India's Energy Overview

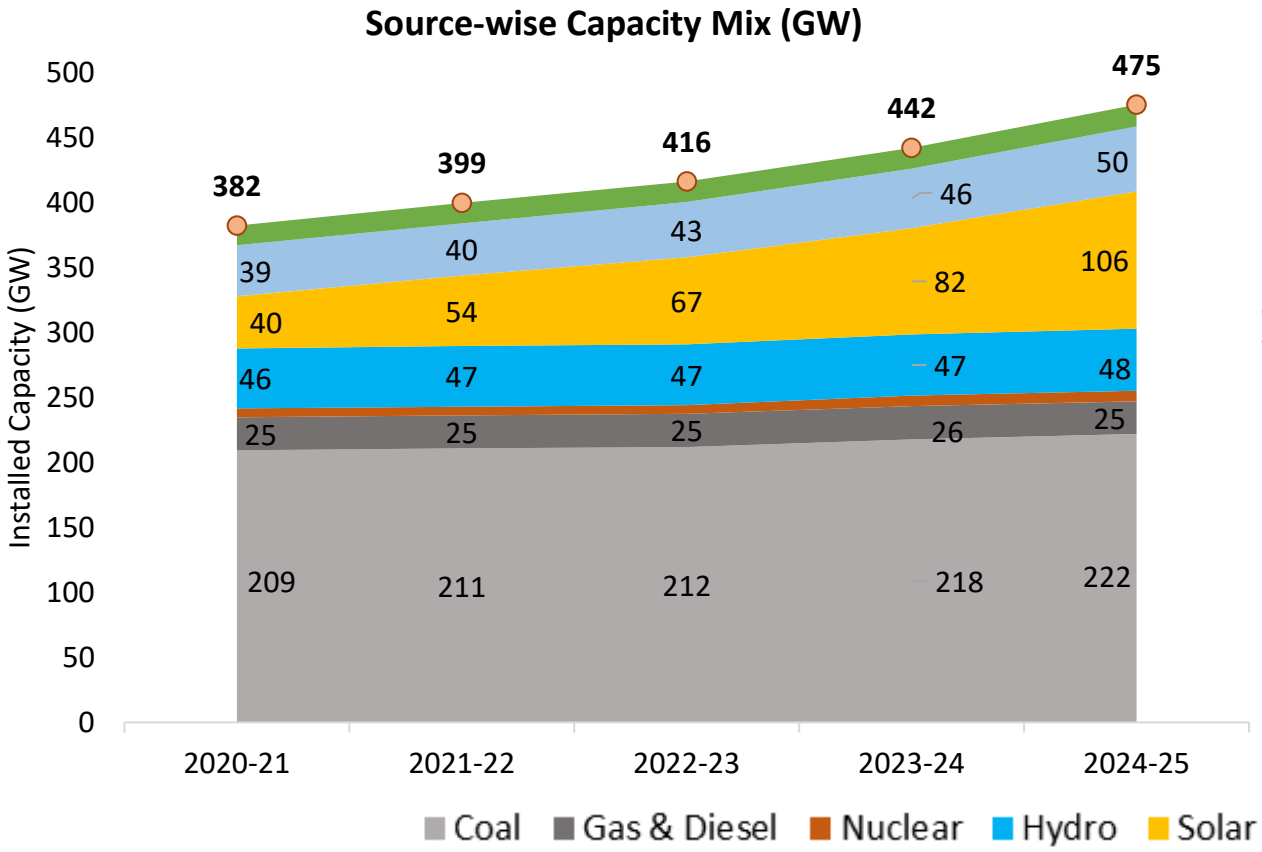
Yearly Highlights of 2024-25

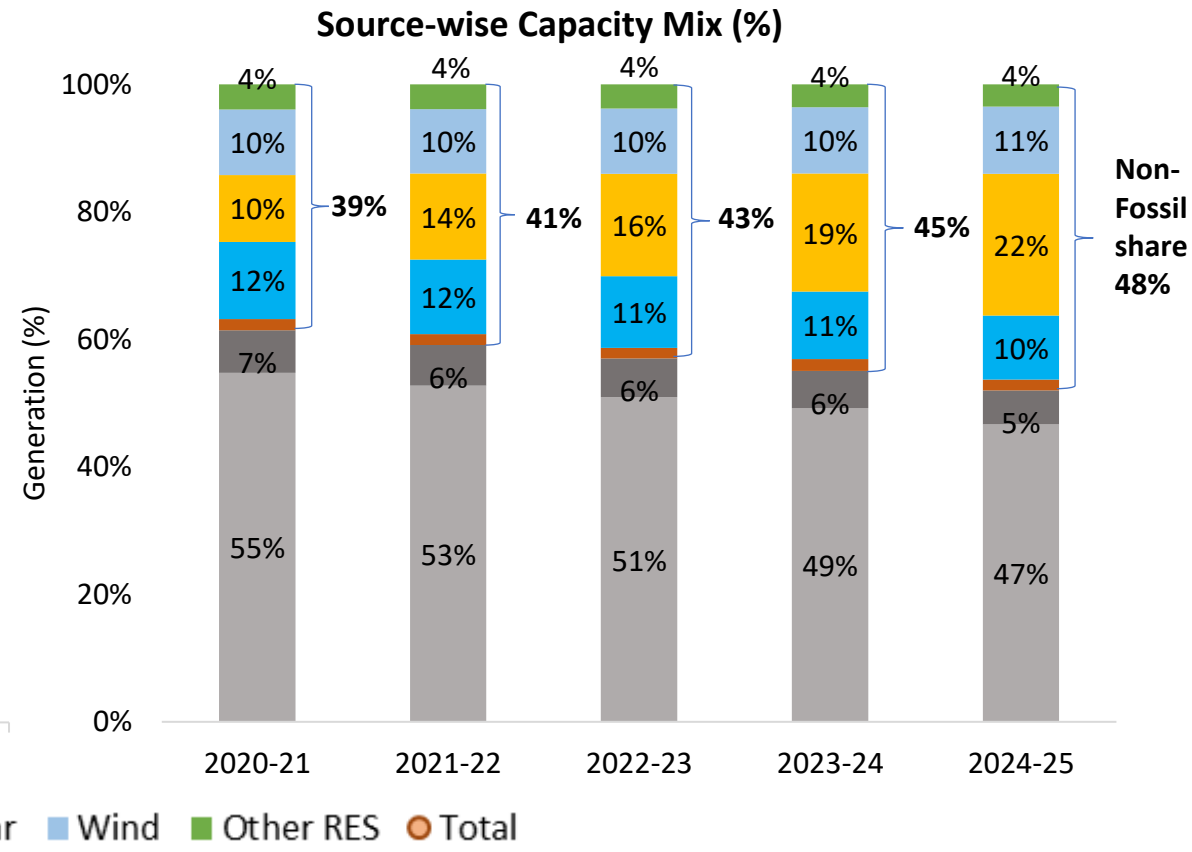
VASUDHA FOUNDATION

Green ways for a good earth!

Contents

India’s Electricity Capacity Mix (Utility-scale)

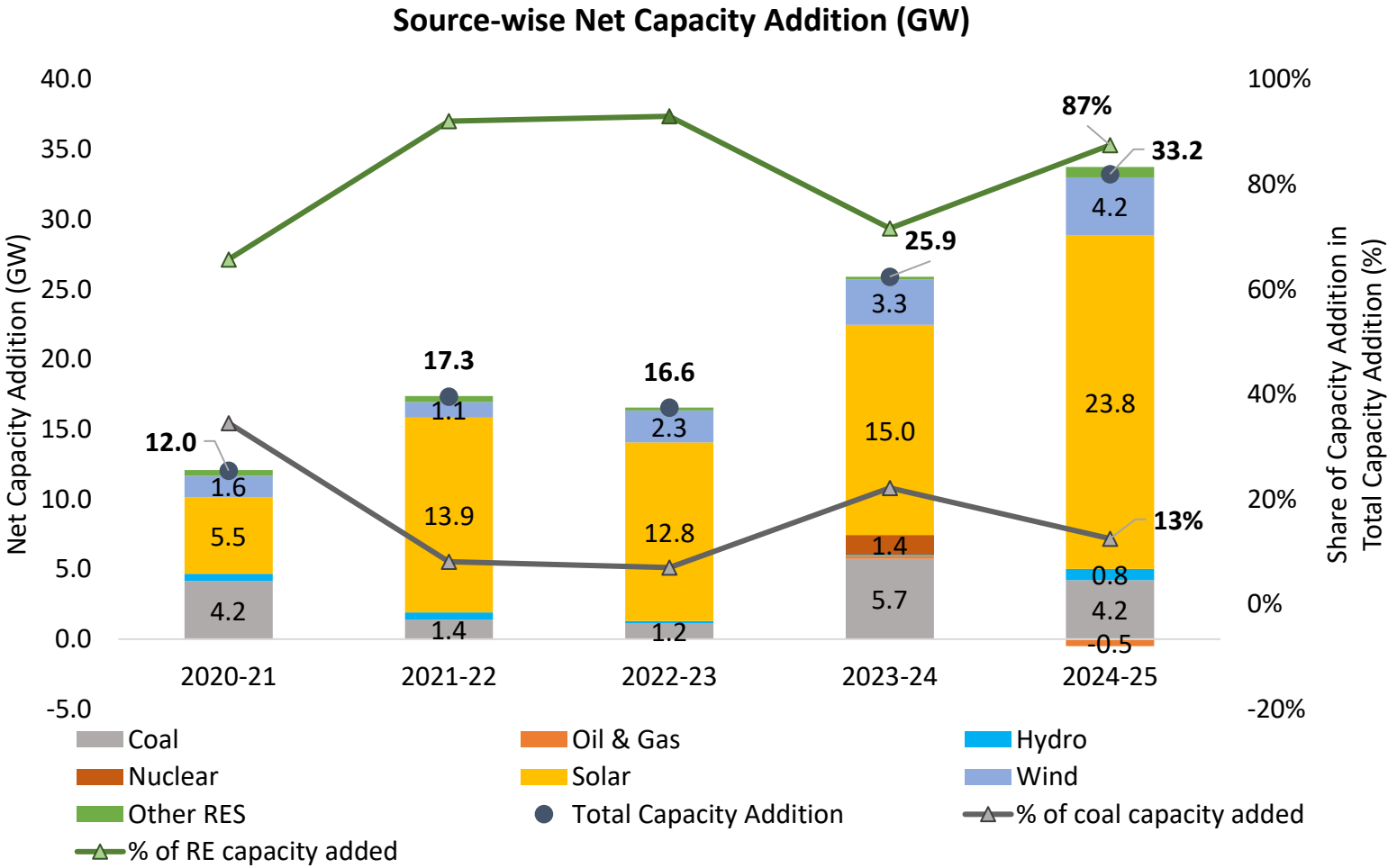


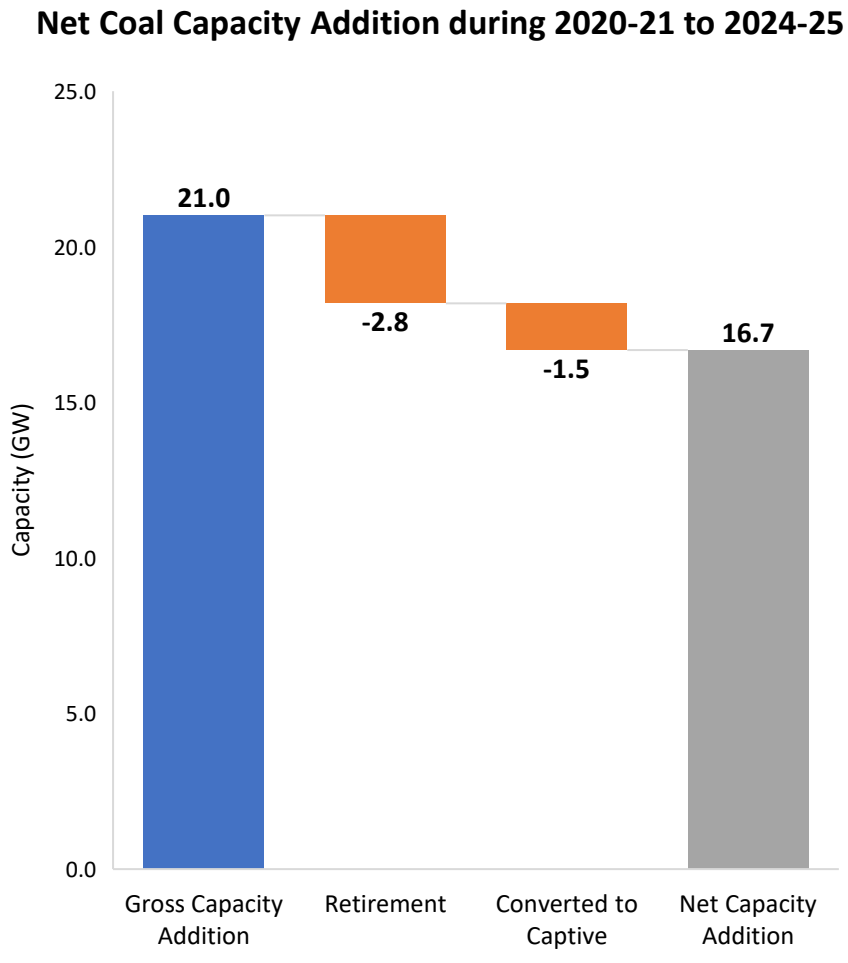


- India’s total electricity generating capacity is 475 GW [coal 222 GW (47%), solar 106 GW (22%), wind 50 GW (11%), and large hydro 48 GW (10%)].
- Currently, the share of non-fossil-based electricity capacity is 48% as against the set target of 50% non-fossil capacity by 2030.
- India’s renewable energy capacity (including large hydro) stood at 220 GW out of total capacity of 475 GW.

Source: CEA

India’s Electricity Capacity Addition in last 5 years

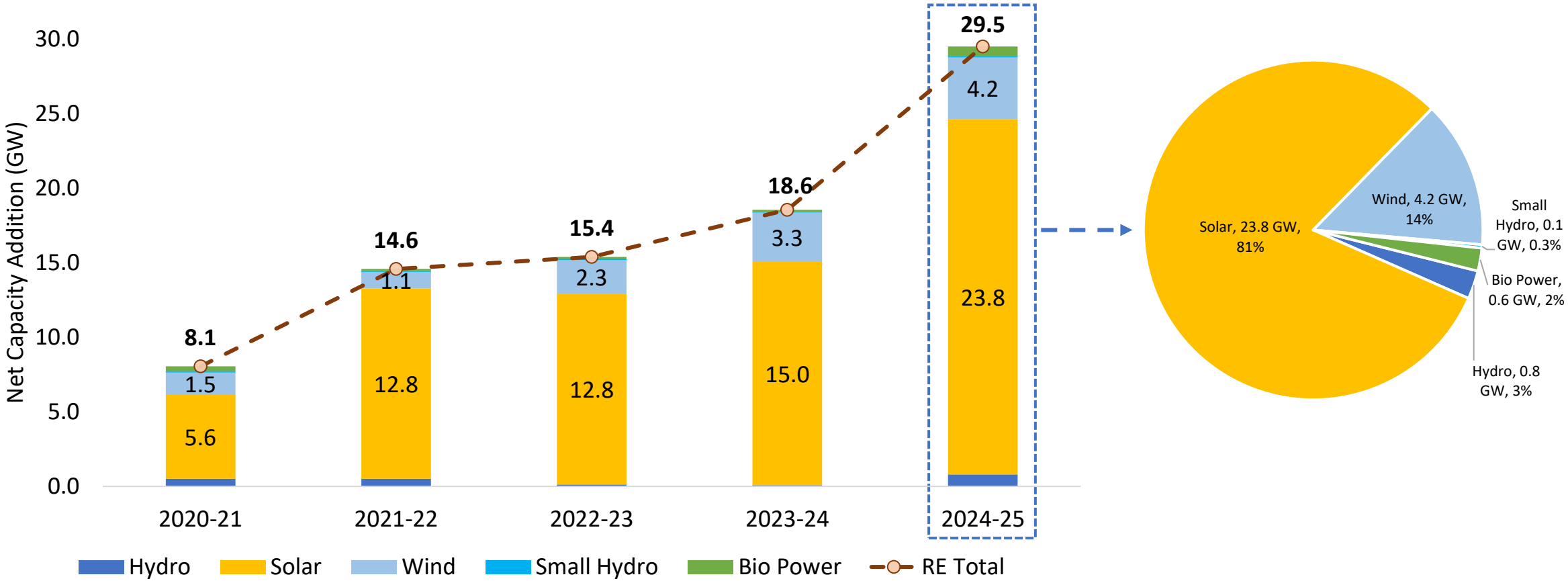




- A total of 87 GW of generation capacity has been added in RE (Hydro, solar, wind, and other RES) over the past 5 years, whereas the net coal capacity addition during the same period was 17 GW, mostly in the central sector.

Source: CEA & MNRE

India’s Renewable Energy Capacity Addition in last 5 years



- In 2024-25, India achieved a record-breaking addition of 29.5 GW in renewable energy (incl. large hydro) capacity, reflecting a significant 59% increase compared to the same period in 2023-24.
- Solar led the way with 23.8 GW, accounting for 81% of the total RE capacity additions. Wind energy contributed 4.2 GW, while large hydro & other renewable energy sources added 0.8 GW & 0.7 GW respectively.

Source: CEA & MNRE

Top Performing States: RE Capacity (in GW)

Solar (incl. Solar Rooftop)

Rajasthan	28.3
Gujarat	18.5
Maharashtra	10.7
Tamil Nadu	10.2
Karnataka	9.7

Wind

Gujarat	12.7
Tamil Nadu	11.7
Karnataka	7.4
Maharashtra	5.3
Rajasthan	5.2

Large Hydro

Himachal Pradesh	11.0
Uttarakhand	4.0
Karnataka	3.7
Jammu & Kashmir	3.4
Maharashtra	3.0

Biopower

Maharashtra	3.0
Uttar Pradesh	2.3
Karnataka	1.9
Tamil Nadu	1.0
Andhra Pradesh	0.6

Small Hydro

Karnataka	1.3
Himachal Pradesh	1.0
Maharashtra	0.4
Kerala	0.3
Uttarakhand	0.2

Solar Rooftop

Gujarat	5.1
Maharashtra	3.3
Rajasthan	1.5
Kerala	1.2
Tamil Nadu	0.9

Total Renewable Energy

Rajasthan	34.1
Gujarat	33.4
Tamil Nadu	25.2
Karnataka	23.9
Maharashtra	22.4

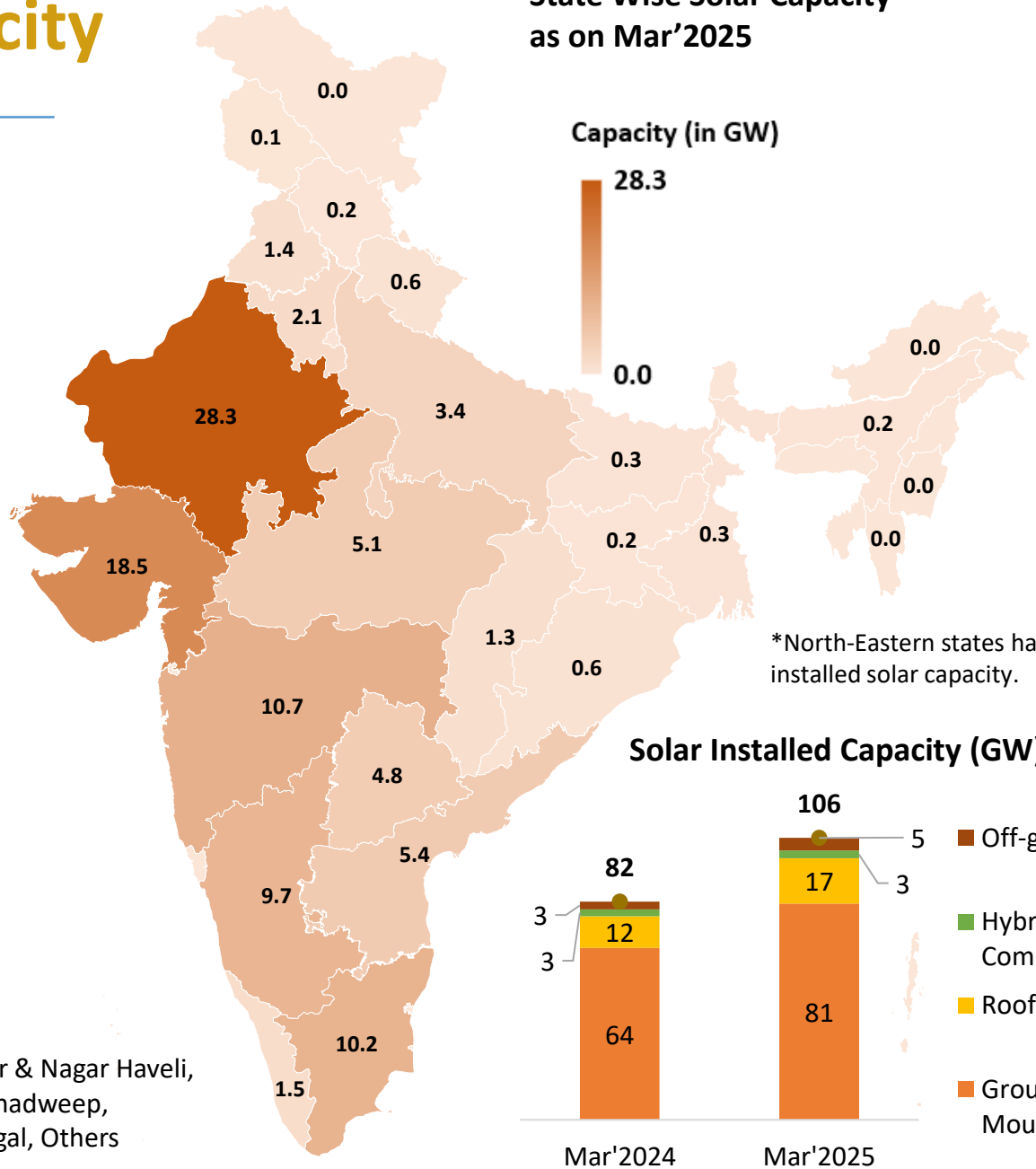
Source: CEA & MNRE

State-wise Solar Installed Capacity

State-wise installed capacity of Solar Power (GW)			
States	**2023-24**	**2024-25**	**Change over previous year (%)**
Rajasthan	21.35	28.29	33%
Gujarat	13.54	18.50	37%
Maharashtra	6.25	10.69	71%
Tamil Nadu	8.21	10.15	24%
Karnataka	8.54	9.68	13%
Andhra Pradesh	4.58	5.37	17%
Madhya Pradesh	4.00	5.12	28%
Telangana	4.76	4.84	2%
Uttar Pradesh	2.92	3.36	15%
Haryana	1.48	2.06	40%
Kerala	1.02	1.54	50%
Punjab	1.32	1.42	7%
Chhattisgarh	1.21	1.35	11%
Odisha	0.50	0.62	26%
Others	2.13	2.65	25%
All India	**81.81**	**105.65**	**29%**

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

State Wise Solar Capacity as on Mar'2025



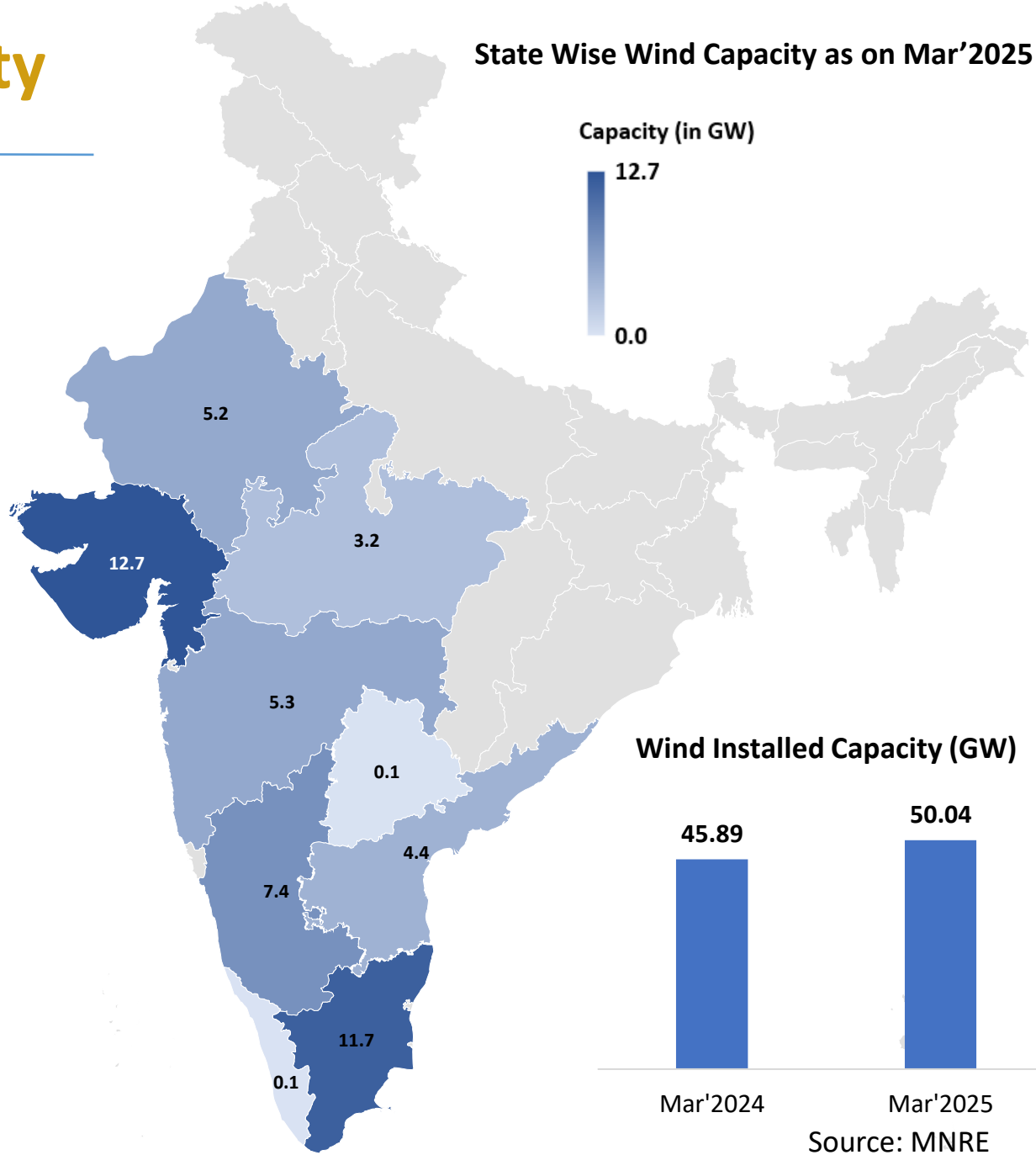
*North-Eastern states have 0.3 GW of installed solar capacity.

Solar Installed Capacity (GW)

Source: MNRE

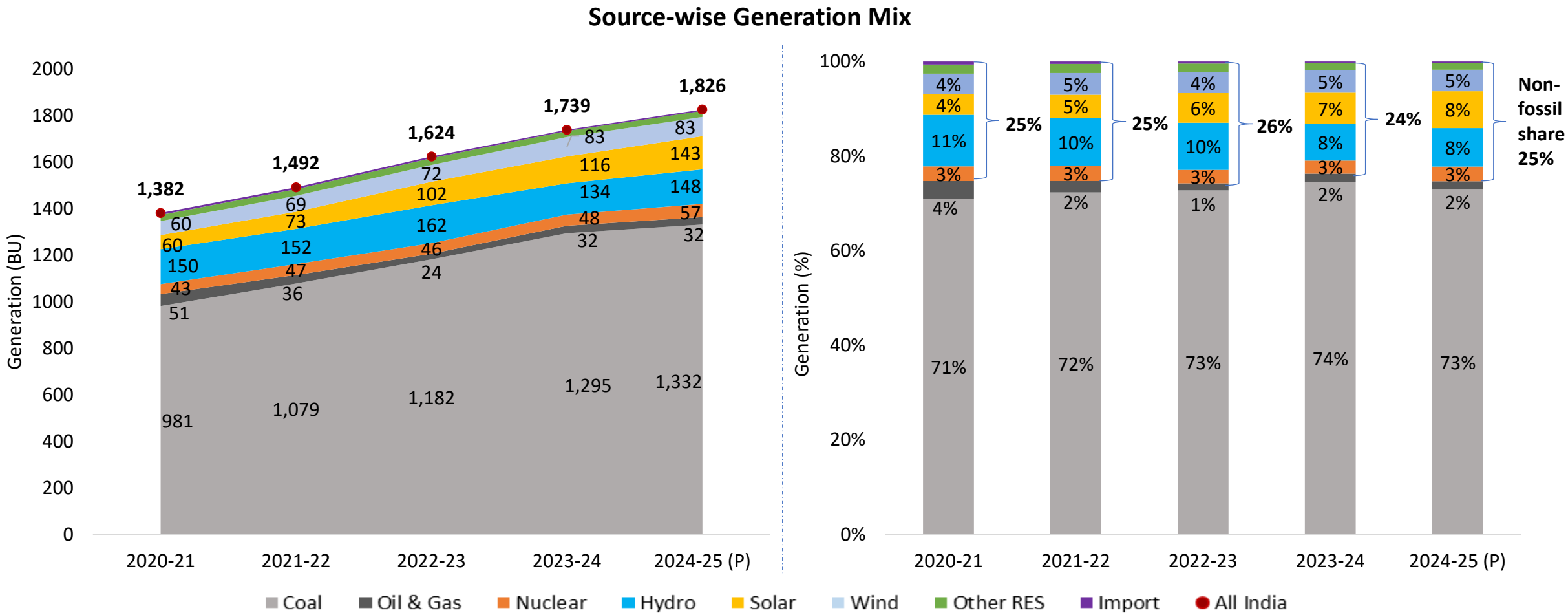
State-wise Wind Installed Capacity

State-wise installed capacity of Wind (Onshore) Power (GW)			
States	**2023-24**	**2024-25**	**Change over previous year (%)**
Gujarat	11.72	12.7	8%
Tamil Nadu	10.60	11.7	11%
Karnataka	6.02	7.4	22%
Maharashtra	5.21	5.3	1%
Rajasthan	5.20	5.2	0%
Andhra Pradesh	4.10	4.4	7%
Madhya Pradesh	2.84	3.2	12%
Telangana	0.13	0.1	0%
Kerala	0.06	0.1	12%
All India	**45.89**	**50.04**	**9%**



Source: MNRE

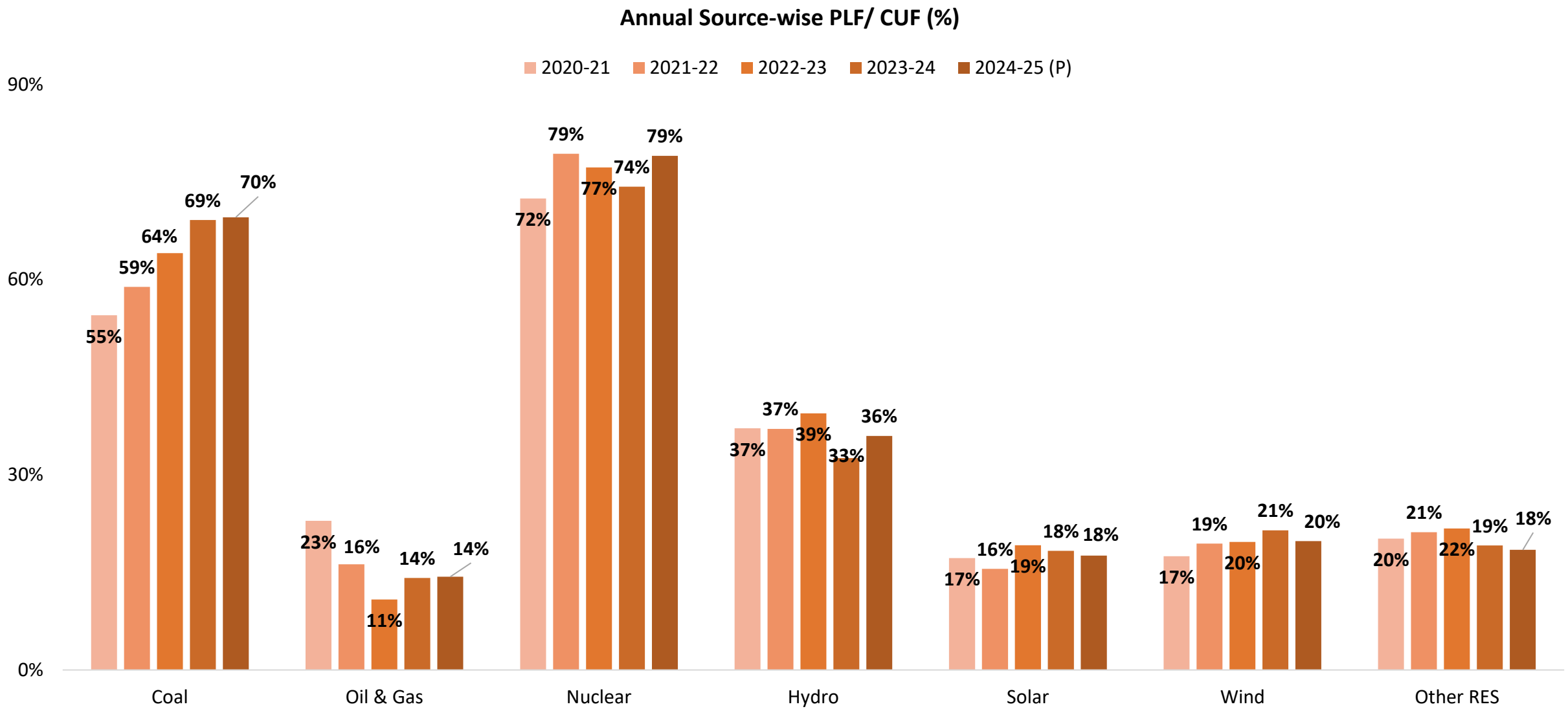
India’s Electricity Generation Mix



- In 2024-25, India’s electricity generation has reached 1,826 BU, marking a 5% increase from 1,739 BU in 2023-24.
- Among all the sources, solar electricity generation recorded the highest growth rate of 23%, increasing from 134 BU in 2023-24 to 148 BU in 2024-25, followed by nuclear with an 18% growth rate.

Note: P- Provisional. Source: CEA

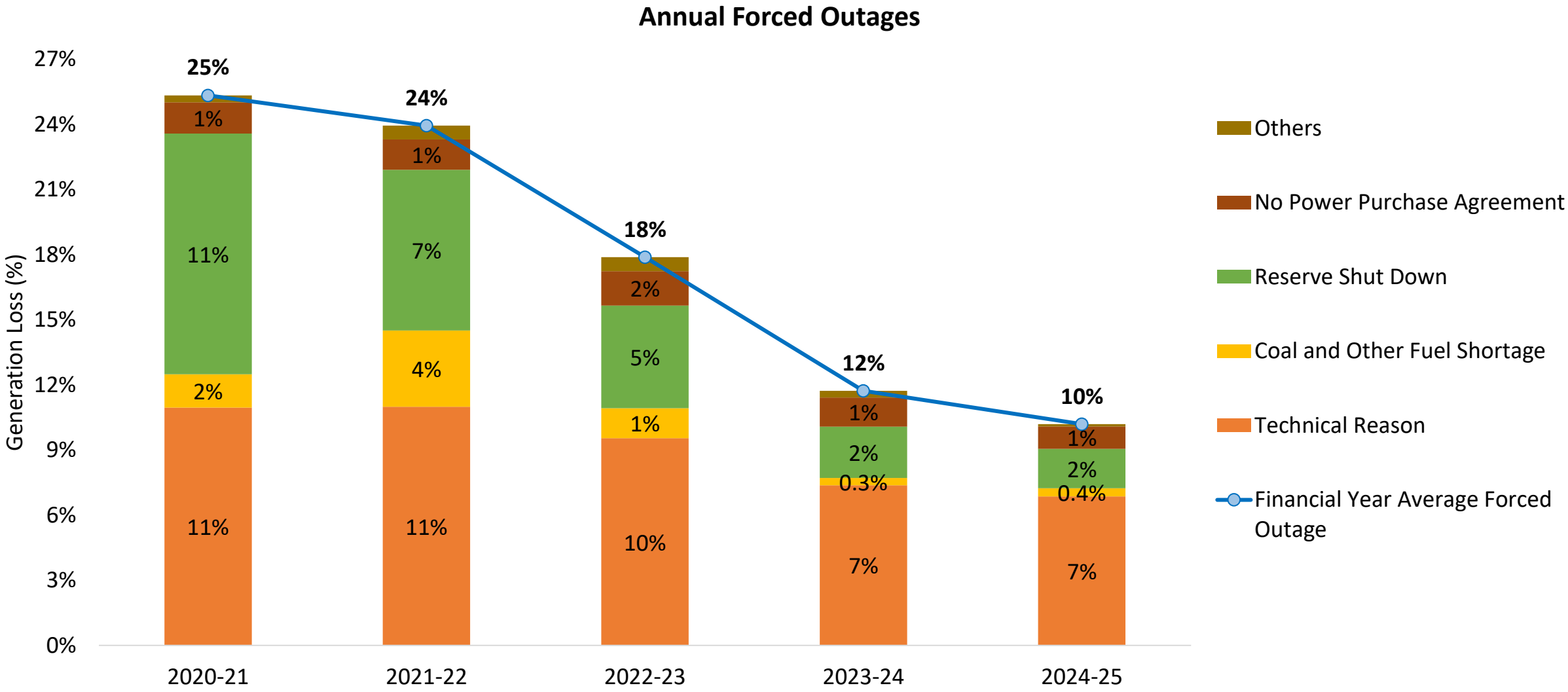
Source-wise PLF/CUF



Note: P- Provisional.

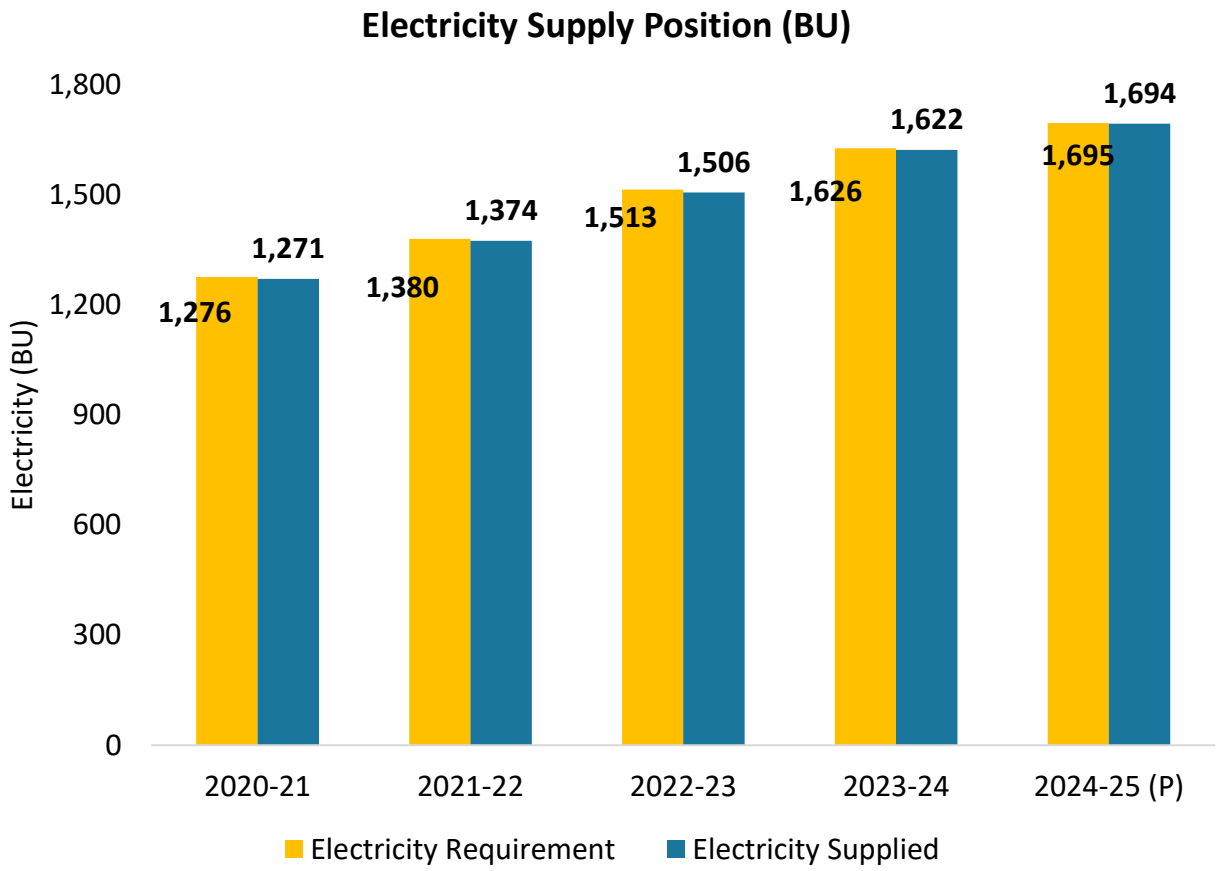
Source: CEA & MNRE

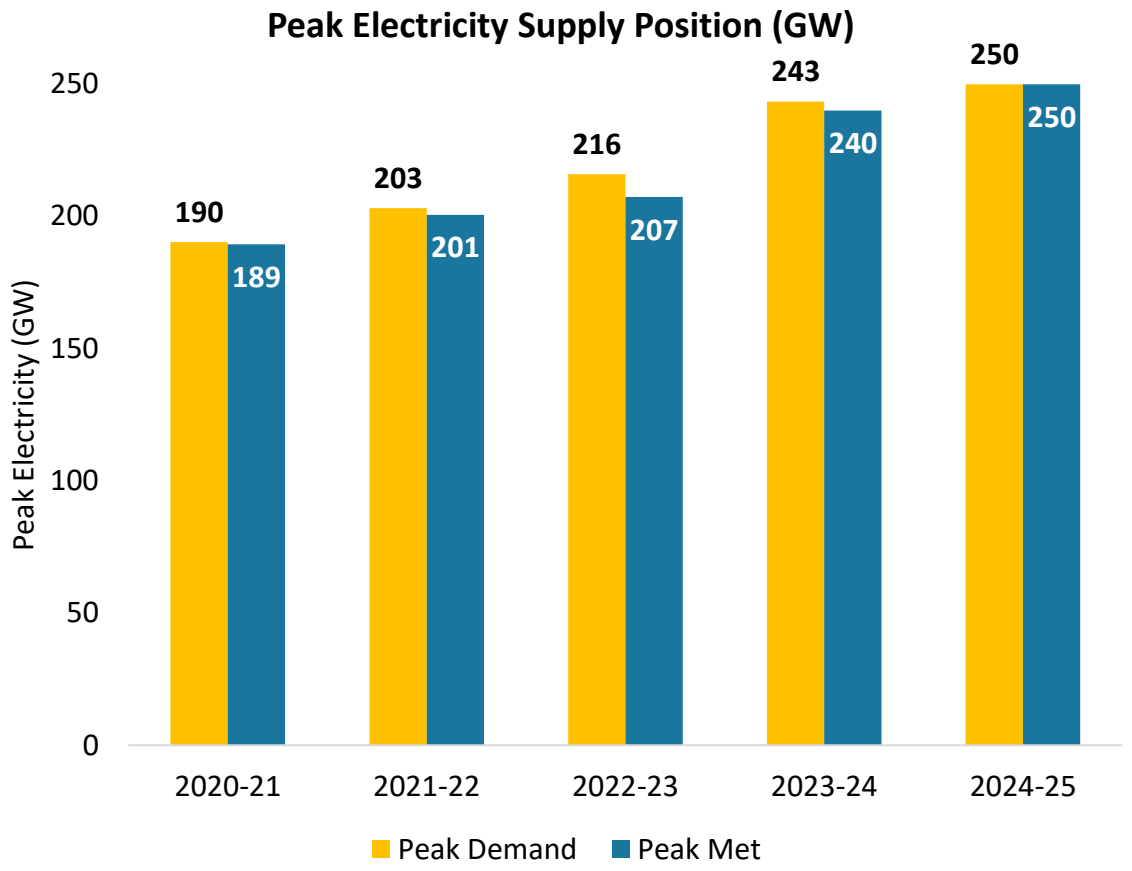
Thermal Generation Loss and Reasons for Forced Outages



Thermal includes only Coal and Lignite Plants.

India’s Electricity Demand and Supply Position



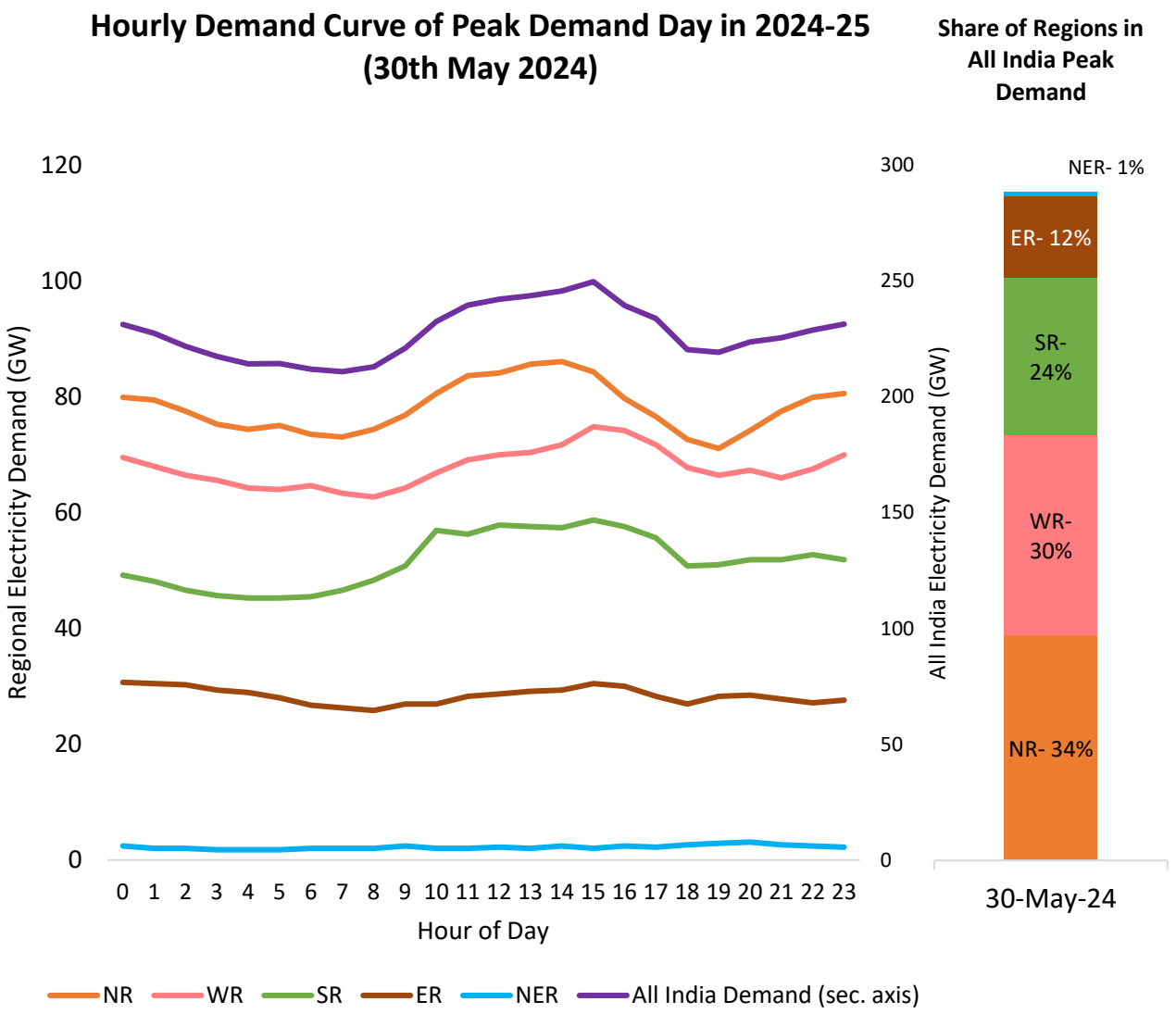


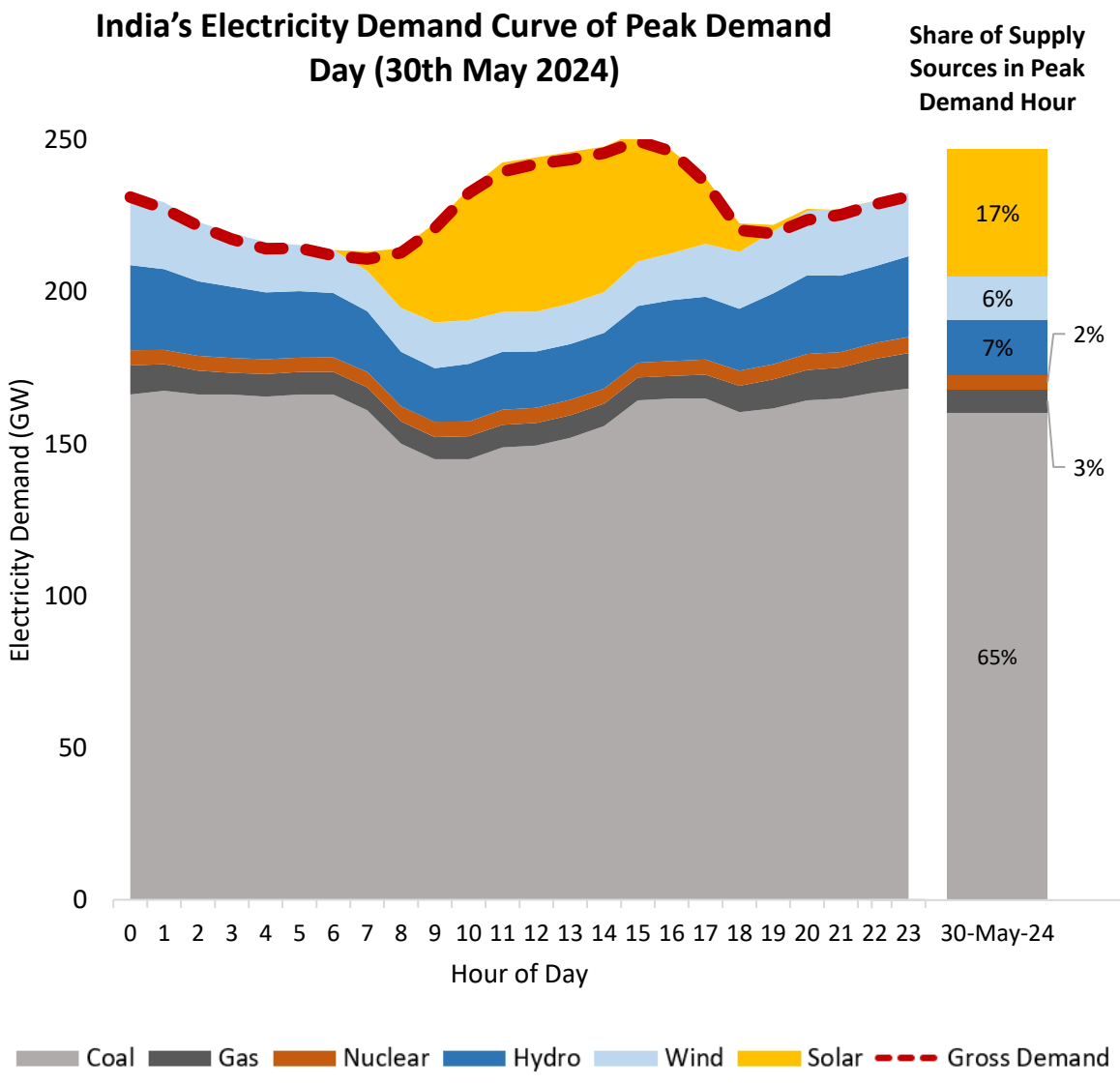
- National electricity demand in 2024-25 increased by 4% compared to the demand in 2023-24.
- National peak electricity demand in 2024-25 has increased by 3% compared to the peak demand in 2023-24.
- The peak demand deficit has decreased from 1.4% in 2023-24 to 0.0% in 2024-25.

Note: The electricity demand represented above includes intra state T&D losses. P- Provisional.

Source: CEA

All India and Regional Electricity Demand Curve of Peak Demand Day

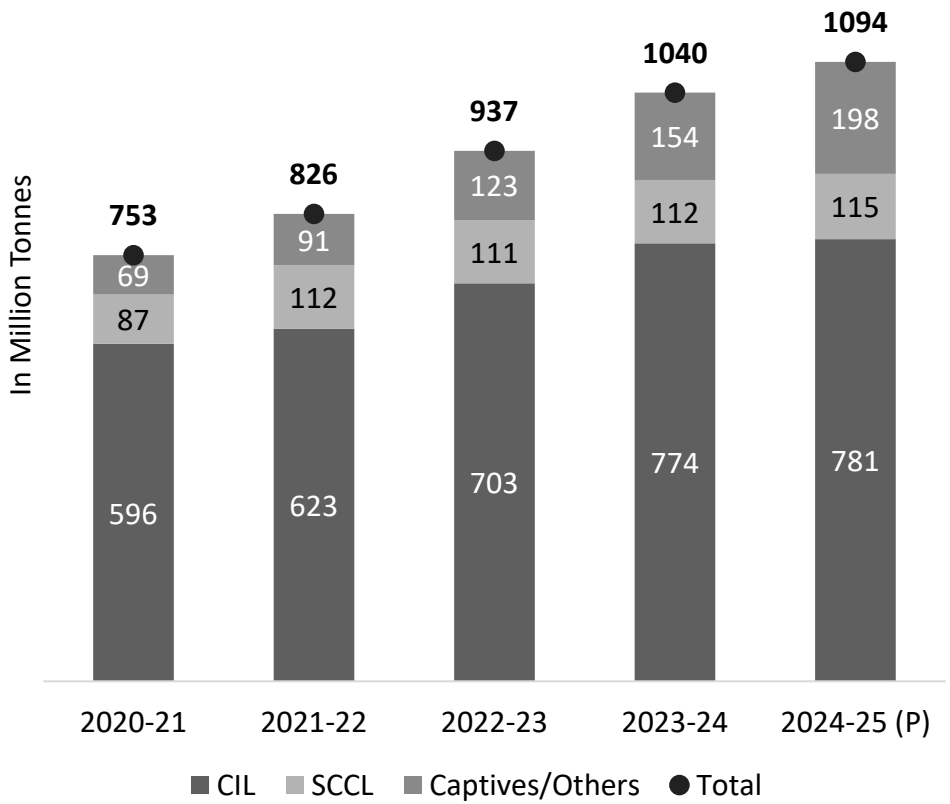




Source: POSOCO

Annual Coal Statistics

Annual Coal Production (in Million Tonnes)

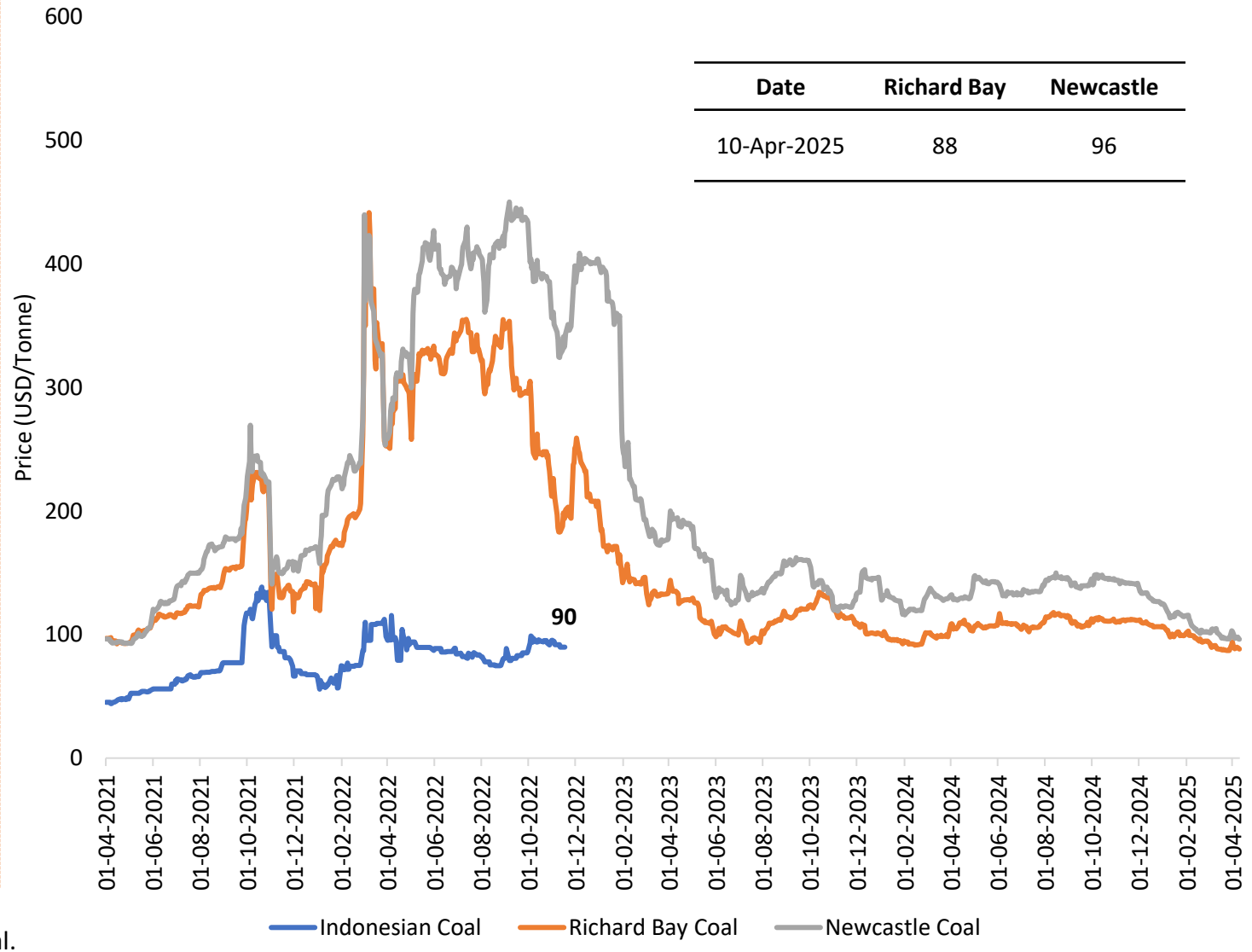


India's coal (incl. lignite) production reached 1.09 billion tonne in 2024-25, marking a 5% increase compared to the previous year (1.04 BT).

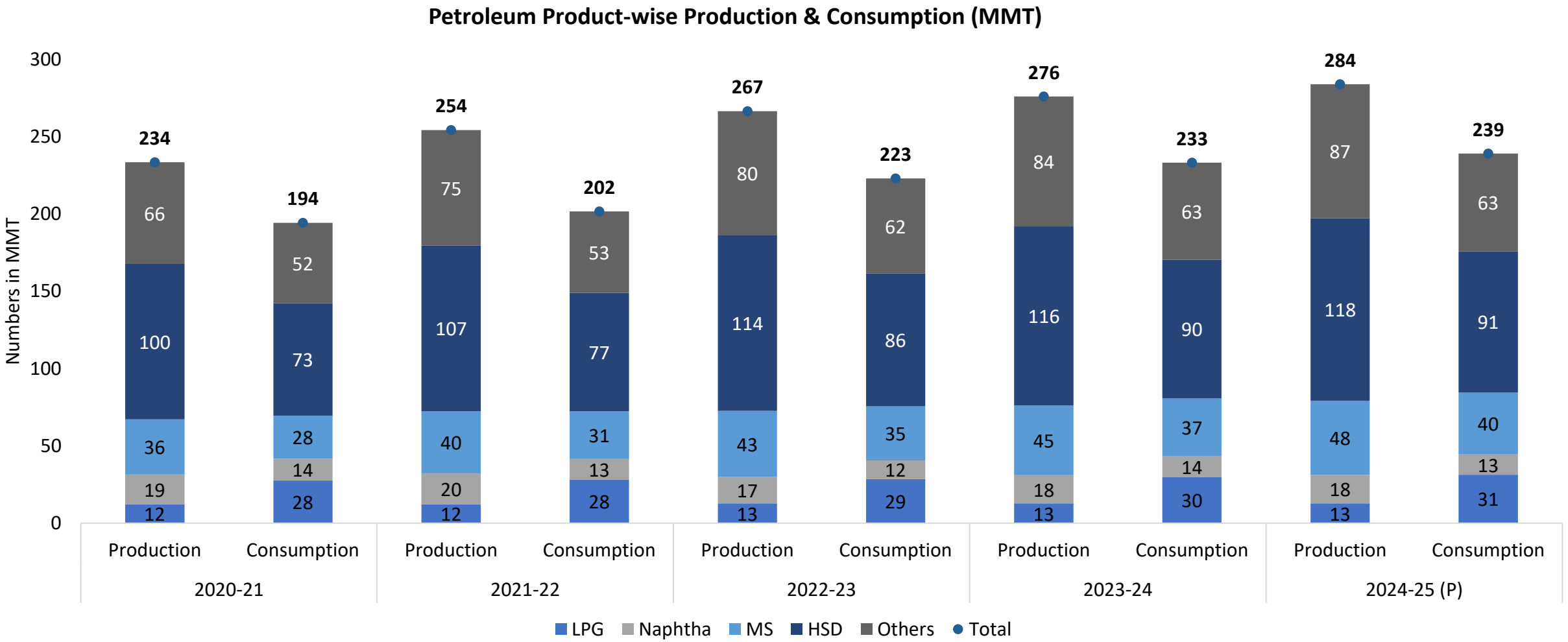
Note: P- Provisional.

International Coal Prices

Date	Richard Bay	Newcastle
10-Apr-2025	88	96



Petroleum Products Market Scenario (1/2)



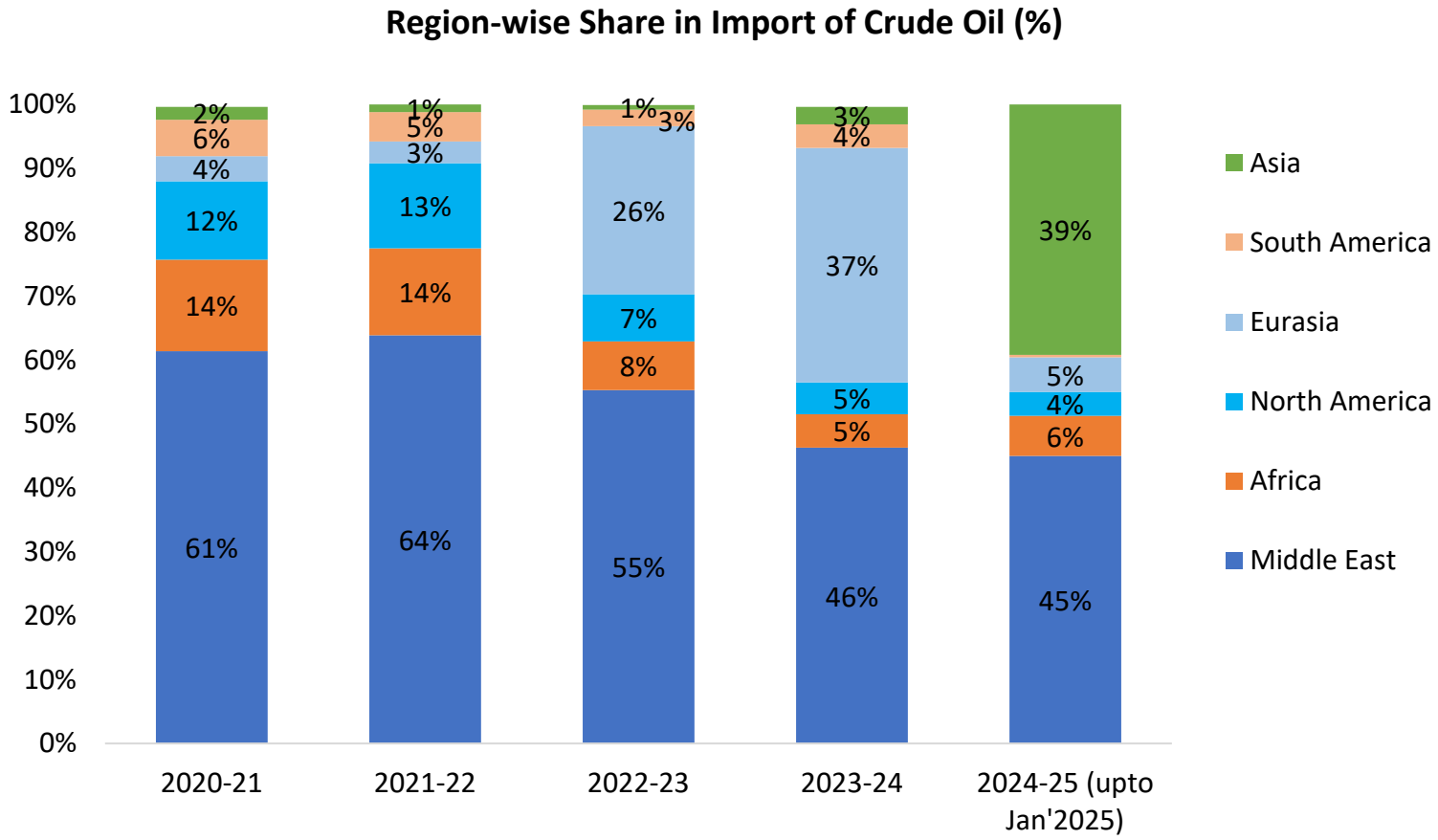
Others include ATF, SKO, LDO, Lubes, FO, LSHS, Bitumen, pet coke, and others.

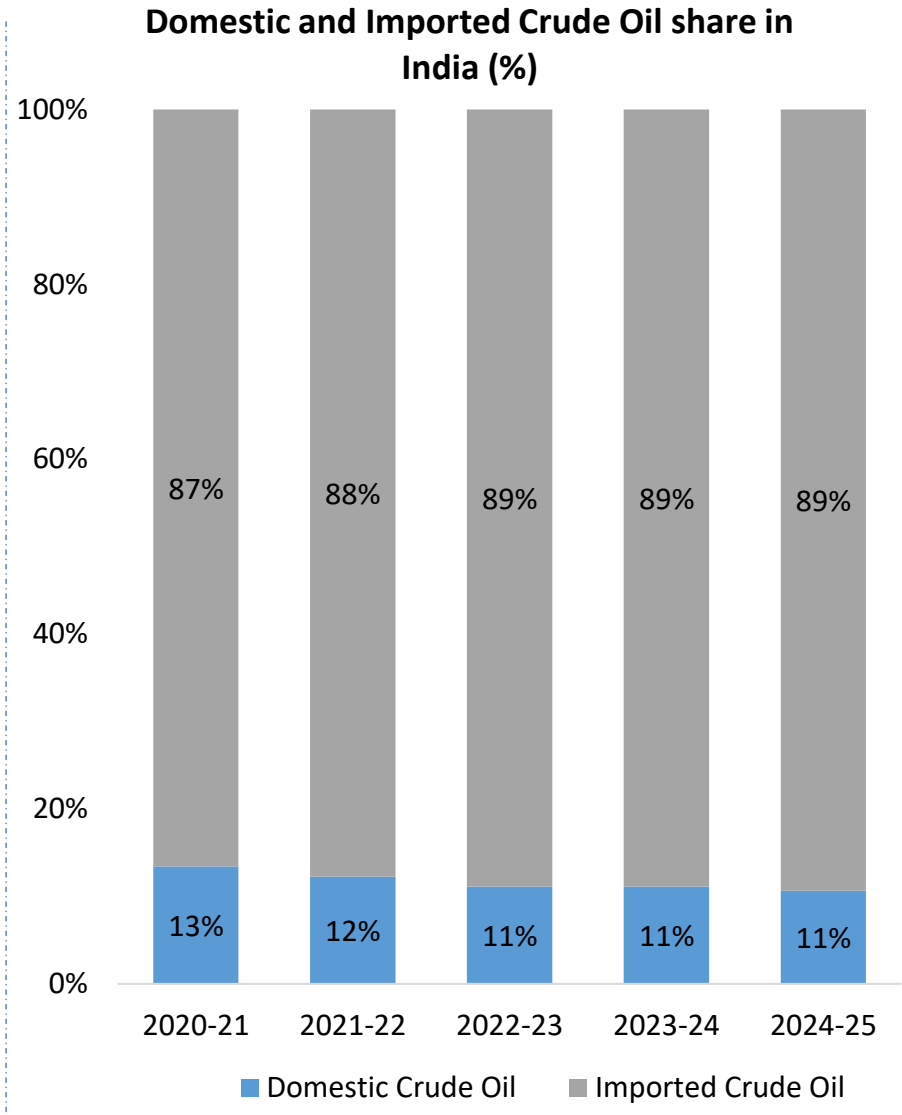
Abbreviations: ATF- Aviation Turbine Fuel, FO- Furnace Oil, HSD- High-Speed Diesel, LDO- Light Diesel Oil, MS- Motor Spirit (Petrol), SKO- Superior Kerosene Oil, LSHS- Low Sulphur Heavy Stock, LPG- Liquefied Petroleum Gas, MMT- Million Metric Tonne

Note: P- Provisional.

Source: PPAC

Petroleum Products Market Scenario (2/2)





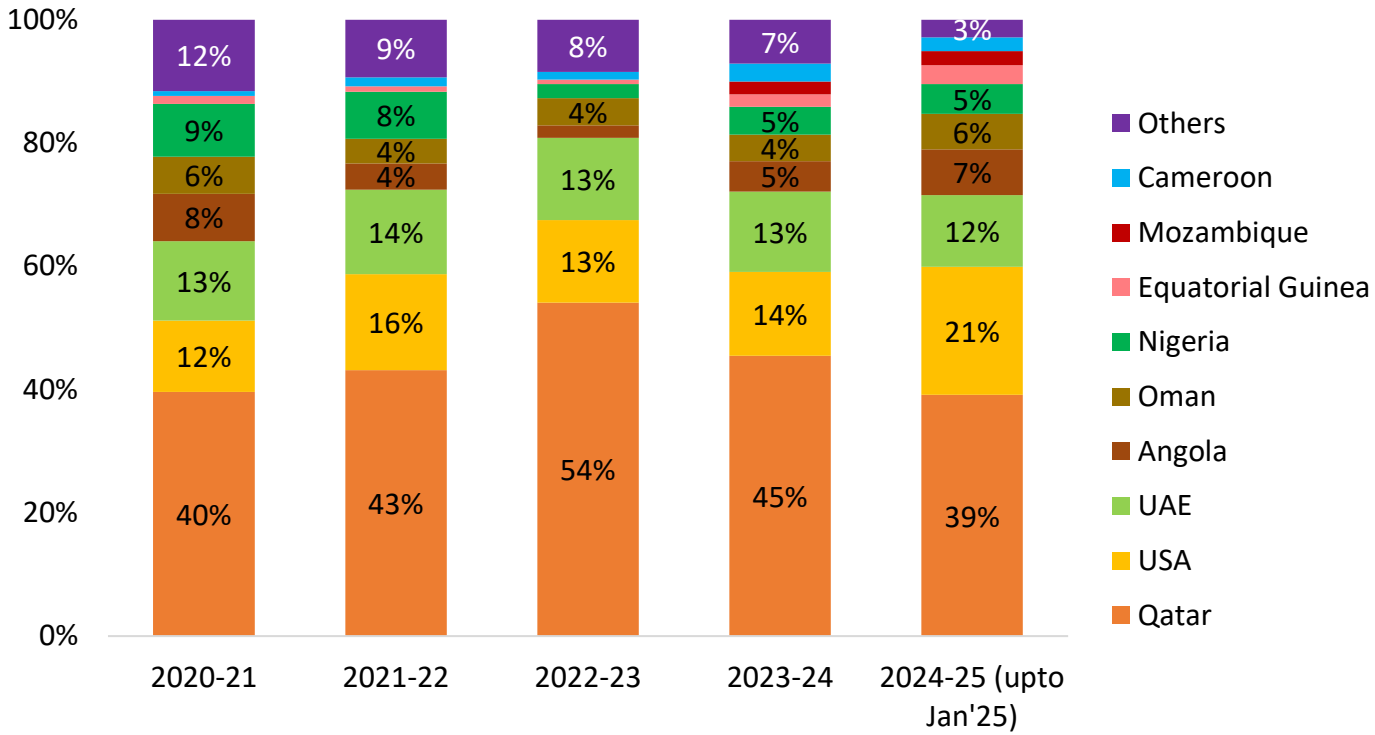
Total Import of Crude Oil (MMT)					
Total Import	**2020-21**	**2021-22**	**2022-23**	**2023-24**	**2024-25**
Crude Oil	**196**	**212**	**233**	**234**	**220**

Note: Data for 2024-25 are up to Feb'2025.

Source: MoPNG and PPAC

Gas Market Scenario

Region-wise Share in Import of LNG (%)



Others include- Egypt, France, Algeria, Belgium, Indonesia, Turkey, Russia, Spain, Malaysia, Brunei, Netherlands, Norway, Singapore, South Africa, Switzerland, UK, and others.

Total Import of Liquified Natural Gas (LNG) (MMT)

Total Import	2020-21	2021-22	2022-23	2023-24	2024-25
LNG	**25.05**	**23.42**	**19.85**	**24.00**	**25.91**

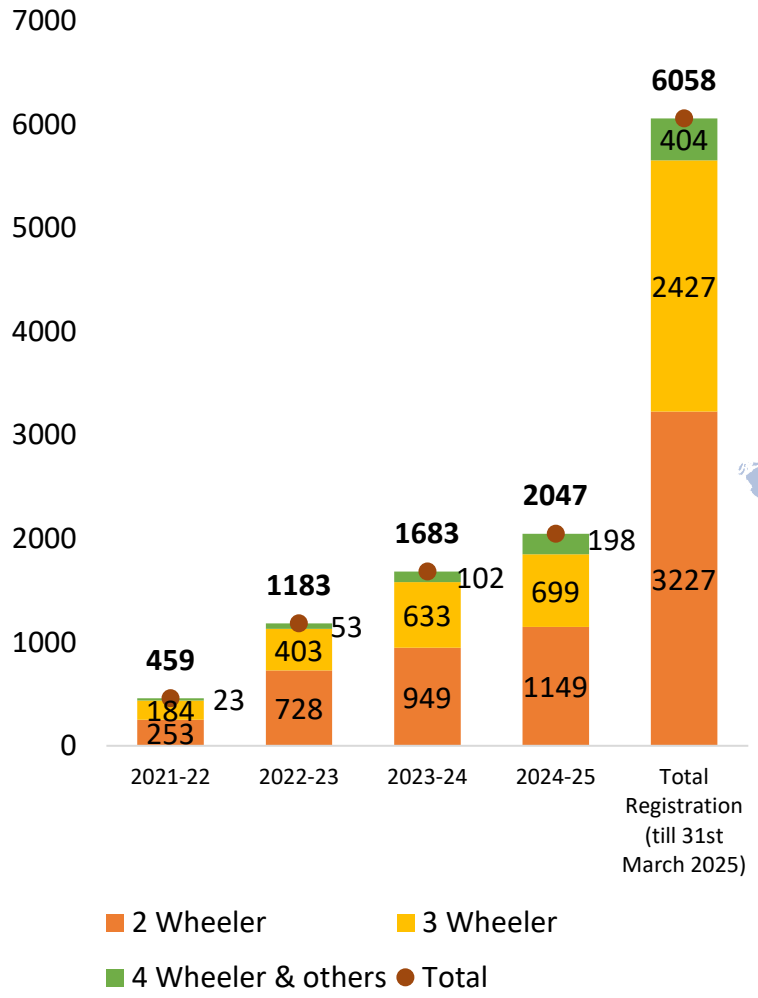
Domestic and Imported Natural Gas share in India (%)

Note: Data for 2024-25 are up to Feb'2025.

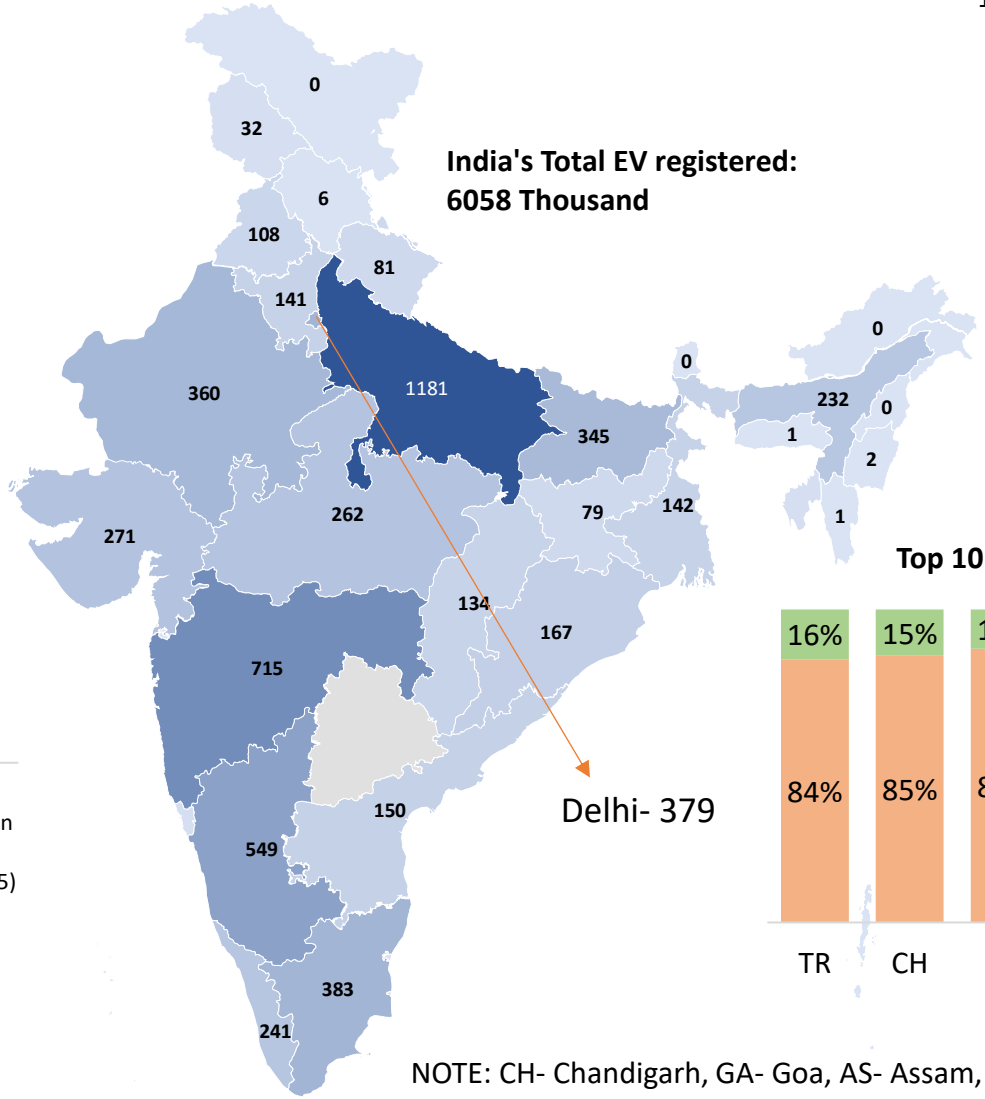
Source: MoCI and PPAC

Status of Electric Mobility in India

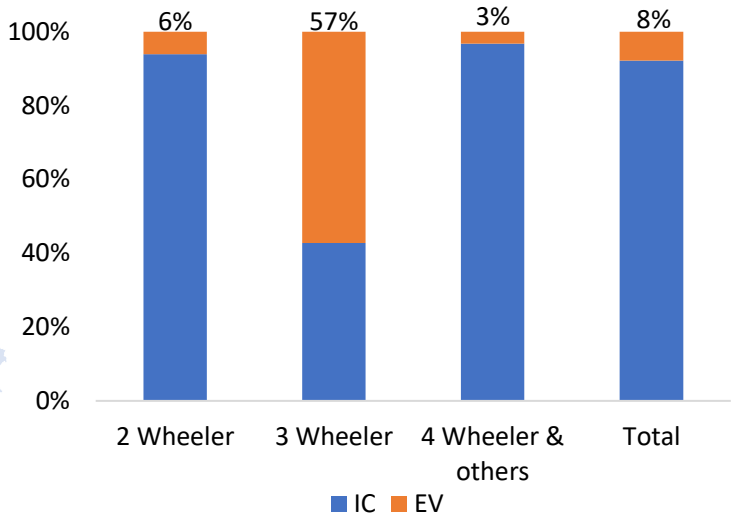
National EV registration (in Thousands)



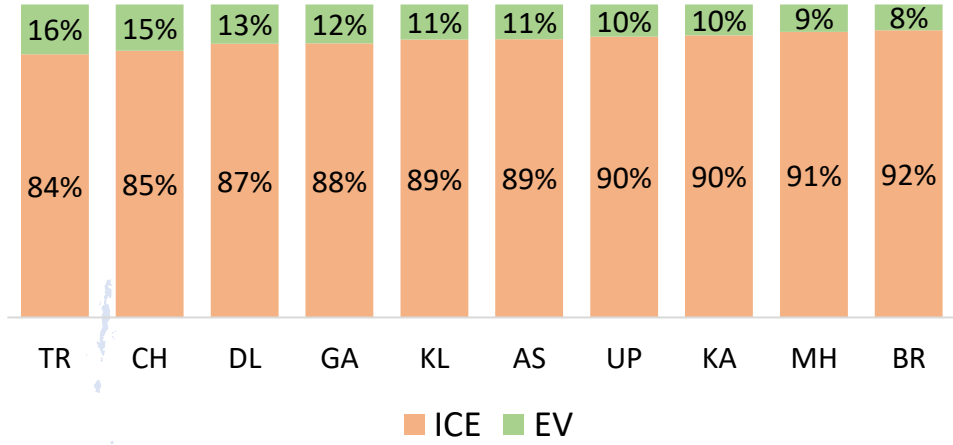
Cumulative State-wise EV registration as on 31st March 2025 (in Thousands)



EV and ICE sale composition in 2024-25



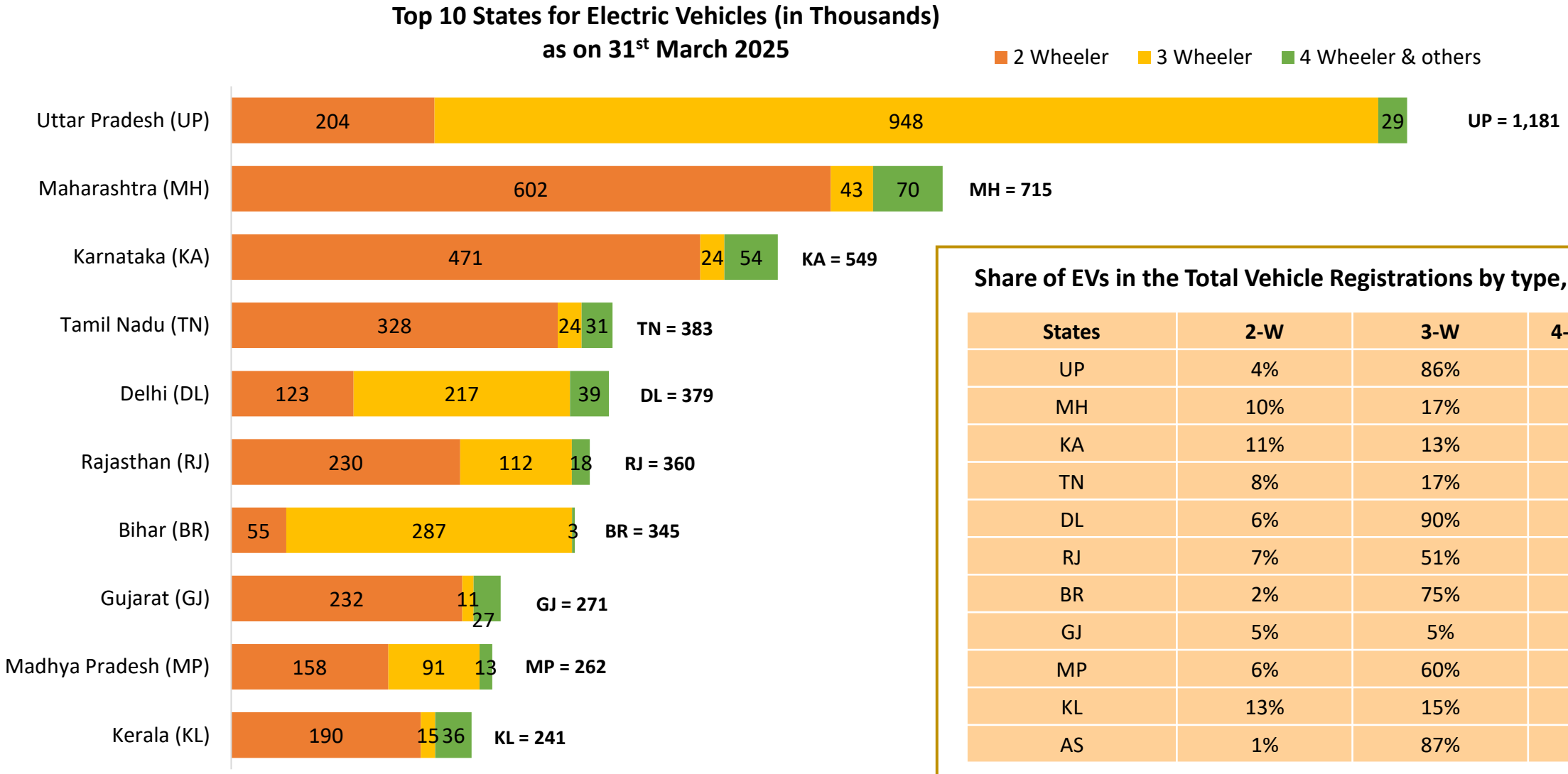
Top 10 states in Electric Vehicle Adoption in 2024-25



NOTE: CH- Chandigarh, GA- Goa, AS- Assam, TR- Tripura

Source: VAHAN Dashboard

Status of Electric Mobility in India



Share of EVs in the Total Vehicle Registrations by type, FY 2024–25

States	2-W	3-W	4-W & Others
UP	4%	86%	3%
MH	10%	17%	4%
KA	11%	13%	5%
TN	8%	17%	4%
DL	6%	90%	7%
RJ	7%	51%	2%
BR	2%	75%	1%
GJ	5%	5%	2%
MP	6%	60%	1%
KL	13%	15%	7%
AS	1%	87%	1%

Source: VAHAN Dashboard

National Key Policy Highlights/ Announcements in 2024-25 (1/3)

A. Renewable Energy and New Technologies

- On 19th June 2024, the Honourable Prime Minister Shri Narendra Modi approved the Viability Gap Funding (VGF) scheme for offshore wind energy projects at a total outlay of Rs.7453 crore, including an outlay of Rs.6853 crore for installation and commissioning of 1 GW of offshore wind energy projects (500 MW each off the coast of Gujarat and Tamil Nadu), and grant of Rs.600 crore for upgradation of two ports to meet logistics requirements for offshore wind energy projects.

- MNRE has unveiled the guidelines for funding of testing facilities, infrastructure, and institutional support for development of Standards and Regulatory framework under the National Green Hydrogen Mission. The Scheme will support creation of new testing facilities and upgradation of existing Testing Facilities to ensure safe and secure operations with a total budgetary outlay of Rs. 200 Crores during the period 2024-26.

- On 3rd July 2024, MNRE has issued a scheme guidelines for implementation of "Strategic Interventions for Green Hydrogen Transition (SIGHT) Programme – Component II: Incentive Scheme for Green Hydrogen Production (under Mode 1)- Tranche-II" of the National Gree Hydrogen Mission with an outlay of Rs 13050 crores during 2025-26 to 2029-30. The capacity of Tranche-II will be 450,000 TPA of Green Hydrogen, with 40,000 TPA capacity reserved for biomass-based pathways (bucket-II) and the rest for technology agnostic pathways (bucket-I).

- The Ministry of New Renewable Energy (MNRE) has released the Guidelines for implementation of Component "Model Solar Village" under PM-Surya Ghar: Muft Bijli Yojana. This initiative aims to establish one Model Solar Village in each district across the country. A total of ₹800 crore has been allocated for this component, with central financial assistance of ₹1 crore per model village. The village must be a revenue village with a population size of more than 5,000 as per the latest published Census. However, in northeastern states, union territories, and states like Uttarakhand, Himachal Pradesh, Jammu & Kashmir, and Ladakh, revenue villages with a population of over 2,000 will be eligible.

- Ministry of Power has issued the Tariff Based Competitive Bidding Guidelines for Procurement of Storage Capacity/Stored Energy From Pumped Storage Plants (PSPs). The primary objective of these guidelines is to promote the development of PSPs while ensuring a transparent, fair, and standardized procurement framework through open competitive bidding with appropriate risk-sharing between various stakeholders.

National Key Policy Highlights/ Announcements in 2024-25 (2/3)

- The Ministry of Heavy Industry launched the PM Electric Drive Revolution in Innovative Vehicle Enhancement (PM E-DRIVE) scheme on September 29, 2024. The scheme will be implemented from 1st October, 2024 till 31st March, 2026 with an total outlay of ₹10,900 crore.

- The CEA has issued an Advisory on co-locating Energy Storage Systems with Solar Power Projects to enhance grid stability and cost efficiency. The key recommendations include:
  - All Renewable Energy Implementing Agencies (REIAs) and State utilities to incorporate a minimum of 2-hour co-located Energy Storage Systems (ESS), equivalent to 10% of the installed solar project capacity, in future solar tenders. This measure aims to mitigate intermittency issues and provide critical support during peak demand periods.
  - Distribution licensees may also consider mandating 2-hour storage with rooftop solar plants. This will improve supply reliability for consumers while reducing the burden on distribution networks caused by over-injection during peak solar hours.

B. Power Sector

- The Ministry of Power has released an "Amendment to the Guidelines for Import/Export (Cross Border) of Electricity, 2018". The key amendments are:
  - The amendments empower the central government to permit additional fuel sources for export of coal and gas-based electricity, such as, imported coal or gas, spot e-auction coal, coal from commercial mining, or other sources specified by the Government of India.
  - The Government of India may now permit connection of generating stations to the Indian Grid (Inter-State or Intra-State) to enable power sale within India, even in cases of non-scheduling or payment delays under PPAs.

- The Central Electricity Authority has released National Electricity Plan (Volume-II: Transmission) in October 2024. The key highlights of the plan are:
  - Addition of 1,91,474 ckm of transmission lines, 12,74,185 MVA transformation capacity, and 33 GW of HVDC bi-pole links from 2022-23 to 2031-32 (220 kV+ voltage).
  - The inter-regional transmission capacity is planned to increase from the present level of 119 GW to 143 GW by 2027 and 168 GW by 2032.

National Key Policy Highlights/ Announcements in 2024-25 (3/3)

C. Carbon Capture and Trading

- The Ministry of Environment, Forest, and Climate Change has notified the Ecomark Rules, 2024 under the Lifestyle for Environment (LIFE) mission. This initiative aims to boost the demand for environment-friendly products in line with the 'LIFE' principles, promoting lower energy consumption, resource efficiency, and a circular economy. The scheme also focuses on ensuring accurate labeling and preventing misleading claims about products.

- India recently submitted its Fourth Biennial Update Report (BUR-4) to the United Nations Framework Convention on Climate Change (UNFCCC), outlining key initiatives undertaken to fulfil the country's commitments to global climate action. The key highlights are-
  - GHG Emissions was decreased by 7.93% in 2020 compared to 2019.
  - India has reduced the emission intensity of its GDP by 36% from 2005 to 2020, against the target of 45% by 2030.
  - Sector wise Emissions: The energy sector contributed 75.66% of total emissions, followed by agriculture at 13.72%, industrial processes and product use (IPPU) at 8.06%, and waste at 2.56%.

- Bureau of Energy Efficiency has released a document on voluntary offset methodologies under the Indian Carbon Credit Trading Scheme (CCTS) for 12 sub-sectors in 6 sectors to be adopted.

Sectors	Methodology
Energy	Grid-connected electricity generation from renewable sources and Hydrogen production from electrolysis of water
Industry	Energy efficiency and fuel switching measures for industrial facilities and Hydrogen production using methane extracted from biogas
Waste Handling and Disposal	Landfill methane recovery Projects, Flaring or use of landfill gas
Agriculture	Production of biofuel, Methane recovery from livestock and manure management at households and small farms.
Forestry	Afforestation and reforestation of lands except wetlands and degraded mangrove habitats
Transport	Modal shift in transportation of cargo from road transportation to water or rail transportation and Emission reductions by electric and hybrid vehicles

State’s Key Policy Highlights in 2024-25

- Government of Andhra Pradesh has unveiled the “Andhra Pradesh Integrated Clean Energy Policy, 2024” for attracting clean energy investments. This policy aims to add over 160 GW of renewable energy capacity with a potential to attract investments worth ₹10,00,000 Crores, thereby generating an estimated employment for 7,50,000, both direct and indirect. The policy will propel Andhra Pradesh to become a clean energy hub, achieve Net Zero emissions by 2047and contribute towards self-economic reliance.

- Government of Assam has released the Assam Integrated Clean Energy Policy- 2025, which will remain effective upto 2029-30, or until superseded by a subsequent policy. The policy significantly raises the renewable energy capacity addition target from 2 GW to 11.70 GW by 2030. It also sets a goal of producing 2,000 kilotonnes per annum of green hydrogen by 2030. Additionally, the policy aims to commission at least one Green Hydrogen Valley to meet the hydrogen demand of fertilizer plants and refineries within the state.

- The Government of Madhya Pradesh has launched the Madhya Pradesh Electric Vehicle Policy 2025, with a vision to establish Bhopal, Indore, Jabalpur, Gwalior, and Ujjain as model EV cities. The policy sets ambitious targets including:
  - 40% of new two-wheeler registrations to be electric
  - 100% electrification of the commercial vehicle fleet
  - 70% of new three-wheeler registrations (both passenger and freight) to be electric
  - 15% of new four-wheeler registrations to be electric
  - 40% of new bus registrations to be electric.

  Additionally, the policy mandates the complete conversion of all state government vehicles to electric vehicles.

Vasudha Foundation

CISRS House, 14 Jangpura B, Mathura Road,
New Delhi - 110014, India
Tel/fax: + 91-11-2437-3680

Visit us at http://www.vasudha-foundation.org/

For more information about Vasudha Foundation, email us at

info@vasudhaindia.org