

INVESTMENT AND INFRASTRUCTURE: KEEPING IT GOING

CHAPTER

06

Building infrastructure – physical, digital and social - has been a central focus area for the Government in the last five years. This has had various dimensions – increase in public spending on infrastructure, creation of institutions to de-bottleneck approvals and execution and innovative modes of resource mobilisation. In FY25, capital expenditure has gathered momentum post-elections.

The government has recognised the importance of continuing the pace of infrastructure building and the increasing need to promote sustainable construction practices. It is also clear that public capital alone cannot meet the demands of upgrading the country's infrastructure commensurate with the requirements of Viksit Bharat@2047. We need to ensure increasing private participation in infrastructure by improving their capacity to conceptualise projects and their confidence in risk and revenue-sharing mechanisms, contract management, conflict resolution and project closure. The efforts of the Union Government would need to be supplemented with wholehearted acceptance of the need for public-private partnerships in infrastructure across the country. Equally important, the private sector must reciprocate, too.

INTRODUCTION

6.1 India's development aspirations require a substantial investment in infrastructure over the next decade. While estimates of the required spending differ in scale^{1,2,3}, there is general agreement that current infrastructure spending needs to be increased to achieve these objectives. Keeping this in view, the government has laid a special focus on infrastructure in the last five years. Reflecting this intent, the capital expenditure by the union government on major infrastructure sectors⁴ has been increased at a trend rate of 38.8 per cent from FY20 to FY24.

1 Asian Development Bank (2017). Meeting Asia's Infrastructure Needs. Manila. <https://tinyurl.com/h2668mpb>.

2 Athar, S., White, R., & Goyal, H. (2022). Financing India's urban infrastructure needs: Constraints to commercial financing and prospects for policy action. Washington, DC: World Bank. <https://hdl.handle.net/10986/38306>.

3 CRISIL (2023, October). CRISIL infrastructure yearbook 2023. <https://tinyurl.com/36muuvrf>.

4 Infrastructure sectors include atomic energy, civil aviation, telecommunications, renewable energy, power, road, rural development, ports, housing & urban affairs and railways.

6.2 The government has also instituted many complementary mechanisms to expedite planning, clearances and execution of projects. The National Infrastructure Pipeline (NIP) was launched with a forward-looking approach, targeting a projected infrastructure investment of around ₹111 lakh crore from FY20 to FY25. The NIP serves as a centralised platform for hosting projects of states, union territories and central ministries to facilitate their monitoring and review. Currently, it encompasses over 9,766 projects and schemes across 37 sub-sectors. These projects are tracked and reviewed through the integrated India Investment Grid (NIP-Project Monitoring Group) portal.

6.3 The government is bringing in innovative frameworks for attracting investment in infrastructure projects. To boost private investment in brownfield assets, the National Monetisation Pipeline (NMP) was launched in August 2021. This initiative laid down the framework for monetisation policy and identified a pipeline of potential core assets with an indicative value of ₹6.0 lakh crore for the period FY22 to FY25⁵. For the period FY22 to FY24, against the target of ₹4.30 lakh crore, transactions of ₹3.86 lakh crore in terms of accruals or private investments were completed under the core asset monetisation. Sector-wise, roads, power, coal, and mines led the performance, supported by market-tested models and reforms. For FY25, the aggregate monetisation target is set at ₹1.91 lakh crore.

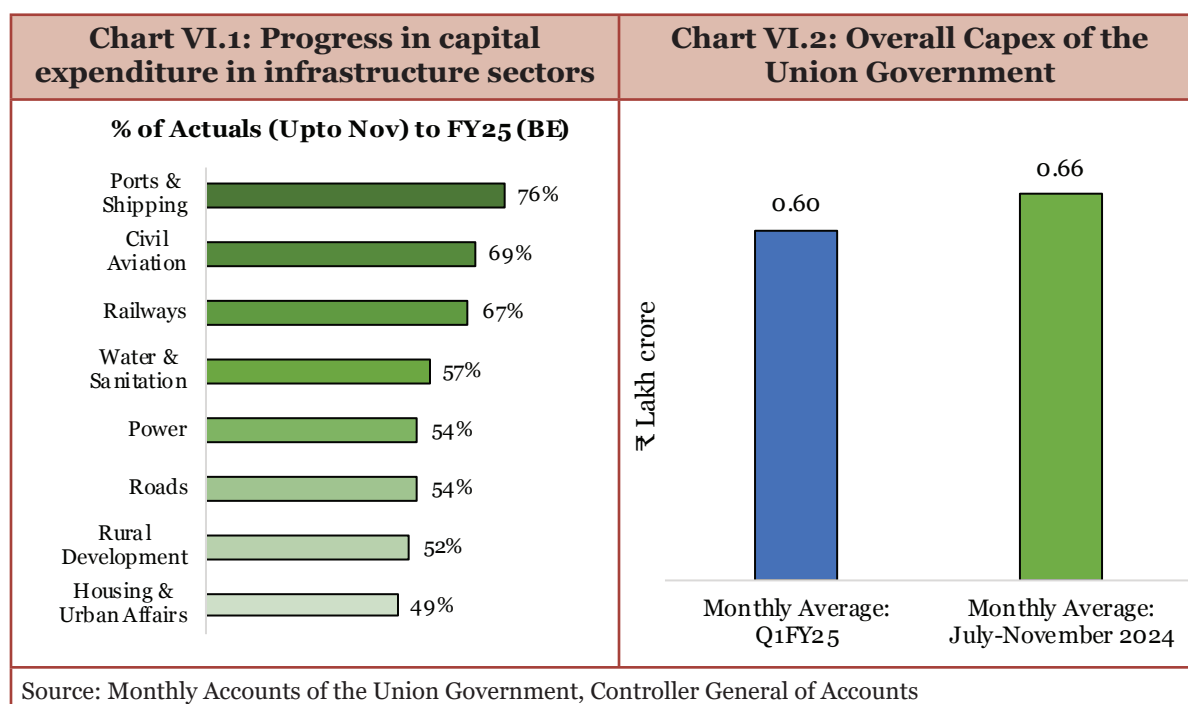
6.4 Despite such earnest efforts by the union government and quite a few state governments and public sector undertakings supplementing these efforts with increased capex, there is still a significant unmet demand for infrastructure development. While this is typical of a dynamic, developing economy, India's goal of Viksit Bharat necessitates the progressive filling of this gap with innovative modes of financing and greater private participation. This sets the context for the discussion in this chapter.

INFRASTRUCTURE CAPEX IMPROVES POST-ELECTION

6.5 The pace of the Union Government's capital expenditure in major infrastructure sectors⁶ was affected during Q1FY25, largely due to the model code of conduct during the general elections. The unusual patterns of the last monsoon season also slowed down the progress of work. Hence, a year-over-year comparison may not be appropriate for Q1FY25.

5 NITI Aayog (2021, August 10). Transforming India's mobility: NITI Aayog's initiatives. Government of India. [PIB Release]. <https://tinyurl.com/4nsnxt5s>.

6 Infrastructure sectors include atomic energy, civil aviation, telecommunications, renewable energy, power, road, rural development, ports, housing & urban affairs, and railways.



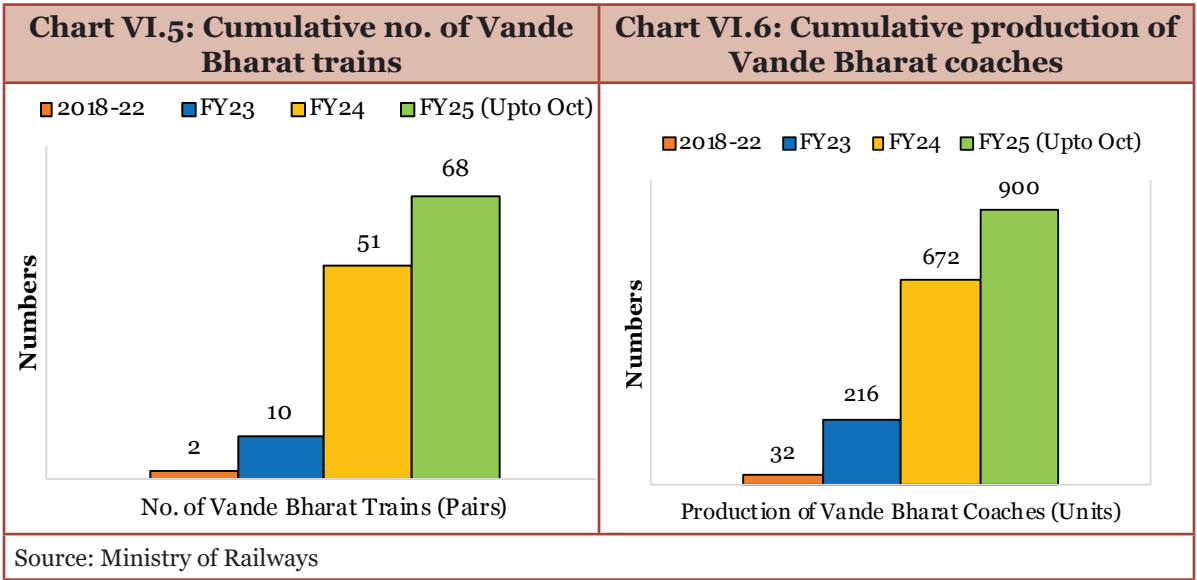
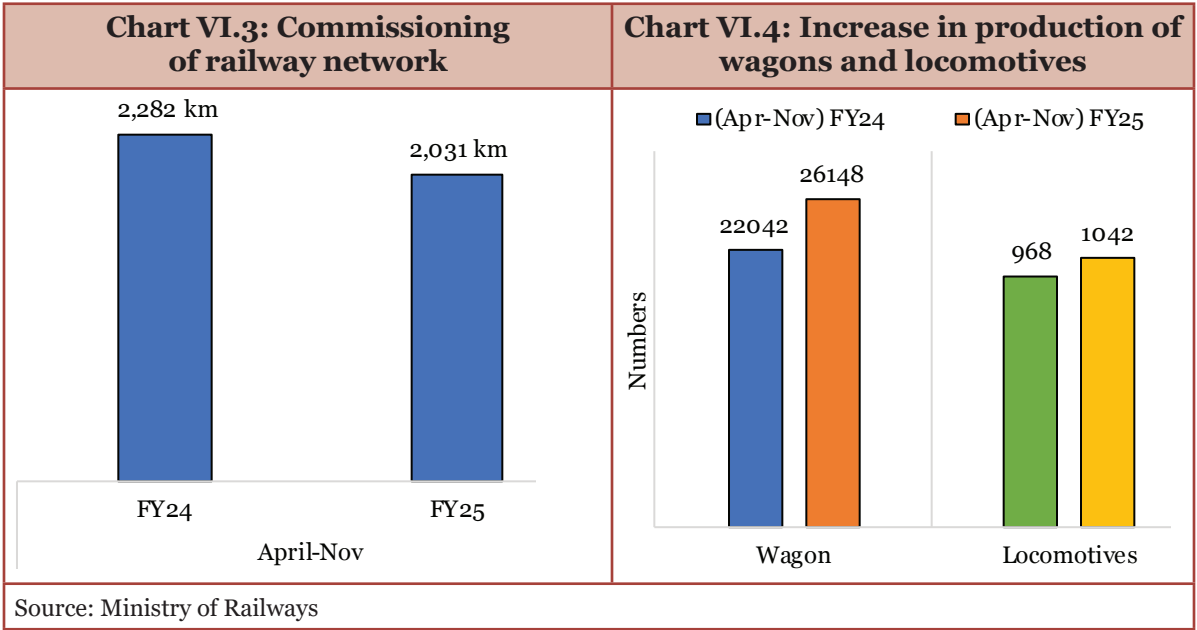
6.6 As the electoral process settled, capital expenditure saw an uptick in July-November 2024 (Chart VI.2). Capex in infrastructure sectors is expected to gain further momentum in the remaining months of the current fiscal. On an average, ministries related to infrastructure sectors utilised 60 per cent of the budgeted capex during April to November 2024. This compares favourably with the progress achieved in the same period in FY20 when the 17th Lok Sabha elections were held.

PHYSICAL CONNECTIVITY

6.7 Notwithstanding the electoral timetable, the capacity addition in physical connectivity sectors stayed on course during FY25. This section examines developments in major components of physical connectivity.

Railways

6.8 During FY25 so far, the progress in the expansion of the railway network stayed at levels comparable to the previous year, while the addition of rolling stock increased considerably. Between April and October 2024, 17 new pairs of Vande Bharat trains were introduced to the network, and 228 coaches were produced. The details of progress in major railway projects are given in Box VI.1.



Box VI.1: Recent developments in railways

Recent initiatives in the rail system

- **Gati shakti multi-modal Cargo Terminal (GCT):** 91 GCTs commissioned and 234 locations approved by October 31, 2024.
- **Net zero carbon emission:** Indian Railways targets 30 GW of renewable energy by 2029-30, with 375 MW of solar and 103 MW of wind commissioned as of October 2024.
- **Major economic corridors:** 434 projects valued at ₹11.17 lakh crore have been identified under three railway corridors, mapped on the PM GatiShakti portal.

- **Public Private Partnership (PPP):** 17 projects have been completed (₹16,434 crore) and 8 ongoing (₹16,614 crore) under the PPP model.

Major projects

- **Mumbai-Ahmedabad High-Speed Rail Project:** Sanctioned in December 2015, this 508 km project, supported by Japan, has a revised cost of ₹1.08 lakh crore. As of October 2024, it has achieved 47.17 per cent physical progress with an expenditure of ₹67,486 crore.
- **Dedicated Freight Corridors (DFCs):** As of November 2024, 2,741 km (96.4 per cent) of the planned 2,843 km DFC network has been commissioned. DFCs have transformed logistics in India by facilitating increased freight volumes without passenger train interference.

6.9 The focus on railway station infrastructure and modernisation of locomotives and coaching stock have improved passenger amenities in the railway sector (Box VI.2).

Box VI.2: Steps for enhancing passenger amenities in railways

Indian Railways is undertaking several initiatives to enhance passenger experience and station amenities. Key projects mainly focus on station redevelopment, affordable healthcare, improving catering services and supporting local artisans.

- **Amrit Bharat Station Scheme:** Under this initiative, aimed at enhancing railway station amenities, 1337 stations have been identified for redevelopment; work has started in 1197 of them.
- **Pradhan Mantri Bhartiya Janaushadhi Kendras (PMBJKs):** In the pursuit to enhance the wellness and welfare of passengers passing through railway stations, 50 PMBJKs were started in railway station premises. In addition, on November 13, 2024, 18 new PMBJKs were inaugurated, providing affordable medications and healthcare services at railway stations.
- **Food and catering services:** A new policy for managing mobile catering was introduced on November 14, 2023. As of November 23, 2024, this has resulted in the establishment of 557 Base Kitchens servicing 468 pairs of trains.
- **One Station One Product Scheme:** This scheme is operational at 1,900 stations, featuring 2,163 outlets that benefit 79,380 local artisans by providing sales opportunities for their products.
- **Passenger amenities:** Train Indication Boards have been provided at 1,351 stations, Coach Guidance Systems at 866 stations, and Wi-Fi availability at 6,112 stations, enhancing passenger experience.

6.10 Box VI.3 gives the key initiatives to improve signalling systems in railways.

Box VI.3: Key initiatives to improve signalling systems in railways

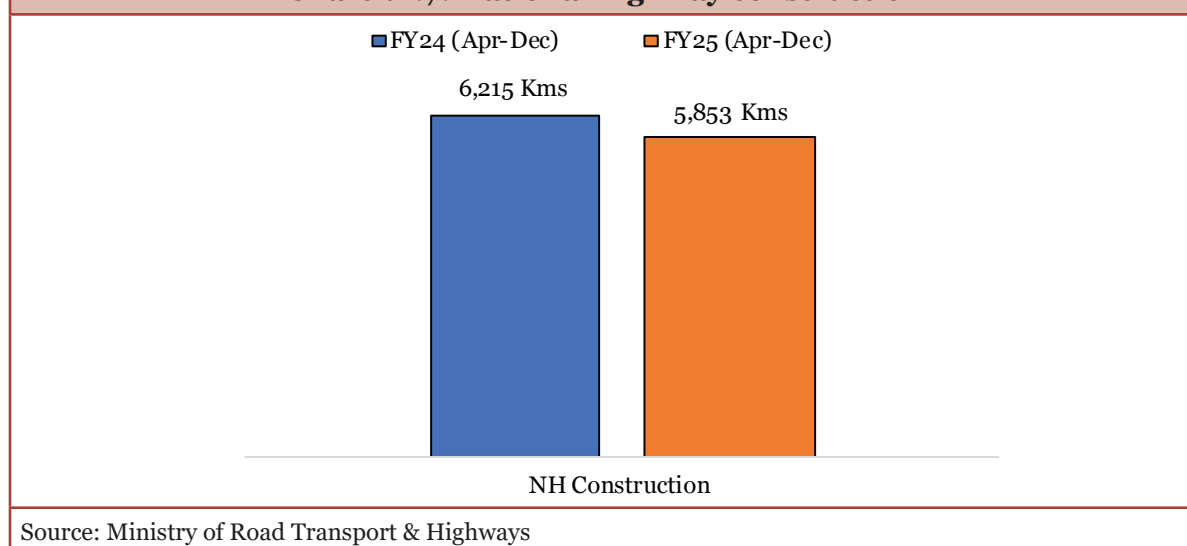
Indian Railways is modernising its signalling and safety systems to enhance operational efficiency and safety across its vast network. Here are the key updates

- **Elimination of mechanical signalling:** Indian Railways is replacing mechanical signalling with Electrical/Electronic Interlocking systems. In FY25, 25 out of 62 pending stations have been upgraded to electrical/electronic interlocking systems, with 9 zonal railways now free from mechanical signalling.
- **Kavach:** This indigenously developed Automated Train Protection system has seen ₹1,547 crore invested (till November 2024). The specification version 4.0 was approved on July 16, 2024.
- **Electronic interlocking:** EI systems have been installed at 227 stations in FY25, increasing the coverage to a total of 3,576 stations. The first Direct Drive Interlocking system was commissioned in November 2024 at Tajpur station.
- **Automatic Block Signalling (ABS):** ABS is being installed to enhance capacity on high-density routes. 720 route kilometres have been completed this fiscal year, increasing the coverage to a total of 4,906 kilometres.
- **Signal design automation tool for electronic interlocking:** This tool automates route control chart generation for station yards. Version 5.0 was released on September 19, 2024.

Road transport

6.11 India has a total road network of 63.4 lakh km, including National highway (NH) network of 146,195 km. NH network forms the arterial backbone of road transport network as even though it comprises only 2 per cent of total road network yet it carries about 40 per cent of the overall road freight traffic.

6.12 The National Industrial Corridor Development Programme aims to create advanced industrial cities in India, positioning them as major manufacturing and investment hubs. In Phase 1, a total of 383 plots, covering 3,788 acres, have been allocated for industrial use in sectors such as electronics and semiconductors, renewables, automobiles and auto-ancillaries, white goods, pharmaceuticals, textiles, and apparel

Chart VI.7: National highway construction

in four cities/townships. These four cities include Dholera in Gujarat, Shendra Bidkin in Maharashtra, Greater Noida in Uttar Pradesh and Vikram Udyogpuri in Madhya Pradesh. Work has started in another four cities, namely Tumakuru in Karnataka, Krishnapatnam in Andhra Pradesh, Nangal Choudhary in Haryana and Dadri in Uttar Pradesh. In addition, 12 new industrial cities have been approved for development, incorporating Industry 4.0 standards alongside the previously approved eight projects. The evolving approach to national highway development is detailed in Box VI.4.

Box VI.4: Development of national highways – progress from a project-based approach to a corridor-based approach

The shift from project-based national highway development to corridor-based approach helped increase the highway length from 91,287 km in 2014 to 1.46 lakh km in 2024. This approach takes into account evolving regional and national needs.

- **Bharatmala Pariyojana:** Launched in October 2017, it aims to develop 34,800 km of National Highways. By 2024, approximately 76 per cent of the projects (26,425 km) has been awarded, and 18,926 km have been constructed.
- **Char Dham Mahamarg Pariyojna:** As of 2024, road project to connect all four dhams through highway with total length of 825 km and 620 km has been completed.
- **National High-Speed Corridors (HSCs):** Length of HSCs expanded from 93 km in 2014 to 2,474 km in 2024.
- **4-lane and above - National Highways (excluding HSCs):** The length grew approximately 2.5 times, from about 18,300 km to 45,900 km between 2014 and 2024.

6.13 The government has introduced a number of sustainable practices in highway development including new-age technologies, sustainable construction raw materials and high-tech machinery. These measures have significantly improved the logistic efficiency and safety of road transport (Box VI.5).

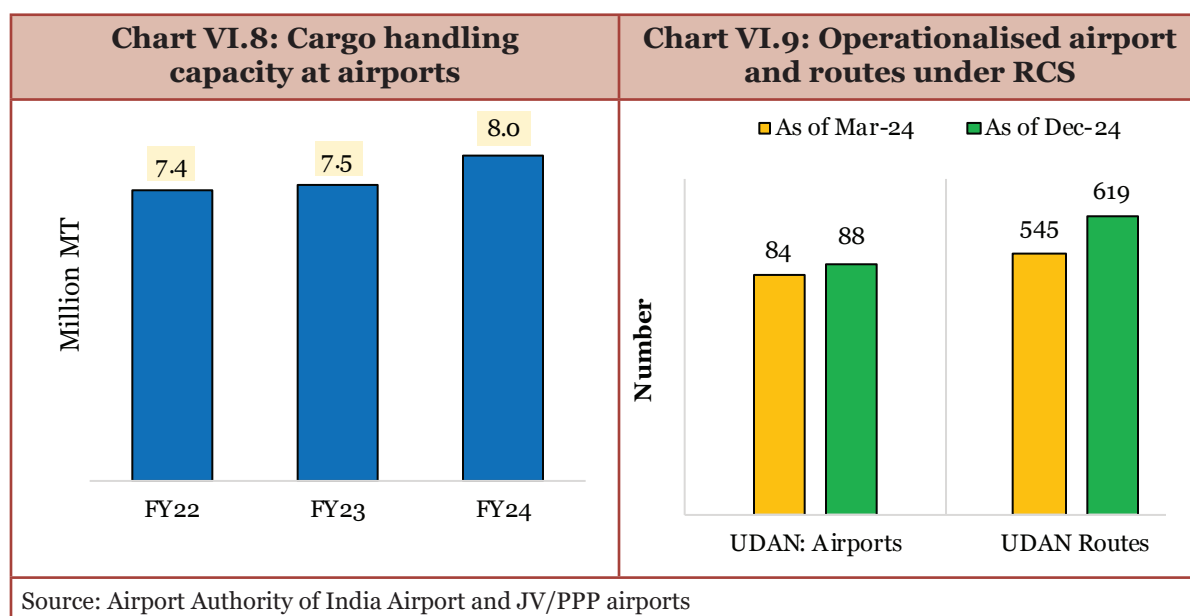
Box VI.5: Key Initiatives for logistics efficiency in road connectivity

To improve road connectivity, key initiatives undertaken include advanced traffic management on highways, establishment of logistics parks, sustainable vehicle scrapping, and ongoing ropeway projects.

- **Advanced traffic management system:** Installed about 4,000 km of national highways for efficient traffic management and emergency response.
- **Multi-Modal Logistics Parks (MMLP):** Till December 2024, Six MMLPs in Chennai, Indore, Nagpur, Jalna, Jogighopa and Bangalore have been awarded.
- **National highway maintenance policy:** Contractual maintenance for the entire NH network is managed through Performance-Based Maintenance Contracts (PBMC) of 5-7 years or Short-Term Maintenance Contracts (STMC) of 1-2 years. Additionally, long-term maintenance contracts of around 20 years are undertaken through the Toll Operate and Transfer mode and Investment Trust.
- **Vehicle scrapping policy:** Incentive/disincentive-based policy with 82 Registered Vehicle Scrapping Facilities (RVSFs) operational across 19 States/UTs, having scrapped about 1.62 lakh vehicles. An additional 65 RVSFs are under construction, which will add one more State.
- **Ropeways projects development:** Fifteen projects are in progress. Projects at Varanasi, Dhosi Hill, Bijli Mahadev, and Ujjain have been awarded, and ten more are under bidding.

Civil aviation

6.14 Airport operators and developers, including the Airports Authority of India, are pursuing a capital expenditure plan exceeding ₹91,000 crore from FY20 to FY25. About 91 per cent of this has been achieved by November 2024. New airports and improved regional connectivity under the Ude Desh ka Aam Naagrik (UDAN) scheme have improved air connectivity considerably. Under the Regional Connectivity Scheme-UDAN), 619 routes connecting 88 airports, including two water aerodromes and 13 heliports, have been operationalised so far. The airport's cargo handling capacity has been gradually increasing, reaching 8.0 million MT in FY24.



Ports and shipping

6.15 Port capacity improved significantly in FY25, leading to improvements in operational efficiency and reduction in average container turnaround time. On waterway transport connectivity, the Sagarmala programme aims to harness India's coastline and waterways fully, improving logistics efficiency. Progress under the programme highlights the highest project completion rates in port modernisation and port-led industrialisation. This is followed by advancements in port connectivity, coastal community development, coastal shipping, and inland water transport. Details of the major initiatives in the port sector can be found in Box VI.6.

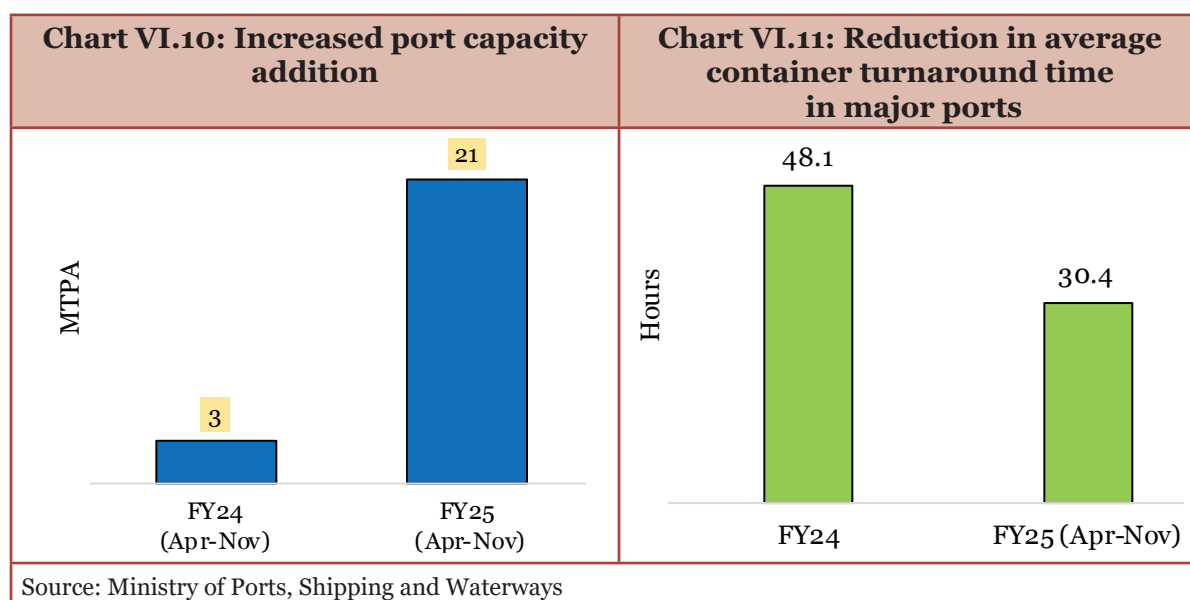
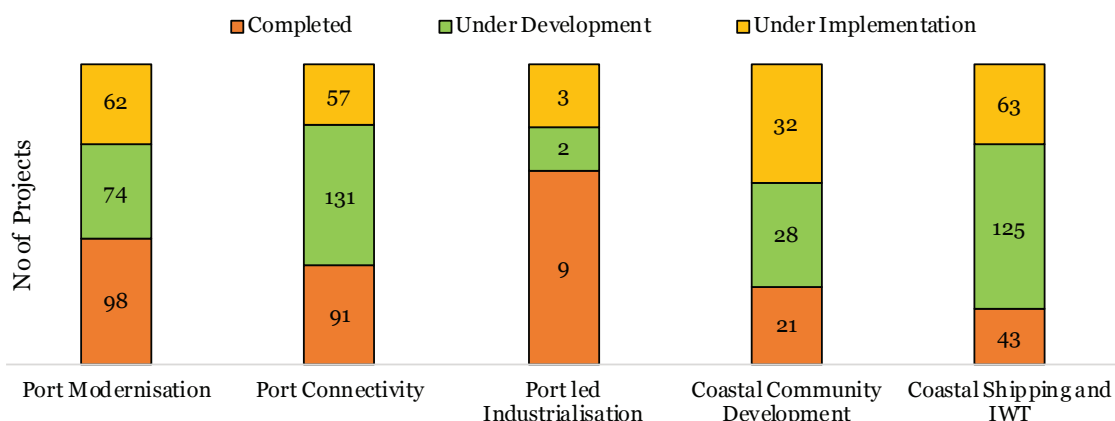


Chart VI.12: Progress in the Sagarmala programme (As on Nov 2024)

Source: Ministry of Ports, Shipping and Waterways

Note: IWT stands for Inland water transport

Box VI.6: Major achievements and initiatives in port sector**Infrastructure Development**

- **Vadhavan Mega Port:** The port is being developed with over ₹76,000 crore investment; this port will have nine container terminals and various berths.
- **Tuticorin International Container Terminal:** Inaugurated in September 2024, it is designed to handle 6 lakh twenty-foot equivalent units (TEUs) annually and accommodate container vessels up to 10,000 TEUs.
- **Outer harbour at Tuticorin:** This project aims to boost port capacity by 4 million TEUs with two 1,000-meter terminals.

Port-led Industrialisation

- **Port-Led Industrialisation:** Union Cabinet approved 12 new industrial smart cities with an investment of ₹ 28,602 crore across 10 states, along with 8 additional sanctioned projects.
- **Utilisation of salt lands:** Around 25,000 acres of salt lands have been identified to enhance port sector infrastructure.

International Linkages

- **Chabahar Port and INSTC:** Shahid Beheshti Port at Chabahar connects Mumbai to Eurasia via the INSTC, reducing transport costs and time, leading to a 43 per cent increase in vessel traffic and a 34 per cent rise in container traffic for FY24.
- **Sittwe Port, Myanmar:** Sittwe Port, part of the Kaladan Project, offers an alternative route to north-eastern states, reducing transport costs between Kolkata and Mizoram.

PPP Projects

- The Central Government approved 98 PPP projects, including 23 captive projects, worth around ₹69,800 crore, excluding the Vadhavan Port Project with a PPP investment of ₹38,000 crore. Currently, 56 projects valued at ₹41,480 crore are operational, increasing port capacity by approximately 550 million tonnes per annum (MTPA).

6.16 There have also been key improvements in maritime infrastructure and urban waterways. In October 2024, the National Maritime Heritage Complex in Lothal was approved, featuring a museum with 14 galleries, the tallest lighthouse museum, India's largest Navy gallery and themed amusement parks. To coordinate maritime initiatives and develop master plans, State Maritime & Waterways Transport Committees were formed in 22 states and Union Territories. The international container transshipment port at Galathea Bay, Great Nicobar Island, has been planned to enhance cargo transshipment from Indian East Coast ports and neighbouring countries.

6.17 Urban Waterways Projects, valued at ₹1,303 crore, are underway, with 16 of the 30 projects already completed. These developments have benefited over 35 lakh passengers while facilitating the transport of more than five lakh vehicles and one lakh cargo trucks. In addition, the transformation of inland waterways has been notable, as detailed in Box VI.7.

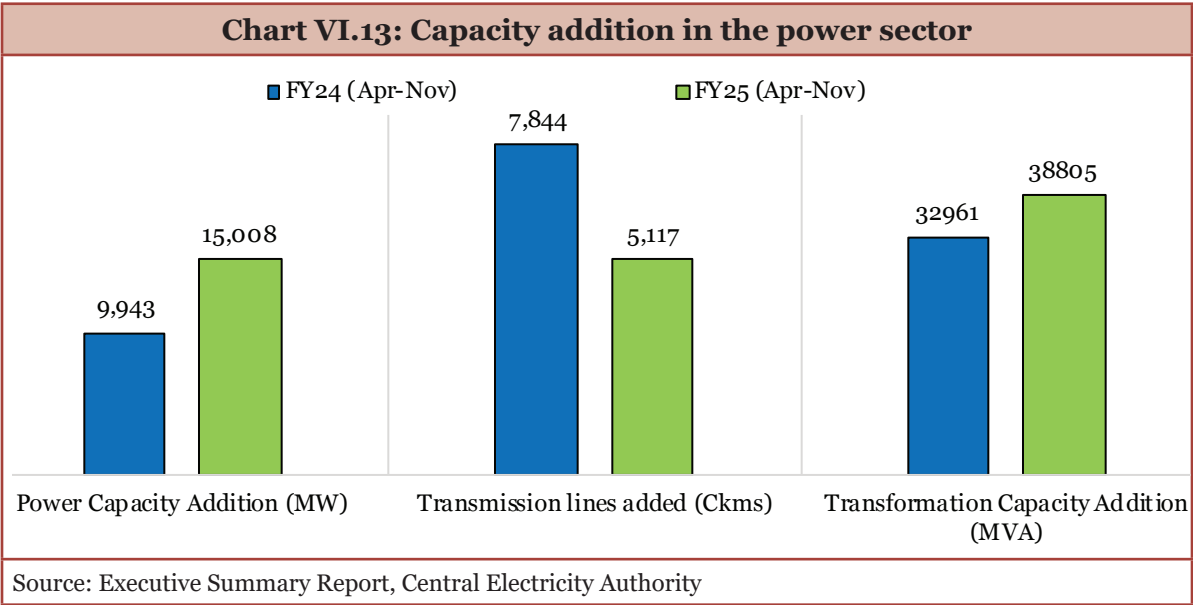
Box VI. 7: Inland waterways transformation: key projects and initiatives

India is enhancing waterway connectivity to the North-East by developing waterways in Bangladesh and funding 80 per cent of the ₹305 crore project. India is also investing ₹1,010 crore to improve the Brahmaputra and Barak rivers and the Indo-Bangladesh Protocol route. Key initiatives include:

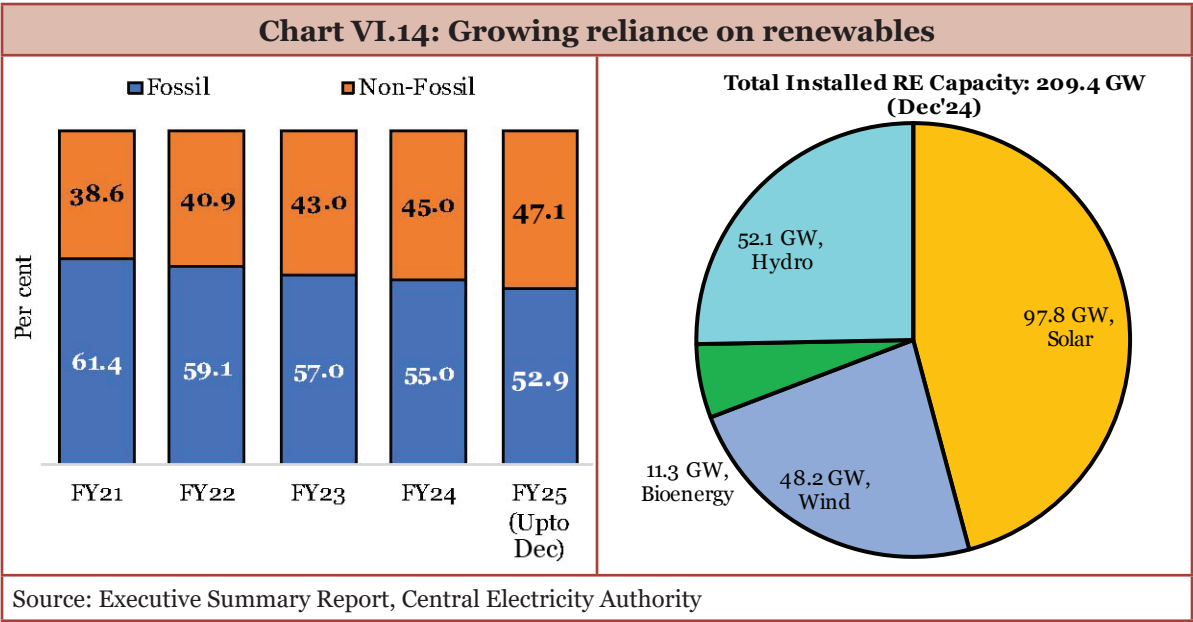
- **Harit nauka Guidelines:** Launched in January 2024, these guidelines aim to green 1,000 inland vessels over the next ten years.
- **Cargo promotion Scheme:** This initiative encourages cargo owners to switch from rail and road to inland waterways transport, promoting it as a sustainable alternative.
- **River cruise tourism:** Improved waterways have benefited both cargo and tourism, with 82,587 passengers on day cruises by October 2024 and a fivefold increase in night cruise passengers to 11,431 in FY24 compared to FY19.
- **Jal Marg Vikas Project on NW-1:** This project enhances cargo transport on the Ganga-Bhagirathi-Hooghly river system, achieving 65 per cent physical progress with a revised cost of ₹5,061.15 crore.
- **Jal Marg Vikas Project II (Arth Ganga):** Focused on sustainable development, this project includes the construction of community jetties and navigation improvements, with 49 out of 60 approved community jetties already commissioned.

POWER SECTOR

6.18 The power sector network continues to expand, with installed capacity rising by 7.2 per cent year-on-year to 456.7 GW as of November 2024. The addition of transformation capacity also gained momentum this year (Chart VI.13). However, the addition of transmission lines was affected by the heavy monsoon conditions that hampered work.



6.19 In the shift towards renewable energy, the power sector has been bolstered primarily by large-scale solar and wind initiatives. By the end of December 2024, the country's total renewable energy installed capacity increased by 15.8 per cent year-on-year, reaching 209.4 GW, up from 180.8 GW in December 2023. Renewable energy now constitutes about 47 per cent of India's total installed capacity (left panel of chart VI.14) , highlighting a growing dependence on cleaner, non-fossil fuel-based energy sources.



6.20 The Government of India implemented multiple initiatives aimed at ensuring uninterrupted power supply to every household. Under the Deen Dayal Upadhyaya Gram Jyoti Yojana (DDUGJY), Integrated Power Development Scheme (IPDS) introduced in

2014, and the Pradhan Mantri Sahaj Bijli Har Ghar Yojana (SAUBHAGYA), introduced in 2017, about ₹1.85 lakh crore has been invested to boost distribution infrastructure across various states. Consequently, 18,374 villages have been electrified under DDUGJY, and 2.9 crore households have gained access to electricity through SAUBHAGYA⁷.

6.21 The government has also been implementing the Revamped Distribution Sector Scheme since July 2021 to enhance the quality and reliability of power supply for consumers. This initiative aims to create a financially sustainable and operationally efficient distribution sector. With a total outlay of ₹3.0 lakh crore and gross budgetary support of ₹97,631 crore allocated for the period from FY22 to FY26, projects worth ₹2.8 lakh crore have been approved to develop distribution infrastructure and implement smart metering solutions⁸.

6.22 Aided by these measures, the daily average power supply has improved from 22.1 hours in FY14 to 23.4 hours in FY24 in the urban areas and from 12.5 hours in FY14 to 21.9 hours in the rural areas. The gap between energy demand and supply has also declined from 4.2 per cent in FY14 to a mere 0.1 per cent by December 2024⁹.

Box VI.8: Measures initiated in February 2024 to facilitate consumers

To enhance the energy infrastructure following additional measures have been undertaken to simplify rooftop solar installations, support EV charging, expedite new electricity connections and facilitate better consumer experience.

- **Rooftop solar PV simplification:** Rules were amended in February 2024 to ease and accelerate the installation of rooftop solar systems. Approvals for systems up to 10 kW no longer require feasibility studies, and timelines for larger systems and commissioning were significantly reduced.
- **EV charging connections:** Consumers can now obtain separate electricity connections for charging electric vehicles, supporting India's Net Zero goal by 2070.
- **Faster new connections:** Timelines for obtaining new electricity connections were reduced to three days in metropolitan areas, seven days in municipal areas, and fifteen days in rural areas.
- **Consumer choice in metering:** Residents of group housing societies and residential colonies can choose either individual or single-point electricity connections. This has promoted transparency and flexibility.
- **Meter reading accuracy:** If a consumer disputes their meter reading, the licensee must install an additional meter within five days to verify consumption over three months, ensuring billing accuracy.

⁷ Ministry of Power (2024, December 12). Collation of replies to Lok Sabha starred and starred questions. Government of India. P.51,72. <https://tinyurl.com/mwv66z83>.

⁸ Ministry of Power (2024, December 12). P.51.

⁹ Ministry of Power (2024, December 12). P.59.

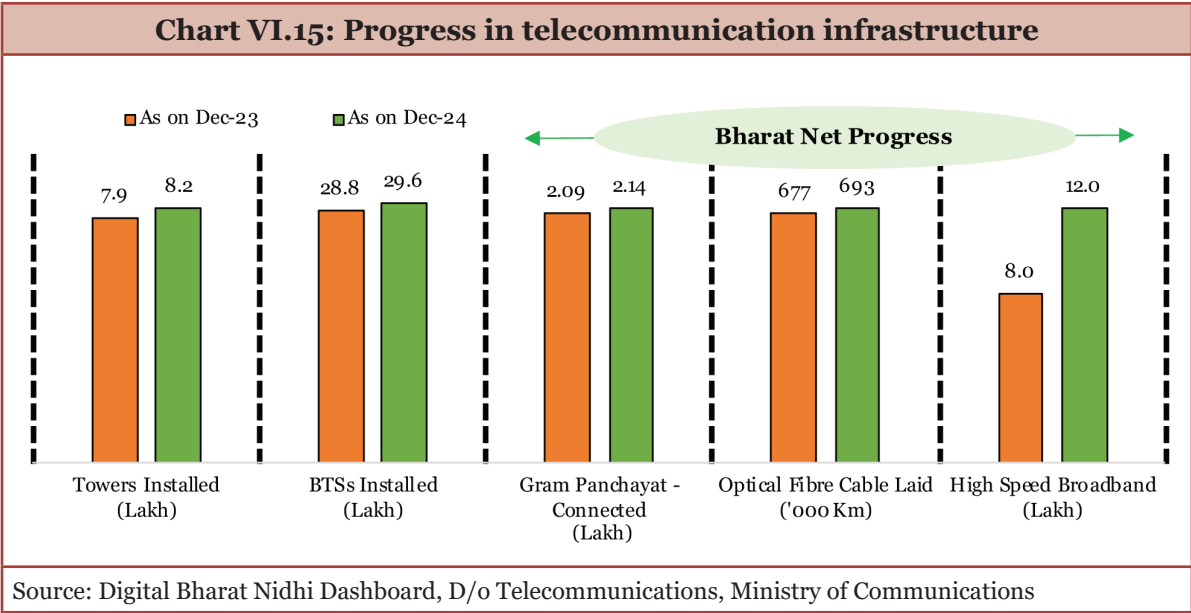
DIGITAL CONNECTIVITY

6.23 Digital connectivity has made major advancements in digital inclusion, technological innovation, and regulatory reforms this fiscal year, all in line with the government's vision for a Digital India.

Telecommunications

6.24 The rollout of 5G services, along with the introduction of new policies aimed at enhancing telecommunications infrastructure and user experience, has played a crucial role in digital connectivity. By October 31, 2024, 5G services were launched in all states and union territories. Currently, 5G services are available in 779 out of 783 districts¹⁰. Over 4.6 lakh 5G Base Transceiver Stations (BTSS) have been installed nationwide.

6.25 In July 2022, the Union Cabinet approved a project to provide 4G mobile services to 24,680 uncovered villages in remote areas and upgrade 6,279 villages, which were then using 2G/3G networks. By December 2024, 7,815 sites covering 10,706 villages have been commissioned.



6.26 In August 2024, the Universal Service Obligation Fund, providing financial support for telecom services and subsidising mobile services, broadband connectivity and infrastructure in rural and remote areas was rechristened Digital Bharat Nidhi (DBN). The progress of activities supported under DBN is presented in Box VI.9.

¹⁰ Ministry of Communications (2024, December 26) Year End Review 2024. Government of India. [PIB Release]. <https://tinyurl.com/2zneyfaz>.

Box VI.9: Providing connectivity in difficult terrains

Telecom infrastructure is being strengthened through Bharat Net Project, extending broadband to villages, and enhancing mobile coverage in the North-East, border areas, and islands. Key efforts include:

- **Bharat Net Project** to connect all Gram Panchayats and villages with broadband. As of December 2024, 6.92 lakh km of Optical Fibre Cable (OFC) has been laid, 2.14 lakh GPs are service-ready (including 5,032 via satellite, 12.04 lakh FTTH connections have been installed).
- **Comprehensive telecom development plan for north-eastern region:**
Mobile Services: 1,358 sites providing services in uncovered villages and highways. Arunachal Pradesh and Assam: 671 towers cover 1,178 villages. Meghalaya: 433 towers cover 622 villages and 3 highways.
- **Telecom development for islands:**
 - Andaman & Nicobar Islands: Submarine OFC connectivity completed, with 205 Gbps bandwidth utilised and satellite bandwidth increased from 2 Gbps to 4 Gbps.
 - Lakshadweep Islands: Submarine OFC project (1,869 km) commissioned in January 2024, enabling 5G and FTTH services.
- **Mobile services in uncovered areas:**
 - Border Villages Scheme: 319 villages covered with 4G (295 towers).
 - LWE-Phase I & II: 297 towers upgraded to 4G under Phase I. 1,106 towers commissioned under Phase II, covering 1,162 locations.
- **Aspirational districts scheme:**
 - 502-Village Scheme: 215 towers commissioned, covering 251 villages across 112 districts in 4 states.
 - 7,287-Village Scheme: 2,497 sites commissioned, covering 3,804 villages in 5 states.

Information Technology

6.27 The GI Cloud initiative, known as MeghRaj, is a key component of India's information technology strategy, aimed at delivering ICT services via cloud computing to Central and State/UT Departments. As of November 30, 2024, the National Informatics Centre supports 1,917 applications on its cloud. The government has empanelled 23 public and private cloud service providers to address the cloud needs of user departments.

Box VI.10: Capacity advancement in data centre

India's data centre market is witnessing significant growth, fuelled by the expansion of infrastructure and a rising demand for digital services. The following literature provides evidence to support this trend:

- India's colocation data centre capacity reached 977 MW¹¹ in 2023. Capacity of 258 MW

¹¹ Cushman & Wakefield (2024, July). Potential for 5x capacity expansion to fuel digital transformation. <https://tinyurl.com/4w4x34a4>.

was added in the year, reflecting a 105 per cent year-on-year growth. The total capacity under construction for 2024-2028 is 1.03 GW, with an additional 1.29 GW planned.

- The data centre market in India is expected to grow from US\$4.5 billion in 2023 to US\$11.6 billion by 2032, at a CAGR of 10.98 per cent¹².
- India benefits from lower construction costs, owing to its well-established IT and digitally enabled services ecosystem, as well as relatively affordable real estate with a median of US\$6.8 million per MW in 2023, compared to US\$9.17 million in Australia, US\$12.73 million in Japan, and US\$11.23 million in Singapore¹³.

RURAL INFRASTRUCTURE

Rural Drinking Water and Sanitation

6.28 The Jal Jeevan Mission (JJM) aims to ensure long-term water security for rural households by providing reliable access to safe piped drinking water. When it was launched in August 2019, only 3.23 crore (17 per cent) of rural households had tap water connections. Since then, over 12.06 crore families have been added, increasing the total to more than 15.30 crore (79.1 per cent) out of approximately 19.34 crore rural households as of November 26, 2024. Eight states, namely, Arunachal Pradesh, Goa, Haryana, Himachal Pradesh, Gujarat, Punjab, Telangana and Mizoram, and three union territories, namely, Andaman & Nicobar Islands, Dadra Nagar Haveli & Daman Diu and Puducherry have achieved 100 per cent coverage. There are 2,160 water quality laboratories, 1,570 of which are accredited by National Accreditation Board for Testing and Calibration Laboratories, ensuring the safety of drinking water.

Box VI.11: Impact of Jal Jeevan Mission

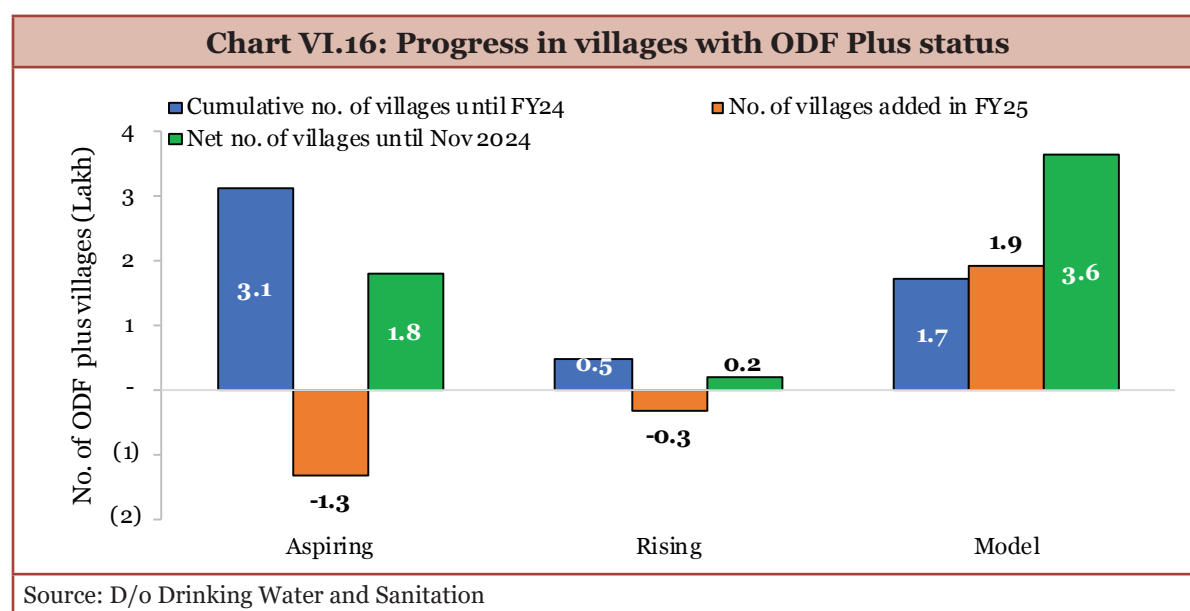
The mission improved access to safe drinking water in rural areas, particularly in regions affected by water quality issues like arsenic and fluoride. Its impact includes better health outcomes and enhanced water security for vulnerable populations.

- **Coverage of quality-affected Areas:** At the time of the launch of JJM, out of 19.4 crore rural households, over 75.2 lakh households lived in quality-affected areas that lacked safe drinking water. Since its implementation, 69.23 lakh rural households in quality-affected areas are getting safe piped water supply.
- **Arsenic-affected and fluoride-affected habitants:** Arsenic-Affected and Fluoride-Affected Habitants: Safe drinking water has been provided to more than 23 lakh households in arsenic-affected habitations and 11.43 lakh households in fluoride-affected habitations.
- **Community Water Purification Plants (CWPPs):** 618 CWPPs have been installed under JJM, out of which 573 are installed in arsenic and fluoride-affected areas.

¹² India Brand Equity Foundation (2024, October,01). Booming data centre growth in India. India Brand Equity Foundation. <https://tinyurl.com/mbcbah7f>.

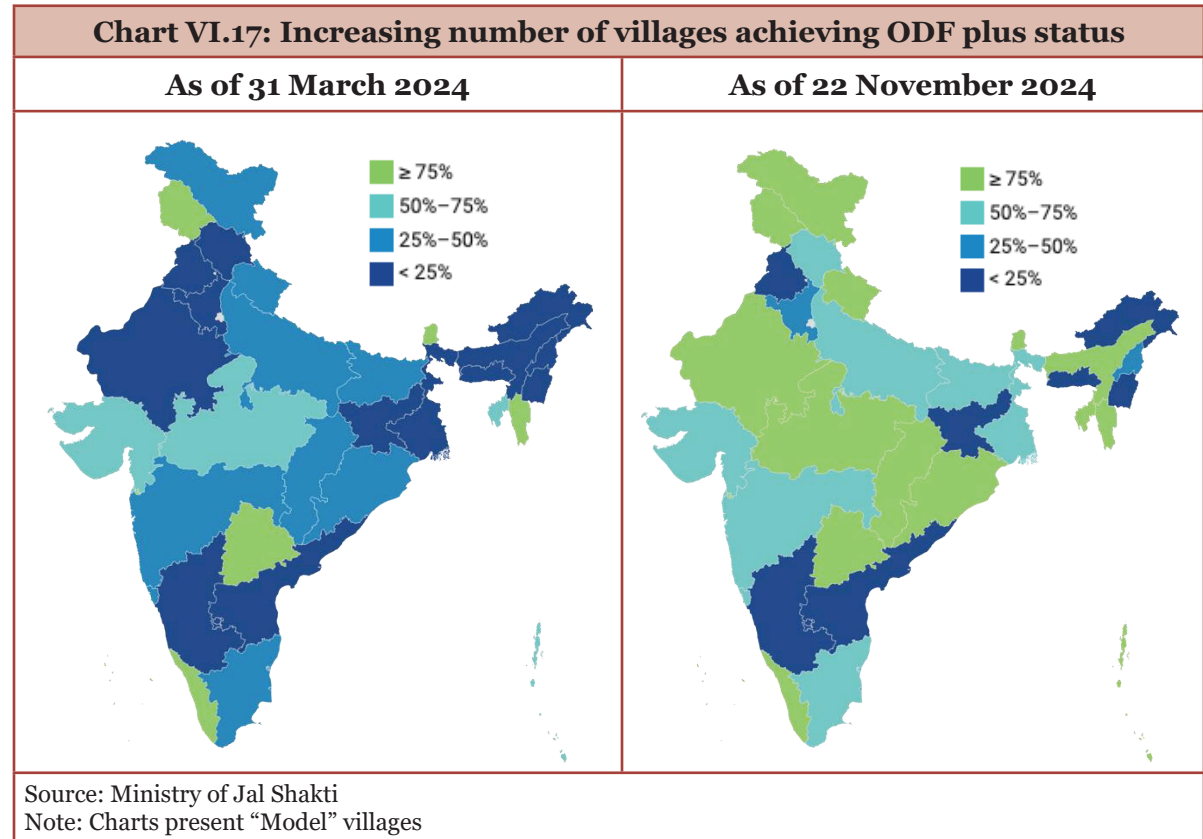
¹³ Cushman & Wakefield (2024, July). Potential for 5x capacity expansion to fuel digital transformation. <https://tinyurl.com/4w4x34a4>.

6.29 Swachh Bharat Mission– Grameen (SBM-G) achieved open defecation-free (ODF) status in the first phase. Phase II of SBM-G is implemented from 2020-21 to 2024-25, with a focus on converting the villages from ODF to ODF Plus. An ODF plus progress is captured in three categories¹⁴ namely aspiring, rising and model. The goal of SBM-G Phase-II is to make all the villages ODF Plus, i.e. “Model Category”. An ODF Plus village in the model category is one that is sustaining its ODF status, plus having arrangements for both solid and liquid waste management, observing visual cleanliness (minimal litter, minimal stagnant wastewater and no plastic waste dump in public places) and displaying ODF plus information, education and communication messages. During April to November 2024, 1.92 lakh villages were incrementally declared ODF Plus under the model category, taking the total number of ODF Plus villages to 3.64 lakh.



6.30 State-wise progress of villages achieving ODF plus status is presented in Chart VI.17. To highlight successful initiatives at the local level, two exemplary stories of waste management in Kerala and Madhya Pradesh are discussed in Box VI.12, demonstrating effective practices and impactful outcomes in these states.

¹⁴ Note: Aspiring: Sustaining ODF status + arrangements for Solid or Liquid Waste Management; Rising: Sustaining ODF status + arrangements for both Solid and Liquid Waste Management; Model: Rising category + observes visual cleanliness i.e. minimal litter, minimal stagnant wastewater and no plastic waste dump in public places. Displays ODF Plus Information, Education and Communication messages.



Box VI.12: Success stories of waste management initiatives

Model of sustainable development and community empowerment in Erattayar Gram Panchayat, Idukki, Kerala:



By focusing on waste management, the Panchayat preserves the environment and creates jobs, particularly for women. The strategy involves door-to-door collection, resource recovery, and recycling, reaching over 4,600 households and 500 institutions. Around 30 women are employed, earning an average of ₹10,000 monthly.

Despite initial challenges like fee collection and infrastructure issues, the Panchayat's resilience has driven progress. With enhanced training and partnerships, waste management practices have improved. The Haritha Karma Sena, with 28 dedicated members, plays a crucial role in this effort, collecting user fees from about 85 per cent of households and 90 per cent of institutions, generating approximately ₹2.5 lakh per month. Materials are meticulously segregated and sent to private agencies for further processing.

The Panchayat collects four tonnes of plastic and other non-biodegradable items monthly, adhering to a set schedule. This initiative not only fosters cleanliness but also empowers women, promoting inclusivity and gender equality. Erattayar Gram Panchayat's approach, emphasising collaboration, innovation, and empowerment, sets an example for other communities striving for a greener, more equitable future.

Transforming Waste into Wealth: NADEP Composting, Chhindwara, Madhya Pradesh

The Chhindwara district of Madhya Pradesh has prioritised biodegradable waste management as part of SBM-G Phase 2, establishing waste management infrastructure in 784 Gram Panchayats and 1,898 villages, including 8,507 NADEP (a method of organic composting that produces fertiliser from organic materials) compost pits. However, due to improper usage of these pits as community dustbins, the district initiated a comprehensive Swachhata Drive from May 1 to June 30. This initiative focused on enhancing awareness and promoting sustainable practices among rural communities.

Community engagement and capacity-building programmes were instrumental in the initiative's success. Extensive outreach efforts educated community members about the benefits of composting, while targeted training programmes equipped farmers and stakeholders with the knowledge to manage organic waste effectively. These efforts ensured the appropriate utilisation of cow dung and organic waste in NADEP pits, facilitating the production of high-quality compost.

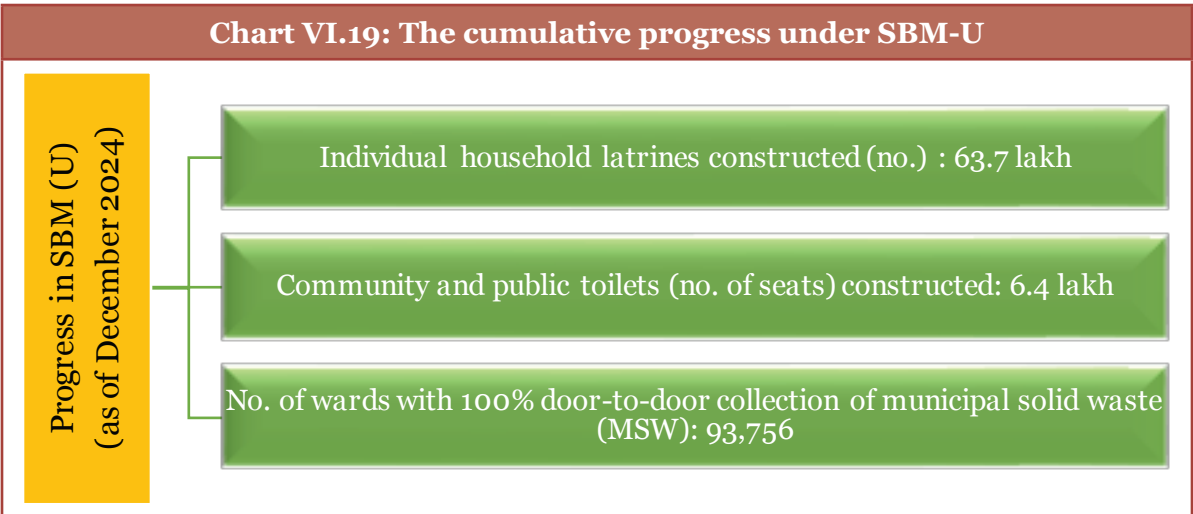
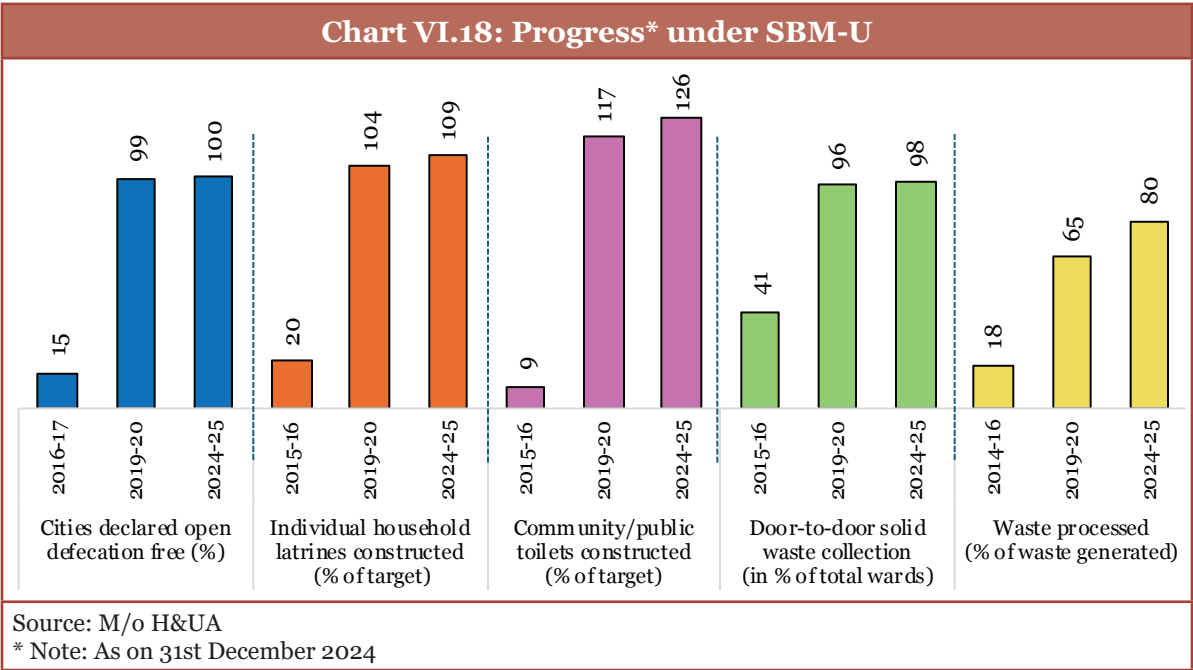
The initiative witnessed active participation of approximately 68,050 stakeholders, including farmers, PRI members, Swachhagrahis, SHGs, and community members, fostering significant improvements in waste segregation and management across villages. Each NADEP pit is projected to yield 500 kg of compost per cycle, generating an estimated income of ₹30,000 annually for farmers through three composting cycles. This shift is expected to reduce dependency on chemical fertilisers, decrease costs, and enhance soil health, supporting sustainable agricultural practices. Future plans include expanding the deployment of NADEP pits, ensuring their optimal use, and establishing market linkages for compost.

URBAN INFRASTRUCTURE

Swachh Bharat Mission-Urban

6.31 Building on the success of the Open Defecation Free (ODF) nation through the Swachh Bharat Mission (SBM-U), SBM-Urban 2.0 was launched in 2021. It envisions

creating ‘garbage-free cities’, integrating waste management and sanitation practices aligned with sustainability and circular economy principles. Progress and cumulative achievements under the SBM-U are given below:



6.32 The impact of the SBM-U was well-recognised. As per the 78th round report of NSS¹⁵, 97 per cent of households in urban areas report access to toilets. Niti Aayog Sector Report (2021)¹⁶ reported that SBM-U was well aligned with sustainable development goals and national priorities and was effectively implemented. Further, to encourage cities to improve urban sanitation, the government developed the ODF, ODF+,

15 Ministry of Statistics and Programme Implementation. (2023, March). Multiple indicator survey in India - NSS 78th Round Report (2020-21). Government of India. (<https://tinyurl.com/469rsmjsj>)

16 Development Monitoring and Evaluation Office, NITI Aayog. (2021, July). Urban Transformation: Sector Report. Government of India. (<https://tinyurl.com/3ttevc72>)

ODF ++ and Water+ protocols to evaluate urban local bodies (ULBs) on standardised parameters of sustainable sanitation. Progress as of December 2024 is given below:

Table VI.1: Achievement under the standard uniform framework to evaluate cities

Protocol	Description	Progress
ODF certified	Complete access to toilets by citizens and ensuring that nobody goes out for open defecation at any time of day or night.	4,576 ULBs
ODF+	ODF and all community and public toilets are clean, hygienic and functional while following basic cleanliness criteria.	3,913 ULBs
ODF++	ODF+ and complete faecal sludge from toilets is safely contained, transported, and treated while ensuring that no untreated sludge is discharged in the open.	1,429 ULBs
Water+	ODF++ and ensuring that no untreated liquid waste (including wastewater) is discharged without proper treatment and ensuring maximum reuse of treated wastewater.	64 ULBs

6.33 Besides, leveraging ICT-enabled tools strengthened the mission governance. The Swachhata App effectively allows citizens to report grievances, directing them to the relevant municipal corporation for resolution. With 2.08 crore users, the app has handled 2.55 crore complaints, resolving 2.39 crore. The Google toilet locator allows users to upload information about community and public toilets in their cities as 'SBM Toilet' on Google Maps and provide feedback. To date, 67,407 toilets across 3,326 cities are mapped on Google Maps, including those in hospitals, malls, bus stands, railway stations, metro stations, markets, and more.

6.34 **Urban housing:** The Pradhan Mantri Awas Yojana – Urban (PMAY-U), launched in 2015, aims to provide permanent housing in urban areas. As of November 25, 2024, a total of 1.18 crore houses have been sanctioned, with 1.14 crore grounded and over 89 lakh completed. PMAY-U 2.0 was launched in September 2024 to assist an additional one crore households. Currently, 29 states and union territories have signed agreements to implement PMAY-U 2.0, with approval having been granted for 6 lakh houses in FY25.

6.35 **Urban transport:** Metro rail and rapid rail transit systems are operational or under construction in 29 cities across India, with 1010 kilometres currently operational in 23 cities and an additional 980 kilometres underway. As of January 5, 2025, 62.7 kms were operationalised in FY25, and the daily ridership reached 10.2 million. These systems have led to considerable savings in emissions, time, vehicle operating costs, accidents and infrastructure maintenance.

6.36 Atal Mission for Rejuvenation and Urban Transformation (AMRUT):

AMRUT scheme was launched in 2015 to focus on improving urban water management in 500 cities. As a result, tap water coverage has increased to 70 per cent, and sewerage coverage has risen to 62 per cent. The mission has created or augmented water treatment capacity of 4,649 million litres per day and developed 2,439 parks, adding 5,070 acres of green space. In 2021, AMRUT 2.0 was introduced to expand coverage to all statutory towns and cities, with an allocation of ₹2.77 lakh crore during FY22 to FY26. This phase so far has initiated 8,923 projects worth ₹1.89 lakh crore. AMRUT 2.0 actively involves self-help groups and promotes innovative technologies.

6.37 Smart Cities Mission: Launched in 2015, the mission aims to develop smart cities with essential infrastructure, good quality of life and a sustainable environment. As of 13 January 2025, 8,058 projects worth ₹1.64 lakh crore have been proposed, with 7,479 projects worth ₹1.50 lakh crore completed (Chart VI.20). Achievements under the mission are provided in Chart V1.21.

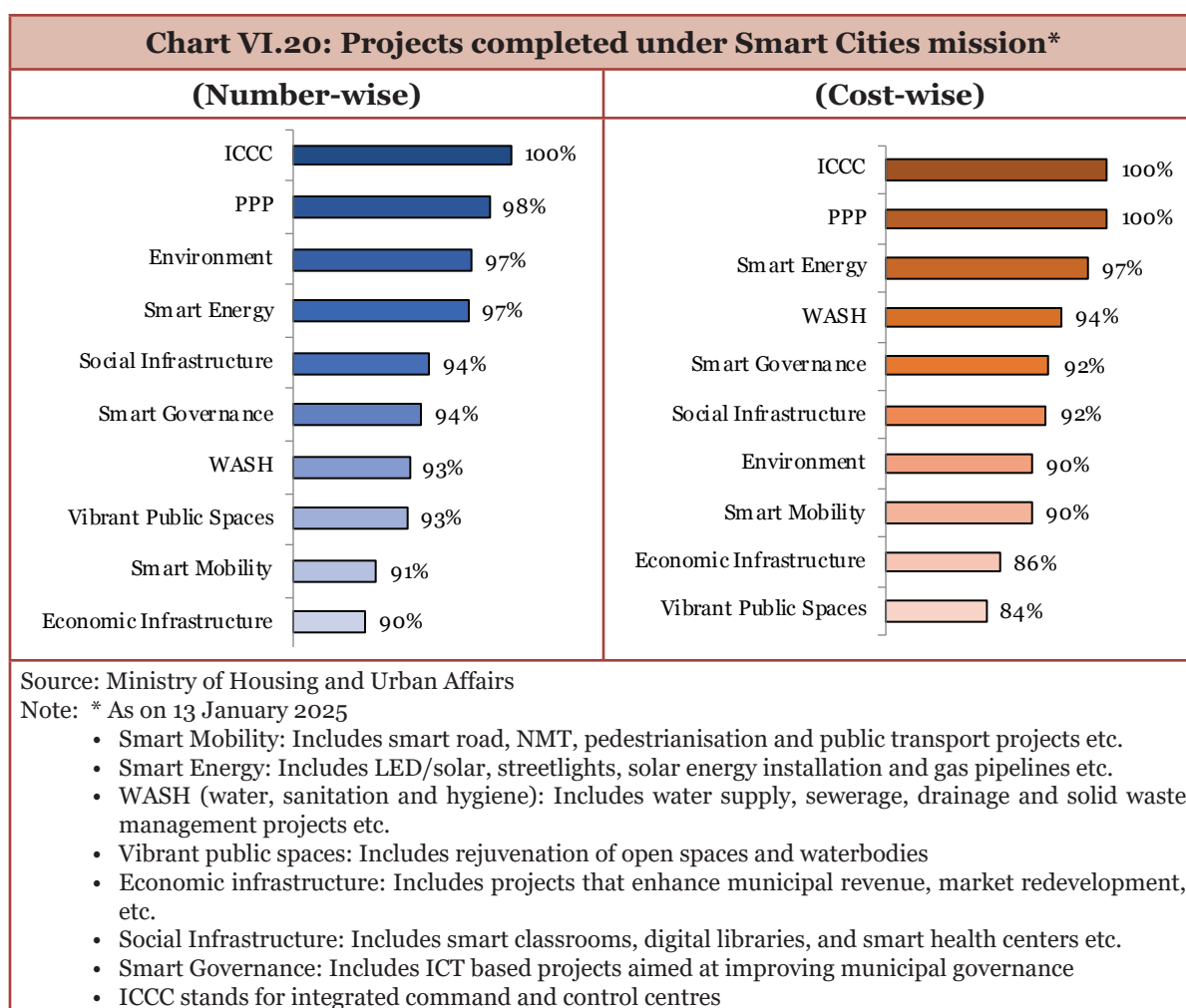


Chart VI.21: Achievements of the Smart Cities mission*

Integrated Command and Control Centres	•Operational in 100 cities. Used for urban management in crime tracking, safety, transport, disaster management, etc.
Public Safety	•83,000+ CCTV cameras, 1,884 emergency call boxes, public address systems, and traffic enforcement tools installed
Public Safety	•1,200+ projects completed, 318 km of waterfronts developed, 484 heritage sites conserved
Water Supply	•17,000 km of water supply monitored via SCADA in 31 cities, reducing water loss and leaks.
Solid Waste Management	•ICCCs and 9,000 RFID-enabled vehicles in 48 cities optimized waste collection.
Streetlights	•16 lakh solar/LED streetlights installed across 79 cities.
Mobility	•1700 km of smart roads, shared bicycles (23,000), buses (1,500+), bus stops (2,000+), ITMS in 35 cities.
Affordable Housing	•35,000+ affordable housing units built in 23 cities.
Smart Solutions	•9,400 Wi-Fi hotspots and 83,000 CCTV cameras created.
Health	•3,100+ hospital beds, 172 e-health centers, 155 health ATMs, and 300 sports facilities added.
Education	•9,400 smart classrooms in 2,300 schools, digital libraries, and Anganwadis developed.
PPP Projects	•199 projects worth ₹9,200 crores implemented in 50+ cities.
Economic Hubs	•Incubation projects and skill centers developed, supporting 1,400+ startups and 20,000+ vendors.

Source: Ministry of Housing and Urban Affairs
Note: * As of 18 Nov 2024

6.38 Central to urban transformation is leveraging technology and data to improve the efficiency and quality of urban services, including transportation, energy, healthcare, and education. Along these lines, the government has taken various initiatives, which are detailed in Box VI.13.

Box VI.13: Initiatives driving urban transformation

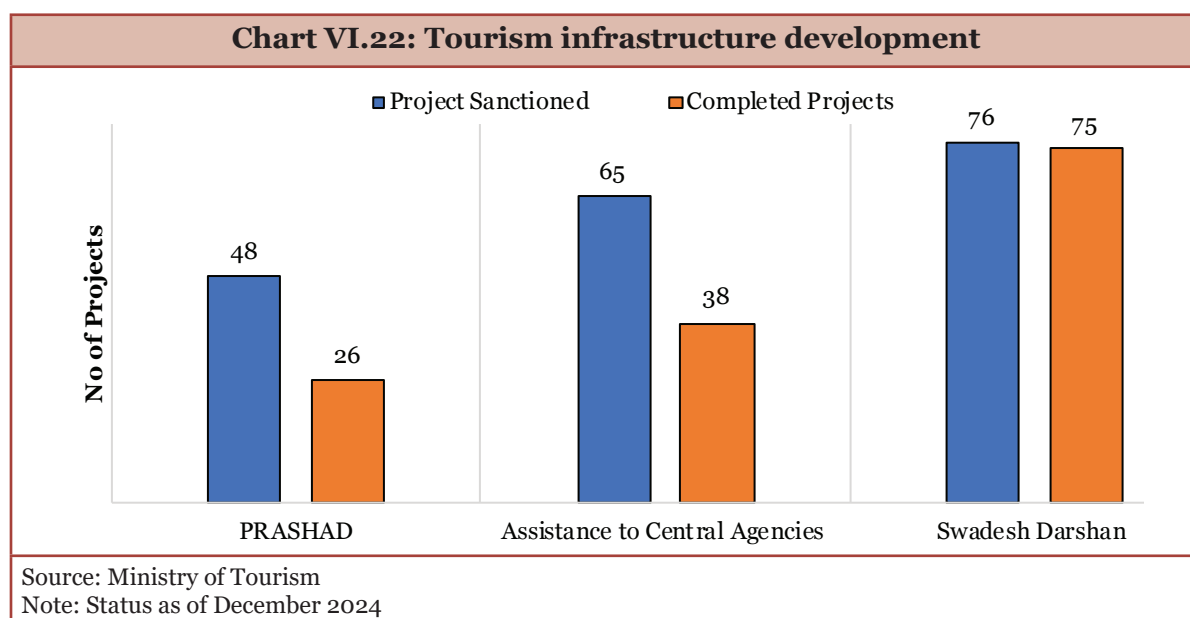
Several initiatives are being implemented to foster sustainable urban development and governance. These efforts focus on enhancing climate resilience, promoting data-driven decision-making, and improving infrastructure and citizen services across cities. These initiatives include:

- **Climate Smart Cities Assessment Framework (CSCAF):** Launched in 2019, this public assessment framework aims to enhance climate-sensitive development in cities. CSCAF 2.0 was introduced in 2020, evaluating 126 cities via 28 indicators across five thematic areas. The upcoming CSCAF 3.0 is currently being developed.
- **DataSmart cities strategy:** promotes data-driven governance with the data maturity assessment framework to assess cities' readiness to adopt data solutions, focusing on systemic and sectoral pillars.
- **National urban innovation stack:** facilitates collaboration within urban ecosystems by leveraging urban data, supporting data-driven governance.
- **National urban learning platform:** A scalable platform designed for capacity building among urban local bodies, offering a comprehensive approach to improve urban management capabilities.
- **City investments to innovate, integrate and sustain challenge:** supports innovative urban projects with significant funding, promoting circular economy practices. The second phase was approved in 2023 to fund climate-resilient infrastructure in a maximum of 18 cities.
- **Urban learning internship programme:** Launched in 2020, TULIP connects urban local bodies with youth, offering internship opportunities to enhance skills and experience in urban transformation. As of now, more than 49,000 internship opportunities have been posted across the nation, out of which over 14,500 internships are ongoing and completed.
- **National Urban Digital Mission:** seeks to establish shared digital infrastructure across cities, enhancing citizen-centric governance and service delivery by 2024.

6.39 Real Estate Development: Rules under the Real Estate (Regulation & Development) Act, 2016 (RERA) have been notified in all States and Union Territories except Nagaland, with various regulatory authorities established. About 1.38 lakh real estate projects and 95,987 real estate agents have been registered under the Real Estate Regulatory Authority as of January 6, 2025. 1.38 lakh complaints have been disposed of by the RERA across the country.

TOURISM INFRASTRUCTURE

6.40 The government has introduced several initiatives to promote domestic tourism. Pilgrimage Rejuvenation and Spiritual Augmentation Drive (PRASHAD) aims to develop tourism infrastructure at identified pilgrimage destinations and heritage cities (Chart VI.22).



6.41 Another major initiative of the Government to promote domestic tourism is Swadesh Darshan, which is aimed at the integrated development of tourism destinations, including theme-based tourist circuits. This programme was rechristened as the Swadesh Darshan Scheme 2.0 (SD 2.0) in 2022, with the vision to develop sustainable and responsible tourism destinations. Under this scheme, 34 projects have been approved, with a total funding of ₹793.2 crore.

6.42 Moreover, in line with the FY25 budget announcement, 40 projects across 23 states have been approved for interest-free loans for 50 years for an amount of ₹3,295.8 crore under the special assistance to states for capital investment. This initiative aims to create iconic tourist centres of global standards by supporting their development and marketing ¹⁷.

SPACE INFRASTRUCTURE

6.43 India currently operates 56 active space assets, including 19 communication satellites, nine navigation satellites, four scientific satellites, and 24 earth observation satellites. ISRO has enhanced its capabilities by adding a small satellite launch vehicle to its fleet. New Space India Limited (NSIL) successfully fulfilled its contract to launch 72 OneWeb satellites into low earth orbit. Recently it also launched the GSAT-20 satellite in collaboration with SpaceX. Various initiatives by the government in the domain of space-based infrastructure are given in Box VI.14.

¹⁷ Ministry of Tourism, (2024, December 25). Year End Review-2024: Ministry of Tourism. Government of India. [PIB Release]. <https://tinyurl.com/mja6ay3>.

Box VI.14: Space-based infrastructure monitoring platforms

ISRO's advanced geospatial platforms are playing a pivotal role in infrastructure monitoring and management. These initiatives support a range of projects, from rural development and electrical infrastructure to judicial and urban planning, enhancing efficiency and tracking progress.

- **ISRO's Bhuvan Platform:** supports infrastructure monitoring under schemes like MGNREGA and the watershed component of PMKSY at different stages of implementation.
- **Electrical infrastructure management:** Bhuvan facilitates the management of electrical infrastructure in Maharashtra and Telangana through Web-GIS portals.
- **NyayaVikas Portal for judicial infrastructure:** Developed in collaboration with the Department of Justice, this portal monitors 2,840 judicial projects using Web GIS and mobile geotagging, with over 7,900 geotags created to track progress.
- **Urban geospatial databases for AMRUT Cities:** ISRO has created large-scale 2D urban geospatial databases for 238 AMRUT cities, assisting in developing GIS-based master plans for urban planning.

6.44 As part of India's Space Vision 2047, the Union Cabinet has approved four key projects: the Gaganyaan follow-on mission, which will pave the way for the establishment of the first module of the Bhartiya Antariksh Station; the Chandrayaan-4 Lunar Sample Return Mission; the Venus Orbiter Mission; and the development of the Next Generation Launch Vehicle. These initiatives aim to enhance India's technological capabilities, foster industry collaboration, and strengthen the country's position in global space exploration.

CONCLUSIONS AND WAY FORWARD

6.45 The government has placed infrastructure development at the centre stage of its fiscal and public policy agenda. The capital expenditure of the union government for FY25 has been budgeted at about 3.3 times the capex for FY20. In Q1FY25, the constraints on new approvals and spending during the general elections, coupled with heavy monsoon in many regions, affected the progress of the infrastructure spending. Between July and November 2024, the pace of capex has picked up.

6.46 The review in the chapter shows that the progress of physical indicators in the current year mirrors the financial progress. The addition to the rolling stock of railways, port handling capacity and power and transformation capacity improved during FY25 so far on a Y-o-Y basis. The addition to the length of highways, roads and railway lines has been modestly lower. On the whole, seen against the background of the constraints that prevailed in Q1FY25, infrastructure build-up in the current year has stayed on course.

6.47 Apart from asset creation, our infrastructure programme also emphasises the use of sustainable materials and processes. These considerations are receiving particular attention in areas such as highway development, waterway projects, power capacity addition and waste management. Given the global imperative of promoting sustainable practices, model practices in this direction need to be replicated widely.

6.48 India needs a continued step-up of infrastructure investment over the next two decades to sustain a high rate of growth. Requirements are aplenty. Accelerating our efforts to build integrated multi-modal transport, coupled with the modernisation of existing physical assets, will improve efficiency and last-mile connectivity. Disaster-resilient urbanisation, public transport, preservation and upkeep of heritage sites, monuments and tourist destinations, as well as rural public infrastructure, including connectivity, call for greater attention. Our Net Zero commitments entail added stress on creating renewable energy capacities.

6.49 Quite clearly, public sector efforts cannot fully meet these requirements. There are binding budget constraints to the different tiers of government. Private participation should accelerate in many critical infrastructure sectors in many ways—programme and project planning, financing, construction, maintenance, monetisation and impact assessment.

6.50 Our infrastructure programme supports a variety of PPP models like build-operate-transfer (toll and annuity), design-build-finance-operate-transfer, hybrid annuity model and toll-operate-transfer. The government has instituted many de-bottlenecking and facilitatory mechanisms like the National Infrastructure Pipeline, National Monetisation Pipeline and PM-Gati Sakti that have made progress. Financial market regulators have introduced reforms to encourage private participation. Yet, the uptake of private enterprise is limited in many core sectors.

6.51 The strategy to step up private participation needs coordinated action of all stakeholders involved - governments at different tiers, financial market players, project management experts and planners, and the private sector. Capacities to conceptualise projects, develop sector-specific innovative strategies for execution, and, develop high-expertise areas such as risk and revenue sharing, contract management, conflict resolution and project closure need to improve substantially. The efforts of the Union Government would need to be supplemented with wholehearted acceptance of the need for public-private partnerships in infrastructure across the country.
