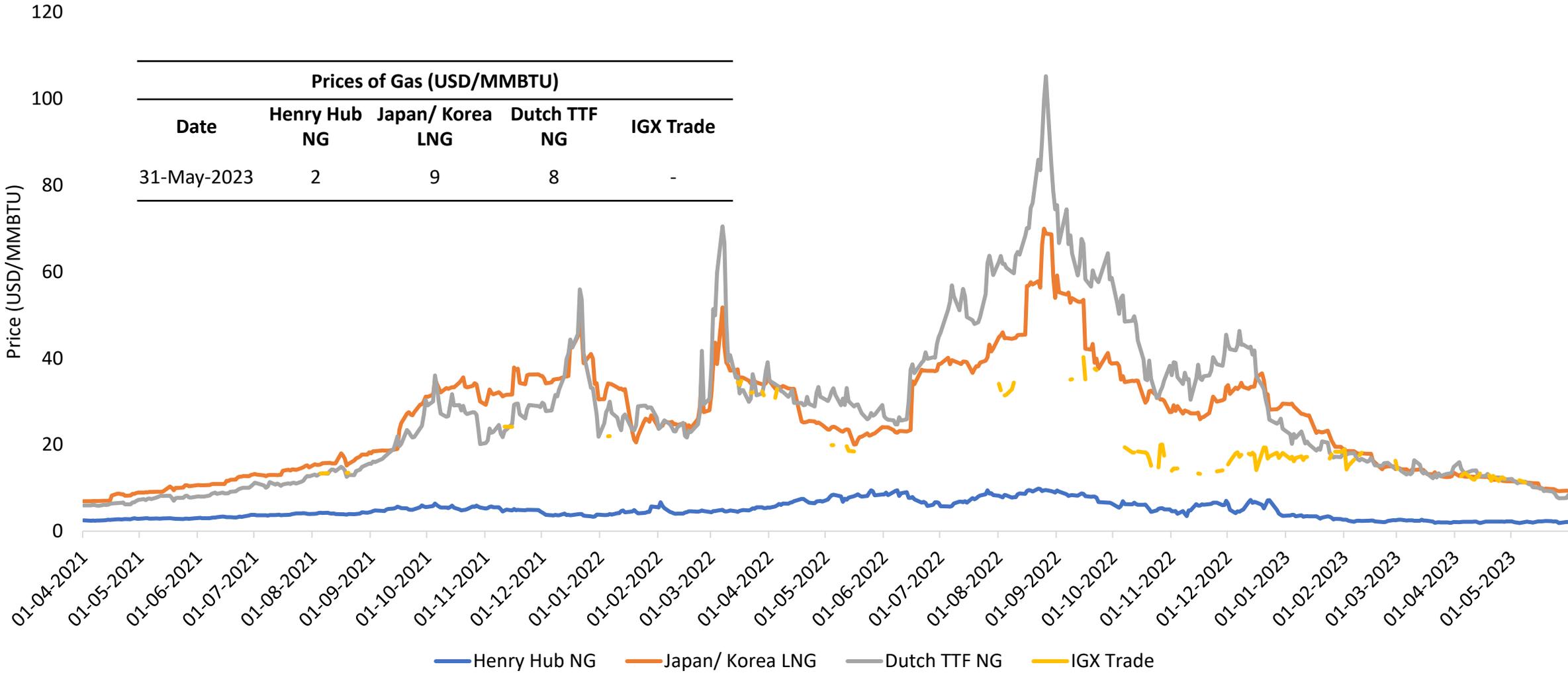
Others include- Equatorial Guinea, Trinidad, Cameroon, Egypt, France, Algeria, Belgium, Indonesia, Turkey, Russia, Spain, Malaysia, Brunei, Netherlands, Norway, and others.

Total Import of Liquefied Natural Gas (LNG) (MMT)			
Total Import	2020-21	2021-22	2022-23
<b>LNG</b>	<b>25.05</b>	<b>23.42</b>	<b>19.85</b>

Source: MoCI and PPAC

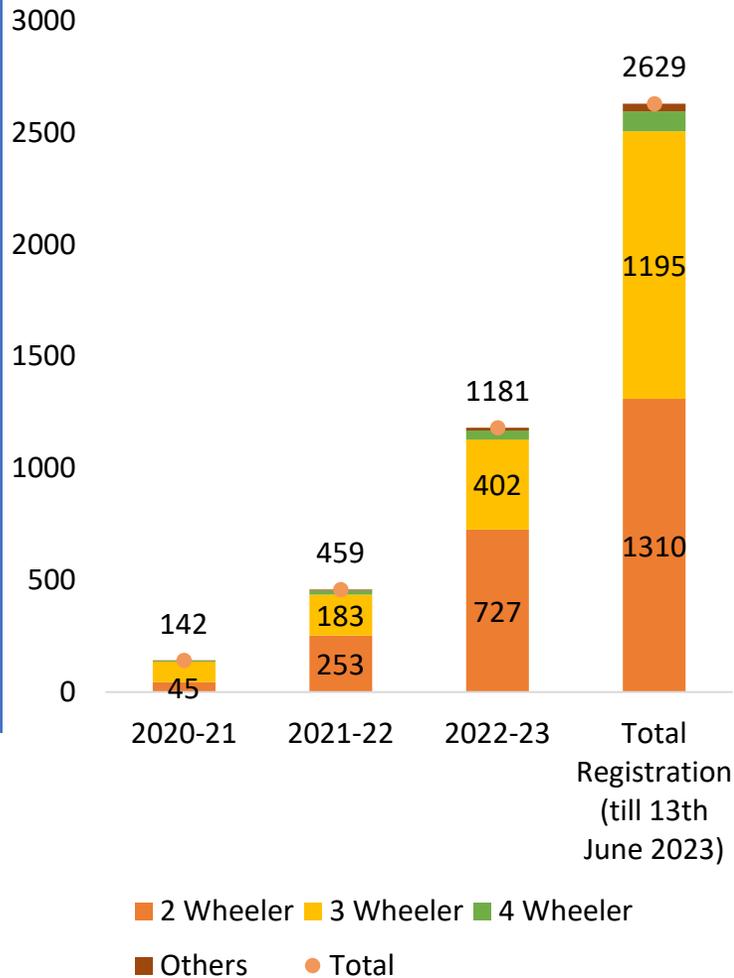
# Daily Prices of Gas

Gas Daily Market Price

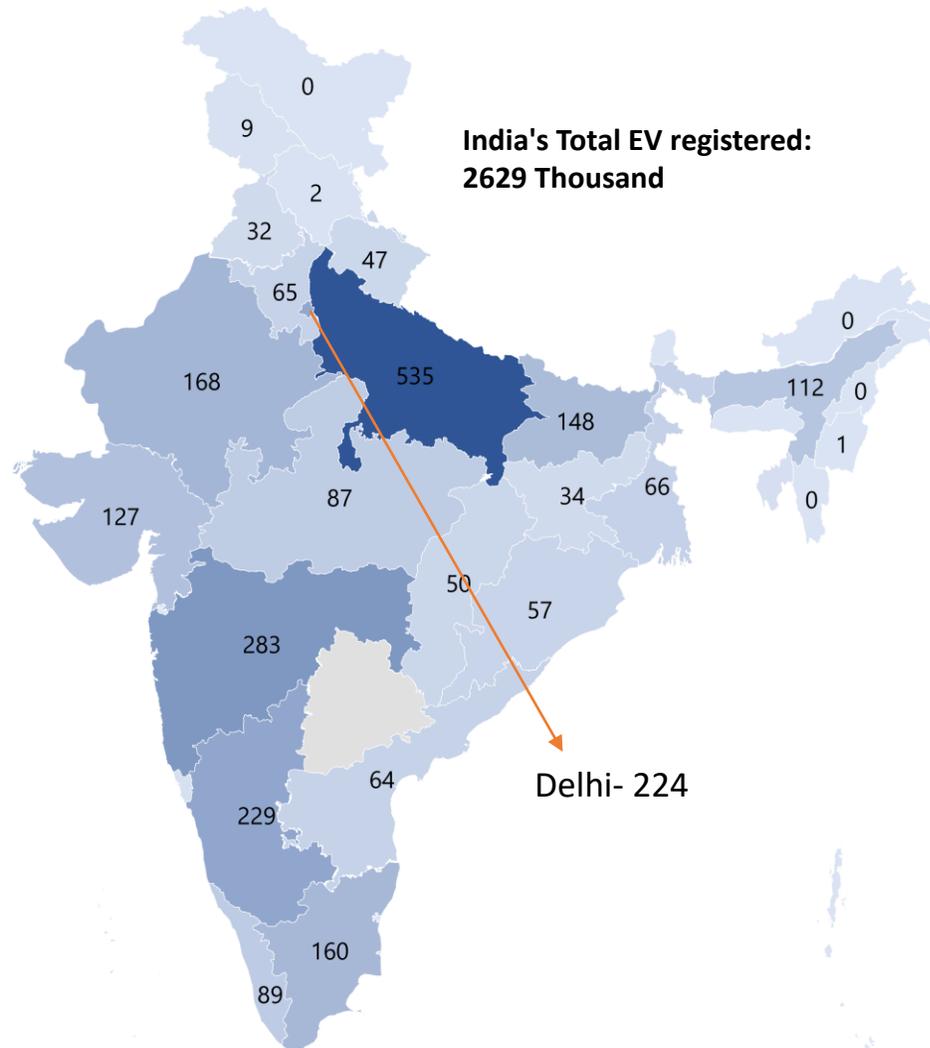


# Status of Electric Mobility in India

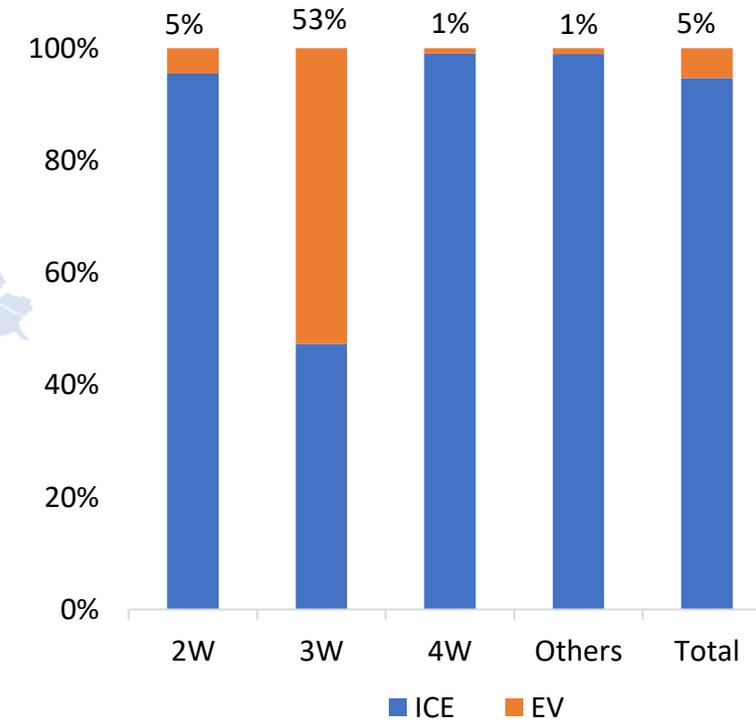
National EV registration (in Thousands)



Cumulative State-wise EV registration as on 13<sup>th</sup> June 2023 (in Thousands)



EV and ICE sale composition in 2022-23



Vehicle Registered in FY 2022-23 (in Thousands)

Fuel Type	2W	3W	4W	Others	Total
EV	727	402	40	12	1,181
ICE	15,285	361	4,219	1,179	21,044

Note: Others include bus, truck and others

# 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 30<sup>th</sup> 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 30<sup>th</sup> June 2025 and for [off-shore projects](#) on or before 31<sup>st</sup> 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 (H<sub>2</sub>)

[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 30<sup>th</sup> June 2025 to 31<sup>st</sup> December 2030.

MNRE has proposed using [green H<sub>2</sub> in Direct Reduced Iron \(DRI\) production](#) by partly replacing natural gas with H<sub>2</sub> 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 May 2023

- CEA has released the [National Electricity Plan \(NEP\) \(Vol-I Generation\)](#) for the period 2022-32. The major highlights are-
  - The source-wise likely installed capacity by 2026-27 and 2031-32:

Source/ Year	Installed Capacity (GW)		Installed Capacity (%)	
	2026-27	2031-32	2026-27	2031-32
Hydro	52	62	9	7
PSP	7	27	1	3
Small Hydro	5	5	1	1
Solar PV	186	365	30	40
Wind	73	122	12	14
Biomass	13	16	2	2
Nuclear	13	20	2	2
Coal + Lignite	235	260	39	29
Gas	25	25	4	3
<b>All India</b>	<b>610</b>	<b>900</b>	<b>100</b>	<b>100</b>
BESS (GW/GWh)	9/35	47/236		

- The estimated domestic coal requirement is 866.4 MT and 1025.8 MT for the year 2026-27 and 2031-32 respectively, with an estimated requirement of 28.9 MT of coal imports for the plants designed to run on imported coal.
- The average grid emission factor is expected to reduce to 0.548 kg CO<sub>2</sub>/kWh net in 2026-27 and to 0.430 kg CO<sub>2</sub>/kWh net by the end of 2031-32.

# Key Highlights or Announcements of May 2023

- Central Electricity Authority (CEA) has released an “[Optimal Mix 2030 Version 2.0](#)” report which provides a roadmap for energy transition through decarbonization of the power sector in the country. The key highlights are:
  - The projected peak demand and electricity requirements are 334.8 GW and 2279.64 BU for year 2029-30.
  - The projected installed capacity for year 2029-30 will be 777.14 GW which will comprise 500.64 GW (64.4%) of non-fossil capacity and 276.51 GW (36.6%) of fossil-fuel based capacity.

Source	Installed Capacity (GW)	Installed Capacity (%)
Hydro	54	7%
Small Hydro	5	1%
PSP	19	2%
Solar PV	293	38%
Wind	100	13%
Biomass	15	2%
Nuclear	15	2%
Coal+ Lignite	252	33%
Gas	25	3%
<b>All India</b>	<b>777</b>	<b>100%</b>
BESS (GW/GWh)	42/208	

- The gross generation in 2029-30 will be 2440.7 BU of which non-fossil fuels will contribute to ~44%.

# Key Highlights or Announcements of May 2023

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- Ministry of Power has granted [a complete waiver of Inter-State Transmission \(ISTS\) charges for offshore wind power projects](#) commissioned on or before 31st December 2032 for a period of 25 years from the date of commissioning of the Project. The off-shore projects commissioned from 1st January 2033 would be given graded ISTS charges. Further, the ISTS waiver of Green Hydrogen and Green Ammonia projects has been extended from 30<sup>th</sup> June 2025 to 31<sup>st</sup> December 2030.
- The government of Gujarat, has issued the “[Policy 2023](#)” for leasing out land to foster the growth of green hydrogen production in the state. The policy aims to provide the framework for promoting green hydrogen production by using renewable energy. According to the policy, the lease period for installing non-conventional projects such as solar, wind, and wind-solar hybrid projects for green hydrogen production will be 40 years. Further, the applicant must produce a minimum of 1 Lakh metric tonnes of green hydrogen per year.
- Ministry of Power directed SERC/JERCs to take appropriate action for the [Determination of the Green Tariff](#) under Electricity (Promoting Renewable Energy Through Green Energy Open Access) Rules, 2022. It is notified that in no case the Green Tariff should be higher than the sum of the average power purchase cost of renewable energy, surcharge at the rate of 20% of the average cost of supply, and a reasonable margin of 25 paise.
- Under the FAME-II scheme, [subsidies for electric 2-wheelers have been reduced](#) from Rs 15,000/kWh to Rs 10,000/kWh. Also, the maximum subsidy for electric 2-wheelers has been capped from 40% to 15% of the ex-factory price of the vehicles.



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Green ways for a good earth!

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