

India's Energy Overview

MARCH 2023

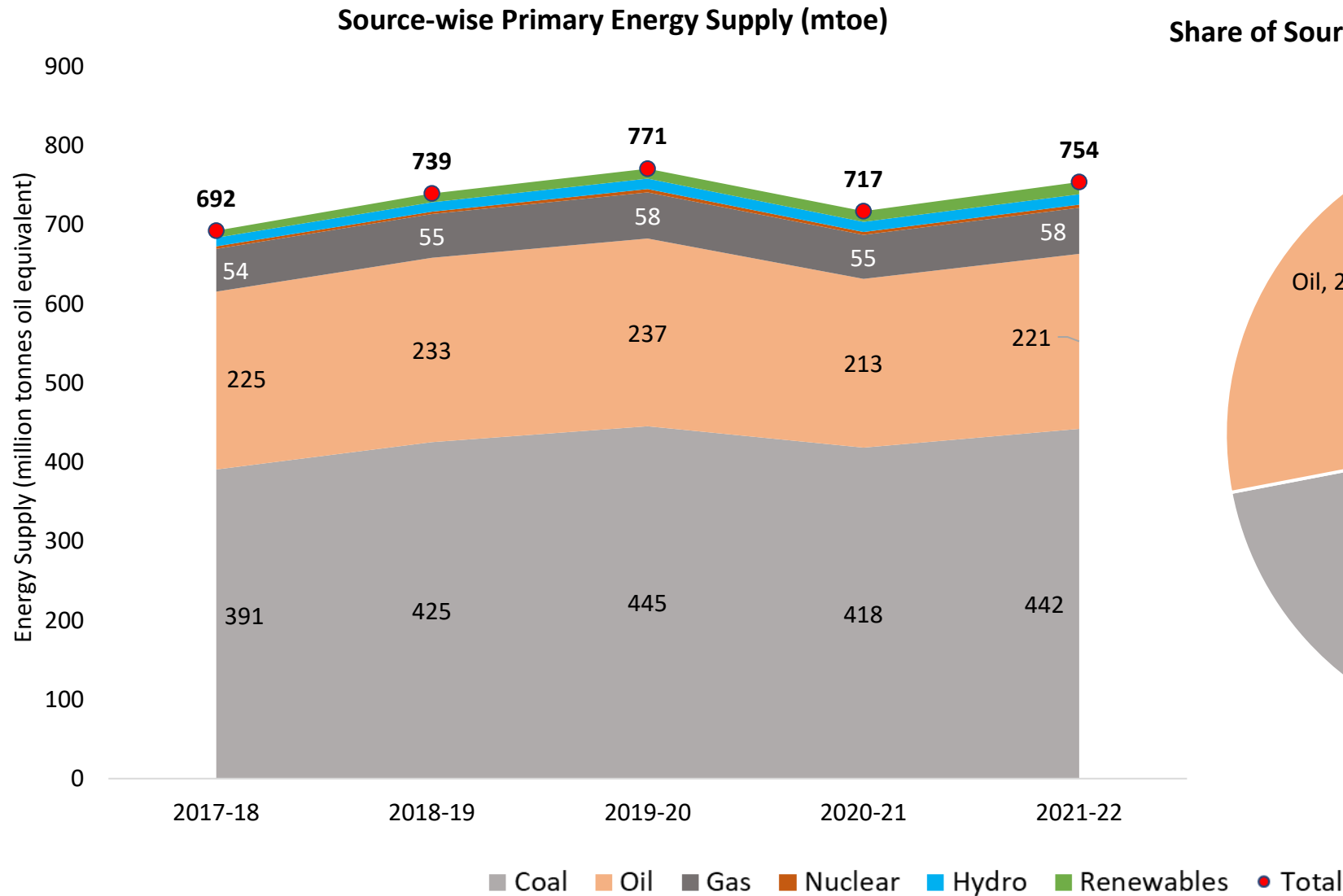


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Green ways for a good earth!

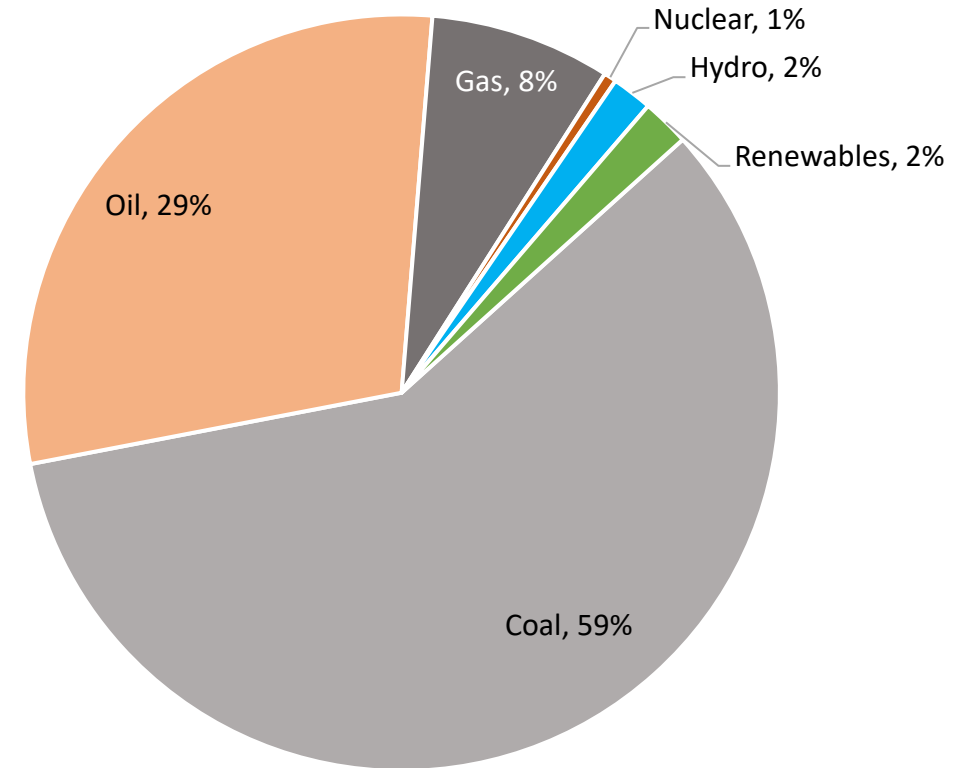
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Primary Energy Mix* for 2021-22

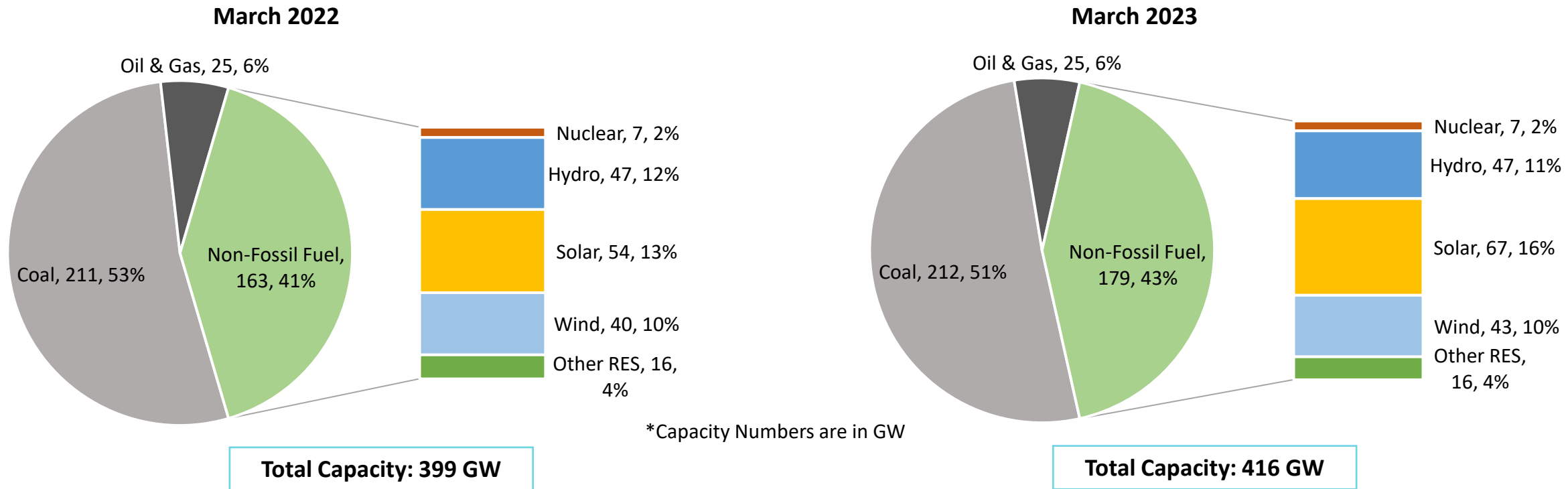


Share of Source-wise Primary Energy Supply in 2021-22 (%)



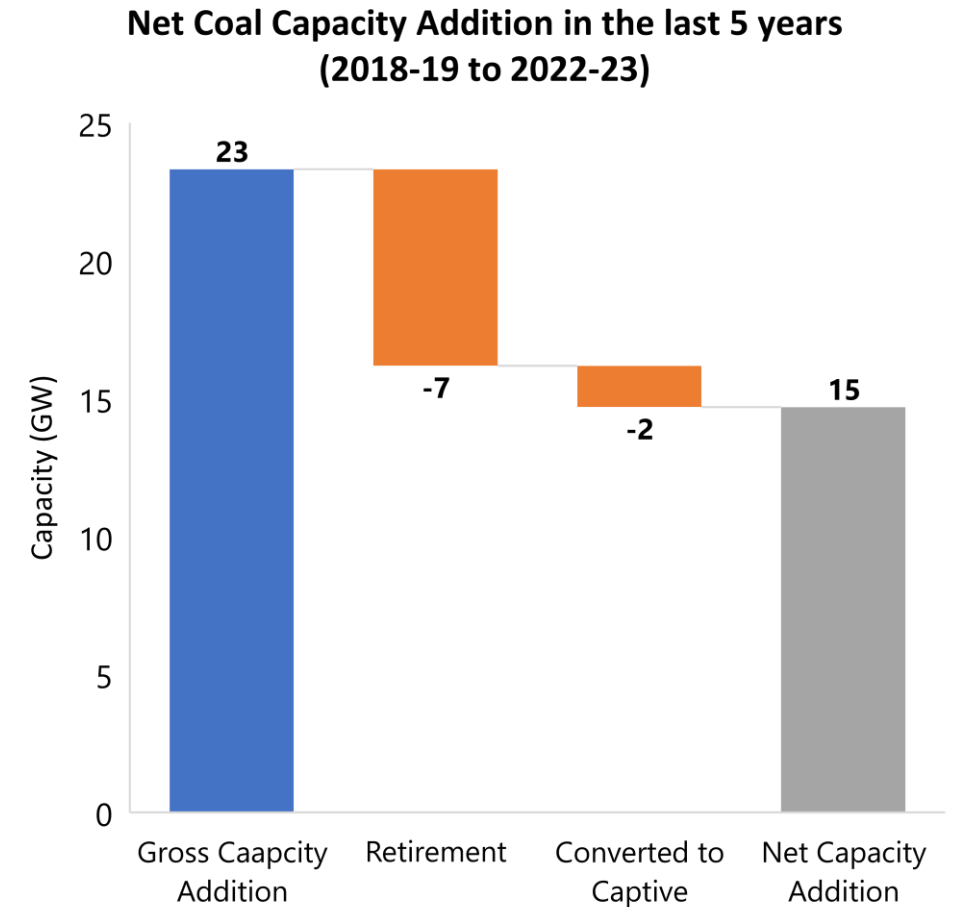
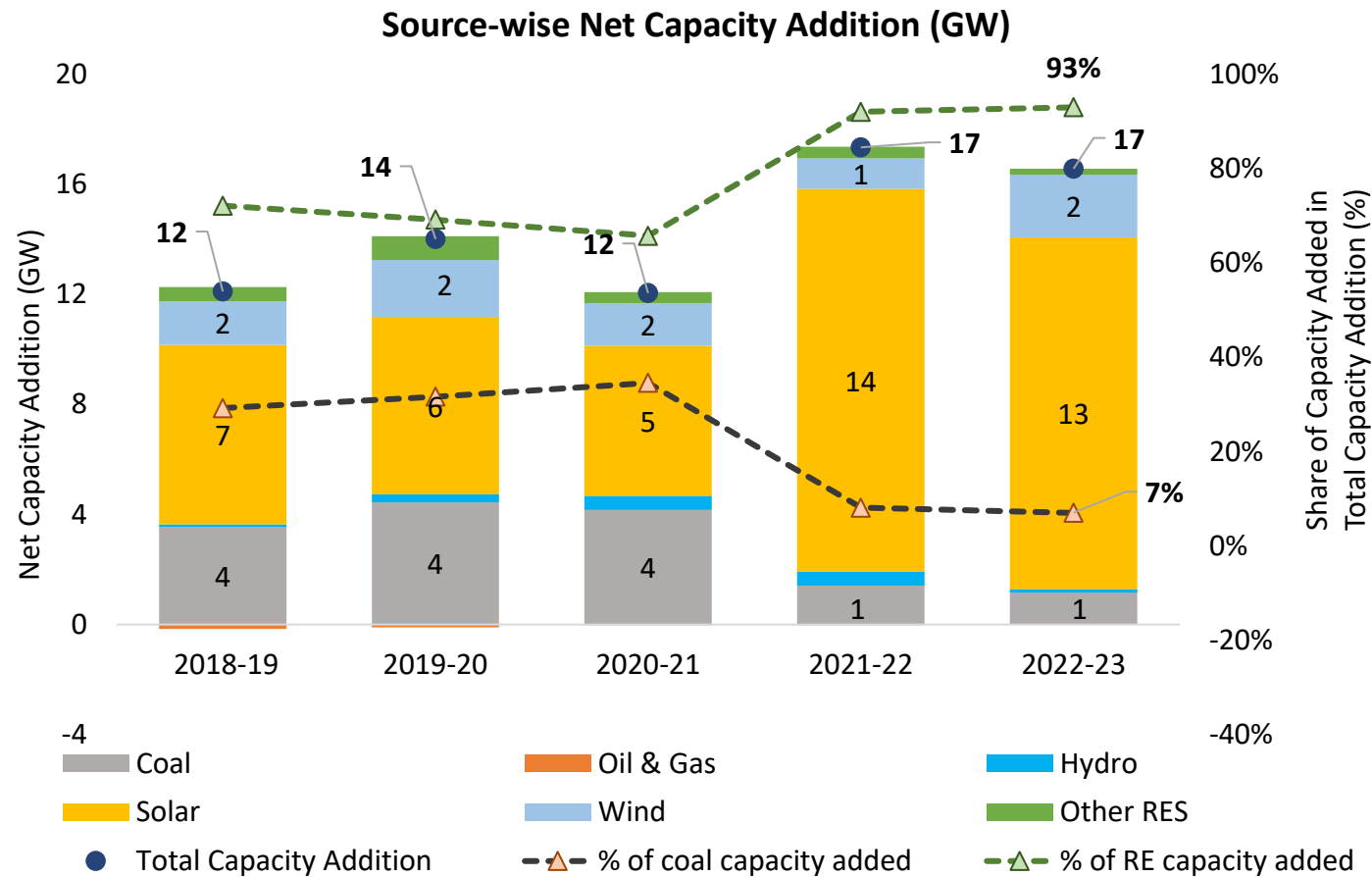
*Excluding biofuels, waste, and other non-commercial source of energy

India's Electricity Capacity Mix (Utility-scale)



- India's electricity generating capacity is 416 GW as on Mar'2023 [coal 212 GW (51%), solar 67 GW (16%), hydro 47 GW (11%), and wind 43 (10%)].
- As on Mar'2023, the share of non-fossil-based electricity capacity is 43% as against the set target of 50% non-fossil capacity by 2030.
- As on Mar'2023, India's renewable energy capacity (including large hydro) stood at 172 GW out of 416 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).

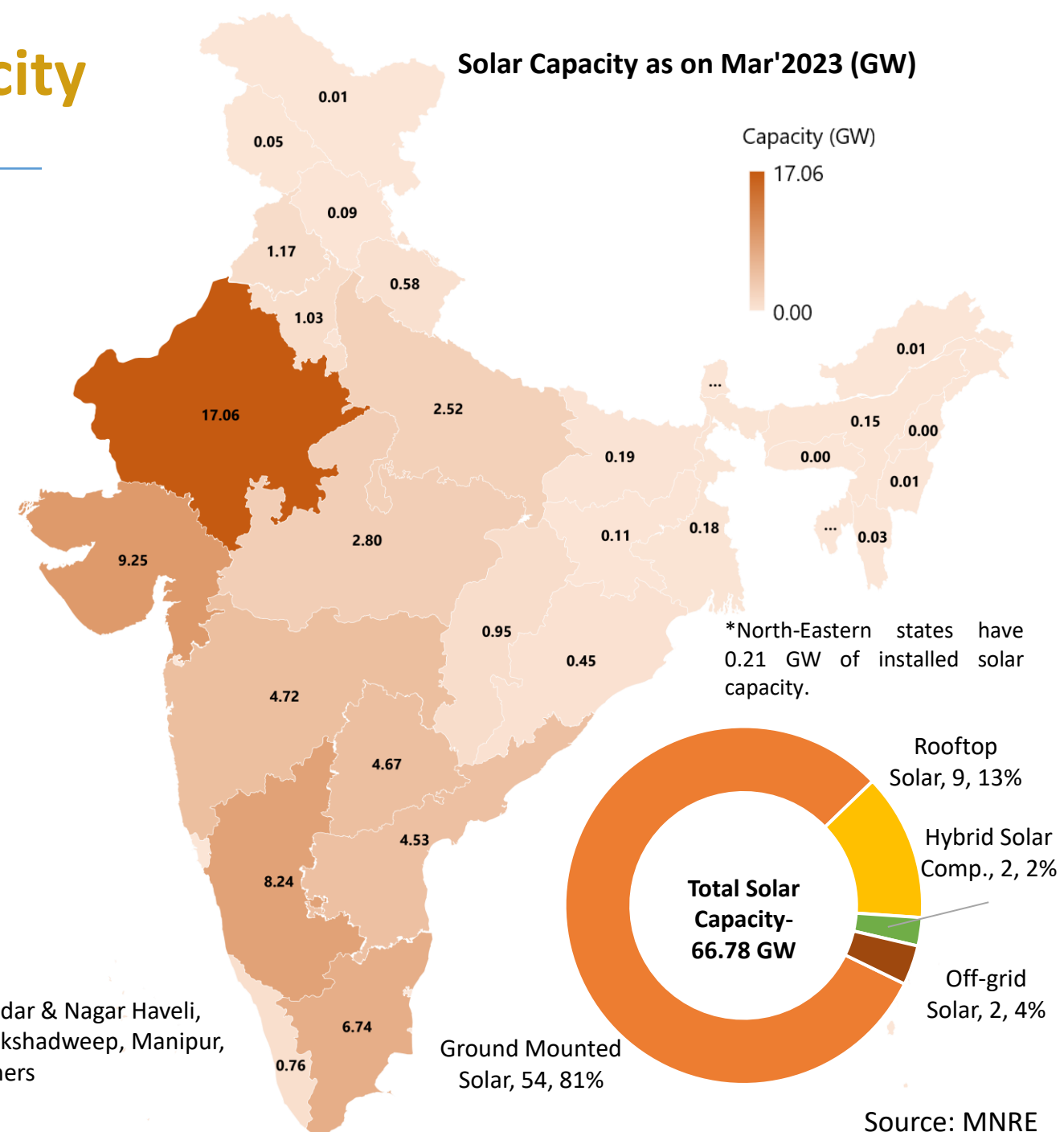
State-wise Solar Installed Capacity

as on March 2023

State-wise installed capacity of Solar Power (GW)					
States	Ground Mounted	Rooftop	Solar Component in Hybrid	Off Grid	Total Solar Power
Rajasthan	14.03	0.89	1.58	0.56	17.06
Gujarat	6.58	2.49	0.13	0.05	9.25
Karnataka	7.62	0.59	0.00	0.03	8.24
Tamil Nadu	6.29	0.39	0.00	0.06	6.74
Maharashtra	3.01	1.49	0.00	0.23	4.72
Telangana	4.36	0.30	0.00	0.01	4.67
Andhra Pradesh	4.28	0.17	0.00	0.09	4.53
Madhya Pradesh	2.46	0.26	0.00	0.09	2.80
Uttar Pradesh	2.07	0.27	0.00	0.18	2.52
Punjab	0.83	0.25	0.00	0.08	1.17
Haryana	0.27	0.43	0.00	0.33	1.03
Chhattisgarh	0.51	0.05	0.00	0.39	0.95
Kerala	0.30	0.44	0.00	0.02	0.76
Uttarakhand	0.30	0.26	0.00	0.01	0.58
Others	0.91	0.60	0.00	0.26	1.77
All India	53.80	8.88	1.71	2.39	66.78

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 Mar'2023 (GW)

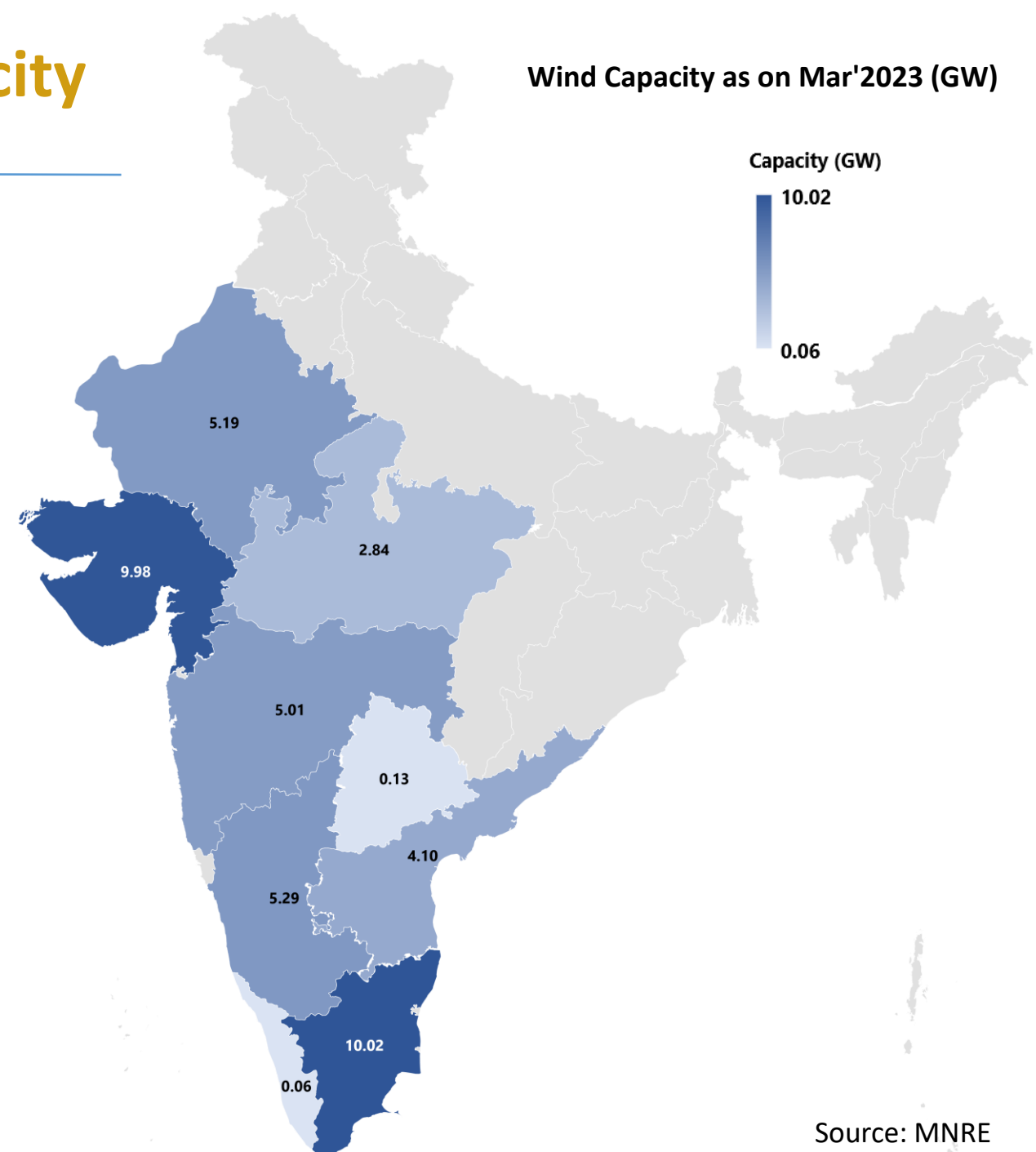


State-wise Wind Installed Capacity

as on March 2023

Wind Capacity as on Mar'2023 (GW)

State-wise installed capacity of Wind (Onshore) Power	
States	Installed Capacity (GW)
Tamil Nadu	10.02
Gujarat	9.98
Karnataka	5.29
Rajasthan	5.19
Maharashtra	5.01
Andhra Pradesh	4.10
Madhya Pradesh	2.84
Telangana	0.13
Kerala	0.06
India Total	42.63

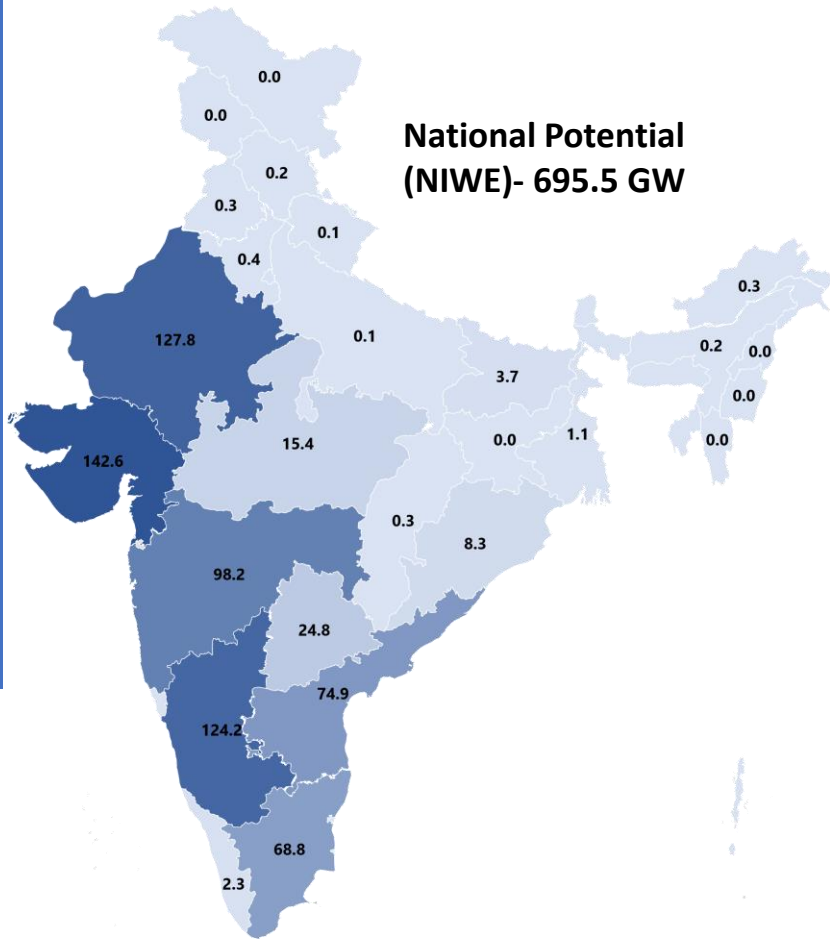


RE Potential and Installed Capacity (1/2)

RE potential in the state

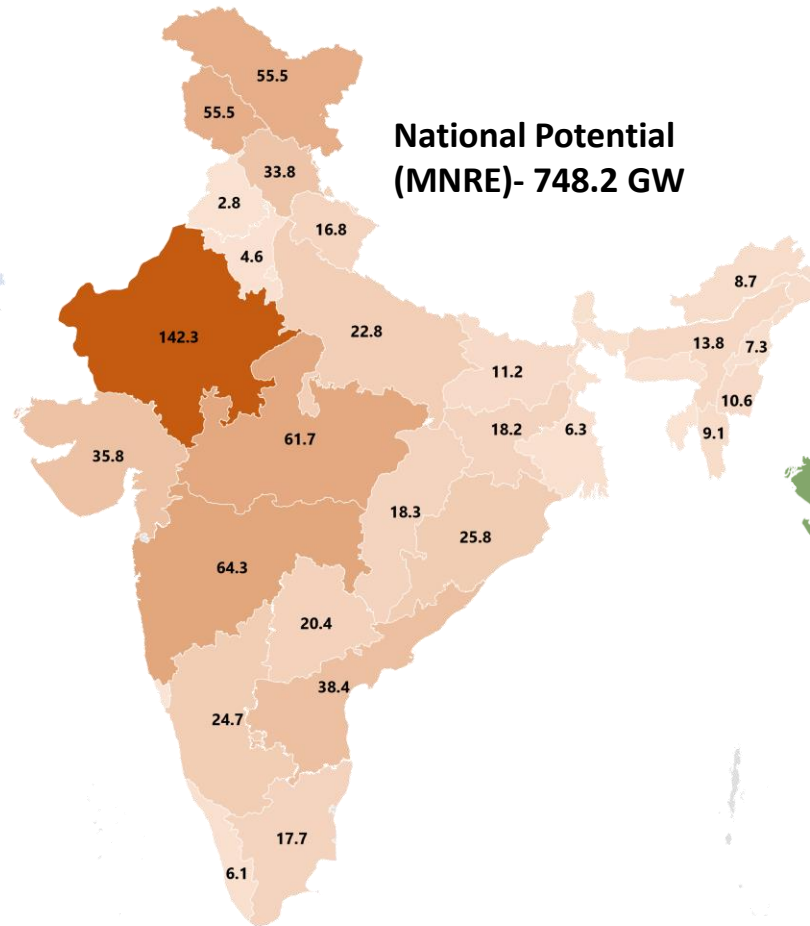
Wind Onshore Potential at 120m agl

State Potential (GW) 0.0 142.6



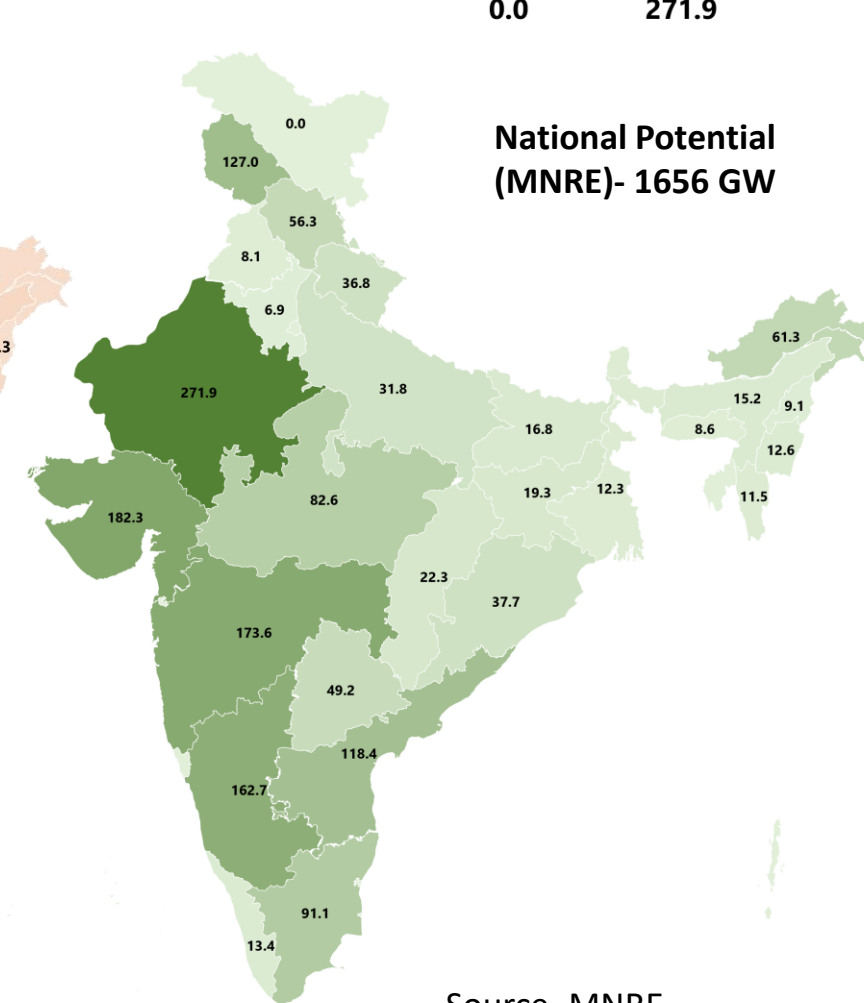
Solar Potential

State Potential (GW) 0.9 142.3



Renewable Energy Potential (all sources including large Hydro)

State Potential (GW) 0.0 271.9

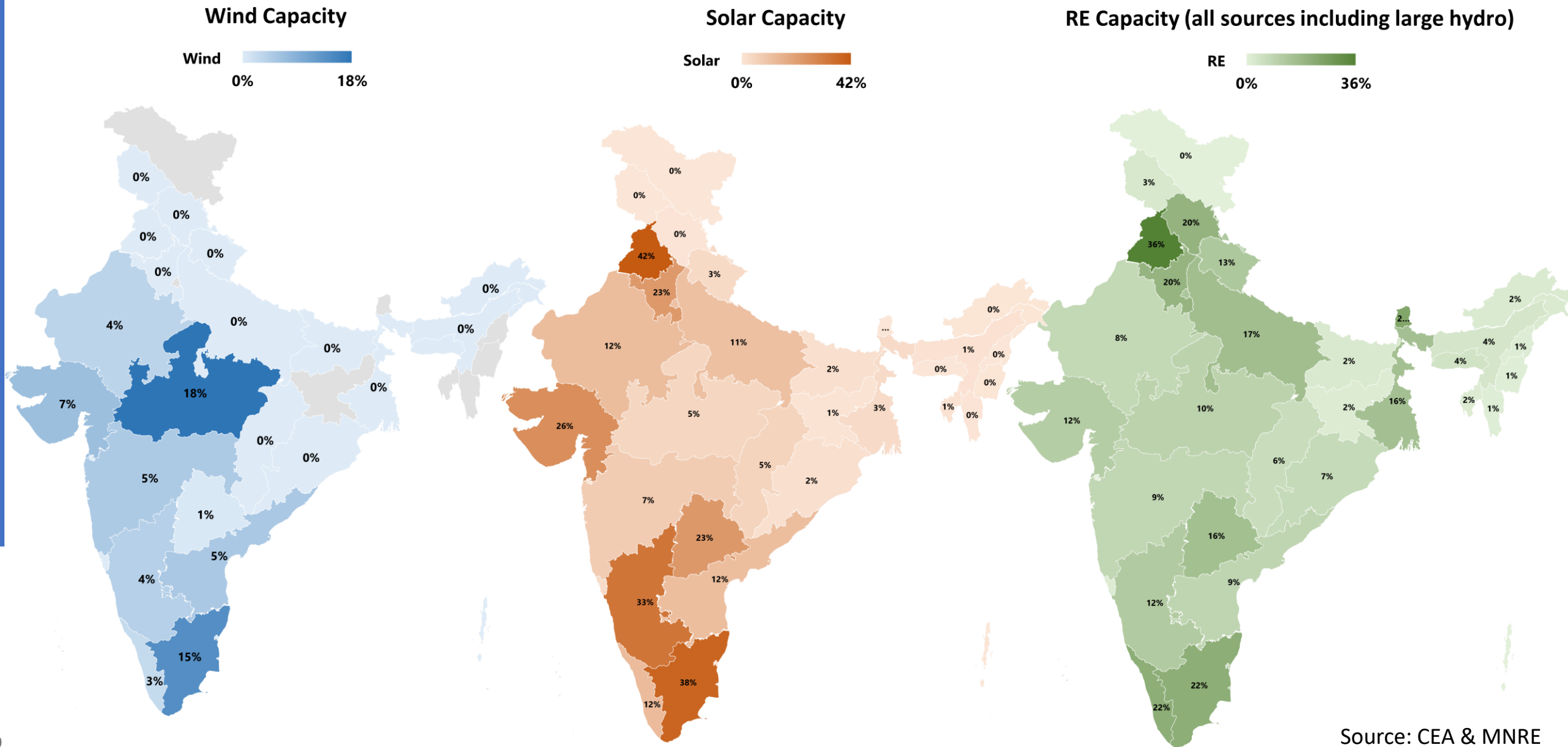


In India, market potential for SPV rooftop is 124 GW

Source- MNRE

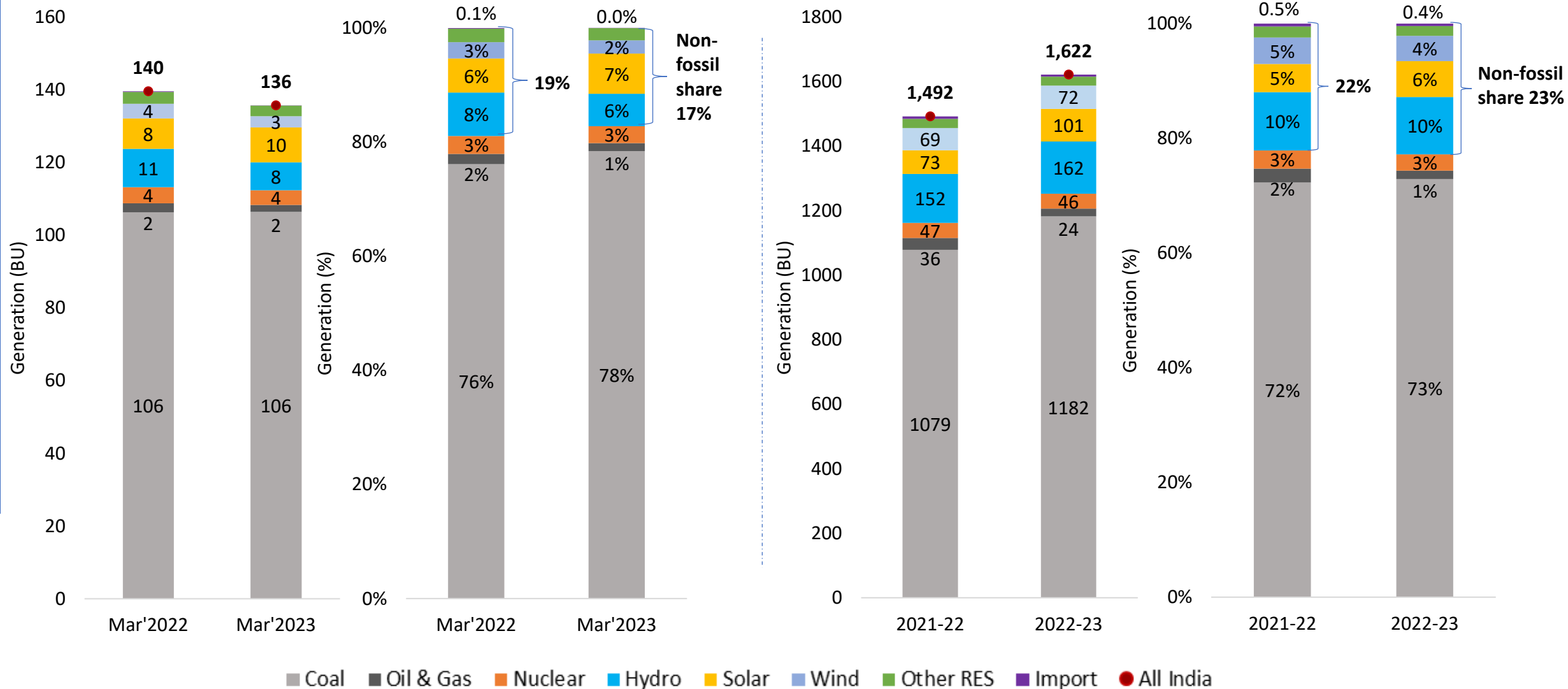
RE Potential and Installed Capacity (2/2)

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



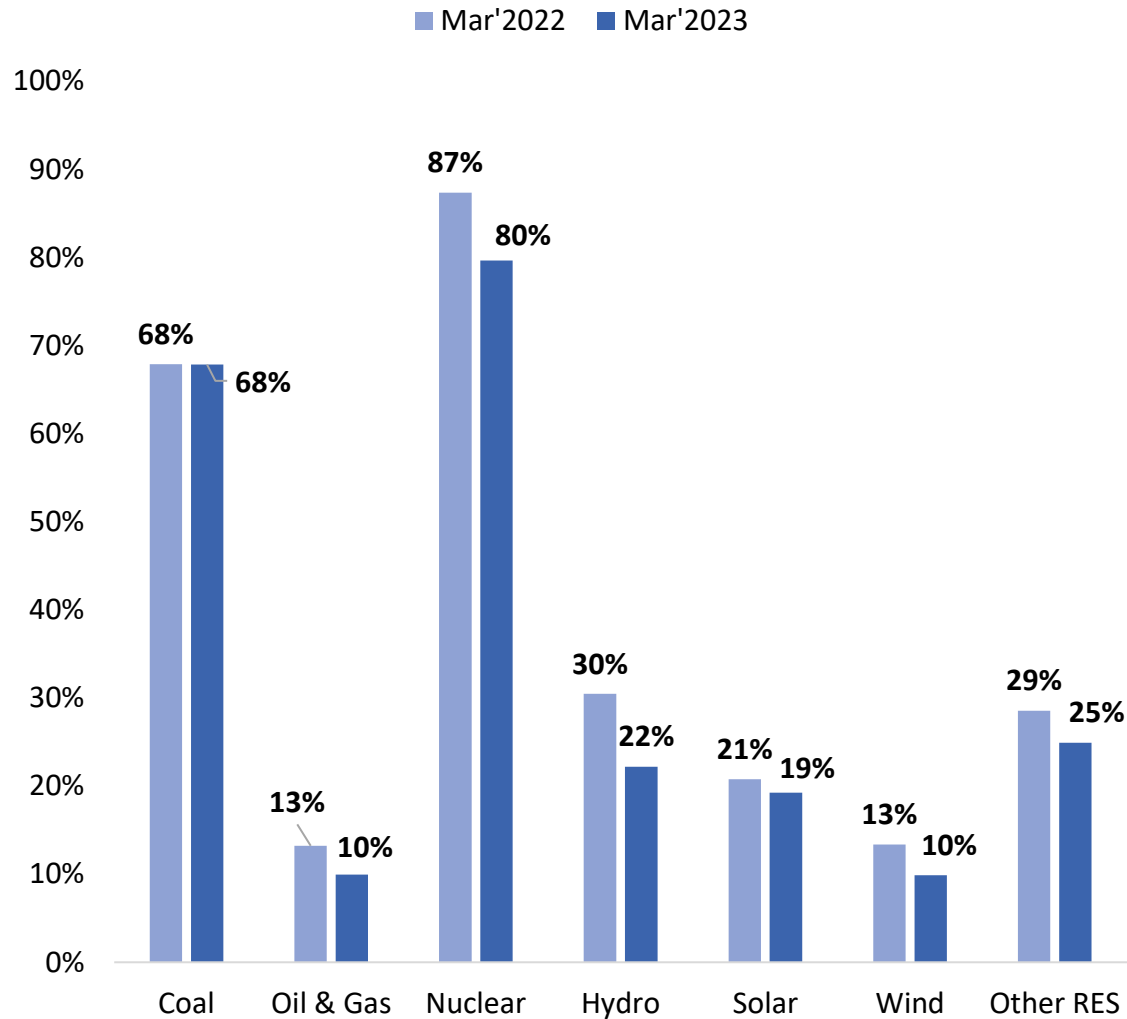
India's Electricity Generation Mix

Source-wise Generation Mix

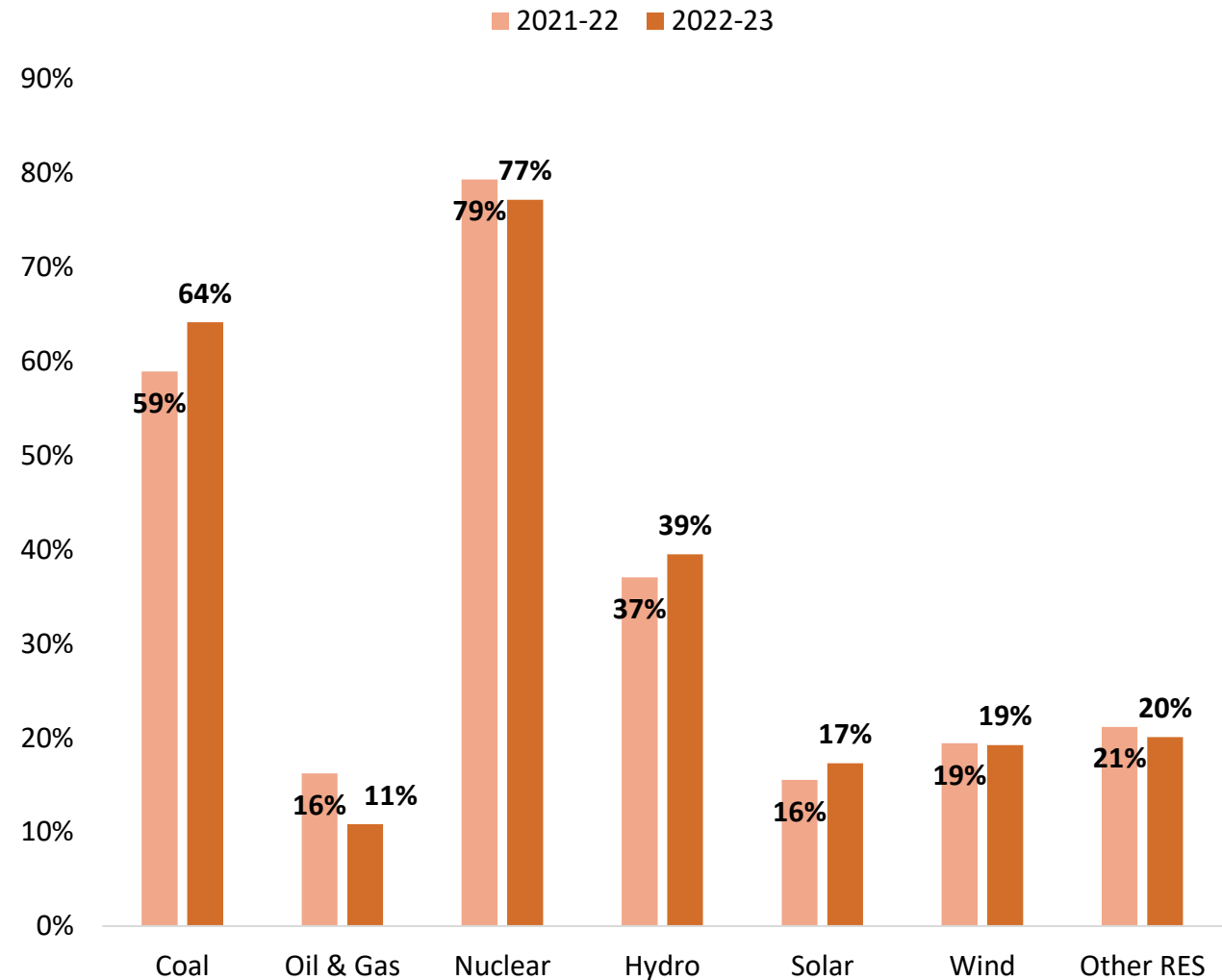


Source-wise PLF/ CUF

Source-wise PLF/ CUF in March 2023

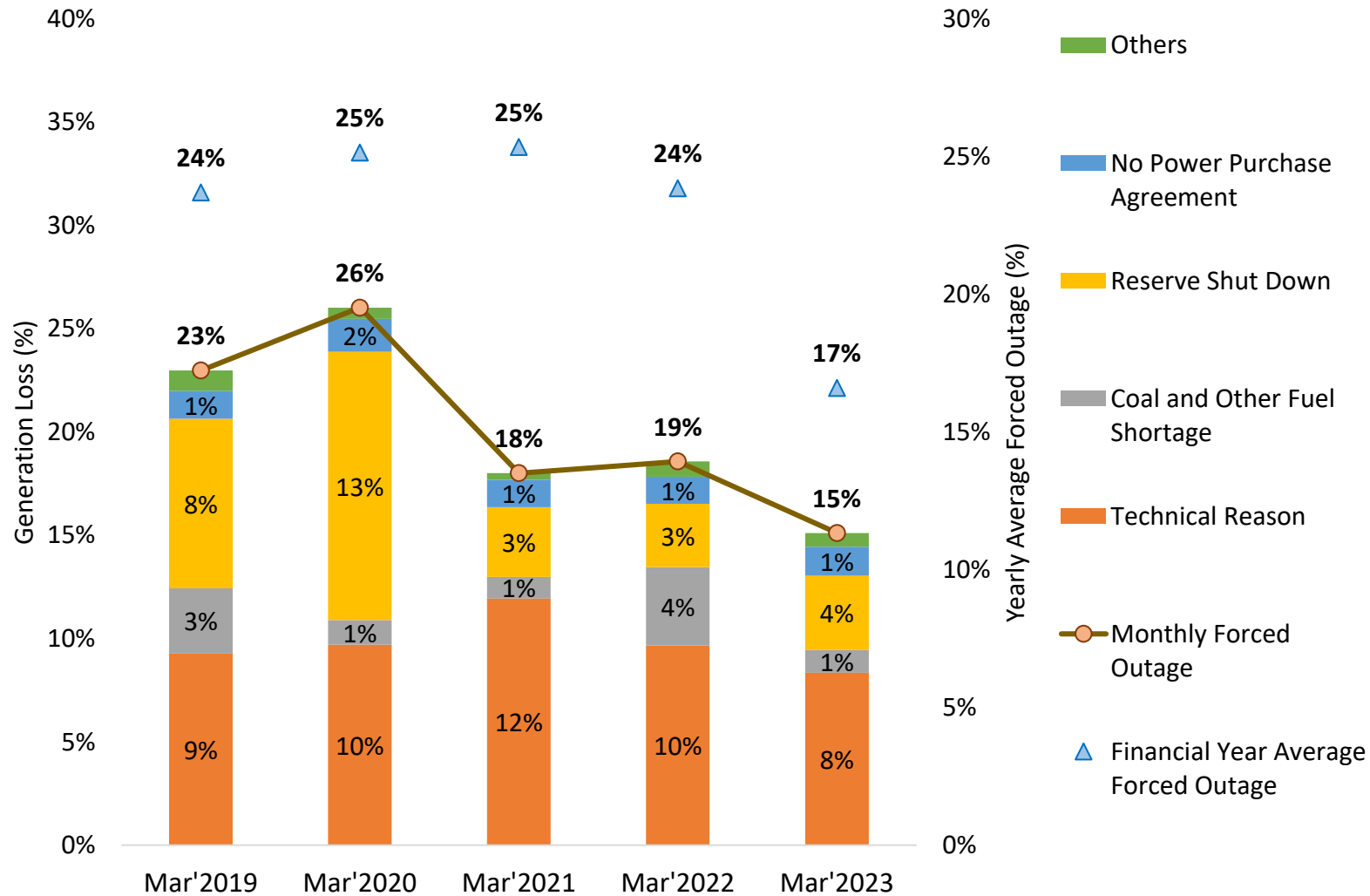


Source-wise PLF/ CUF (%)



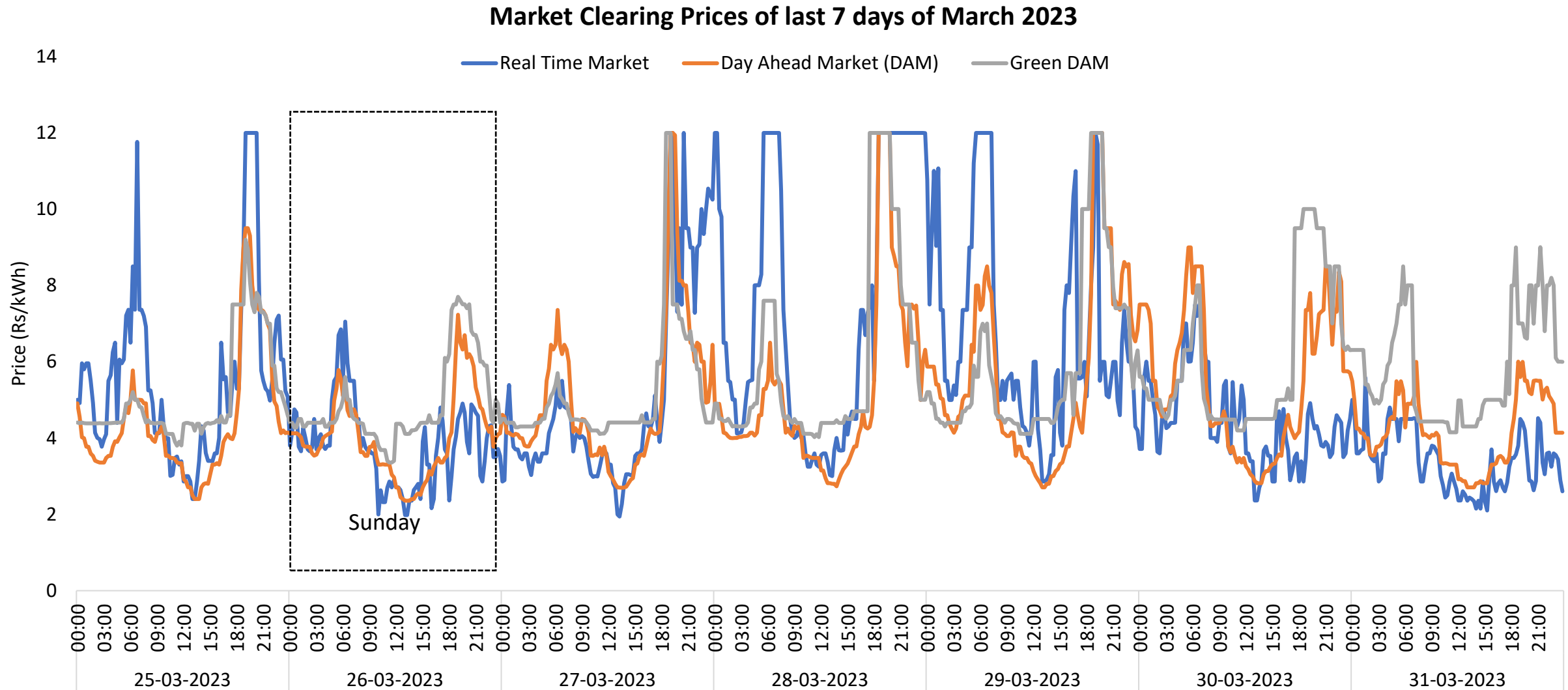
Thermal Generation Loss and Reasons for Forced Outages

Forced Outages for March



Year/ Month		Average Forced Outage Share
Yearly	FY 2020-21	25%
	FY 2021-22	24%
	FY 2022-23	17%
Monthly	Mar'2021	18%
	Mar'2022	19%
	Mar'2023	15%

Indian Electricity Exchange (IEX) Market Snapshot

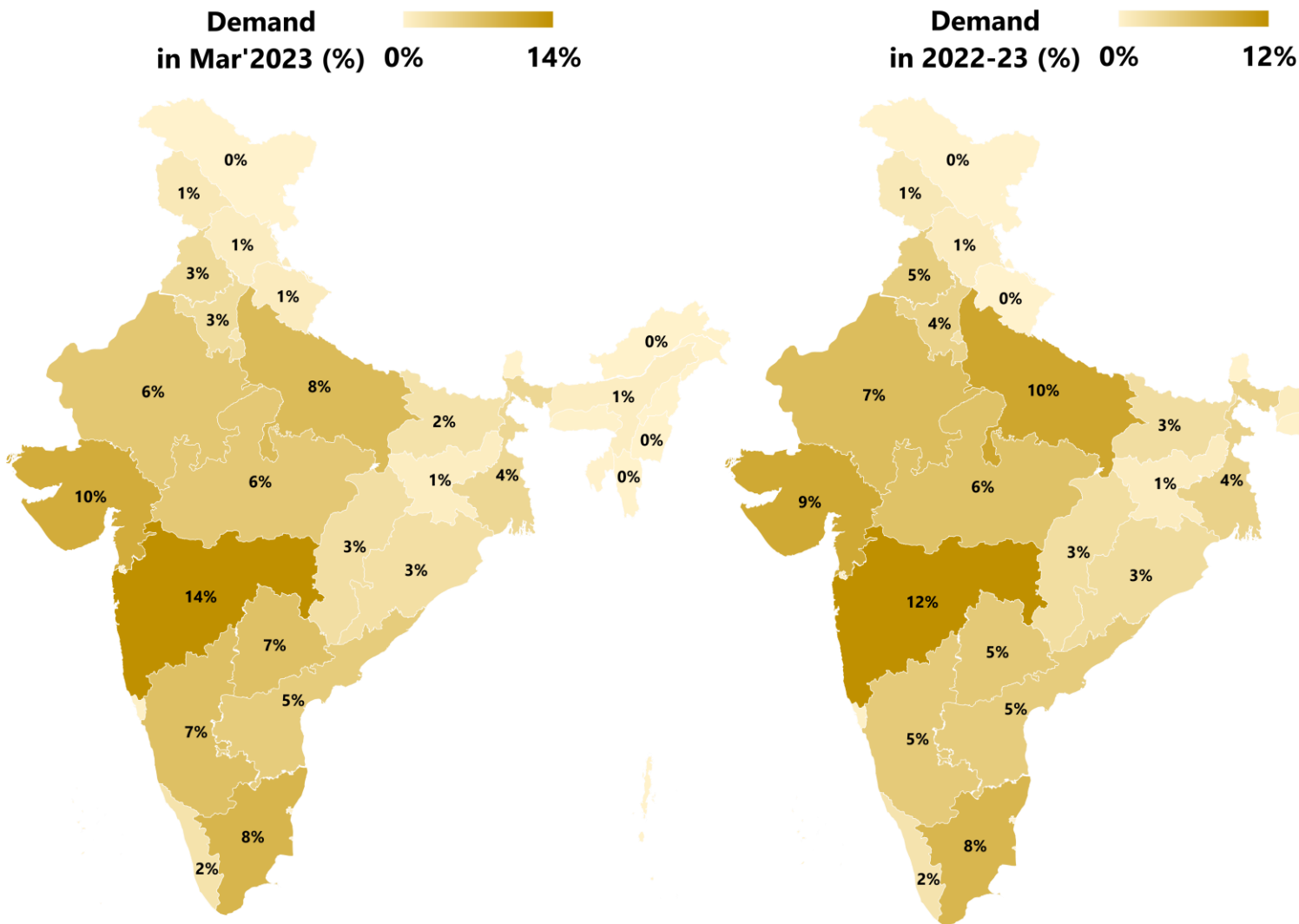


CERC has imposed a cap of Rs 12/kWh on the power exchange rate.

Source: IEX

National and State level Electricity Demand

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



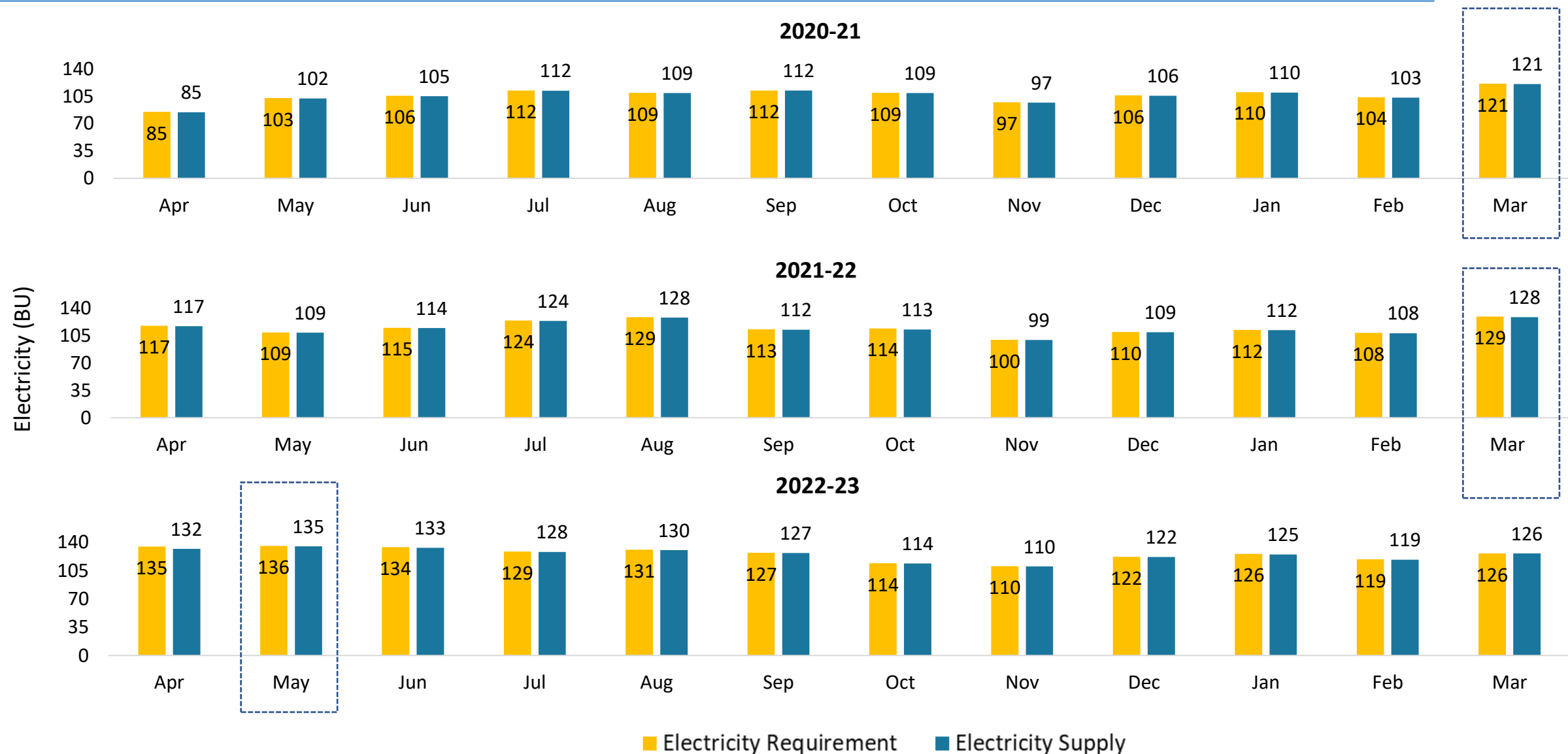
Month	Electricity Demand (BU)	Electricity Supply (BU)	Gap (BU) (+/-)
Mar'2021	121	121	0.6
Mar'2022	129	128	0.7
Mar'2023	126	126	0.2

Year	Electricity Demand (BU)	Electricity Supply (BU)	Gap (BU) (+/-)
FY 2020-21	1276	1271	5
FY 2021-22	1380	1374	6
FY 2022-23	1511	1504	8

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

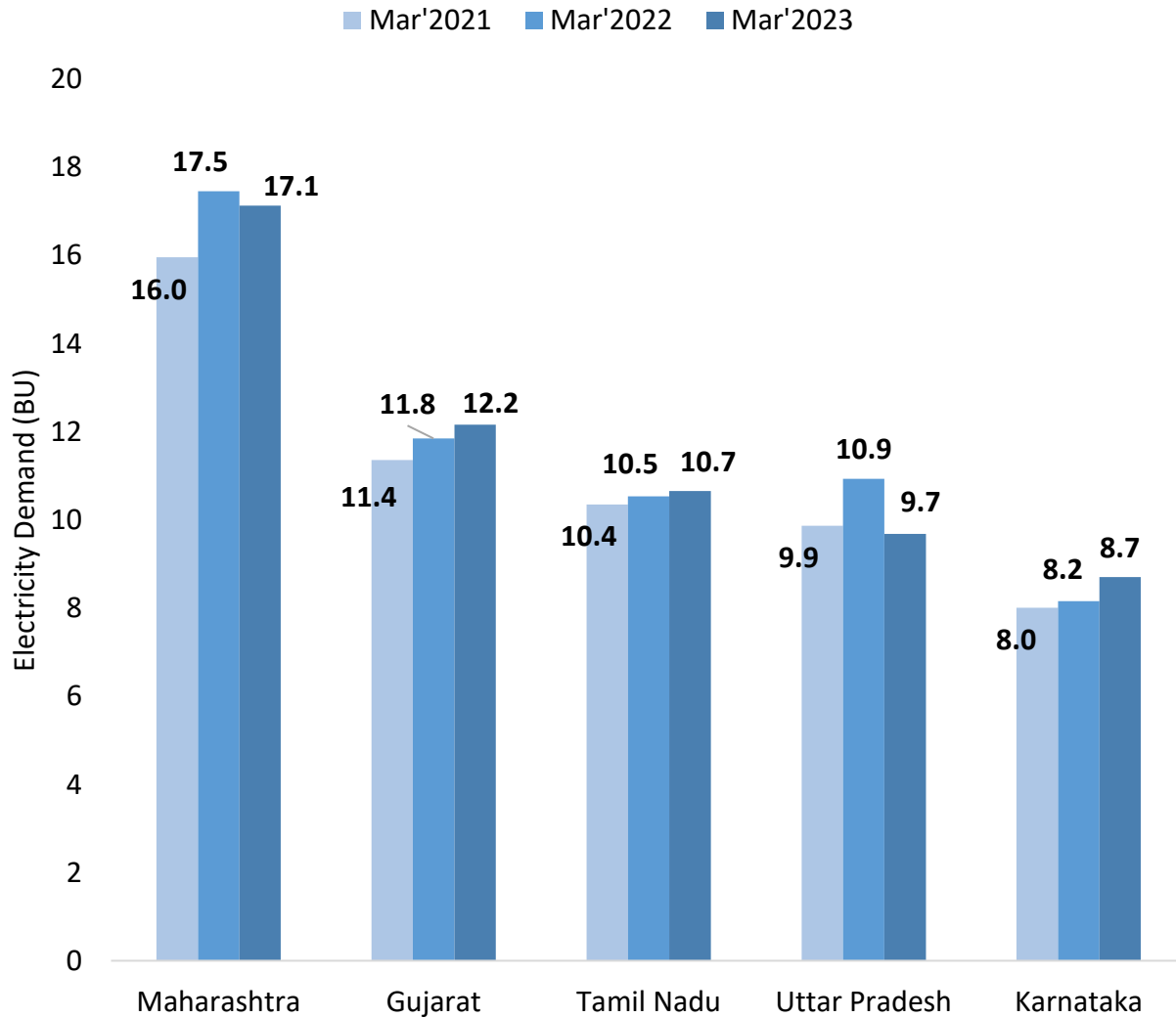
Source: CEA

India's Monthly Electricity Requirement and Supply

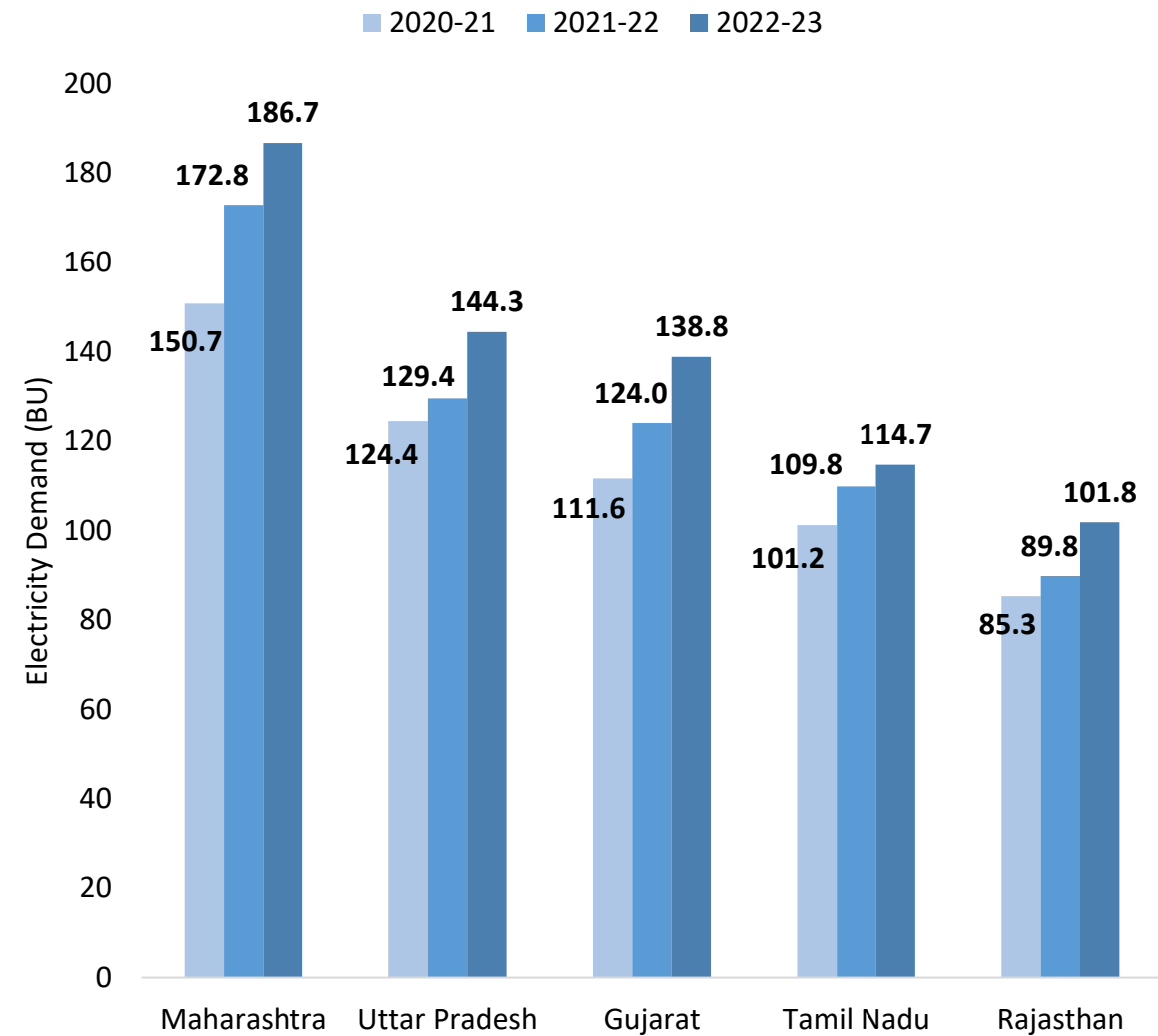


Monthly Electricity Demand of the top 5 states

States with Highest Electricity Demand in March (BU)

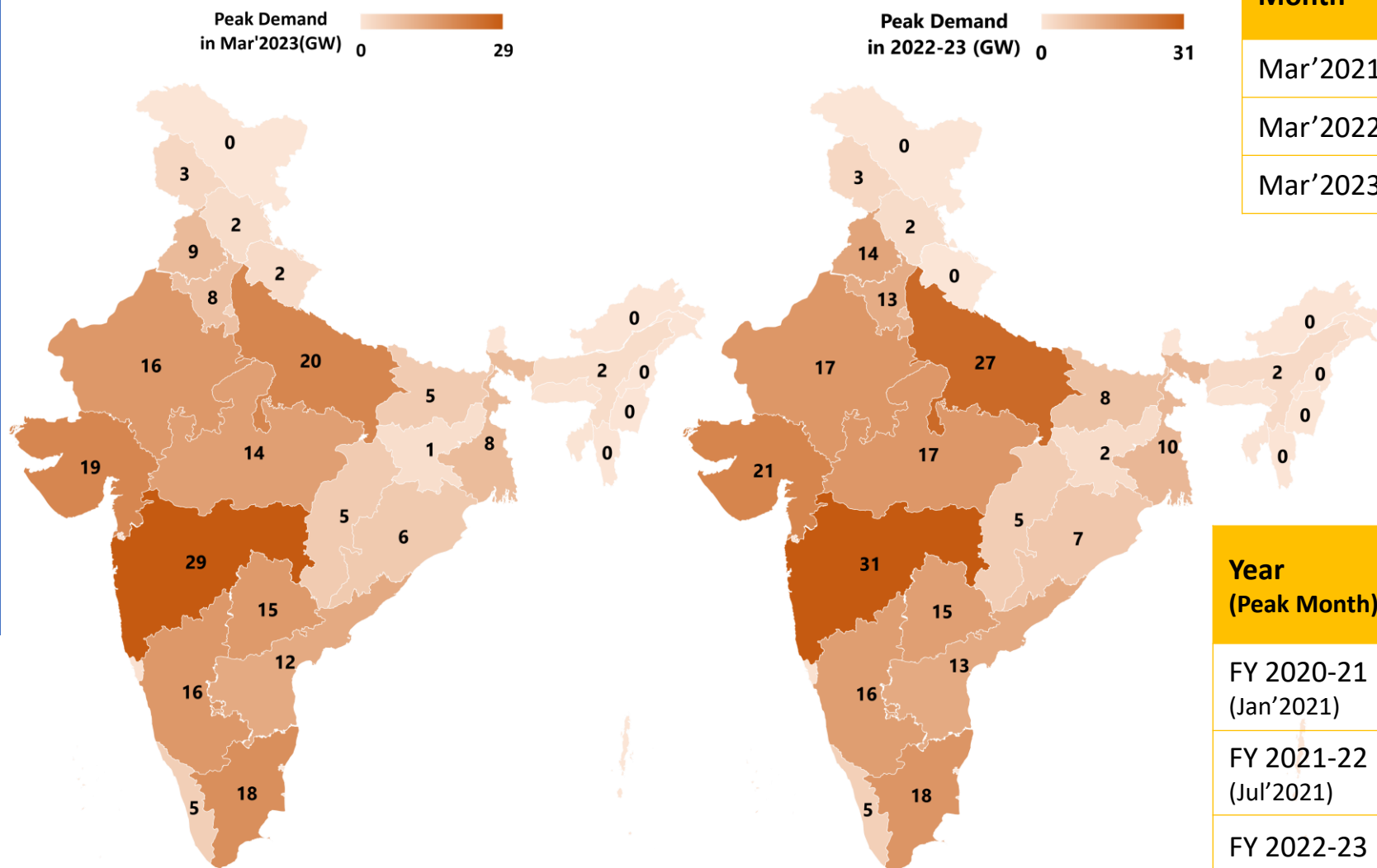


States with Highest Electricity Demand (BU)



National and State level Peak Electricity Demand

State-level Peak Electricity Demand (GW)

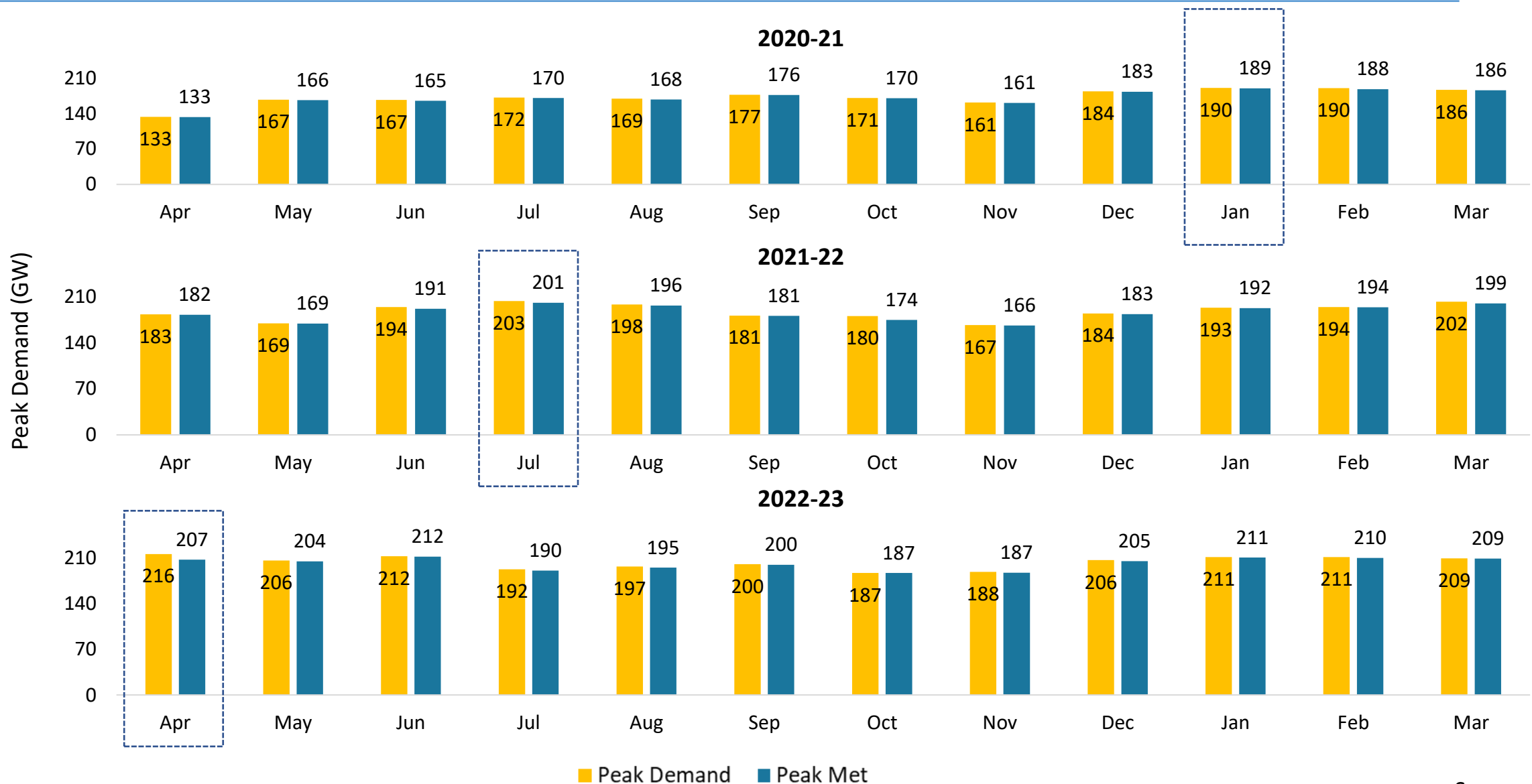


Month	Peak Demand (GW)	Peak Supply (GW)	Gap(BU) (+/-)
Mar'2021	186	186	0.5
Mar'2022	202	199	3
Mar'2023	209	209	0.2

Year (Peak Month)	Peak Demand (GW)	Peak Supply (GW)	Gap (BU) (+/-)
FY 2020-21 (Jan'2021)	190	189	1
FY 2021-22 (Jul'2021)	203	201	2
FY 2022-23 (Apr'2022)	216	207	9

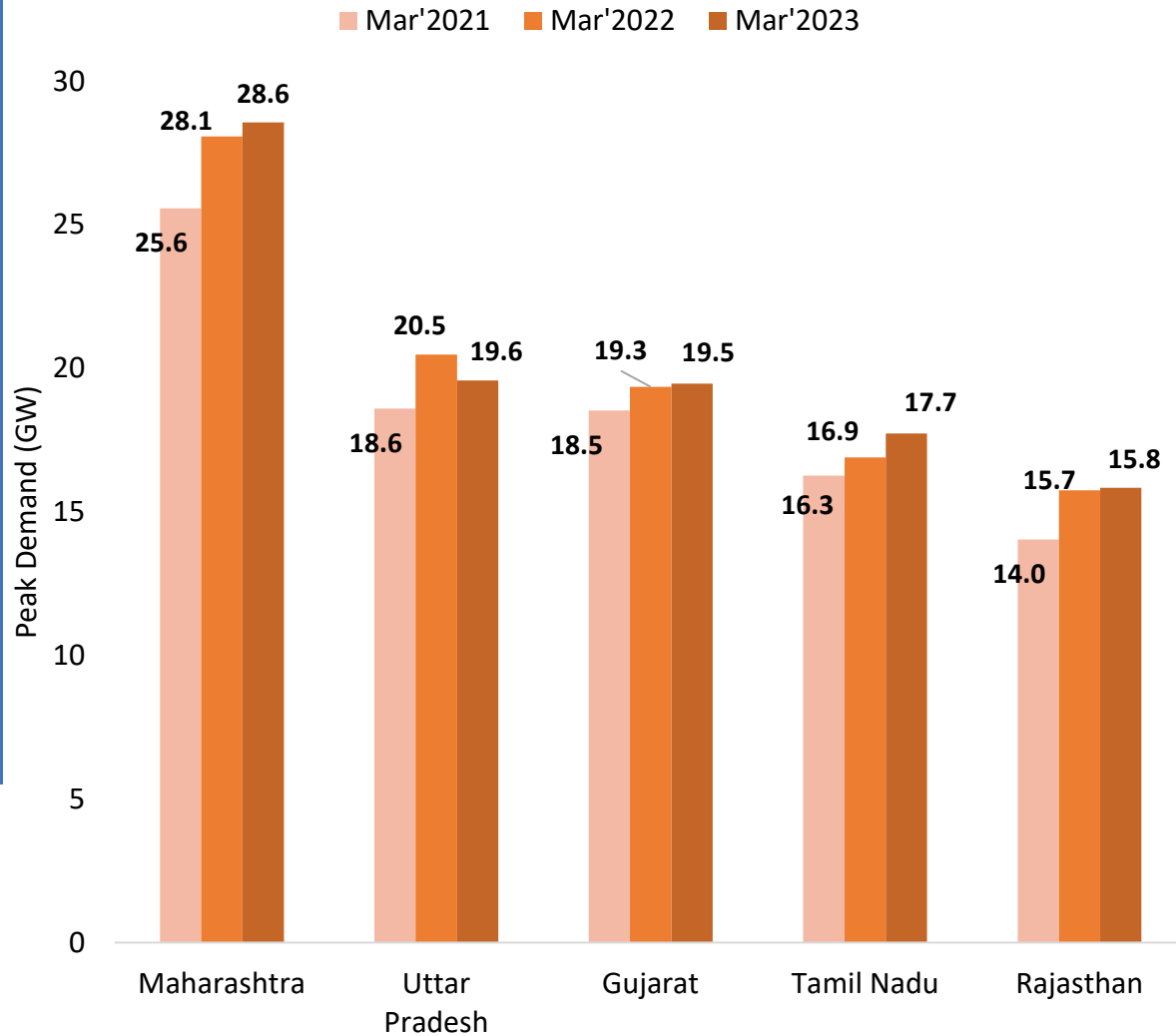
Source: CEA

India's Monthly Peak Electricity Demand and Supply

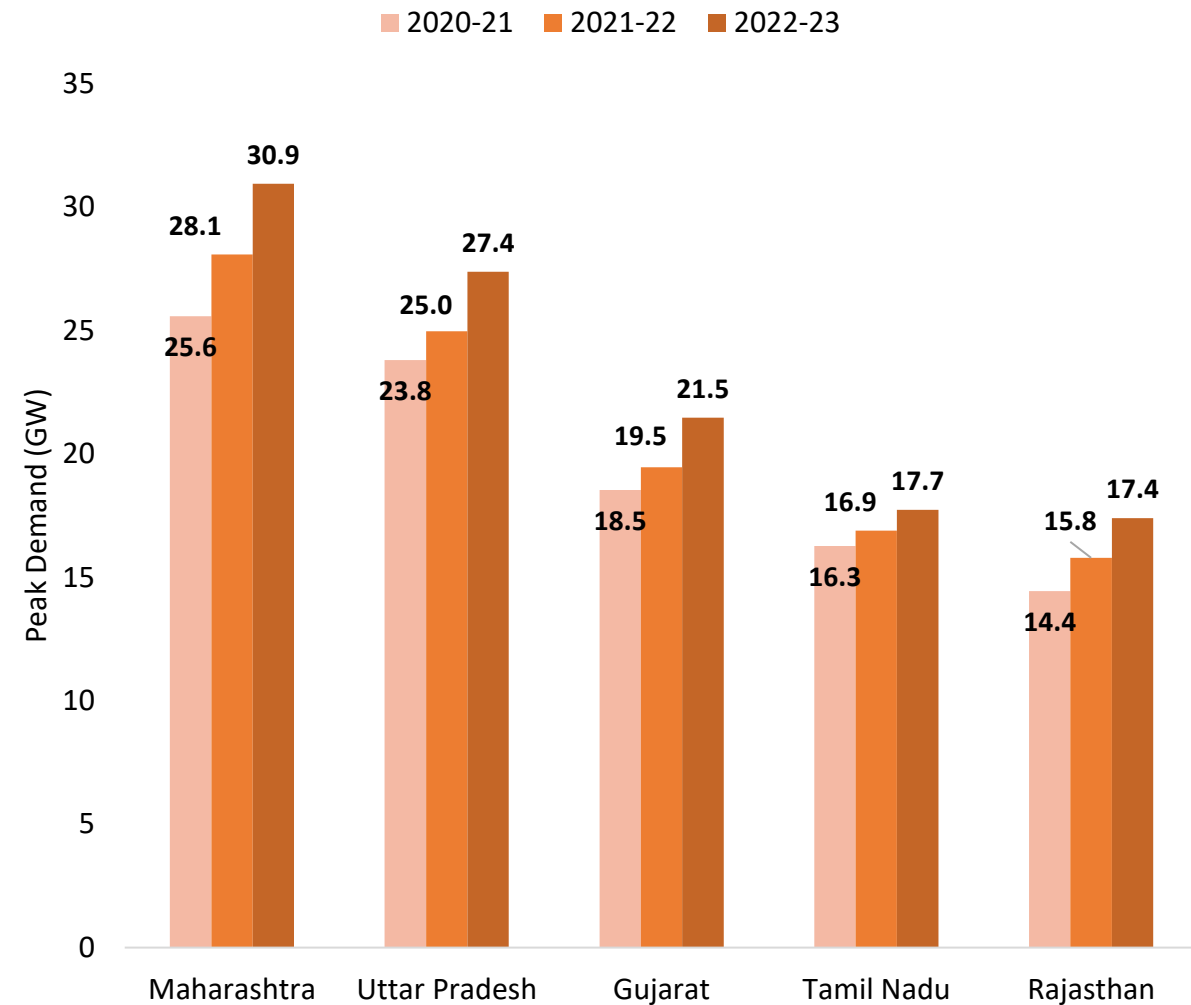


Monthly Peak Electricity Demand of the top 5 states

States with Highest Peak Electricity Demand in March (GW)

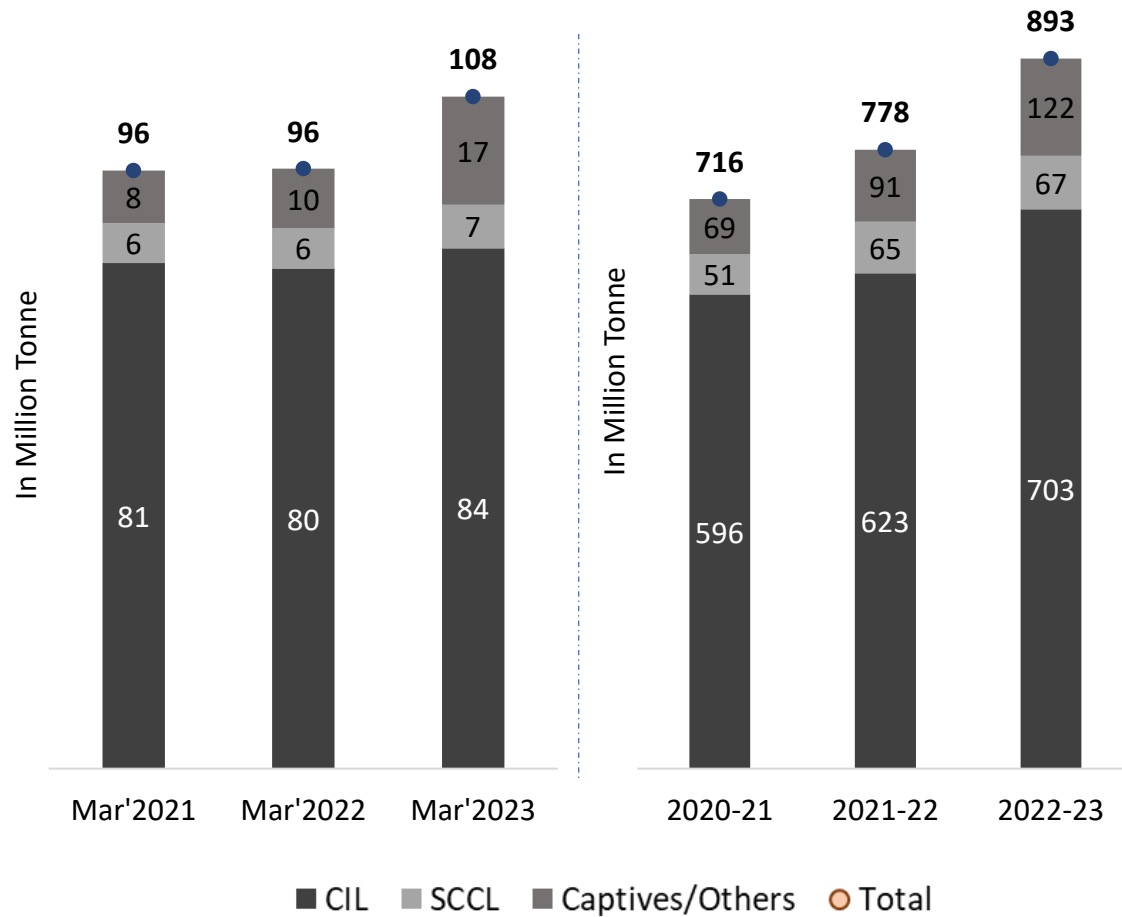


States with Highest Peak Electricity Demand (GW)



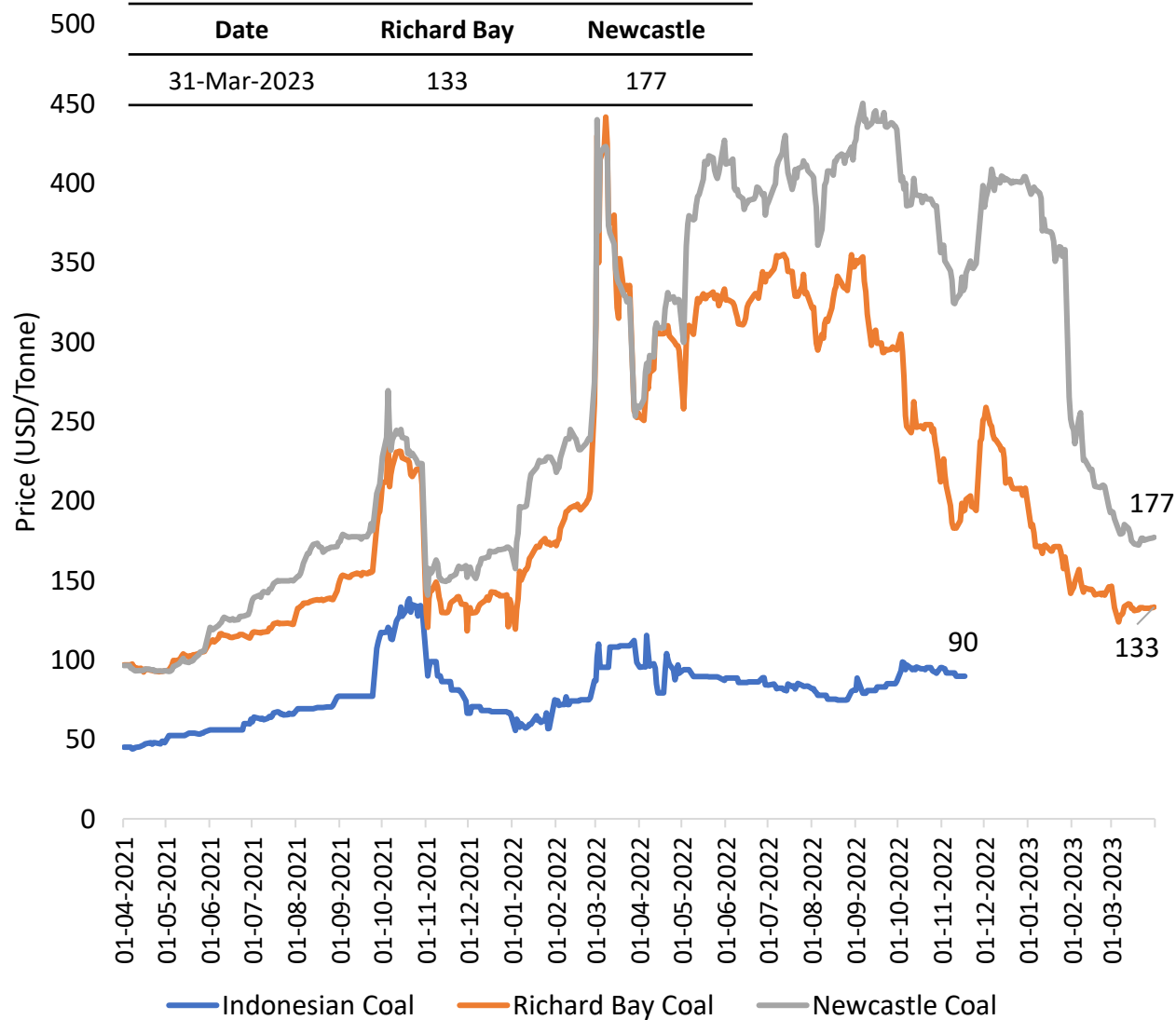
Monthly Coal Statistics

Monthly/ Annual Coal Production (in Million Tonnes)



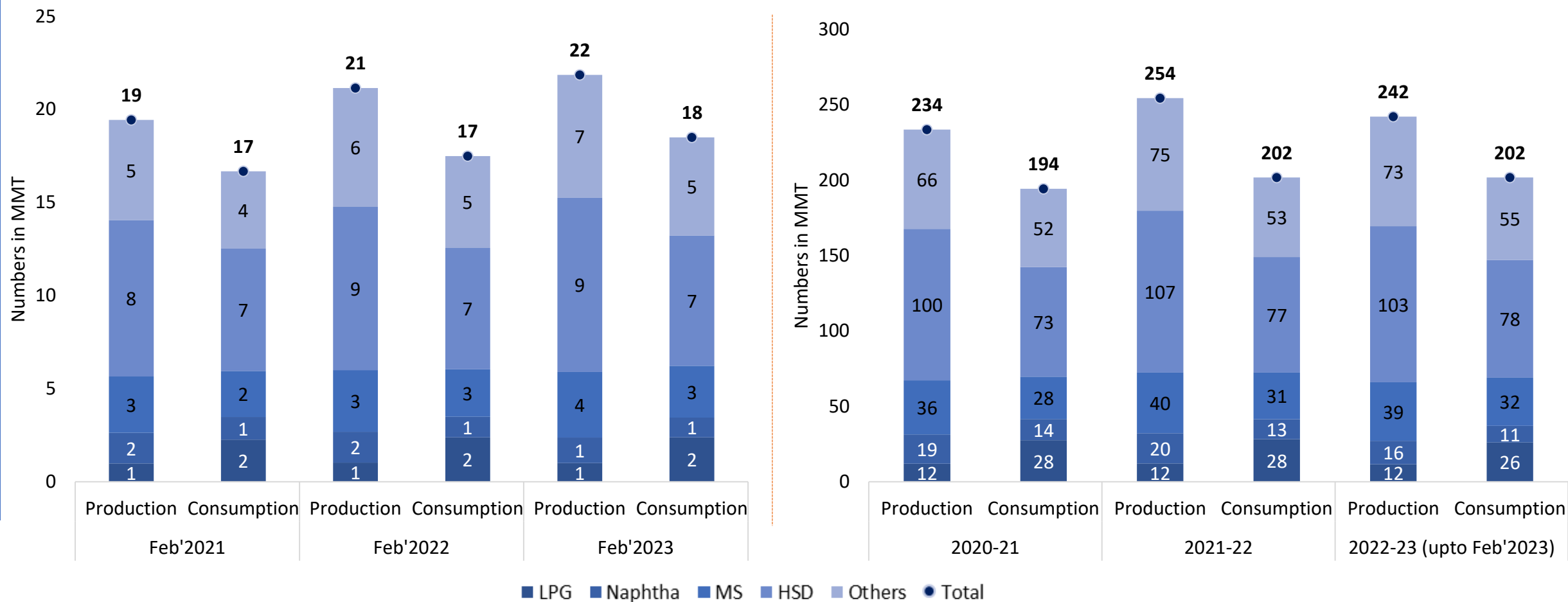
India's coal production increased in Mar'2023 (108 MT) by 12% as compared to Mar'2022.

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.

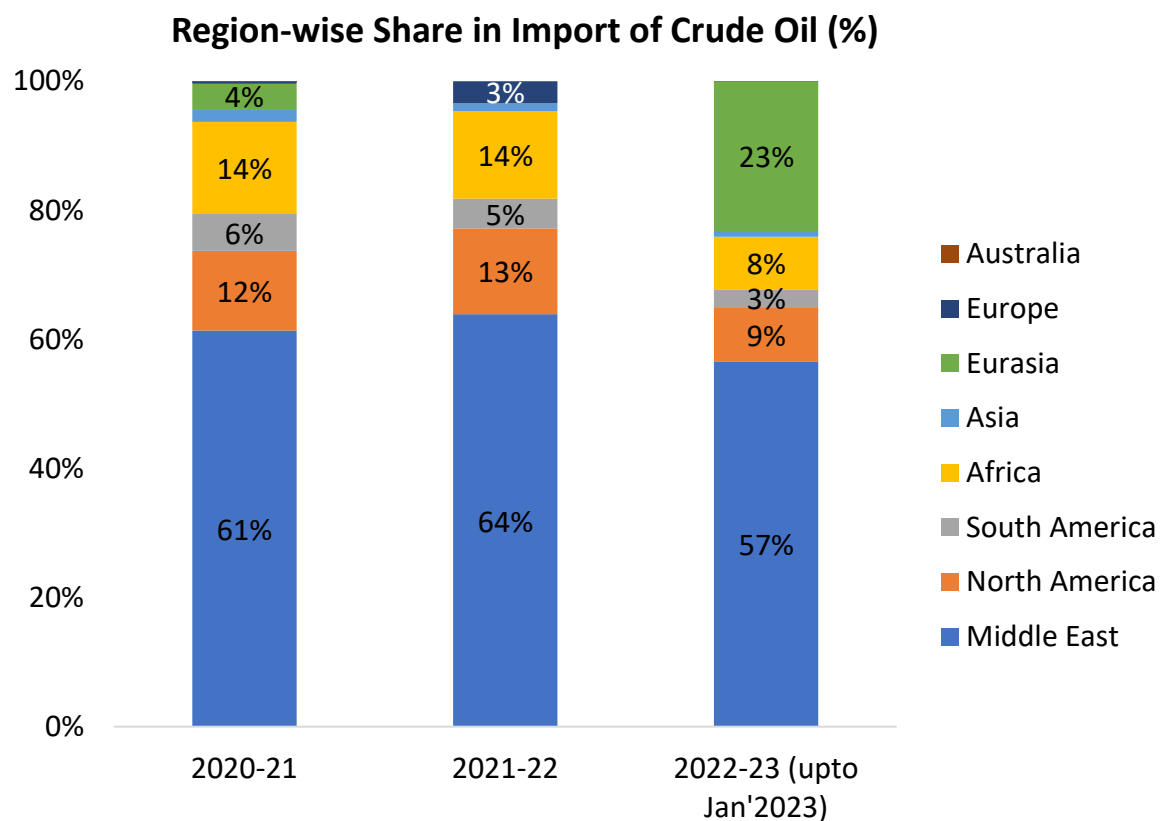
Abbreviations: ATF- Aviation Turbine Fuel, FO- Furnace Oil, HSD- High-Speed Diesel, LDO- Light Diesel Oil, MS- Motor Spirit (Petrol), SKO- Superior Kerosene Oil, LSHS- Low Sulphur Heavy Stock, LPG- Liquefied Petroleum Gas, MMT- Million Metric Tonne

Petroleum Products Market Scenario (2/3)

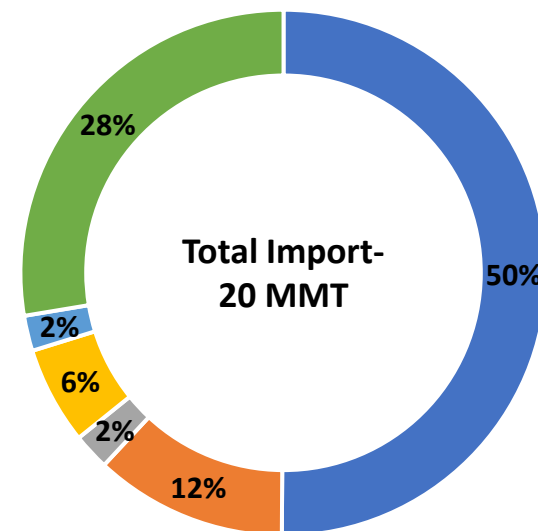
Import/Export of Crude Oil and Petroleum Products ('000 Tonnes)							
Petroleum Products	Import/ Export	Monthly			Yearly		
		Feb'2021	Feb'2022	Feb'2023	2020-21	2021-22	2022-23 (up to Feb'2023)
Crude Oil	Import	15235	17589	19088	196461	212382	211635
	Export	0	0	0	0	0	0
	Net Import	15235	17589	19088	196461	212382	211635
LPG	Import	1521	1253	1559	16476	17120	16766
	Export	41	45	42	452	513	483
	Net Import	1480	1209	1517	16024	16607	16283
Diesel	Import	18	6	6	648	75	321
	Export	2109	2415	2150	30576	32407	26053
	Net Import	-2091	-2409	-2144	-29928	-32332	-25732
Petrol	Import	82	0	0	1351	671	1069
	Export	884	1217	1379	11606	13482	11646
	Net Import	-802	-1217	-1379	-10255	-12812	-10577
Others*	Import	1742	2051	1920	24772	24196	21901
	Export	1114	1178	1485	14135	16352	16850
	Net Import	628	873	435	10637	7844	5051

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

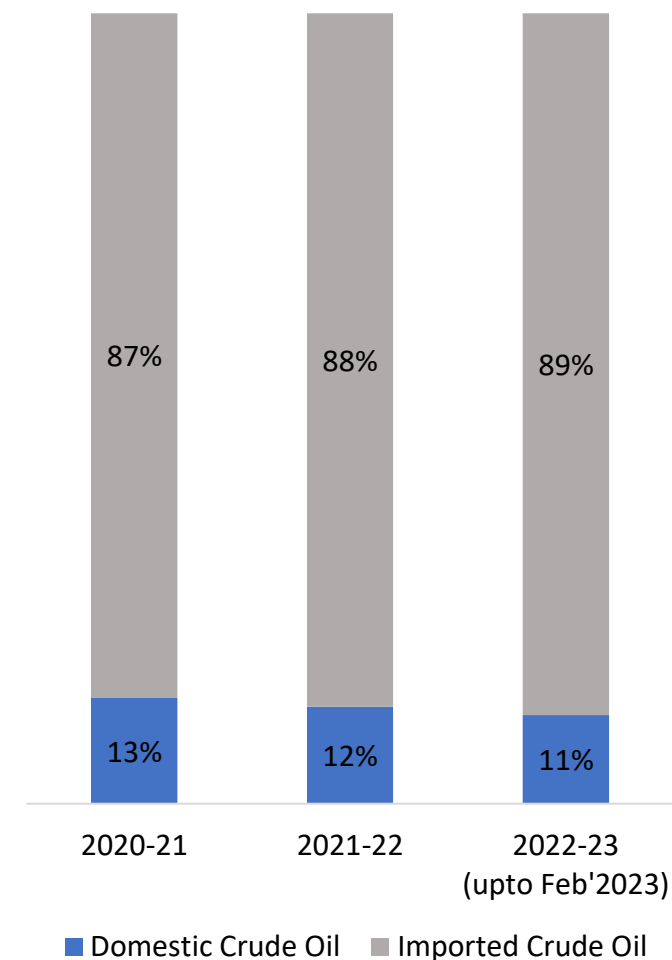
Petroleum Products Market Scenario (3/3)



Regional share of Imported Crude oil in Jan'2023



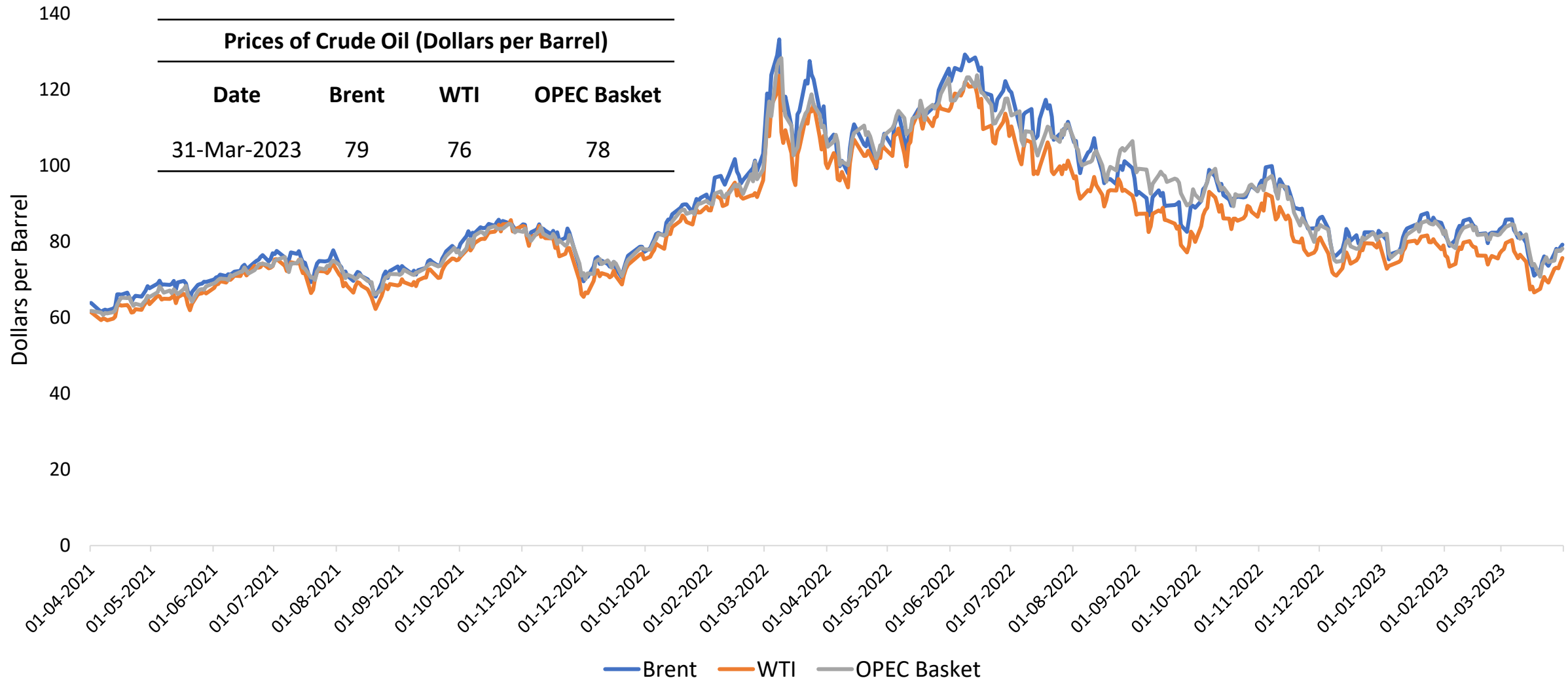
Domestic and Imported Crude Oil share in India (%)



Total Import of Crude Oil (MMT)			
Total Import	2020-21	2021-22	2022-23 (up to Feb'2023)
Crude Oil	196	212	212

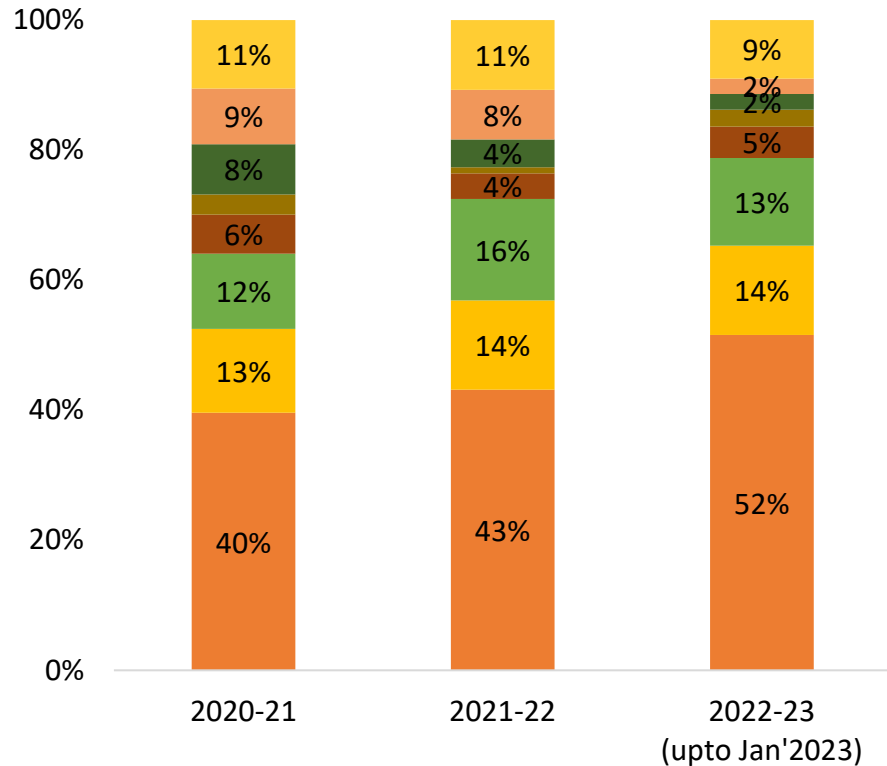
Daily Prices of Crude Oil

Daily Prices of Crude Oil

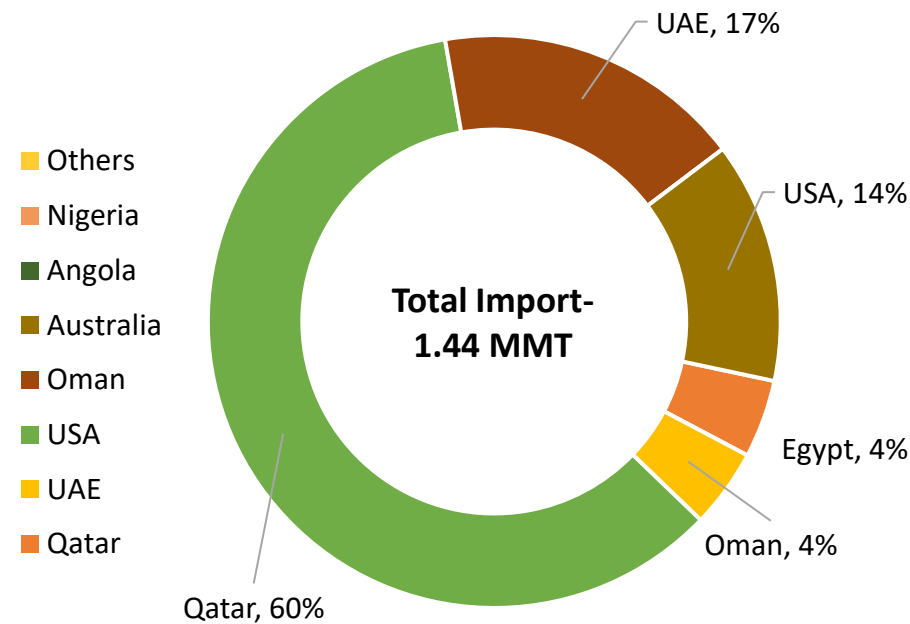


Gas Market Scenario

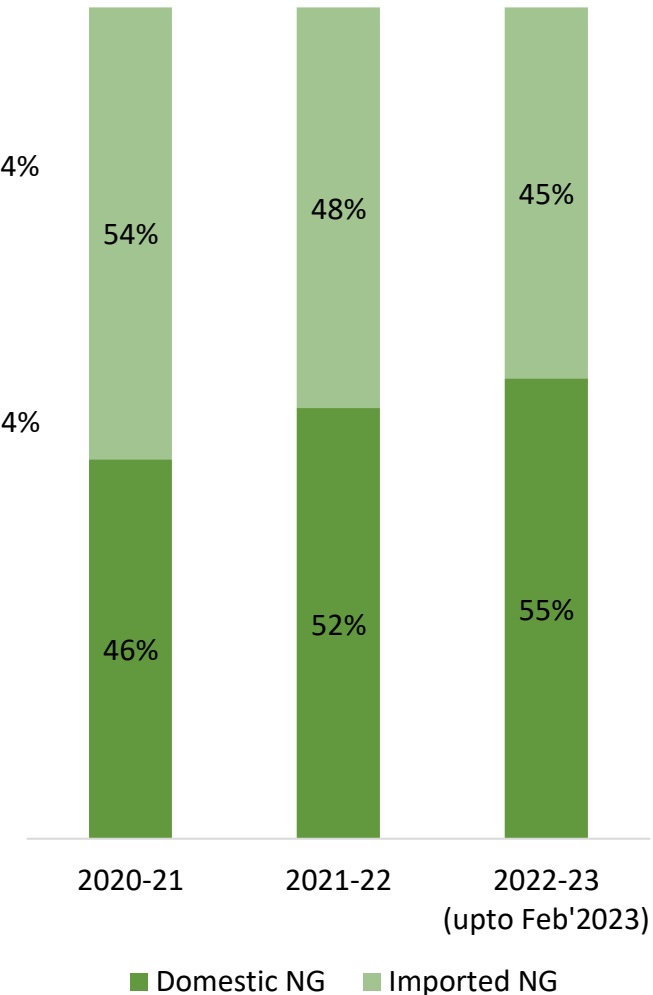
Region-wise Share in Import of LNG (%)



Country share of Imported LNG in Jan'2023



Domestic and Imported Natural Gas share in India (%)

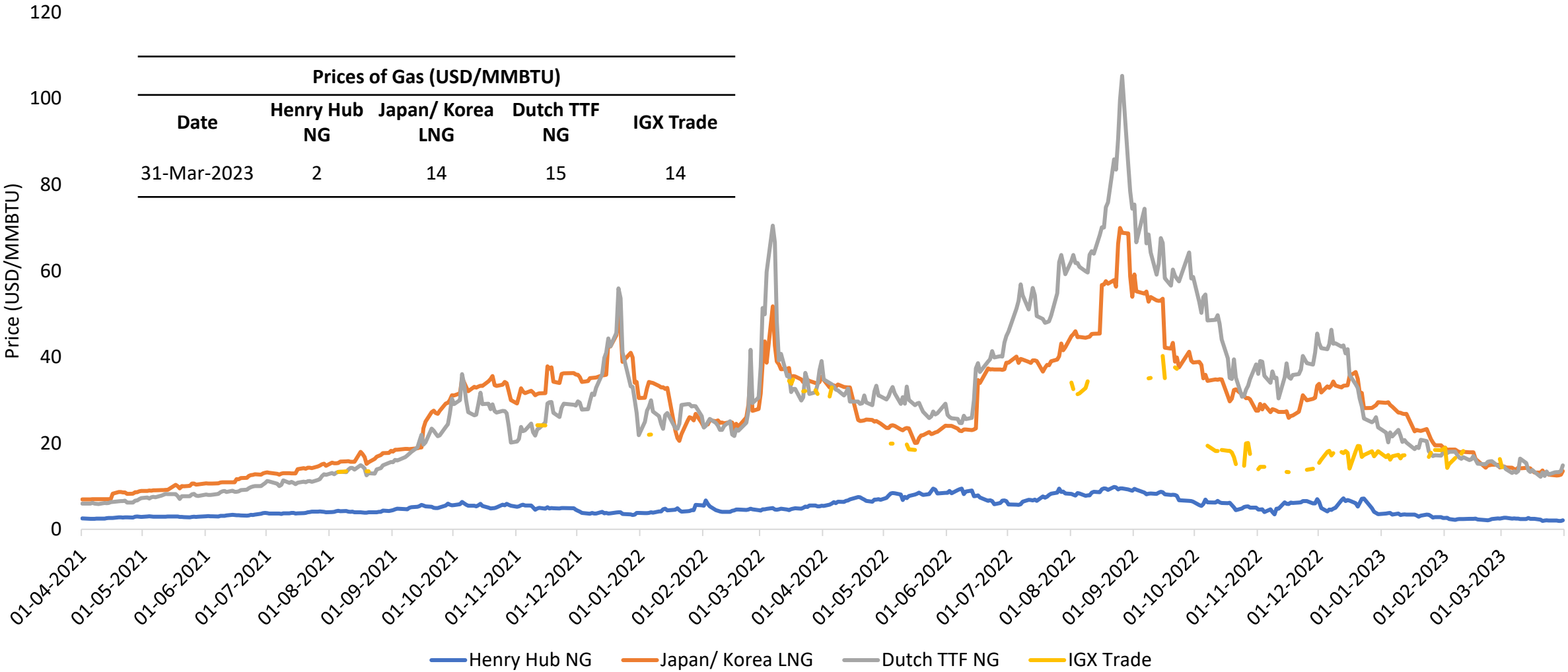


Others include- Equatorial Guinea, Trinidad, Cameroon, Egypt, France, Algeria, Belgium, Indonesia, Turkey, Russia, Spain, Malaysia, Brunei, Netherlands, Norway, and others.

Total Import of Liquefied Natural Gas (LNG) (MMT)			
Total Import	2020-21	2021-22	2022-23 (up to Feb'2023)
LNG	25.05	23.42	16.99

Daily Prices of Gas

Gas Daily Market Price

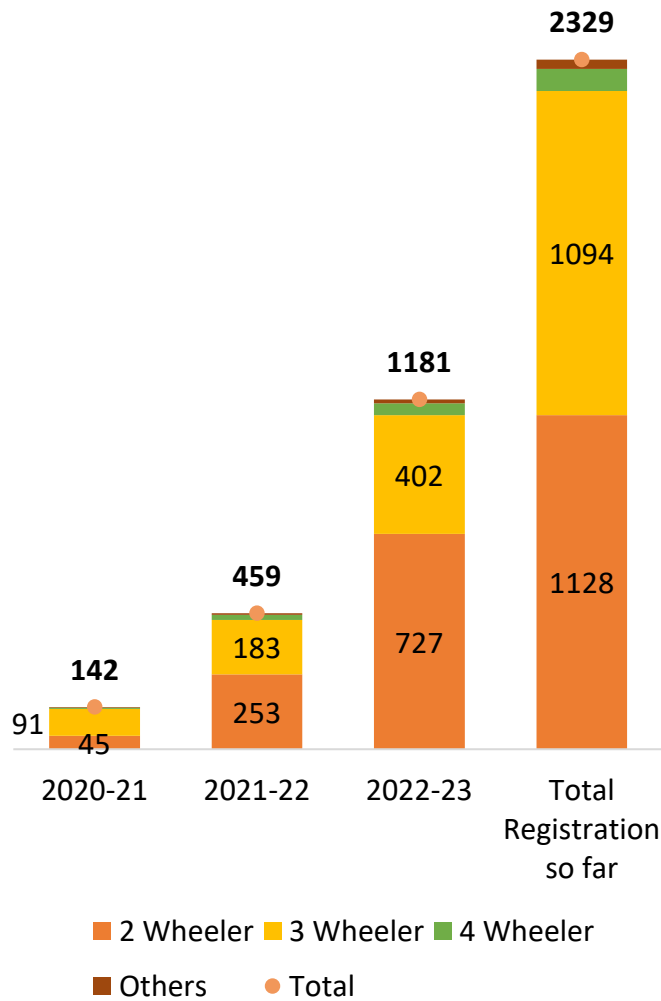


Prices of Gas (USD/MMBTU)				
Date	Henry Hub NG	Japan/ Korea LNG	Dutch TTF NG	IGX Trade
31-Mar-2023	2	14	15	14

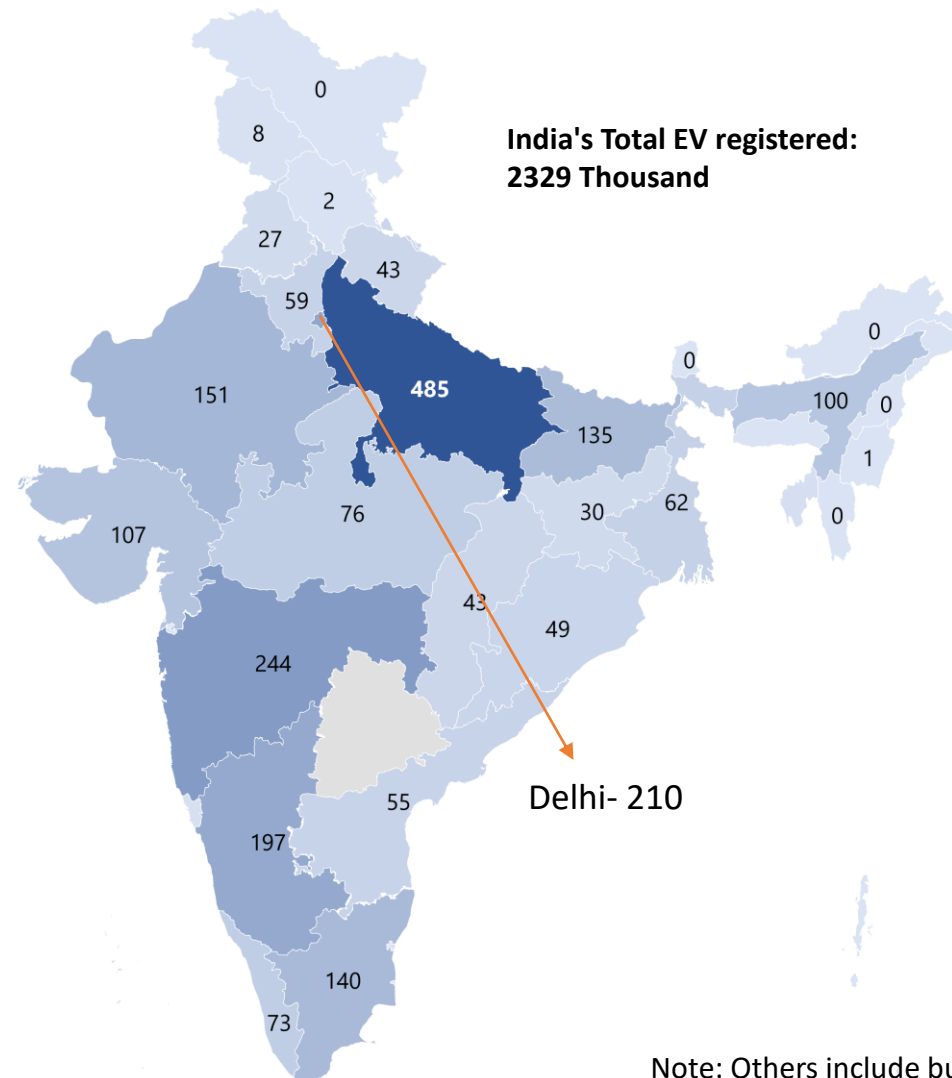
MMBTU- Million Metric British Thermal Unit

Status of Electric Mobility in India

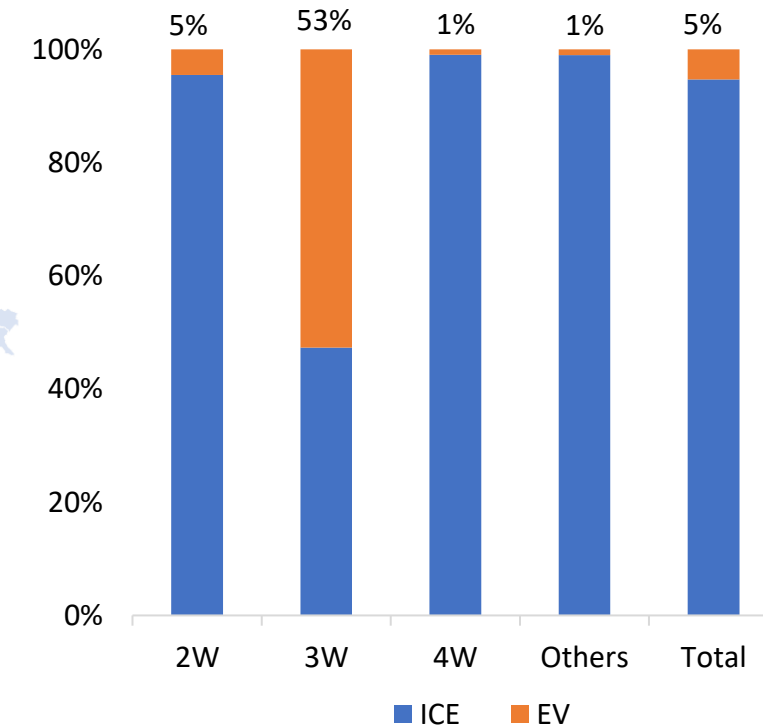
National EV registration
(in Thousands)



Cumulative State-wise EV registration
as on 1st April 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 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.

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

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.

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 released the [Green Hydrogen Policy](#) under which the inter-state transmission charges are waived for 25 years of the projects being commissioned before 30th June 2025.

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 March

- [Ministry of Power](#) has set the electricity generation target for 2023-24 at 1750 BU comprising 1324 BU thermal, 1567 BU hydro, 46 BU nuclear, 8 BU import from Bhutan, and 215 BU renewable energy sources (excluding large hydro).
- The Ministry of Power has released the [Renewable Generation Obligation \(RGO\)](#), mandating all new thermal power plants running their commercial operation on or after 1st April 2023, to ensure a minimum of 40% of the total production comes from RE.
- The Ministry of Power has released the [draft Carbon Credit Trading Scheme \(CCTS\)](#) to set up a framework for the Indian Carbon Market. The scheme outlines that:
 - An 'Accredited Carbon Verifier' is an agency accredited by the BEE to carry out validation or verification activities in respect of the CCTS.
 - Carbon credit trading aims to reduce carbon emissions and address climate change.
 - The 'Carbon Credit Certificate' (CCC) is the certificate issued to the registered entity by the central government, or any authorized agency, in the CCTS. Each certificate issued shall represent the reduction or removal of one ton of CO₂ equivalent (tCO₂e).
 - The draft scheme also provides for the establishment of the Indian Carbon Market Governing Board (ICMGB). The governance of the Indian Carbon Market (ICM) and direct oversight of its administrative and regulatory functioning shall vest in the governing board, to be called ICMGB.



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Green ways for a good earth!

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