

# India's Energy Overview

FEBRUARY 2023



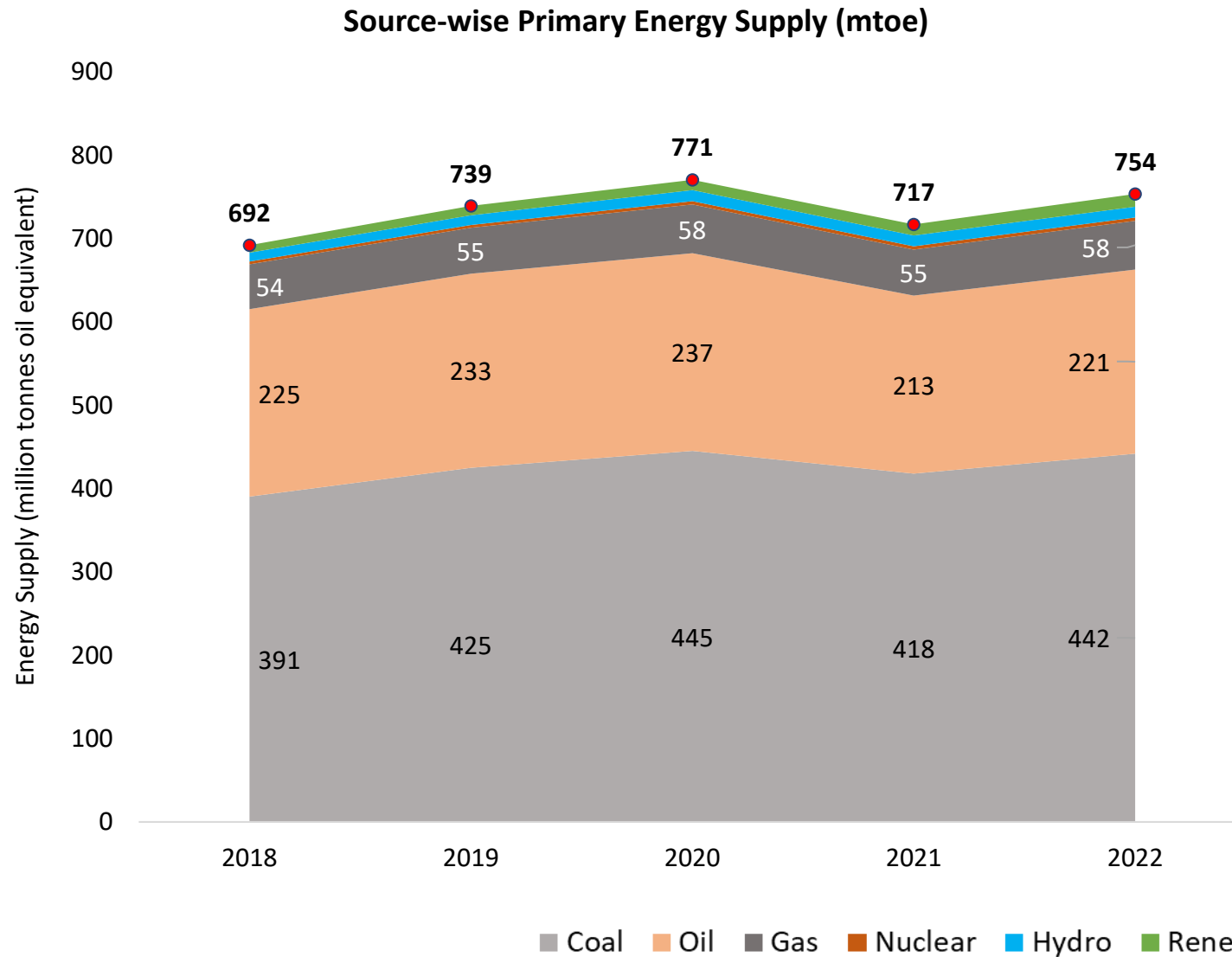
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Green ways for a good earth!

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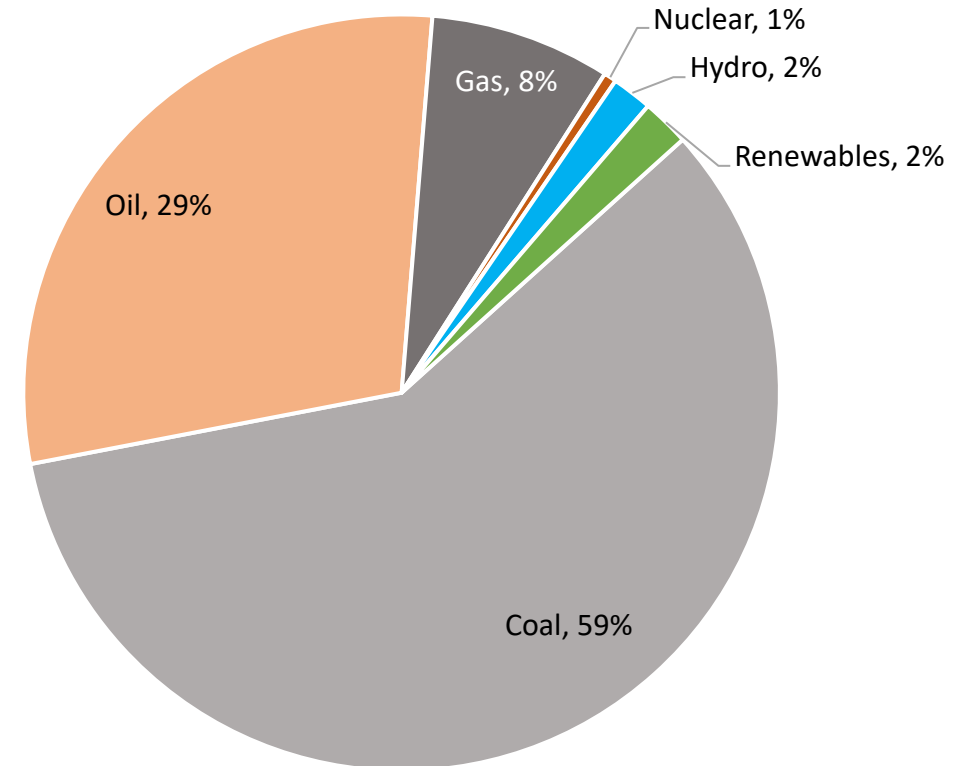
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# Primary Energy Mix\* for 2021-22

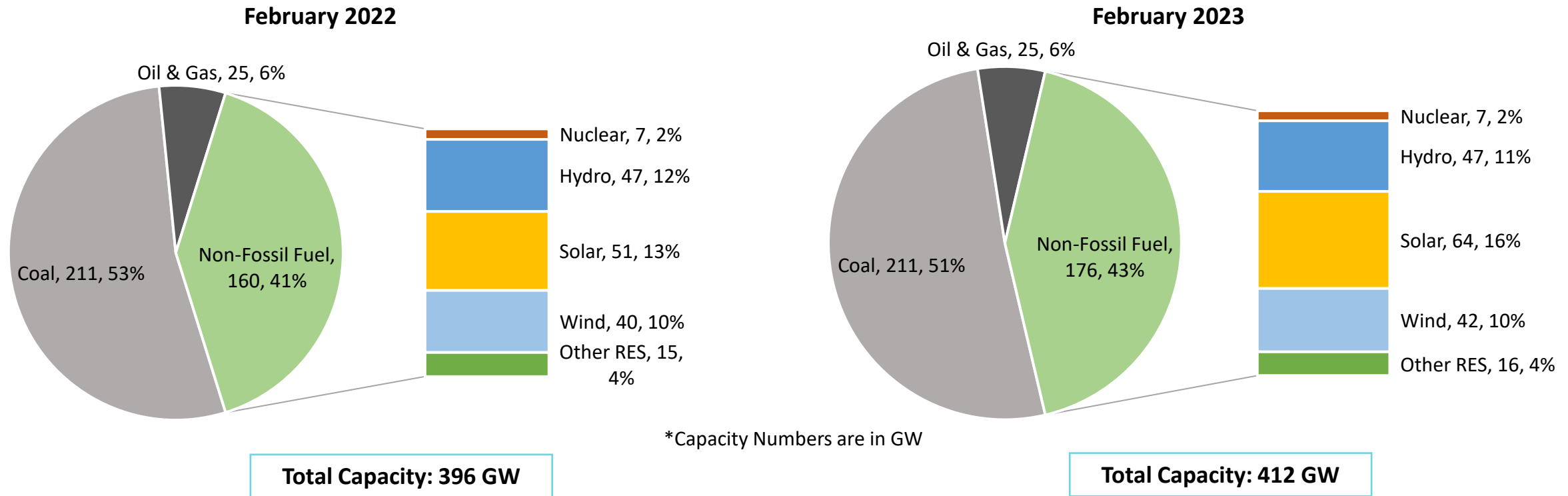


Share of Source-wise Primary Energy Supply in 2021-22 (%)



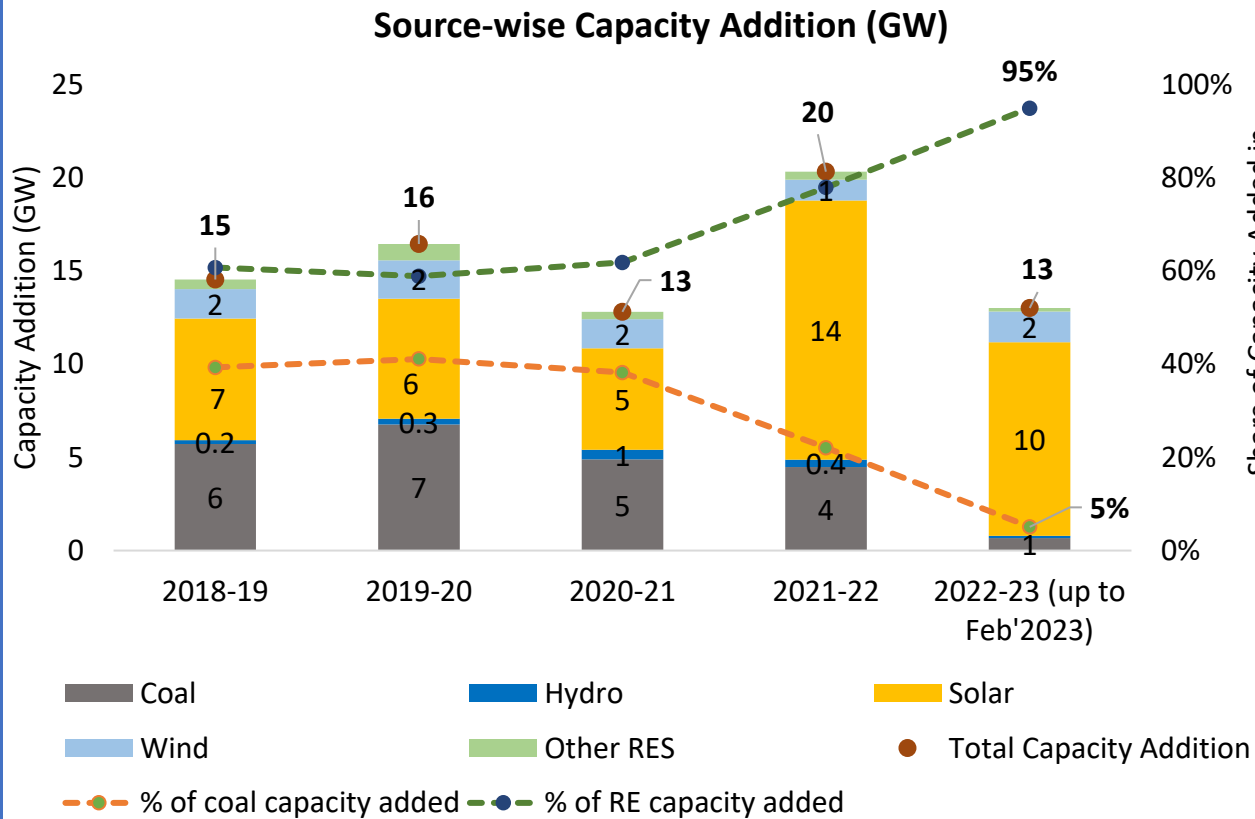
\*Excluding biofuels, waste, and other non-commercial source of energy

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

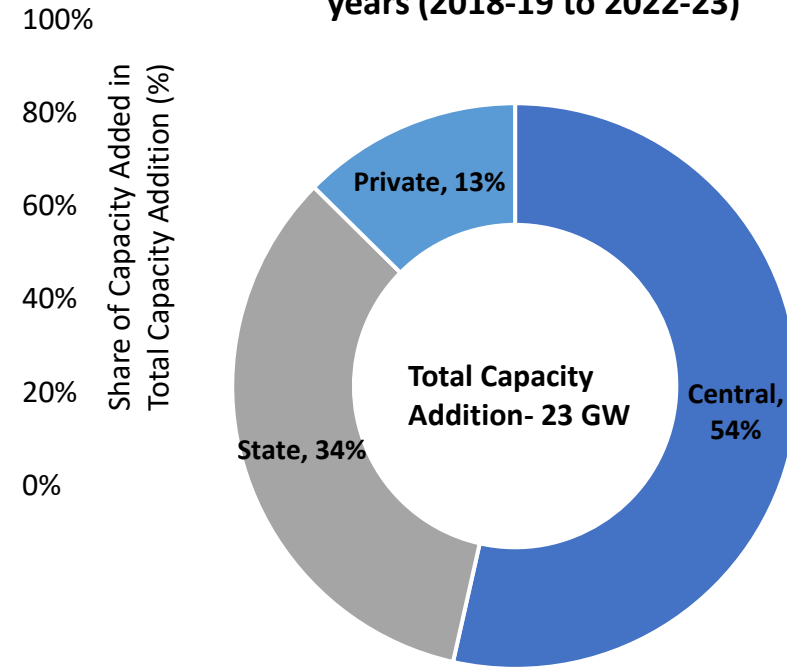


- India's electricity generating capacity is 412 GW as on Feb'2023 [coal 211 GW (51%), solar 64 GW (16%), hydro 47 GW (11%), and wind 42 (10%)].
- As on Feb'2023, the share of non-fossil-based electricity capacity is 43% as against the set target of 50% non-fossil capacity by 2030.
- As on Feb'2023, India's renewable energy capacity (including large hydro) stood at 169 GW out of 412 GW.

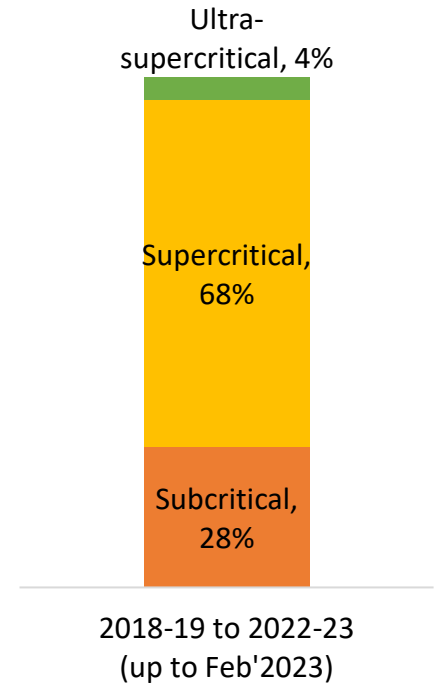
# India's Electricity Capacity Addition in last 5 years



**Sectoral Coal Capacity Addition for the last 5 years (2018-19 to 2022-23)**



**Technology type**



- A total of 55 GW of generation capacity has been added in RE (Hydro, solar, wind, and other) over the past 5 years, whereas the coal capacity addition during the same period was 23 GW, mostly in the central sector (54%).
- The share of RE addition in total capacity has shown an increasing trend (from 61% in 2018-19 to 95% in 2022-23 up to Feb'2023).

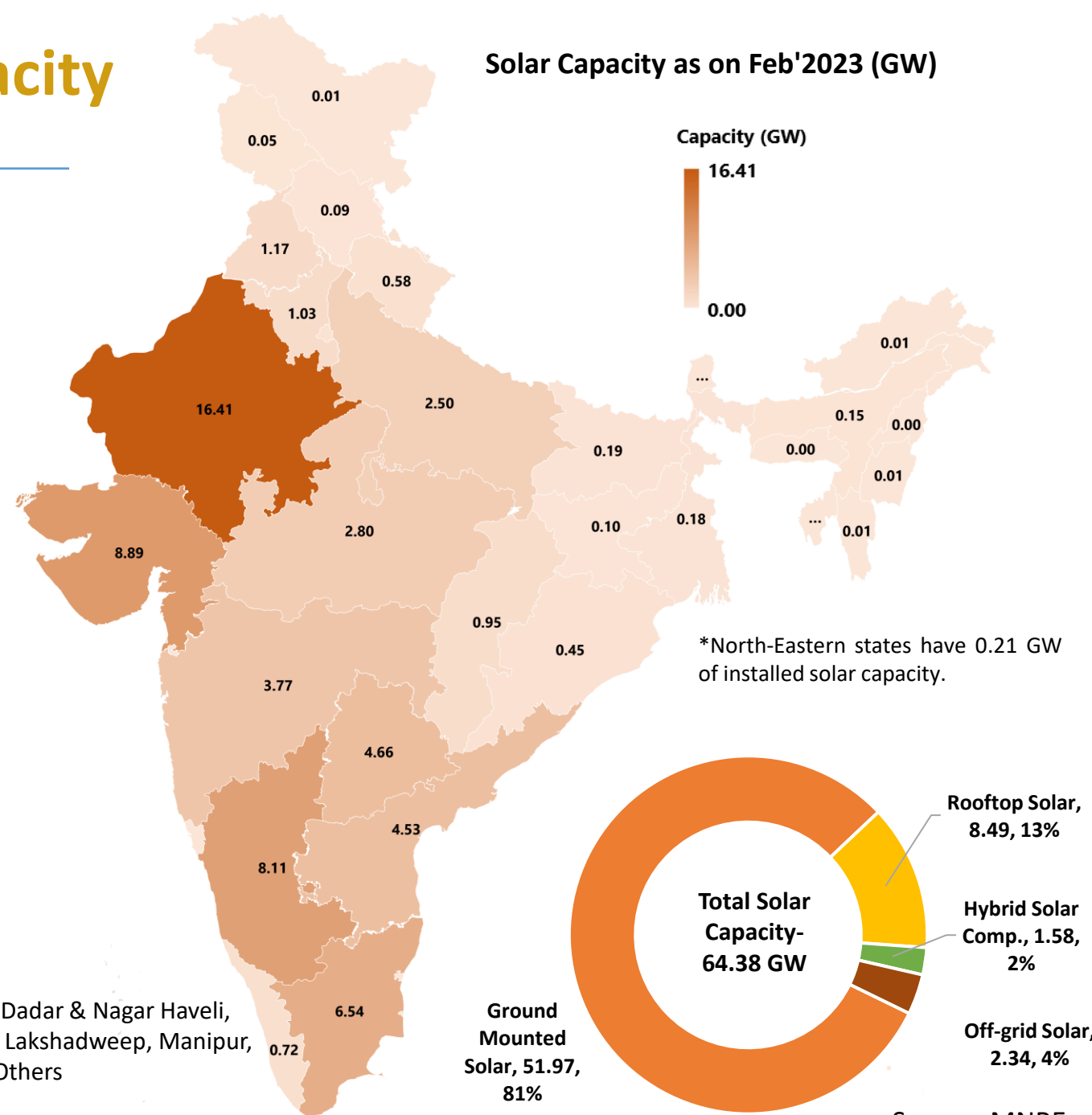
# State-wise Solar Installed Capacity

as on February 2023

State-wise installed capacity of Solar Power (GW)					
States	Ground Mounted	Rooftop	Solar Component in Hybrid	Off Grid	Total Solar Power
Rajasthan	13.45	0.84	1.58	0.54	16.41
Gujarat	6.47	2.37	0.00	0.05	8.89
Karnataka	7.61	0.47	0.00	0.03	8.11
Tamil Nadu	6.09	0.39	0.00	0.06	6.54
Telangana	4.36	0.29	0.00	0.01	4.66
Andhra Pradesh	4.27	0.17	0.00	0.09	4.53
Maharashtra	2.10	1.46	0.00	0.21	3.77
MP	2.46	0.26	0.00	0.09	2.80
Uttar Pradesh	2.07	0.26	0.00	0.17	2.50
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	0.29	0.42	0.00	0.02	0.72
Uttarakhand	0.30	0.26	0.00	0.01	0.58
Others	0.89	0.59	0.00	0.26	1.74
<b>All India</b>	<b>51.97</b>	<b>8.49</b>	<b>1.58</b>	<b>2.34</b>	<b>64.38</b>

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 Feb'2023 (GW)

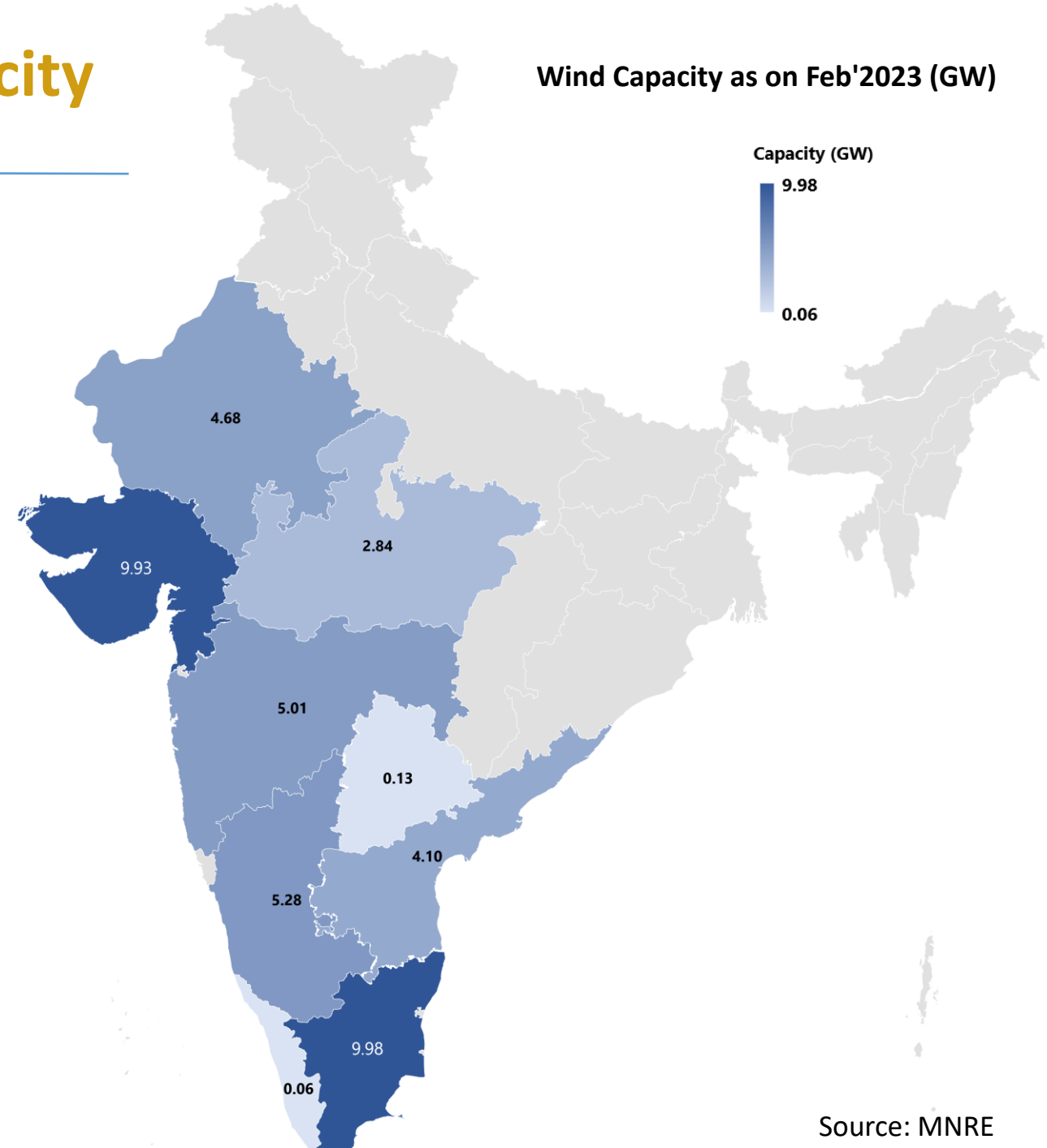


# State-wise Wind Installed Capacity

as on February 2023

Wind Capacity as on Feb'2023 (GW)

State-wise installed capacity of Wind (Onshore) Power	
States	Installed Capacity (GW)
Tamil Nadu	9.98
Gujarat	9.93
Karnataka	5.28
Maharashtra	5.01
Rajasthan	4.68
Andhra Pradesh	4.10
Madhya Pradesh	2.84
Telangana	0.13
Kerala	0.06
<b>India Total</b>	<b>42.02</b>



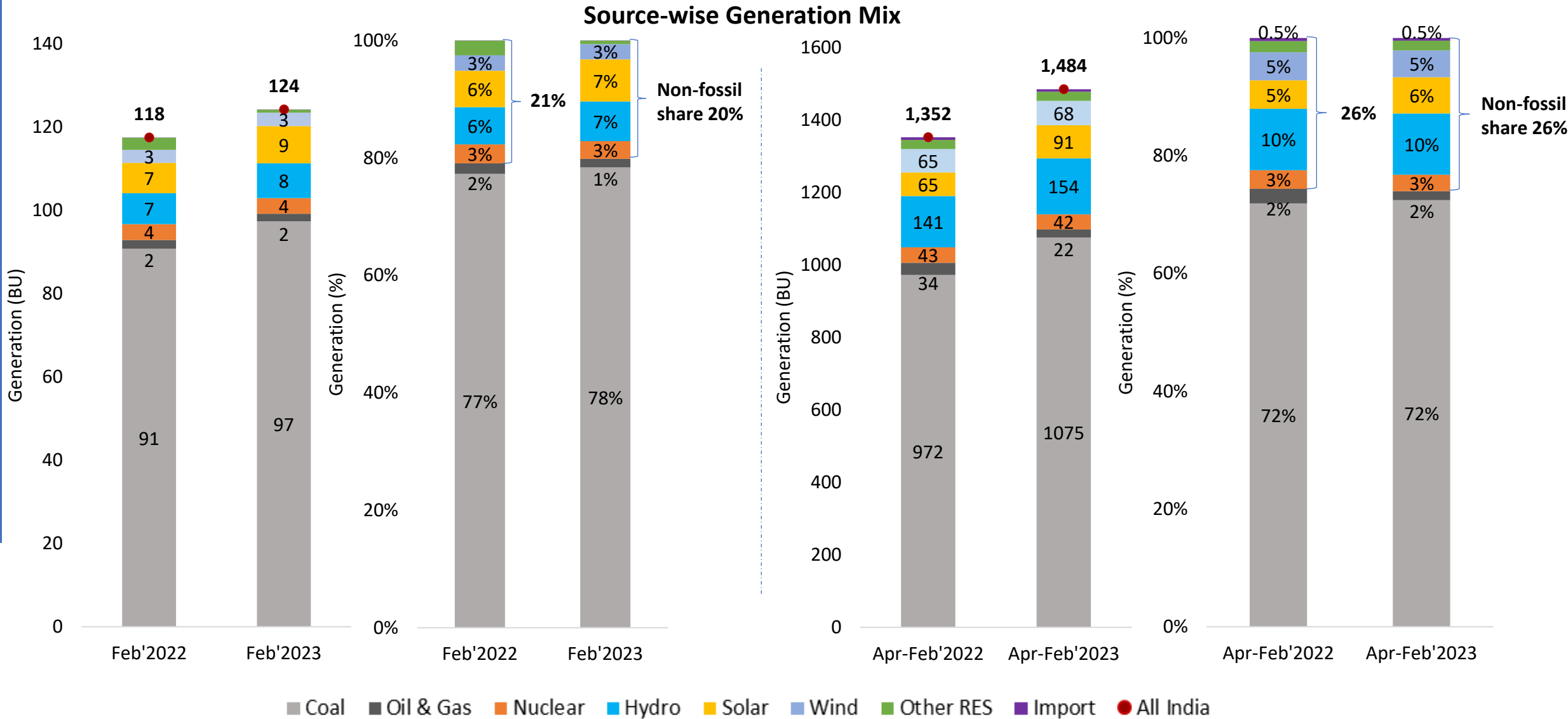






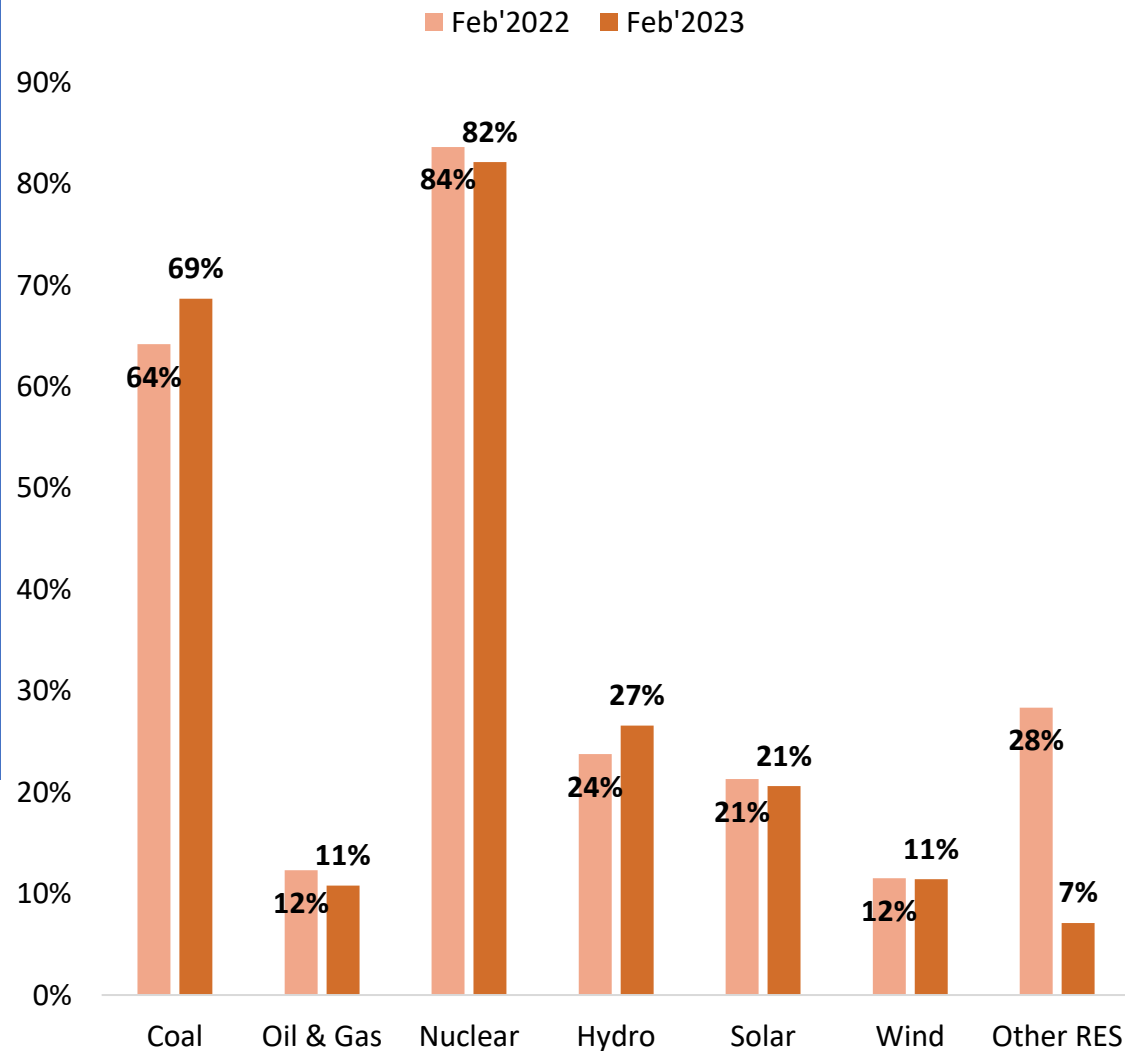


# India's Electricity Generation Mix

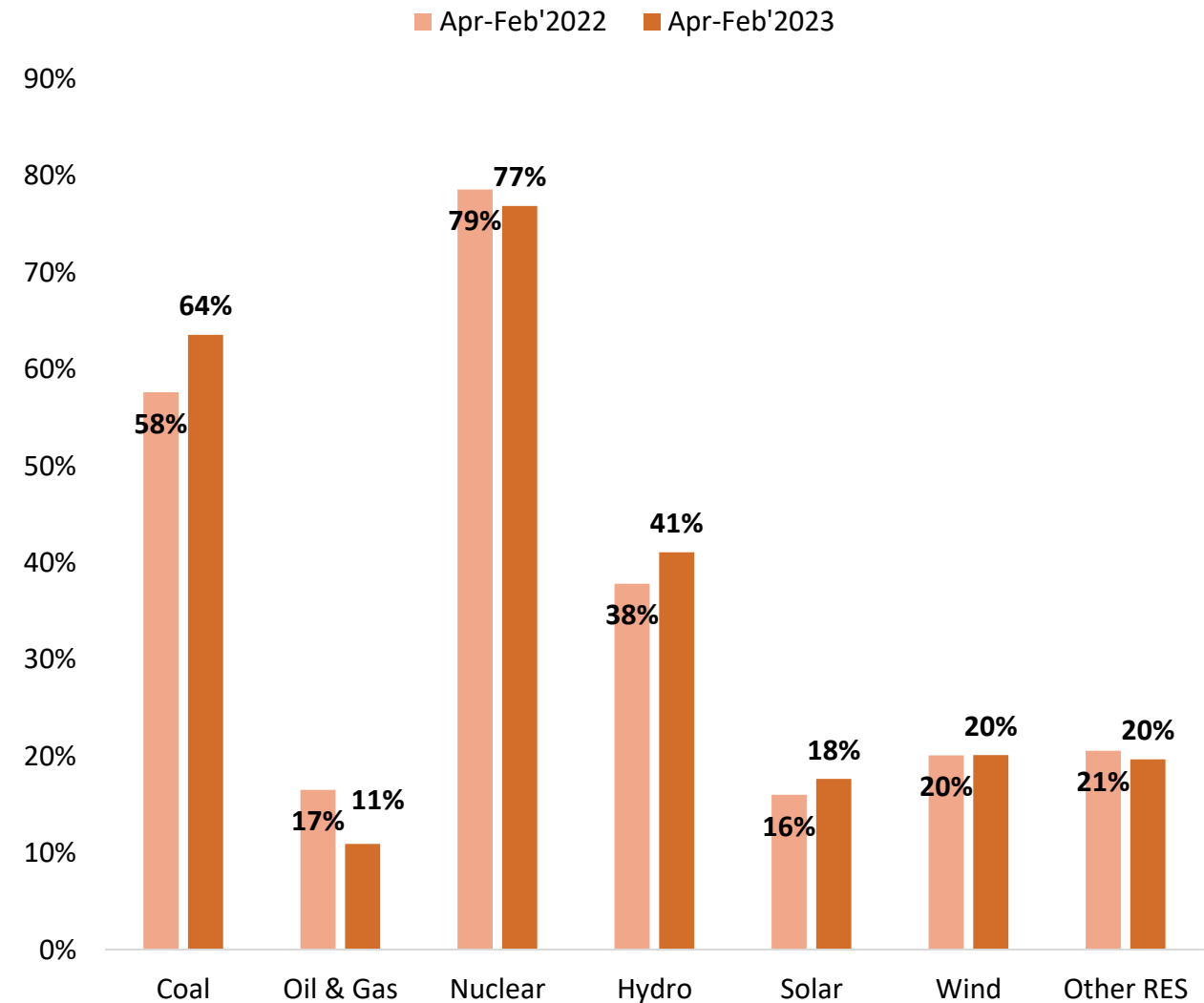


# Source-wise PLF/ CUF

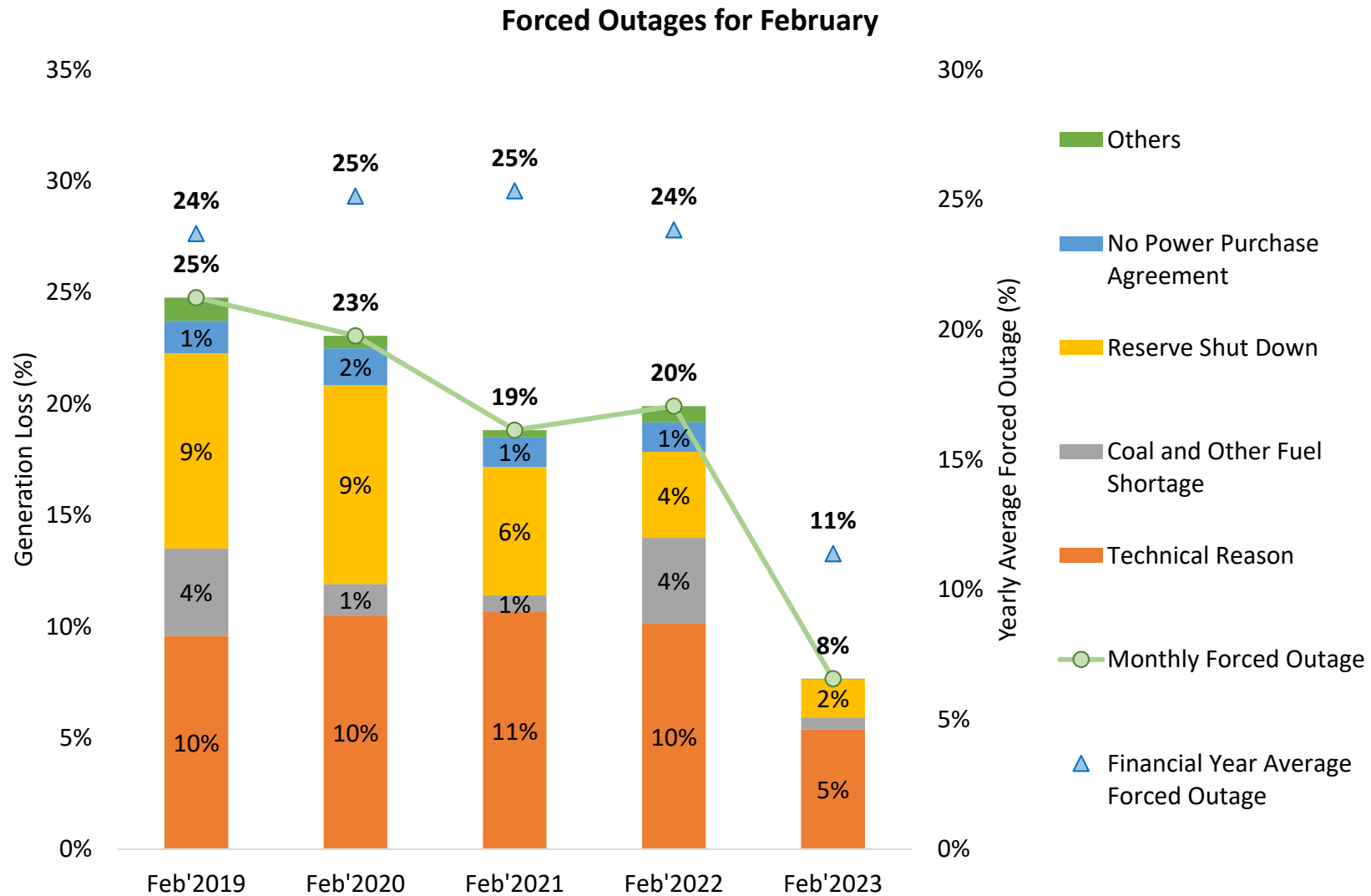
## Source-wise PLF/ CUF in February 2023



## Source-wise PLF/ CUF in Apr-Feb'2023 (%)



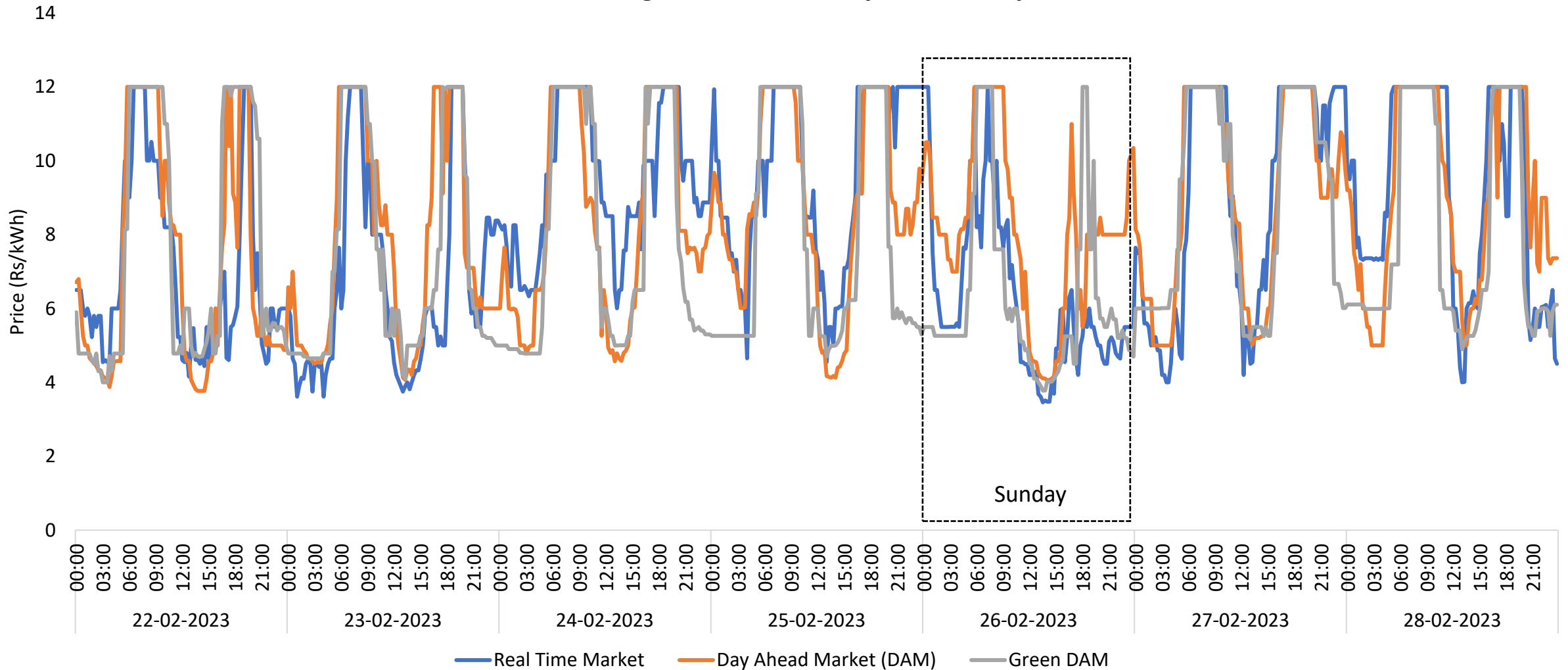
# Thermal Generation Loss and Reasons for Forced Outages



Year/ Month		Average Forced Outage Share
Yearly	FY 2020-21	25%
	FY 2021-22	24%
	FY 2022-23 (up to Feb'2023)	11%
Monthly	Feb'2021	19%
	Feb'2022	20%
	Feb'2023	8%

# Indian Electricity Exchange (IEX) Market Snapshot

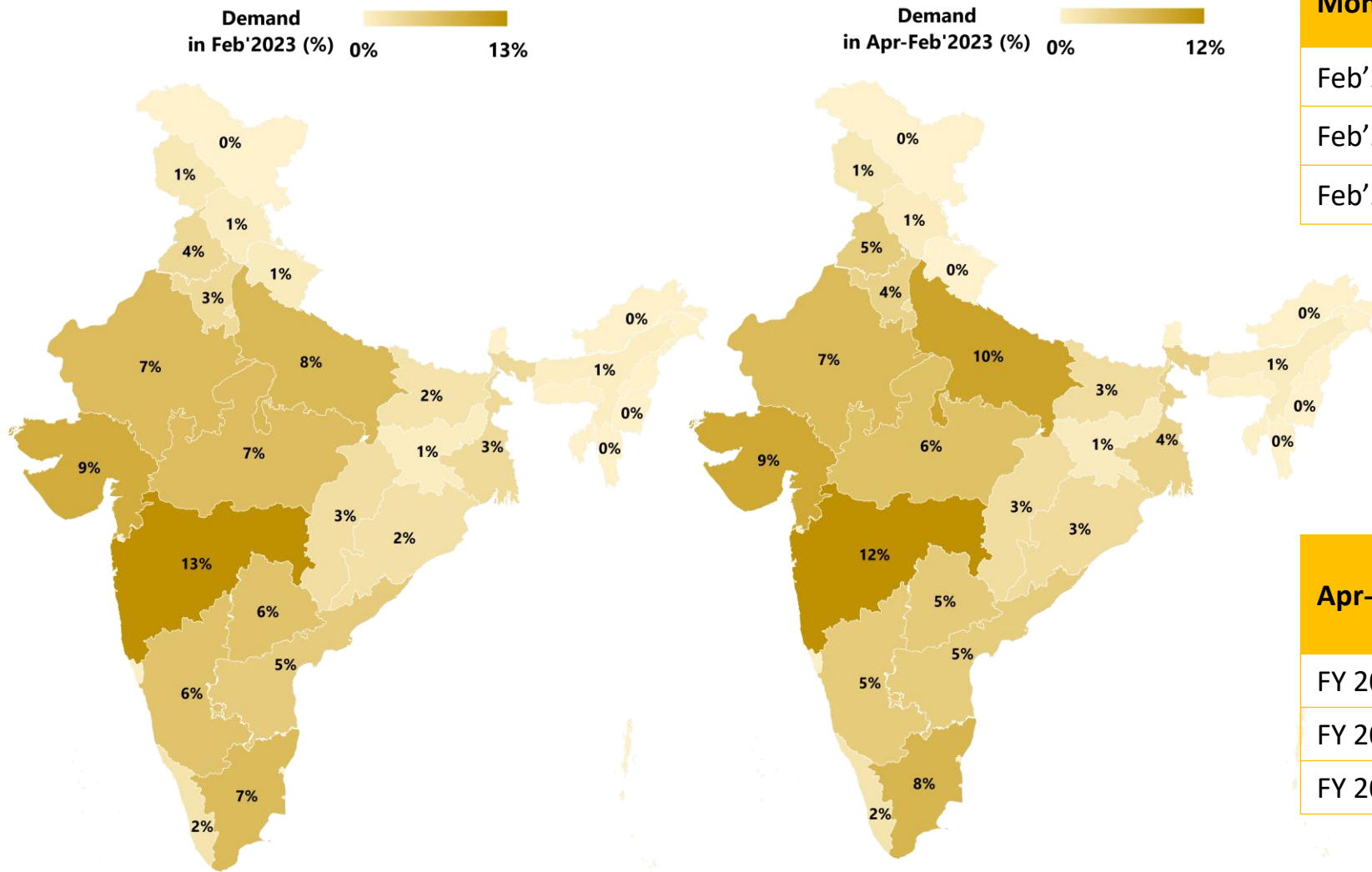
Market Clearing Prices of last 7 days of February 2023



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

# National and State level Electricity Demand

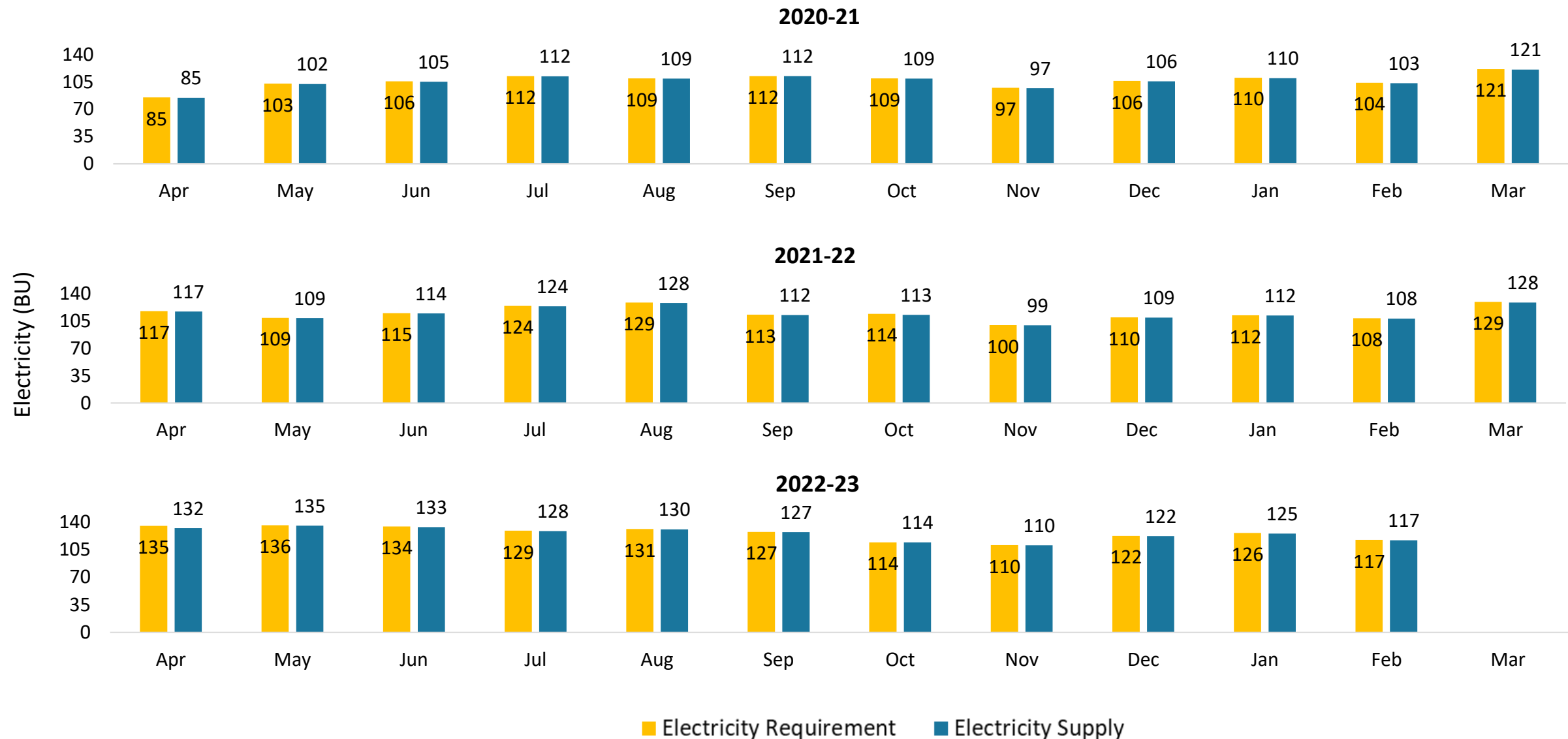
State-level Electricity Demand as a percent of National Demand (%)



Month	Electricity Demand (BU)	Electricity Supply (BU)	Gap (+/-)
Feb'2021	104	103	1
Feb'2022	108	108	0.3
Feb'2023	117	117	0.5

Apr-Feb	Electricity Demand (BU)	Electricity Supply (BU)	Gap (+/-)
FY 2020-21	1154	1150	4
FY 2021-22	1251	1246	5
FY 2022-23	1383	1376	7

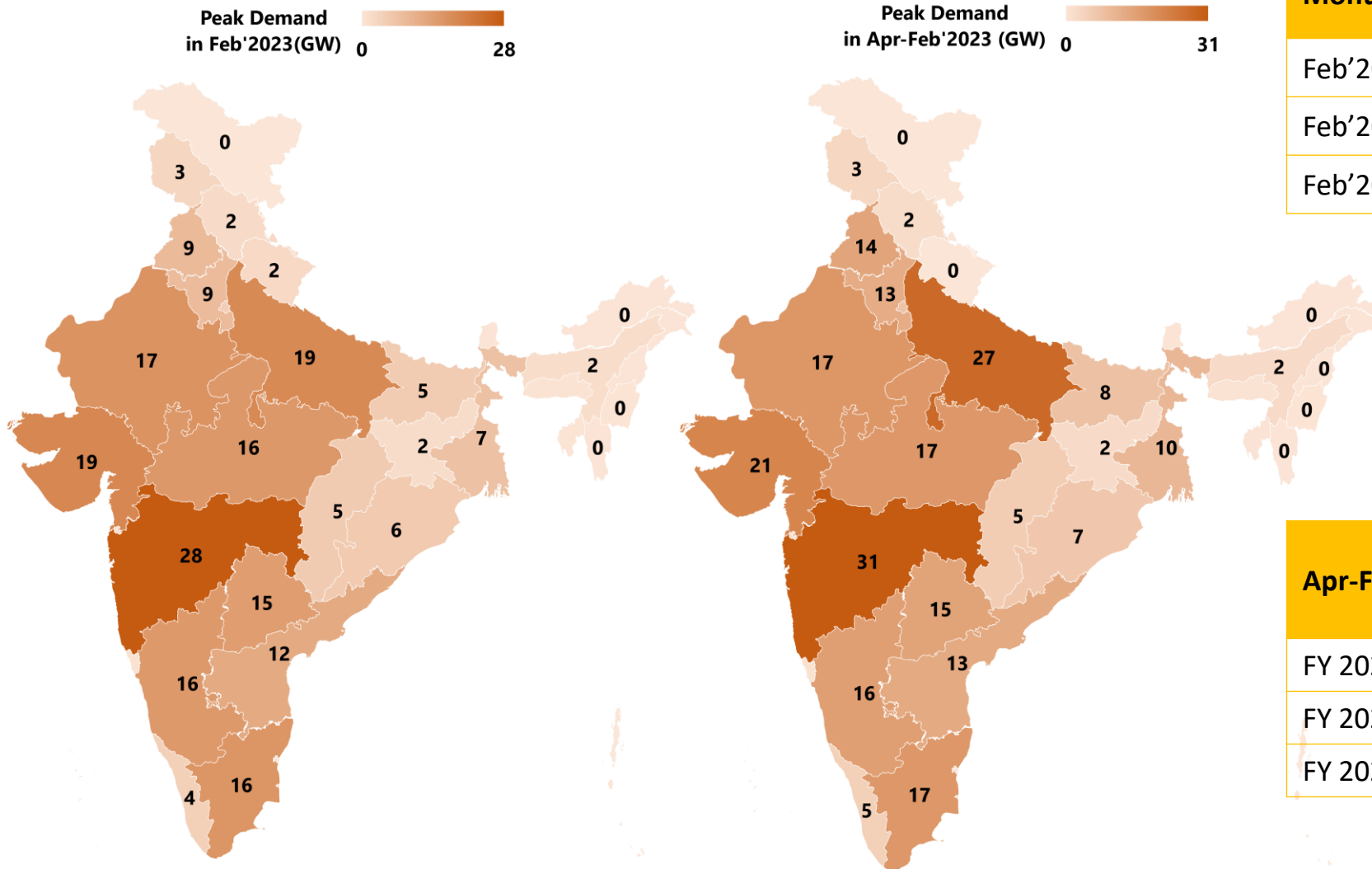
# India's Monthly Electricity Requirement and Supply





# National and State level Peak Electricity Demand

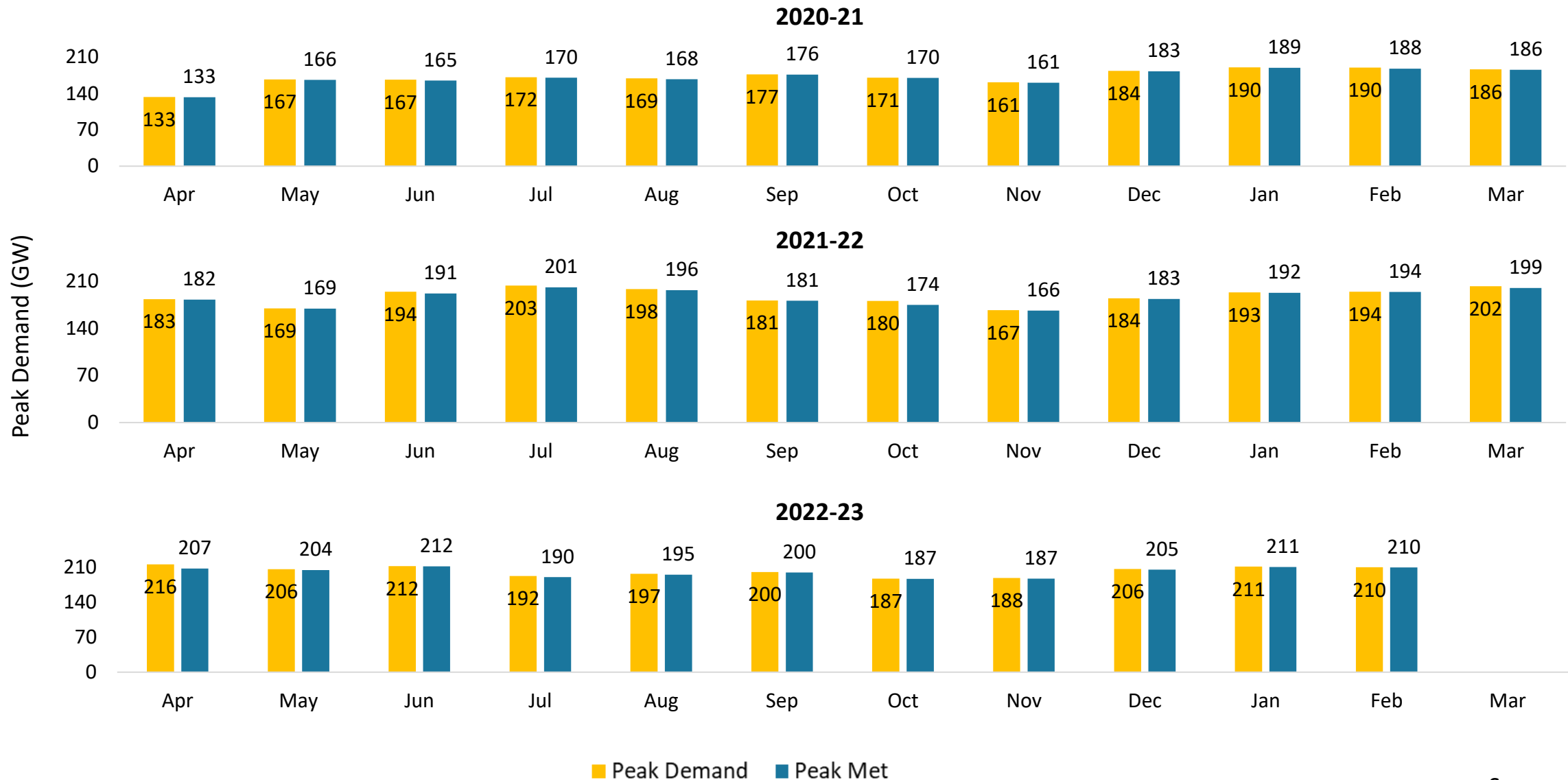
State-level Peak Electricity Demand (GW)



Month	Peak Demand (GW)	Peak Supply (GW)	Gap (+/-)
Feb'2021	190	188	2
Feb'2022	194	194	0.2
Feb'2023	210	210	0.2

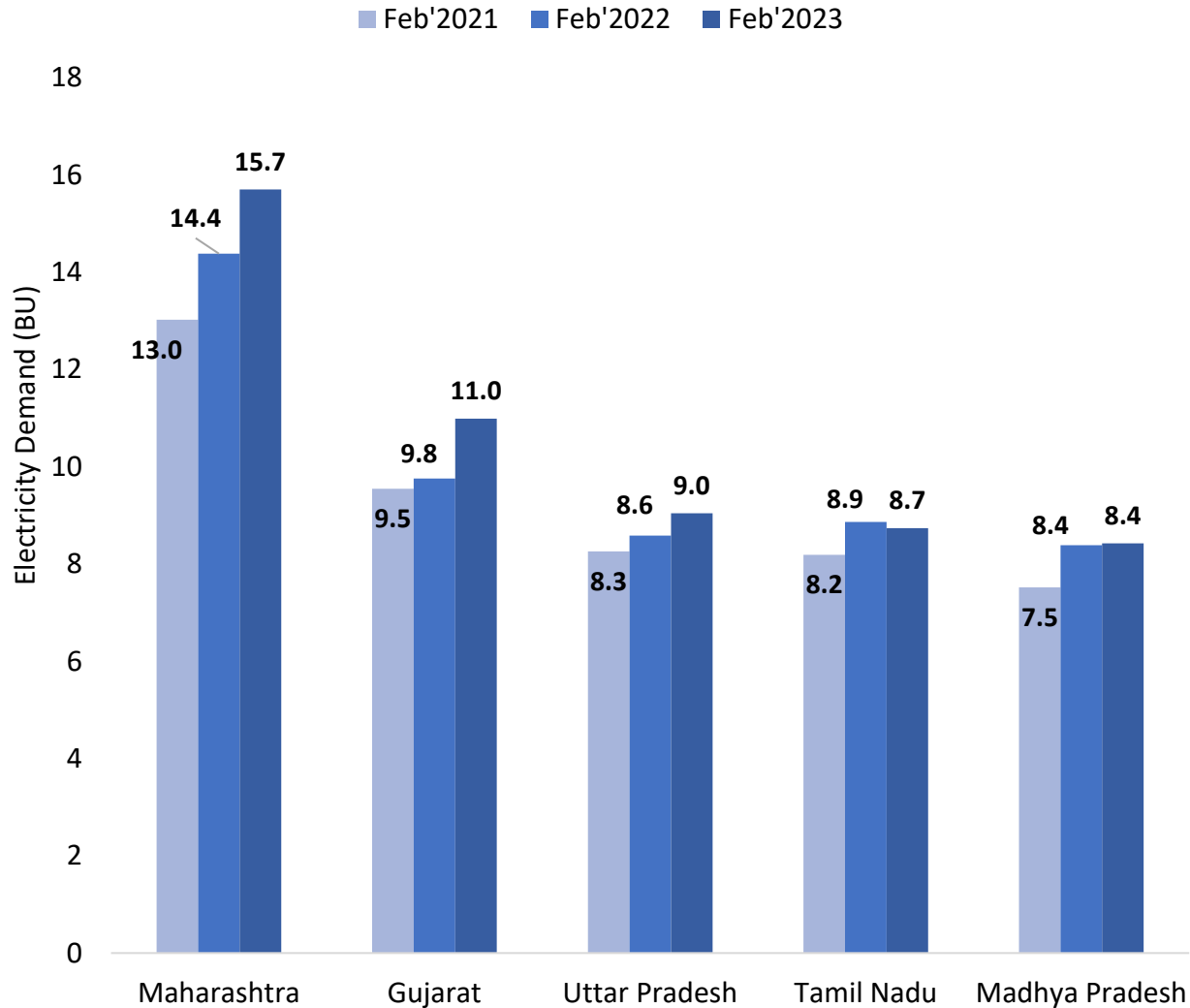
Apr-Feb	Peak Demand (GW)	Peak Supply (GW)	Gap (+/-)
FY 2020-21	190	189	1
FY 2021-22	203	201	2
FY 2022-23	216	207	9

# India's Monthly Peak Electricity Demand and Supply

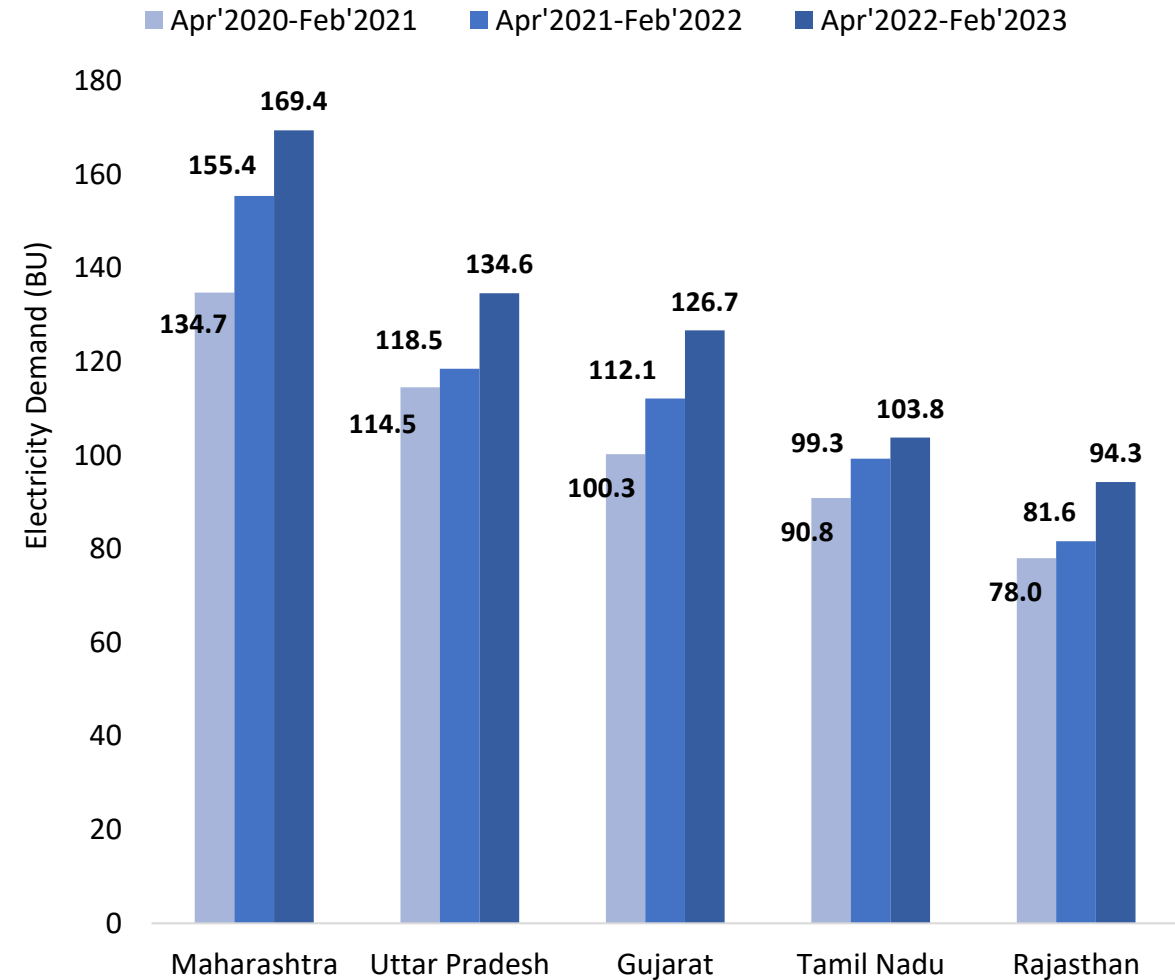


# Monthly Electricity Demand of the top 5 states (1/2)

States with Highest Electricity Demand in February (BU)

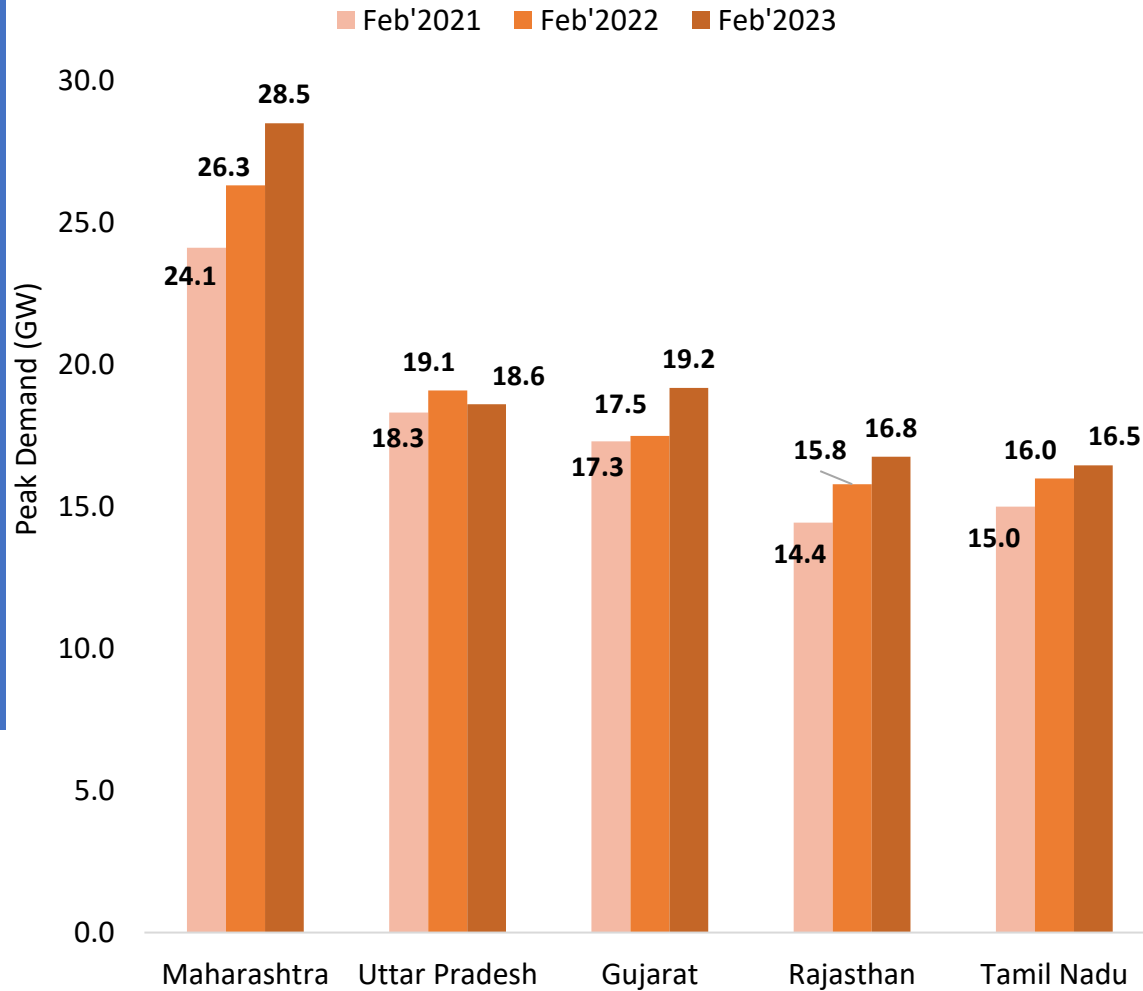


States with Highest Electricity Demand in April to February (BU)

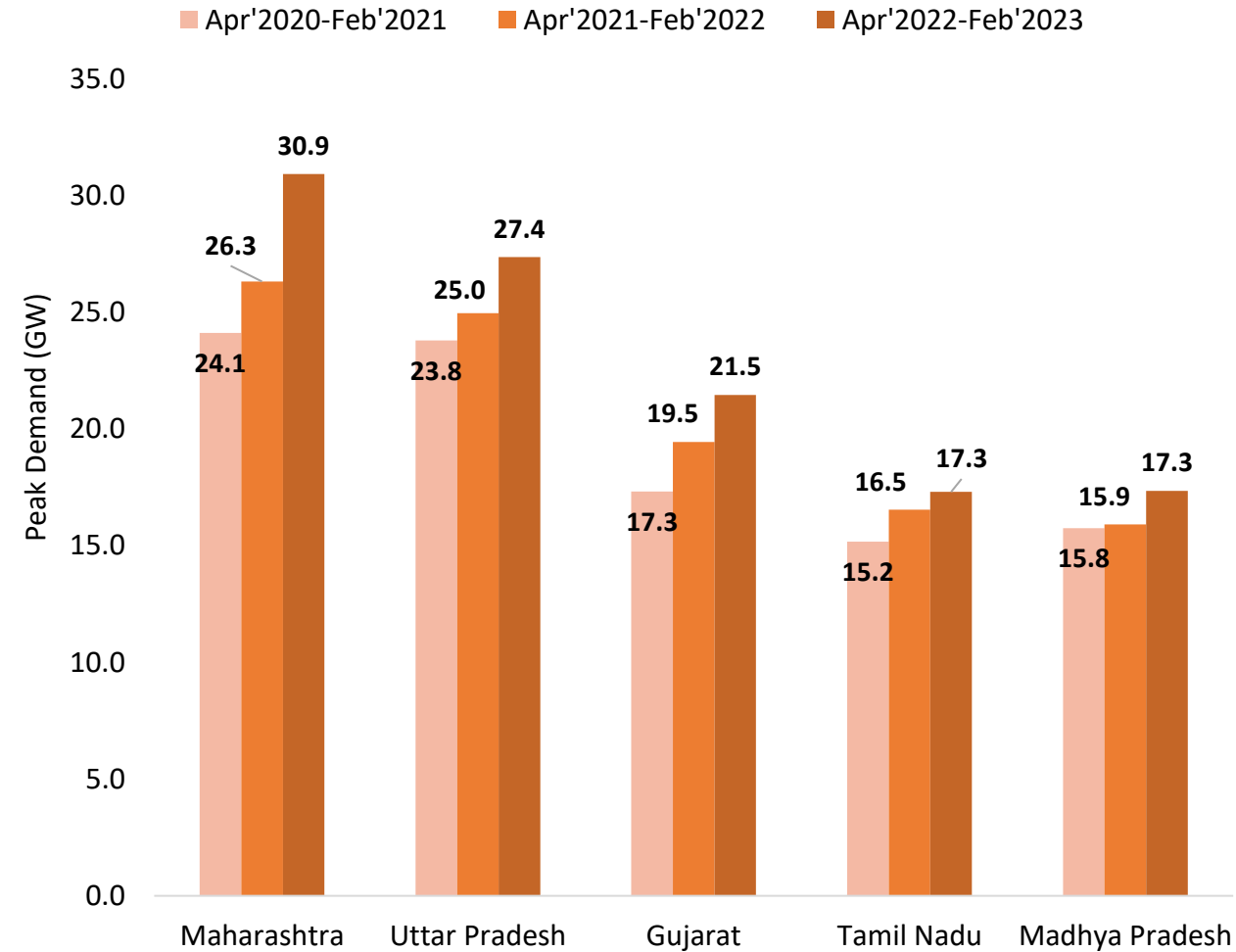


# Monthly Electricity Demand of the top 5 states (2/2)

## States with Highest Peak Electricity Demand in February (GW)

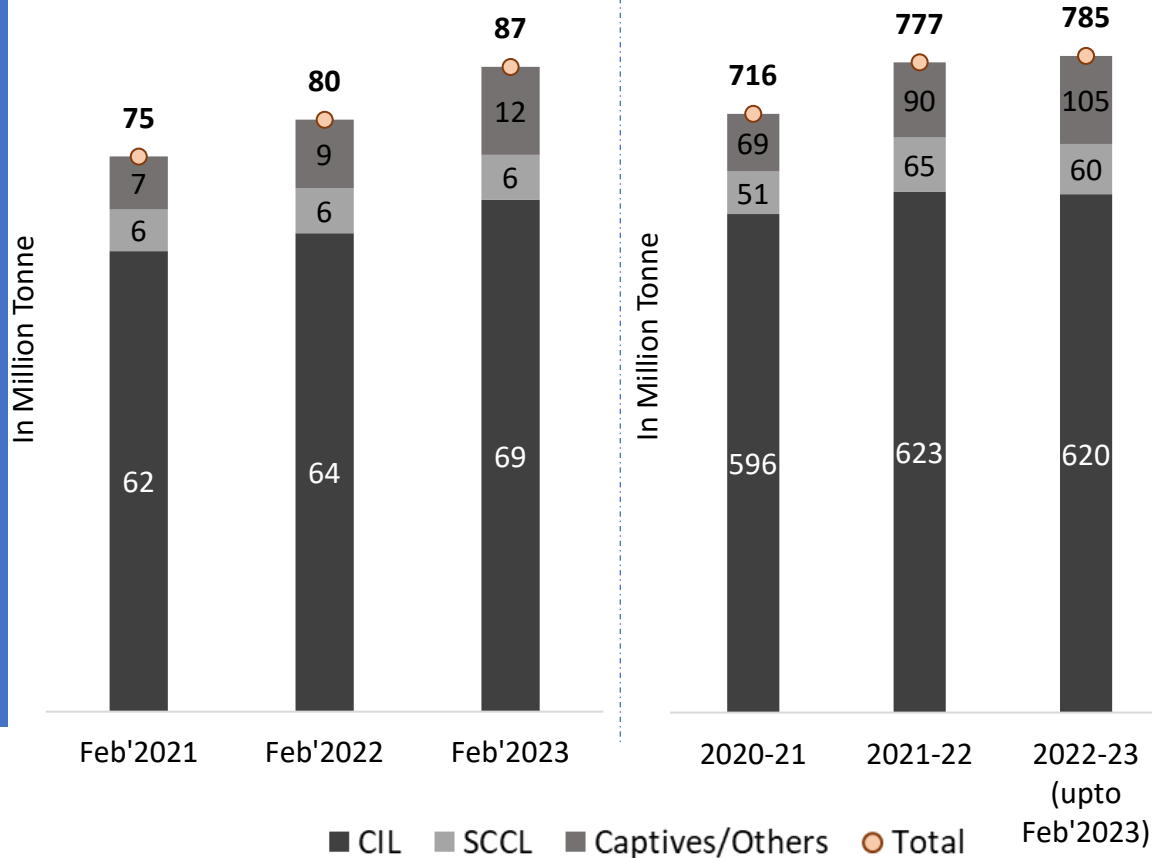


## States with Highest Peak Electricity Demand in April to February (GW)



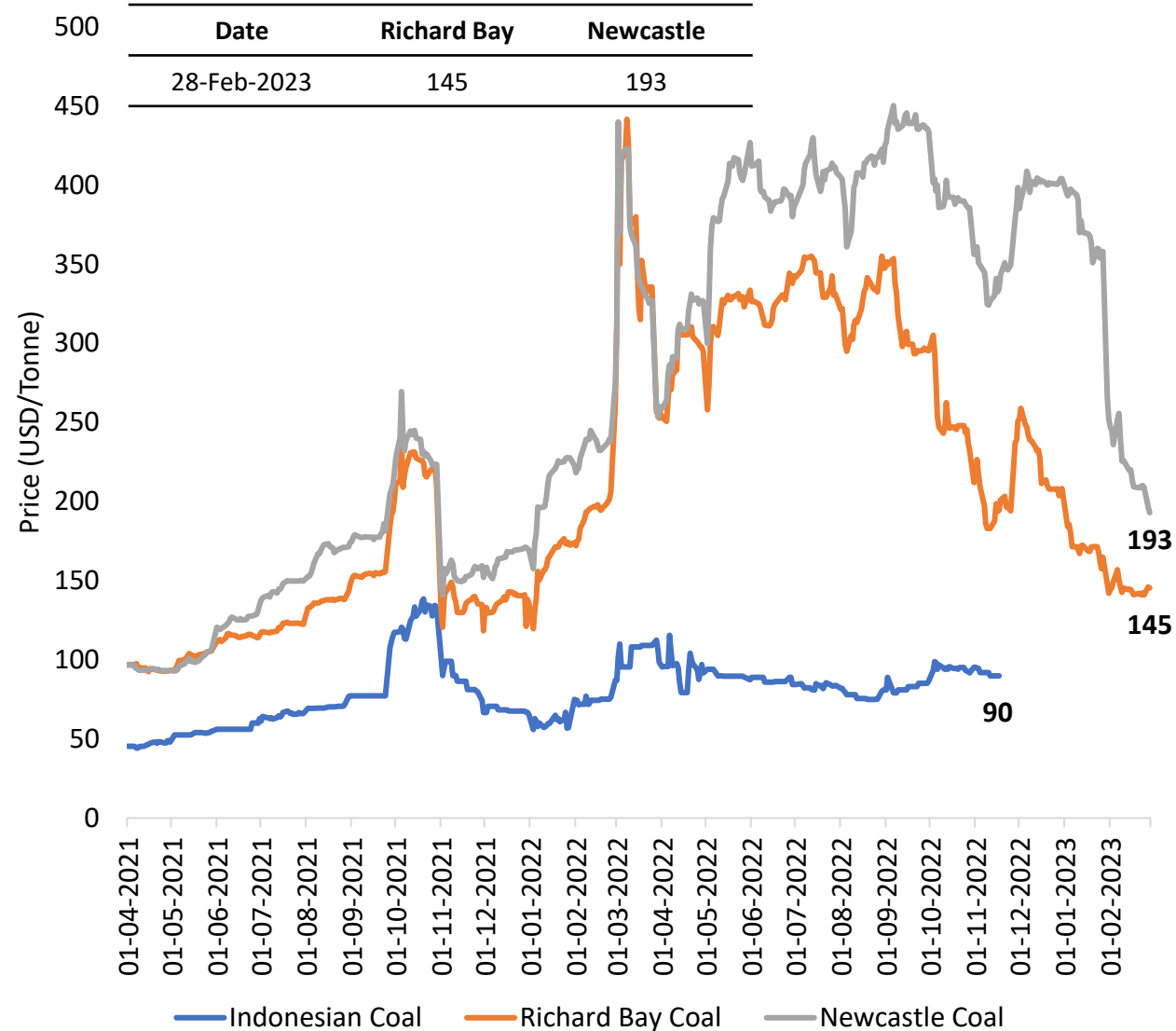
# Monthly Coal Statistics

### Monthly/ Annual Coal Production (in Million Tonnes)

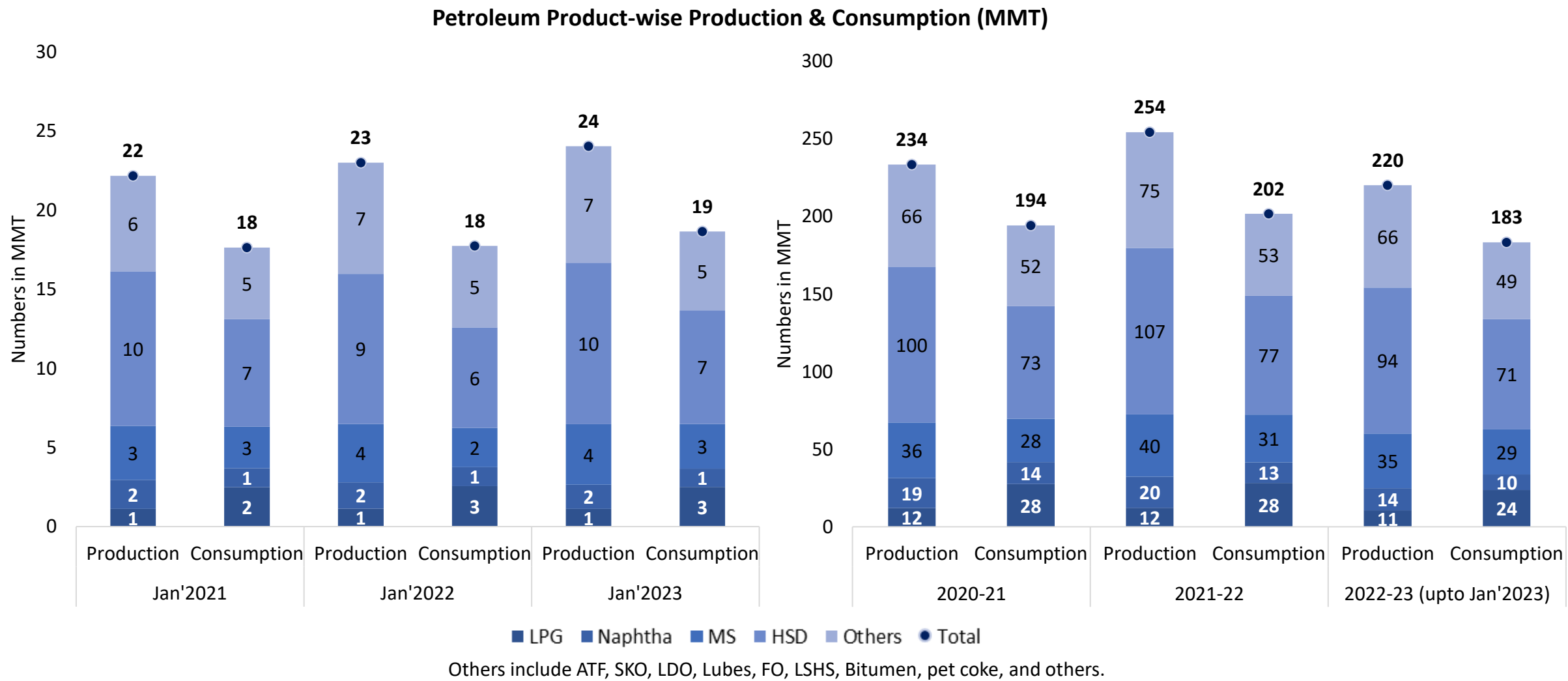


India's coal production increased in Feb'2023 (87 MT) by 9% as compared to Feb'2022.

### International Coal Prices



# Petroleum Products Market Scenario (1/3)



**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

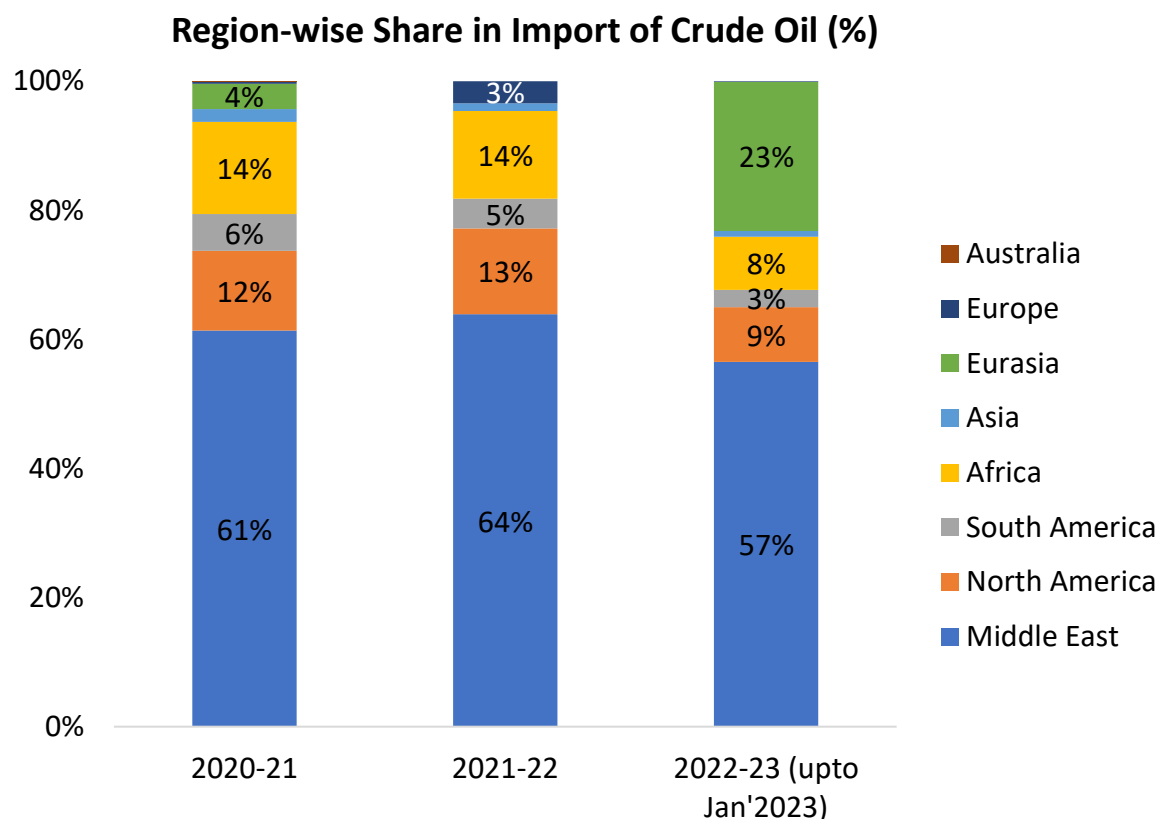
# Petroleum Products Market Scenario (2/3)

Import/Export of Crude Oil and Petroleum Products ('000 Tonnes)							
Petroleum Products	Import/ Export	Monthly			Yearly		
		Jan'2021	Jan'2022	Jan'2023	2020-21	2021-22	2022-23 (up to Jan'2023)
Crude Oil	Import	19594	19254	19956	196461	212382	192446
	Export	0	0	0	0	0	0
	<b>Net Import</b>	<b>19594</b>	<b>19254</b>	<b>19956</b>	<b>196461</b>	<b>212382</b>	<b>192446</b>
LPG	Import	1363	1392	1710	16476	17120	15213
	Export	46	49	47	452	513	440
	<b>Net Import</b>	<b>1316</b>	<b>1343</b>	<b>1663</b>	<b>16024</b>	<b>16607</b>	<b>14773</b>
Diesel	Import	73	11	6	648	75	310
	Export	2324	2578	1991	30576	32407	23903
	<b>Net Import</b>	<b>-2250</b>	<b>-2567</b>	<b>-1985</b>	<b>-29928</b>	<b>-32332</b>	<b>-23593</b>
Petrol	Import	124	0	0	1351	671	1069
	Export	890	1082	1165	11606	13482	10267
	<b>Net Import</b>	<b>-766</b>	<b>-1082</b>	<b>-1165</b>	<b>-10255</b>	<b>-12812</b>	<b>-9198</b>
Others*	Import	1489	2459	2309	24772	24196	19996
	Export	1169	1362	1298	14135	16352	15621
	<b>Net Import</b>	<b>320</b>	<b>1097</b>	<b>1011</b>	<b>10637</b>	<b>7844</b>	<b>4375</b>

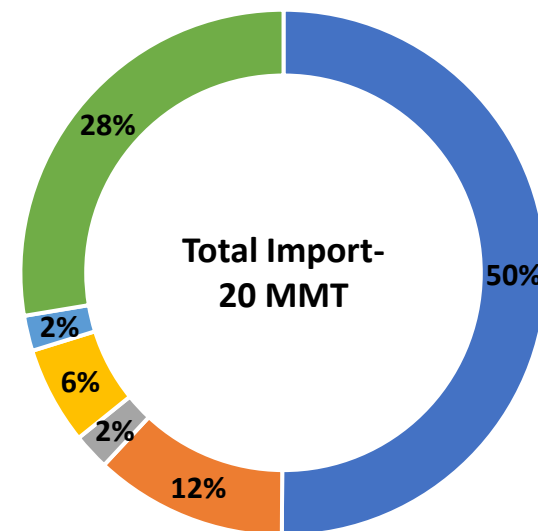
\*Others include ATF, Naphtha, SKO, LDO, Lubes, FO, LSHS, Bitumen, pet coke, and others.



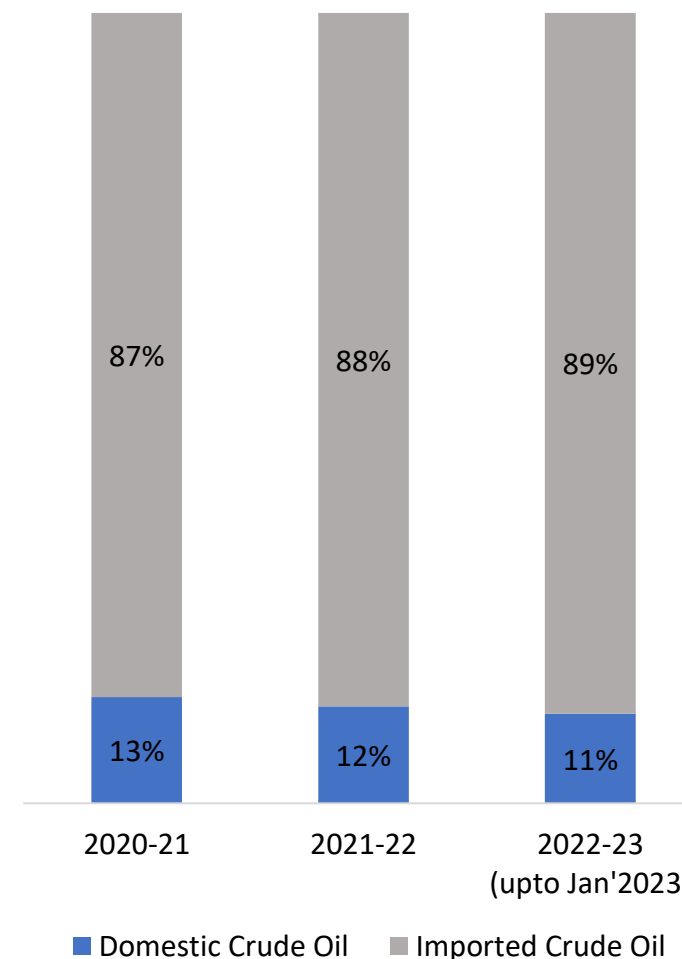
# Petroleum Products Market Scenario (3/3)



**Regional share of Imported Crude oil in Jan'2023**

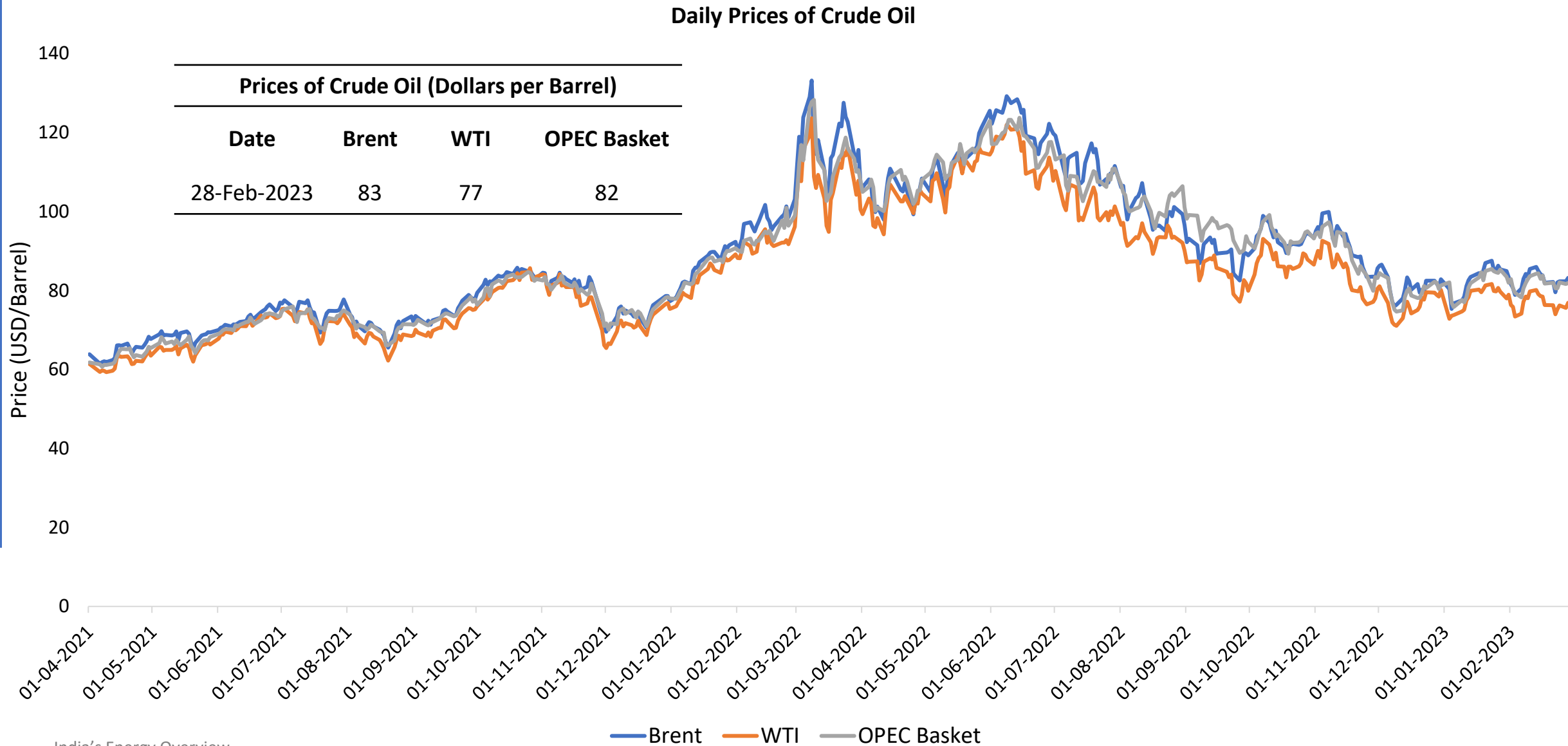


**Domestic and Imported Crude Oil share in India (%)**



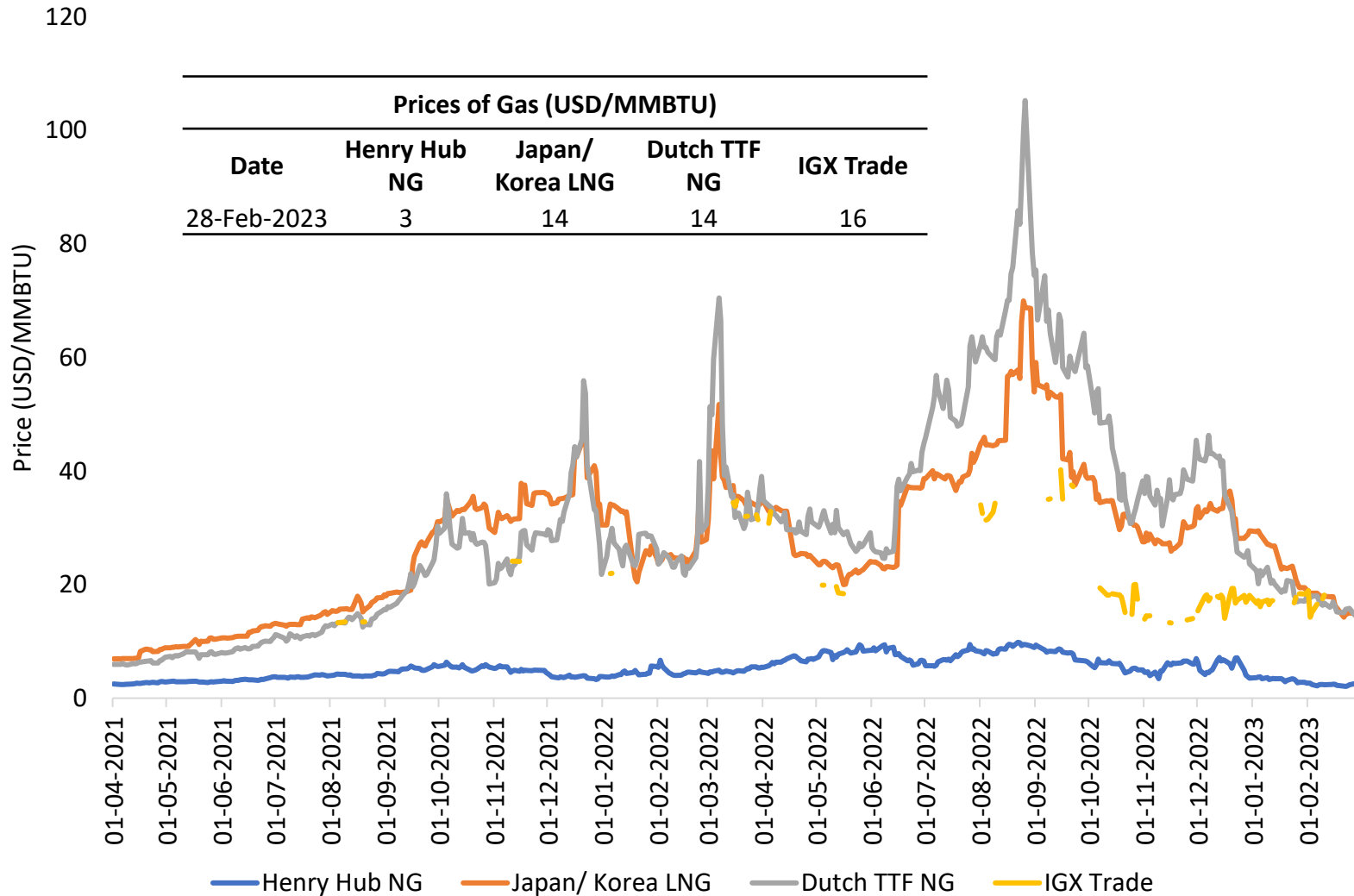
<b>Total Import of Crude Oil (MMT)</b>			
Total Import	2020-21	2021-22	2022-23 (up to Jan'2023)
<b>Crude Oil</b>	<b>196</b>	<b>212</b>	<b>192</b>

# Daily Prices of Crude Oil



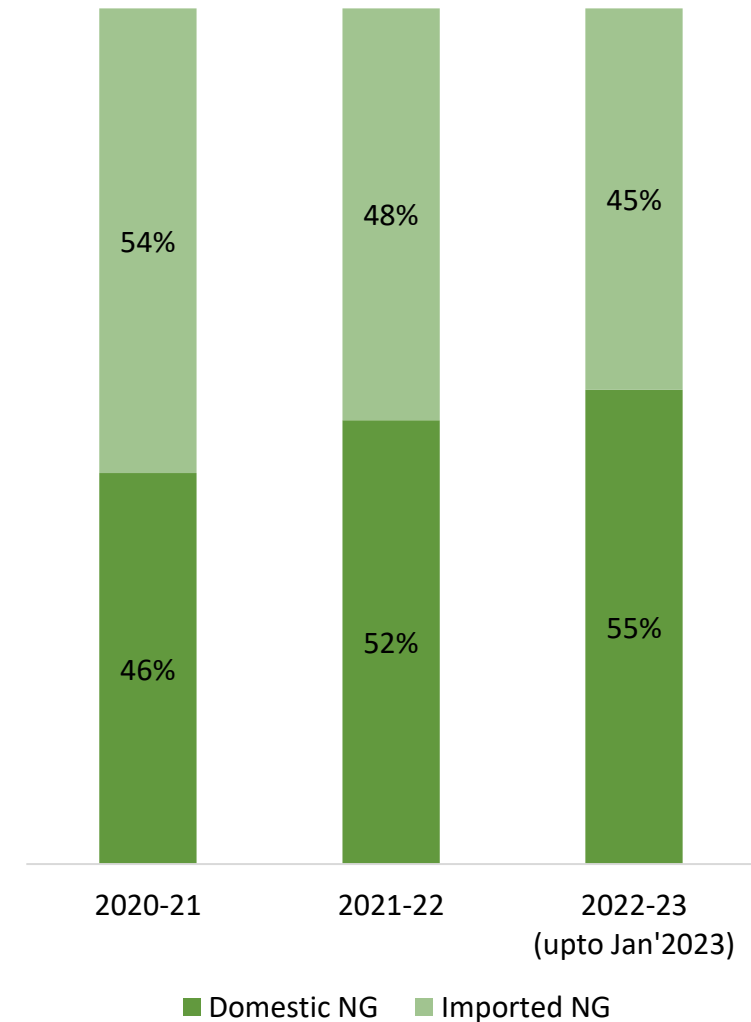
# Gas Market Scenario

Gas Daily Market Price



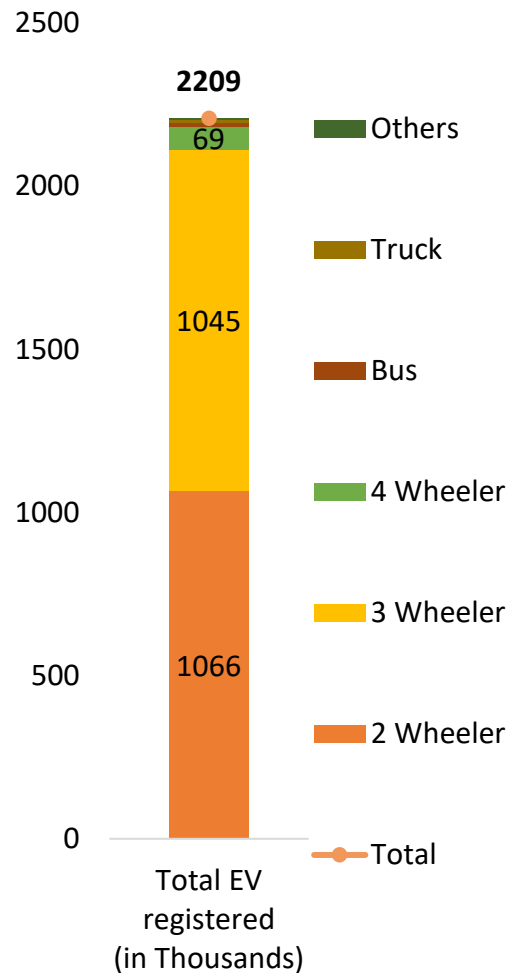
MMBTU- Million Metric British Thermal Unit

Domestic and Imported Natural Gas share in India (%)

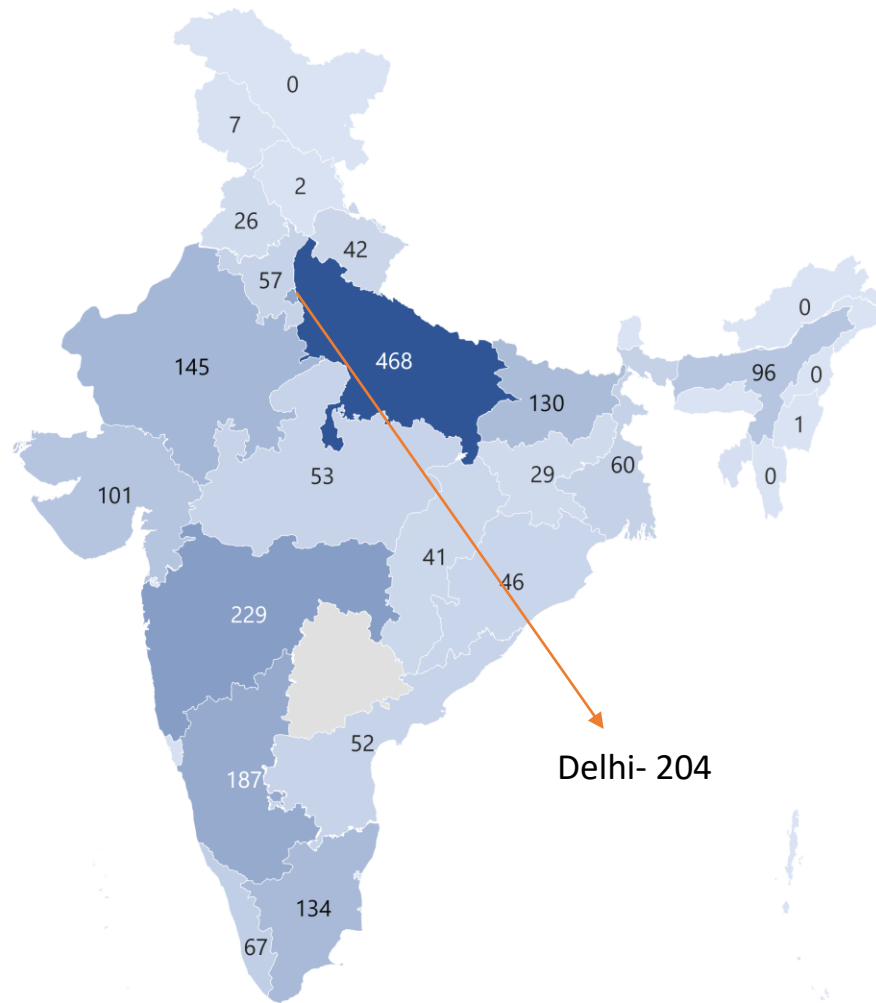


# Status of Electric Mobility in India

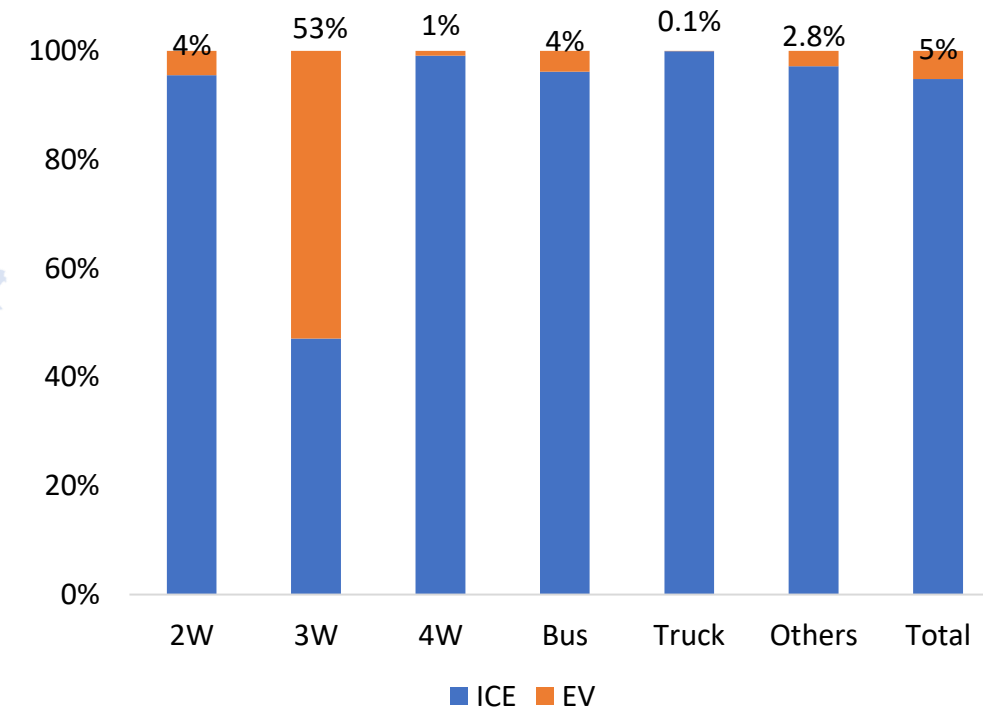
National EV registration (till 13th March 2023)



Cumulative State-wise EV registration as on 13th March 2023 (in Thousands)



EV and ICE sale composition in 2022-23 (till 13th March 2023)



Vehicle Registered in FY 2022-23 [till 13th March 2023] (in Thousands)

Fuel Type	2W	3W	4W	Bus	Truck	Others	Total
EV	666	362	35	8	1	1	1072
ICE	14346	322	3949	191	836	49	19694

# 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.

## 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 30<sup>th</sup> 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

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

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 February (1/3)

1. The Hon'ble Finance Minister Shrimati Nirmala Sitharaman, announced the [Green Growth in Budget 2023](#) on 1<sup>st</sup> February 2023. The main highlights are:
  - Green Hydrogen Mission, with an outlay of Rs 19,700 crores, will facilitate the low-carbon transition of the economy.
  - Rs 3,500 crore for priority capital investments toward energy transition and net zero objectives.
  - Battery Energy Storage Systems with a capacity of 4,000 MWH will be supported with Viability Gap Funding.
  - Renewable Energy Evacuation: The Inter-state transmission system for evacuation and grid integration of 13 GW renewable energy from Ladakh will be constructed with an investment of Rs. 20,700 crores including central support of Rs. 8,300 crores.
  - 500 new 'waste to wealth' plants under GOBARdhan (Galvanizing Organic Bio-Agro Resources Dhan) scheme
  - Coastal shipping will be promoted as the energy-efficient and lower-cost mode of transport, both for passengers and freight, through PPP mode with viability gap funding.
2. The Hon'ble Chief Minister of Tamil Nadu Thiru. M. K. Stalin released the [Tamil Nadu Electric Vehicles Policy 2023](#). The government of Tamil Nadu has a vision of attracting Rs. 50,000 crore worth of investments in EV manufacturing, the creation of 1.5 lakh new jobs during the policy period, and the development of a robust EV ecosystem in the state. The salient features are:
  - Expanded range of investor-friendly options for Investment Promotion Subsidy
  - Special focus on cell and battery manufacturing
  - Encouraging existing automotive company transitions to electric vehicles.

# Key Highlights or Announcements of February (2/3)

3. Ministry of Power has released the [draft guidelines to promote the development of Pumped Storage Projects \(PSP\)](#) in the country on 15<sup>th</sup> February 2023. The guidelines focus on the allotment of project sites, charges to be paid by the developer, monetization of ancillary services, utilization of exhausted mines to develop PSPs, environmental clearances for off-river PSPs, green finance, etc.
4. The Geological Survey of India has for the first time established [Lithium inferred resources \(G3\) of 5.9 million tonnes](#) in the Salal-Haimana area of the Reasi District of Jammu & Kashmir (UT).
5. CEA has released the [Central Electricity Authority \(Flexible Operation of Coal-based Thermal Power Generating Units\) Regulations, 2023](#). The main highlights are:
  - The coal-based thermal power generating units shall be designed or suitably retrofitted, if required, to comply with these regulations for the full range of ambient and environmental conditions prevailing at the site.
  - Flexible operation of coal-based thermal power generating units.
  - Power plants shall have flexible operation capability with a minimum power level of 40%.
  - To achieve minimum ramp rate capability of coal power plants within a year of the notification-

Graded Level of Operation	Ramp Rate (%)
100% - 70%	3
70% - 55%	2
55% - 40%	1



# Key Highlights or Announcements of February (3/3)

6. Government of India launched the [Revamped Distribution Sector Scheme \(RDSS\)](#) with an outlay of Rs. 3,03,758 crore and estimated GBS from the Central Government of Rs. 97,631 crores for the duration of 5 years i.e. from (FY 2021-22 to FY 2025-26). The Scheme aims to reduce the Aggregate Technical & Commercial (AT&C) losses to pan-India levels of 12-15% and the Average Cost of Supply (ACS)-Average Revenue Realized (ARR) gap to zero by 2024-25. The Scheme has two major components:
  - PART 'A'- Financial assistance to DISCOMs is provided for the upgradation of the Distribution Infrastructure and for Prepaid Smart Consumer Metering & System Metering based on meeting pre-qualifying criteria and achieving a basic minimum benchmark in reforms.
  - Part 'B' – Training & Capacity Building and other Enabling & Supporting Activities.
7. India has finalized [13 activities in 3 heads for the trading of carbon credits](#) under the Article 6.2 mechanism to facilitate the transfer of emerging technologies and mobilize international finance. The three heads are- GHG Mitigation Activities, Alternate Materials, and Removal Activities.
8. Himachal Pradesh transport department has set an ambitious target to equip [all government departments with electric vehicles](#) within a year, paving the way for a cost-efficient and environmentally friendly system. HRTC will add 300 e-buses to its fleet, for which an outlay of Rs 400 crore has been sanctioned. The main aim is to have the entire fleet of e-buses operational by 2025, contributing to a reduction in the state's carbon footprint and air pollution.



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Green ways for a good earth!

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