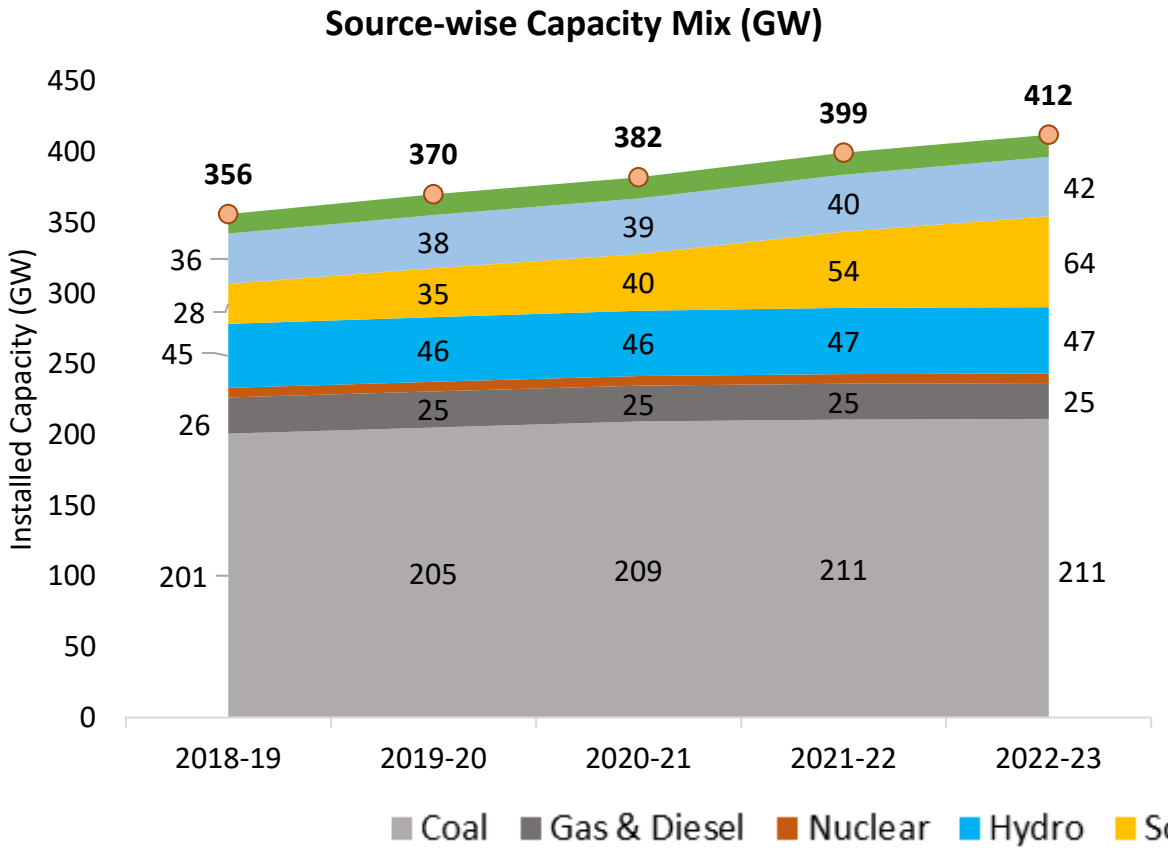
India's Energy Overview

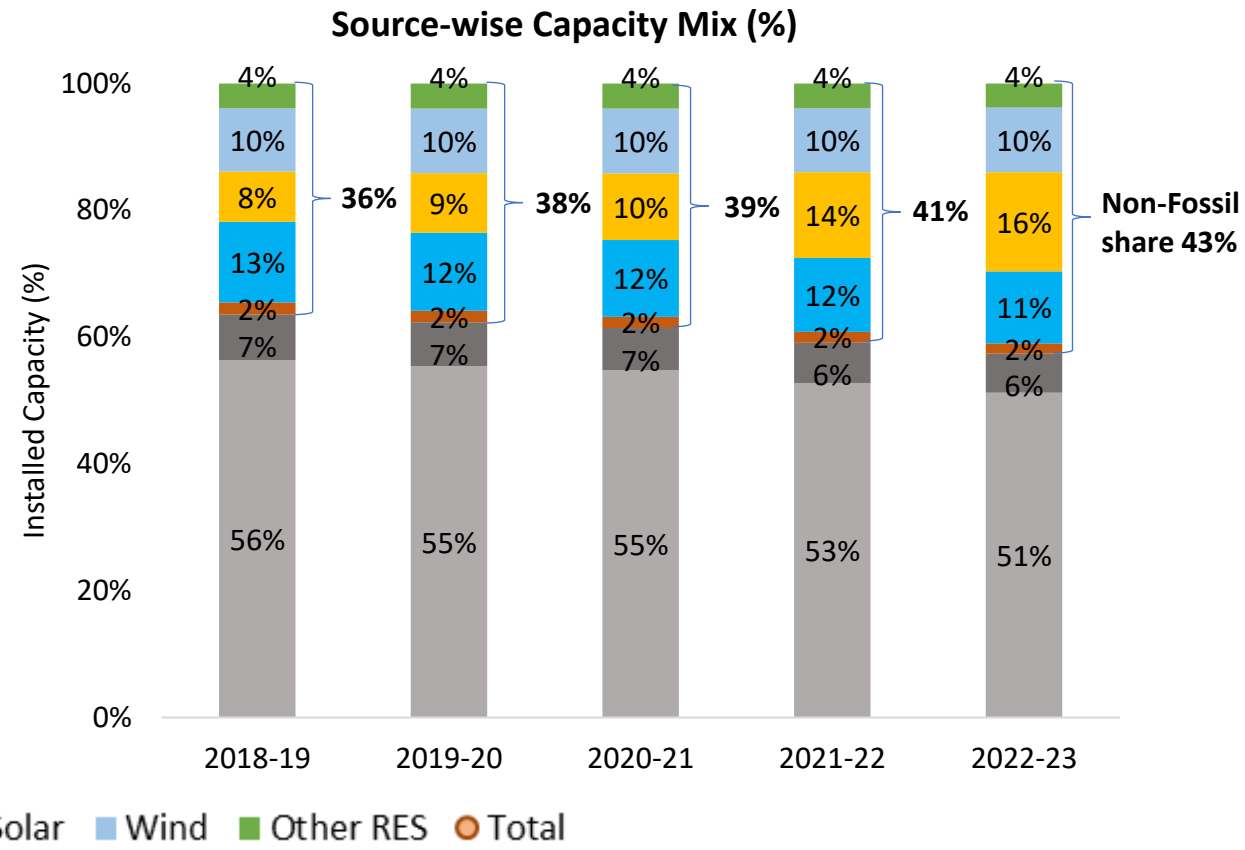
Yearly Highlights of 2022-23

VASUDHA FOUNDATION
Green ways for a good earth!

Contents

India’s Electricity Capacity Mix (Utility-scale)



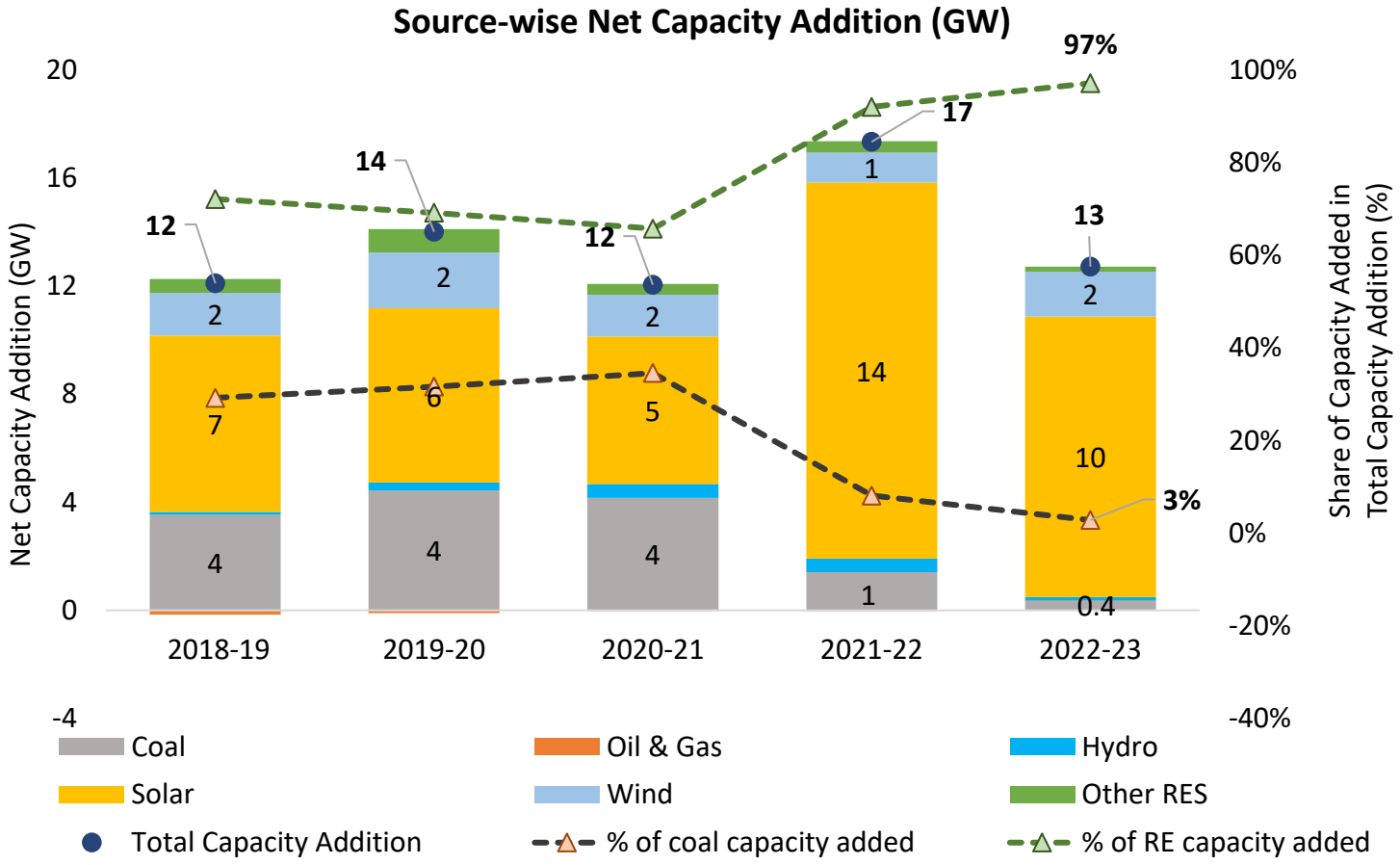


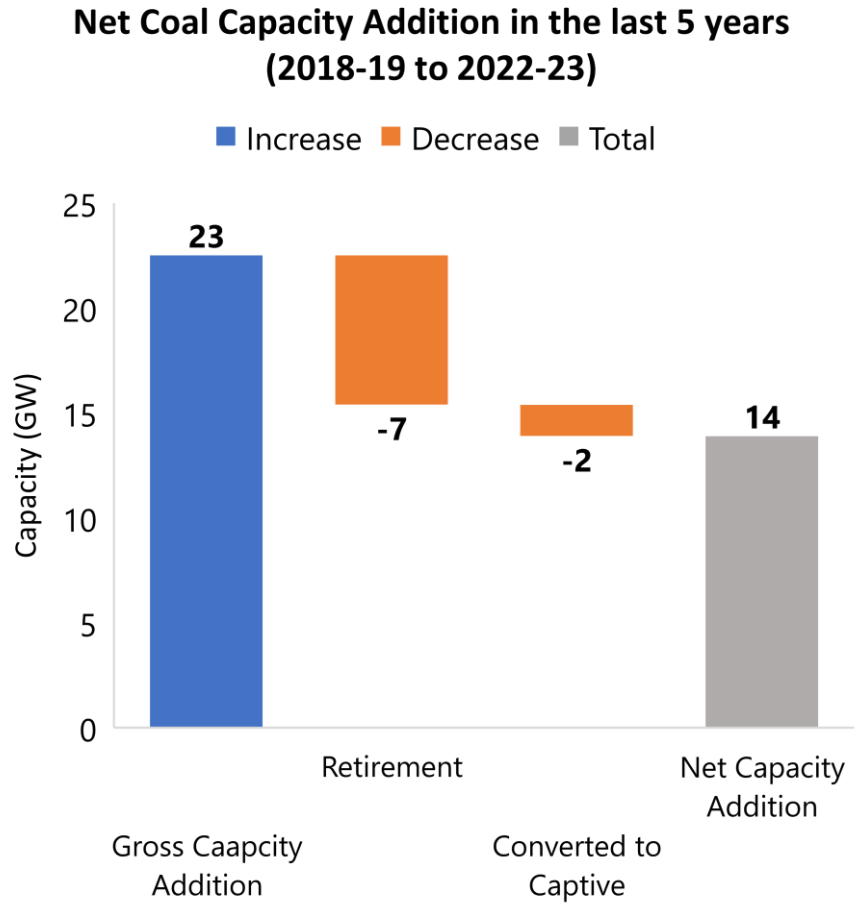
- India’s total electricity generating capacity is 412 GW [coal 211 GW (51%), solar 64 GW (16%), hydro 47 GW (11%), and wind 42 (10%)].
- Currently, the share of non-fossil-based electricity capacity is 43% as against the set target of 50% non-fossil capacity by 2030.
- India’s renewable energy capacity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

Note: Capacity numbers for 2022-23 are up to Feb’2023.

Source: CEA

India’s Electricity Capacity Addition in last 5 years





- A total of 54 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 14 GW, mostly in the central sector (54%).
- The share of RE addition in total capacity has shown an increasing trend (from 72% in 2018-19 to 97% in 2022-23).

Note: Capacity numbers for 2022-23 are up to Feb’2023.

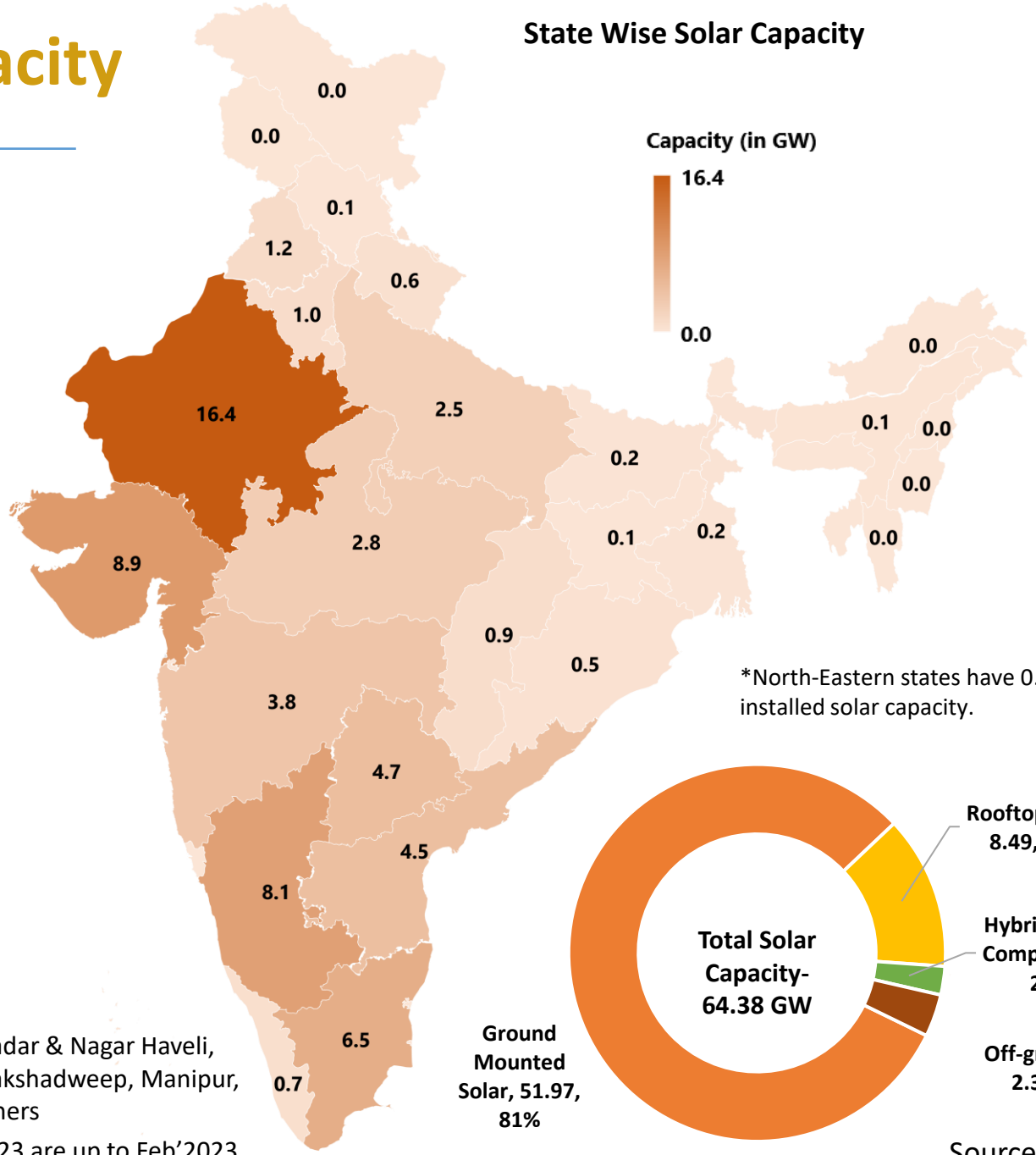
Source: CEA & MNRE

State-wise Solar Installed Capacity

State-wise installed capacity of Solar Power (GW)			
States	**2021-22**	**2022-23**	**Change over previous year (%)**
Rajasthan	12.6	16.4	31%
Gujarat	7.2	8.9	24%
Karnataka	7.6	8.1	7%
Tamil Nadu	5.1	6.5	29%
Telangana	4.5	4.7	3%
Andhra Pradesh	4.4	4.5	3%
Maharashtra	2.6	3.8	43%
Madhya Pradesh	2.7	2.8	3%
Uttar Pradesh	2.2	2.5	11%
Punjab	1.1	1.2	6%
Haryana	0.9	1.0	13%
Chhattisgarh	0.5	0.9	83%
Kerala	0.4	0.7	99%
Uttarakhand	0.6	0.6	0%
Others	1.6	1.7	7%
All India	**54.0**	**64.4**	**19%**

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

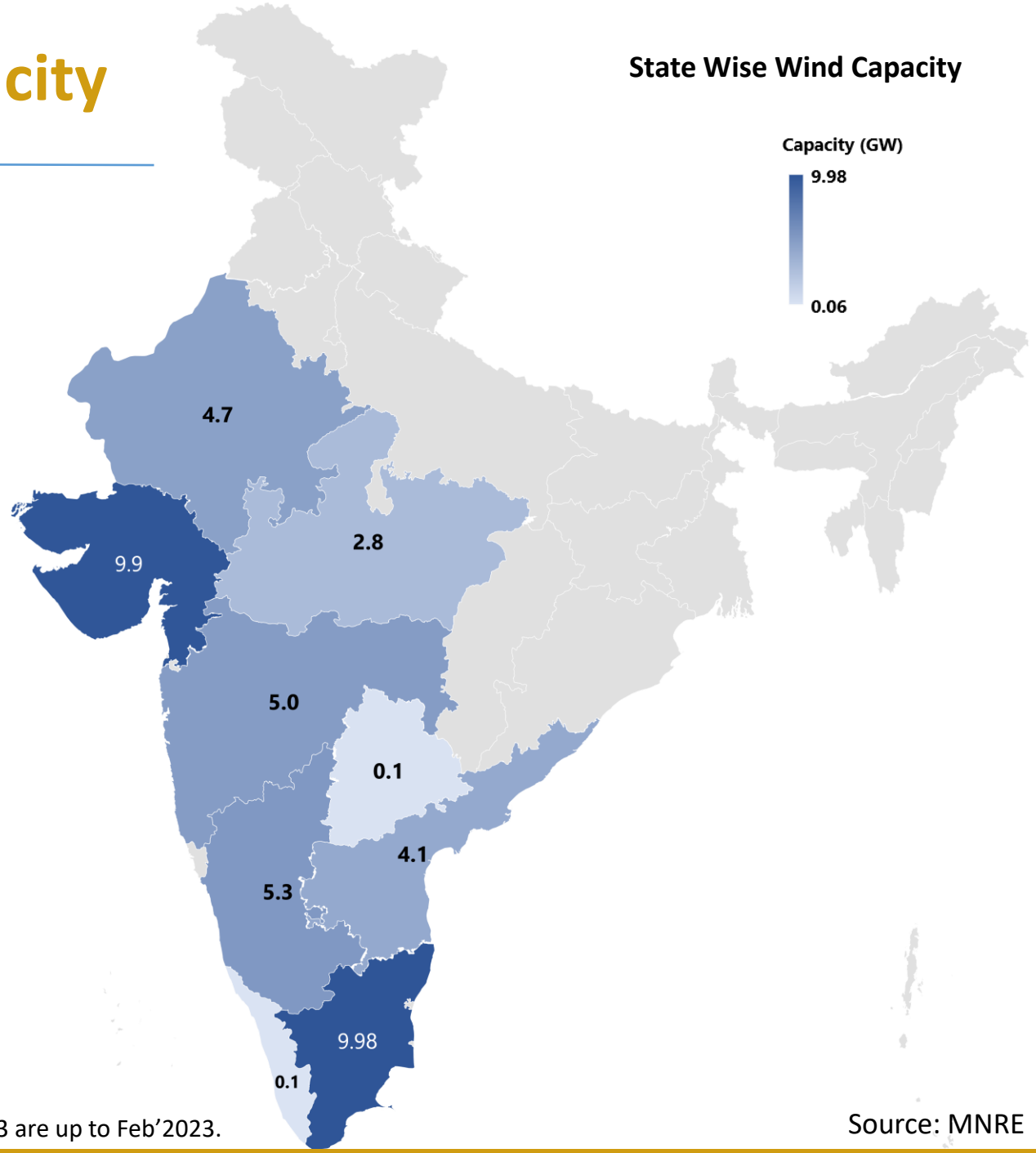
Note: Capacity numbers for 2022-23 are up to Feb'2023.



Source: MNRE

State-wise Wind Installed Capacity

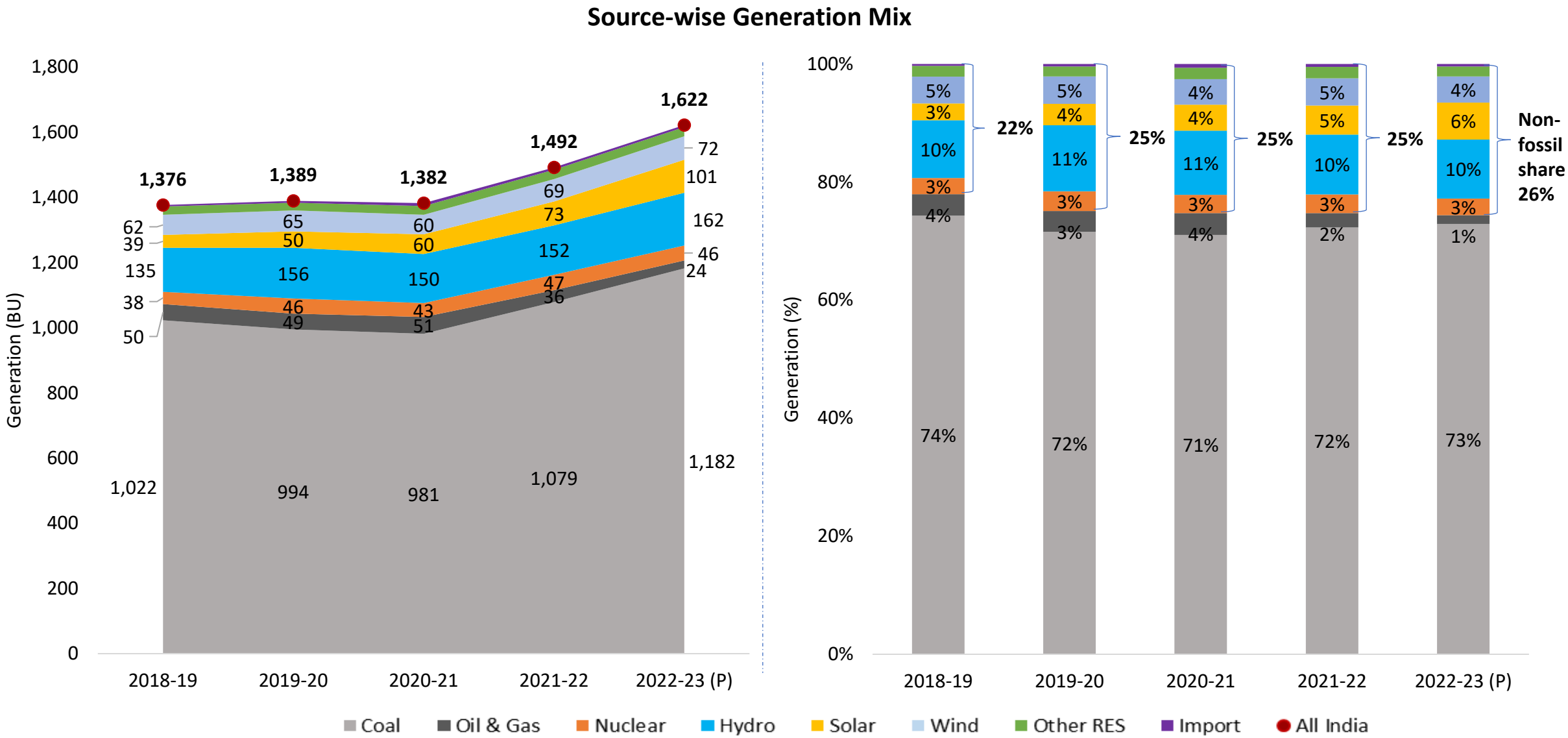
State-wise installed capacity of Wind (Onshore) Power (GW)			
States	**2021-22**	**2022-23**	**Change over previous year (%)**
Tamil Nadu	9.87	9.98	1%
Gujarat	9.21	9.93	8%
Karnataka	5.13	5.28	3%
Maharashtra	5.01	5.01	0%
Rajasthan	4.33	4.68	8%
Andhra Pradesh	4.10	4.10	0%
Madhya Pradesh	2.52	2.84	13%
Telangana	0.13	0.13	0%
Kerala	0.06	0.06	0%
India Total	**40.36**	**42.02**	**4%**



Note: Capacity numbers for 2022-23 are up to Feb'2023.

Source: MNRE

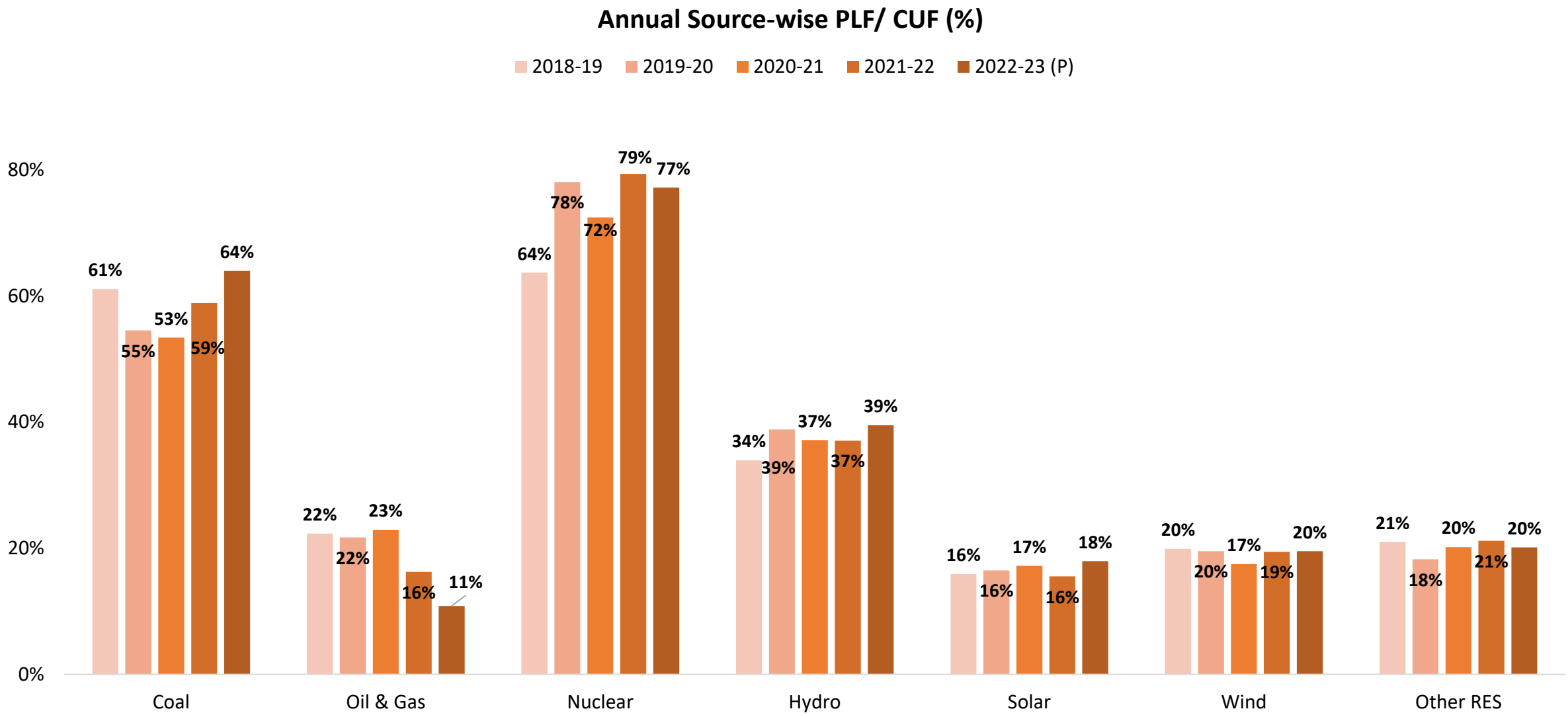
India’s Electricity Generation Mix



Note: P- Provisional.

Source: CEA

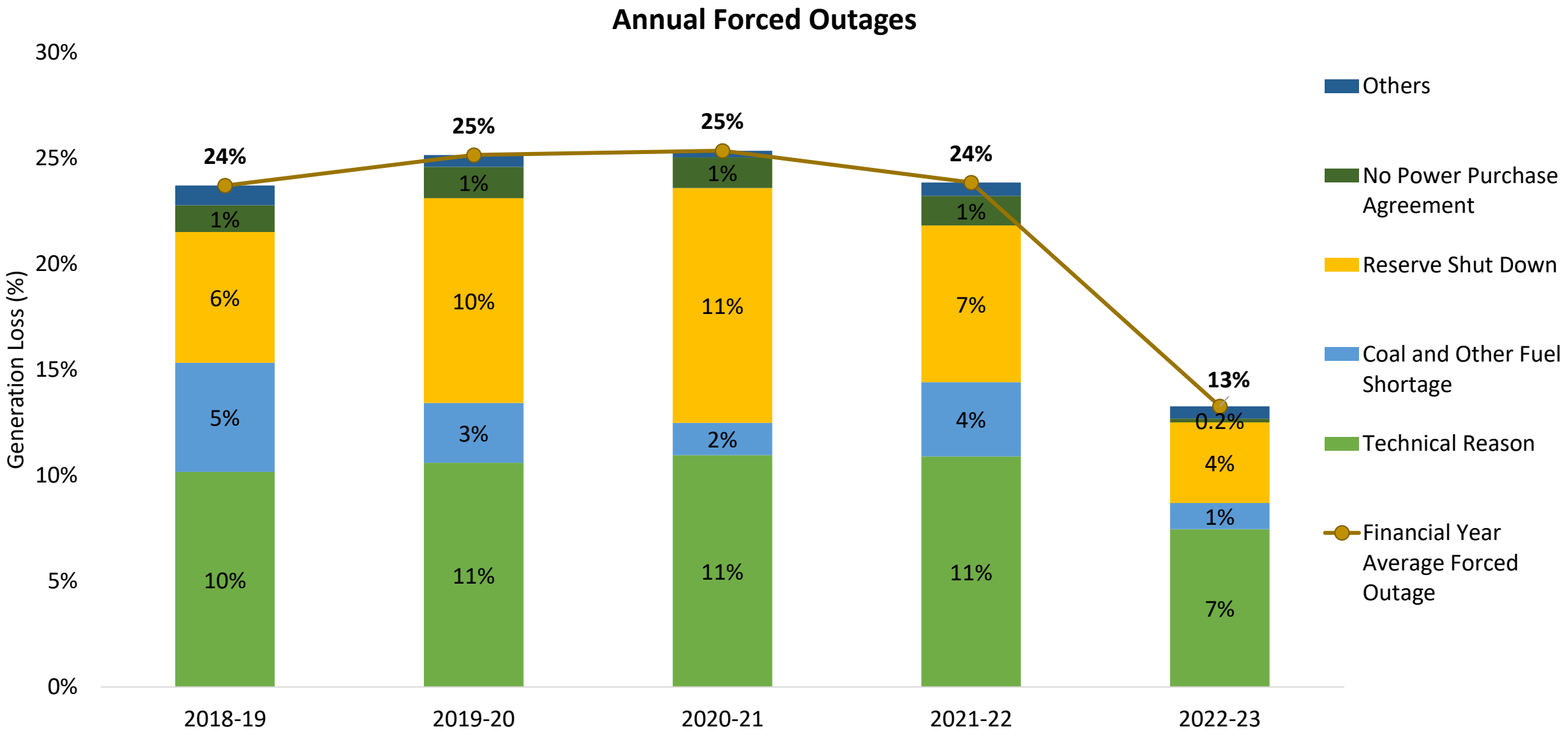
Source-wise PLF/CUF



Note: P- Provisional.

Source: CEA & MNRE

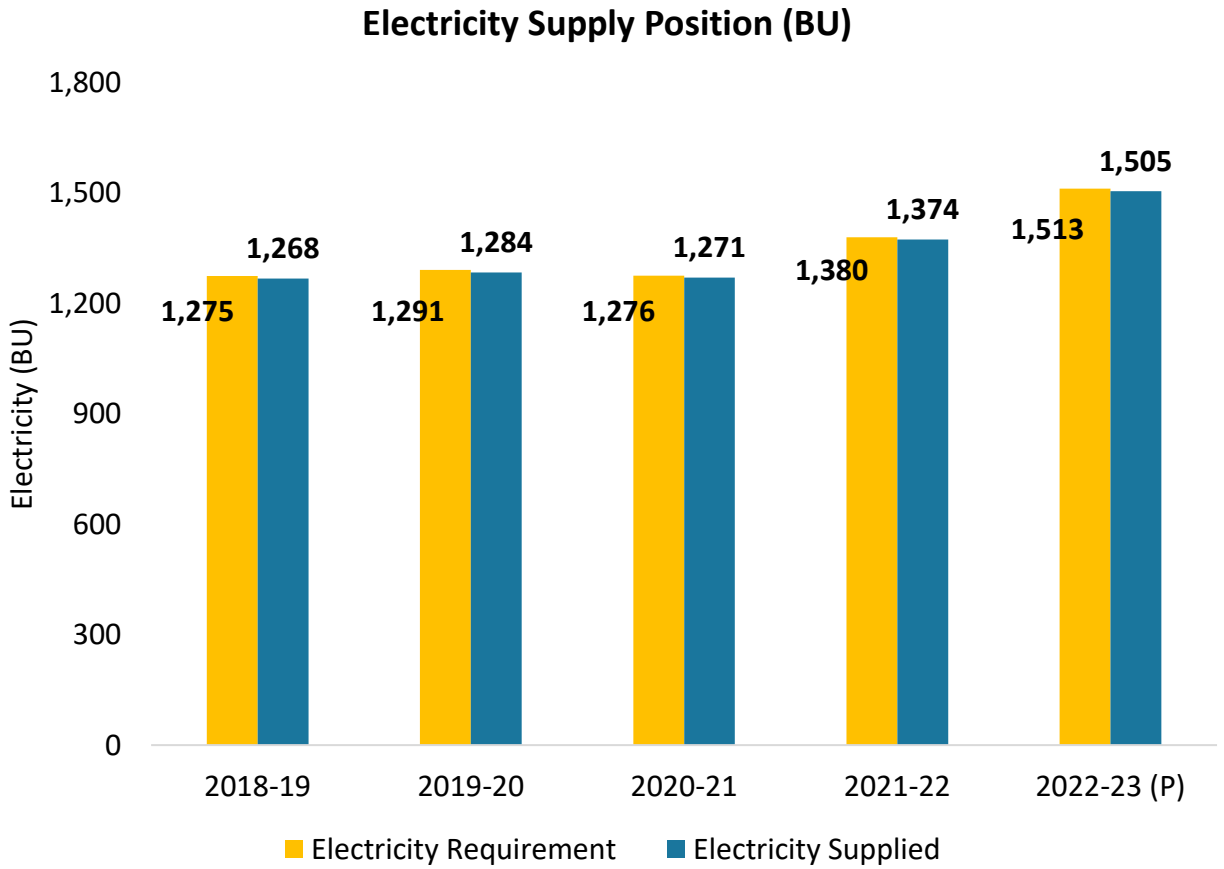
Thermal Generation Loss and Reasons for Forced Outages

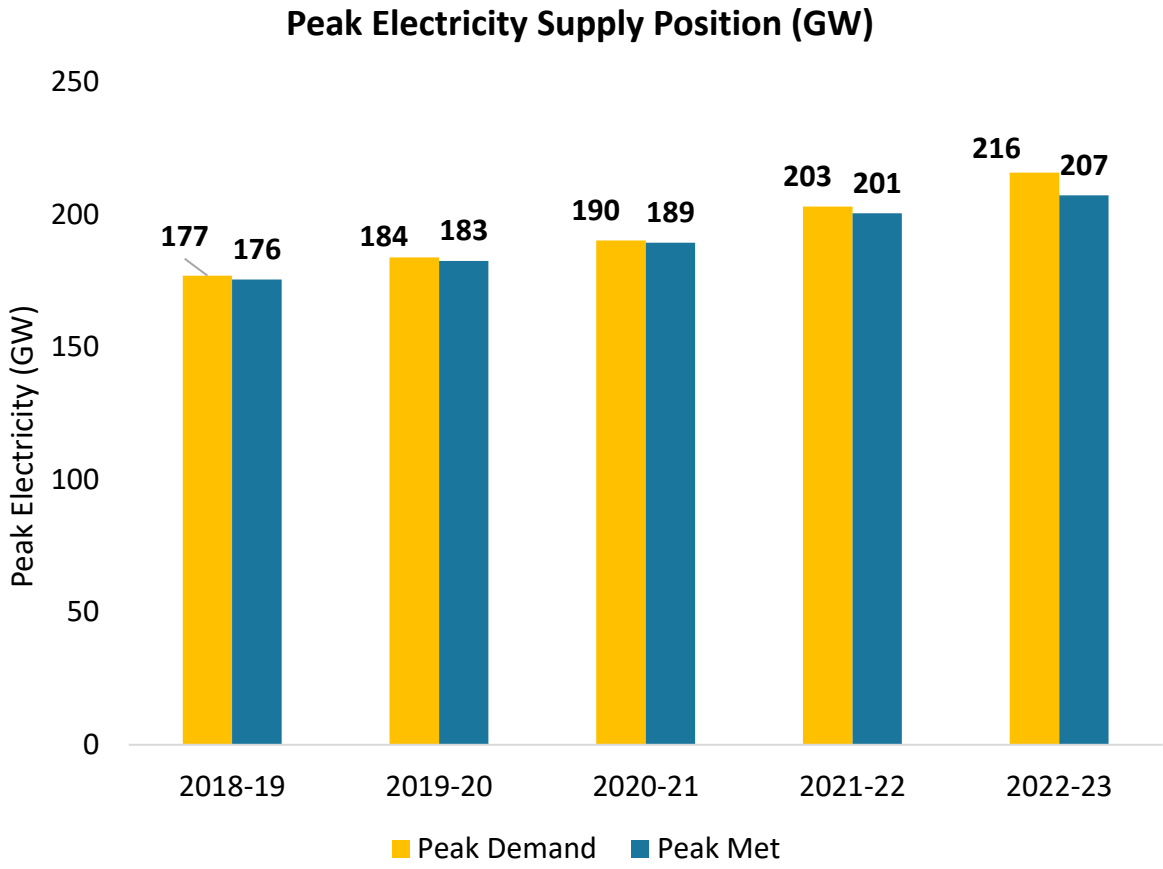


Note: Generation Loss numbers for 2022-23 are up to 21st March 2023.

Thermal includes only Coal and Lignite Plants.

India’s Electricity Demand and Supply Position





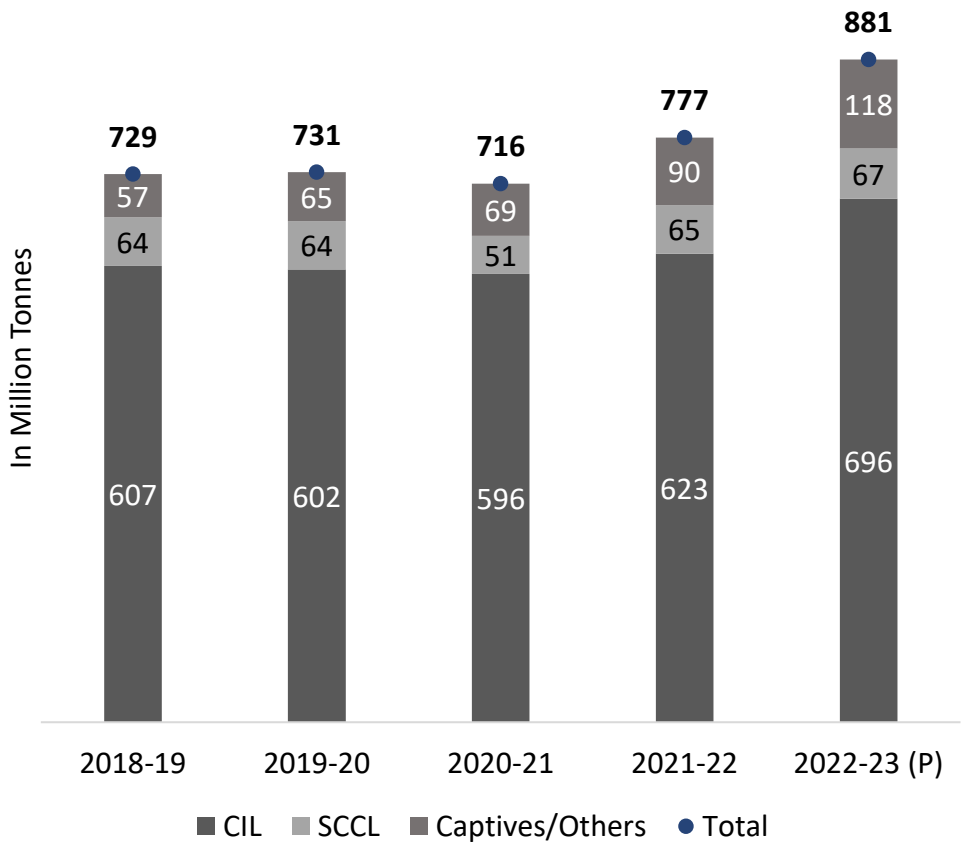
- National electricity demand in 2022-23 increased by 10% compared to the demand in 2021-22.
- National peak electricity demand in 2022-23 has increased by 6% compared to the peak demand in 2021-22.
- The peak demand deficit in 2022-23 has increased to 4.0% from 1.2% in 2021-22.

Note: P- Provisional.

Source: CEA

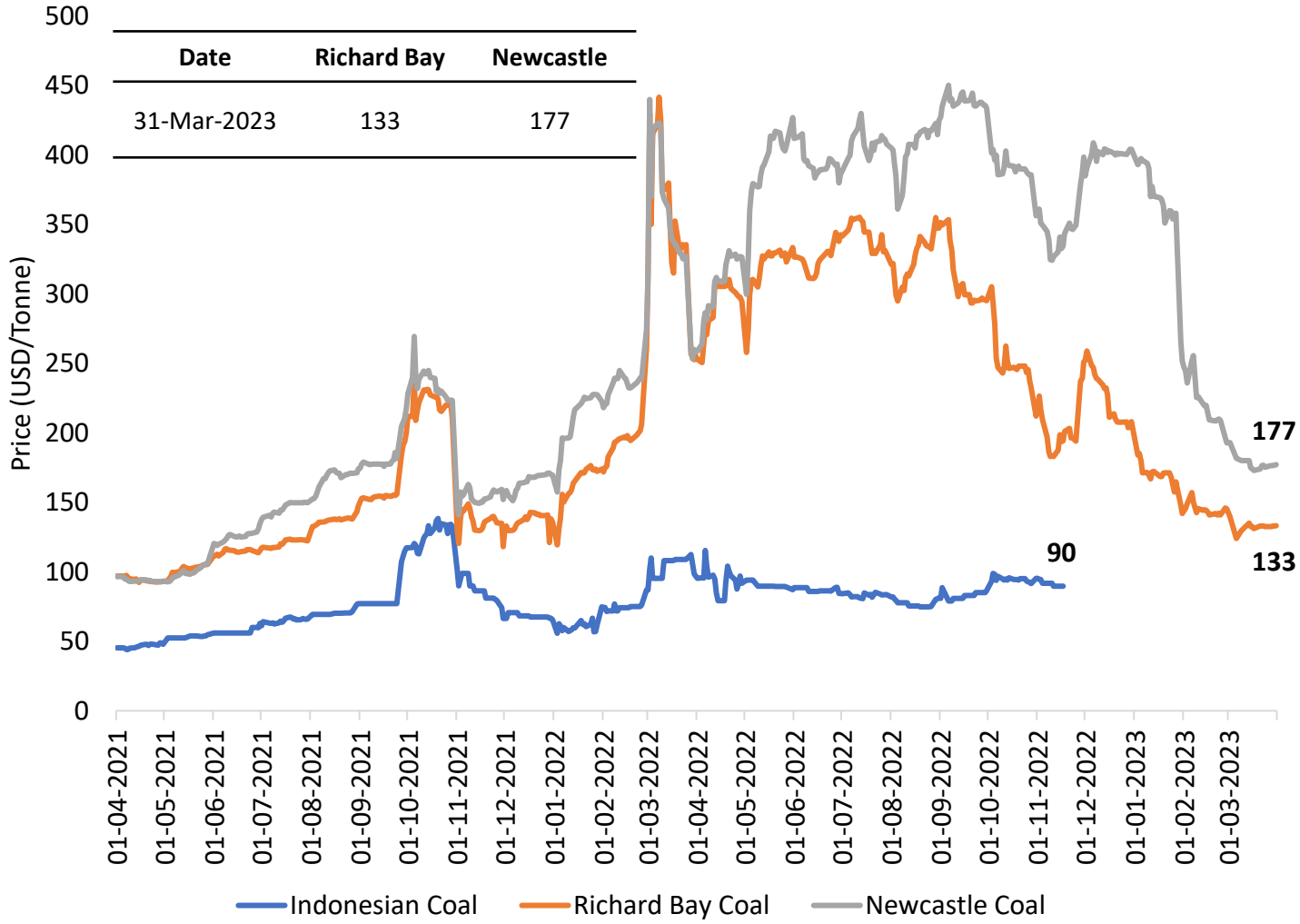
Annual Coal Statistics

Annual Coal Production (in Million Tonnes)



India's coal production increased in 2022-23 (881 MT) by 13% as compared to 2021-22.

International Coal Prices

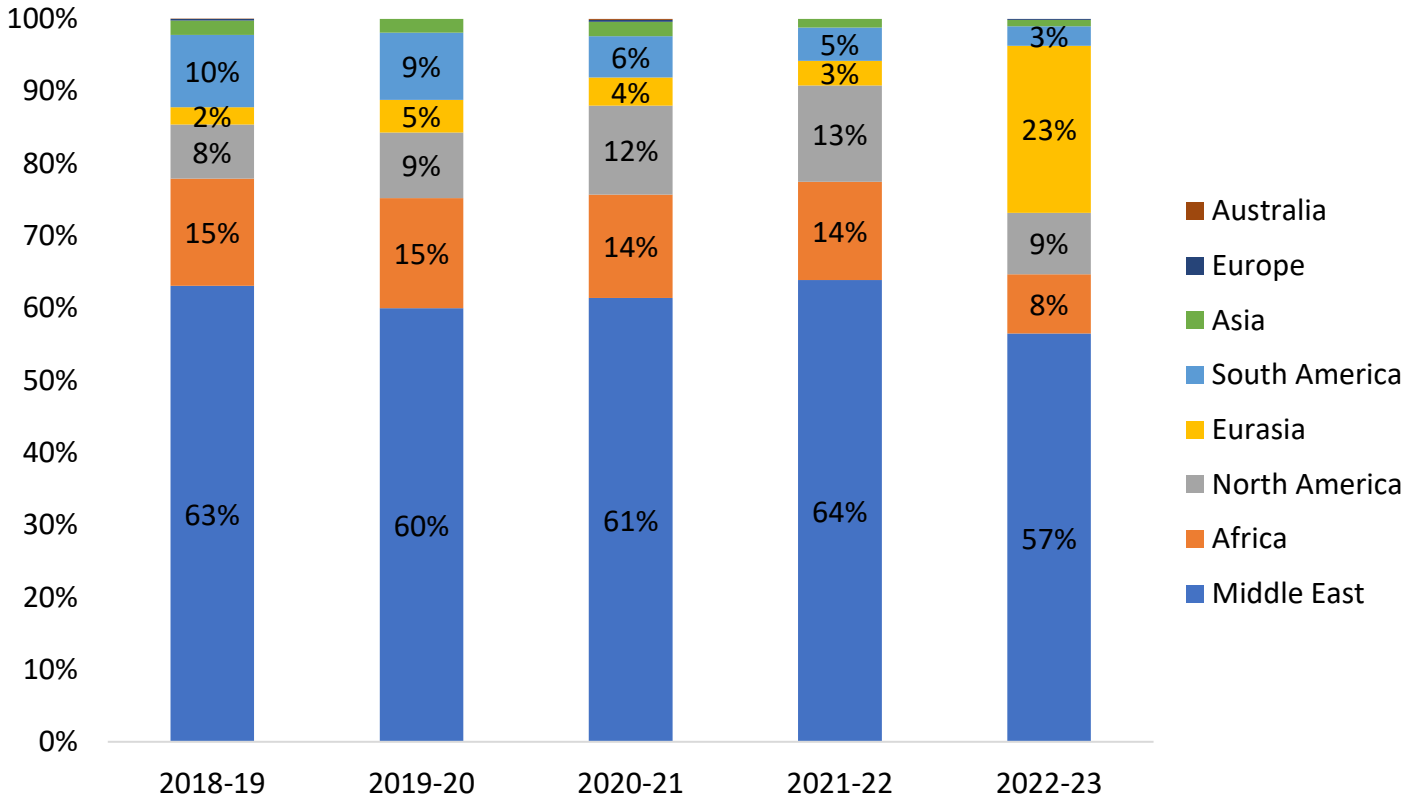


Note: P- Provisional.

Source: Ministry of Coal

Petroleum Products Market Scenario (1/2)

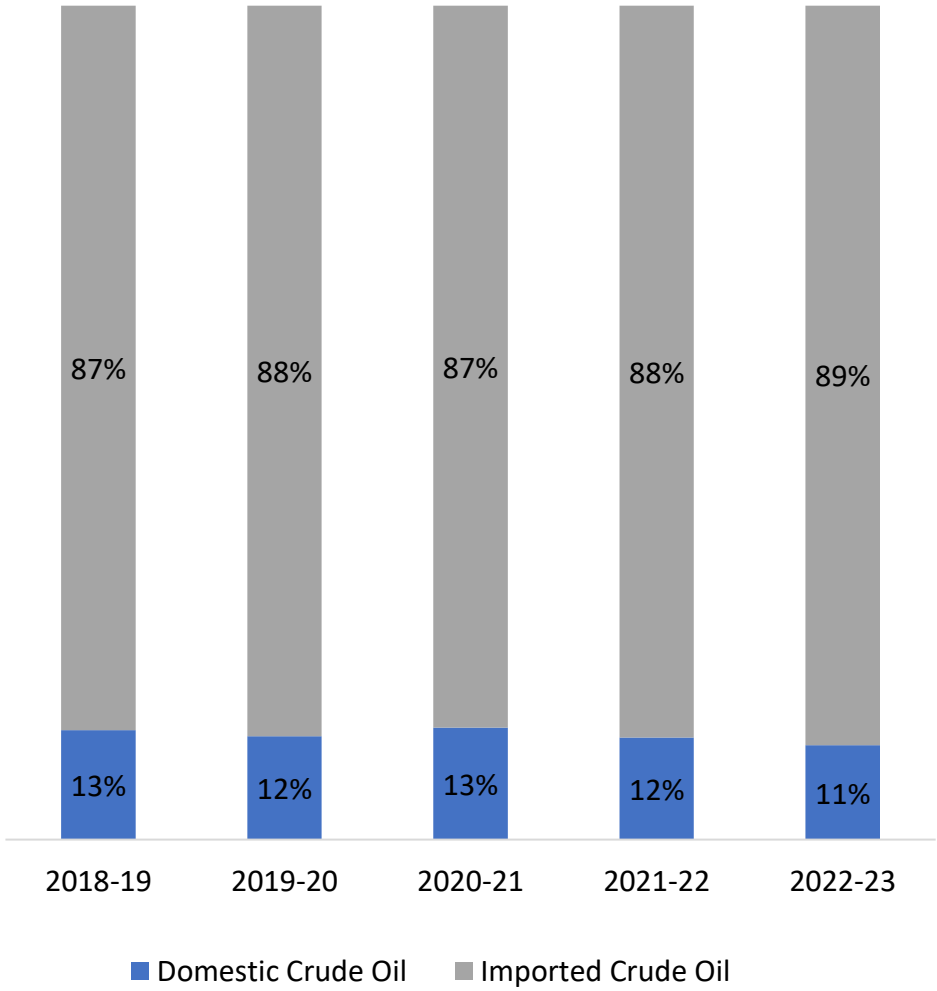
Region-wise Share in Import of Crude Oil (%)



Total Import of Crude Oil (MMT)

Total Import	2018-19	2019-20	2020-21	2021-22	2022-23
Crude Oil	**226**	**227**	**196**	**212**	**193**

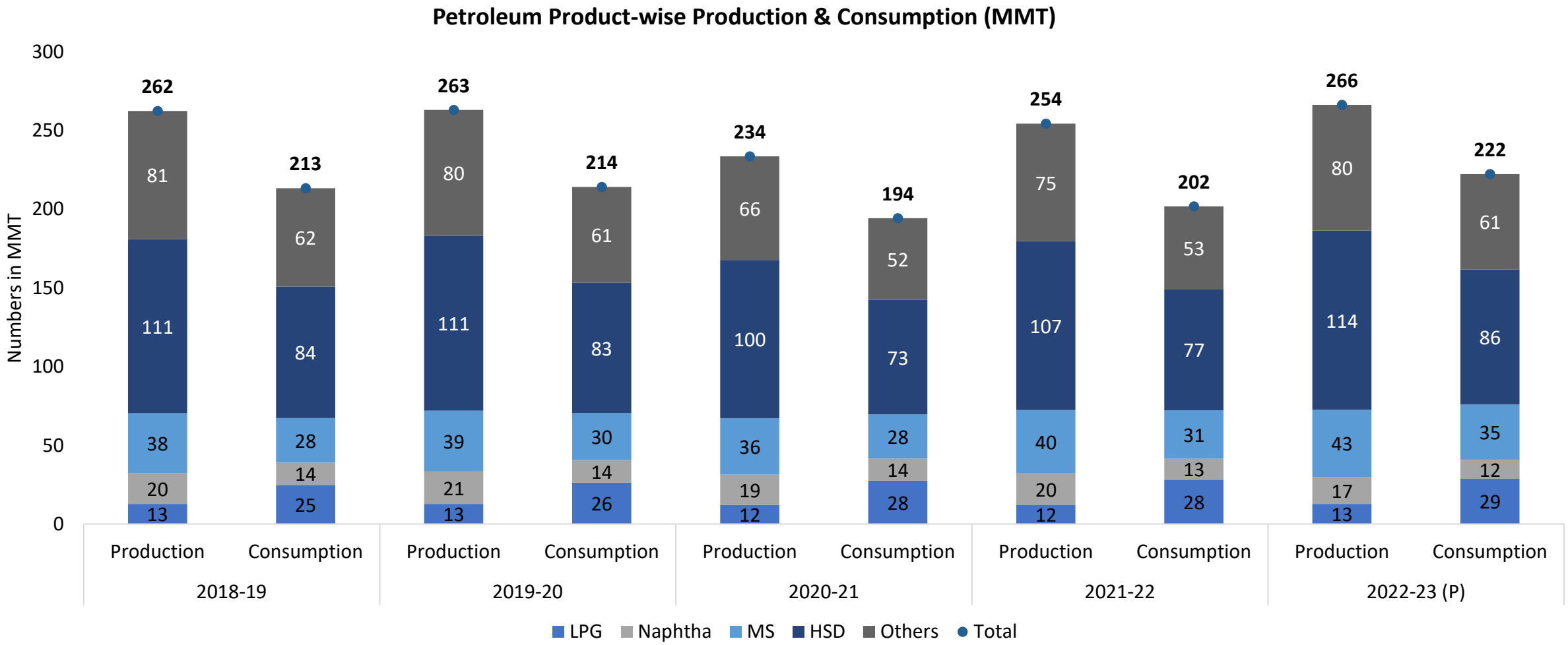
Domestic and Imported Crude Oil share in India (%)



Note: Data for 2022-23 are up to Jan'2023.

Source: MoPNG and PPAC

Petroleum Products Market Scenario (2/2)



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

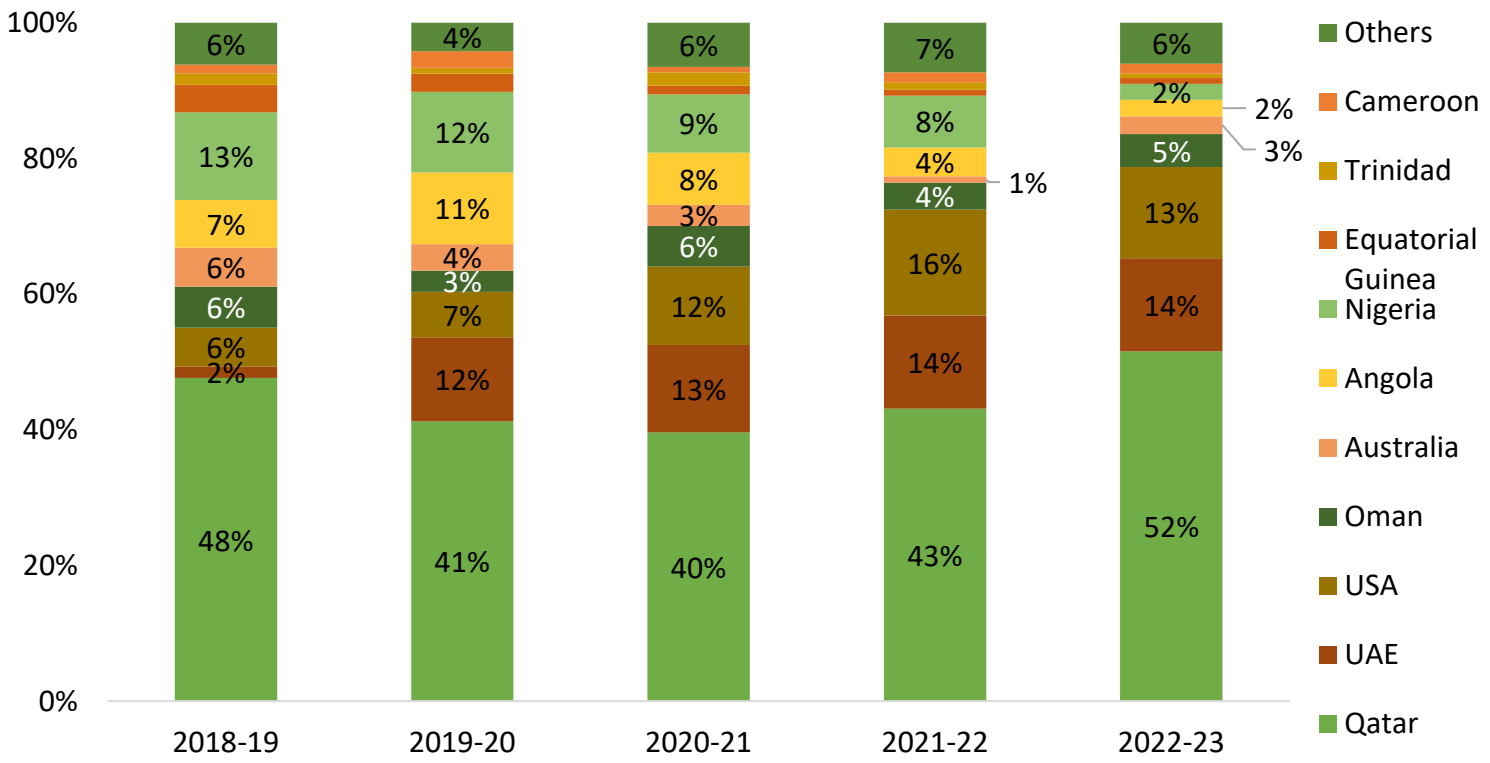
Abbreviations: ATF- Aviation Turbine Fuel, FO- Furnace Oil, HSD- High-Speed Diesel, LDO- Light Diesel Oil, MS- Motor Spirit (Petrol), SKO- Superior Kerosene Oil, LSHS- Low Sulphur Heavy Stock, LPG- Liquefied Petroleum Gas, MMT- Million Metric Tonne

Note: P- Provisional.

Source: PPAC

Gas Market Scenario

Region-wise Share in Import of LNG (%)

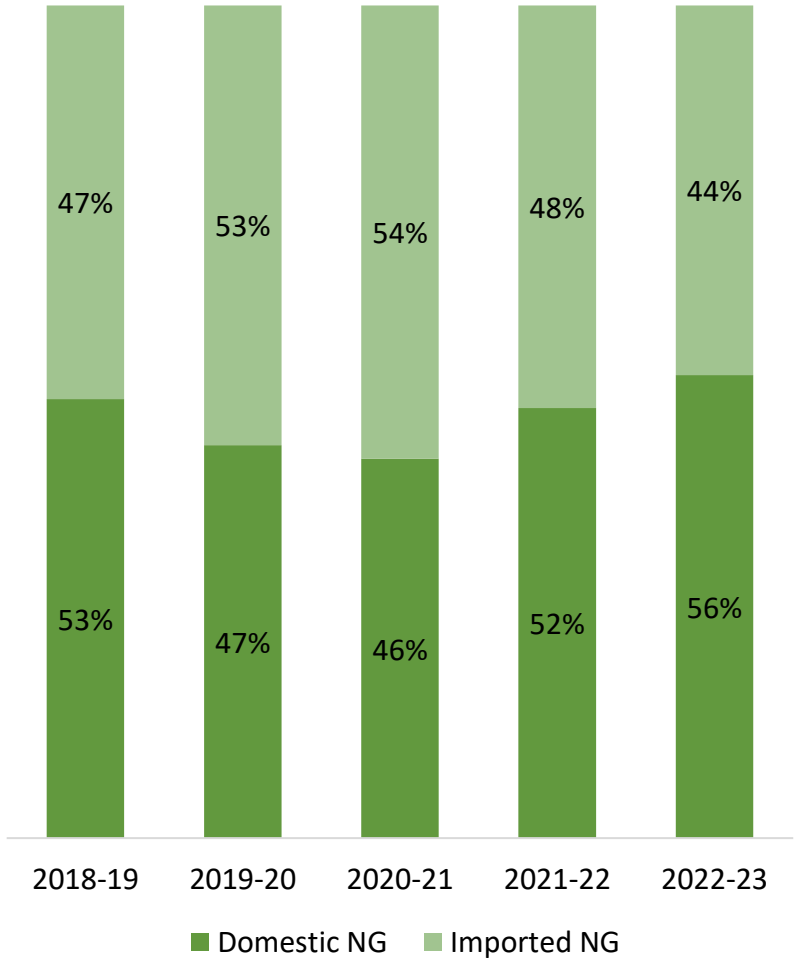


Others include- Egypt, France, Algeria, Belgium, Indonesia, Turkey, Russia, Spain, Malaysia, Brunei, Netherlands, Norway, Singapore, South Africa, Switzerland, UK, and others.

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

Total Import	2018-19	2019-20	2020-21	2021-22	2022-23
LNG	**21.69**	**25.57**	**25.05**	**23.42**	**16.99**

Domestic and Imported Natural Gas share in India (%)

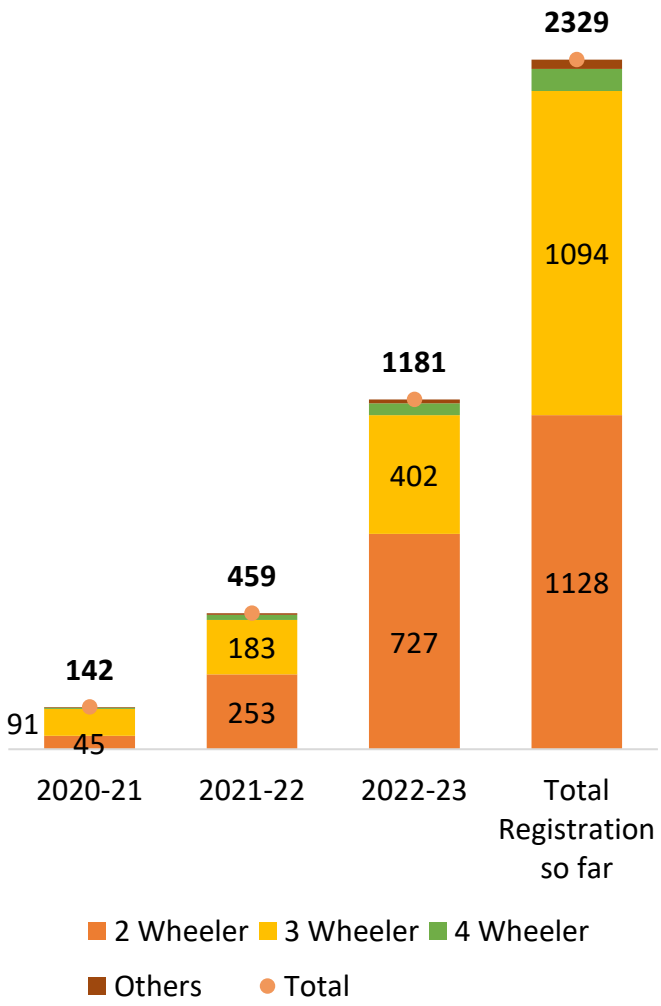


Note: Data for 2022-23 are up to Jan'2023.

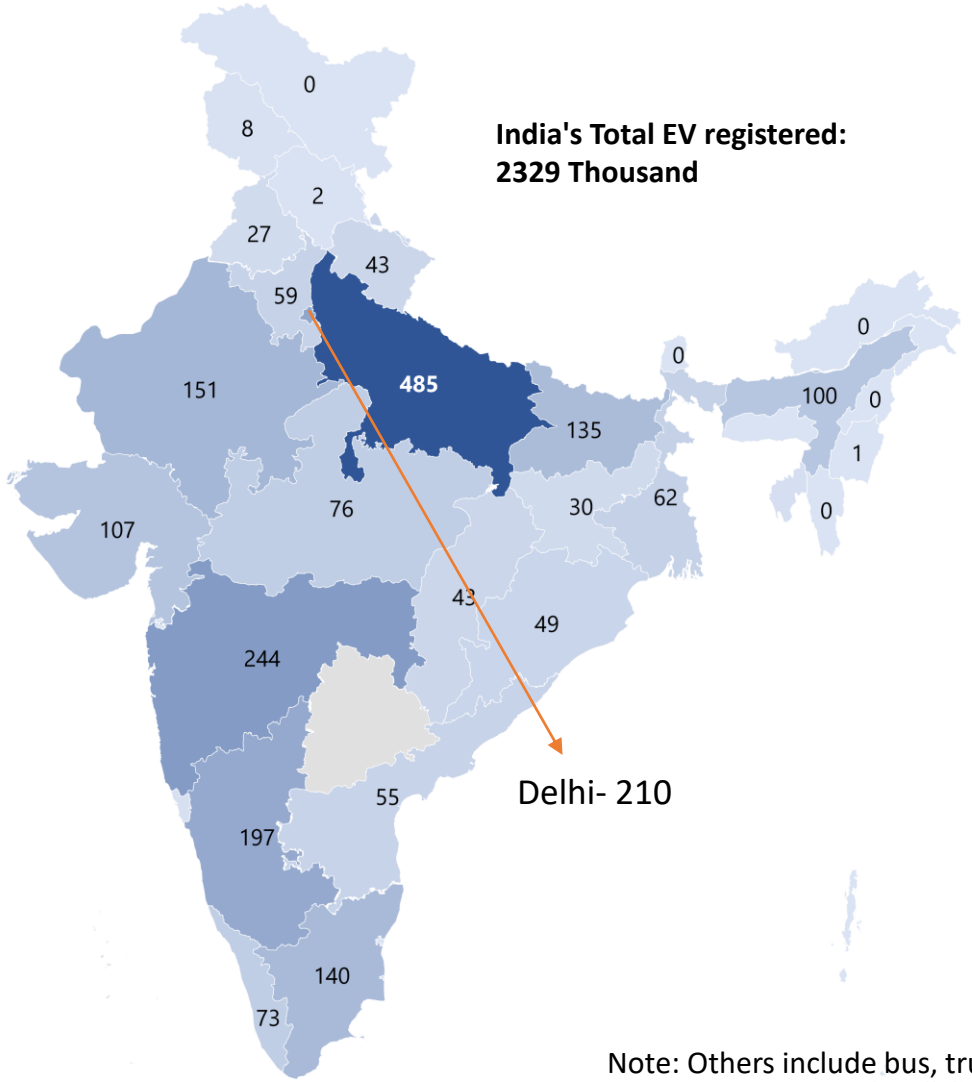
Source: MoCI and PPAC

Status of Electric Mobility in India

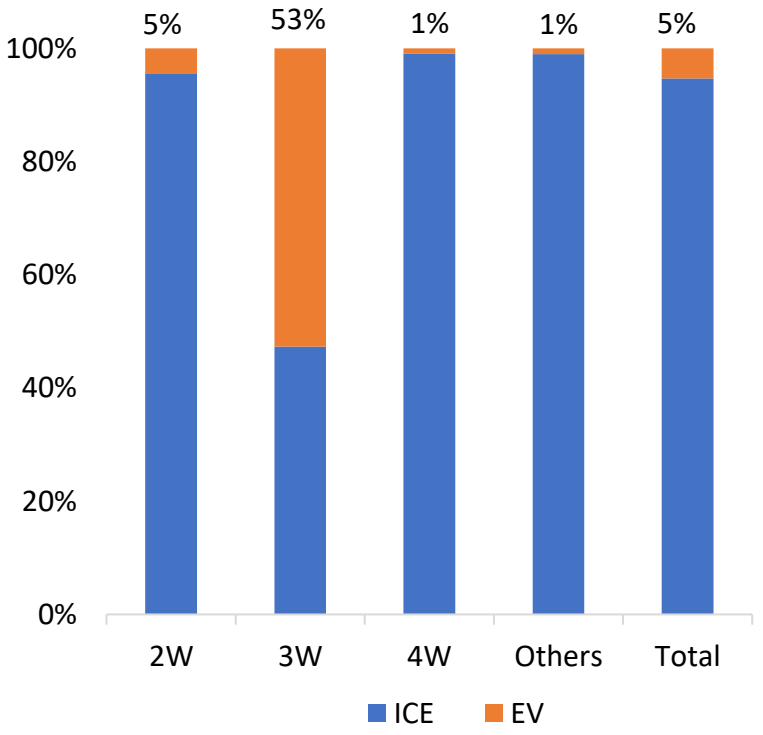
National EV registration (in Thousands)



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

Source: VAHAN Dashboard

Policy Highlights or Announcements in 2022-23 (1/4)

- On 22nd July 2022, the Ministry of Power released the **RPO and Energy Storage Obligation Trajectory till 2029-30**. The RPO target for the year 2030 is 43.33%, which includes targets for Wind at 6.94%, Hydro at 2.82%, and Other RPO (Solar, waste to energy, biomass, etc.) at 33.57%.

- Hon'ble Prime Minister Shri Narendra Modi launched the **power sector's revamped distribution sector scheme** with an outlay of Rs. 303,758 crores for the years FY2021-22 to FY 2025-26. The scheme highlights the following points: a) Financial assistance to DISCOMs for modernization and strengthening of distribution infrastructure. **b)** Improvement of the reliability and quality of supply to end consumers. **c)** Proposal of provision of 23 crore smart prepaid meters to consumers all over the country.

- India submitted the **updated Nationally Determined Contribution (NDC)** to UNFCCC with the ultimate narrative of Net zero emission by 2070. It aims to **a)** achieve 50% of its cumulative electric power installed capacity from non-fossil fuel energy sources by 2030 **b)** 45% reduction in the GDP's emissions intensity from its level in 2005 **c)** include a mass movement for LIFE– 'Lifestyle for Environment': a healthy and sustainable way of living based on traditions and values of conservation and moderation.

- Central Electricity Authority (CEA) published the **draft National Electricity Plan (NEP) 2022**, which includes a review for the period 2017-22, detailed capacity addition requirements, and capacity projections during the years 2022-27 and 2027-32. As per the draft NEP, The projected electricity requirement and peak electricity demand are estimated to be 2538 BU and 363 GW for the year 2031-32 respectively.

- The Hon'ble PM approved MNRE's proposal for the implementation of **the PLI Scheme (Tranche II)** with an outlay of INR 19,500 crores for achieving the Giga Watt (GW) scale solar PV manufacturing capacity in India.

Policy Highlights or Announcements in 2022-23 (2/4)

- MNRE issued the draft **National Repowering Policy for Wind Power Projects, 2022**. The policy focuses on the optimum utilization of wind energy resources by maximizing energy (kWh) yield per sq. km of the project area and provides direction for utilizing the latest state-of-the-art onshore wind turbine technologies.

- Central Electricity Authority (CEA) released the **20th Electricity Power Survey of India (EPS)** which provides all India, regions, states, UTs, and discoms electricity demand projections through PEUM* for the years 2021-22 to 2031-32, 2036-37, and 2041-42.

- Shri Bhupender Yadav, Union Minister for Environment Forest and Climate Change, launched the "**Long-Term Low Emission Development Strategy (LT LEDS)**" during the 27th Conference of Parties (COP27). The salient feature of the strategy are:
  - India aspires to maximize the use of electric vehicles, ethanol blending to reach 20% by 2025, a strong modal shift to public transport for passengers and freight. The increased use of green hydrogen fuel is expected to further drive the low carbon development of the transport sector.
  - India's forest and tree cover are a net carbon sink absorbing 15% of CO2 emissions in 2016, and it is on track to fulfilling its NDC commitment of creating 2.5 to 3 billion tonnes of additional carbon sequestration in forest and tree cover by 2030.
  - Climate finance by developed countries will play a very crucial role and needs to be enhanced, in the form of grants and concessional loans in accordance with the principles of the UNFCCC.

- **MNRE scrapped the e-reverse bidding mechanism for the wind sector** to ensure faster capacity addition. The ministry has also decided to issue 8 GW of wind capacity tender every year starting from Jan'2023 to 2030.

Policy Highlights or Announcements in 2022-23 (3/4)

- Union Minister for Power and MNRE unveiled the plan for "**Transmission System for Integration of over 500 GW RE Capacity by 2030**". This plan is a major step towards the achievement of the goal of integrating 500 GW of non-fossil fuel-based capacity by 2030 by providing a broad plan of the required transmission system for having 537 GW of Renewable Energy capacity (detailed below) by the year 2030.

- The **Energy Conservation (Amendment) Bill, 2022** was passed by Rajya Sabha on 12th December 2022. The bill seeks to:
  - mandate the use of non-fossil sources, including Green Hydrogen, Green Ammonia, Biomass, and Ethanol for energy and feedstock
  - establish Carbon Markets and issuance of Energy Saving Certificates
  - enhance the scope of the Energy Conservation Building Code to Energy Conservation and Sustainable Building Code
  - amend penalty provisions
  - empower the State Electricity Regulatory Commissions to make regulations for the smooth discharge of its functions.

- The Hon'ble Prime Minister Shri Narendra Modi, approved the **National Green Hydrogen Mission** on 4th January 2023. The initial outlay for the mission will be Rs 19,744 crores, including an outlay of Rs 17,490 crores for the Strategic Interventions For Green Hydrogen Transition (SIGHT) programme, Rs1,466 crores for pilot projects, Rs 400 crores for R&D, and Rs 388 crores for other mission components. MNRE will formulate the scheme guidelines for the implementation of the respective components.

- CEA released the notification regarding the **Renovation and Modernization (R&M) of aged coal-fired Thermal Power Stations** on 20th January 2023. CEA advised all power utilities not to retire any thermal units till 2030 and urged them to carry out R&M for life extension (LE) and to improve the flexibility and reliability of thermal units considering the expected demand scenario.

Policy Highlights or Announcements in 2022-23 (4/4)

- The Hon'ble Finance Minister Shrimati Nirmala Sitharaman, announced the **Green Growth in Budget 2023** on 1st 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

- Ministry of Power released the **draft guidelines to promote the development of Pumped Storage Projects (PSP)** in the country on 15th 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.

- India 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.

- CEA 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%.

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