

**CONSENT FROM THE INDUSTRY SOURCES:  
FORMAT OF THE REQUEST LETTER AND CONSENT LETTER**

**Date: February 22, 2024**

To,

**The Board of Directors**

**Hindustan Construction Company Limited**

Hincon House, Lal Bahadur Shastri Marg, Vikhroli (West),  
Mumbai 400 083, Maharashtra, India

**Re: Proposed Rights Issue of equity shares of face value of Rs. 1 each ("Equity Shares") by Hindustan Construction Company Limited (the "Company") (the "Issue")**

We refer to your letter dated 17.10.2023 wherein you have sought our consent for inclusion of our name Care Analytics and Advisory Private Limited as an "expert" in terms of Companies Act, 2013 and quoting data from the report on the Infrastructure sector in India (the "**Report**") released in India in February / 2024 and as issued to the Company on 22.2.2024, in documents prepared in connection with the Issue. We hereby unconditionally consent to, and have no objection to, the inclusion of our name (Care Analytics and Advisory Private Limited) and the Report or reproduce any extract in entirety or parts thereof in the draft letter of offer ("**DLOF**"), the letter of offer ("**LOF**") and Abridged Letter of Offer ("**ABLOF**") to be filed with Securities and Exchange Board of India ("**SEBI**") and BSE Limited and the National Stock Exchange of India Limited ("**Stock Exchanges**") where the Equity Shares of the Company are to be listed or any other document, including publicity material, press releases, marketing material and presentations to be issued or filed in relation to the Issue, by the Company (DLOF along with the LOF and ABLOF or any other document in relation to the Issue, are collectively referred to as the "**Issue Documents**"). In this regard, we undertake that no, inter alia, consent, approval, or permission will be required by the Company in the future in connection with using our name and/ or contents of the Report, in full or in part in the said Issue Documents.

We further agree that such disclosures would be made only as deemed fit by the Company and the lead manager appointed in relation to the Issue and do not impose any obligation on the Company to make any or all of the disclosures for which the consent is being sought in terms of the aforesaid letter and granted in terms of this letter.

We confirm that we have, where required, obtained requisite consent in relation to any information used by us in the Report. We confirm that information contained in the Report has been obtained or derived from publicly available sources and interaction with industry participants, which we consider as reliable and after exercise of reasonable care and diligence by us. We also confirm that the above information in relation to us is in accordance with the Companies Act, 2013, the Securities and Exchange Board of India (Issue of Capital and Disclosure Requirements) Regulations, 2018 and other applicable law, each as amended. We further confirm that the above information in relation to us is true and correct and there is no untrue statement or omission which would render contents of this consent letter misleading in its form or context.

This consent letter is for information and for inclusion (in part or full) in the Issue Documents. We also consent to the inclusion of this letter, the engagement letter, the Report, as a part of "Material Contracts and Documents for Inspection" in connection with this Issue, which will be available for public for inspection from date of the filing of the LOF until the Issue Closing Date including through online means on the website of the Company and we consent to any such other form of access to the Report as may be required under applicable law or regulatory direction, request or order.

Further, except as disclosed below, as on the date of this letter, we confirm that neither we nor our associates hold any Equity Shares.

CARE Analytics and Advisory Private Limited  
(previously known as CARE Risk Solutions Private Limited)

Corporate Office: A Wing - 1102 / 1103, Kanakia Wall Street,  
Andheri Kurla Road, Chakala, Andheri (East),  
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This letter can be relied on by the Company, the lead manager and the legal advisor in relation to the Issue. We also authorize you to deliver this letter of consent to SEBI, the Stock Exchanges or any other governmental or regulatory authority as may be required. We have no objection with you sharing the Report and this consent letter with any regulatory or judicial authority as required by law or regulation in relation to the Issue or pursuant to any order passed by any such regulatory or judicial authority.

We confirm that we are not, and have not in the past, been engaged or interested in the formation, or promotion, or management, of the Company. We declare that we do not have any direct / indirect interest in or relationship with the Company, its directors, its management, its subsidiaries, the lead manager and also confirm that we do not perceive any conflict of interest in such relationship / interest while issuing the Report. We hereby confirm we are an independent agency with no relationship and are not a related party of the Company or its directors or the lead manager to the Issue.

We undertake to inform you and the lead manager promptly, in writing, of any changes within our knowledge, to the above information (other than any changes or update to the said Report) until the Equity Shares commence trading on the Stock Exchanges, pursuant to the Issue. In the absence of such communication from us, the lead manager and legal advisor to the Issue can assume the above information as updated information until the Equity Shares commence trading, on the Stock Exchanges, pursuant to the Issue.

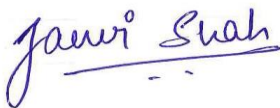
We represent that our execution, delivery and performance of this consent have been duly authorised by all necessary actions (corporate or otherwise).

We further confirm that we will not withdraw this consent until the date of listing of the Equity Shares.

We agree to keep the information regarding the Issue strictly confidential.

Kind regards,

For and on behalf of **CARE Analytics and Advisory Private Limited**  
Authorized Signatory



Name: Tanvi Shah  
Designation: Director  
Place: Mumbai

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CIN- U74210MH1999PTC118349

# Industry Research Report on Infrastructure sector in India

February 2024

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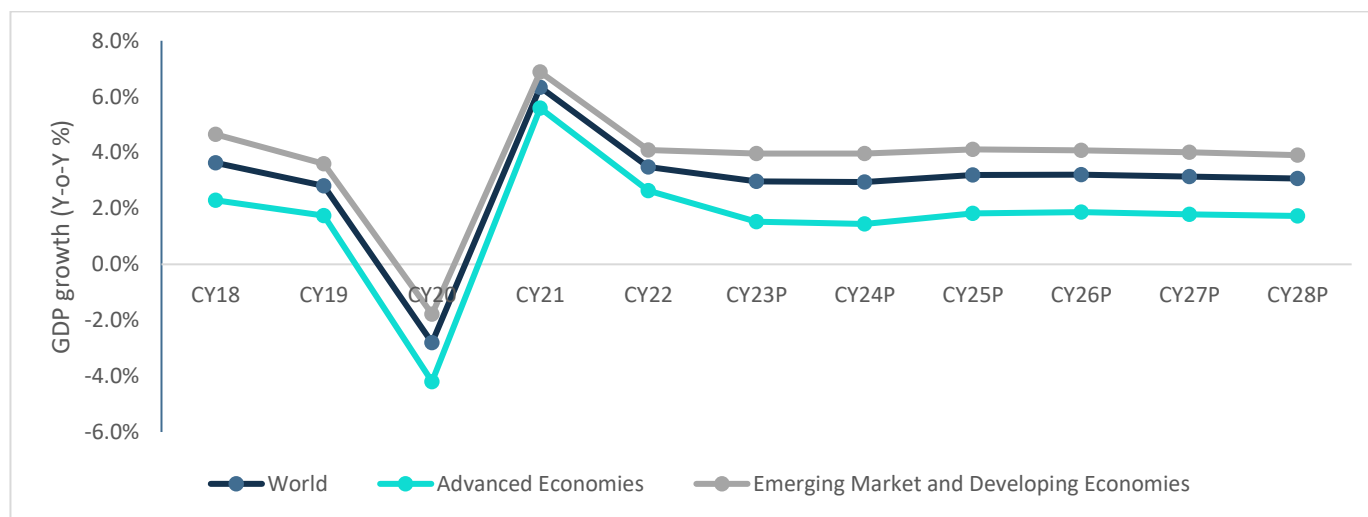
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## 1. Economic Outlook

### 1.1 Global Economy

As per the International Monetary Fund (IMF)’s World Economic Outlook growth projections released in January 2024, the global economic growth for CY23<sup>1</sup> stood at 3.1% on a year-on-year (y-o-y) basis, down from 3.5% in CY22 due to disruptions resulting from the Russia-Ukraine conflict and higher-than-expected inflation worldwide. On the other hand, the global economic growth for CY24 is projected to remain stable at 3.1%, attributed to growth resilience in major economies due to high government and private spending, rapidly subsiding inflation rates, and advanced economies easing their fiscal policies. Cost of borrowing remained high as central banks fight inflation. For the next 4 years, the IMF projects world economic growth in the range of 3.1%-3.2% on a y-o-y basis.

**Chart 1: Global Growth Outlook Projections (Real GDP, Y-o-Y change in %)**



Notes: P-Projection;

Source: IMF – World Economic Outlook, October 2023

**Table 1: GDP Growth Trend Comparison - India v/s Other Economies (Real GDP, Y-o-Y change in %)**

	Real GDP (Y-o-Y change in %)									
	CY19	CY20	CY21	CY22	CY23P	CY24P	CY25P	CY26P	CY27P	CY28P
India	3.9	-5.8	9.1	7.2	6.3	6.3	6.3	6.3	6.3	6.3
China	6.0	2.2	8.5	3.0	5.0	4.2	4.1	4.1	3.7	3.4
Indonesia	5.0	-2.1	3.7	5.3	5.0	5.0	5.0	5.0	5.0	5.0
Saudi Arabia	0.8	-4.3	3.9	8.7	0.8	4.0	4.2	3.3	3.3	3.1
Brazil	1.2	-3.3	5.0	2.9	3.1	1.5	1.9	1.9	2.0	2.0
Euro Area	1.6	-6.1	5.6	3.3	0.7	1.2	1.8	1.7	1.5	1.3
United States	2.3	-2.8	5.9	2.1	2.1	1.5	1.8	2.1	2.1	2.1

P- Projections; Source: IMF- World Economic Outlook Database (January 2024)

<sup>1</sup> CY – Calendar Year

### Advanced Economies Group

For the major advanced economies GDP is projected to decline to 1.5% in CY24 from 1.6% in CY23. Going forward it is projected to rise thereafter to 1.8% in CY25. The 2024 growth projection is adjusted upwards by 0.1%, driven by stronger-than-anticipated growth in the US but tempered by slower growth in the euro area.

One of the major countries from this group is the **United States**. In the United States, economic growth is anticipated to decline from 2.5 percent in 2023 to 2.1 percent in 2024 and further to 1.7 percent in 2025. This trajectory is attributed to the delayed impacts of monetary policy tightening, incremental fiscal tightening, and a moderation in labor market dynamics, all of which are projected to dampen aggregate demand. The upward adjustment of 0.6 percentage points for 2024, compared to the October 2023 World Economic Outlook (WEO), is primarily driven by statistical carryover effects stemming from the stronger-than-expected growth observed in 2023.

Further, the **Euro area's** growth is forecasted to rebound from a low estimated rate of 0.5 percent in 2023, attributed to significant exposure to the Ukraine conflict, to 0.9 percent in 2024 and further to 1.7 percent in 2025. This recovery is underpinned by stronger household consumption as the impact of energy price shocks diminishes, coupled with a decrease in inflation, thereby bolstering real income growth. However, compared to the October 2023 World Economic Outlook (WEO) forecast, there's a downward revision of 0.3 percentage points for 2024, mainly due to carryover effects from the weaker-than-expected outcome in 2023.

### Emerging Market and Developing Economies Group

For the emerging market and developing economies group, GDP growth stood at 4.1% in CY23, like 4.1% in CY22. This growth is further projected to remain constant at 4.1% in CY24 and 4.2% in CY25. All the emerging economies are projected to make positive growth. While the remaining economies, including the low-income countries, are expected to progress slower.

Further, in **China**, projected growth is revised to 4.6% in CY24 followed by 4.1% in CY25. The upgrade is driven by carryover effects from stronger-than-expected growth in 2023 and heightened government spending on capacity building to address natural disasters. Whereas, **India** is projected to remain strong at 6.5% for both CY24 and CY25 backed by resilient domestic demands despite external headwinds.

The **Indonesian** economy is expected to register growth of 5% both in CY24 and CY25 with a strong recovery in domestic demands, a healthy export performance, policy measures, and normalization in commodity prices. In CY22, **Saudi Arabia** was the fastest-growing economy in this peer set with 8.7% growth. The growth is accredited to robust oil production, non-oil private investments encompassing wholesale and retail trade, construction and transport, and surging private consumption. Saudi Arabia's growth slowed at -1.1% in CY23 attributed to lower oil production. Going forward, GDP is expected to grow at 2.7% and 5.5% in CY24 and CY25, respectively. On the other hand, **Brazil** is expected to project growth of 1.7% in CY24 driven by strong domestic demand and increase in trading partner companies.

Despite the turmoil in the last 2-3 years, India bears good tidings to become a USD 5 trillion economy by CY27. According to the IMF dataset on Gross Domestic Product (GDP) at current prices, the nominal GDP has been estimated to be at USD 3.4 trillion for CY22 and is projected to reach USD 5.2 trillion by CY27. India's expected GDP growth rate for coming years is almost double compared to the world economy.

Besides, India stands out as the fastest-growing economy among the major economies. The country is expected to grow at more than 6% in the period of CY24-CY28, outshining China's growth rate. By CY27, the Indian economy is estimated to emerge as the third-largest economy globally, hopping over Japan and Germany. Currently, it is the third-

largest economy globally in terms of Purchasing Power Parity (PPP) with a ~7% share in the global economy, with China [~18%] on the top followed by the United States [~15%]. Purchasing Power Parity is an economic performance indicator denoting the relative price of an average basket of goods and services that a household needs for livelihood in each country.

Despite Covid-19's impact, high inflationary environment and interest rates globally, and the geopolitical tensions in Europe, India has been a major contributor to world economic growth. India is increasingly becoming an open economy as well through growing foreign trade. Despite the global inflation and uncertainties, Indian economy continues to show resilience. This resilience is mainly supported stable financial sector backed by well-capitalized banks and export of services in trade balance. With this, the growth of Indian economy is expected to fare better than other economies majorly because of strong investment activity bolstered by the government's capex push and buoyant private consumption, particularly among higher income earners.

## **1.2 Indian Economic Outlook**

### **1.2.1 GDP Growth and Outlook**

#### **Resilience to External Shocks remains Critical for Near-Term Outlook**

India's real GDP grew by 9.1% in FY22 and stood at ~Rs. 149 trillion despite the pandemic and geopolitical Russia-Ukraine spillovers. In Q1FY23, India recorded 13.1% y-o-y growth in real GDP, largely attributed to improved performance by the agriculture and services sectors. Following this double-digit growth, Q2FY23 witnessed 6.2% y-o-y growth, while Q3FY23 registered 4.5% y-o-y growth. The slowdown during Q2FY23 and Q3FY23 compared to Q1FY23 can be attributed to the normalization of the base and a contraction in the manufacturing sector's output.

Subsequently, Q4FY23 registered broad-based improvement across sectors compared to Q3FY23 with a growth of 6.1% y-o-y. The investments, as announced in the Union Budget 2022-23 on boosting public infrastructure through enhanced capital expenditure, have augmented growth and encouraged private investment through large multiplier effects in FY23. Supported by fixed investment and higher net exports, real GDP for full-year FY23 was valued at Rs. ~160. trillion registering an increase of 7.2% y-o-y.

Furthermore, in Q1FY24, the economic growth accelerated to 7.8%. The manufacturing sector maintained an encouraging pace of growth, given the favorable demand conditions and lower input prices. The growth was supplemented by a supportive base alongside robust services and construction activities. This momentum was maintained in the Q2FY24 with GDP growth at 7.6%, mainly supported by acceleration in investments. However, private consumption growth was muted due to weak rural demand and some moderation in urban demand amid elevated inflationary pressures in Q2FY24. On the supply side, a significant improvement in manufacturing and construction activities supported growth. Overall, the economy expanded by 7.7% in H1FY24 compared to 5.3% in H2FY23. As per recent Ministry of Statistics and Programme Implementation (MoSPI)'s advanced estimate release, the real GDP growth for FY24 is pegged at 7.3% and will attain a level of ~ Rs. 171.79 trillion.

#### **GDP Growth Outlook**

- Driven by resilience in urban demand and the front loading of the government's capital expenditure, the H1FY24 witnessed a strong growth. While festive cheer will support urban demand in Q3, the outlook for rural demand revival remains clouded amid monsoon deficiency and likely hit to the agricultural production.
- The recent announcements of various relief measures such as LPG price reduction and extension of Pradhan Mantri Garib Kalyan Anna Yojna (PMGKAY) are expected to provide some cushion and so far, investment demand has remained robust. However, there could be some moderation in H2FY24 as both the government and private sector may restrain their

capital spending ahead of the general elections. Despite some expected moderation in the H2FY24, India's overall GDP growth for FY24 is expected to remain on a firm footing. In terms of fiscal deficit for the year, the Finance Ministry has estimated it to be at 5.1% of GDP.

- Strong credit growth, resilient financial markets, and the government's continual push for capital spending and infrastructure are likely to create a compatible environment for investments. In the Interim Budget 2024-25, significant emphasis is placed on infrastructure development with an increased capital expenditure outlay of Rs. 11,11,111 crores, amounting to 3.4% of the GDP.
- External demand is likely to remain subdued with a slowdown in global activities, thereby indicating adverse implications for exports. Additionally, heightened inflationary pressures and resultant policy tightening may pose a risk to the growth potential.

Prior to the Interim Budget, in December 2023, the RBI in its bi-monthly monetary policy meeting estimated a real GDP growth of 7% y-o-y for FY24 comparatively lower from MoSPI's estimate of 7.2%.

**Table 2: RBI's GDP Growth Outlook (Y-o-Y %)**

FY25P (complete year)	Q4FY24P	Q1FY25P	Q2FY25P	Q3FY25P	Q4FY25P
7.0%	6.5%	7.2%	6.8%	7.0%	6.9%

Note: P-Projected; Source: Reserve Bank of India

### 1.2.2 Gross Value Added (GVA)

Gross Value Added (GVA) is the measure of the value of goods and services produced in an economy. GVA gives a picture of the supply side whereas GDP represents consumption.

#### Industry and Services sector leading the recovery charge

- The gap between GDP and GVA growth turned positive in FY22 (after a gap of two years) due to robust tax collections. Of the three major sector heads, the service sector has been the fastest-growing sector in the last 5 years.
- The **agriculture sector** was holding growth momentum till FY18. In FY19, the acreage for the rabi crop was marginally lower than the previous year which affected the agricultural performance. Whereas FY20 witnessed growth on account of improved production. During the pandemic-impacted period of FY21, the agriculture sector was largely insulated as timely and proactive exemptions from COVID-induced lockdowns to the sector facilitated uninterrupted harvesting of rabi crops and sowing of kharif crops. However, supply chain disruptions impacted the flow of agricultural goods leading to high food inflation and adverse initial impact on some major agricultural exports. However, performance remained steady in FY22.

In FY23, the agriculture sector performed well despite weather-related disruptions, such as uneven monsoon and unseasonal rainfall, impacting yields of some major crops and clocked a growth of 4% y-o-y, garnering Rs. 22.3 trillion.

In Q1FY24, this sector expanded at a slower pace of 3.5% y-o-y growth compared to y-o-y growth a quarter ago. This further stumbled to 1.2% in Q2FY24. Overall, H1FY24 registered a 2.4% growth with weakest monsoon experience caused by El Nino conditions.

In the Interim Budget 2024-25, the government plans to boost private and public investment in post-harvest activities and expand the application of Nano-DAP across agro-climatic zones. Strategies for self-reliance in oilseeds and dairy development are to be formulated, alongside ramping up the Pradhan Mantri Matsya Sampada Yojana and establishing Integrated Aquaparks. Allocation for PM-Formalisation of Micro Food Processing Enterprises scheme has increased from Rs. 639 crores in FY24 to Rs. 880 crores in FY25.

Going forward, rising bank credit to the sector and increased exports will be the drivers for the agriculture sector. However, a deficient rainfall may have impact on the reservoir level, weighing on prospects of Kharif sowing. Considering these factors, the agriculture sector is estimated to attain Rs. 22.7 trillion and mark 1.8% y-o-y growth for complete FY24.

- The **industrial sector** witnessed a CAGR of 4.7% for the period FY16 to FY19. From March 2020 onwards, the nationwide lockdown due to the pandemic significantly impacted industrial activities. In FY20 and FY21, this sector felt turbulence due to the pandemic and recorded a decline of 1.4% and 0.9%, respectively, on a y-o-y basis. With the opening of the economy and resumption of industrial activities, it registered 11.6% y-o-y growth in FY22, albeit on a lower base.

The industrial output in FY23 grew by 4.4% with estimated value Rs. 45.2 trillion owing to a rebound in manufacturing activities and healthy growth in the construction sector.

The industrial sector grew by 5.5% in Q1FY24, while Q2FY24 growth was up by 13.2% owing to positive business optimism and strong growth in new orders supported manufacturing output. The industrial growth was mainly supported by sustained momentum in the manufacturing and construction sectors. Within manufacturing, industries such as pharma, motor vehicles, metals, petroleum and pharma witnessed higher production growth during the quarter. The construction sector (13% growth in Q2FY24) benefited from poor rainfall during August and September and higher implementation of infrastructure projects. This was reflected in robust cement and steel production and power demand in Q2FY24. Overall, H1FY24 picked up by 9.3% with manufacturing and construction activities witnessing significant acceleration.

India's industrial sector is experiencing strong growth, driven by significant expansion in manufacturing, mining, and construction. This growth is supported by positive business sentiment, declining commodity prices, beneficial government policies like production-linked incentive schemes, and efforts to boost infrastructure development. These factors collectively contribute to the sustained buoyancy in industrial growth due to which the industrial growth is estimated at 7.9% on y-o-y basis registering the value of Rs. 48.9 trillion in FY24.

- The **Services sector** recorded a CAGR of 7.1% for the period FY16 to FY20, which was led by trade, hotels, transport, communication, and services related to broadcasting, finance, real estate, and professional services. This sector was the hardest hit by the pandemic and registered an 8.2% y-o-y decline in FY21. The easing of restrictions aided a fast rebound in this sector, with 8.8% y-o-y growth witnessed in FY22.

Overall, in FY23, benefitting from the pent-up demand, the service sector was valued at Rs. 20.6 trillion and registered growth of 9.5% y-o-y.

In Q1FY24, the services sector growth jumped to 10.3%. Within services, there was a broad-based improvement in growth across different sub-sectors. However, the sharpest jump was seen in financial, real estate, and professional services. Trade, hotels, and transport sub-sectors expanded at a healthy pace gaining from strength in discretionary demand. The service sector growth in Q2FY24 moderated to 5.8% partly due to the normalization of base effect and some possible dilution in discretionary demand. Considering these factors, service sector marked 8% growth in H1FY24.

With this performance, steady growth in various service sector indicators like air passenger traffic, port cargo traffic, GST collections, and retail credit are expected to support the services sector. With this, the growth of service sector is estimated at Rs. 86.2 trillion registering 7.7% growth in FY24 overall.



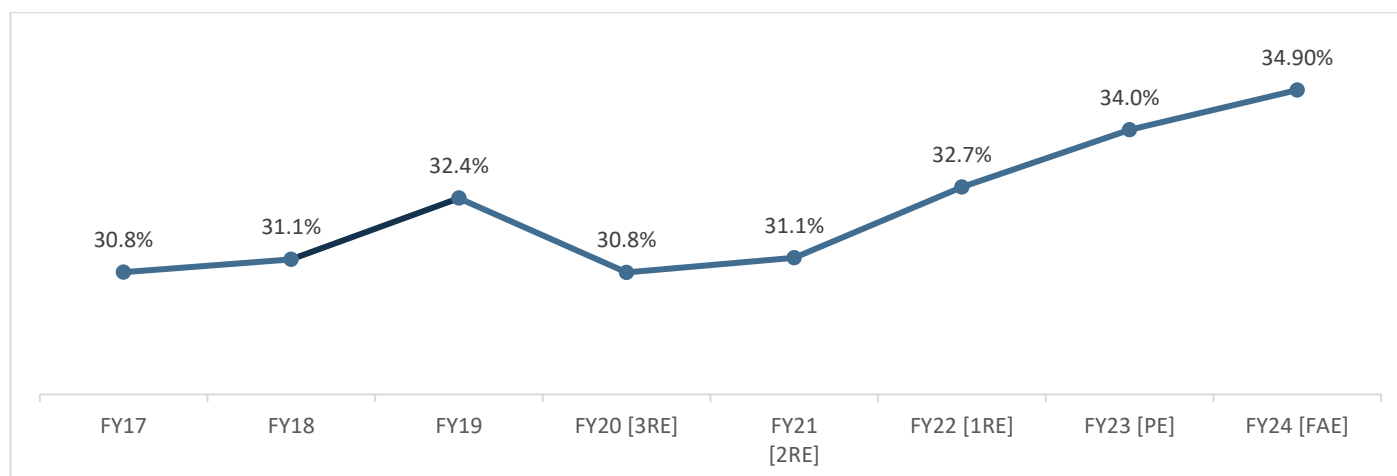
**Table 3: Sectoral Growth (Y-o-Y % Growth) - at Constant Prices**

At constant Prices	FY19	FY20	FY21	FY22 (FRE)	FY23 (PE)	FY24 (FAE)
<b>Agriculture, Forestry &amp; Fishing</b>	<b>2.1</b>	<b>6.2</b>	<b>4.1</b>	<b>3.5</b>	<b>4.0</b>	<b>1.8</b>
<b>Industry</b>	<b>5.3</b>	<b>-1.4</b>	<b>-0.9</b>	<b>11.6</b>	<b>4.4</b>	<b>7.9</b>
Mining & Quarrying	-0.9	-3.0	-8.6	7.1	4.6	8.1
Manufacturing	5.4	-3.0	2.9	11.1	1.3	6.5
Electricity, Gas, Water Supply & Other Utility Services	7.9	2.3	-4.3	9.9	9.0	8.3
Construction	6.5	1.6	-5.7	14.8	10.0	10.7
<b>Services</b>	<b>7.2</b>	<b>6.4</b>	<b>-8.2</b>	<b>8.8</b>	<b>9.5</b>	<b>7.7</b>
Trade, Hotels, Transport, Communication & Broadcasting	7.2	6.0	-19.7	13.8	14.0	6.3
Financial, Real Estate & Professional Services	7.0	6.8	2.1	4.7	7.2	8.9
Public Administration, Defence and Other Services	7.5	6.6	-7.6	9.7	7.2	7.7
<b>GVA at Basic Price</b>	<b>5.8</b>	<b>3.9</b>	<b>-4.2</b>	<b>8.8</b>	<b>7.0</b>	<b>6.9</b>

Note: FRE – First Revised Estimates, PE – Provisional Estimate, FAE – First Advance Estimate; Source: MOSPI

### 1.2.3 Investment Trend in Infrastructure

Gross Fixed Capital Formation (GFCF), which is a measure of the net increase in physical assets, witnessed an improvement in FY22. As a proportion of GDP, it is estimated to be at 32.7%, which is the second-highest level in 7 years (since FY17). In FY23, the ratio of investment (GFCF) to GDP climbed up to its highest in the last decade at 34%. Continuing in its growth trend, this ratio is expected to reach 34.9% in FY24.

**Chart 2: Gross Fixed Capital Formation (GFCF) as % of GDP (At constant prices):**

Note: 3RE – Third Revised Estimate, 2RE – Second Revised Estimates, 1RE – First Revised Estimates, PE – Provisional Estimate, FAE-First Advance Estimate; Source: MOSPI

Overall, the support of public investment in infrastructure is likely to gain traction due to initiatives such as Atmanirbhar Bharat, Make in India, and Production-linked Incentive (PLI) scheme announced across various sectors.

### 1.2.4 Industrial Growth

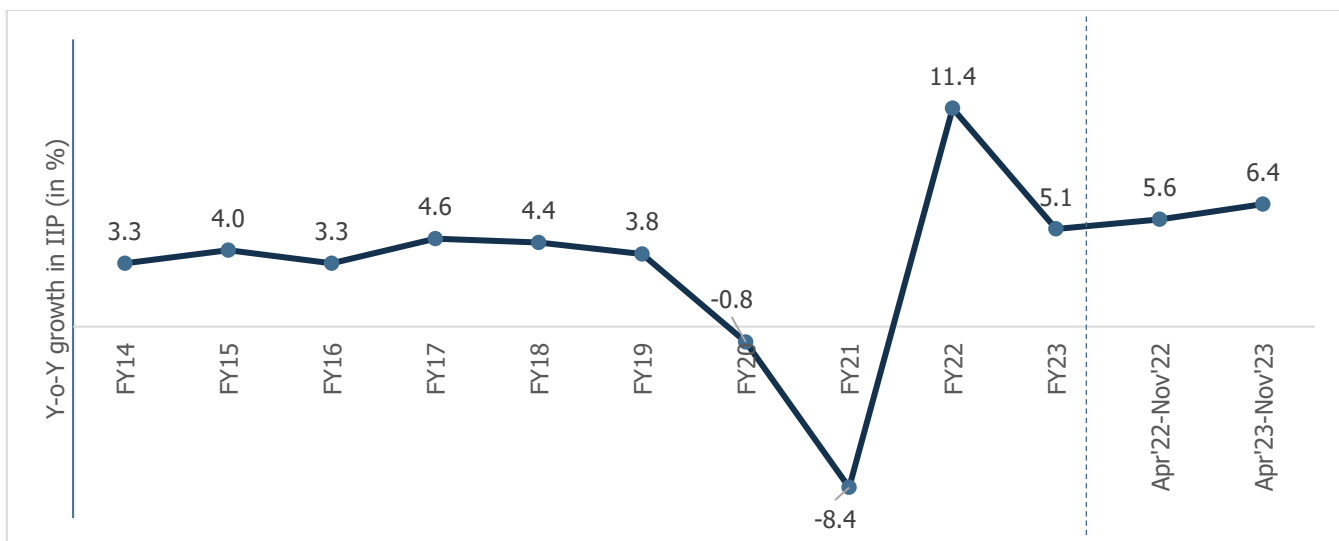
#### Improved Core and Capital Goods Sectors helped IIP Growth Momentum

The Index of Industrial Production (IIP) is an index to track manufacturing activity in an economy. On a cumulative basis, IIP grew by 11.4% y-o-y in FY22 post declining by 0.8% y-o-y and 8.4% y-o-y, respectively, in FY20 and FY21. This high growth was mainly backed by a low base of FY21.

During FY23, the industrial output recorded a growth of 5.1% y-o-y supported by a favorable base and a rebound in economic activities. The period April 2023 – November 2023, industrial output grew by 6.4% compared to the 5.6% growth in the corresponding period last year. For the month of November 2023, the IIP growth slowed down to 2.4% compared to the last year primarily on account of a normalization of base.

So far in the current fiscal, while the infrastructure-related sectors have been doing well, slowing global growth and downside risks to rural demand have posed a challenge for industrial activity. Though the continued moderation in inflationary pressure offers some comfort, pain points in the form of elevated prices of select food items continue to persist.

**Chart 3: Y-o-Y growth in IIP (in %)**



Source: MOSPI

### 1.2.5 Consumer Price Index

India’s consumer price index (CPI), which tracks retail price inflation, stood at an average of 5.5% in FY22 which was within RBI’s targeted tolerance band of 6%. However, consumer inflation started to upswing from October 2021 onwards and reached a tolerance level of 6% in January 2022. Following this, CPI reached 6.9% in March 2022.

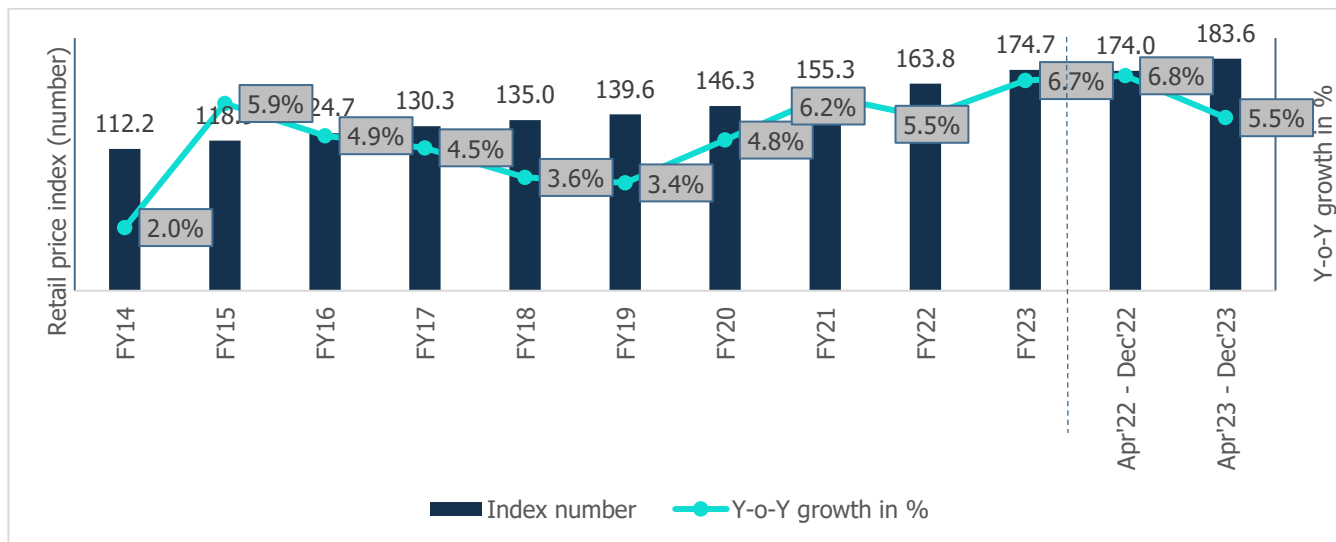
CPI remained elevated at an average of 6.7% in FY23, above the RBI’s tolerance level. However, there was some respite toward the end of the fiscal wherein the retail inflation stood at 5.7% in March 2023, tracing back to the RBI’s

tolerance band. Apart from a favorable base effect, the relief in retail inflation came from a moderation in food inflation.

In the current fiscal FY24, the CPI moderated for two consecutive months to 4.7% in April 2023 and 4.3% in May 2023. This trend snapped in June 2023 with CPI rising to 4.9%. In July 2023, the CPI had reached the RBI’s target range for the first time since February 2023 at 7.4% largely due to increased food inflation. This marked the highest reading observed since the peak in April 2022 at 7.8%. The notable surge in vegetable prices and elevated inflation in other food categories such as cereals, pulses, spices, and milk have driven this increase. Further, the contribution of food and beverage to the overall inflation had risen significantly to 65%, surpassing their weight in the CPI basket. In August 2023, the food inflation witnessed some moderation owing to government’s active intervention. This was further moderated for second consecutive month in September 2023 to 5%, led by a sharp correction in vegetables prices and lower LPG prices. Helped by deflation in the fuel and light category, the retail inflation in October 2023 softened at 4.9%. This trend reversed in November 2023 due to spike in certain vegetable prices as well as sticky inflation in non-perishable food items such as cereals, pulses and spices and the CPI rose to 5.6%. In the month of December 2023, elevated food prices and an unfavourable base drove headline inflation to a four-month peak of 5.7%.

While the consistent decrease in core inflation due to falling commodity prices and diminishing demand-side pressures is encouraging, the ongoing high food inflation, potentially exacerbated by a projected drop in Kharif production and uncertainties around Rabi sowing, remains worrisome. Despite these concerns, the favourable base effect throughout Q4FY24 and the expected easing of food price pressures with the arrival of fresh crops from January to March could help mitigate inflation risks.

**Chart 4: Retail Price Inflation in terms of index and Y-o-Y Growth in % (Base: 2011-12=100)**

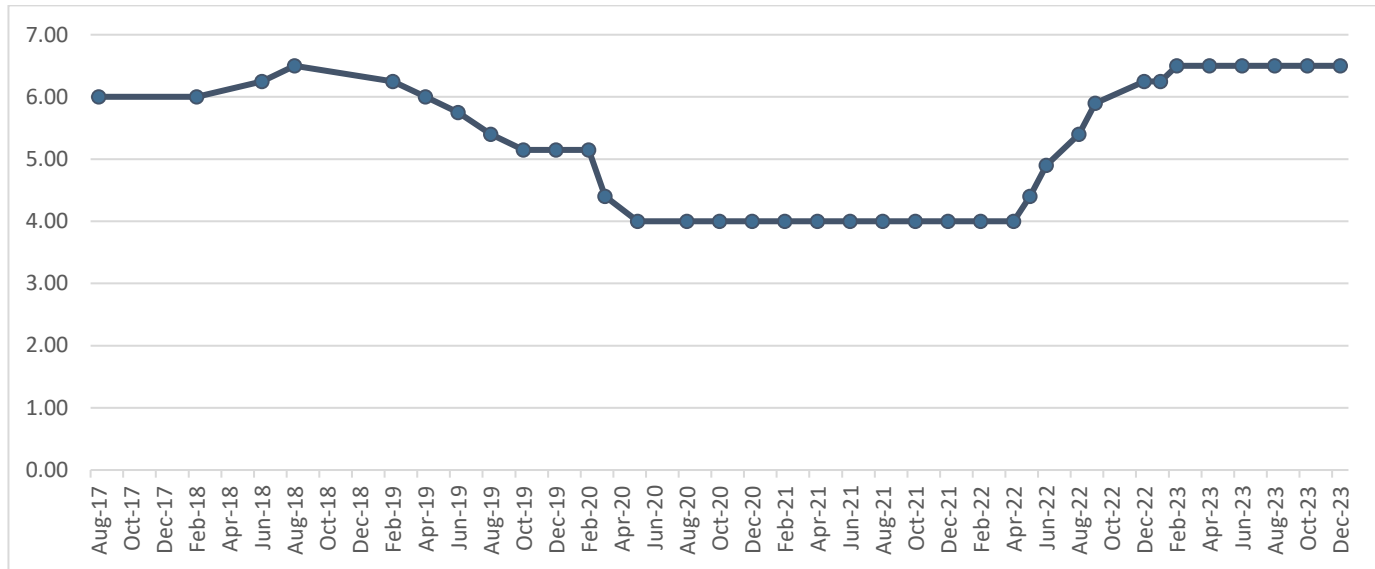


Source: MOSPI

The CPI is primarily factored in by RBI while preparing their bi-monthly monetary policy. At the bi-monthly meeting held in December 2023, RBI projected inflation at 5.4% for FY24 with inflation during Q3FY24 at 5.6%, Q4FY24 at 5.2%, while for FY25 it is pegged at 4.5% and in Q1FY25 at 5.0% , Q2FY25 at 4.0%, Q3FY25 at 4.6% and Q4FY25 at 4.7%.

The RBI has increased the repo rates with the rise in inflation in the past year from 4% in April 2022 to 6.5% in January 2023. Considering the current inflation situation, RBI has kept the repo rate unchanged at 6.5% in the last five meetings of the Monetary Policy Committee.

**Chart 5: RBI historical Repo Rate**



Source: RBI

In a meeting held in December 2023, RBI also maintained the liquidity adjustment facility (LAF) corridor by adjusting the standing deposit facility (SDF) rate of 6.25% as the floor and the marginal standing facility (MSF) at the upper end of the band at 6.75%.

Further, the central bank continued to remain focused on the withdrawal of its accommodative stance. With domestic economic activities gaining traction, RBI has shifted gears to prioritize controlling inflation. While RBI has paused on the policy rate front, it has also strongly reiterated its commitment to bringing down inflation close to its medium-term target of 4%. Given the uncertain global environment and lingering risks to inflation, the Central Bank has kept the window open for further monetary policy tightening in the future, if required.

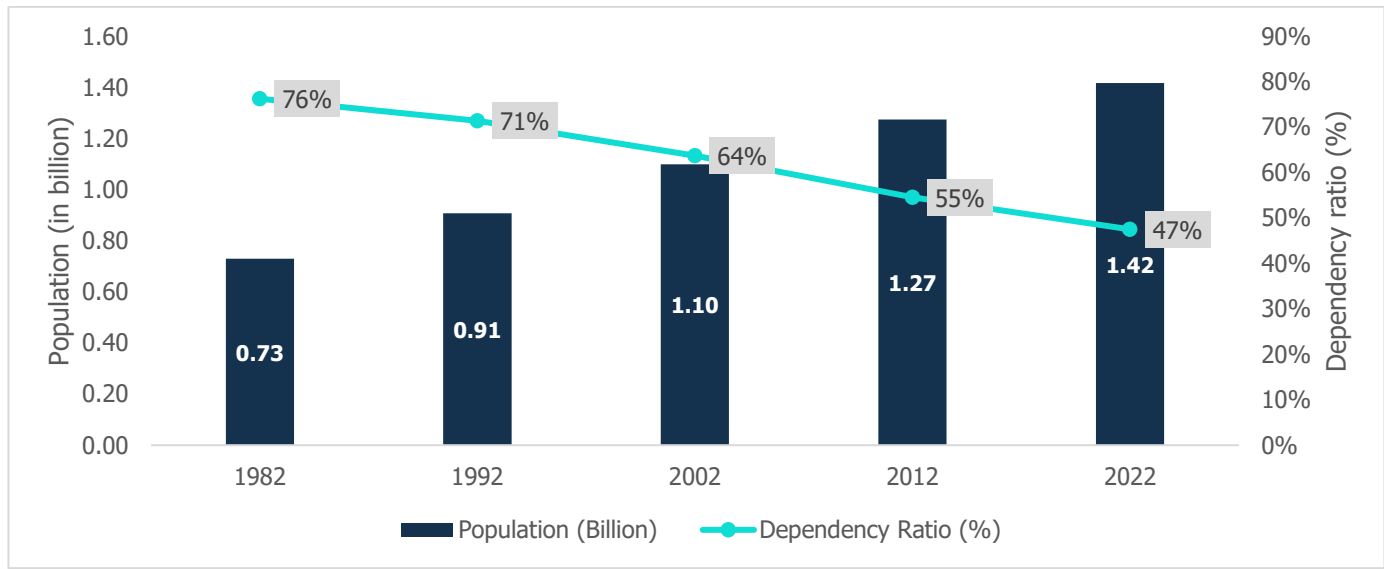
**1.2.6 Overview on Key Demographic Parameters**

- **Population growth and Urbanization**

The trajectory of economic growth of India and private consumption is driven by socio-economic factors such as demographics and urbanization. According to the world bank, India’s population in 2022 surpassed 1.42 billion slightly higher than China’s population 1.41 billion and became the most populous country in the world.

Age Dependency Ratio is the ratio of dependents to the working age population, i.e., 15 to 64 years, wherein dependents are population younger than 15 and older than 64. This ratio has been on a declining trend. It was as high as 76% in 1982, which has reduced to 47% in 2022. Declining dependency means the country has an improving share of working-age population generating income, which is a good sign for the economy.

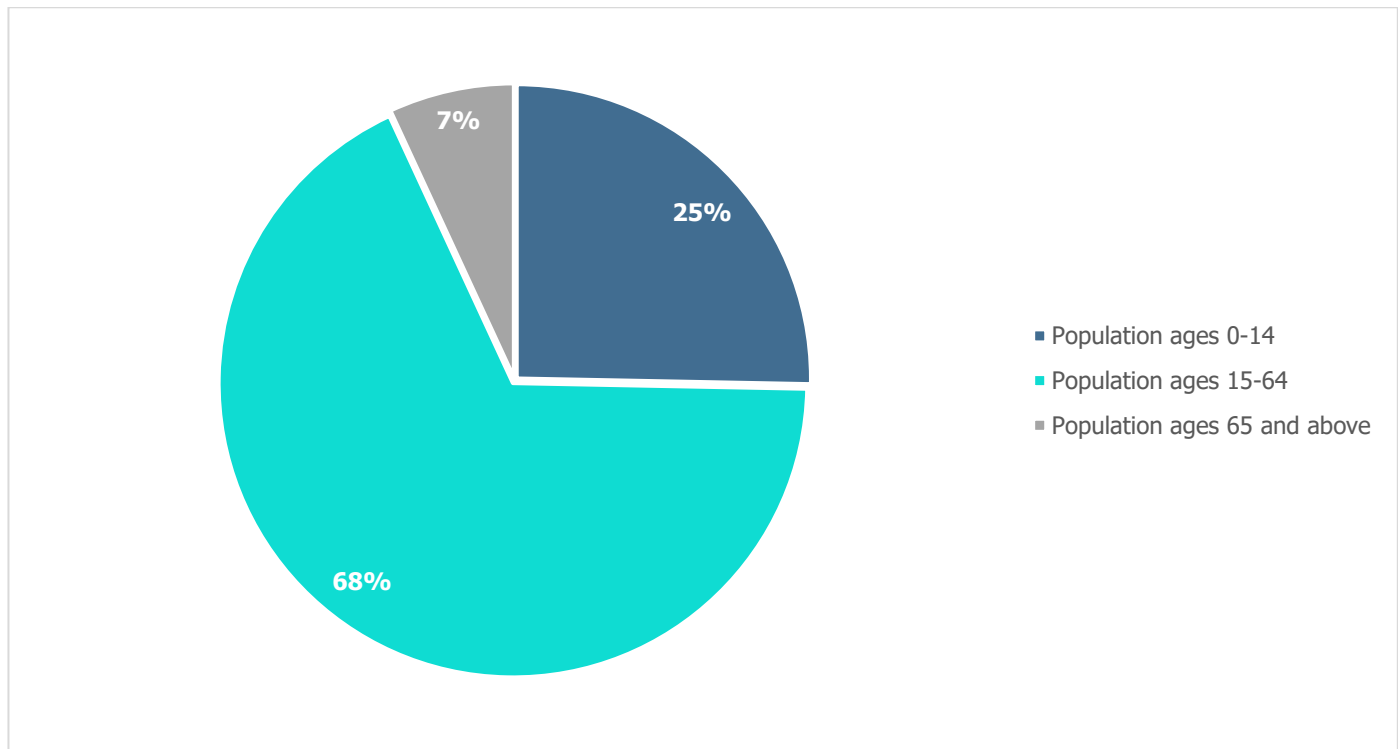
**Chart 6: Population trend of India vis-à-vis dependency ratio**



Source: World Bank Database

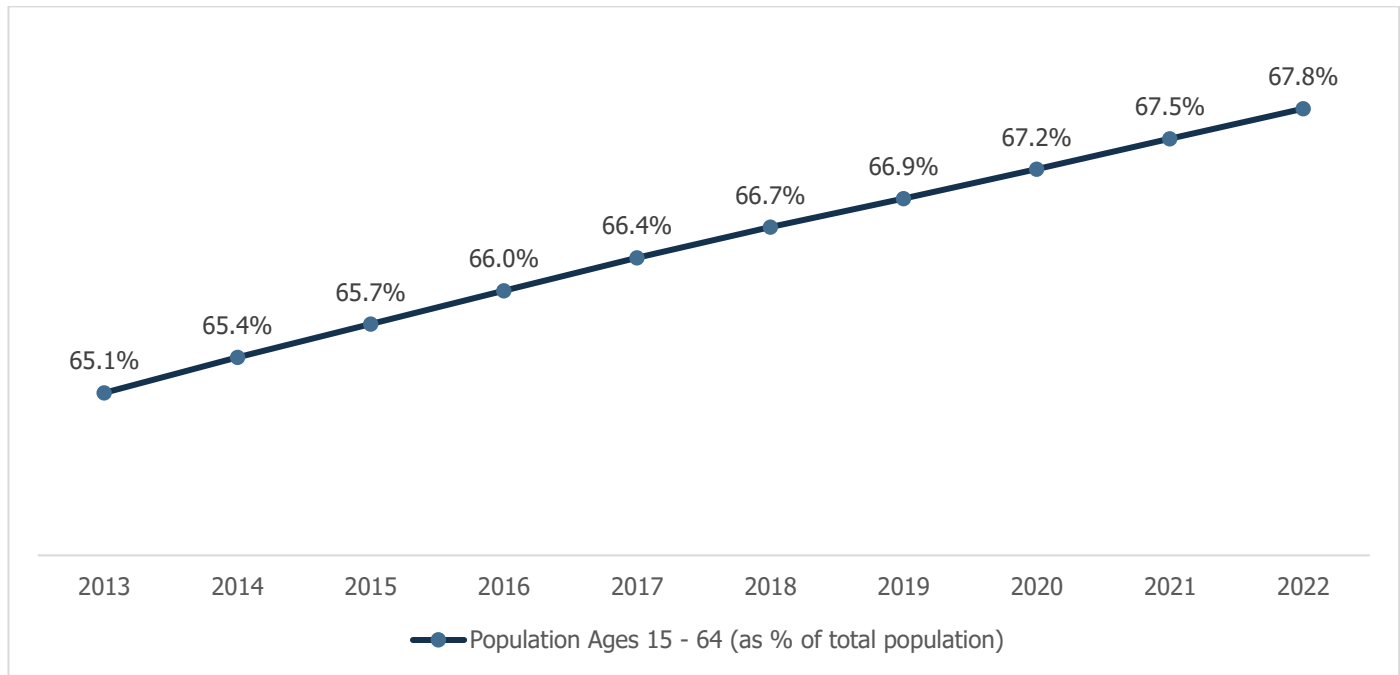
With an average age of 29, India has one of the youngest populations globally. With vast resources of young citizens entering the workforce every year, it is expected to create a 'demographic dividend'. India is home to a fifth of the world's youth demographic and this population advantage will play a critical role in economic growth.

**Chart 7: Age-Wise Break Up of Indian population**



Source: World Bank Database

**Chart 8: Yearly Trend - Young Population as % of Total Population**

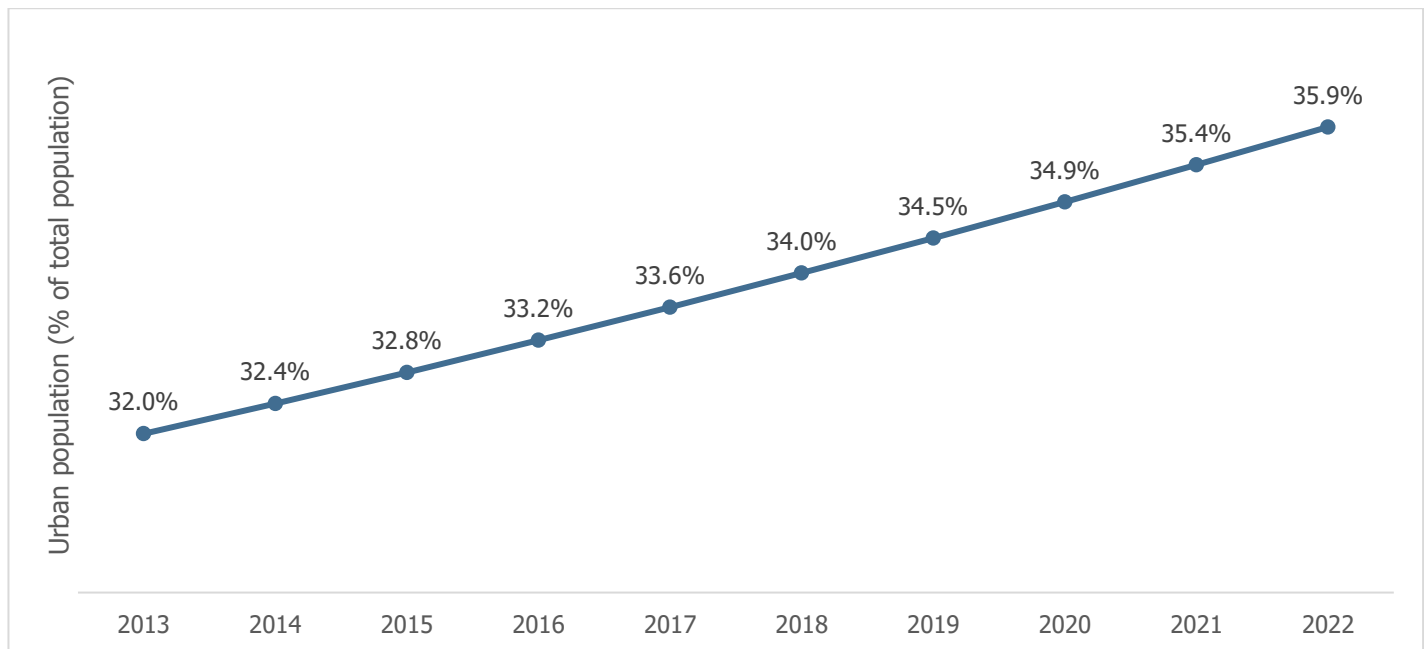


Source: World Bank Database

- **Urbanization**

The urban population is significantly growing in India. The urban population in India is estimated to have increased from 403 million (31.6% of total population) in 2012 to 508 million (35.9% of total population) in the year 2022. People living in Tier-2 and Tier-3 cities have greater purchasing power.

**Chart 9: Urbanization Trend in India**



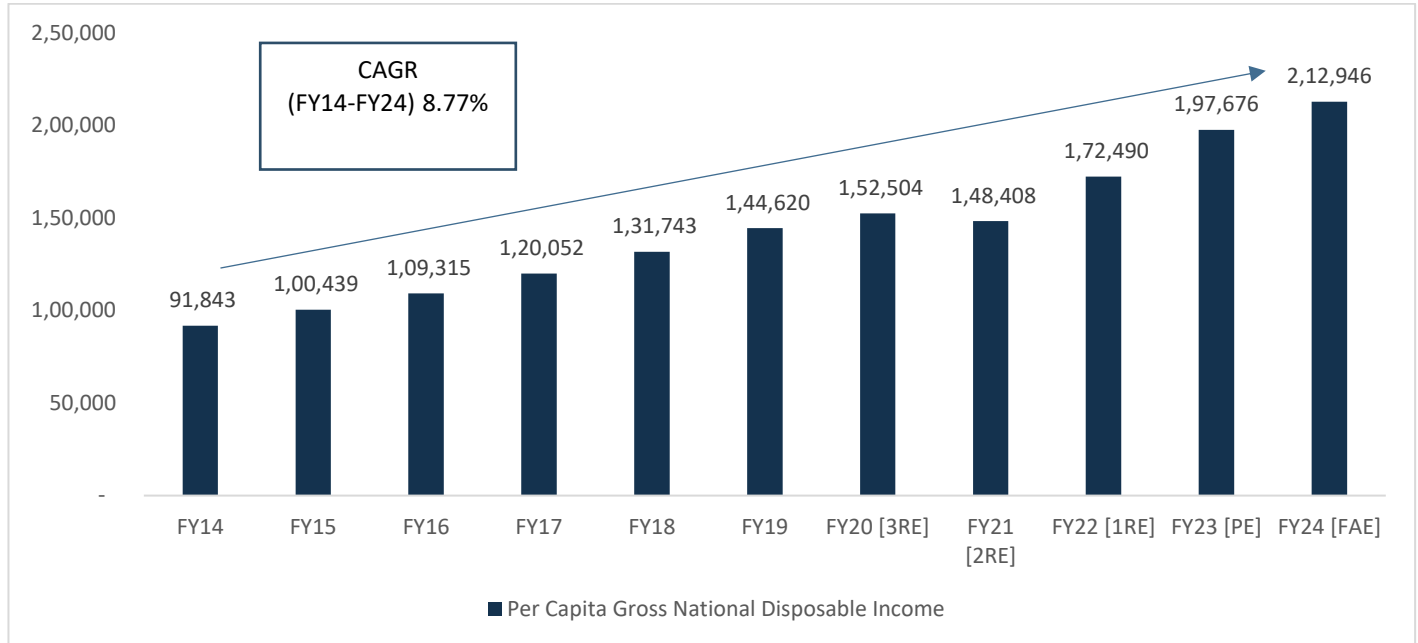
Source: World Bank Database

- Increasing Per Capita Disposable Income**

Gross National Disposable Income (GNDI) is a measure of the income available to the nation for final consumption and gross savings. Between the period FY14 to FY24, per capita GNDI at current prices registered a CAGR of 8.77%. More disposable income drives more consumption, thereby driving economic growth.

The chart below depicts the trend of per capita GNDI in the past decade:

**Chart 10: Trend of Per Capita Gross National Disposable Income (Current Price)**

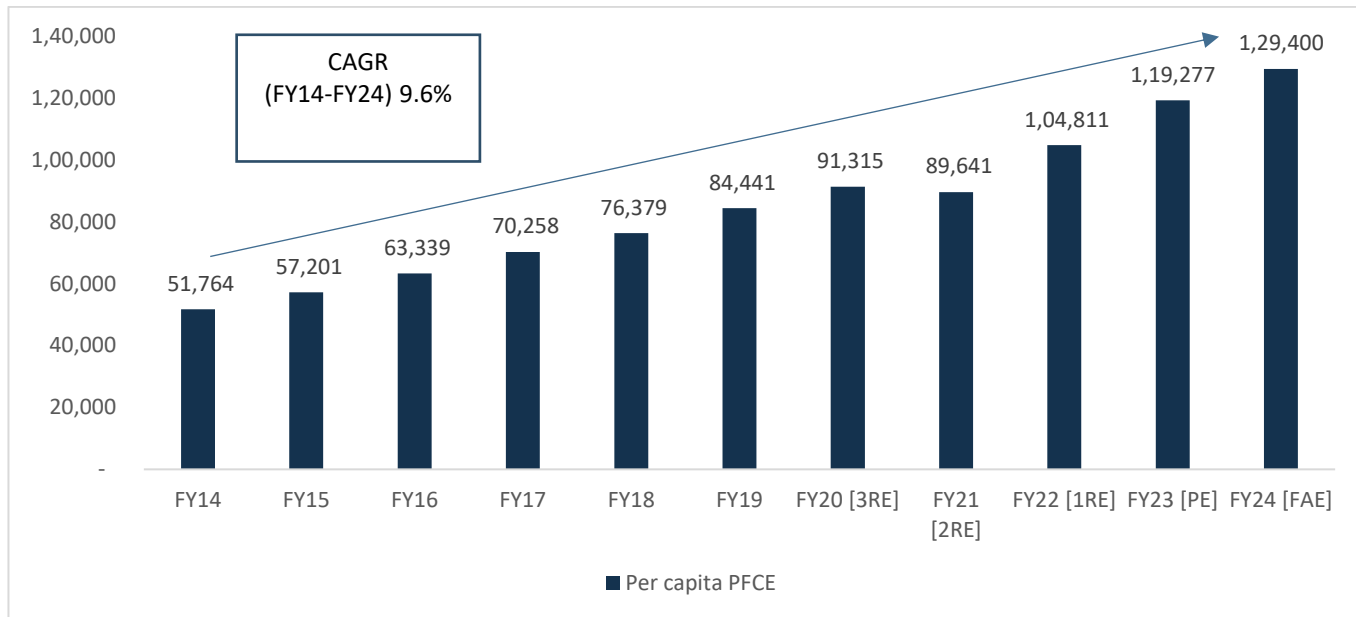


Note: 3RE – Third Revised Estimate, 2RE – Second Revised Estimates, 1RE – First Revised Estimates, PE – Provisional Estimate;  
Source: MOSPI

- Increase in Consumer Spending**

With increase in disposable income, there has been a gradual change in consumer spending behaviour as well. Private Final Consumption Expenditure (PFCE) which is measure of consumer spending has also showcased significant growth in the past decade at a CAGR of 9.6%. Following chart depicts the trend of per capita PFCE at current prices:

**Chart 11: Trend of Per Capita Private Final Consumption Expenditure (Current Price)**



Source: MOSPI

**1.2.7 Concluding Remarks**

The major headwinds to global economic growth are escalating geopolitical tensions, volatile global commodity prices, and a shortage of key inputs. Despite the global economic growth uncertainties, the Indian economy is relatively better placed in terms of GDP growth compared to other emerging economies. According to IMF’s forecast, it is expected to be 6.3% in CY24 compared to the world GDP growth projection of 3%. The bright spots for the economy are continued healthy domestic demand, support from the government towards capital expenditure, moderating inflation, and improving business confidence.

Likewise, several high-frequency growth indicators including the purchasing managers index, auto sales, bank credit, and GST collections have shown improvement in FY23. Moreover, normalizing the employment situation after the opening of the economy is expected to improve and provide support to consumption expenditure.

Further, as per the Indian Meteorological Department (IMD), the rainfall witnessed a deficit until September 2023. A drop-in yield due to irregular monsoons and a lower acreage can lead to a demand-supply mismatch, further increasing the inflationary pressures on the food basket. Moreover, the consumption demand is expected to pick up in Q3FY24 due to the festive season. Going forward, the rising domestic demand will be driven by the rural economy’s performance and continual growth in urban consumption. However, high domestic inflation and global headwinds pose a downside risk to domestic demand.

At the same time, public investment is expected to exhibit healthy growth as the government has allocated a strong capital expenditure of about Rs. 10 lakh crores for FY24. The private sector’s intent to invest is also showing improvement as per the data announced on new project investments. However, volatile commodity prices and economic uncertainties emanating from global turbulence may slow down the improvement in private CapEx and investment cycle.



## 2. Global Infrastructure Industry

### 2.1 Overview

The need for physical infrastructure including real estate, roads, railways, airports, ports, water and energy, etc., is rising day by day. According to the World Bank, one billion people reside more than two kilometers from an all-season road, 675 million do not have access to electricity at home, and almost 4 billion do not have access to the internet. It is critical to bridge this gap in order to promote economic growth across the globe.

Despite the enormous economic growth and development over the last decade, the Asian Development Bank emphasizes that essential infrastructure in many nations remains far from adequate. The demand for resilient infrastructure, especially in the medical and digital field has increased due to COVID-19. Several initiatives on infrastructure-related projects have been taken by governments globally to boost economic growth and provide job opportunities.

Some of the key growth drivers of the global infrastructure industry are the rising population, increasing urbanization, upgrading infrastructure and retrofit industries, and technological advancements. In addition, the shift toward sustainable infrastructure is propelling the industry's demands because of environmental concerns. Besides, investments in infrastructure the government and private sector will aid in social and economic development.

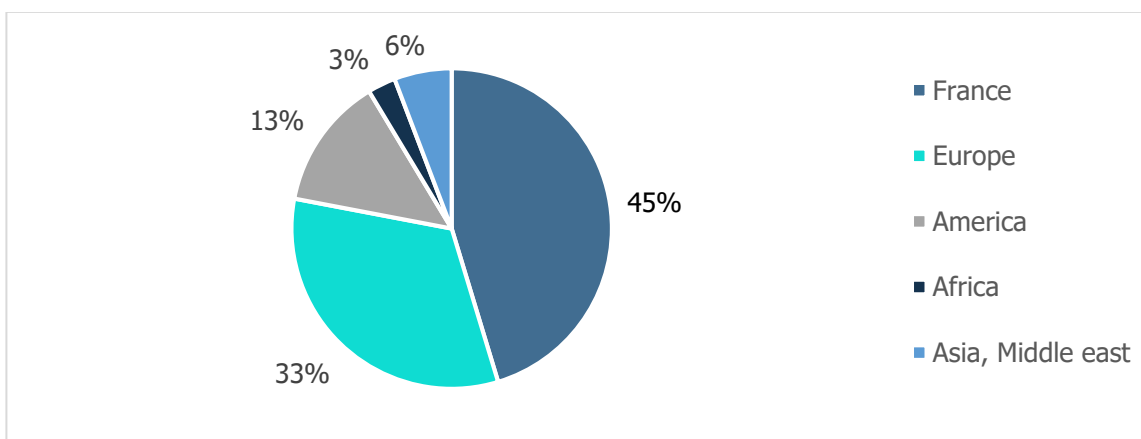
Overall, the demand for the global infrastructure industry will continue to grow as it is integral to the physical landscape of the world and facilitates trade and commerce between countries. Furthermore, the rising urbanization, attributed to the growing population and support from governments worldwide will accelerate the industry growth.

### 2.2 Overview of major global players

#### A. VINCI

- Vinci is one of the global infrastructure company which was founded in 1899 in France and is majorly into energy, construction and real estate businesses.
- Currently, it is operating in around 130 countries with 4,000 business units.
- As of 31<sup>st</sup> December 2022, the revenue generated by the company was € 61.7 billion out of which the business from construction segment was € 29.3 billion.

#### Revenue Mix by Geography for CY22

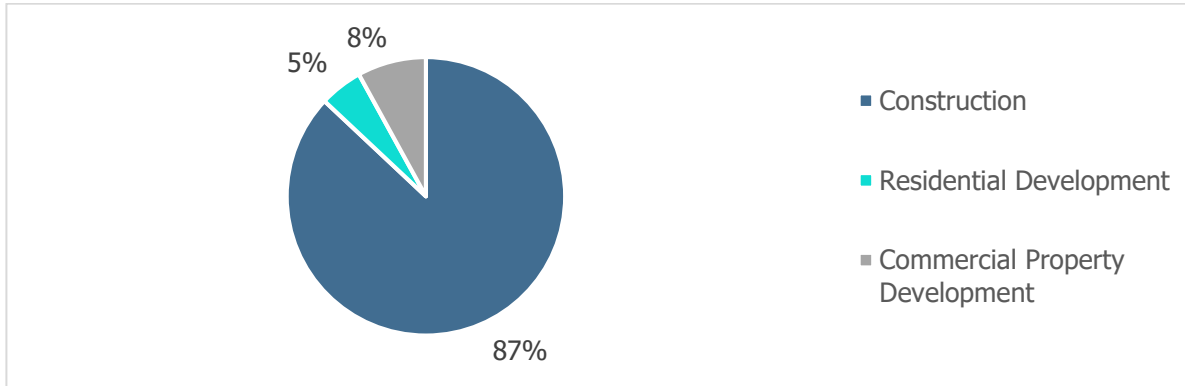


Source: Company disclosures

**B. SKANSKA**

- Skanska is one of the global companies which is established in Sweden in the year 1887. It is engaged in construction business, operating across select markets in the Nordics, Europe and the USA.
- The company has four business segments namely, Construction, Residential Development, Commercial Property Development and Investment Properties.
- As of 31<sup>st</sup> December 2022, the consolidated income generated by the company was € 152.5 billion out of which the construction segment has reported € 145.8 billion.

**Revenue generation in different segments of business during CY22**

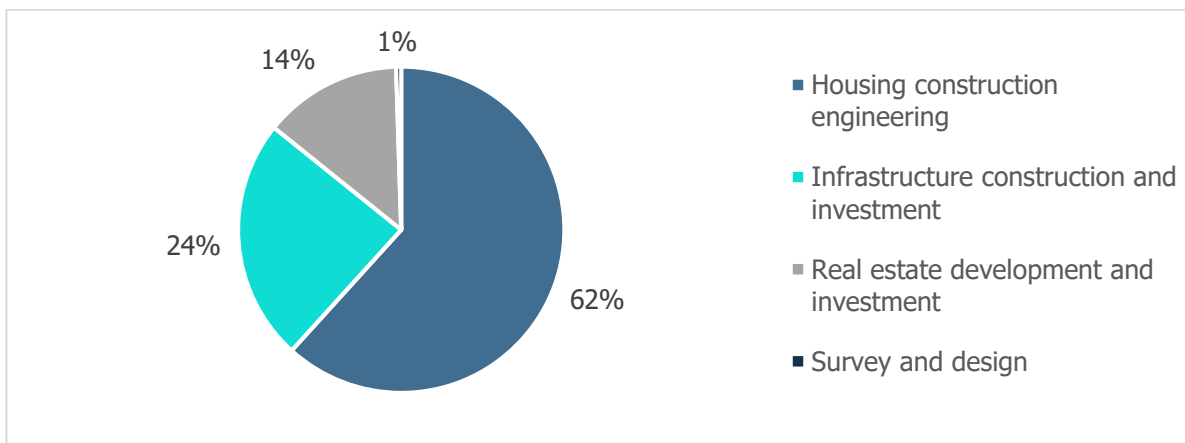


Source: Company disclosures

**C. CHINA STATE CONSTRUCTION ENGINEERING CORPORATION LTD (CSCEC)**

- Founded in 1982, CSCEC is the engineering contractor which is into investment and construction operations across the world with revenue of € 1,920 billion as of 31<sup>st</sup> December 2022.
- Currently, CSCEC is operating in more than 100 countries and regions.
- The business segments of the company include housing construction engineering, infrastructure construction and investment, real estate development and investment, survey and design etc.

**Revenue generation in different segments of business during CY22**



Source: Company disclosures

### 3. Infrastructure industry in India

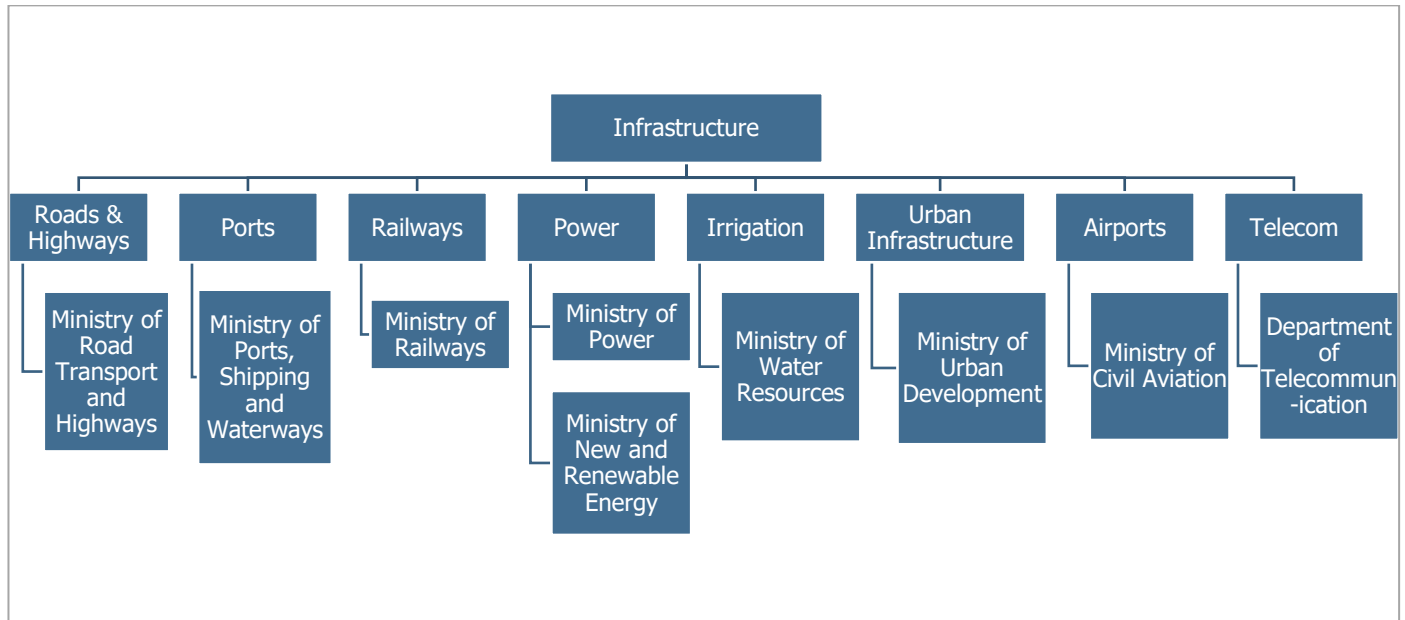
Infrastructure sector is a key driver for the Indian economy. The sector is highly responsible for propelling India’s overall development and enjoys intense focus from the Government for initiating policies that would ensure time-bound creation of world class infrastructure in the country. Infrastructure sector includes power, bridges, dams, roads, and urban infrastructure. In other words, infrastructure sector acts as a catalyst for India’s economic growth as it drives the growth of the allied sectors like townships, housing, built-up infrastructure and construction development projects.

In order to become a US\$ 5 trillion economy by 2025, infrastructure development is the need of the hour. The Government has launched the National Infrastructure Pipeline (NIP) combined with other initiatives such as ‘Make in India’ and the production-linked incentives (PLI) scheme to augment the growth of infrastructure sector. Historically, more than 80% of the country’s infrastructure spending has gone towards funding for transportation, electricity and water & irrigation. Centre’s share in NIP is 39% whereas, State and Private sector’s share is 39% and 22% respectively.

Under NIP, investment in Energy sector will be Rs.25,000 Billion, Rs.20,000 Billion in Roads, Rs.16,000 Billion in Irrigation, rural, agriculture and food processing, Rs.16,000 Billion in Mobility, Rs.14,000 Billion in Railways, Rs.3,200 Billion in Digital Infrastructure and Rs.2,500 Billion in Ports & Airports.

While these sectors still remain the key focus, the Government has also started to focus on other sectors as India's environment and demographics are evolving. There is a need for enhanced and improved delivery across the whole infrastructure range, from housing to water and sanitation services to digital and transportation demands, which will assure economic growth, increase quality of life and boost sectoral competitiveness.

#### Ministries under Infrastructure Industry



Source: CareEdge Research

### 3.1 Policy framework for the infrastructure sector

NITI Aayog had brought in the National Program and Project Management Policy Framework, which introduced sweeping reforms in the way infrastructure projects were executed in India, an action plan to:

1. Adopt a program and project management approach to infra development.
2. Institutionalize and promote the profession of program and project management and build a workforce of such professionals.
3. Enhance institutional capacity and capability of professionals.

#### Major functions of the Infrastructure Policy & Planning Division are:

- Matters relating to the Harmonized List of Infrastructure sub-sectors.
- All policy related issues in infrastructure sectors including those concerning road, ports, shipping, railways, inland water transport, urban development, power, new and renewable energy, railways and telecommunication sector referred to Department of Economic Affairs by the Administrative Ministries concerned.
- Examination of proposals requiring the approval of Expenditure Finance Committee (EFC) / Press Information Bureau (PIB) / Cabinet Committee on Economic Affairs (CCEA) / Committee of Secretaries (COS) / Competition Commission of India (CCI) in above sectors for viability and justification. In addition, all matters relating to Delhi Mumbai Industrial Corridor Trust and Delhi Mumbai Industry Corridor Development Corporation (DMICDC).
- Matters relating to infrastructure financing and promotion of investments in infrastructure sectors and credit enhancement.
- All International interface on infrastructure policy issues and infrastructure financing.
- Matters relating to the Infrastructure and Investment Working Group (IIWG) of G-20.
- All policy related issues pertaining to energy sector, viz., Petroleum & Natural Gas, Coal, Atomic Energy and New & Renewable Energy.
- Examination of proposals for grant of viability gap funding (VGF) under the National Clean Energy Fund (NCEF), matters relating to OPEC Fund for International Development (OFID) and Committee on Allocation of Natural Resources (CANR).
- Policy matters related to Public Private Partnerships (PPPs). The Public Private Partnership (PPP) Cell is responsible for matters concerning Public Private Partnerships, including policy, schemes and programmes and all other matters relating to mainstreaming PPPs.
- Matters and proposals relating to the scheme for Financial support to Public Private Partnerships in Infrastructure [Viability Gap Funding (VGF)] Scheme and the India Infrastructure Project Development Fund.

#### These major functions were further allocated Subject/Section wise Work

##### 1. Infrastructure (policy) Cell:

- All policy related issues in infrastructure sector including those concerning roads, ports, shipping, railways, inland water transport, urban development, power and telecommunication sector referred to the Department of Economic Affairs (DEA) by the concerned administrative Ministries or identified and examined by DEA.

- Examination of proposals in above sectors requiring the approval of EFC/PIB/CCEA/COS/CCI for their viability and justification.
- Sectoral Charge – Ministry of Road Transport & Highways, Ministry of Shipping including Ports and Inland Water Transport, Ministry of Urban Development, Ministry of Railways, Ministry of Civil Aviation, Department of Telecommunication, Department of Post.
- All matters relating to Roads projects (PPP and non-PPP) including EFC/State Finance Commission (SFC) / Public Private Partnership Appraisal Committee (PPPAC) and Environmental Information (EI) / Environmental Clearance (EC) under the GoI VGF Scheme.
- Matters relating to Delhi Mumbai Industrial Corridor Trust and DMICDC.
- Development of Smart Cities.
- Atal Mission for Rejuvenation & Urban Transformation (AMRUT).
- Institutional Mechanism (IM) for Harmonized Master List of Infrastructure Sub-sectors.
- Telecom Commission.
- National Highway Authority of India.
- External charge – China, South Korea and North Korea.
- India Korea Macro-economic and Financial Dialogue, and
- India – China Financial Dialogue.

## **2. Infrastructure Finance Section:**

- Matters related to infrastructure financing and promotion of investments in infrastructure sectors.
- Matters relating to Infrastructure Debt Funds (IDFs), Real Estate Investment Trusts (REITs)/Infrastructure Investment Trust InvITs, Tax Free Bonds, Municipal Bonds and other instruments meant for infrastructure financing and credit enhancements.
- All international interfaces on infrastructure financing (other than PPPs).
- Model Tripartite Agreements (MTA) for sectors such as Road, Ports, etc.
- External charge- Bahrain, Oman, Saudi Arabia, Qatar, Kuwait, UAE, Yemen, Israel, Jordan and Lebanon.
- Matters relating to Infrastructure and Investment Working Group (IIWG) of G-20.
- India-Saudi Joint Investment Fund, Indo-Israeli R & D Fund.
- Examination of proposals in above sectors requiring the approval of EFC/PIB/CCEA/COS/CCI for their viability and justification.

- All policy matters relating to Project Monitoring Group (PMG).
- India Saudi Arabia Joint Commission for Technical and Economic Cooperation.
- Matters relating to meetings of Board of Directors of ONGC-Videsh Limited (OVL), IIFCL and IRFC as Government nominee on the Board of Directors.
- Coordination and general matters pertaining to the Division.

### **3. Public Private Partnership (PPP) Cell**

- Matters relating to appraisal and approval of Central sector PPP projects, as per the Cabinet approved "Compendium of Guidelines for Central Sector PPPs" and the delegation of powers assigned from time to time except those in Road Sector.
- Matters and proposals relating to clearance by Public Private Partnership Appraisal Committee (PPPAC) except those in Road Sector.
- Matters and proposals relating to the scheme for Financial support to Public Private Partnerships in Infrastructure Viability Gap Funding (VGF) Scheme except those in Road Sector.
- Matters and proposals relating to the scheme for India Infrastructure Project Development Fund (IIPDF).
- Developing Multi-pronged and innovative interventions and support mechanisms for facilitating PPPs in the country, including Technical Assistance and programmes from bilateral/multilateral agencies on mainstreaming PPPs and support to State and local Governments.
- Managing training programs, strategies, exposures for capacity building for PPPs and other matters relating to institution building for mainstreaming PPPs.
- All International interfaces on PPPs & other matters concerning PPPs.

#### **3.2 Investments & Government initiatives in the Infrastructure sector in India**

- Shri Gadkari has stated that green initiatives in construction will be taken to make country carbon neutral by 2070.
- The Ministry has undertaken development of 2,078 km of Port connectivity roads in the country, including 372 km in the State of Maharashtra to increase logistics efficiency.
- A total 27 Greenfield corridors having overall length 9,860 km planned in the country. The objective behind construction of roads under Greenfield projects is to optimize the overall cost to the economy, while catering to the traffic needs of the Origin-Destination in the most efficient way, providing most efficient connectivity between key economic centres, avoiding rehabilitation and resettlement on large scale, achieving higher speed and safer roads with dedicated entry/exit points.
- Shri Gadkari announced that there is a plan to implement Bahu Bali Cattle fence along the highways in the country to prevent accidents that cause loss to human life.
- Foundation stone for 11 NH projects worth Rs 5,600 crore have been laid in Pratapgarh, Rajasthan.

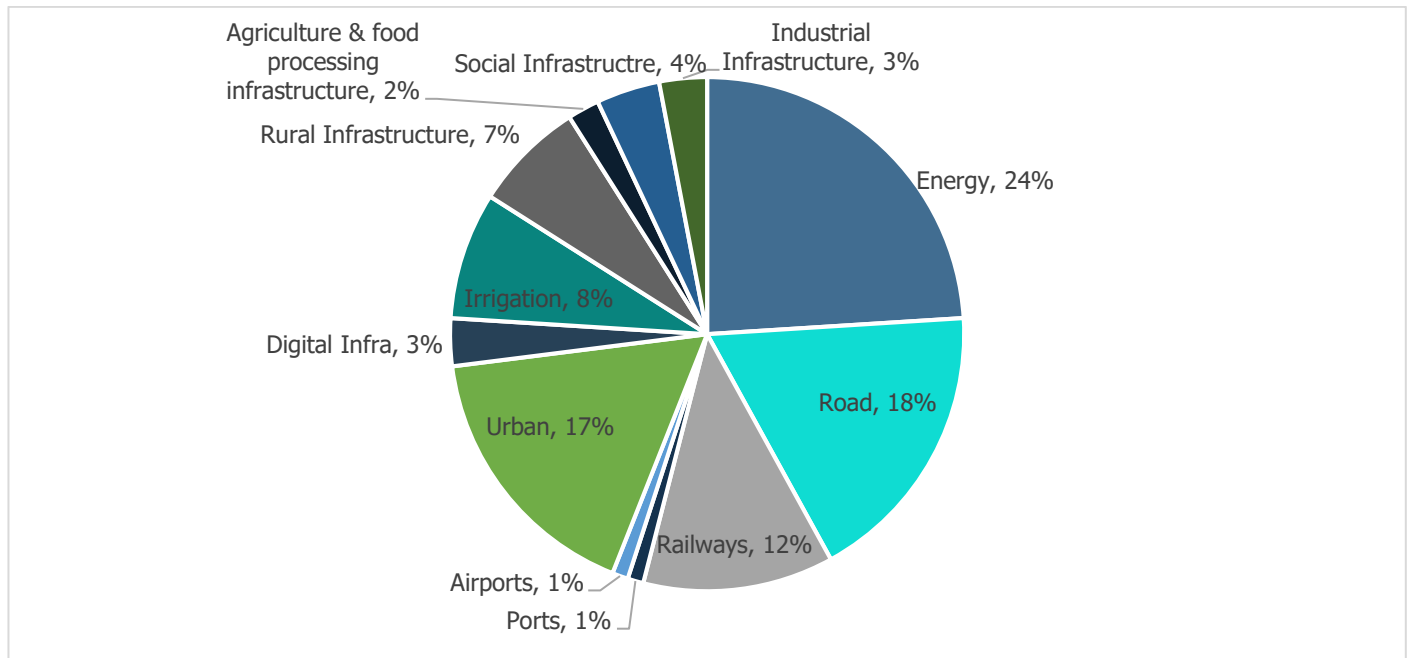
- The Asian Development Bank (ADB) approved a loan in November 2021 for US\$ 250 Million to support the National Industrial Corridor Development Program (NICDP). This is a portion of the US\$ 500 Million loan for constructing 11 industrial corridors connecting 17 states.
- With the launch of the "Infrastructure for the Resilient Island States" initiative in November 2021, India will have a significant opportunity to improve the lives of other vulnerable nations around the globe.
- Dubai and the Indian Government signed a contract in October 2021 to build infrastructure in Jammu and Kashmir, including industrial parks, IT towers, multipurpose towers, logistics centres, medical colleges, and specialized hospitals.
- For reform-based and result-linked fresh electricity distribution, the Government declared Rs. 3,059.84 Billion scheme over the next five years.
- The Mega Investment Textiles Parks (MITRA) scheme was introduced to create seven textile parks over three years and world-class infrastructure for the textile industry.
- The Ministry of Railways intends to monetize a number of assets, including the Eastern and Western Dedicated Freight Corridors once they have been put into service, the introduction of 150 modern rakes via public private partnership (PPP), station renovation via PPP, railway land parcels, multifunctional complexes (MFC), railway colonies, hill railways, and stadiums.

### **Opportunities in National Infrastructure Policy**

Before the onset of the pandemic the GoI had unveiled the National Infrastructure Policy (NIP) covering various sectors and regions indicating that it is relying on an 'infrastructure creation' led revival of the country's economy. The NIP which covered rural and urban infrastructure entailed investments to the tune of Rs.111 Trillion to be undertaken by the Central Government, State Governments and the private sector during FY20-25. This in turn is expected to offer significant opportunities to construction players in India.

In order to achieve the GDP of USD 5 trillion by FY25, India needs to spend about USD 1.4 trillion over these years on infrastructure. During FYs 2008-17, India invested about USD 1.1 trillion on infrastructure. However, the challenge is to step up infrastructure investment substantially. Keeping this objective in view, National Infrastructure Pipeline (NIP) was launched with projected infrastructure investment of around Rs.111 Trillion (USD 1.5 trillion) during FY 2020-2025 to provide world-class infrastructure across the country, and improve the quality of life for all citizens. It also envisages to improve project preparation and attract investment, both domestic and foreign in infrastructure. NIP was launched with 6,835 projects, which has expanded to over 9,000 projects covering 34 infrastructure sub-sectors.

**Chart 12: Sector-wise break-up of capital expenditure of Rs.111 Trillion during fiscal 2020-25**



Source: NIP

During the fiscals 2020 to 2025, sectors such as energy (24%), roads (18%), urban (17%), and railways (12%) amount to around 70% of the projected capital expenditure in infrastructure in India. NIP has involved all the stakeholders for a coordinated approach to infrastructure creation in India to boost short-term as well as the potential GDP growth.

Further, the number of projects and the total cost as per NIP for different sectors as on 15<sup>th</sup> February 2024 are as follows:

Sector	No. of projects	Value of projects (USD Billion)
Roads & bridges	3,816	401.67
Waste and Water	2,413	93.21
Real Estate	1,732	262.84
Power (Generation, Transmission & Distribution)	1,426	428.63
Railways	821	249.91
Urban public transport (Metro, bus terminal, road/traffic infra etc)	229	99.26

Source: NIP



## 4. SWOT Analysis for Infrastructure

### Strengths:

- Availability of a large workforce that can be employed for infrastructure projects.
- The adoption of technology in infrastructure projects is gradually increasing, helping in cost reduction and enhancing efficiency.
- Huge investments by the government - There has been a 11.1% % increase in CapEx toward infrastructure to Rs. 11.11 lakh crore (3.4% of the GDP) in the 2024-25 Union budget as compared to the 2023-24 Union Budget. As per the Union Budget 2024-25, a capital outlay of Rs. 2.52 lakh crore has been provided for the railways, which is the highest ever outlay and about more than 9 times the outlay made in 2013-14.
- Boosting tourism development in India, for instance, the Mumbai-Goa National Highway completed by December 2023, is a highway connecting major tourist destinations in Konkan. Also, industrial development will get a boost as there is a road connecting major industrial areas.
- The capital expenditure in the roads sector has increased by a CAGR of 32% from Rs. 89,195 crore in 2020-21 to Rs. 2,72,241 crore in 2024-25 as per Union Budget estimates.
- As per Pradhan Mantri Gram Sadak Yojana, focus on new and green technology as per 1,38,060 Km road length sanctioned and 85,583 km constructed as of July 2023 from 12,686 Km sanctioned and 2,133 km completed as of March 2014, has been increasingly done with regard to road construction.
- Three major economic railway corridor programmes were identified under the PM Gati Shakti in Union Budget 2024-25 to be implemented to improve logistics efficiency as well as reduce cost. Moreover, 40,000 normal rail bogies to be converted to Vande Bharat standards.

### Weakness:

- Due to limited financial flexibility and to bridge the infrastructure investment gap, there is a need to encourage private investment as most infrastructure financing comes from the government.
- Due to substantial upfront expenditure and long gestation periods involved, private players may hesitate to participate in infrastructure projects.
- There is an overdependence in India on older technologies for waste water treatment resulting in more repair work and less efficiencies of these plants. These limitations lead to poor performance of the plants and adulteration of sewage and water bodies. The conventional centralized wastewater treatment plants are designed to remove only Nitrogen, Biological Oxygen, and Phosphorous but with rapid urbanization and changing types of contaminants, technologically advanced plants are needed to be set up to deal with them.
- Social acceptance of treated wastewater is a big challenge due to fear and disgust when it comes to reuse. Moreover, recycled water is unlikely to be used as drinking water when compared to its use in irrigation, etc.
- Revenue from large infrastructure projects is spread over 20-30 years whereas the loan for the same project is for the period of 10-15 years. This results in cash flow mismatch in the initial years of operations till the project stabilizes and also overall tenure mismatch between project cashflows and debt repayment, thereby resulting in private players' fund cashflow mismatches from their own sources.
- Land acquisition gives rise to major resettlement and rehabilitation issues, especially in the metro cities and these issues can go on for years, leading to project delays. Since cities are densely populated and for a new railway or metro line, a large chunk of land is to be acquired. This land may belong to slums, construction companies, or even business owners. Additionally, the rehabilitation cost may also add up to the project cost for the railway/metro project.

**Opportunities:**

- Rapid urbanization provides an opportunity for the development of urban infrastructure including smart cities.
- Increase in capacity additions in industrial activities to aid the growth in infrastructure and manufacturing plants.
- The Public Private Partnership (PPP) model along with financial instruments like Viability Gap Funding (VGF) and Special Purpose Vehicles (SPVs) and the introduction of Infrastructure Investment Trusts (InvITs) provides avenues for private sector participation.
- Improvement in transportation networks boosts connectivity and trade, thereby paving the way for economic growth. Development of infrastructure has a multiplier effect on demand and efficiency of transport along with increasing commercial and entrepreneurship opportunities.
- Significant capacity additions in power generation expected over the next 7-8 years including renewable resources.
- The National Monetization Plan (NMP) announced by the Government has identified the road sector as having the maximum potential at Rs. 1,602 Billion which constitutes a 27% share in the overall NMP. Around 26,700 km of road assets are to be monetized under NMP which makes up around 20% of the total asset length.
- Government plans to add more national highways to the InvIT portfolio as long-term revenue-generating assets which will further give retail businesses a regular investment opportunity. With InvIT coming into the picture, the burden on the budget will be lowered as financing will be borne by InvIT. This will result in reducing the debt of NHA and enable access to additional funds for the new projects.

**Threats:**

- Delay in implementation of government schemes.
- Economic uncertainties can impact funding for infrastructure projects and delay their execution along with discouraging private participation.
- Geopolitical risks may impact foreign investments and disrupt infrastructure development.
- Complex regulatory procedures/ government regulations cause delays in project implementation and cost overruns.
- The volatility in commodity prices impacts the margins of construction players. The rising cost of steel and cement, two major raw materials that are consumed in railways and the metro industry, saw a sharp rise post-COVID-19. Therefore, any variation in the prices of raw materials during the construction period of the project has a direct impact on the total cost of the project.
- With lower-than-anticipated revenues, the private players' debt servicing capacity has been impacted. To mitigate the risk of failure of the company, restructuring of loans has been opted by the private players. Restructuring of loans for the first time does not impact asset classification but subsequent restructuring leads to NPA recognition in the books of financial institutions.
- Rising interest rates reflect higher inflation, causing higher costs of borrowings as most of industry depends on external borrowings. Therefore, higher interest rates impact different infrastructure assets differently.

## 5. Power (Hydro, nuclear, thermal)

### 5.1 Overview

Power is one of the most critical components for infrastructure development and crucial for the economic growth and well-being of any country. The existence and development of adequate power infrastructure is essential for the sustained growth of the Indian economy.

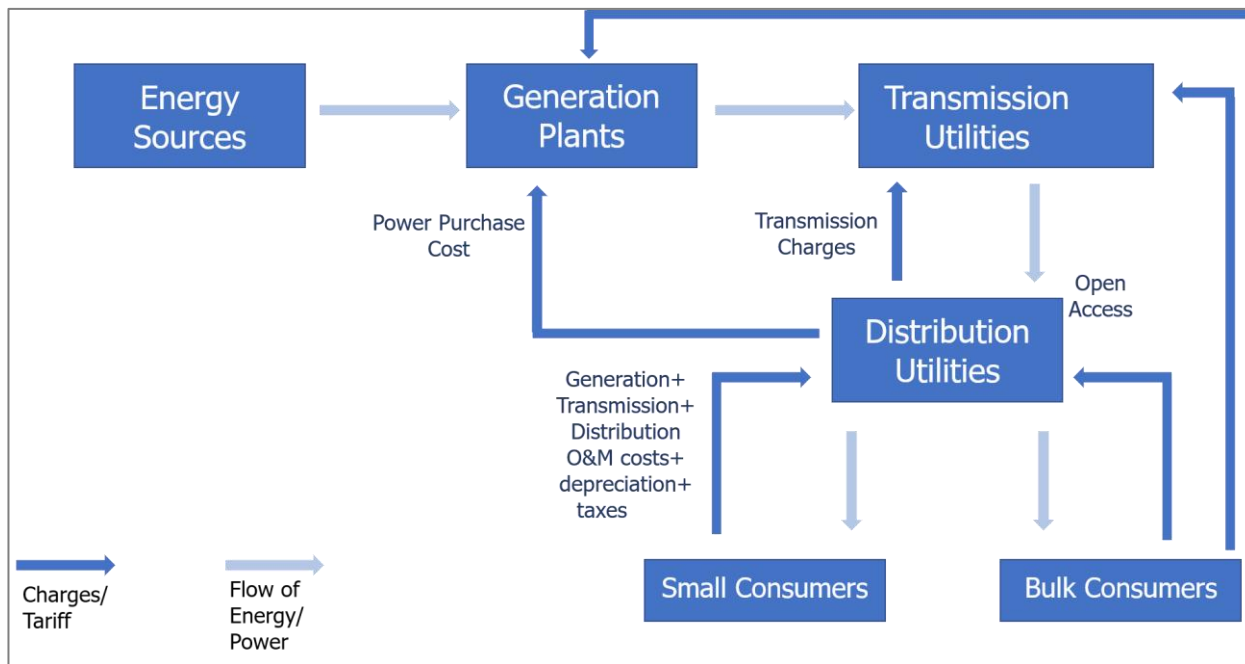
The power industry is divided into three segments:

- Generation
- Transmission
- Distribution

Generation is the process of producing electricity from different sources like thermal energy (coal, diesel etc.), nuclear and renewable sources such as sunlight and wind, natural gas, etc. in generating stations or power generation plants. Transmission utilities transport large amount of electricity from power plants to distribution substations via a grid at high voltages. The retail electricity distribution, which is the distribution of electricity to consumers at lower voltages, forms part of the distribution segment.

The structure of the power industry is depicted in the figure below.

**Chart 13: Structure of Power Sector in India**



Source: CareEdge Research

## 5.2 Evolution of Power Sector and Its Structure in India

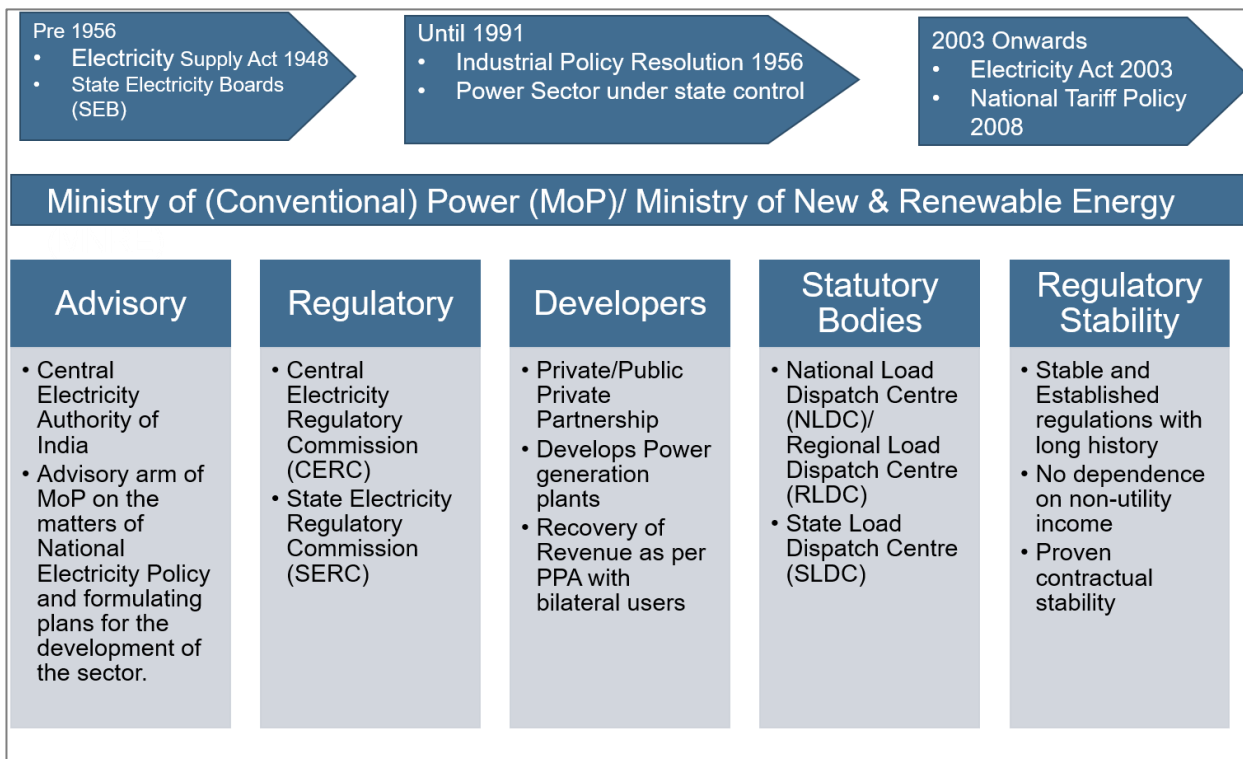
### 5.2.1 Regulatory Overview

In India, the Electricity Act, 2003 governs the generation, transmission, distribution, exchange, and use of electricity. It also establishes a complex system of bodies to administer the Electricity Act's functions. The Electricity Act, among other things, delicensed all generation activities except hydropower.

The Electricity Act's principal goals are as follows:

- Promoting competition
- Protecting the interest of consumers
- Ensuring electricity supply to all areas along with a rationalization of tariffs
- Ensuring transparent policies and promotion of efficiency

The following diagram shows the regulatory structure of power sector in India:



Under the Electricity Act, the CEA is a statutory agency that advises the Government of India on policy, safety regulations, and technical standards. The Central Electricity Regulatory Commission (CERC) and the State Electricity Regulatory Commissions (SERCs) draft the regulations and the Government of India (in cooperation with the states and the CEA) develops policies (such as the Nation Tariff Policy and National Electricity Policy) as guidelines.

**Table 4: Regulatory Capabilities of different bodies**

	Centre		State/Private		
<b>Policy</b>	Ministry of Power		State Government		
<b>Plan</b>	CEA				
<b>Regulations</b>	CERC; MNRE		SERC		
<b>System Operations</b>	National Load Dispatch Centre, Regional Load Dispatch Centre		State Load Dispatch Centre		
<b>Generation</b>	Central Generation Stations, MNRE, Department of Atomic Energy		State Gencos	Captive and Co-Generation Plants, Independent Power Producers	Private Licensees in Ahmedabad, Kolkata, Mumbai, Surat, Delhi, Noida, etc.
<b>Transmission</b>	Central Transmission Utility (PGCIL)	Transmission Licensee	State Transmission Utility	Transmission Licensee	
<b>Distribution</b>	-		State Distribution Company	Private Discoms	
<b>Trading</b>	Trading Licensee	Power Exchanges	Bilateral Markets		
<b>Appeal</b>	Appellate Tribunal (APTEL)				

Electricity generation, distribution, and transmission are regulated and overseen by regulatory bodies at the federal and state levels. They are self-contained entities with responsibilities outlined in the Electricity Act.

In relation to the promotion of renewable energy, the Ministry of New and Renewable Energy (MNRE) is the relevant agency of the Government of India for the following matters:

- Solar Energy
- Wind Energy
- Bio-Gas Units
- Hydroelectric Power
- Tidal Energy
- Geothermal Energy

Solar Energy Corporation of India Limited (SECI), a government firm under MNRE's supervision, assists MNRE in implementing and facilitating schemes like as the Jawaharlal Nehru National Solar Mission (NSM), wind project schemes, and solar-wind hybrid project schemes.

#### **Power Exchanges:**

Electricity trading through Power Exchange (PX) has hitherto been introduced in many electricity markets. In India, there are two exchanges, the Indian Energy Exchange (IEX) and Power Exchange of India Ltd. (PXIL), functioning with guidance from CERC. The electrical market in India has a supply shortfall (in some locations) and is made up of a variety of generation methods. PX is a marketplace where utilities, power marketers, and other electricity providers post price and quantity bids for selling energy or services, and potential customers submit offers to buy energy or services.

**Appellate Tribunals:**

- The Central Government has established an Appellate Tribunal for Electricity (APTEL) for those dissatisfied with an order of the CERC or a state. The APTEL, like the Income-Tax Tribunal and the Central Administrative Tribunal, has the power to overturn or change that order.
- The APTEL comprises a Chairperson who has been a Judge of the Supreme Court or Chief Justice of a High Court, one Judicial Member who has been or qualified to be a judge of the High Court, two technical members who are electricity sector experts and one technical member who is an expert from the petroleum and natural gas sectors.
- Since its operationalization, the APTEL has been called upon to resolve many complex and path-breaking issues, which has facilitated the development of the power sector as per the intent of the Electricity Act, 2003.

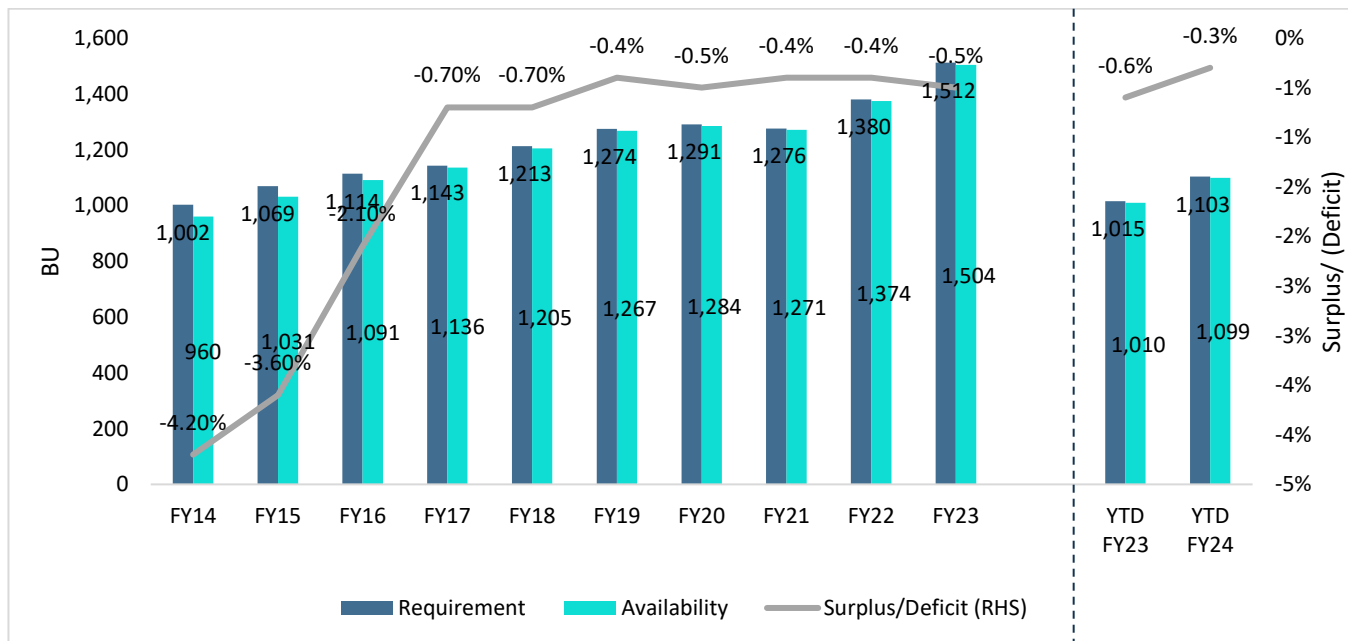
Besides, the government has been taking initiatives to promote this sector and has come up with various schemes and policies that have been covered under section 5.13.

**5.2.2 Review and outlook of the power demand – supply in India**

**Power demand, supply and deficit in India**

In India, power demand has been on the rise in the past decade, except during FY21 due to COVID-19. COVID-19-induced-lockdown and restrictions have led to lower demand and generation of electricity since the pandemic curtailed commercial and business activities. As a result, the first half of FY21 witnessed a decline in power demand. However, with the gradual reopening of the economy despite localized lockdowns, the power demand has continued to gradually rise over the past 2 years.

**Chart 14: Power supply position in India**



Source: Power Ministry, CEA, CareEdge Research

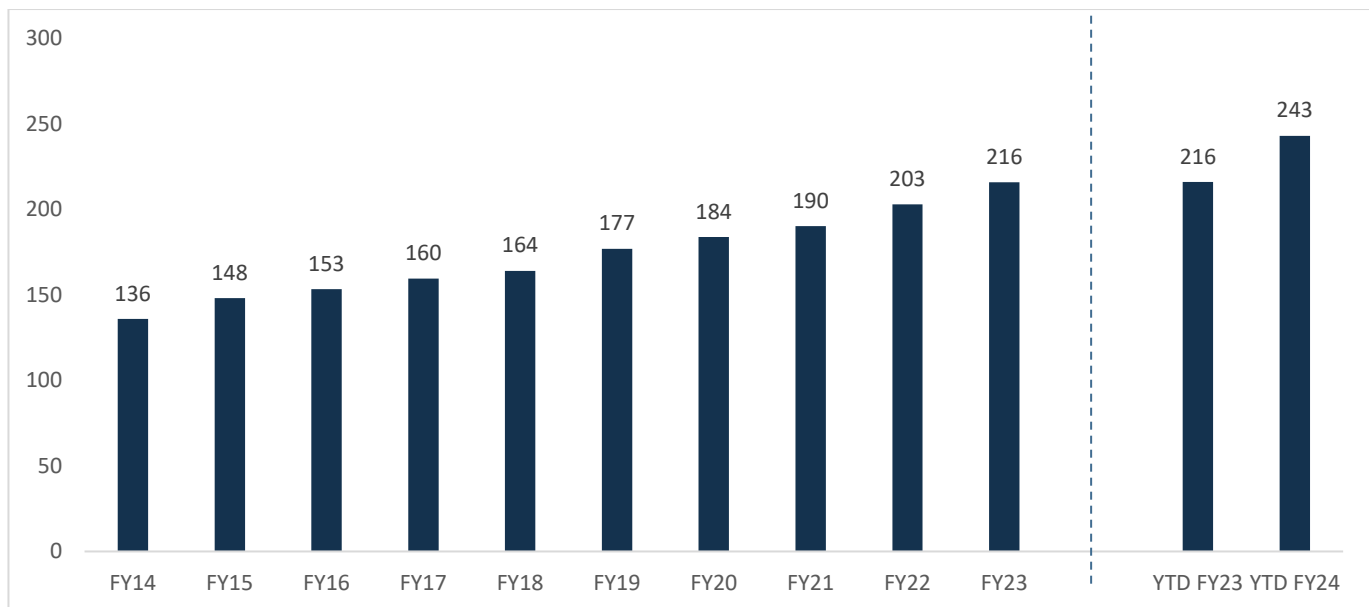
Note: YTD is year to date consisting of data from April to November for the respective period

The electricity requirement has grown from 1,002 BU in FY14 to 1,512 BU in FY23. There has been a continuous deficit between electricity requirement and availability of around 0.5%-4.2% between FY14 and FY23. During April-November 2023, the electricity demand stood at 1,103 BU, an increase of 9% y-o-y, while the deficit was 0.3%.

However, the peak demand not met was around 6 GW in FY14 and the average energy not supplied was around 42,428 MU. The peak demand not met and energy not supplied has been on a downward trend since and substantially decreased to 2.475 GW and 5,787 MU, respectively, in FY22. However, in FY23, due to high power demands, the peak demand not met was 8.6 GW and energy not supplied increased to 5,057 MU. Whereas during April-November 2023, the peak demand not met was 3.340 GW and the energy not supplied was 2,980 MU.

Further, peak energy demand grew at a CAGR of 4.7% from 136 GW in FY14 to 216 GW in FY23, while peak supply grew at a CAGR of 5.3% over the same time period. There was a 10% y-o-y increase in the power requirement by the country in FY23. The peak power demand was the highest ever at 243 GW in April-November 2023, due to higher temperatures during the summer season compared to last year.

**Chart 15: All India peak demand**



Source: Power Ministry, CEA, CareEdge Research

Note: YTD is year to date consisting of data from April to November for the respective period

### 5.3 Overview of Indian Power Generation Industry

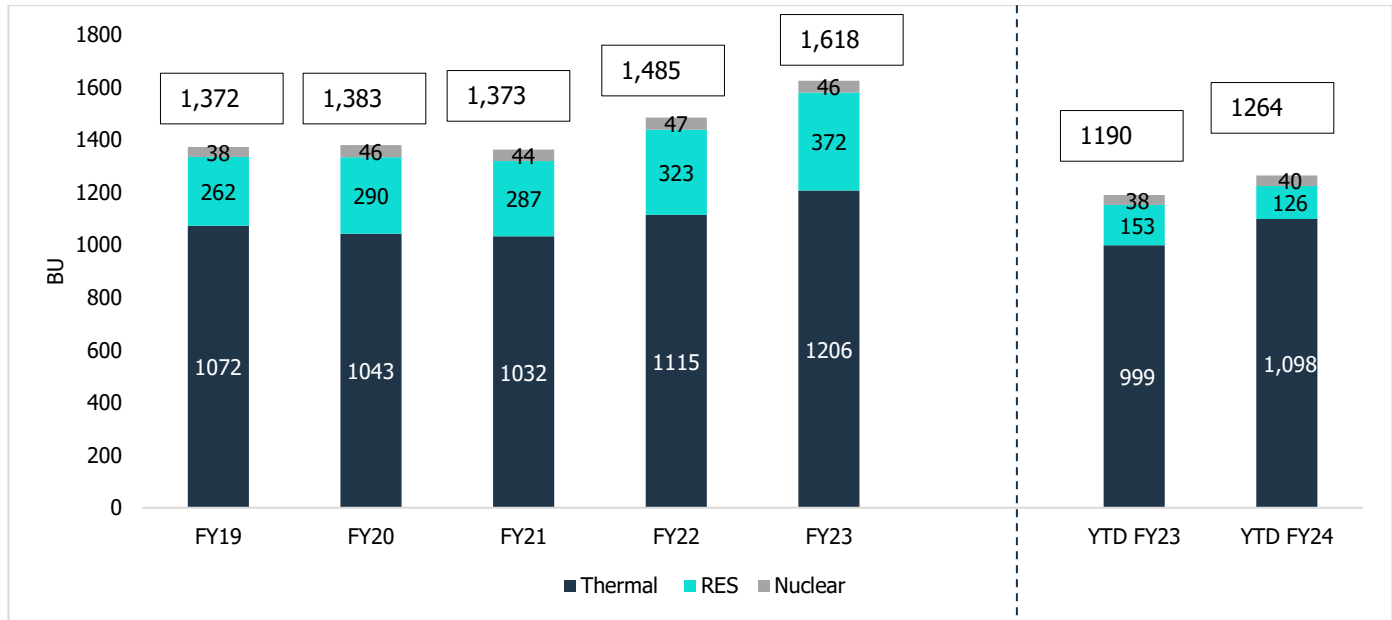
The Indian power generation sector is one of the most diversified in the world. Power generation sources in India range from conventional sources such as coal, lignite, natural gas, oil, and nuclear to viable unconventional sources such as wind, solar, hydro, agricultural and household waste.

Electricity generation in India increased from 1,372 BU in FY19 to 1,624 BU in FY23, implying a compounded annual growth rate (CAGR) of 4.2%. Electricity generation increased by about 6% y-o-y to 1,264 BU in January'24.

Thermal power forms the largest power source in the country with about 75% of the electricity consumed being generated from thermal power plants. There are different types of thermal power plants. Coal-based thermal power plants account

for highest amount of electricity followed by gas and diesel. Renewable Energy Sources (RES) including solar, wind, and hydro are rapidly gaining share and their contribution has increased from 19.1% in FY19 to 23% in FY23.

**Chart 16: Power Generation over the years**



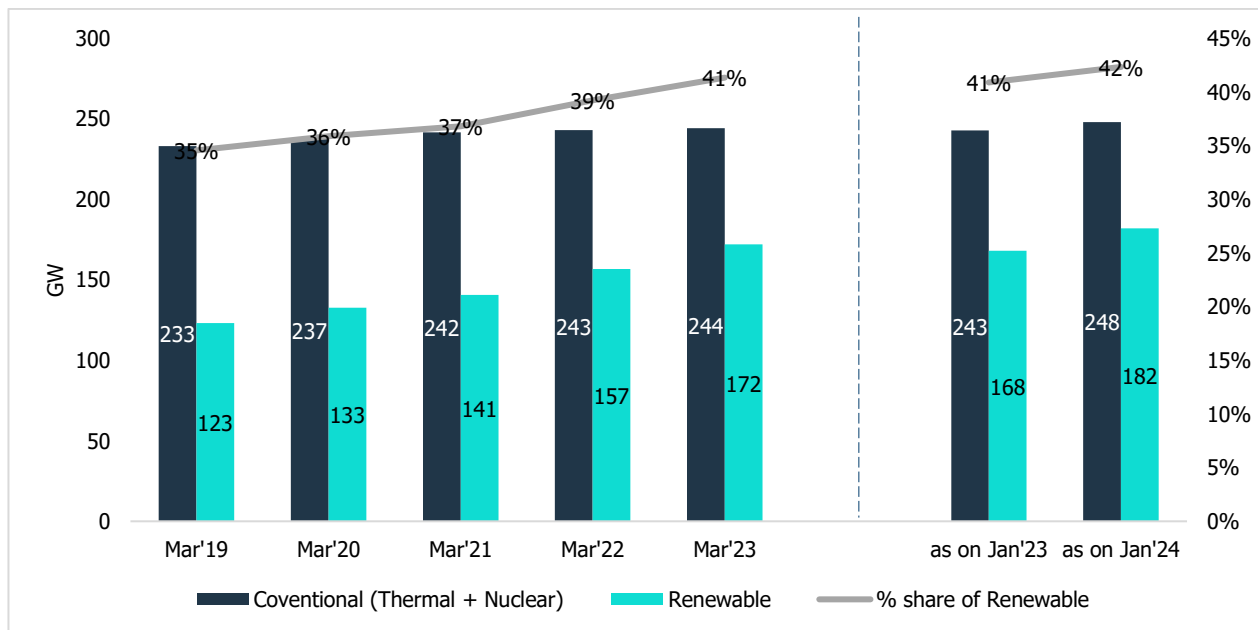
Source: CEA; RES refers to power generated from Hydro, Wind, Solar, Small hydro and Bioenergy projects;

Note: YTD FY23/FY24 indicates period from April to January

**5.4 Installed capacity**

India is the world's third-largest producer and second-largest user of energy. The installed power capacity in India increased from 356 GW in FY19 to 416 GW in FY23. It increased by 4.6% y-o-y in January 2024 to 430 GW.

**Chart 17: Installed Capacity Trend**





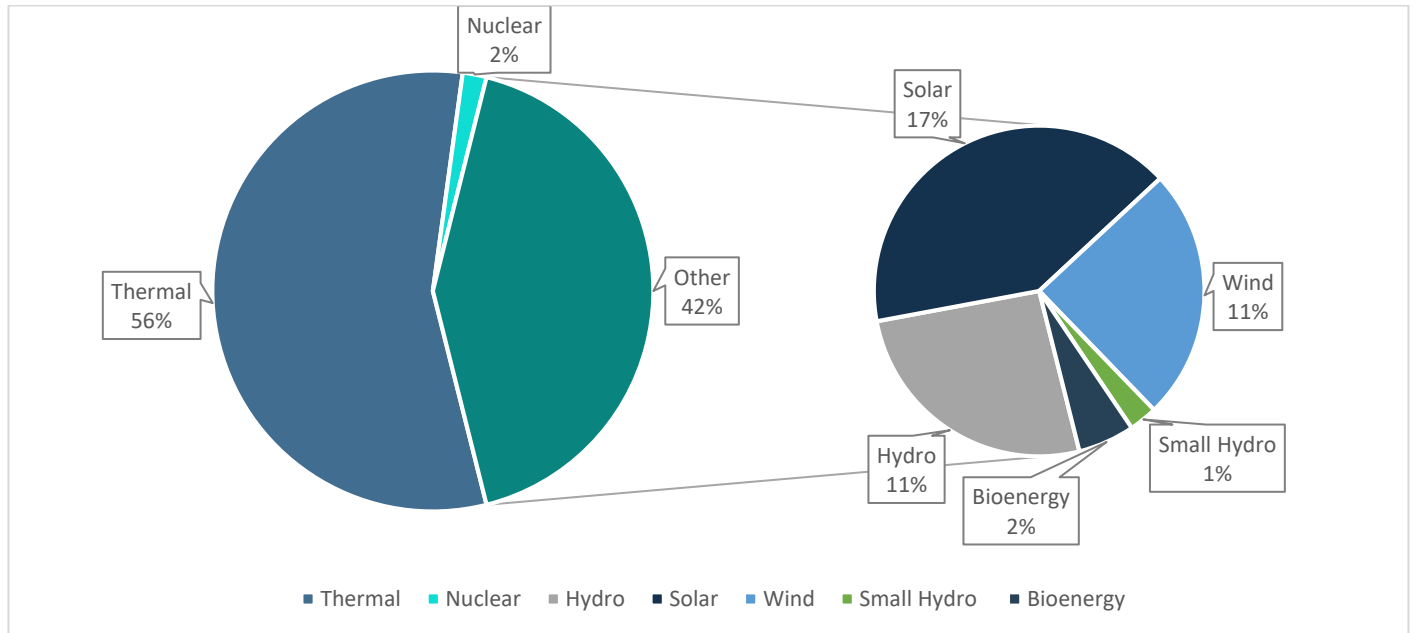
Source: CEA, CareEdge Research

Note: Renewable also consists of Hydro power

YTD FY23/FY24 indicates period from April to January

Conventional sources currently account for 59% of installed capacity, while RES including hydro, currently accounts for 41%. Within RES, solar accounts for the largest share of 16% followed by hydro at 11% and wind at 10%.

**Chart 18: Mode-Wise Total Installed Capacity – 428 GW (January'24)**



Source: CEA, CareEdge Research

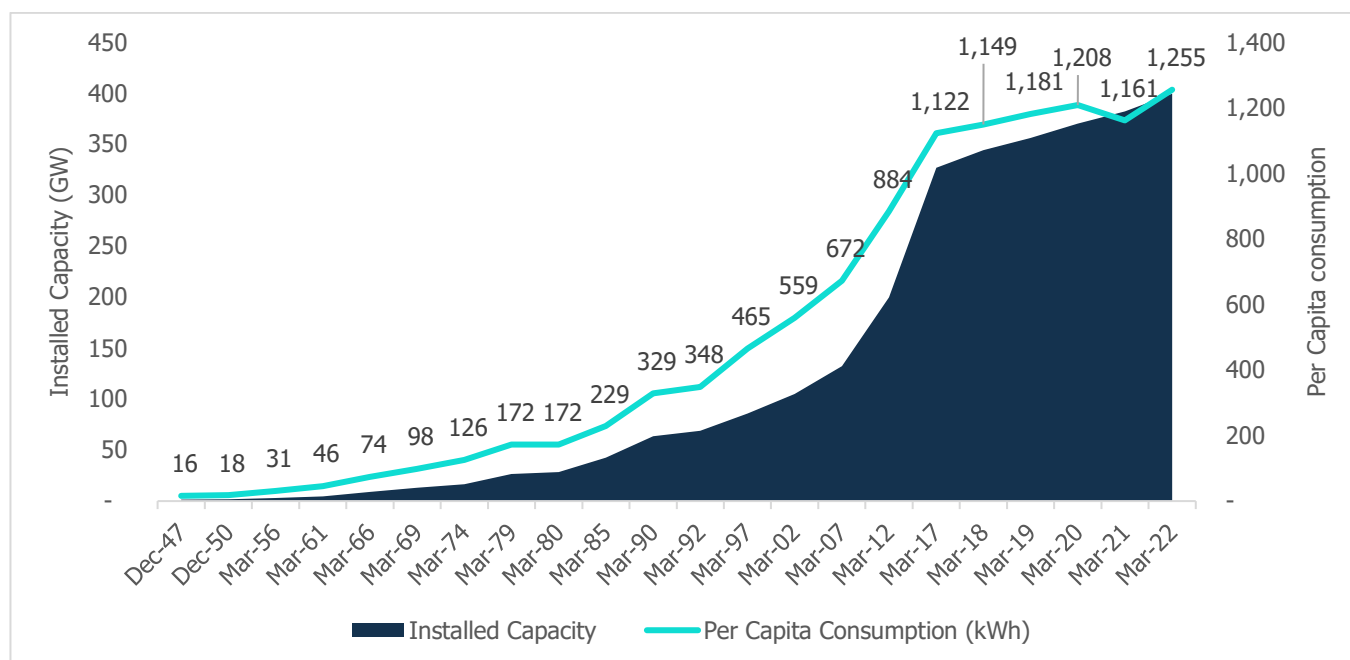
Renewable accounts for 42% of the total power generation capacity of which solar accounts for the largest share of 17% followed by hydro and wind at 11%.

### 5.5 India's per capita power consumption

#### India's per capita power consumption

India's per capita power consumption has been on a consistent rise with the government focusing more and more on electrification of villages and families across the country. It has risen steadily over the last nine years, from 884 kWh per capita in 2011-12 to 1,255 kWh per capita in 2021-22. At the time of India's independence in 1947, demand was only 16 kWh per capita.

**Chart 19: Growth of Electricity Sector in India - Installed Capacity and Per Capita Consumption\***



Source: CEA, CareEdge Research

(\*) Per Capita Consumption= Gross Electricity availability/ Mid-year Population

Developed countries such as Japan and the United States have the world's highest per capita electricity consumption. India's per capita consumption has remained low as compared to even the emerging countries like Brazil and Mexico, implying significant room for growth.

**Table 5: Global Per Capita Consumption Comparison (MWh/Capita)**

Year	World	India	Nigeria	Mexico	Thailand	Brazil	China	Japan	USA
1990	2.06	0.32	0.11	1.14	0.70	1.46	0.53	6.71	11.69
1995	2.14	0.46	0.11	1.38	1.25	1.63	0.79	7.53	12.64
2000	2.32	0.51	0.09	1.76	1.45	1.90	1.02	8.05	13.66
2005	2.58	0.61	0.13	1.98	1.91	2.02	1.81	8.30	13.68
2010	2.87	0.77	0.14	2.02	2.31	2.37	2.96	8.78	13.38
2015	3.06	1.01	0.15	2.23	2.58	2.56	4.05	8.01	12.86
2019	3.30	1.18	0.10	2.40	2.90	2.60	5.10	7.90	12.70

Source: IEA, CEA (For India), CareEdge Research

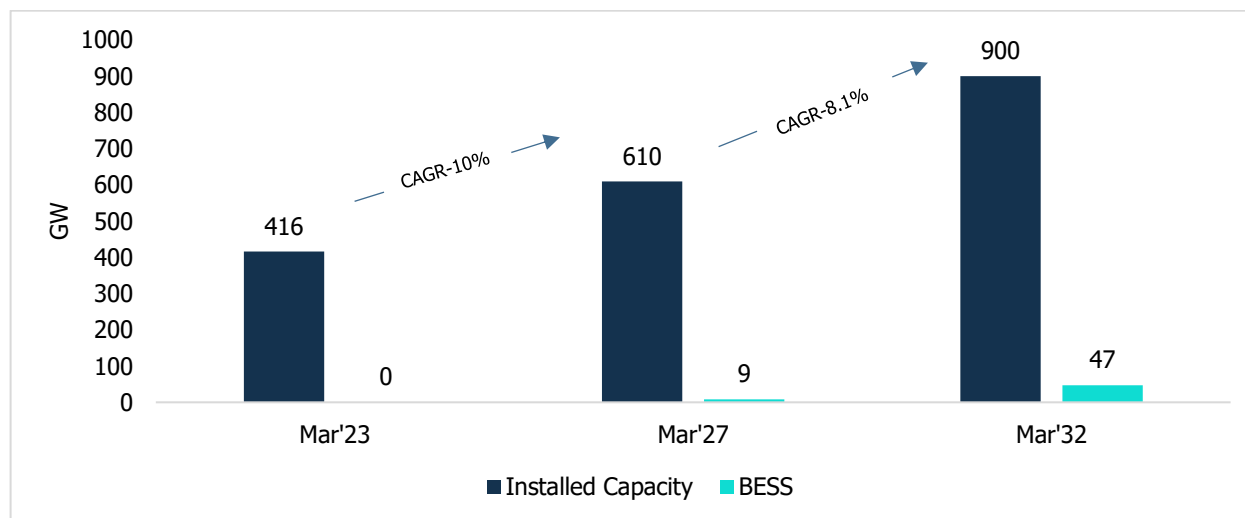
Data for India is as per FY-Financial Year while for others it is CY-Current Year

### 5.6 Outlook

The Indian power sector is witnessing a major transformation in terms of demand growth and energy mix. To ensure that everyone has access to reliable power and sufficient electricity, investments are being carried out to increase the installed capacity and clean energy transition. The government plans to establish a renewable capacity of 500 GW by 2030 and increase the share of non-fossil fuel-based installed capacity to around 50%.

As per National Electricity Plan Vol-1 released in March 2023, the installed capacity is expected to grow from 416 GW in March 2023 to around 610 GW by March 2027, growing at a CAGR of around 10%. The Battery Energy Storage System (BESS) is expected to gain traction and reach 9 GW of installed capacity. Capacity is expected to reach 900 GW by March 2032, growing at a CAGR of 8.1% from March 2027, while the BESS capacity is expected to reach 47 GW.

**Chart 20: Aggregate Installed Capacity Outlook**



Source: National Electricity Plan (NEP) March 2023, CareEdge Research

**Table 6: Sector wise and fuel wise break up of Capacity Additions (MW)**

	From FY22 to FY27			From FY27 to FY32		
	Under Construction	Additional Capacity Requirement	Total Capacity	Under Construction	Additional Capacity Requirement	Total Capacity
<b>Renewable</b>						
Hydro	10,462	0	10,462	1,032	8,700	9,732
PSP	2,700	0	2,700	80	19,160	19,240
Solar	92,580	38,990	131,570	0	17,900	17,900
Wind	25,000	7,537	32,537	0	49,000	49,000
Biomass	2,318	0	2,318	2,500	0	2,500
Small Hydro	352	0	352	250	0	250
<b>Conventional</b>						
Nuclear	6,300	0	6,300	2,400	4,200	6,600

Coal & Lignite	25,580	0	25,580	1,320	24,160	25,480
<b>Total</b>	165,292	46,527	211,819	7,582	284,220	291,802
BESS	0	8,680	8,680	0	38,564	38,564

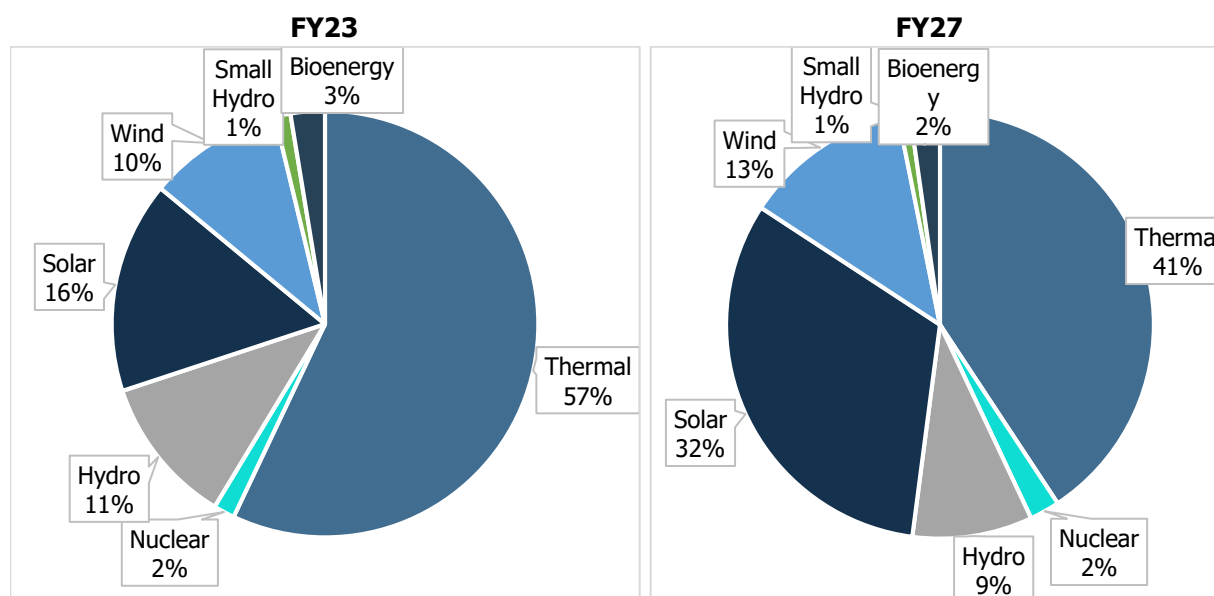
Note: 1. As per MNRE, 117.58 MW of solar and wind capacity was planned for 31.03.22, out of which 10.87 GW has been added during 2022-23 till 31.12.22

2. Nuclear Projects of 8,700 MW are under construction of which 6,300 MW are considered to be commissioned during 2022-27 and 2,400 MW are considered to be commissioned during 2027-32. Additionally, nuclear projects totaling to 7,000 MW are in principle approval stage of which 4,200 MW capacity is likely to yield benefit during the year 2027-32.

Source: National Electricity Plan (NEP) March 2023, CareEdge Research

At the end of FY23, the conventional generation capacity accounted for 59% of the total installed capacity while renewable energy accounted for the balance 41%. By FY27, it is expected that the contribution of conventional generation will decline to 43%.

**Chart 21: Break-up of the total installed capacity - FY23 vs FY27**



Source: National Electricity Plan (NEP) March 2023, CEA, CareEdge Research,

### 5.7 India’s Renewable Potential and Global Rank in Terms of Installed Capacity

There has been a significant shift globally in the generation capacity mix due to the growing environmental concerns and climate change. India is an active participant and has taken initiatives toward sustainable development and cleaner environment, including significant additions of renewable energy generation capacity.

Further, India is among the top nations in the world leading the global renewable energy growth. In technology-specific installed capacity, India ranks 3<sup>th</sup> in onshore wind, 5<sup>th</sup> in Solar, 4<sup>th</sup> in Bioenergy, and 6<sup>th</sup> in Hydro as per the International Renewable Energy Agency (IRENA) renewable capacity statistics 2023.

**Table 7: List of Top 10 Countries – Installed Capacity Statistics 2023 (As on Dec 2022)**

Ranking	Technology Specific Ranking by Installed Capacity					Ranking - Total Renewable Installed Capacity
	Onshore Wind	Offshore Wind	Solar	Bioenergy	Hydro	
1	China	China	China	China	China	China
2	USA	UK	USA	Brazil	Brazil	USA
3	Germany	Germany	Japan	USA	USA	Brazil
4	India	Netherlands	Germany	India	Canada	India
5	Spain	Denmark	India	Germany	Russia	Germany
6	Brazil	Belgium	Australia	UK	India	Japan
7	France	Vietnam	Italy	Japan	Japan	Canada
8	Canada	Chinese Taipei	Brazil	Thailand	Norway	Spain
9	UK	France	Netherlands	Sweden	Turkey	France
10	Sweden	Sweden	Korea	Italy	France	Italy

Source: IRENA Renewable Capacity Statistics 2023, CareEdge Research

The total potential of renewable power in India is estimated to be 1,625 GW as compared to installed capacity of 182 GW as on January 2024.

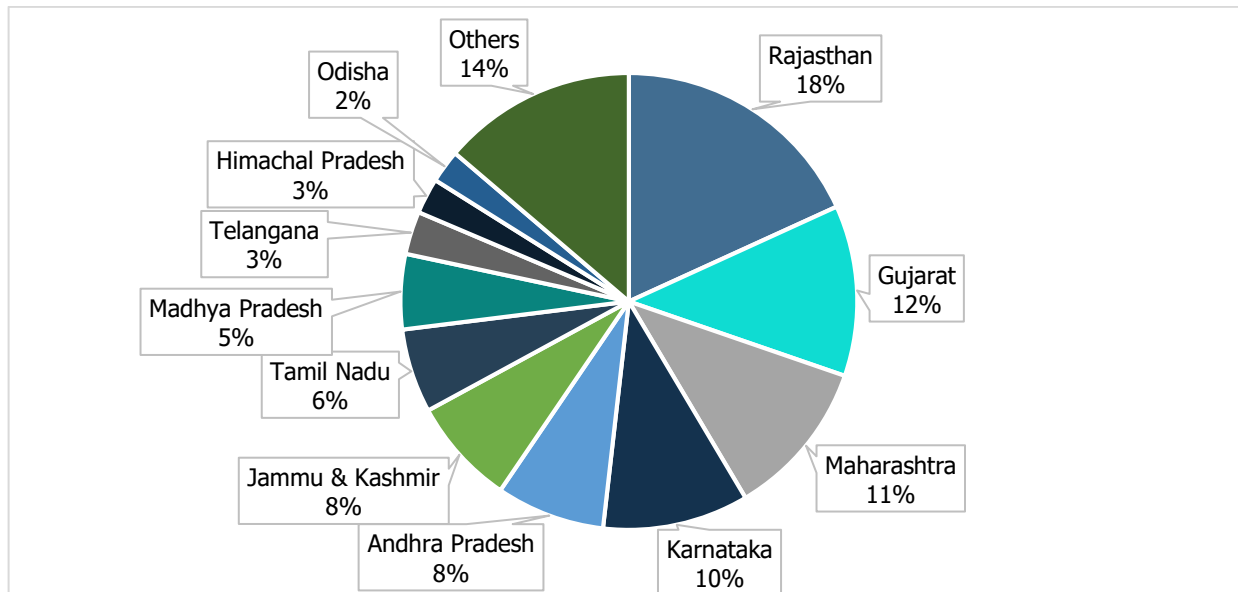
**Table 8: India’s Physical Progress cumulative up to January’24 (GW):**

Sector	Cumulative up to January 2024	Potential (GW)
Hydro Power	46.9	133.4
Wind Power	44.9	695
Solar Power	74.3	750
Small Hydro Power	4.9	21.1
Bioenergy- Biomass (Bagasse) Cogeneration	9.4	22
Bioenergy- Biomass (Non-Bagasse) (Cogeneration/ Captive Power)	0.8	
Waste to Power	0.2	
Waste to Energy (Off-grid)	0.5	3
Hybrid/ Round the clock/ Thermal + RE bundling	-	0
<b>Total</b>	<b>181.9</b>	<b>1,625</b>

Source: MNRE, Energy Statistics India 2023, CareEdge Research

The state-wise potential of renewable energy is as below. Rajasthan, Gujarat, Maharashtra, Karnataka, and Andhra Pradesh are the top 5 renewable energy potential states.

**Chart 22: State-wise estimated potential of renewable power in India**



\*Excluding Hydro power

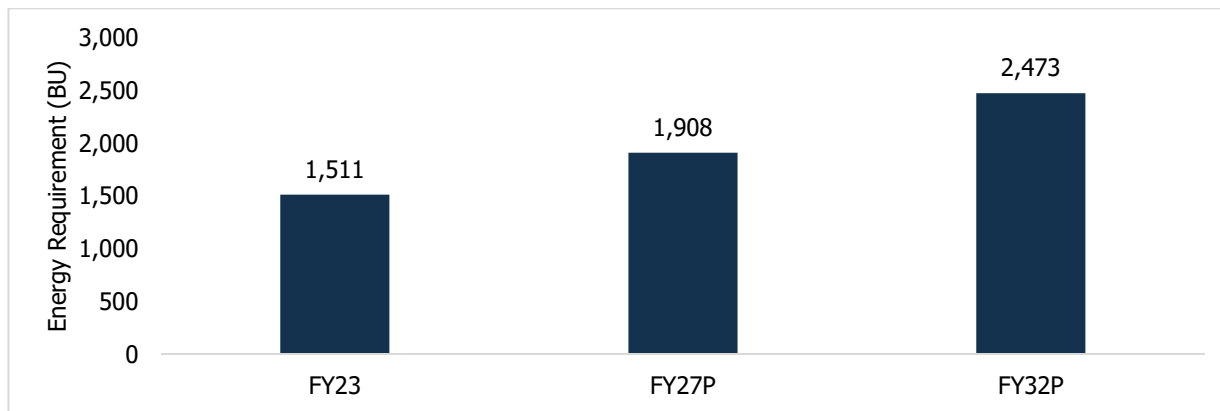
Source: Energy Statistics India 2023, CareEdge Research

**5.8 Power Peak Demand Forecast, Energy Requirement and Supply Potential**

According to the National Electricity Plan Vol 1, the all India peak electricity demand is projected at 277 GW and energy requirement is projected at 1,908 BU for FY27. The power demand is further expected to rise with the growing population and increased economic activities. For FY32, the peak electricity demand is projected at 366 GW and energy requirement at 2,473 BU.

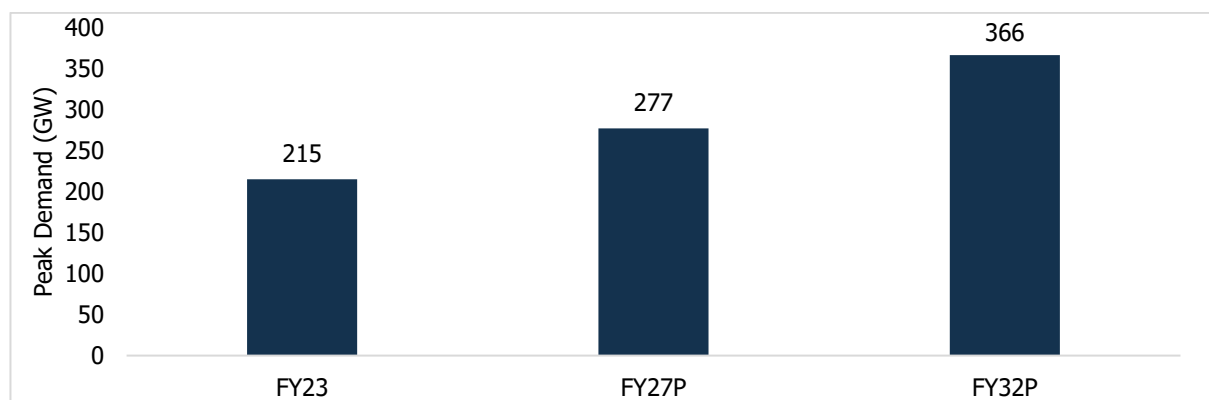
The energy requirement is expected to grow at a CAGR of 6% and peak demand is expected to grow at CAGR of 6.5% between FY23-FY27. For FY27 to FY32, the CAGR is on a higher side at 5.3% for energy requirement and 5.7% for peak demand.

**Chart 23: Projected All India Energy Requirement**



\*Projected

Source: National Electricity Plan (NEP) March 2023, CareEdge Research

**Chart 24: Projected All India Peak Demand**

\*Projected

Source: National Electricity Plan (NEP) March 2023, CareEdge Research

The region that is driving the growth from FY23 to FY27 is the North-Eastern region, growing at a CAGR of 7.4% followed by the Northern region growing at 6.1%. The region that is driving growth between FY27 to FY32 is the Eastern region growing at CAGR of 5.8% followed by the Northern region.

**Table 9: State wise Energy Requirement (MU) for FY27 and FY32**

Sr. No.	State	FY27	FY32
1	Northern Region	592,312	773,545
2	Western Region	596,793	763,198
3	Southern Region	460,853	596,557
4	Eastern Region	232,971	308,103
5	North Eastern Region	24,904	32,373
	<b>All India</b>	<b>1,907,835</b>	<b>2,473,776</b>

Source: National Electricity Plan (NEP) March 2023, CareEdge Research

The government has taken various steps to meet the peak demand of power such as:

- 175 GW of power generation capacity, 17,33,459 CKM of transmission lines and 6,21,176 MVA of transformation capacity have been added to the grid from 2014 till 31.12.2022.
- Schemes like Deen Dayal Upadhyaya Gram Jyoti Yojana (DDUGJY)/ Pradhan Mantri Sahaj Bijli Har Ghar Yojana (SAUBHAGYA) / Integrated Power Development Scheme (IPDS) have strengthened the distribution system.
- 100% FDI through automatic route for power generation projects
- Private sector participation in generation and transmission through notification of revised Tariff Policy on 28.01.2016
- For promoting the generation, purchase, and consumption of green energy, the Green Open Access Rules, 2022 were notified on 06.06.22
- Revamped Distribution Sector Scheme (RDSS) launched in 2021 to improve financial sustainability and make the distribution sector operationally efficient.
- The Electricity Amendment Rules, 2022 were notified on 29.12.2022, which mandates the preparation of a resource adequacy plan so as to successfully meet the power demand of the consumers.

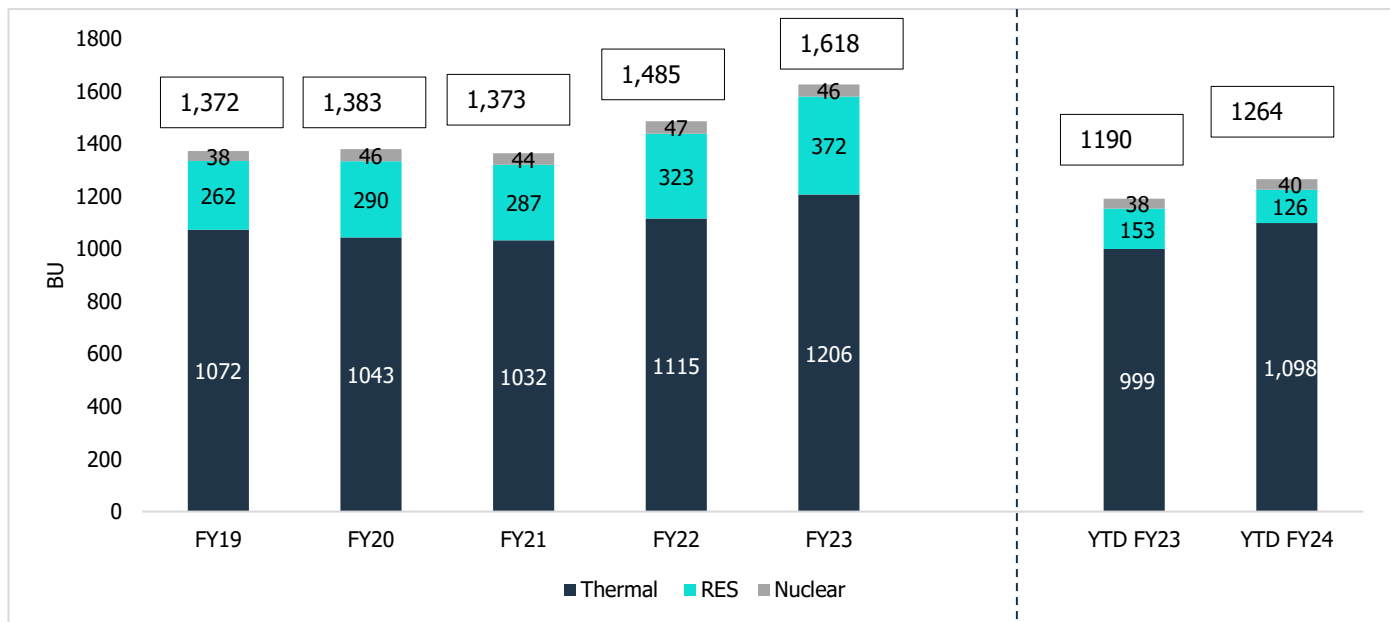
Further, as discussed in Section 3.1, the installed power generation capacity is expected to increase from 416 GW in FY23 to 610 GW by FY27 and 900 GW by FY32 to cater to the growing power demand.

### 5.9 Power Supply Mix of India

Indian power generation sector is one of the most diversified in the world. Power generation sources in India range from conventional sources such as coal, lignite, natural gas, oil, and nuclear to viable unconventional sources such as wind, solar, hydro, agricultural and household waste.

Electricity generation in India increased from 1,372 BU in FY19 to 1,618 BU in FY23, implying a compounded annual growth rate (CAGR) of 4.2%. Electricity generation increased by about 6% y-o-y to 1,264 BU in January'24. Thermal power currently forms the largest source of power in the country with about 75% of the electricity consumed being generated from thermal power plants. There are different types of thermal power plants, out of which coal-based thermal power plants account for the highest amount of electricity followed by gas and diesel. Renewable Energy Sources (RES) including solar, wind, and hydro are quickly increasing their share and their contribution has increased from 19.1% in FY19 to 23% in FY23.

**Chart 25: Power Generation over the years**



Source: CEA; RES refers to power generated from Hydro, Wind, Solar, Small hydro and Bioenergy projects;

Note: YTD FY23/FY24 indicates April to January



The Anticipated Region-Wise All India Power Supply Position of the country for the year 2023-24 is given below:

**Table 10: Anticipated All India Power Supply Position**

	2023-24 (A)				2022-23			
	Requirement (MU)	Availability (MU)	Surplus/ (Deficit)		Requirement (MU)	Availability (MU)	Surplus/ (Deficit)	
Northern	490,767	482,130	-8,637	-1.8%	467,114	462,322	4,792	1.0%
Western	489,791	523,904	34,113	7.0%	474,458	473,870	588	0.1%
Southern	396,820	423,806	26,985	6.8%	372,240	371,664	576	0.2%
Eastern	191,985	195,605	3,620	1.9%	182,725	180,821	1,904	1.0%
North-Eastern	20,510	21,225	714	3.5%	18,763	18,686	78	0.4%
All India	1,589,873	1,646,670	56,796	3.6%	1,515,300	1,507,363	7,937	0.5%

(A)-Anticipated

Source: CEA, CareEdge Research

**Table 11: All India Peak Demand and Energy Requirement**

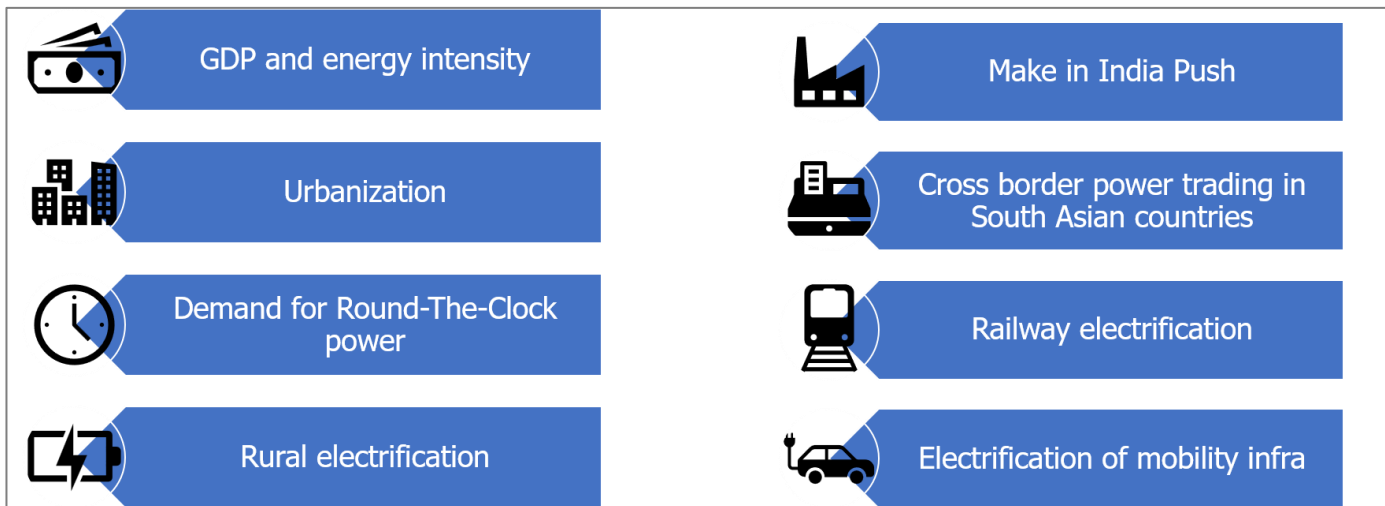
Region	Peak Demand (MW)		Energy Requirement (BU)	
	FY27	FY32	FY27	FY32
Northern	97,898	127,553	592.3	773.5
Western	89,457	114,766	596.8	763.2
Southern	80,864	107,259	460.9	596.6
Eastern	37,265	50,420	232.9	308.1
North-Eastern	4,855	6,519	24.9	32.4
<b>All India</b>	<b>277,201</b>	<b>366,393</b>	<b>1,907.8</b>	<b>2,473.8</b>

Source: CEA, CareEdge Research

Going forward, the Western and Northern regions are expected to continue to drive the energy requirement followed by the Southern region.

The growth drivers for the increasing power demand are mentioned as below.

Chart 26: Growth Drivers for power demand and constraints



Source: CareEdge Research

- **GDP and energy intensity**

India has latent power demand because of its low per capita power consumption, strong GDP outlook, and a growing population. India is likely to emerge as one of the world's fastest-growing economies as per IMF, which is expected to lead to an increase in the power demand of the country. India will outpace world to be USD 5 Trillion economy by 2025 and achieve USD 1 Trillion in exports by 2030, which will all drive power consumption. Details of India's expected GDP growth are mentioned in Section 1.

- **Urbanization**

Urbanization leads to faster infrastructure development, job creation, development of the consumer and services sectors, and hence is a major driver for the growing power demand. The urban consumption is increasing due to rising disposable income, favourable demographics and the trend is likely to continue.

- **Demand for Round-The-Clock power**

Recently, there has been a significant focus on blending two or more energy sources like wind-solar hybrid to achieve better synergies, higher plant load factor and better energy gains. The wind and solar energy have complementary generation patterns and hence provide smooth output. Round-The-Clock ensures quality clean power is made available round the clock, mixing renewable with conventional energy sources for stable power and utilization of existing coal-based plants.

- **Rural Electrification**

The government of India has taken joint initiative with the state governments for providing Power for All (PFA) to all households/homes, industrial and commercial consumers including supply of power to agricultural consumers. PFA initiative along with rural electrification across various states aims to ensure 24X7 electricity access, enhance the satisfaction levels of the consumers, improve quality of life of people and increase economic activities resulting in development. This is one of the key drivers for the growing power demand.

Deen Dayal Upadhyaya Gram Jyoti Yojana (DDUGJY) was launched in December 2014 with the objective of electrification of all un-electrified villages as per Census 2011 by the Government of India. Similarly, Pradhan Mantri

Sahak Bijli Har Ghar Yojana- SAUBHAGYA was launched in October 2017 for electrification of rural and urban poor households in the country.

Following have been achieved so far:

1. All 5,97,464 (Census 2011) inhabited villages stood electrified as on 28.04.2018
2. SAUBHAGYA Scheme:
  - a. Under this scheme, projects worth Rs. 140.82 billion were sanctioned with a closure cost of Rs. 92.46 billion. Against this central grant of Rs. 63.05 billion were released up to March 2022.
  - b. Under the SAUBHAGYA scheme as on March 2019, all households were reported electrified by the states except 18,734 households in Left Wing Extremists (LWE) affected areas of Chhattisgarh.
  - c. Subsequently the seven states namely Assam, Chhattisgarh, Jharkhand, Karnataka, Manipur, Rajasthan and Uttar Pradesh had reported 1.909 million unelectrified household that were unwilling, later as on March 2021 these households expressed willingness and the states reported 100% electrification.
  - d. Post March 2021, around 1.184 million households remain to be electrified as reported by the states against which 0.443 million households have been electrified.
  - e. Under the SAUBHAGYA scheme, a total of 28.17 million households were electrified as on March 2021 and as on March 2022, the schemes stand closed.
3. For 24X7 power supply:
  - In Urban areas, 20 states comprising of 24 DISCOMs having more than 20 average hours of power supply in a day has been achieved.
  - In Rural areas, 17 states and 1 union territory (UT) comprising of 35 DISCOMs having more than 20 hours of power supply in a day has been achieved.
4. The present status of power availability has reached 22 ½ hours on average in rural areas and 23 ½ hours in urban areas.

Schemes like Integrated Power Development Scheme (IPDS) with an outlay of Rs. 326.12 billion including a budgetary support of Rs. 253.54 billion from the Government of India have been approved. Other schemes like Deendayal Upadhyaya Gram Jyoti Yojana, Pradhan Mantri Sahaj Har Ghar Yojana, etc. have also been announced.

- **Make in India push**

The Make in India Initiative which aims to boost manufacturing's share in the GDP would lead to substantial growth in electricity demand.

- **Cross border power trading in South Asian countries:**

Power deficit in India has been on a declining trajectory and India is expected to further expand its generation capacity. India is also evaluating opportunities with neighbouring countries such as Nepal, Bangladesh, Sri Lanka, Maldives and Bhutan for better integration and synergies by interlinking electricity transmission systems and allowing surplus power to be exported to other grids.

- **Railway Electrification**

A lot of emphasis is given to railway electrification with the view to reduce the nation's dependence on the imported coal and petroleum-based energy and with a vision of providing eco-friendly, faster and energy-efficient mode of transportation. In the past 9 years, the pace of electrification has increased significantly with a record breaking 37,011 route kms (RKM) of tracks being electrified.

A total of 58,424 RKM have been electrified, nearly 50% was completed in the last 5 years alone. 100% railway electrification in 14 states/UTs has been achieved making significant strides. Electrification of 6,542 RKM has been achieved in Indian railways history during FY23, registering an increase of 2.76% over last year. Government plans to fully electrify railway network by 2024. To support the electrified railway network, close to 30 billion units of electricity shall be required on an annual basis by 2024.

- **Electrification of Mobility Infra**

The global market for electric vehicles (EVs) is growing. As per the International Energy Agency (IEA), the global EV fleet will reach about 130 million by 2030, a sharp rise from just more than 5.1 million in 2018.

The growth of EV segment in India has also been on an increasing trend. The penetration of EVs has increased to 5% of the total vehicle sales in FY23. The EV sales have witnessed massive growth in FY23 on account of favourable government policies for EVs supporting reduction in upfront cost and expansion of charging infrastructure, rising fuel prices and shifting consumer preferences.

The 2-wheeler and 3-wheeler segments dominate the electric vehicles market in India, comprising of around 62% and 34%, respectively, of total EV sales in year FY23. Electric two-wheelers (E2Ws) are a key segment of the electric vehicle market in India, with growing interest among consumers and increasing government support for electric mobility. On the other hand, Electric three-wheelers (E3Ws) are also an important mode of public transportation in India, particularly for last-mile connectivity and intra-city transportation. The historical trends of sales of EVs in each segment are depicted in the table below:

**Table 12: Sale of EV Units in India (in units)**

EV Sales Units	FY18	FY19	FY20	FY21	FY22	FY23
Two-wheeler	1,897	25,393	24,839	40,837	2,52,547	7,27,434
Three-wheeler	92,395	1,18,944	1,40,683	88,378	1,82,587	4,04,231
Four-wheeler	1,362	1,632	2,727	4,588	18,565	47,383
Goods vehicle	993	517	50	28	2,452	3,049
<b>Total EV sales units</b>	<b>96,647</b>	<b>1,46,486</b>	<b>1,68,299</b>	<b>1,33,831</b>	<b>4,56,151</b>	<b>11,82,097</b>

Source: Council of Energy & Environment & Water (CEEW), CareEdge Research

The Government of India has targeted 30% EV penetration by 2030. NITI Aayog projects EV sales penetration of 80% for two and three wheelers, 50% for four wheelers, and 40% for buses by 2030.

As EV adoption grows, there will be additional power demand for EVs and hence readiness of the electricity grid to EV charging demand is critical to achieve rapid and large-scale transition to EVs.

The total electricity demand for EVs, at 33% EV penetration rate by 2030, is projected to be 37 TWh as per NITI Aayog 2021 report. This constitutes less than 2% of the total electricity demand across the country by 2030. Therefore, meeting the overall energy demand for EVs in India can be met going forward. The charging demand by vehicle segment is depicted below in the table:

**Table 13: Charging demand by vehicle segment**

Vehicle segments	Total daily charging demand in kWh - 2025	Total daily charging demand in kWh – 2030
E – 2W	1,25,596	7,65,442
E-3W (passenger / cargo)	2,55,162	9,72,757
E-car (personal)	17,498	1,64,786
E-car (commercial)	55,931	4,91,838
<b>Total</b>	<b>4,54,187</b>	<b>23,94,823</b>

Source: Handbook of electric vehicle charging infrastructure implementation by NITI Aayog – Version 1

**Constraints:**

- **Grid Connectivity**

Power generation in India is dominated by coal-based generation. The use of other resources, such as renewable energy, is experiencing a staggering growth in installed capacity. Going forward, it is expected that the growth in renewable energy capacity additions will be healthy. Such expansion plans require large-scale development in the transmission sector. This is mainly because large solar and wind power plants are usually located in remote areas with limited infrastructure to support generation and transmission. The government has already implemented measures to develop the transmission capacity to support renewable capacity additions in India, however, delays in the addition of transmission infrastructure to evacuate power from the upcoming capacities is a key risk faced by the sector.

- **Poor Health of DISCOMS**

The DISCOMs have faced several issues in the past including increasing debt levels, poor collection efficiency, high AT&C losses and high ACS-ARR gap. The government has taken multiple initiatives over the past few years to improve the sector. However, the delays in payment to the power producers pose a risk to their cash flow and overall financial stability.

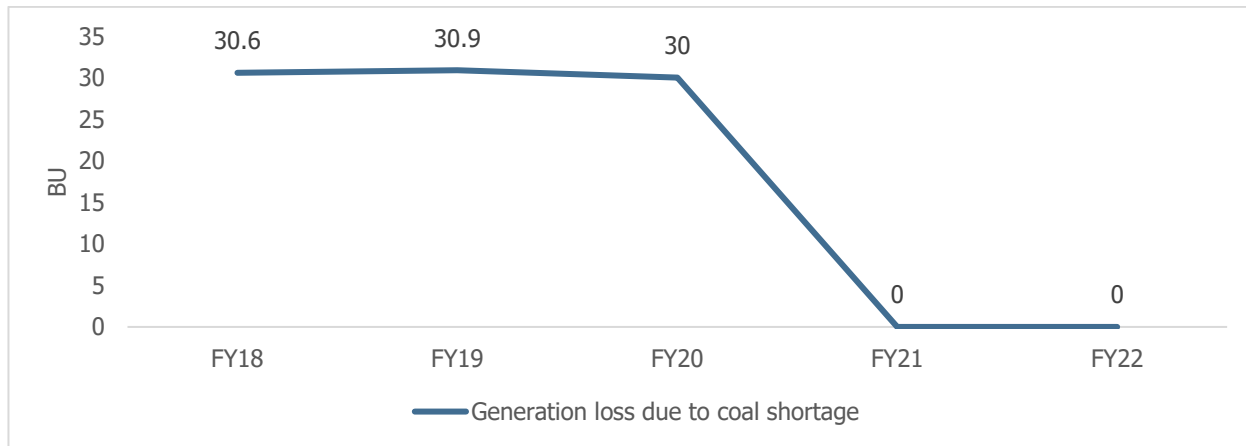
- **Fuel Availability (Coal)**

While traditional thermal power generation requires fuels like coal, lignite, gas and diesel which are available in limited quantity and the resources deplete on usage, renewable power sources are abundantly available in nature and do not deplete.

From FY18 to FY20, there was around 30 BU of loss in generation due to coal shortage which was reduced to zero in FY21 and FY22 due to the import of coal to meet the increasing demand.

The loss of generation due to coal shortage as reported by the power utilities between FY18 to FY22 is given as below:

**Chart 27: Generation loss due to coal shortage**



Source: National Electricity Plan Vol 1 (March 2023), CareEdge Research

While the government is taking proactive steps to increase domestic production of coal and has prioritized allocation to the power sector, the sector remains dependent on imported coal to optimally run the power plant to meet the increasing electricity requirements of the country.

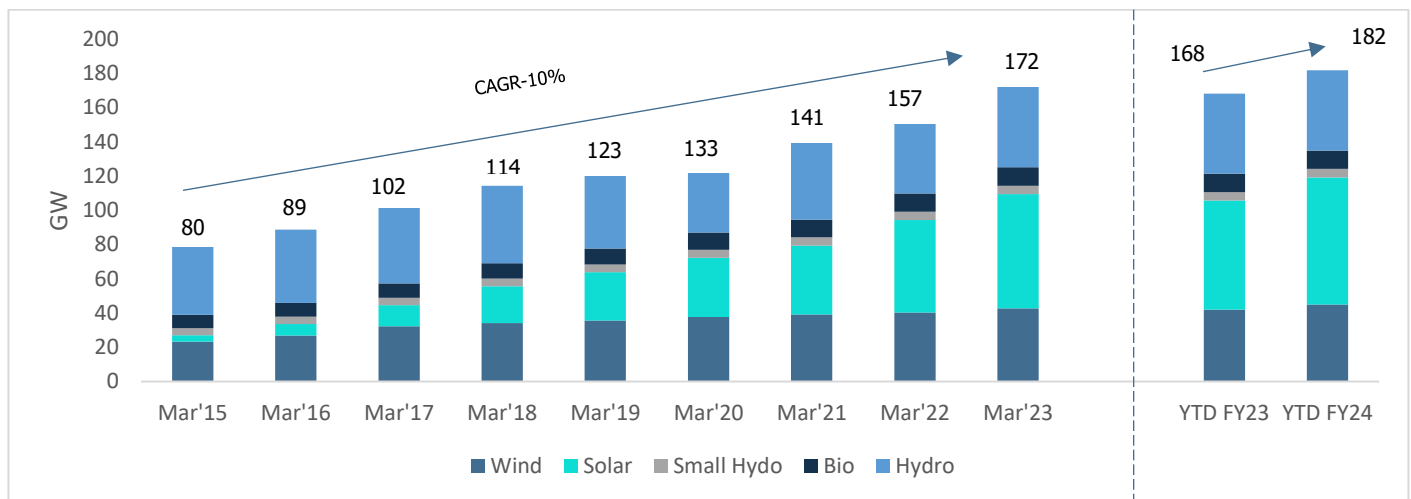
## 5.10 Renewable Energy

### 5.10.1 Overview

There has been a significant shift globally in the generation capacity mix due to the growing concerns towards the environment and climate change. India is an active participant and has taken initiatives towards sustainable development and cleaner environment including significant additions of renewable energy generation capacity.

As per REN21 Renewables 2022 Global Status Report, India currently ranks 4<sup>th</sup> globally in total renewable energy installed capacity, wind power capacity and solar power capacity with generation from non-fossil fuel sources being 41% of the total installed generation capacity in 2022. The total potential of renewable power in India is estimated to be 1,639 GW as compared to installed capacity of 182 GW as on January 2024. The installed capacity of renewable energy has grown by 92 GW over FY15-FY23, implying a CAGR of around 10%.

**Chart 28: Renewable Energy – Trend in Installed Capacity**



Note: Small Hydro denotes projects up to 25 MW, Hydro Power Plants denotes projects more than 25 MW

Source: CEA, CareEdge Research

Note: YTD FY23/FY24 indicates April to January

- Solar:**

In the last nine years, solar power capacity has risen manifold, from 4 GW in Mar 2015 to 74 GW in January 2024, supported by MNRE. Solar tariffs in India are now highly competitive and have reached grid parity. Along with large scale grid connected solar PV, there is development of off-grid solar projects for local needs in India.

Solar energy in India has emerged as a significant player in the grid connected power generation capacity over the years and various initiatives by the government like National Solar Mission, Solar Park Scheme, VGF Schemes, CPSU Scheme, Canal and Canal top Scheme, Grid Connected Solar Rooftop Scheme, etc. have helped solar to grow fastest among other renewable energy sources.

As per Central Electricity Authority (CEA), as on March 2023, solar projects aggregating 36.27 GW are under construction.

- Wind:**

With a total installed capacity of 45 GW (as of January 2024), the country has the fourth largest wind installed capacity in the world. The pace of capacity additions in wind has slowed down in the past few years due to non-availability of favourable wind sites, policy structure moving away from feed-in-tariff mechanism to competitive bidding, removal of

generation-based incentives (GBI) and accelerated depreciation (AD) benefits etc. These factors are expected to continue to affect future capacity additions in wind.

As per Central Electricity Authority (CEA), as on March 2023, wind projects aggregating to 10.76 GW are under construction along with another 6.47 GW of hybrid projects.

- **Hydro:**

India has the fifth-largest installed hydroelectric power capacity in the world. India's installed utility-scale hydroelectric capacity was 47 GW on January 2024, accounting for 11% of the country's total utility power generating capacity. Hydro projects aggregating to 10.9 GW are under construction and are likely to be completed between FY24 and FY27.

- **Small Hydro**

The Ministry of New and Renewable Energy (MNRE) is in charge of constructing Small Hydro Power (SHP) Projects, i.e. hydro power projects with a capacity of up to 25MW. As on January 2024 the total installed capacity is 4,995 MW while another 277 MW are under construction.

- **Bioenergy:**

Power generation from bioenergy and waste to energy offers good potential in rural areas especially if they are far from the grid. The total power generating capacity is 10,846 MW as on January 2024. Gasification based (bioenergy) power projects of aggregate capacity of 59.25 MW are under construction along with 227.25 MW of waste to energy and co-generation projects.

**Table 14: Physical Progress cumulative up to January'24 (GW):**

Sector	Cumulative up to January 2024	Under Construction*	Tendered*	Potential (GW)
Hydro Power	46.9	10.9	0	148
Wind Power	44.9	17.23	1.2	695
Solar Power	74.3	36.27	20.3	750
Small Hydro Power	4.9	0.3	0	21
Bioenergy- Biomass (Bagasse) Cogeneration	9.4	0	0	22
Bioenergy- Biomass (Non-Bagasse) (Cogeneration/ Captive Power)	0.8	0	0	
Waste to Power	0.2	0	0	3
Waste to Energy (Off-grid)	0.5	0	0	
Hybrid/ Round the clock/ Thermal + RE bundling	-	-	11.0	0
<b>Total</b>	<b>181.8</b>	<b>64.7</b>	<b>33</b>	<b>1,639</b>

Source: MNRE, Energy Statistics India 2023, CareEdge Research

\*Denotes figure as on March'23

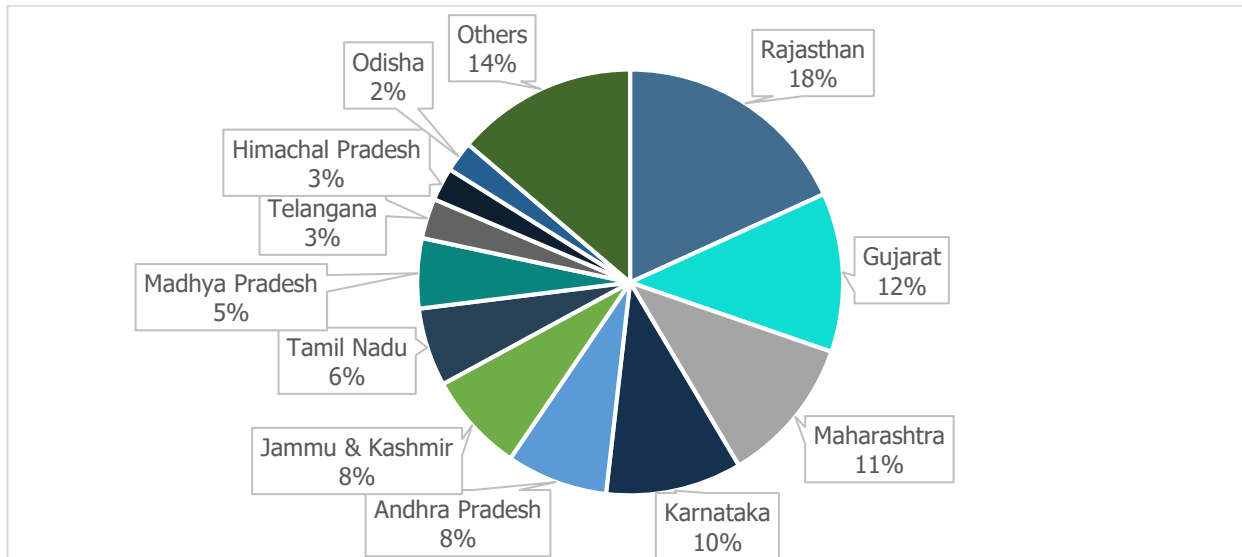
The MNRE has declared a quarterly plan for bids for FY24, which includes bids of around 15 GW of renewable energy in first and second quarter of FY24 and around 10 GW of renewable energy in third and fourth quarters of FY24. The targeted capacity for FY24 will be allocated among the four Renewable Energy Implementing Agency (REIA) i.e. Satluj



Jal Vidyut Nigam (SJVN), Solar Energy Corporation of India Ltd. (SECI), National Thermal Power Corporation (NTPC) and National Hydro Electric Power Corporation (NHPC).

The state-wise potential of renewable energy is as below. Rajasthan, Gujarat, Maharashtra, Karnataka and Andhra Pradesh are top 5 renewable energy potential states.

**Chart 29: State-wise estimated potential of renewable power in India**



\*Excluding Hydro power

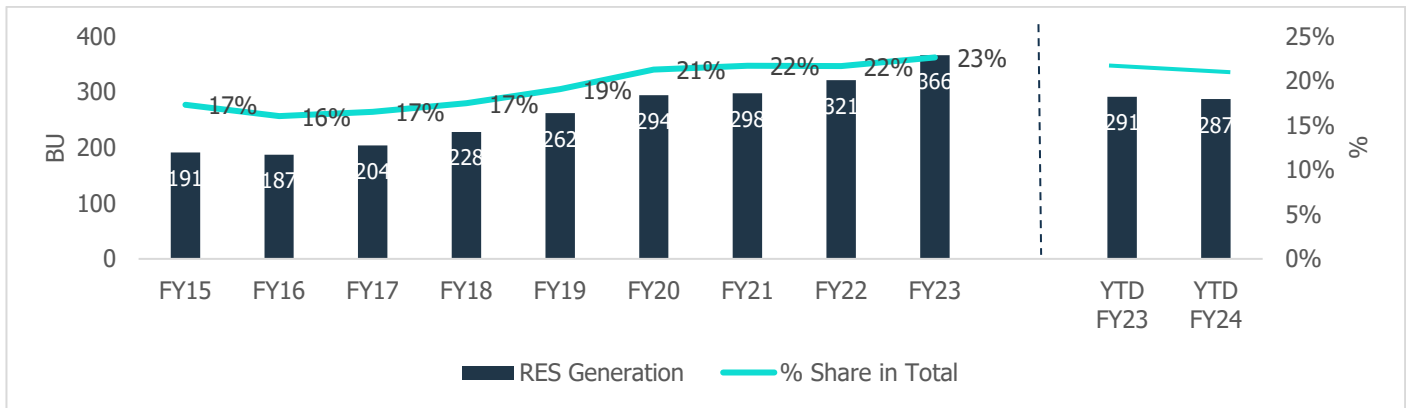
Source: Energy Statistics India 2023, CareEdge Research

**5.10.2 Trend in Renewable Generation**

India is the world's third-largest producer of energy and is also the second largest consumer of electricity.

While conventional sources (thermal power comprising of coal, lignite, gas and diesel-based power plants) currently account for 58% of installed capacity, installed capacity of RES, which currently accounts for 42%, is expected to contribute equally as the conventional sources in the long term supported by Government of India's ambitious projects and targets.

**Chart 30: Share of Renewables in total power generation**



RES includes Solar, Wind, Hydro, Small Hydro and Bioenergy.

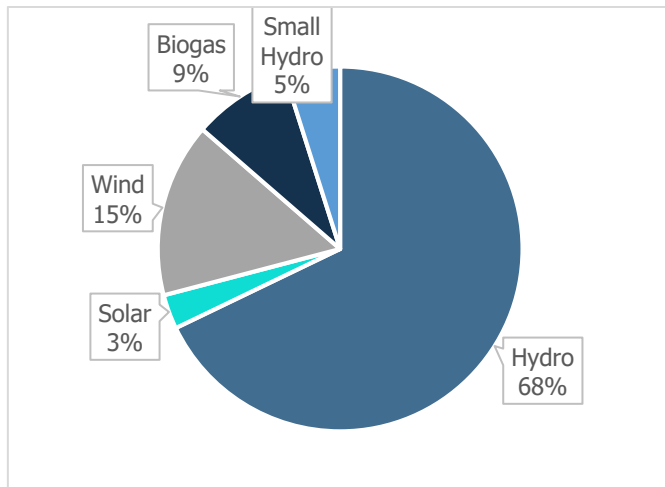
Source: CEA, CareEdge Research

YTD FY23/FY24 includes period from April to December.

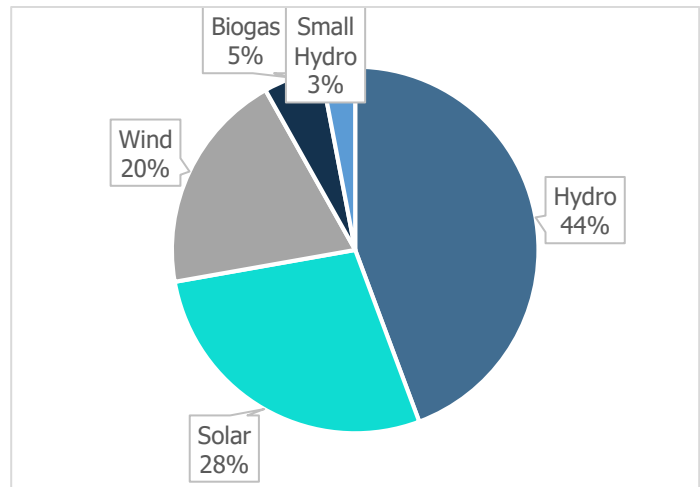
In FY15, the power generated from renewable sources including hydro was 191 BU which has increased to 366 BU in FY23, growing at a compounded annual growth rate of 8.5%. The share of renewable also increased from 17% in FY15 to around 23% in FY23.

In FY15, hydro power had the largest share in renewable energy generation at 68% followed by wind at 9%. In FY23, while hydro continues to have the largest share, it has decreased from 68% to 44%, and solar has emerged as the second largest with a share of 28% followed by wind.

**Chart 31: Breakup of renewable energy generation FY15**



**Chart 32: Breakup of renewable energy generation FY23**



Source: CEA, CareEdge Research

**5.10.3 Renewable Purchase Obligation (RPO)**

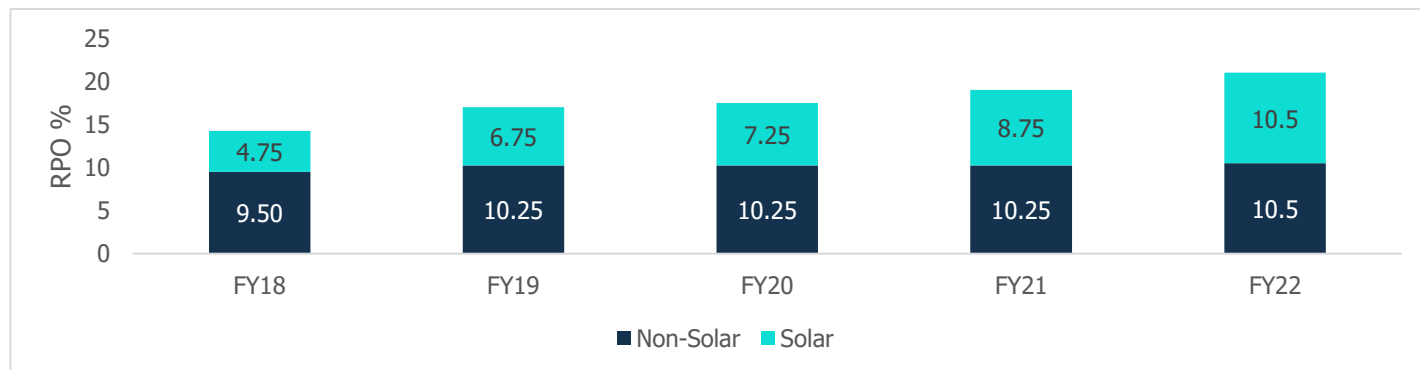
Under Section 86(1) (e) of the Electricity Act 2003 and the National Tariff Policy 2006, Renewable Purchase Obligation (RPO), is a mechanism by which the obligated entities are obliged to purchase certain percentage of electricity from

renewable energy sources, as a percentage of the total consumption of electricity or buy, in lieu of that, renewable energy certificates (REC) from the market.

RPOs are categorized as solar and non-solar RPO. Obligated entities (which includes distribution companies (or DISCOMs), open access consumers and captive power producers) are obligated to purchase a minimum share of their electricity from renewable energy sources as per RPO targets.

As per the targets set, an RPO of 43.33% is proposed to be achieved by FY30.

**Chart 33: Long term RPO Trajectory**



Source: National Portal for Renewable Power Obligations, MNRE, CareEdge Research

**5.10.4 India’s Renewable Energy Targets**

India’s installed renewable power capacity as on January 2024 stood at 183 GW, as per the break-up given in following table.

**Table 15: Renewable Energy Capacity as on January 2024 (GW)**

	Capacity
Solar	74
Wind	45
Bioenergy	11
Large Hydro	47
Small Hydro-power	5.00
<b>Total</b>	<b>183</b>

Source: CEA, CareEdge Research

As India is committed to meet 50% of its energy requirements from renewable energy by 2030, non-fossil fuel based installed capacity target of 500 GW by 2030 has been set, with highest target for solar power.

**Table 16: Renewable Energy Capacity - Target for CY30 (GW)**

	Target
Solar	270
Wind	117
Bioenergy	15
Small Hydro-power	5
<b>Sub-Total</b>	<b>407</b>
Large Hydro	72
Nuclear	21
<b>Total</b>	<b>500</b>

Source: Thirty-Fourth Report of the Standing Committee on Energy on Demands for Grants (2023-24) (17th Lok Sabha) of the MNRE, CareEdge Research

### Hydro Power in India (including PSP)

Hydroelectric power is electricity produced from generators driven by turbines that convert the potential energy of falling water from rivers, rivulets, artificially created storage dams or canal drops into mechanical energy. Hydro power projects are classified as large and small hydro projects based on their sizes and in India, hydro power plants of 25MW or below capacity are classified as small hydro and comes under purview of Ministry of New and renewable energy.

India has the fifth-largest installed hydroelectric power capacity in the world. India's installed utility-scale hydroelectric capacity was 47 GW on July 2023, accounting for 11% of the country's total power generating capacity. At a 60% load factor, India's hydroelectric power potential is projected to be 148 GW.

Government-owned companies produce 92.5% of hydropower generated in India including National Hydroelectric Power Corporation (NHPC), Northeast Electric Power Company (NEEPCO), Satluj Jal Vidyut Nigam (SJVN), THDC India, and NTPC. With the growth of hydroelectric power in the Himalayan mountain ranges and Northeast India, the private sector participation is projected to increase as well. Hydropower plants have also been built by Indian firms in Bhutan, Nepal, Afghanistan, etc.

The energy generated from hydropower was around 10% of the total power generated in the country in FY23. The share of overall hydro power generation has been declining over the years, from 12% in FY15 to around 10% in FY23.

### Small Hydro

MNRE is in charge of constructing Small Hydro Power (SHP) Projects, which are hydro power projects with a capacity of up to 25 MW. These projects have the ability to satisfy the electricity needs of rural and inaccessible locations in a decentralized way while also generating jobs for locals.

The projected potential of small, mini, and micro hydel projects in India is 21,135 MW<sup>2</sup> as on June, 2021, with 7,135 locations around the nation. Around half of this potential is in the hilly states of India mainly Arunachal Pradesh, Himachal Pradesh, Jammu & Kashmir and Uttarakhand. As on January 2024 the total installed capacity of small hydro power is 4,995 MW.

### Pumped Storage Power Plants (PSPs)

Pumped hydro storage is where water is pumped uphill into a reservoir and released to power turbines when needed. They play an important part in meeting peak power requirement and maintain system stability in the power system. The

<sup>2</sup> Source: MNRE

pumped storage technology is long term technically proven, cost effective, highly efficient, and flexible way of energy storage large scale.

In India, the Purulia project which was set up in West Bengal in 2009 with a capacity of 900 MW, has been running successfully. As on March 31, 2022, there are 8 PSP announced projects with an aggregate capacity of 4,746 MW, out of which projects with the capacity of 3,306 MW are working in pumped mode while the balance is not commissioned due to delay in construction.

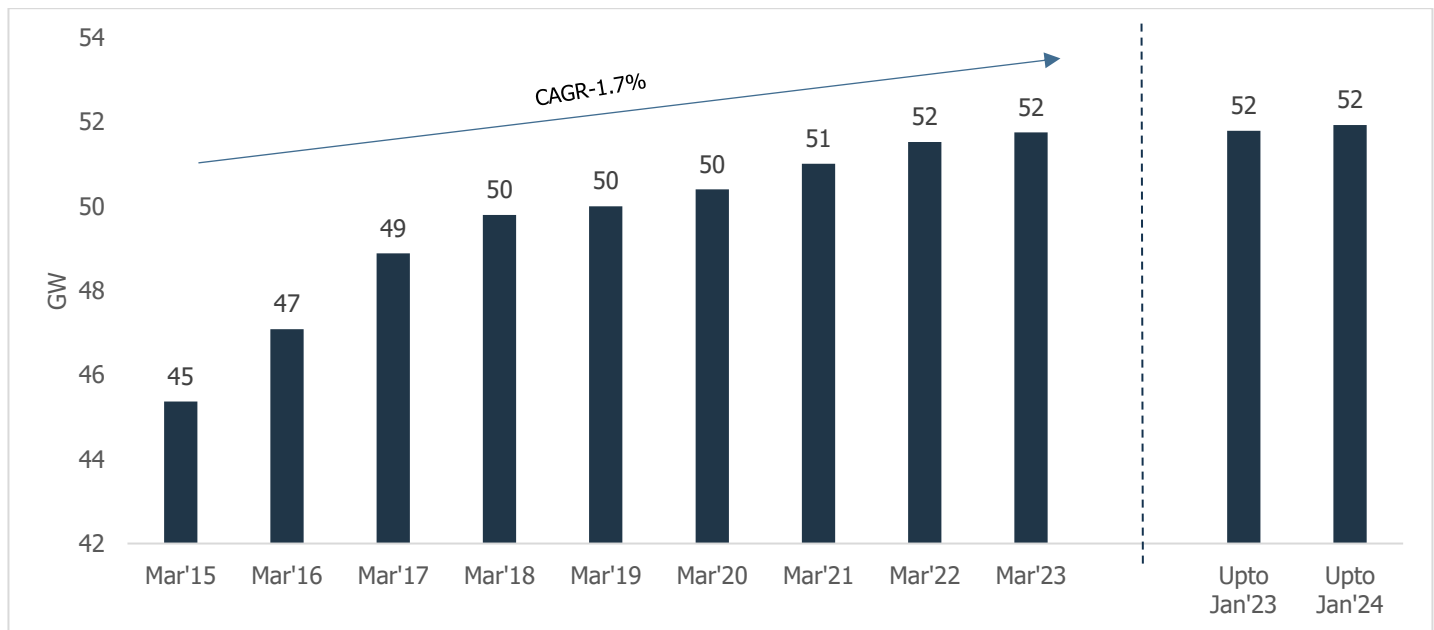
The PSP potential in India has been identified of 96,529 MW as per Central Electricity Authority. The Western region has the highest PSP potential of 37,845 MW. The following projects are under construction as on March 31, 2022:

- Tehri Stage II: 1,000 MW located in Uttarakhand implemented by THDC limited
- Koyna Left Bank: 80 MW in Maharashtra being implemented by the Water Resources Department of Maharashtra
- Kundah Pump Storage Project Stages I, II, III and IV (500 MW) in Tamil Nadu being implemented by TANGEDCO

**Capacity Additions Trend**

Over the FY15 to FY23, only 6.4 GW of hydro power capacity has been added, representing a CAGR of mere 1.7%. The sector has been suffering from project delays caused by complex planning procedures, land acquisition and settlement problems, long term financing, etc. Government has been providing support to hydro power with the help of budgetary support towards cost of enabling infrastructure along with significant reforms like Hydro Project Policy 2008 for encouraging private sector participation.

**Chart 34: Trend in Hydro Power Installations**



Source: CEA, CareEdge Research

### 5.11 Demand Drivers and Challenges

#### Demand Drivers

- Significant hydro potential in India
- GOI's push for development of hydro power
- Flexible energy generation and storage

#### Challenges

- Delay in project execution
- Tariff competitiveness with solar and wind
- Local environmental costs
- High initial cost

#### Demand Drivers:

- **Significant hydro potential in India**

India has a considerable hydro potential and hence it can play a key role in reducing carbon footprint of the power sector. As per the assessment carried out by Central Electricity Authority in 1978-87, the total potential of hydro power is 84,044 MW at 60% load factor, from a total of 845 identified hydro-electric schemes which would result in an installed capacity of 1,48,701 MW.

From the total potential of 1,48,701 MW, above 25 MW installed capacity potential is around 1,45,320 MW. As on May 2023, hydroelectric potential of the country is given below:

**Table 17: Status of Hydro Electric Potential (Above 25 MW)**

		Indus	Ganga	Central Indian River System	West Flowing Rivers of Peninsular India	East Flowing Rivers of Peninsular India	Brahmaputra	All India
Identified Capacity as per	1978-87	33,028	20,252	3,868	8,997	13,775	65,400	145,320
	2017-23	32,322	15,591	4,498.5	7,002	11,269	62,727	133,410
Capacity in Operation	MW	14,637	5,687	3,160	5,684	8,249	4,687	42,105
	%	45	36	70	81	73	7.5	32
Under Construction	MW	5,703	1,324	0	140	960	5,740	13,867
	%	18	9	0	2	9	9	10
Construction held up	MW	48	291	400	0	0	417	1156
	%	0	2	9	0	0	0.6	1
Yet to be taken up	MW	11,933	8,289	939	1,177	2,060	51,883	76,282
	%	37	53	21	17	18	83	57

Source: CEA, CareEdge Research

- **Government of India's push for development of hydro power**

Previously, the government had considered hydro projects up to 25 MW as renewable but now the government of India has formally recognized large hydropower as renewable in 2019.

The Ministry of Power has constituted several committees to suggest ways and means to promote pumped storage hydropower (PSH) and form framework for development, policy and regulatory aspects. The Draft Guidelines to Promote Development of Pumped Storage Projects was issued on February 2023 which recognized PSPs invaluable for the grid.

Details of other government schemes and initiatives are mentioned in section 4.

- **Flexible energy generation and storage**

Hydro power is flexible source of power generation and storage, they can go from zero power to maximum output. Hydropower plants provide backup power during major electricity outages or disruptions as they can generate power to the grid immediately.

### **Challenges:**

- **Delay in project execution**

The growth of the hydro power sector has been slow due to delay in project execution. This involves problems like long gestation period of hydroelectric power plants, remote locations, unpredictable geology, delay in environmental clearances, local resistance.

- **Tariff competitiveness with solar and wind**

The tariff for hydro power is higher than that of other renewable like solar and wind and hence it becomes a challenge for the hydro power sector. The cost of building roads and bridges and to ferry the construction equipment can be quite high as most of projects are locate on hills, hence bringing the tariff of the hydro projects on upward trajectory.

- **Local environmental costs**

Most of the hydro projects in India are in the north and north eastern of the country barring a few small projects in central and southern India. Projects on the Himalayan rivers have been damaged by floods and landslides. This had led to huge losses of lives and infrastructure. There has been critique on construction of hydro projects in the Himalayan mountains highlighting environmental damage.

Massive floods in Uttarakhand in 2013 caused 5000 deaths, damaged homes and hydropower projects. There have been many similar incidents since then.

- **High Initial Cost**

Even though hydroelectricity generation is considered to be economical compared to other power sources, the upfront cost of setting up a hydro power plant is very high along with considerable requirement of resources, time and effort to build. According to National Electricity Plan Vol -1 by CEA, the capex of hydro power projects is Rs. 60 million to 200 million per MW with a construction time require of 5-8 years which is the highest among all other renewable power. The O&M fixed cost is also high at 2.5% of capex per MW.

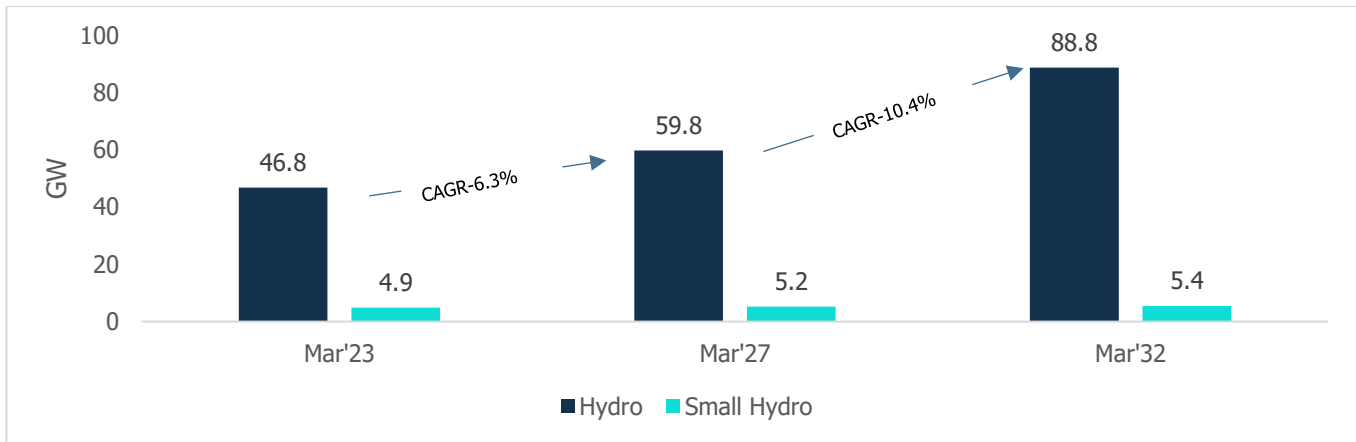
### 5.12 Outlook

There has been a subdued increase in the installed hydro power capacity because of various challenges like hydro power projects being site specific, lengthy process for detailed project report and environmental clearances, geological surprises, etc.

To meet the country’s energy demand at a faster pace and achieve the targeted 500 GW of non-renewable energy, there needs to be an increase and shift of dependence on hydro power. The development of Mega hydro projects is essential.

The hydro power capacity is expected to grow at a CAGR of 6.3% from FY23 to FY27, reaching 59.8 GW while in FY32, the installed capacity is expected to reach 88.8 GW. For small hydro, the installed capacity is expected to remain in the range of 4.8 GW to 5.4 GW.

**Chart 35: Hydro Power Projections (Including PSP)**

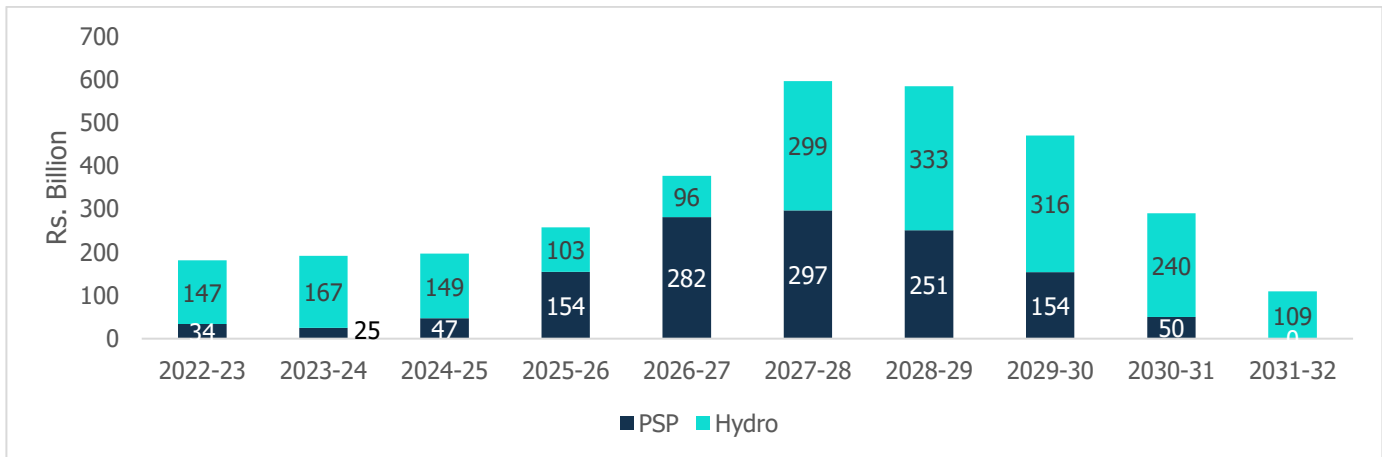


Source: National Electricity Plan Vol-1 (March 2023), CareEdge Research

The capacity addition targets translate into an investment opportunity of Rs. 542.03 billion and Rs. 661.5 billion between FY23-27 and Rs. 752.4 billion and Rs. 1,297.77 billion between FY28-32 for PSP and Hydro power, respectively. The year-wise investment opportunity for hydro power including pumped hydro storage is given below.



**Chart 36: Investment opportunity in hydro power projects (including pumped hydro storage)**



Source: National Electricity Plan Vol-1 (March 2023), CareEdge Research

Note: Investments pertain to capacity additions targeted up to FY32. Investments towards capacities which will be commissioned beyond FY32 are not included.

### 5.13 Government schemes

#### Hydro (including PSP)

The Hydro Policy was notified by the government on March 2019, the salient features of the policy are as follows:

- Declaring Large Hydro Projects as renewable energy sources

The large hydro projects with the capacity more than 25 MW were earlier not recognized as renewable energy, but through the Hydro Policy, it was recognized as renewable in 2019. The large hydro projects would however not be eligible for any differential treatment for statutory clearances like forest clearances, environmental clearances, National Board of Wildlife clearance, any related assessment and study, etc. available for small hydro projects.

- Hydro Power Obligation (HPO)

Hydro Power Obligation was given separate category within the non-solar RPO and these would cover all large hydro projects commissioned after the notification as well as untied capacity of the commissioned projects. The non-solar RPO for other renewable sources have remained unchanged by the introduction of HPO.

- Tariff rationalization measures

Tariff rationalization measures were introduced to bring down the hydropower tariffs. The measures include providing flexibility to the developers to determine the tariff by back loading of tariff after increasing project life to 40 years, increasing the debt repayment period to 18 years and introducing escalating tariff of 2%.

- Budgetary support for funding flood moderation component of hydropower in case-to-case basis
- Budgetary support for cost funding for infrastructure i.e. roads and bridges limited to Rs. 15 million per MW for up to 200 MW projects and Rs. 10 million per MW for above 200 MW projects.

### • Hydro Pumped Storage Guidelines

To achieve government of India's commitment of 500 GW of installed capacity from non-fossil fuel sources by 2030, become energy independent by 2047 and achieve net zero emissions by the year 2070, hydro pumped storage projects are necessary. Hence 39 Hydro PSPs of 47 GW are being pursued to be commissioned by 2029-30.

Various steps have been taken by the government in order to ensure that Pumped Storage Projects (PSPs) get commissioned on a fast track for accelerating the growth of renewable energy sector of India. The steps include:

- Revamped process for approval of pumped storage projects
- Single window clearance
- Speeding up environmental clearance
- Compressed timelines for approval of DPRs

The Central government had issued waiver of ISTS charges for PSP and BESS projects in order to promote commissioning and optimum utilization of storage projects on 21.06.2021. The scheme also waiver of transmission charges for trading of electricity generated/supplied from Solar, Wind, PSP and BESS in Green Term Ahead Market (GTAM) and Green Day Ahead Market (GDAM) for till 30.06.2023.

The ISTS charges for power supplied from Hydro PSP or BESS projects shall be levied gradually as follows:

- 25% of STOA charges for initial 5 years of operation.
- After 5 years, the charges will be increased in steps of 25% every 3<sup>rd</sup> year to reach 100% of STOA charges from 12th year onwards.

### Green Transmission

India has a target of 500 GW of non-fossil fuel capacity by 2030 and hence significant investments have commenced towards increasing and upgrading the transmission infrastructure. Transmission system has been planned for following RE capacity to be commission by 2030:

**Table 18: Transmission System planned for Renewable Energy**

Sr. No.	Category	Capacity (MW)
1.	RE capacity already commissioned (As on 31.10.2022)	1,65,943
2.	66.5 GW RE capacity to be integrated to Inter State Transmission System (ISTS) network (8.861 GW already commissioned)	57,639
3.	Additional RE capacity totalling to 236.58 GW to be integrated to ISTS network	2,36,580
4.	Margin already available in ISTS sub-station which can be used for integration of RE capacity	33,658
5.	Balance RE capacity to be integrated to intra-state system under Green Energy Corridor-I Scheme	7,000
6.	RE capacity to be integrated to intra-state system under Green Energy Corridor -II Scheme	19,431
7.	Additional Hydro Capacity likely by 2030	16,673
	<b>Total (RE)</b>	<b>5,36,924</b>

Source: CEA Report- Transmission System Integration of over 500GW RE Capacity by 2030, CareEdge Research

For integration of additional wind and solar capacity by 2030, the estimated length of transmission line and sub-station capacity planned is around 50,890 ckm and 4,33,575 MVA, respectively. The investment required for the green transmission is estimated to be around Rs. 2,440 billion as per the Ministry of Power. Out of this, Rs. 281 billion will be required for integration of offshore wind capacities while Rs. 2,160 billion will be required for new solar and wind (onshore) plants.

**Table 19: Tentative cost of additional transmission system**

	RE Capacity (GW)	BESS (GW)	Requirement of Transmission system (GW)	Tentative cost of transmission system (Rs. billion)	Average cost of Transmission system (Rs. Million/MW)
On-shore RE Capacity (Solar & Wind)	268.68	51.5	217.18	2,161	9.95
Offshore RE capacity (Wind)	10	0	10	281	28.1
<b>Total RE capacity</b>	<b>278.68</b>	<b>51.5</b>	<b>227.18</b>	<b>2,442</b>	<b>10.75</b>

The tentative cost includes the cost of ISTS transmission schemes for (i) 66.5 GW RE capacity (excluding commissioned transmission schemes and associated RE capacity) (ii) 55.08 GW RE capacity and (iii) 181.5 GW RE capacity

Source: CEA Report- Transmission System Integration of over 500GW RE Capacity by 2030, CareEdge Research

**Table 20: Summary of government schemes with defined targets/ financial outlay**

Sr. No.	Scheme/ Policy	Financial Outlay	Target
1.	Green Energy Corridor	Rs. 120.31 billion	
2.	Green Transmission	Rs. 2,440 billion	
	<b>Solar</b>		
3.	Solar GBI	NA	91.8 MW
4.	National Solar Mission	NA	100 GW by 2022
5.	PM KUSUM	Rs. 340 billion	30.8 MW
6.	RTS Programme	Rs. 350 billion	7.6 MW
7.	Solar Parks	NA	40 GW by Mar'24
8.	Solar Cities	NA	60 solar cities
9.	CPSU Scheme	Rs. 858 million	8.2 GW
10.	PLI Scheme for Solar Module	Rs. 195 billion	NA
	<b>Wind</b>		
11.	Wind GBI	Rs. 12.14 billion	NA
12.	Offshore Wind Policy	Rs. 156.08 billion	37 GW by 2030
	<b>Hydro</b>		
	Hydro Pumped Storage	NA	47 GW by 2030
	<b>Bioenergy</b>		
13.	National Bioenergy Programme	Rs. 8.58 billion	NA
	<b>Green Hydrogen</b>		
14.	Green Hydrogen Mission	Rs. 197.4 billion	NA

Note: Timelines of the policies and proposed financial outlay are provided in the earlier

## 6. Water supply and Waste Water management

### 6.1 Overview

India is the world's second most populous country with 1.39 Billion people. Out of this, 65% of the population lives in rural areas and 35% are connected to the urban centres according to United Nations (2019). The metropolitan cities of the country are seeing major expansion as a result of economic expansions and reforms. This expansion in urban population is unsustainable without efficient planning of cities and provision of utility services especially clean and affordable water. Water allocation in cities is usually done from common pool with multiple sectoral demand.

India has a challenge of serving 18% of the world population with 4% of the world's fresh water resources. Currently, India stores less than one-tenth of the annual rainfall and is designated to be a water stressed nation. Disproportionate use of water for agricultural use, excessive ground water pumping and deficient monsoon in the last couple of years make the demand-supply balance more critical. India is facing water crisis with around 50% population experiencing high-to-extreme water shortage, as per NITI Aayog.

The average water available per capita annually depends on the region's hydro-meteorological and geological factors. The per capita water availability in the country is reducing due to increasing population. The annual per-capita water availability is less than 1,700 cubic meters and is expected to fall to 1,367 cubic meters by 2031 according to "Reassessment of Water Availability in India using Space Inputs (2019)." As per a report by Dynamic Ground Water Resource Assessment 2022, out of 7,089 assessment units which includes blocks, talukas, mandals, watersheds, firkas in the country, 1,006 units have been categorized as 'Over-exploited'.

It is expected that by 2050, about 1,450 km<sup>3</sup> of water will be required out of which approx. 75% will be used in agriculture, ~7% for drinking water, ~4% in industries, ~9% for energy generation. However, because of growing urbanization, the need for drinking water will take precedence from the rural water requirements. Many of the cities are situated by the bank of rivers from where the fresh water is consumed by the population and the waste water is disposed back into the river, thus causing contamination of the water source and irrigation water. This has raised serious challenges for urban wastewater management, planning and treatment.

According to the Central Pollution Control Board (CPCB), the estimated wastewater generation was almost 39,600 Million liters per day (MLD) in rural regions, while in urban regions it was estimated to be 72,368 MLD for the year 2020-21. The estimated volume in the urban cities is almost double than that of the rural regions because of the availability of more water for sanitation which has improved the standard of living.

### 6.2 Water supply management

With increasing population of the country, the need for water and its management is ever increasing. Water availability is projected to become a major concern in the future. In addition to that, the damage to water resources done by pollution is yet another concern. Releasing industrial waste, discharge of untreated or partly treated municipal waste water through drains, discharge of industrial effluent, improper solid waste management, illegal ground water abstraction, encroachments in flood plains/ river banks, deforestation, improper water shade management and non-maintenance of e-flows and agriculture run off etc. are some of the major reasons for pollution of water bodies. The Government of India (GoI) has come up with various schemes that emphasizes on water conservation and restoration. As a result, the number of polluted river stretches has reduced from 351 in 2018 to 311 in 2022 and improvement in water quality has been observed in 180 out of 351 Polluted River Stretches (PRS) during the year 2018. As per a report by Ministry of Jal Shakti, assessment of water quality over the years discloses that in the year 2015, 70% of rivers monitored were identified as polluted, whereas in the year 2022 only 46% of rivers monitored are identified as polluted. The water requirement is only estimated to grow higher in the coming years.

**Market size for water requirement for different uses (in Billion Cubic Meters) in coming years:**

Sr No.	Uses	Scenario (2025)	Scenario (2050)
1	Irrigation	611	807
2	Domestic	62	111
3	Industries	67	81
4	Power	33	70
5	Others	70	111
	<b>Total</b>	<b>843</b>	<b>1,180</b>

Source: Ministry of Jal Shakti

Providing clean drinking water is the main focus of the Government. Over the years, the drinking water quality has become a major concern in the rural areas.

Central Water Commission (CWC) periodically assesses country’s overall water resources and it has accorded water supply for drinking purpose as the top most priority under water allocation.

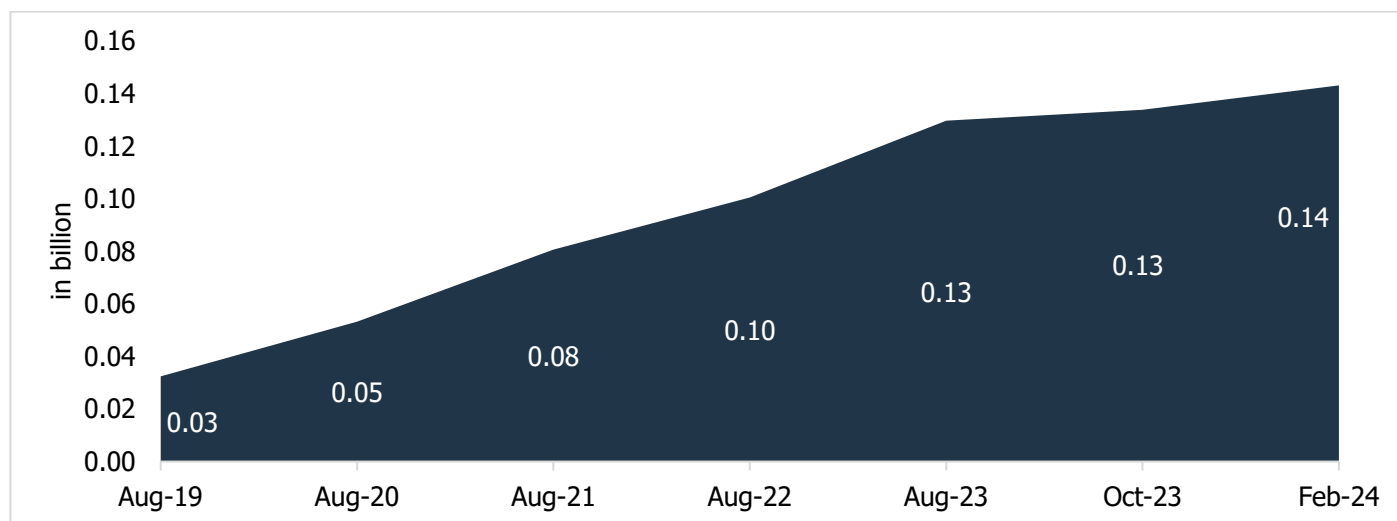
To address the present and future food and water security concerns, the GoI has been implementing various schemes. Following are some of the priority areas, focusing on water resources development, that have been identified by the GoI:

- Improving the overall water use efficiency in irrigation and drinking water supply system
- Adoption of piped distribution system in place of open canal system to reduce the conveyance water loss
- Command area development by implementing more micro irrigation system and participatory irrigation management
- Dam safety, dam rehabilitation and performance improvement
- Repair, renovation and restoration of existing water bodies for irrigation, drinking water supply, cultural activities, etc.
- Improving the rural drinking water supply system and sanitation

**Key performance indicators for water supply management in India:**

The GoI in partnership with States is implementing Jal Jeevan Mission (JJM). At the time of the announcement of the JJM, only 17% of the households were reported to have tap connections. However, as on February 13, 2024, post implementation of the JJM, 74% of the households are reported to have tap water supply in their homes.

**Chart 37: Rural Households given tap water connections (cumulative)**



Source – Jal Jeevan Mission, CareEdge Research

Some States and Union territories have even achieved 100% tap water connections in the rural households.

List of State / Union Territories (UTs) Rural Households with 100% tap water supply:

- Andaman & Nicobar Islands
- Dadra & Nagar Haveli and Daman & Diu
- Goa
- Gujarat
- Haryana
- Puducherry
- Telangana
- Punjab
- Himachal Pradesh
- Arunachal Pradesh

#### **Water supply management traction:**

- All 0.23 Million rural households of Goa & 0.08 households of Dadra & Nagar Haveli and Daman & Diu have access to potable water through tap connection
- As of February 2023, 0.93 Million (88.60%) schools and 0.96 Million (85.83%) Anganwadi Centers across India have been provided with potable tap water supply for drinking & cooking mid-day meals and hand washing. The remaining States/ UTs are working hard to provide tap connections in schools and Anganwadi centers so that children get access to safe water
- 0.51 Million Village Water & Sanitation Committee/Paani Samitis have been formed, and 0.50 Million Village Action Plans (VAPs) have been developed for sustained drinking water supply management

#### **Urban Waste Generation and Treatment**

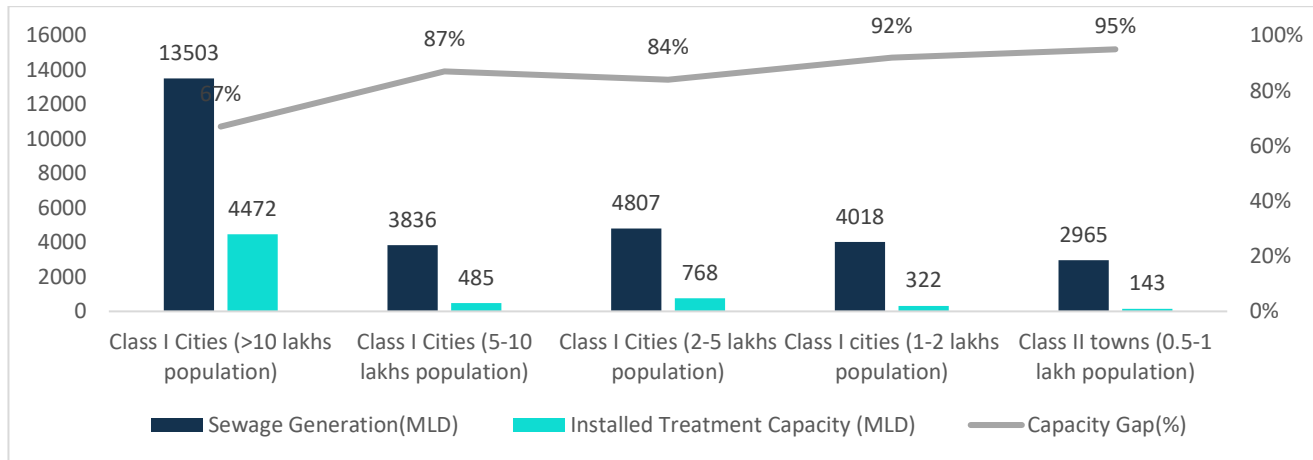
In India, the sewage generation in the urban region was 72,368 Million Litres per Day (MLD) for the year 2020-21, while the installed sewage treatment capacity is 31,841 MLD. The operational capacity is 26,869 MLD, which is very low than the load generation.

As per a Niti Aayog report, as of August 2022, of the total sewage generation only 28% i.e. 20,236 MLD was treated which implies that 72% of the waste water is left untreated and is disposed in the various water bodies like river, lakes or underground water. Some capacity additions like 4,827 MLD sewage treatment have been proposed but a gap between the waste water generation and treatment of 35,700 MLD i.e. 49% still remains.

Additionally, as per the CPCB (2021) in the city-scale assessments, the wastewater generation from Class I cities and Class II towns (as per the 2001 census) is estimated as 29,129 MLD, and under the assumption of a 30% decadal increase in urban population, it is expected to be 33,212 MLD at the current time. Against this, the existing capacity of sewage treatment is only 6,190 MLD. There is still a 79% (22,939 MLD) capacity gap between sewage generation and existing sewage treatment capacity. Another 1,742.6 MLD wastewater treatment capacity is being planned or built. Even with this added to the current capacity, there is still a sewage treatment capacity shortfall of 21,196 MLD.

**Key performance indicator for the water sewage sector:**

**Chart 38: Sewage generation and treatment capacities (MLD)**



Source- Central Pollution Control Board, 2022

Note- Performance of 115 sewage treatment plants studied by Central Pollution Control Board

**6.3 Regulatory framework for water and waste water Industry in India**

The management of water and waste water has been highly fragmented in India. The first ever National Water Policy (NWP) in India was set up in 1987. Currently the NWP - 2012 is in effect in India. But to address the present challenges in water sector, revision of NWP has been envisaged and a drafting committee was constituted to revise the NWP.

The Ministry of Water Resources assumes a nodal role as regards to all matters concerning India's water resources.

**The Central Ground Water Board (CGWB)**, a subordinate office of the Ministry of Water Resources, GoI, is the National Apex Agency entrusted with the responsibilities of providing scientific inputs for management, exploration, monitoring, assessment, augmentation and regulation of ground water resources of the country. CGWB was established in 1970 by renaming the Exploratory Tube Wells Organization under the Ministry of Agriculture, GoI. It was merged with the Ground Water Wing of the Geological Survey of India during 1972.

**Department of Water Resources, River Development and Ganga Rejuvenation now "Ministry of Jal Shakti"/ "Jal Shakti Mantralaya"** has two departments i.e. department of Water Resources, River Development and Ganga Rejuvenation (Jal Sansadhan, Nadi Vikas Aur Ganga Sanrakshan Vibhag) and Department of Drinking Water and Sanitation (Peya Jal Aur Swachhata Vibhag).

As per Ministry of Jal Shakti's publication, water being a State subject, steps for augmentation, conservation and efficient management of water resources are primarily undertaken by the respective State Governments. In order to supplement the efforts of the State Governments, the Central Government provides technical and financial assistance to them through various schemes and programmes.

The GoI along with the States is implementing Jal Jeevan Mission – Har Ghar Jal. This program aims at providing potable water in adequate quantity of prescribed quality on regular and long-term basis to every rural household, through tap water connection, by 2024 with an estimated outlay of RS.3,600 Billion. The water sources inter alia include groundwater, surface water (river, reservoir, lake, pond, springs, etc.) and rain water stored in small tanks.

### **Atal Mission for Rejuvenation and Urban Transformation (AMRUT):**

The mission of AMRUT is providing basic services (e.g. water supply, sewerage, urban transport) to households and build amenities in cities which will improve the quality of life for all, especially the poor and the disadvantaged which is a national priority.

Its mission components include:

- Decentralised, networked underground sewerage systems, including augmentation of existing sewerage systems and sewage treatment plants
- Rehabilitation of old sewerage system and treatment plants
- Recycling of water for beneficial purposes and reuse of waste water

### **6.4 Key trends in the water supply and waste water management system in India**

**Increase in schemes introduced by Government:** In recent times, there has been an increased number of schemes introduced by the Government towards improving water supply as well as water sewage infrastructure in India. Schemes like JJM, Jal Shakti, Atal Bhujal Yojana have been set up in the last 7 years. In FY25 Budget, allocation for JJM/National Drinking Water Mission has increased to Rs.702 Billion, from Rs.700 Billion in FY24.

**Emergence of new sources of water:** Techniques like rain water harvesting, treated waste water are gaining momentum due to growing demand of water. These techniques are acting as soon as they can reduce pressure on fresh surface water.

**Focus on improving water efficiency:** A new initiative 'Support for Irrigation Modernization Program' to improve water efficiency, increase crop water productivity has been taken up by the Department of Water Resources.

**Use of technology in water and waste water management:** Use of technology in various sectors is increasing day by day. Similarly, use of technology in water supply and waste water management is expected to increase for data collection, to keep a record of water treatment, sanction disposal and project mapping.

**Increased private participation:** The participation of the private players who are providing water availability 24x7 is increasing. These players are setting up recycling facilities, sewage treatment plants to support increased supply of water.

### **6.5 Key growth drivers in the water supply and waste water treatment industry**

Use of technologies and innovative waste water treatments play an important role in improving urban sanitation and enhancing water security. The usage of treated waste water is still an issue in India despite the known benefits of waste water treatment and information about reuse technologies.

#### **Key drivers for water supply management:**

- **Mission on making water available to all**

The focus of the GoI in the past few years has been to make potable water available to all the households in the country. For the same reason, a number of schemes have been established by the GoI. The per capita water availability in the country is decreasing due to increasing population. As per a NITI Aayog report, India is facing water crisis with around 50% population experiencing high-to-extreme water shortage.

The Government has introduced schemes like 'Jal Jeevan Mission' to execute the mission of providing safe and adequate water to all. Under JJM, the tap connections in rural households have increased to 74% as of February 2024.



- **Focus on improving water availability**

Based on the study of “Reassessment of Water Availability in India using Space Inputs” (CWC, 2019), the average annual per capita water availability for the year 2031 has been assessed as 1,367 cubic meters. The Government is coming up with measures to improve availability of water by building and maintaining natural resources of water. Below schemes have been set up by the GoI to tackle the declining availability of water:

- Atal Bhujal Yojana (Atal Jal): Sustainable groundwater management
- Jal Shakti Abhiyan: “Jal Shakti Abhiyan: Catch the Rain” focuses on creating Rainwater Harvesting Structures

The thrust areas for these schemes will be rain water harvesting, rejuvenation of water bodies.

On the other hand, the Department of Water Resources and other schemes aim to ensure maintenance and efficient use of water resources to match the continuously growing demand of water.

- **Rejuvenation of urban water bodies**

Water bodies in urban areas such as lakes, ponds, step-wells, and baolis have traditionally served the function of meeting water requirements of various needs like washing, agriculture or religious/cultural purposes. Surface water bodies and traditional water harvesting structures in numerous cities have either dried up, or disappeared due to encroachment, dumping of garbage, and entry of untreated sewage. These water bodies can store water and recharge ground water if revived thus helping in meeting the increased requirement of water.

**Key drivers for waste water treatment:**

- **Central Government policies push for waste water treatment and use**

Under the National Sanitation Policy, waste water treatment and reuse of water to enhance alternative water supplies and conservation is promoted. Initiatives like National Lake Conservation Plan, National Wetland Conservation Program are introduced to help identify lakes and wetlands across the country for undertaking conservation, waste water treatment, pollution abatement, education and awareness creation etc.

Central Government has also implemented National River Conservation Plan for abatement of pollution across stretches of various rivers and undertaking conservation plan, sewage systems construction, sewage treatment plant construction, electric crematoria and river front development.

Financial assistance for treatment plants installation are also provided to small scale industries. Apart from this, the Central Government has also issued directions for zero liquid discharge implementation.

- **Development plans to clean River Ganga and improve wastewater treatment and management**

The GoI has launched two flagship programs for cleaning River Ganga i.e., Ganga Action Plan (GAP) (1985) and Namami Gange Programme (2014). The Government has also initiated sectoral plans like Swachh Bharat Mission, AMRUT, Smart City initiatives etc. to improve unsewered and sewer sanitation. Under these initiatives, the State Government, municipal and private sector applicants are given grants and subsidies for the construction of sewage treatment plants and water treatment plants.

- **Agricultural water reuse**

Low quality water is not conventionally used in agricultural production. The two sources of non-conventional water (NCW) are – waste water used for domestic, municipal and industrial and saline water from underground, drainage or surface sources. But many countries are using the NCW sources for agricultural uses as the fresh water sources are limited. The NCW is primarily treated and blended with other water to produce the desired quality and quantity. In India, under Ganga Action Plan - I, the objective was to improve the water quality along with diversion and treatment of domestic sewage and industrial waste. If not properly treated the low-quality irrigation water might cause severe

water and soil contamination. To tackle this, India needs water treatment plants with advanced technology and increased volume across the country.

- **Industrial water reuse**

The industrial water can be recycled and reused by processing the waste water produced. Various methods are used to perform this depending upon the quality of the waste water requirements, space constraints, and budget. Benefit of this, is reduction of fresh water cost and reduction in the water footprint. The operational and sustainability of the industries can also be improved with improved water treatment process and production capacity.

## 6.6 Key Risks and challenges in the water supply and waste water industry

### Water Supply:

- **Regulatory challenges:**

Under water supply management, permits and finance are key elements for setting up the project. Different projects might need different permits along with financial sanctions which follow a regulatory process. The process can become time consuming due to delayed submissions, incomplete information, revised project plans. The unexpected changes could lead to extended timelines and delay the project timelines. Also, receiving funds required for implementation and execution of projects takes time, which leads to project execution delay.

- **Financial challenges:**

When the draft for a water supply project is presented, an estimated cost of the project is presented to the authorities as well. The project cost estimates typically get revised as the design gets more specific or the design gets updated due to additions made in the project. Based on the draft design, the authorities sanction the budgeted amount which may get revised due to factors like inflation, change in material cost, economic changes or even inaccurate estimations. These unexpected changes lead to revised project cost which need approval from the authorities again or in some cases the additional construction cost may have to be borne by the construction company assigned.

- **Environmental challenges**

Climate change is affecting the environment in a major way. It is impacting rainfall patterns, causing floods and may also lead to long term decline in naturally available sources like groundwater storage. Groundwater availability is closely linked to food security as it has played a vital role in increasing agricultural production over the years. Groundwater contributes nearly 62% in irrigation, 85% in rural water supply and 50% in urban water supply. Even though Groundwater is replenishable but its availability is non-uniform as it is dependent on rainfall. The over exploited groundwater sources are a major challenge as it is a key water supply source for agriculture.

### Waste water management:

- **Institutional Challenges**

The Urban Local Bodies (ULBs) are responsible for domestic waste water management and treatment. However, there is a lack of planning capacity and project implementation. According to the audit report of Comptroller and Audit General (CAG 2017), there was a shortage of man power in the municipalities for waste water collection, treatment and revenue collection which affected delivery of citizen services. It also exposed deficiencies in planning, financial management, implementation, and monitoring of various projects. Similarly, the CAG performance audit (2016) in the state of Jharkhand found that none of the sampled ULBs had a sewage network. In the absence of the same, around 175 MLD of untreated waste water is discharged into open drains polluting nearby water bodies.

The current institutional, legal and policy mechanisms for management and treatment of waste water and control of water pollution in the country is not sufficient to address the looming crisis.

- **Economic Challenges**

The gap between the sewage generation and present treatment capacity is very large in all the classes of cities and towns due to increasing population and urbanization in India. It is difficult for smaller cities and towns in finding necessary resources to set water treatment plants considering high capital expenditure and operation and maintenance cost. Community participation in operation and maintenance is suggested to improve the economic viability of Sewage Treatment Plants (STP). Private sector waste water treatment investments are difficult in India due to high capital investments and unpredictable revenue stream.

- **Technical Challenges**

There is an overdependence in India on older technologies for waste water treatment due to its high cost. This results in more repair work and less efficiencies of these plants. These limitations lead to poor performance of the plants and adulteration of sewage and water bodies. The conventional centralized waste water treatment plants are designed to remove only Nitrogen, Biological Oxygen Demand and Phosphorous but with rapid urbanization and changing type of contaminants, technologically advanced plants are needed to be setup to deal with them.

Apart from this the land requirement for STP plants is a big challenge. In urban areas land availability is a big issue due to limited land availability and high cost.

- **Social Challenges**

Social acceptance of treated waste water is a big challenge due to fear and disgust when it comes to reuse. Recycled water is unlikely to be used as drinking water when compared to its use in irrigation etc. The negative attitude towards this has also stemmed from concerns like health risk and aesthetic aspects like colour, odour, taste and cultural and religious background of consumers.

Identifying and obtaining of sites for plant setup is another challenge due to people not preferring to live near these plants. This is because of the reasons like health risks, aesthetic impacts and factors like land depreciation. Solutions like underground plant setup can help eliminate the above stated factors but involves a huge capital expenditure. Also, buffer zones are limited to solid wastes. Conventional systems in India suffers operational costs, management costs, demand of treated water and decentralized systems.

## **6.7 Government Initiatives for water supply and waste water management**

### **Water supply**

#### **Jal Jeevan Mission - 'Har Ghar Jal'**

JJM is a Central Government initiative undertaken by Ministry of JAL SHAKTI. It aims to ensure piped water access to every household in India. The initiative was launched on 15<sup>th</sup> August 2019 by the Prime Minister of India.

The program is implemented in partnership with States to assure tap water supply in adequate quantity, prescribed quality, adequate pressure, on a regular and long-term basis in all rural households and public institutions, which includes anganwadi, schools, ashramshalas, public/ community health centres, sub-centres, wellness centres, community centres, gram panchayat buildings, etc., by the year 2024.

Under JJM, 30% weightage was assigned for difficult terrains which inter alia include areas under Desert Development Programme (DDP) and Drought Prone Area Programme (DPAP) while allocating the fund, to prioritize the coverage in these areas. Further, provisions have been made in the operational guidelines for planning and implementation of bulk water transfer from long distances and regional water supply schemes for ensuring tap water supply in drought-prone &

water-scarce areas/ areas with inadequate rainfall or dependable ground water sources. In addition, provisions have also been made for source recharging, viz. dedicated bore well recharge structures, rain water recharge, rejuvenation of existing water bodies, etc., in convergence with other schemes such as the Mahatma Gandhi National Rural Employment Guarantee Act 2005 (MGNREGA), Integrated Watershed Management Programme (IWMP), 15th Finance Commission tied grants to Rural Local Bodies (RLB)/ Panchayat Raj Institutions (PRI), State schemes, Corporate Social Responsibility funds, etc.

For villages in water-scarce areas, in order to save the precious fresh water, states are also being encouraged to plan new water supply scheme with dual piped water supply system, i.e. supply of fresh water in one and treated grey/ waste water in another pipe for non-potable/ gardening/ toilet flushing use. Moreover, the households in these areas are to be encouraged to use the faucet aerators that save a significant amount of water, in multiple taps that they may be using inside their house.

### **Atal Bhujal Yojana**

Atal Bhujal Yojana was launched in 2019 to undertake community-led sustainable ground water management of the stressed areas identified. It was launched to strengthen institutional framework and monitoring ground water data and improve planning and implementation of the water management interventions.

It is a Scheme of the GOI aided by the World Bank with an outlay of Rs.60 Billion. and is implemented to focus on community participation and sustain ground water level in identified water stressed areas during five-year duration. The schemes currently are taken up in seven states of Haryana, Gujarat, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan and Uttar Pradesh.

It is the world's largest community-led ground water management program which is helping villagers understand the water availability and usage pattern in their areas.

### **Jal Sakti Abhiyan (JSA)**

Jal Sakti Abhiyan - I was launched in the year 2019 in the stressed districts of the country to promote conservation of water, water resource management, implementing rain water harvesting, renovation of traditional water bodies, reuse of water, recharging water body structures, watershed development and afforestation. The actual expenditure from MGNREGS fund was Rs. 180.66 Billion.

JSA is expanded to 'Jal Sakti Abhiyan: Catch the Rain' to cover all the blocks of the districts across the country to focus on –

- 1) Rainwater harvesting & water conservation
- 2) Enumerating, geo tagging & making inventory of all water bodies
- 3) Setting up Jal Shakti Kendras
- 4) Afforestation
- 5) Generation of awareness

The progress of the Jal Shakti Abhiyan: Catch the Rain campaign of 2021 as uploaded on the portal from 22.3.2021 to 28.03.2022 are as follows: -

- Water Conservation & Rainwater Harvesting Structures: 1.62 Million
- Renovation of Traditional Water Bodies: 0.30 Million
- Reuse and Recharge Structures: 0.83 Million
- Watershed Development: 1.92 Million
- Intensive Afforestation: 367.57 Million
- and Training Programmes/ Kisan Melas: 0.04 Million

The above details include completed as well as ongoing works. Actual expenditure from MGNREGS fund was Rs. 656.66 Billion. States/UTs have also been directed to utilize their own resources.

### **Water Vision@2047**

'Water Vision@2047' conference was held in Bhopal on 6<sup>th</sup> January, 2023 under the Ministry of Jal Sakti. In this conference different ways of increasing water availability and efficient utilization of water resources and their development was discussed. Challenges of water conservation, increasing population, climate change, rapid industrialization and urbanisation, and economic boom which will lead to increase in demand of water were discussed. It was also stated that the harvestable component of water resources is to be surpassed and planning is to be done towards 2047 to achieve the water conservation goals were discussed.

Water quality was also discussed and the vision was set to creating over 2,000 water quality testing laboratories, training 4 lakh women for using Field Testing Kits to testing water using Internet of Things based on sensor.

### **Atal Mission for Rejuvenation and Urban Transformation (AMRUT)**

The Atal Mission for Rejuvenation and Urban Transformation was launched in June 2015 under GoI. It is the first focused national water mission and was launched in 500 cities and covers 60% of the urban population. In the Budget FY25, the allocation to AMRUT scheme has been estimated at Rs. 104 Billion while the revised estimates for FY24 is at Rs. 132 Billion

The program focuses on basic urban infrastructure in water supply system and access to potable water for every household.

Universal coverage of water supply is the priority under the Mission, under which 2.28 Million tap connections have been provided. The total plan size of all State Annual Action Plan (SAAPs) was Rs.776.40 Billion. out of which Rs.390.11 Billion i.e. 50% has been allocated to water supply.

### **Waste water management:**

#### **Jawaharlal Nehru National Urban Renewal Mission**

This scheme was launched in December 2005 and is the largest national urban initiative to encourage reforms and fast track planned development of 63 identified cities. The focus is improving efficiencies of the urban infrastructure and services. It consists of two sub-missions - Urban Infrastructure & Governance and Basic Services to the Urban Poor.

It focuses on many aspects of urbanization like redevelopment, water supply, sewage and solid waste management, urban transport including roads, high ways, metro projects, parking lots, heritage area development, prevention of soil erosion, preservation of water bodies etc.

### **Atal Mission for Rejuvenation and Urban Transformation (AMRUT)**

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Under the program, 883 sewerage & septage management projects which amounts to Rs.340.81 Billion. have been taken up out of which 370 projects costing Rs.82.58 Billion. have been completed till date. In the Budget FY25, the allocation to AMRUT scheme has been estimated at Rs. 104 Billion while the revised estimates for FY24 is at Rs. 132 Billion.

### **Namami Gange programme**

It is an integrated Conservation Mission approved as 'Flagship Programme' by the Union Government in June 2014 with budget outlay of Rs.200 Billion to accomplish the twin objectives of:

- i. effective abatement of pollution
- ii. conservation and rejuvenation of National River Ganga

The Programme has main objectives of Sewerage Treatment Infrastructure, River Surface Cleaning, Afforestation, Industrial Effluent Monitoring, etc. For conservation of rivers, the Ministry of Jal Sakti has been supplementing efforts with the states and Union Territories by providing financial and technical assistance for abatement of pollution under the programme. The National River Conservation Plan has so far covered polluted stretches of 34 rivers across 77 towns and sanctioned cost of Rs. 59.61 Billion. and created a sewage treatment capacity of 2,677 Million litres per day.

Under the Namami Gange programme, so far, a total of 352 projects have been sanctioned. 157 sewage treatment projects of 4.90 Billion litres per day, sewer network of 5,212 kms have been taken up with a sanctioned amount of Rs.304.58 Billion. for all projects.

### **Swachh Bharat Mission (Urban)**

Swachh Bharat Mission (SBM) (Urban) was launched by GoI with the vision of ensuring hygiene, waste management and sanitation across the country in 2019. The SBM (Urban) was implemented under the Ministry of Housing and Urban Affairs. The key focus area under this are eliminating open defecation, eradication of manual scavenging by converting insanitary toilets to sanitary, solid waste manager, behavioural change, general sanitation awareness etc.

Under Swachh Bharat Mission (Urban) 2.0 launched on October, 2021 an amount of Rs.158.83 Billion. has been allocated to states and union territories for waste water management including setup of sewage treatment plants and faecal sludge treatment plants.

## **6.8 Recent events in water supply and waste water management**

### **Interlinking of rivers (Eastern Rajasthan Canal Project (ERCP) with the Parbati-Kalisindh-Chambal link)**

National Perspective Plan (NPP) for development of water resources was formulated by the GoI in the year 1980. 30 link projects (16 under Peninsular Component & 14 under Himalayan Component) have been identified under NPP. National Water Development Agency (NWDA) has been entrusted with the work of inter-linking of rivers under NPP.

Looking at the scarce water availability in the State of Rajasthan, the Special Committee for Interlinking of Rivers (SCILR) in its 20<sup>th</sup> meeting held in December, 2022 in New Delhi has approved the proposal of integration of the Eastern Rajasthan Canal Project (ERCP) with the Parbati-Kalisindh-Chambal link (a link under NPP) and the Modified Parbati-Kalisindh-Chambal (PKC), duly integrated with ERCP, to be a part of NPP of interlinking of rivers in the country. The project envisages mitigating the water needs, particularly the drinking water needs, in 13 districts of Rajasthan and 7 districts of Madhya Pradesh.

### **Namami Gange Mission II approved with a budgetary outlay of Rs.225 Billion till 2026:**

Namami Gange Programme which was launched in June 2014 for a period up to 31st March, 2021 with the objective to rejuvenate River Ganga and its tributaries with a budgetary outlay of Rs.200 Billion has been further approved with a budgetary outlay Rs.220 Billion till 2026 inter alia including projects for existing liabilities (Rs.112.25 Billion) and new projects/interventions (Rs.112.75 Billion).

Under the programme, a comprehensive set of interventions such as waste water treatment, solid waste management, river front management (Ghats and crematoria development), e-flow, afforestation, biodiversity conservation and Public Participation etc. have been taken up for rejuvenation of river Ganga and its tributaries. The increased budgetary outlay will help the programme to achieve its goal of waste water treatment significantly.

## **6.9 Outlook**

About 35% of the Indian population lives in urban centers according to census 2011 and the number is expected to go up rapidly leading to the increase of demand of fresh water. The generation of waste water is double in cities as compared to rural India because of availability of more water in urban cities due to increased living standards and the urbanization pace.

Rapid urbanization has also added pressure on the food and fresh water requirement. This is also responsible for consuming large water quantities and discharging the waste water back into the source. Due to increase of use of water for various household, industrial and agricultural purposes, waste water management and treatment is very important. As per a NITI Aayog report, as of August 2022, of the total sewage generation, only 28%, i.e., 20,236 MLD is treated. This implies that 72% of the wastewater is left untreated and disposed of in various water bodies like rivers, lakes, or underground water. Some capacity additions like 4,827 MLD sewage treatment have been proposed, but a gap between the wastewater generation and treatment of 35,700 MLD, i.e., 49% remains.

## 7. Transportation (Roads, Highway and Port)

### 7.1 Overview

Robust infrastructure is an essential sign of a developing nation. Development of roads, bridges, airports and railways is crucial for economic development of the country. Out of all modes of transport, road is the only mode which has ability of last mile connectivity.

Transportation of freight as well as passengers by road is one of the most cost-effective mode. With a total 6.33 Million kilometers (kms) of road network, India ranks second in the world after USA. This road network supports movement of 60% of freight traffic in the country and 87% of the total India's passenger traffic. The Indian road network comprises of National Highways, Expressways, State Highways, Major District Roads, Other District Roads and Village Roads. To get the country in fast forward mode, development of National Highways has been key focus area, however state highways, district and rural roads continue to be large part of overall road network.

**Table 21: Breakup of Road Network as stated in March 2023:**

	Million kms	%
National Highways	0.14	2%
State Highways	0.17	3%
Other Roads	6.02	95%
<b>Total</b>	<b>6.33</b>	<b>100%</b>

Source: MoRTH & CareEdge Research

With improvement in road connectivity over the years between cities, towns and villages, transportation by way of road has gradually increased over the years. Development and maintenance of roads in India is undertaken by various agencies of both Central and State Governments. The primary agency responsible for the development and maintenance of National highways is the Ministry of Road Transport & Highways (MoRTH) and it executes the same through the agency of National Highways Authority of India Ltd (NHAI), National Highway Infrastructure Development Corporation Ltd (NHIDCL) and State PWDs & Border Roads Organizations etc.

India's road infrastructure has seen consistent improvement in the last few years. Connectivity has improved and road transportation has become a focus of rapid development. Roads are providing better access to services, ease of transportation and movement to people. Recognizing the significance of a reliable and swift road network in the country and the role it plays in influencing its economic development, the MoRTH has taken up the responsibility of building quality roads and highways across the country. As per MoRTH, road transport emerged as the dominant segment in India's transportation sector with a share of 4.5% in India's GDP in FY06.

Road construction trends in recent years also gives optimism of achieving high targets during next few years in spite the sector badly hit by the COVID - 19 pandemic and partial lockdown at various states across India. Sector has clearly shown focus on Bharatmala Pariyojana with added emphasis on multimodal integration, road safety, increasing use of Information Technology applications, augmentation of existing funding sources and emphasis on green initiatives.

### 7.2 Institutional framework for Roads at Central level

MoRTH, an apex organization under the Central Government, is entrusted with the task of formulating and administering, in consultation with other Central Ministries/Departments, State Governments/UT Administrations, organizations and individuals, policies for road transport, national highways and transport research with a view to increasing the mobility and efficiency of the road transport system in the country. The Ministry has two wings:



- **Roads wing** responsible for development and maintenance of National Highways in the country
- **Transport wing** responsible for matter relating Road Transport.

Main Responsibilities of Road wing are:

- Planning, development and maintenance of National Highways in the country
- Extend technical and financial support to State Governments for the development of state roads and the roads of inter-state connectivity and economic importance
- Evolve standard specifications for roads and bridges in the country
- Serve as a repository of technical knowledge on roads and bridges

Main Responsibilities of Transport Wings are:

- Motor Vehicle legislation
- Administration of the Motor Vehicles Act, 1988
- Taxation of motor vehicles
- Compulsory insurance of motor vehicles
- Administration of the Road Transport Corporations Act, 1950
- Promotion of Transport co-operatives in the field of motor transport
- Evolves road safety standards in the form of a National Policy on Road Safety and by preparing and implementing the Annual Road Safety Plan
- Collects, compiles and analyses road accident statistics and takes steps for developing a Road Safety Culture in the country by involving the members of public and organizing various awareness campaigns
- Provides grants-in-aid to Non-Governmental Organizations in accordance with the laid down guidelines

Various institutes with responsibilities make the functioning of MoRTH smooth. An autonomous body **National Highways Authority of India (NHAI)** is responsible for development and maintenance of National Highways. **National Academy of Highway Engineers** (formerly National Institute of Training for Highway Engineers) is for sharing of knowledge and pooling of experience on the entire range of subjects dealing with the construction and maintenance of roads; bridges; tunnels and road transportation including technology, equipment, research, planning, finance, taxation, organization and all connected policy issues. A fully owned company of MoRTH, **National Highways and Infrastructure Development Corporation (NHIDCL)** is responsible for promoting, surveying, establishing, designing, building, operating, maintenance and upgradation of National Highways and Strategic Roads including interconnecting roads in parts of the country which share international boundaries with neighboring countries.

### **National Highways Development Project (NHDP)**

NHDP was launched in 1999-2000 to achieve a turn-around in the road sector in phased manner. Under First and second phase, four laning of 6,359 km and 6,359 km was approved on 12<sup>th</sup> January 2000 and 18<sup>th</sup> December 2003 at the cost of Rs. 303 Billion and Rs.343.39 Billion respectively. These two phases comprise of Golden Quadrilateral (GQ), North-South and East-West Corridors (NS-EW), Port Connectivity and other projects. The GQ (5,846 km) connects the four major cities of Delhi, Mumbai, Chennai and Kolkata. The NS-EW Corridors (7,300 km) connect Srinagar in the North to Kanyakumari in the South, including a spur from Salem to Kochi and Silchar in the East to Porbandar in the West. Under third phase, upgradation of 12,109 km was approved on 12<sup>th</sup> April 2007 at the estimated cost of Rs.806.26 Billion. Under fourth phase, upgradation/strengthening of 20,000 km of national highways to 2 lanes with paved shoulders on EPC/ BOT (Toll/Annuity) basis was approved on 18<sup>th</sup> June 2008. Under fifth phase, six laning of 6,500 km of national highways comprising 5,700 km of Golden Quadrilateral and balance 800 km of other sections were approved on 5<sup>th</sup> October 2006 at the cost of Rs.412.1 Billion. Under sixth phase, construction of 1000 km of expressways with full access control on new alignments at a cost of Rs.166.8 Billion was approved in November 2006. Under seventh phase, construction of ring roads, bypasses, grade separators, flyovers, elevated roads and tunnels at a cost of Rs.166.8 Billion were approved in December 2007.

Below table explains the status of completion of various phases of NHDP, which have been subsumed under the umbrella programme of Bharatmala Pariyojana, Phase-I:

**Table 22: Completion status of NHDP Phases December 2020**

NHDP Phases	Length completed up to 31.12.2020 in km
I+II+III+IV: GQ, Port connection & Up-gradation with 2/4/6-laning / North-South & East West Corridor	38,685
V: 6-laning of GQ and High-density corridor	4,088
VI: Expressways	219
VII: Ring Roads, Bypasses and flyovers and other structures	181

Source: MoRTH

### NHAI – Authority in Charge for National Highways

National Highway Authority of India (NHAI), is the authority responsible for the development of National Highways in India. It came into existence by passing of the National Highway Authority of India Act 1988. It was formed with the vision to meet the need of provision and maintenance of National Highway networks to global standards. Its mission is to develop, maintain and manage National Highways vested in it by the Government, to collect fees on National Highways, regulate and control the plying of vehicles on National Highways for its proper management, to develop and provide consultancy and construction services in India and abroad and carry on research activities in relation to the development, maintenance and management of highways or any other facilities there at, to advise the Central Government on matters relating to highways, to assist on such terms and conditions as may be mutually agreed upon, any State Government in the formulation and implementation of schemes for highway development. It has tried to achieve its mission by bringing innovative ways of construction so as to increase private participation.

NHAI receives its funding through:

- Government support in form of capital base, cess funds, additional budgetary support, capital grant, maintenance grant, ploughing back of toll revenue and Toll Operate & Transfer (TOT) proceeds;
- Loan from multilateral agencies;
- Market borrowings;
- Borrowing from International market through Masala Bonds by Inaugural International Debt offering;
- Asset Monetization through InvIT.

Table 23: NHAI Source of Funds (Rs. Billion)

Sources of Funds	FY21	FY22
Receipts of Cess	239	362
Plough Back of Toll Revenue	115	127
Plough Back TOT Remittance	73	50
Additional Budgetary Support	28	161
Capital Grant (JICA & WB)	1	10
Capital Gains Tax Exemption Bonds	34	50
InvIT (Projects)	0	74
Taxable Bonds	458	171
Term Loan	159	354
Other Sources (DME, Interest, Capital Receipts, Maintenance etc.)	136	351
Utilization of opening balance	11	12
<b>Total</b>	<b>12,534</b>	<b>1,723</b>

Source: NHAI

Table 24: NHAI Application of Funds (Rs. Billion)

Application of Funds	FY21	FY22
Land Acquisition	359	359
Project Expenditure	615	819
Repayment of Loans and Interest thereon	256	473
Other Outflow	24	72
<b>Total</b>	<b>1,254</b>	<b>1,723</b>

Source: NHAI

## National Highway

### Recovery Mode on – Highway construction pace returned to pre COVID - 19 level

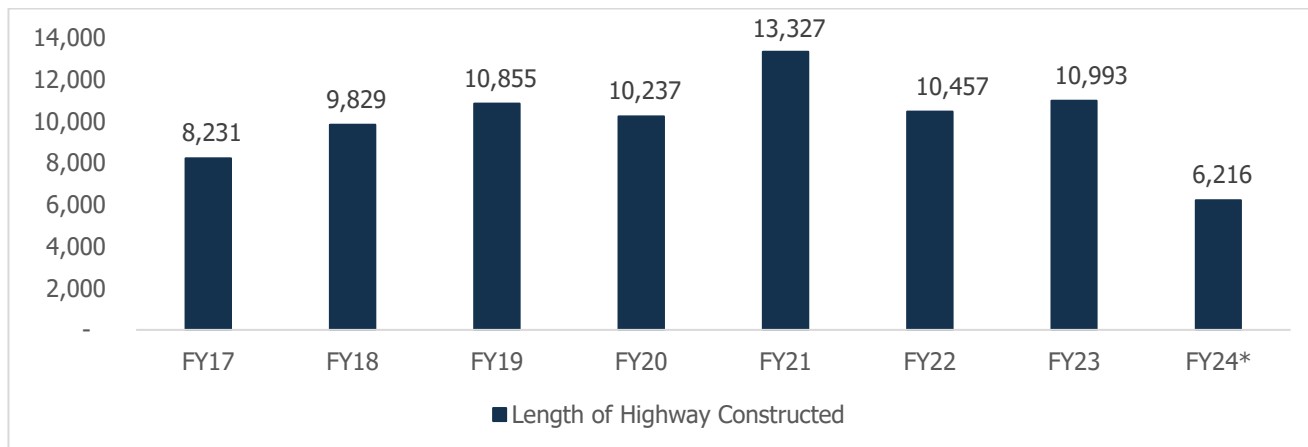
The highway construction in India grew at a CAGR of 12% between FY15-FY23. Despite the challenges amid COVID - 19, the Government’s relentless focus on infrastructure spending, boosted a sharp growth in highway construction in FY21. After a slow growth in the first half of FY21, the pace of highway construction picked up in the second half of FY21, in which the February and March 2021 registered a record high construction at a pace of over 70 kms a day.

In FY22, the pace of project award picked up by 16.1% but the construction pace slowed down by 21.54% after record highway construction in FY21. The project awarding pace did not pick up in FY23 as well, where the projects awarded declined by 2.8% and construction pace pick up by 5.1% as compared to FY22. In FY23, 10,993 Kms of highways were constructed and 12,375 kms were awarded. The slowdown in construction can be attributed to the slowdown in awarding activity. In 9M FY24 (April 2023 – December 2023), the awarding activity has slowed down due to the general elections scheduled in the current year.

The construction of the highway in 9M FY24, i.e., till December 2023 stood at 6,216 kms and the pace of construction has been maintained at 25 km/day. However, construction activity is expected to be robust backed by various Government initiatives such as Gati Shakti, Bharatmala Pariyojana, National Infrastructure Pipeline and change in the Model Concession Agreement (MCA) of the Hybrid Annual Model (HAM) of road project implementation.

### Key performance indicator for national highways:

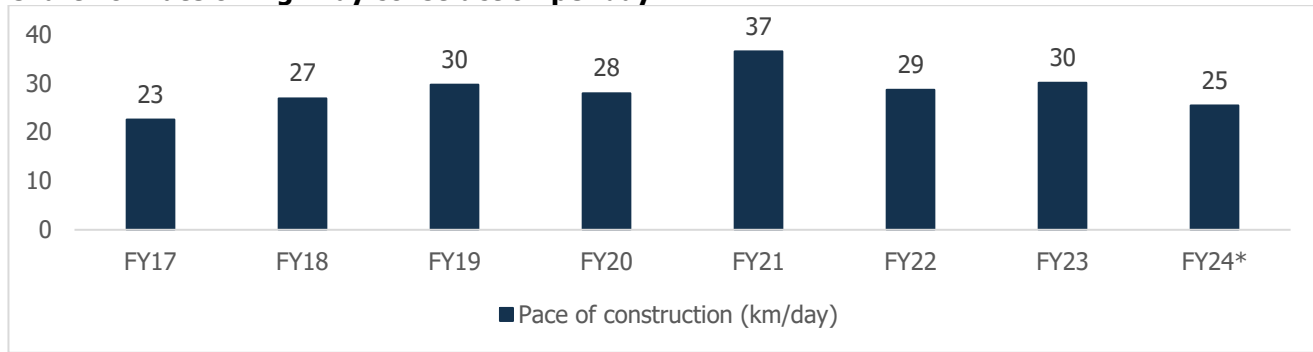
**Chart 39: Length of Highway constructed in India**



Source: MoRTH & CareEdge Research

Note\*: Refers to period April 2023 to December 2023

**Chart 40: Rate of Highway construction per day**



Source: MoRTH & CareEdge Research

Note\*: Refers to period April 2023 to December 2023

**Electric Toll collection**

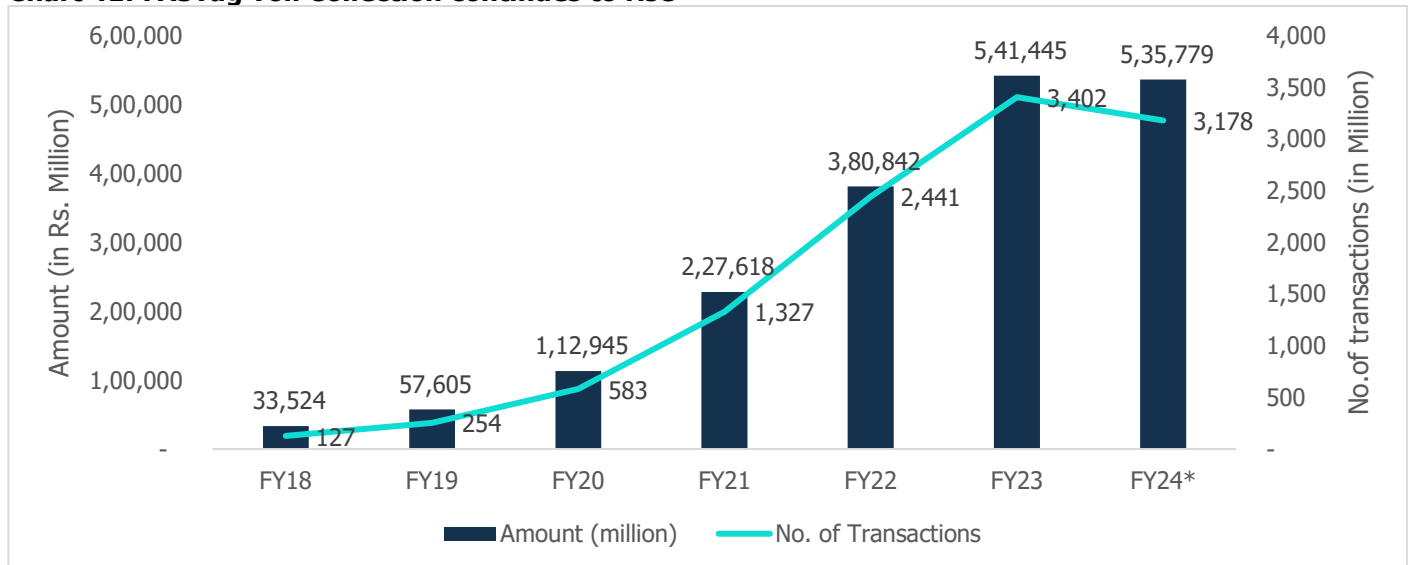
**FASTag is proving an effective and time saving mode of Toll Collection**

FASTag comes as a part of the GoI’s initiative to enhance digital transactions across various sectors in the country. It was first introduced in India in 2014 and was made mandatory from February 2021. It has transformed the way toll tax is collected in the country. It is a Radio Frequency Identification (RFID) technology enabled card that allows drivers to pay their toll tax electronically at the toll booth reducing long vehicle queues and waiting times and at the same time saving time and fuel.

Electronic toll collections have soared since the introduction of FASTag. FASTag toll collection during 10M FY24 (April 2023 – January 2024) stood at Rs. 535.78 Billion with 3,178 Million transaction, making it highest ever collection. The record high transaction and toll collections come on the back of declaration of all lanes on national highway as FASTag lane, increased economic and transportation activities across India especially during the festive season.

The toll collection as well as transactions are witnessing sharp growth y-o-y. The constant growth and adoption of FASTag by users has helped in increasing efficiency of toll operations as well.

**Chart 41: FASTag Toll Collection continues to rise**



Source: National Payments Corporation of India

Note\*: Refers to period April 2023 to January 2024

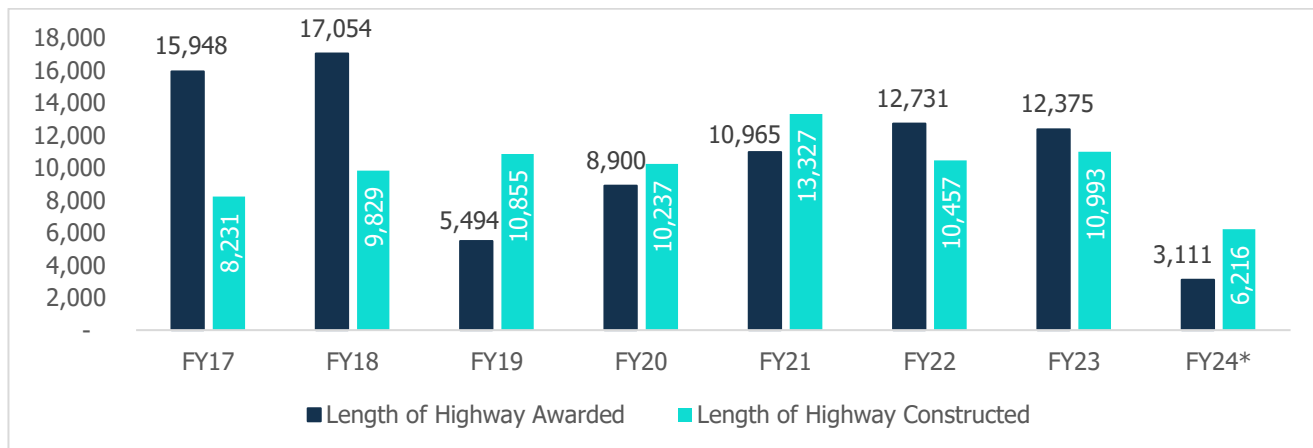
### 7.3 Key growth drivers of the sector

#### Firing the fuel that lead to achieve pre COVID - 19 levels

The national highway projects have witnessed a decline in awarding activity due to lower participation from private players. However, with an increased focus on Engineering, Procurement and Construction (EPC) and Hybrid Annual Model (HAM) models, the pace of awards of NH projects till FY23 grew at a strong pace of 11.41% CAGR over the past 4 years (Refer to the chart below).

Strong execution of projects was witnessed in FY22, albeit lower than in FY21 as it was impacted by the reinforcement of lockdowns and extended monsoons. In FY23, construction activity picked up but was still lower than in FY21 on account of lower awarding activity than in FY22. However, project execution is expected to continue its momentum in FY24 on the back of various government initiatives such as Gati Shakti, Bharatmala Pariyojana, National Infrastructure Pipeline and change in the Model Concession Agreement (MCA) of the Hybrid Annual Model (HAM) of road project implementation.

**Chart 42: Road Projects Awarded and Constructed**



Source: MoRTH & CareEdge Research

Note: \* refers to period April 2023 to December 2023

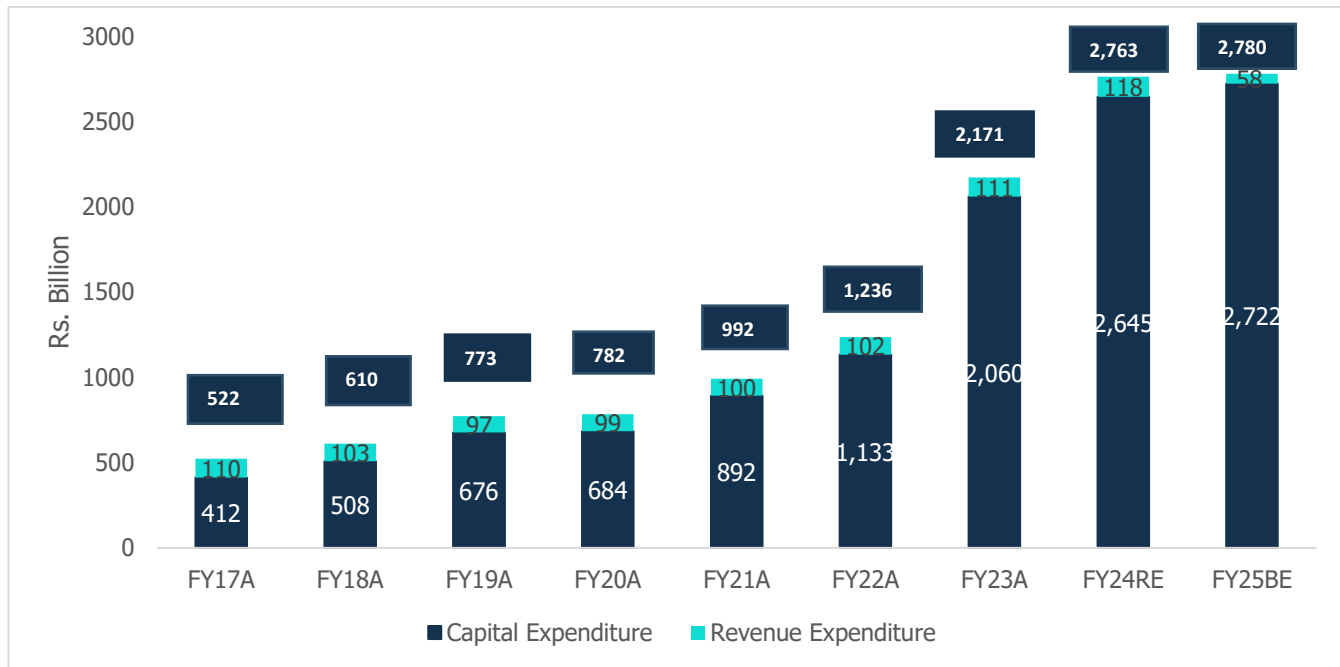
#### Government's Infrastructural Development Plans to Support Medium-Term Growth

Road construction is amongst the critical sub-segments for infrastructure development, economic growth, and employment creation. Besides, the government is primarily focusing on infrastructure. For instance, in the Union budget 2024-25, the government budgeted to incur higher expenditure toward road construction. Wherein, the central government made the highest ever outlay of Rs 2,780 billion (compared to the estimated expenditure of Rs 2,763 billion for 2023-24).

Overall, the Union Budget for 2024-25 emphasized infrastructure development. The budget plan aims for multi-modal logistics facilities and connectivity systems under the PM Gati Shakti. For infra push, financial assistance of Rs 1,300 billion in interest-free loans for 50 years has been allocated to states from the Centre. This augurs well for the roads sector alongside the government's plans to generate employment opportunities.

Moreover, Rs 111 trillion of investments have been projected in infrastructure projects for FY20-FY25 by the Task Force on National Infrastructure Pipeline (NIP), with ~18% of the targeted investment expected to be made in the road sector in India. Also, under the recently announced Asset Monetization Pipeline, around Rs 1,600 billion are to be raised through the monetisation of roads.

**Chart 43: Budget Allocation for the Ministry of Road Transport and Highways**



Source: Demand for Grants 2024-25, Ministry of Road Transport and Highways of India

RE – Revised Estimates

BE – Budgeted Estimates

**Key budget announcements for road sector**

The 2024-25 budget by the Government highlights the impetus for growth by focusing on big public investments for modern infrastructure, which shall be guided by PM Gati Shakti and benefited from the synergy of a multi-modal approach.

- The Ministry of Road and Highways gross budgetary outlay has doubled from Rs. 1.28 trillion in fiscal 2019 to 2.64 trillion in fiscal 2024. In fiscal 2025, the capex witnessed a modest 3% y-o-y growth with an allocation of Rs. 2.72 trillion which is expected to normalise the order book of road EPC companies for the coming fiscal.
- The assets monetization target has increased to Rs. 150 billion in fiscal 2025 from Rs. 100 billion in fiscal 2024.
- The budgetary outlay of Rs 1.68 trillion towards the NHAI for fiscal 2025 has remained flattish as compared to fiscal 2024.
- The NHAI aims to increase project awards by modifying the build-operate-transfer (BOT) model with fast-tracked clearance, as its share has decreased in recent years.

**7.4 Government Initiatives for Development of Road Infrastructure**

GoI has introduced a number of policy initiatives to ensure an enabling environment for various stakeholders involved.

The initiatives are broadly categorized as follows:

**1. Development Initiatives by Government of India**

**• Bharatmala Pariyojana**

MoRTH has envisaged an ambitious highway development program Bharatmala Pariyojana which includes the development of 65,000 km of national highways. The key objective of the programme is to optimize the efficiency of freight and passenger movement – this would be achieved by bridging critical infrastructure gaps through the

development of Greenfield expressways, economic corridors, inter-corridors and feeder routes. Under Phase-I of Bharatmala Pariyojana, the MoRTH has approved implementation of 34,800 km of National highways in 5 years with outlay of Rs.5,350 Billion. NHAH has been mandated the development of about 27,500 km of National Highways under Bharatmala Pariyojana Phase-I.

- **Connectivity in LWE Area**

The Government has approved a scheme for development of about 1,177 km of NHs and 4,276 km of State Roads in Left Wing Extremism (LWE) affected areas as a Special Project with an estimated cost of about Rs.73 Billion. The detailed estimates for 5,422 km length have been sanctioned at an estimated cost of Rs.86.74 Billion. Development in 4,792 km length has been completed up to March, 2019 and cumulative expenditure incurred so far is Rs.73.15 Billion.

- **Char Dham Pariyojana**

MoRTH has taken up separate programme for connectivity Improvement for Char-Dham (Kedarnath, Badrinath, Yamunothri & Gangotri) in Uttarakhand. Out of total 53 civil works covering the entire length of 889 km under Char Dham project, 40 civil works of total project cost amounting to Rs.94.74 Billion (including cost of pre-construction works amounting to Rs.4.91 Billion) in a length of 673 km has been sanctioned.

- **Special Accelerated Road Development Programme (SARDP) including Arunachal Pradesh Package**

The Scheme has been envisaged to be taken up under three phases. First phase - improvement of about 4,099 km length of roads (3,014 km of NH and 1,085 km of State roads). Out of these, 3,213 km roads have been approved for execution and balance 886 km has been approved 'In-Principle'. 3,333 km of length has been awarded and 2,101 km of roads have been completed till March, 2019. The SARDP-North East first phase is expected to be completed by 2023-24. Second phase of SARDP-NE - improvement of 3,723 km of roads (2,210 km NHs and 1,513 km of State roads) and shall be taken up after completion of first phase.

The Arunachal Pradesh Package for Road & Highways involving development of about 2,319 km length of road (2,205 km of NHs & 114 km of State / General Staff / Strategic Roads) has also been approved by the Government. Projects on 776 km are to be taken up on BOT (Annuity) mode and the remaining are to be developed on EPC mode / Item Rate Contract as per MoRTH's extant policy. Projects of 2,047 km length have been awarded and 928 km of road has been completed till March, 2019. The entire Arunachal Pradesh package is targeted for completion by 2023-24. An amount of about Rs.303.15 Million has been spent in SARDP including Arunachal Pradesh Package.

- **State Public Works Department (PWD) and Border Road Organization (BRO)**

An amount of about Rs.249.29 Billion was earmarked during the year 2021-22, for the development of NH entrusted to State PWDs. States have spent Rs. 191.57 Billion till 31<sup>st</sup> December 2021. An amount of about Rs.4.33 Billion was earmarked during the year 2021-22, for the development of NH entrusted to BRO. BRO has spent Rs.1.79 Billion till 31<sup>st</sup> December 2021. An amount of about Rs.9.11 Billion was earmarked during the year 2021-22, for the maintenance of NH entrusted to State PWDs. States have spent Rs.2.10 Billion till 31<sup>st</sup> December 2021. An amount of about Rs.1.70 Billion has been earmarked during the year 2021-22, for the maintenance of NH entrusted to BRO. BRO has spent Rs.0.69 Billion till 31<sup>st</sup> December 2021.

- **FDI Investment in Roads and Highways**

Government has permitted 100% FDI investment in roads and highways projects by direct route. This has attracted many international institutes to invest in projects. Some of the investments are as follows:



- Australia-based Macquarie Infrastructure and Real Assets' second pan-Asian infrastructure fund, Macquarie Asia Infrastructure Fund 2 (MAIF 2), in association with Ashoka Buildcon, has bagged contract for the first bundle of nine highway stretches measuring 680 km in Andhra Pradesh and Gujarat
- Canada Pension Plan Investment Board (CPPIB) and Allianz Capital Partners (ACP) acting as anchor investors in India's first private infrastructure investment trust, namely, IndInfravit Trust, which is sponsored by L&T Infrastructure Development Projects Ltd (L&T IDPL). Under this, CPPIB's investment of Canadian \$200 Million fetched it 30% of IndInfravit units with ACP and L&T IDPL accounting for 25% and 15%, respectively. The remaining units were subscribed by other institutional investors

## 2. Various Operational Initiatives to smoothen construction

Process streamlining is being increasingly taken up by MoRTH to ensure smooth appraisal and approval of road sector projects. Some of the major steps for process streamlining are:

- **Mode of Delivery:** MoRTH is empowered by a Cabinet Committee on Economic Affairs (CCEA) decision on mode of delivery of projects.
- **Increased threshold for project appraisal and approval:** MoRTH was authorized through a CCEA decision to appraise and approve projects up to Rs.100 Billion.

In addition to this many technological initiatives have been adopted by MoRTH to aid the execution and operation of a road projects. Some of technological initiatives are:

- **Use of Bhoomirashi:** MoRTH has corroborated with the National Informatics Centre, to create Bhoomirashi, a web portal which digitizes the cumbersome land acquisition process and also helps in processing notifications relating to land acquisition process and also helps in processing notifications relating to land acquisition online. Processing time, which was earlier two or three months, has come down to one to two weeks now
- **E-procurement System:** NHAI is using the e-procurement portal for tendering of all kinds of goods and services. This has led to greater transparency. The system currently in use by NHAI is the Central Public Procurement Portal by National Informatics Centre (NIC)
- **Bidder Information Management System (BIMS):** BIMS aims to simplify the qualification process of bidders for road construction contracts. This helps in faster evaluation of technical information provided by the bidders
- **Interlinked between various platforms:** The two IT initiatives Bhoomirashi and BIMS, have now been integrated with the Public Financial Management System (PFMS). PFMS allows for the compensation amount to be paid to the concerned person directly rather than being deposited with CALA (Competent Authority for Land Acquisition)
- **mVahan:** mVahan has been envisaged as a convenient mobile solution for managing various VAHAN services by Department Officers at the RTOs and other stakeholders like dealers. The current version, facilitates a number of processes including automation of Vehicle Inspection and Fitness, facilitation of documents uploads by Dealer/RTO during vehicle registration and other services like processing requests for change of address etc. The Government is further working to expand to cover the full range of RTO operations.

### 3. Revival of languishing projects:

Projects which were languishing for a number of years have been attempted to be revived with the help of number of policy measures taken by the Government. Some of the policy measures have been discussed below:

- **100% equity divestment two years post Commercial Operation Date (COD)** – The policy enables private developers to take out their entire equity and exit all operational BOT projects two years from commercial operation date
- **Premium deferment in stressed projects** – The policy permits rescheduling of premium committed by concessionaires during bid stage for awarded projects
- **Rationalized compensation to concessionaires for languishing NH projects in BOT mode for delays not attributable to concessionaires** – The policy enables extension of concession period for languishing BOT projects to the extent of delay provided. The original operation period remains unchanged
- **One-time fund infusion** – The policy enables revival and physical completion of languishing BOT projects that have achieved at least 50% physical progress, through one-time fund infusion by NHAI, subject to adequate due diligence on a case to case basis

### 4. Amicable dispute resolution:

To enable time-bound resolution in an affordable manner, efforts have been made by NHAI for dispute resolution through the established mechanism of alternate dispute resolution through the three-tier stage of.

- 3-CGM committee
- Independent Settlement Advisory Committee (ISAC) and
- Executive Committee/Board of NHAI for Settlement of disputes

In 2017, NHAI established Conciliation through Committee of Independent Experts (CCIE). Further, Society of Affordable Redressal of Disputes (SAROD) was formed in 2013 by NHAI to reduce cost and time overruns due to the arbitration process and for fast dispute redressal. The main objectives of SAROD were to reduce cost due to the arbitration process and pendency of disputes, efficient disposal of disputes and to develop experts for the arbitration process 347 arbitrators have already been empaneled.

#### 7.5 Key trends in Roads sector

**Robust demand of automobiles:** The overall domestic sales in 9MFY23 grew by 12% compared to 9MFY22. The growth has been primarily driven by the commercial vehicle and passenger vehicle segment, especially the utility vehicles sub-segment under passenger vehicles. This growth of automobiles is a major push for road development in the country.

**Huge investments by Government:** In the Union budget 2023-24, the Government budgeted to incur higher expenditure towards road construction (approximately 2,700 Billion). The Central Government made an outlay of Rs.1,990 Billion in 2022-23 (compared to the estimated expenditure of Rs.1,310 Billion for 2021-22).

**Development of economic corridors:** Corridors like Bharatmala Pariyojana help in integrating the economic corridors which facilitate larger connectedness between economically important production and consumption centers.

## 7.6 Recent events in Roads and Highways sector

**New project for National Highways inaugurated in Maharashtra:** Foundation stone for 5 National Highway projects of 212 km length at Nanded worth Rs.15.75 Billion, 3 National Highway projects worth Rs.10.58 Billion and 75 km length at Parbhani, and National Highway project worth Rs.10.37 Billion are laid at Hingoli. This project will help in improving connectivity of Marathwada region with Telangana and Karnataka.

**NHAI to explore use of Phosphur – Gypsum in highway construction:** Keeping its commitment to encourage use of waste material to build ecologically sustainable National Highway Infrastructure, NHAI along with Department of Fertilizers, Ministry of Chemicals & Fertilizers is going to take up field trials on NHAI projects for use of Phosphor-Gypsum in National Highway construction to achieve a circular economy in the use of Gypsum. The fertilizer company and CRRRI have been asked to take up field trials on an NHAI project to evaluate performance of Phosphor-Gypsum on a National Highway and to generate confidence among various stakeholders on use of Phosphor-Gypsum waste material in Highway construction.

**Joint projects with Japan to be undertaken for digital transformation:** The Indo-Japan Joint Working Group (JWG) to function together for providing best road infrastructure for commuters and freight movement and helping India achieve its sustainable transport goals. The joint projects will be undertaken for a massive digital transformation in the areas of Intelligent Transport Systems (ITS), and eco-friendly mobility.

## 7.7 PPP models

To boost Private participation, Government has come up with various models

### Overview

Connectivity has been priority of the Government and making last mile connectivity, road is the best and cheapest way of increasing connectivity. Construction of roads in every corner of the country by only Government agency is difficult as it will increase time and cost both. To achieve complete connectivity by way of roads, Government partnered with the private players and it came to be known as Public Private Partnership (PPP). Initially, PPP road projects broadly fell in one of the two categories of toll or annuity. However private sector participation gradually subdued post 2012 due to various issues including aggressive bidding and over-leveraged balance sheet of developers, shortcomings in project preparation activities and land acquisition issues. To attract PPP participation in the road sector, Government introduced the Hybrid Annuity Model (HAM). It focused on proper allocation of risk among partners. Further, operational asset monetization model has gained prominence recently with the advent of the Toll-Operate-Transfer (TOT). Other asset monetization options like use of Infrastructure Investment Trusts (InvIT) and Securitization of toll revenue are also in various stages of implementation.

### Key types of PPP models in India

- **Build Operate and Transfer (BOT)**

This is a simple and conventional PPP model where the private partner is responsible to design, build, operate (during the concession period) and transfer back the facility to the public sector. Role of the private sector partner is to bring the finance for the project and take the responsibility to construct and maintain it. In return, the public sector will allow it to collect revenue from the users by way of toll.

- **BOT (Annuity)**

In the BOT (Annuity) mode, the private partner is responsible for building, operating and transferring the road at the end of the agreement period to the public sector. The toll collection is however undertaken by the Government agency and the payment is made on semi-annual basis to the private players.

- **Engineering, Procurement and Construction (EPC)**

In the EPC mode, the cost is completely borne by the public sector - Government. Public sector invites bids for engineering knowledge from the private players. Procurement of raw material and construction costs are met by the public player. The private sector's participation is minimum and is limited to the provision of engineering expertise.

- **Management Contract**

Here, the private promoter has the responsibility for a full range of investment, operation and maintenance functions. He has the authority to make daily management decisions under a profit sharing or fixed-fee arrangement. Variants include basic management for fee contract, management contract with performance incentives, management and finance contract with some rehabilitation and expansion.

- **Lease Contract**

In this approach, the Government gives a concession to a private entity to build a facility (and possibly design it as well), own the facility, lease the facility to the public sector and then at the end of the lease period transfer the ownership of the facility to the Government. Usually, the private partner in such cases would require an assurance in terms of tariff levels, increases over term of lease and compensation and review mechanism in case the tariff levels do not meet the estimates.

- **Service contract**

In this approach, the private promoter performs a particular operational or maintenance function for a fee over a specified period of time. In addition, there are modes such as TOT and Operate-Maintain-Transfer (OMT) for monetizing future toll earnings of completed projects.

- **Hybrid Annuity Model (HAM)**

Due to subdued private participation in the bidding process, the Government opted for advance version of the Hybrid Annuity Model (HAM) in FY2017. It was introduced when private players were piling on debt and banks were fearing on providing additional loan as major of the projects were failing. Major BOT project had proven to be bad choice as there the main assumption for the returns was traffic, if there was no enough traffic as assumed the whole project would turn into fund trap for private players. But in case of HAM, it is a mix of BOT (Annuity) and EPC models. This model safeguards the interest of both the parties i.e., Government and private entity. During the construction period, the private entity is provided 40% grant of the bid project cost by the Government in five equal instalments depending on the physical progress of the project. The remaining 60% of the bid project cost is to be borne by private entity through debt and equity. The Government generates its revenue from the project by way of toll collection. This model has been very successful as the burden of financing of private players has reduced. In the first year of its implementation, Rs. 280 Billion of projects were awarded by the NHAI of which 50% of the projects were under HAM. HAM has not only brought back private participation but it has also safeguarded the banks as the fund disbursed to private players are backed by the Government annuity payments i.e. the traffic risk is taken care by Government itself, private players are only responsible for building the project and there is no role in road's ownership, toll collection or maintenance.

### 7.8 Major challenges faced by the roads sector

Despite Governments continues support by way of Finance and tweaking PPP models many challenges still persist for the sector

- **Land Acquisitions:** Post Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2003, many land owners demand for higher compensation and refuse to hand over possession of their land. With the Act coming into effect, cost of land has increased and in some case land cost is higher than the project cost.
- **Mismatch between project cashflows and debt repayment tenure:** Revenue from large infrastructure projects is spread over 20-30 years whereas the loan for the same project is for the period of 10-15 years. This results into cashflow mismatches in the initial years of operations till the project stabilizes and also overall tenure mismatch between project cashflows and debt repayment, thereby resulting in private players to fund cashflow mismatches from their own sources.
- **Projects Delays Impact on Financial Institutions:** As debt is on a rise due to push for road projects, many projects get stuck or get delayed, turning the loans into NPAs which leads to contraction in the lending capacity of the banks.
- **Financial Stress:** Due to failed BOT projects on account of lower than estimated traffic or delays in project completion due to approvals/ land acquisition, private players have come under financial stress due to significantly leveraged balance sheets in anticipation of high levels of project revenue growth. Due to slowdown in economic activity on account of COVID - 19, revenue realization has also been much lower than anticipated.
- **Highly stressed Loan portfolios:** With lower than anticipated revenues, the private players' debt servicing capacity has been impacted. To mitigate the risk of failure of company, restructuring of loan has been opted by the private players. Restructuring of loans for the first time does not impact asset classification but subsequent restructuring leads to NPA recognition in the books of financial institutions.

### 7.9 Outlook

Connectivity has always been the backbone of any economy as it not only reduces the overall cost of logistics but also reduces the overall cost of production. To achieve last mile connectivity, roads and highways pave the way as they are cost effective way of connectivity. Over the years budgetary allocation has been increased from Rs.522 Billion in FY17 to Rs. 2,780 Billion in FY25 proving the Government's high focus on infrastructure sector. India has second largest road network in world with 6.37 Million kilometers of roads and highways of which 5% falls under Highways. For better connectivity and faster movement of goods, Government is expanding 2 lane highways to 4 lanes and 4 lanes to 6 lanes. Government has also identified border areas for better connectivity and have launched various projects. This sector has higher opportunities as the connectivity of ports and other key locations such as consumption centres, metros, Tier-2 cities and strategic importance is still under developed.

To achieve the complete connectivity, private player participation is must and to attract the investment of private players, Government has brought in several Public-Private Partnership (PPP) models which has attracted significant investment over the past decade. Of all the PPP models, HAM has proven to be successful. It has given favorable condition for the participation of private players. Government is looking forward to bring in more projects under HAM followed by EPC. Lower participation for private players has at some point hampered the overall development of roads and highway sector. Issues of delay in project completion, due to land unavailability has been dealt by NHAI's decision to allot project, post completion of 90% of land acquisition. Also, to ease the burden of debt and avoid NPAs in books

of private players & banks, Government has allowed 100% FDI in the sector and also allowed asset monetisation for private players post construction is complete.

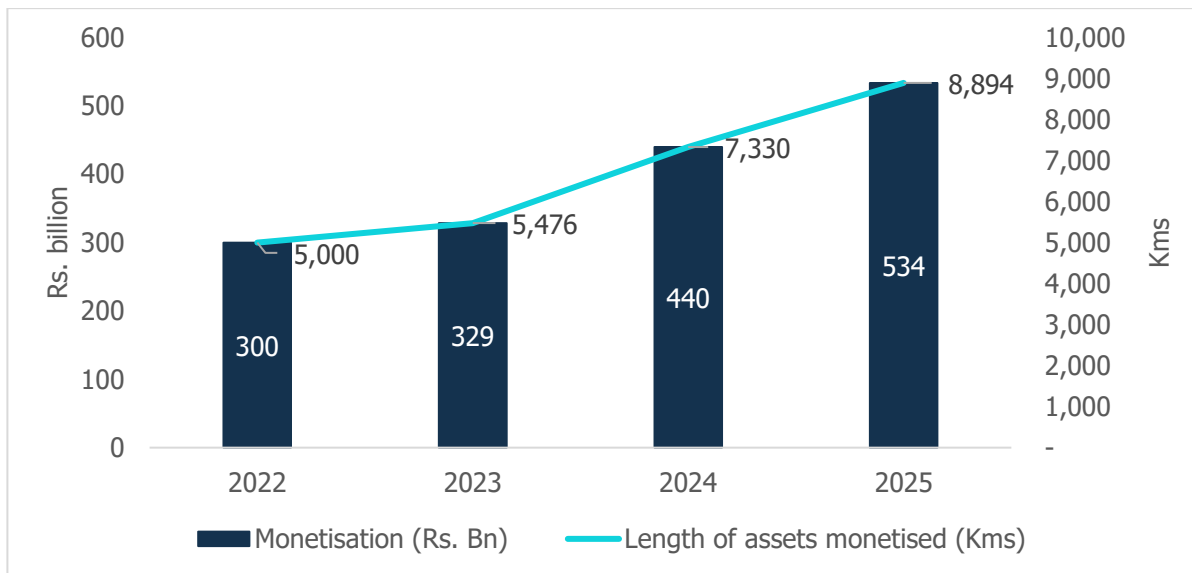
Further to set a clear view of development, Government has set up National Infrastructure Pipeline. Under the National Infrastructure Pipeline (NIP), 18% of the Rs.111 Trillion investment targeted over FY20-FY25 is expected to be made in the roads sector. Majority of it is targeted towards improving road length and safety features. A total of 1815 national highway projects spanning 87,612 kms and 5 expressway projects spanning 2,142 kms have been identified under the pipeline with a capital expenditure of Rs. 13,800 Billion over the fiscals 2020 to 2025. Delhi-Mumbai expressway and Chennai-Bengaluru Expressway have been identified as the marquee projects.

To finance the NIP, several innovative financial avenues would have to be looked at such as asset monetization, increased implementation of de-risked models such as Hybrid Annuity Model (HAM) and introduction of investment platforms such as Infrastructure Investment Trusts (InvITs) apart from monetization planned through the National Monetization Plan (NMP).

**National Monetization Plan**

The National Monetization Plan (NMP) announced by the Government has identified the road sector having the maximum potential at 1,602 Billion which constitutes 27% share in the overall NMP. Around 26,700 km of road assets are to be monetized under NMP which makes around 20% of the total asset length. The chart below shows the phasing planned under NMP.

**Chart 44: Phasing Under NMP (For 2022-2025)**



Source: National Monetization Pipeline, Volume II, Niti Aayog

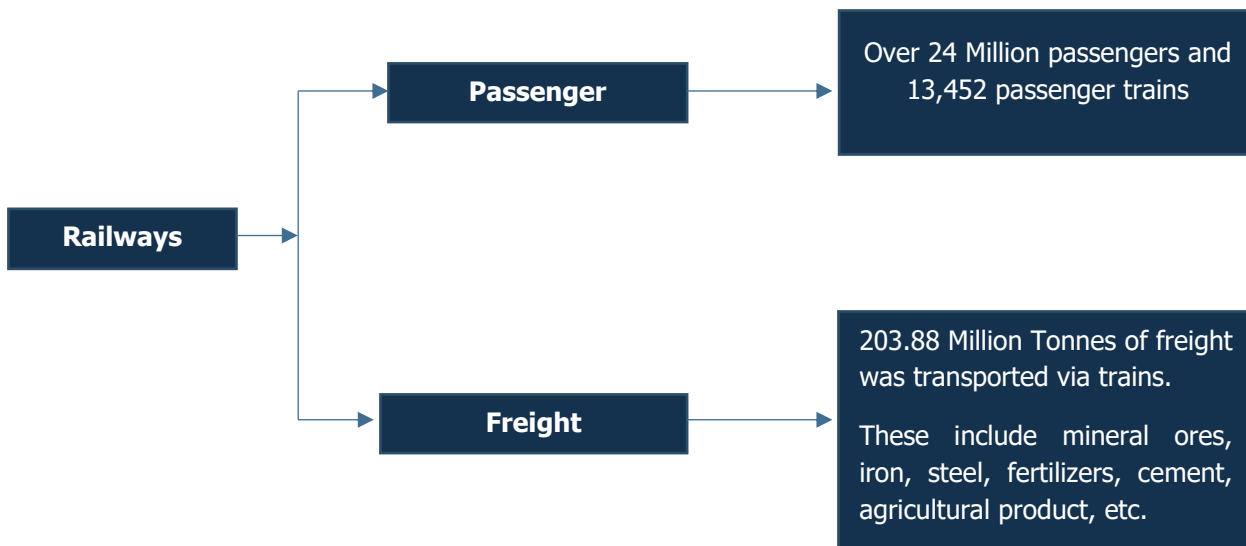
NHAI announced InvIT as a mode to monetize road projects under NMP. The InvIT will initially have a portfolio of five operating toll roads with an aggregate length of 390 kilometers. These roads are located across the states of Gujarat, Karnataka, Rajasthan, Maharashtra, Andhra Pradesh, Madhya Pradesh and Telangana. NHAI’s first InvIT raised more than Rs.50 Billion in November 2021 and second InvIT raised Rs.15 Billion in October 2022. TOT projects covered under InvITs are Kota, Kothakota - Kurnool Project Highway, Chittorgarh Kota Project Highway, Maharashtra Belgaum Project Highway, Abu Road Swaroopganj Project Highway and Palanpur Abu Road Project Highway. InvITs are instruments like

mutual funds, designed to pool money from investors and invest the amount in assets that will provide cash flow over a period of time. The Government plans to add more national highways to the InvIT portfolio as the long-term revenue generating assets such as toll roads provide stable and long-term yields under the InvIT structure. With InvIT coming into picture, burden on budget will be lowered as financing will be take care by InvIT. This will not only result in reducing debt of NHAI but also have access to additional funds for the new projects.

**7.10 Railways**

The Indian Railways is the largest rail network in the World and is a regulated body under GoI and is the backbone of the Indian economy. It is also the fourth largest national railway system in the world. It consists of a total track length of over 0.12 Million km with over 0.07 Million km route consisting of more than 7,000 stations. Indian railways run about 9,000 freight trains and 13,500 passenger trains carrying a total passenger count of over 24 Million passengers and more than 203 Million tonnes of freight. It is also the largest employer in India and contributes to about 1.5% of the GDP as it supports about 45% share of the modal freight of India. It is the driver of India’s economic growth and is considered safe, viable and environment friendly mode of transport in India. The Railways operations can be divided into passenger and Freight segments. The Government has estimated an allocation of Rs.2.65 Trillion to Railways in Budget FY25.

Owing to customer centric approach and business development units backed by strong policies, the Railways achieved 1,400 Million Tonne (Mn Tonnes) Freight loading mark for the first time in FY22.



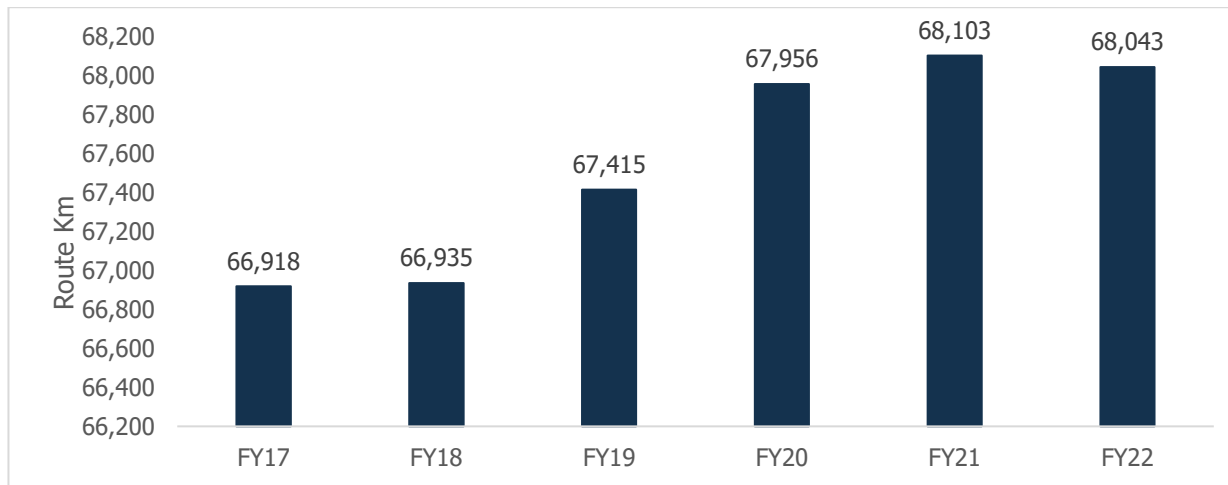
The reasons for the same are improvement in passenger earnings which happened by introduction of new trains and special trains or premium special trains etc. by increase in freight earnings like rationalizing merry-go-round policy, reducing distance in mini rakes etc., by leasing of parcel space to private parties and by liberalization of parcel policy.

Apart from this, Indian railways is also considering to explore areas like changing coaches’ compositions, having additional streams by monetizing traffic on digital booking on IRCTC.

Further, the Indian railway sector has witnessed multiple developments in the last decade such as the introduction of high-speed trains and the modernization of railway stations. In addition, India Railways has set out massive network expansion and decongestion targets. It plans to undertake 17,000 track km of new lines, doubling and gauge conversion work by 2024, out of which, 5,243 km was achieved during FY23 as compared to 2,909 km during FY22. It also plans to become a

net zero carbon emitter by 2030 as part of the country's strategy to combat climate change. It plans to source 1,000 MW of solar power and 200 MW of wind power across zonal railway and production units.

**Chart 45: Indian Railway Route Length**



Source: Indian Rail Yearbook

Further, as on April 2022, across Indian Railways, 452 Railway projects (183 New Line, 42 Gauge Conversion and 227 Doubling) of total length 49,323 Km, costing approx. Rs 7.33 lakh crore are in different stages of planning/sanction/execution, out of which 11,518 Km length have been commissioned and an expenditure of approx 2.35 lakh crore has been incurred upto March, 2022.

### Passenger Earnings

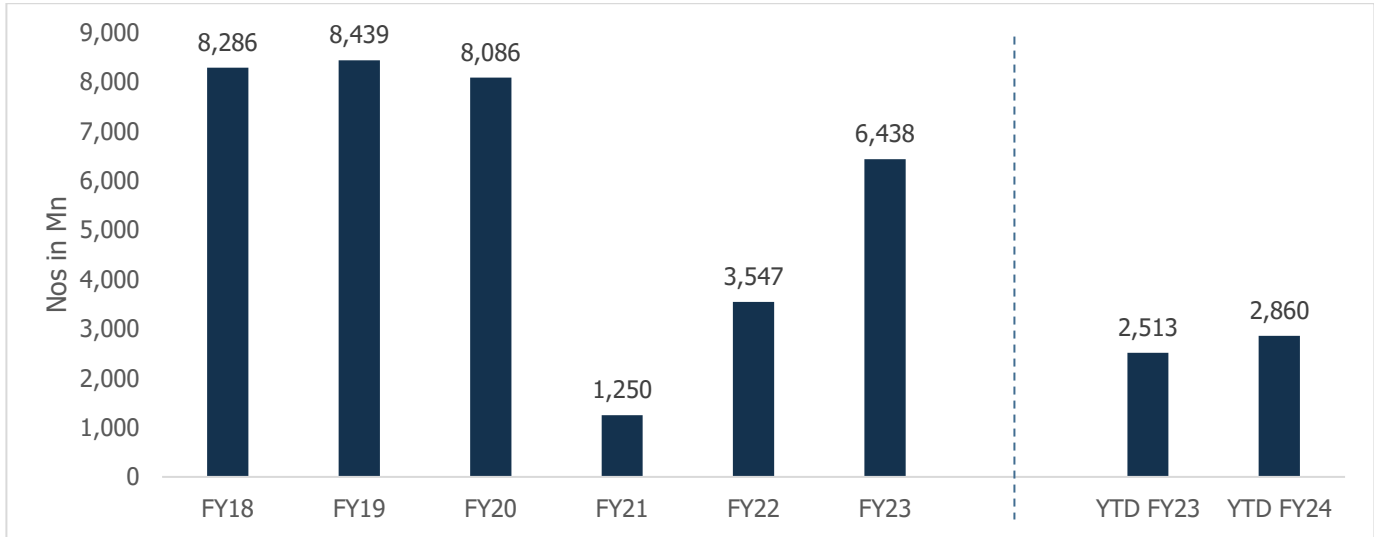
Train travel is the preferred means of transport for long-distance travel for majority of Indians. Passenger traffic is broadly divided into two categories i.e. suburban and non-suburban traffic. Suburban trains usually cover small distances like 150 km and carries the passenger within the cities whereas non-suburban trains cover larger distances and covers inter cities or states. Majority of the revenue i.e. 94% comes from non-suburban trains. In FY22, there was a 61% growth in passenger revenue y-o-y, according to the provisional reports, and it was majorly because of low base effect due to the lockdown in COVID - 19 pandemic.

The year 2020-21 ended with an excess of earning over expenditure to the tune of Rs.25.47 Billion. In FY24, between April and August, the passenger traffic is at 2860 million which is 14% higher than what it was in the same period in FY23. The increase in the demand for passenger trains is supported by return of normalcy after the blow of pandemic, urbanization, improving income standards, etc.



**7.11 Key performance indicators for the railways sector:**

**Chart 46: Passenger Traffic**



Source: Indian Rail Yearbook; Indian Railway Monthly Evaluation Report August 2023

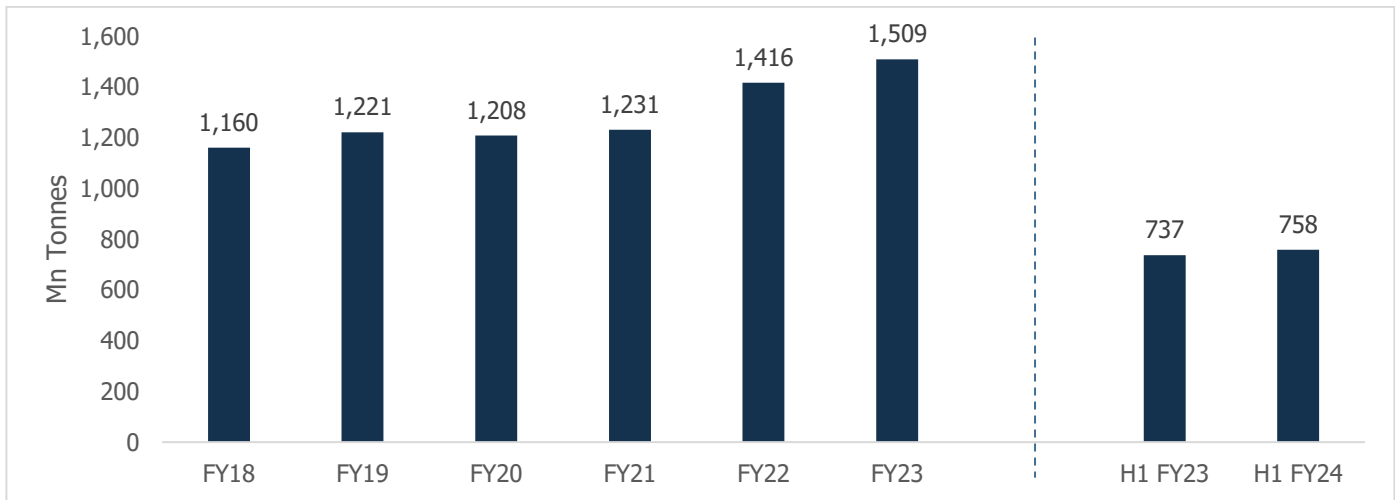
Note: YTD FY24 and YTD FY23 refer to period from April -August 2023 and April-August 2022, respectively

Source- Ministry of Railways, CareEdge Research

Note- P: Provisional

**Freight Traffic**

The freight traffic in India mainly consists of 9 commodities - coal, steel, iron ore, food grains, petroleum products, amongst others. It is a key revenue generator in the railway segment and accounts for about 70-75% of the total revenue in FY22. Despite the passenger traffic being lower than the pre-covid levels, the freight traffic was 15% higher in FY22 and 17% higher than FY21. This is mainly because the transport of commodities not being much effected by the COVID - 19. The freight is higher in FY24 (April to August) by 3% as compared to the same period in FY23. The growth is led by incremental loading of coal, cement and clinker. The Government is also heavily investing in rail infrastructure to improve freight transport. Due to favorable policy measures and increasing private participation increase in freight traffic is expected in medium to long term.

**Chart 47: Freight Traffic**

Source- Ministry of Railways, CareEdge Research

Note- P: Provisional

### 7.12 Capacity Expansion Plans and Investments in Railway sector

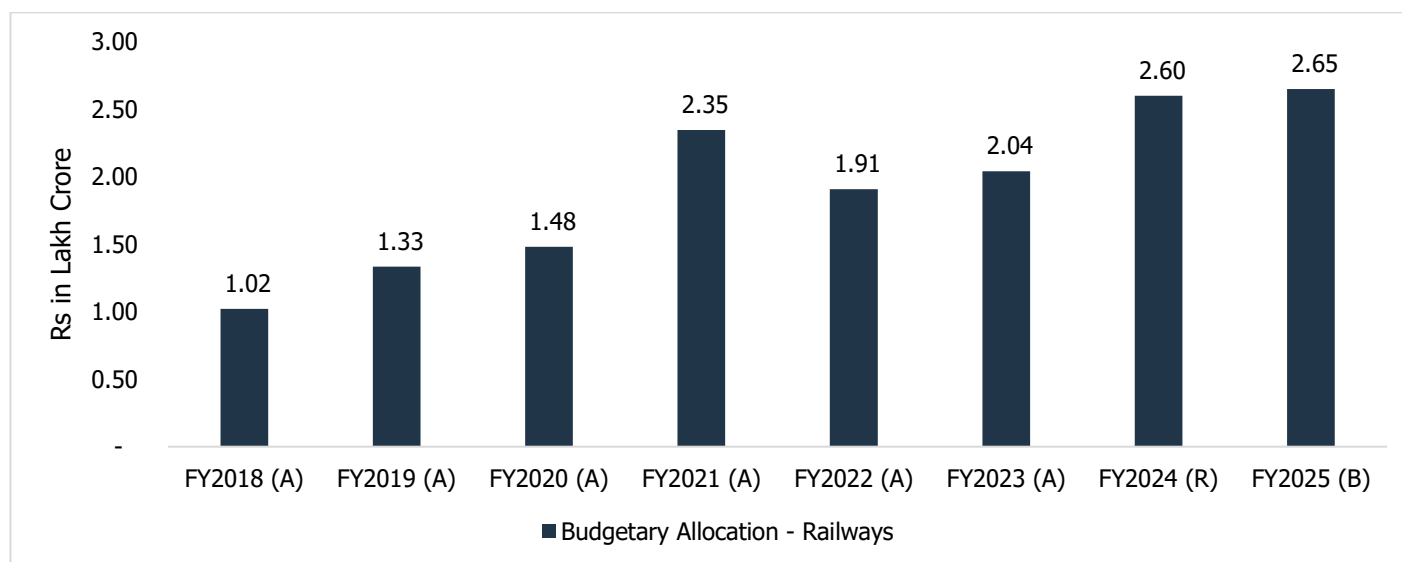
Being the third largest network in the world under single management and over 68,000 route kms, Indian Railways is known to provide safe, efficient, competitive transport system. On an average 1,835 new track km per year has been added via new-line and multi-tracking projects during the period of 2014 to 2021. Indian Railways is adopting new technology such as KAVACH, Vande Bharat trains and redevelopment of stations to have safe and better journey experience for the passengers.

CAPEX has been increased substantially from an average of Rs.459.80 Billion during 2009-2014 to Rs. 2,150.58 Billion during FY22. Indian Railways is also targeting for 100% electrification of its network by December 2023. In addition to the above, projects connecting difficult terrain such as Rishikesh - Karnaprayag line is also laid down to connect all capitals of north east states. Further, a number of infrastructure development initiatives are taken under the National Rail Plan (NRP) prepared by Indian Railways.

The National Rail Plan is the road map for capacity expansion of the railway network by 2030 to cater to growth up to 2050. It has been incorporated to take care of the demand and expectation of passengers and also increase the modal share of railways in freight to 40-45% from the present level of 26-27%. The target of 40-45% modal share for railways is necessary from the perspective of sustainability and also from the national commitments made globally for reducing emission levels.

#### Budgetary support

Railways is one of the key enablers for economic growth and an investment of USD 750 billion was proposed by the government in the Union Budget 2019-20 to improve the railway infrastructure over 2018 - 2030. The budgetary allocation to Indian Railways has been on a rise.

**Chart 48: Budgetary Outlay towards Indian Railway**


Source: Budget Documents. Note: B – Budgeted, A – Actual, R – Revised and Includes Internal and Extra Budgetary Resources (IEBR)

In the Union Budget 2024-25, the government has allocated Rs 2.65 lakh crore towards railways which is the highest ever allocation. The allocation towards rolling stock has more than doubled Y-o-Y to Rs 41,086 crore in the union budget 2024-25 from Rs 19,035 crore (revised budget) in 2022-23.

**Table 25: Budgetary Outlay toward Railway Projects**

Railway Projects	FY18 (A)	FY19 (A)	FY20 (A)	FY21 (A)	FY22 (A)	FY23 (A)	FY24 (R)	FY25 (B)
Doubling	1,290	610	678	379	3,000	25,620	35,046	30,000
New Lines (Construction)	8,952	5,648	9,871	1,058	16,246	24,377	34,410	36,091
Track Renewals	8,884	9,690	9,387	0	10,695	16,326	16,826	17,150
Gauge Conversion	2,555	2,590	3,313	117	1,803	2,582	4,279	4,534
Rolling Stock	1,514	4,572	3,963	839	6,815	19,035	40,396	41,086
Passenger Amenities	1,287	1,586	1,903	1,788	2,800	2,159	9,618	16,352
Road Safety Works	4,167	4,733	4,874	17	6,400	6,397	8,849	12,294
Signalling and Telecom	1,257	1,538	1,623	6	2,448	2,456	3,581	4,492
Leased assets - Payment of Capital Component	7,980	9,112	10,462	11,948	19,459	17,456	21,300	24,270
Manufacturing Misc.	29,403	34,281	39,854	31,103	40,097	41,718	52,923	59,299

Source: Budget Documents. Note: B – Budgeted, A – Actual, R – Revised and Includes Internal and Extra Budgetary Resources (IEBR)

### 7.13 Government regulations and initiatives

#### PM- Gati Shakti

PM Gati-Shakti is a national master plan for multi-modal connectivity across the country. It is a digital platform to bring 16 ministries including railways, roadways together with an integrated plan to coordinate the implementation of infrastructure connectivity projects.

Under PM-Gati shakti, the concept of 'One Station- One product' is to be popularized to help the local businesses and supply chain. About 2,000 km of network will be brought under Kavach as a part of Atmanirbhar Bharat. Kavach is an indigenous world-class technology for safety and capacity augmentation in 2022-23.

Under this scheme, a total of 400 new-generation Vande Bharat Trains with greater energy efficiencies and passenger experience are to be developed and manufactured and 100 cargo terminals for multimodal facilities are to be setup in the next three years as stated by the Finance Minister in February 2022.

#### National Rail Plan

Indian Railways prepared a National Rail Plan for India-2030. This plan is to make railway system future ready by 2030. The plan will be aimed to formulate strategies based on operational capacities and commercial policy initiatives to improve the modal share of the railways to 45% in freight.

As per the National Rail Plan, the freight ecosystem is expected to grow from the present level of 4,700 Million Tonnes to 8,200 Million Tonnes by 2030. Currently, railway capacity is barely able to carry 1,220 Million Tonnes which is around 26-27% of the modal share. The Plan provides a pipeline of projects, which on completion will increase railway capacity to capture 45% of freight traffic. Since the railways is already having a large number of sanctioned projects that need to be completed before taking up new projects, it has been planned to increase railway capacity in two surges. The first surge is to be provided by the Vision 2024 plan to prioritize and complete sanctioned projects so that railway capacity does not fall far behind the targeted modal share, such that by the time capacity is finally created, the traffic would have shifted to another mode. To prevent further diversion from modal share, railway capacity enhancing projects have been categorized as Super Critical and Critical. These projects are focused at increasing capacity on routes that serve major mineral, industrial hubs along with ports and major consumption centers.

#### Dedicated Freight Corridor (DFC)

Dedicated Freight Corridor Corp. of India Ltd. (DFCCIL) is building two freight corridors namely Eastern Freight Corridor from Ludhiana to Dankuni (1,856 km), and Western Freight Corridor from Dadri to Jawaharlal Nehru Port (1,504 km), at a total cost of Rs. 810 Billion. DFCCIL is a special purpose vehicle for implementing the DFC project under the administrative control of Ministry of Railways.

Total length of the DFC is 28,243 kms and the total estimated cost is US\$ 11.66 Billion as on September 2019. The financial progress stands at 63.6% and physical progress stands 67.5%. The eastern wing of the DFC is funded by the World Bank and western wing is being financed by the Japanese International Cooperation Agency. The Japanese International Cooperation Agency has granted Rs. 85.53 Billion (US\$ 1,167.68 Million) for phase 1 of the DFC. The World Bank granted loan of US\$ 1,100 Million for EDFC-2 and sanctioned loan of US\$ 650 Million for EDFC-3 in October, 2016.

Currently, new links New DDU to New Sonnapur (137 Km) section, New Rooma to New Sujatpur section (130 km) and New Kanpur to New Bhimsen (28.18km) have been sanctioned in the calendar year of 2022.

Key features of the DFCs include double speeds, higher load carrying capacity, and double stacking capability.

**Table 26: Railway Infrastructure – Key Segments**

Design Feature	Indian Railway	DFC
Height	4.265m	5.1m/7.1 m
Width	3,200 mm	3,600 mm
Train Length	700 m	700m/1500m
Train Load	5,400 tonnes	12,000 tonnes
Axel Load	22.9 tonnes	25 tonnes track structure; Bridges and formation designed for 32.5 tonnes
Average Speed	25 kmph	>65 kmph
Traction	Electrical (25 Kv)	Electrical (2*25kv)
Signalling	Absolute/automatic with 1 Km spacing	Automatic with 2 Km spacing in automatic territory

Source: Dedicated Freight Corridor Corporation of India

### 7.14 Regulatory Framework for Railways

The Ministry of Railways is the apex organization for Railways. Apart from its functions as the top Railway executive body for the administration, technical supervision and direction of the Railways, the Railway Board function, also, as a Ministry of the GoI exercises all the powers of Central Government in relation to the Railways.

#### The Mission of Indian Railways is

- Protect and safeguard railway passengers, passenger area and railway property.
- Ensure the safety, security and boost the confidence of the traveling public in the Indian Railways.

#### The Objectives are:

- Carry on an unrelenting fight against criminals in protecting railway passengers, passenger area and railway property.
- Facilitate passenger-travel and security by removing all anti-social elements from trains, railway premises and passenger area.
- Remain vigilant to prevent trafficking in women and children and take appropriate action to rehabilitate destitute children found in Railway areas.
- Co-operate with other departments of the Railways in improving the efficiency and image of the Indian Railways.
- Act as a bridge between the Government Railway Police/local police and the Railway administration.
- Adopt proactively all modern technology, best human rights practices, management techniques and special measures for protection of female and elderly passengers and children, in the pursuit of these objectives.

### 7.15 Recent events in Railways sector

#### Indian railways plan to run 35 hydrogen trains under 'Hydrogen for Heritage'

Indian Railways has envisaged to run 35 Hydrogen trains under "Hydrogen for Heritage" at an estimated cost of Rs.0.8 Billion per train and ground infrastructure of Rs.0.7 Billion per route on various heritage/hill routes.

Additionally, the Railways has also awarded a pilot project for retro fitment of Hydrogen Fuel cell on existing Diesel Electric Multiple Unit (DEMU) rake along with ground infrastructure at the cost of Rs.1.12 Billion which is planned to be run on Jind –Sonipat section of Northern Railway. The first field trials of the first prototype on Jind –Sonipat section of Northern Railway are expected to commence in 2023-2024.

The use of Hydrogen as fuel will provide greater benefits in the green transportation technology space and support zero carbon emission goals.

### **Indian Railways and India Posts launch 'Rail Post Gati Shakti Express Cargo Service'**

This is an initiative of partnership between Indian Railways and India Posts to provide seamless logistics for the services sector in the country which is in compliance with the Budget Announcement of FY 2022-23 and it has been started in February 2023, on the four sectors - Delhi to Kolkata, Bangalore to Guwahati, Surat to Muzaffarpur and Hyderabad to Hazrat Nizamuddin. However, a total of 15 sectors have been planned to be covered in the first phase.

The highlights of this service are total logistic Service: Pick-up and delivery at customer premises, palletization - transportation through covered and sealed boxes, semi-mechanized handling, time tabled service, insurance at 0.05% of the declared value of the cargo for loss, damage and deterioration, Integrated Parcel Way Bill.

### **7.16 Key trends in Railways sector**

**Improving passenger experience:** Increasing urbanization along with rising income is driving demand for passenger travel. To provide improved experience to the passengers, the Railways are trying to introduce new features and trains with better services.

**Net zero carbon emission:** Indian Railways has planned to gradually reduce its carbon footprint and become Net Zero Carbon Emitter by 2030. It will attempt to reduce its carbon footprint primarily through sourcing of its energy requirements from renewable energy sources. By the year 2029-30, expected requirement of installation of renewable capacity would be about 30 GW. Indian Railways has installed 142 MW solar rooftop capacity and 103.4 MW of Wind energy till August, 2022.

**Electrification:** Indian Railways has embarked upon an ambitious plan of electrification of its complete Broad-Gauge network which would not only result in a better fuel energy usage resulting in increased throughput, reduced fuel expenditure but also savings in precious foreign exchange.

### **7.17 PPP in Railways**

For the faster & safe movement of passenger and increase stake in freight transport from 17% to 45%, Indian Railways has planned huge investment by 2030 which is estimated to be around Rs. 50,000 Billion will be capital investment required for network expansion and capacity augmentation, rolling stock induction and other modernization works to enable better delivery of passenger and freight services and to improve its modal share in transport. To bridge the gap in capital funding and to induct modern technologies and improve efficiencies, Indian Railways has planned to use Public Private Partnership (PPP) model for few initiatives.

PPP model was allowed in areas such as Suburban Corridors, Mass Rapid Transport System, High-Speed Trains, Dedicated Freight Lines, Rolling Stock, Train Sets, Locomotives, etc., Railway Electrification, Signalling Systems, Freight and Passengers Terminals, Industrial Parks.

The policy provides following five PPP models for implementation of various types of rail-connectivity and capacity augmentation projects:

- Non-Government Private Line Model
- Joint Venture (JV) model
- Build, Operate and Transfer (BOT) model
- Capacity augmentation with funding provided by customers
- Capacity augmentation through annuity model

As per the guidelines, three of these models (private line, JV and customer funded) involve participation of strategic investors/customers and two others (BOT and Annuity models) are pure PPP models.

Through the above five models, Railways aims to mobilise substantial investments through various Projects/Schemes like Port Connectivity Projects, Private Freight Terminals (PFT), Private Container Operations, Liberalised Wagon Investment Scheme (LWIS), Wagon Leasing Scheme (WLS), Automobile Freight Train Operator Scheme (AFTO), Special Freight Train Operator Scheme (SFTO), Redevelopment of Stations and Locomotive Manufacturing Unit.

Ministry of Railways (MoR) had invited applications for investment and induction of modern rakes over select routes through Public Private Partnership (PPP) to provide world class services to the passengers. Accordingly, MoR had issued 12 Requests for Qualification (RFQs) on 1st July, 2020 for operation of passenger trains over approximately 109 origin-destination pairs (divided into 12 clusters) through PPP on Design, Build, Finance and Operate ("DBFO") basis.

In addition, the Government also announced a PPP model for station redevelopment. Under this move, 400 stations have been identified for redevelopment which envisages an investment opportunity of nearly Rs. 1,000 Billion. These development plans would improve participation of private players in the railway sector over the longer term.

### 7.18 Key growth drivers

#### Railways:

**Rising passenger travel:** The vast network of Railways is used by Millions of Indians to travel, whether local or leisure. Railways are well connected to travel for pilgrimage, business or vacations. In reserved passenger segment, the total approximate numbers of passengers booked during the period 1st April 2022 to 31st December 2022 is 0.6 Billion as compared to 0.6 Billion during the same period in 2021, showing an increase of 6%. The rising population is only leading towards increased passenger travel in future.

**Push to Freight business:** Indian railways play a major role in freight movement in the country. The railways are well connected and offer competitive pricing. According to a report by Ministry of Railways, following the Mantra, "Hungry For Cargo", Indian Railways has made continuous efforts to improve the ease of doing business as well as improve the service delivery at competitive prices which has resulted in new traffic coming to railways from both conventional and non-conventional commodity streams. The Indian Railways on a cumulative basis from April - December 22, achieved the freight loading of 1,109.38 MT as against 1,029.96 MT for the same period in 2021, an improvement of 8% over last year loading.

**Use of digital technology:** Automatic trains are being introduced with modern technology to make the travelling experience better and distance shorter. As per Ministry of Railways, in order to increase line capacity to run more trains on existing High-Density Routes of Indian Railways, Automatic Block Signalling (ABS) is a cost-effective solution. Indian Railways has been rolling out Automatic Block signalling on a mission mode. With implementation of Automatic Signalling, increase in capacity will accrue resulting in more train services becoming possible.

Electronic Interlocking are being adopted on a large scale to derive benefits of digital technologies in train operation and to enhance safety.

**Initiatives to promote tourism:** With introduction of new routes and special trains, the Government is also providing EMI options to the passengers. For the Ayodhya to Janakpur train – 'Bharat Gaurav Deluxe AC Tourist Train', the Railways is providing with an attractive as well as affordable package, IRCTC has tied up with Paytm and Razorpay payment gateways for providing EMI payment option for breaking the total payment in small amount EMIs. Users can avail the EMI payment option for making payment in 3, 6, 9, 12, 18 or 24-month EMIs. These EMI payment options can be made through Debit/Credit Cards.

### 7.19 Major challenges

**Changes in raw material prices:** The rising cost of steel and cement, two major raw materials that are consumed in railways and metro industry saw a sharp rise during the second half of FY21. Any variation in the prices of raw materials during the construction period of the project has a direct impact on total cost of the project. The average domestic steel prices surged 26% y-o-y in FY21. In FY22 as well, the average price of domestic steel and cement increased by 45% and 8% respectively. Here, increased international steel prices led to significantly higher export volumes, which in turn led to an increase in domestic steel prices. Whereas, the rise in cement prices was primarily on account of rising input and fuel costs pressure due to geopolitical tensions. The volatile commodity prices are expected to impact margins of construction players.

**Land acquisition issues:** Cities are densely populated and to plant a new railway or metro line, a large chunk of land is to be acquired. This land may belong to slums, construction companies or even business owners. Land acquisition gives rise to major resettlement and rehabilitation issues especially in the metro cities. The issues related to land can go up to years and lead to project delays. A detailed survey is done by the agencies to determine the people affected in that area due to the upcoming project. Additionally, the rehabilitation cost may also add up to the project cost for the railway/metro project.

**Operational inefficiencies:** The railway and metro projects are large scale operations. These projects require a lot of approvals from different authorities. Lack of clarity, delays in submission, incorrect or inefficient data can lead to delays in the project.

**Inaccurate Data:** Data collection and analysis related to traffic forecast, demand forecast, expected ridership plays a very crucial role in finalizing a project. Incorrect data for a project can lead to a huge losses and enormous loss of resources and time. Over estimation of projects can lead to over sizing of the asset whereas, under sizing of the infrastructure resources.

### 7.20 Ports

#### Overview

Ports are large gateways which act as an interface between ocean and land transport. Ports are considered to be providers of solutions to all types of cargoes. The global trend is currently moving towards the development of specialized ports such as container terminals and liquefied natural gas (LNG) terminals which requires high capital costs and intensive deployment of equipment handling the cargo.

The Indian shipping industry has benefitted due to a combination of growth in international trade and removal of trade barriers and restrictions. As per the Ministry of Shipping (Government of India), the Indian ports handle around 90% of EXIM cargo by volume and 70% by value.

Port traffic at 12 major ports remained flat in FY23. Movement of coal, cement and other goods (including salt) cargo saw a y-o-y growth in 14%, 10% and 17%, respectively. However, movement of ores and iron & steel cargo saw a y-o-y degrowth of 21% and 20%, respectively.



**Table 27: Movement in commodity-wise traffic at major ports ('000 tonnes)**

Year	POL	Iron Ore	Iron & Steel	Fertilizers	Containers	Coal	Cement	Other Good (Incl. Salt)
<b>FY18</b>	2,26,675	41,052	10,909	7,377	1,33,633	1,20,768	2,888	80,645
<b>FY19</b>	2,32,350	34,068	10,340	8,171	1,45,451	1,25,578	2,889	86,553
<b>FY20</b>	2,37,164	48,453	9,644	8,948	1,46,912	1,14,905	3,142	78,766
<b>FY21</b>	2,06,764	64,282	11,483	10,105	1,43,773	97,394	2,797	72,082
<b>FY22</b>	2,22,089	51,289	11,520	6,897	1,66,946	1,23,573	2,695	76,037
<b>FY23</b>	2,15,128	40,561	9,242	6,963	1,54,739	1,40,625	2,970	88,665
<b>9MFY24</b>	1,81,377	43,468	8,286	6,190	1,35,696	1,13,982	2,197	73,380

Source: CMIE

POL – Petroleum, oil & lubricants (POL) account for a third of the total cargo handled at Indian ports and POL is the largest commodity transported through ports since most of India's requirements for crude oil are met through imports and India is a major exporter of petroleum products. POL traffic grew in the range of 2-8% from FY17 to FY20. It contracted by 13% during FY21, on account of a fall in India's imports of crude oil and exports of petroleum products because of the lower demand during the pandemic. FY22 witnessed recovery of POL traffic which grew by 7% over previous year owing to recovery of economic activities. However, POL traffic saw a growth of 3.6% y-o-y in FY24, the growth pace was lower on account of disturbance in trade due to the war between Russia and Ukraine. India is the third largest importer of crude oil after China and US and the imports are expected to remain significant in near term due to expected economic growth.

Containers – Containers are the second largest contributors to freight traffic after POL and account for close to a fourth of overall cargo traffic. This is on account of the efficiency and agility achieved through transport using containers. The container freight traffic grew steadily until FY21 with increase in trade but saw a dip in the pandemic. The cargo traffic was up by 14% in FY22 as compared to FY21, while in FY23, container cargo traffic declined by 7% y-o-y due to disruption in global trade activities. In FY24 the cargo traffic saw a y-o-y growth of 7.9%.

Coal – Coal is an important commodity transported through Indian ports. It is the third largest contributor to overall freight traffic. India is partly dependent on imports to meet its domestic requirements of coal and imports constitute for roughly a fourth of domestic coal consumption. The cargo traffic for coal grew by 27% y-o-y in FY22 & 14% in FY23 driven mainly by the import of thermal coal backed by higher demand from the power sector, while there was a degrowth of 1.9% y-o-y for 9MFY24.

Iron ore – Iron ore cargo traffic grew robustly for two consecutive years from FY20 to FY21. The stellar growth in iron ore exports came on the back of higher demand for steel amid global supply disruptions, especially in Brazil and Australia, which resulted in a rise in international prices. This led to domestic production finding traction in Chinese markets. China alone accounted for more than 85% of iron ore exported by India during FY20 and FY21. India's iron ore exports to China grew by a robust 98% to USD 4 billion during FY21. In FY22, the export demand from China decreased

substantially due to the slowdown in China, policy measures to reduce pollution by restricting steel production and slowing construction activities. As a result, the iron ore traffic reduced by 20% y-o-y in FY22. In May 2022, the Government raised the export duty on iron ore which impacted iron ore exports and led to 21% y-o-y decline iron ore traffic through ports in FY23. However, for 9MFY24, the iron ore traffic increased y-o-y by 45%.

Fertilizers – India is heavily dependent on imports for raw materials that are used in production of fertilizer. It also imports fertilizers and feedstock. Fertilizers volumes through ports grew by 13% in FY21, because of its linkage with agriculture which was termed as 'essential activity' during pandemic. The cargo traffic saw a decline of about 10% y-o-y in FY22, due to significant increase in prices of raw materials and chemicals used in the manufacturing of fertilizers. During FY23, there was a marginal increase of 1% in fertilizer traffic as compared to FY22, while there was a 7.3% y-o-y increase in 9MFY24.

### **7.21 Regulations**

The 12 major ports in India are regulated by the Major Port Trusts Act, 1963 and the Non-major ports (Minor ports) are governed under the IPA Act, 1908. The IPA Act consists of 69 sections and 2 schedules, it regulates the berths, stations, anchoring, fastening, mooring and unmooring of vessels.

Tariff Authority for Major Ports (TAMP):

The Tariff Authority for Major Ports (TAMP) was created in the year 1997. The regulatory jurisdiction of the Authority extends to all major port trusts and private terminals operating therein.

#### **Role, functions and organizational structure:**

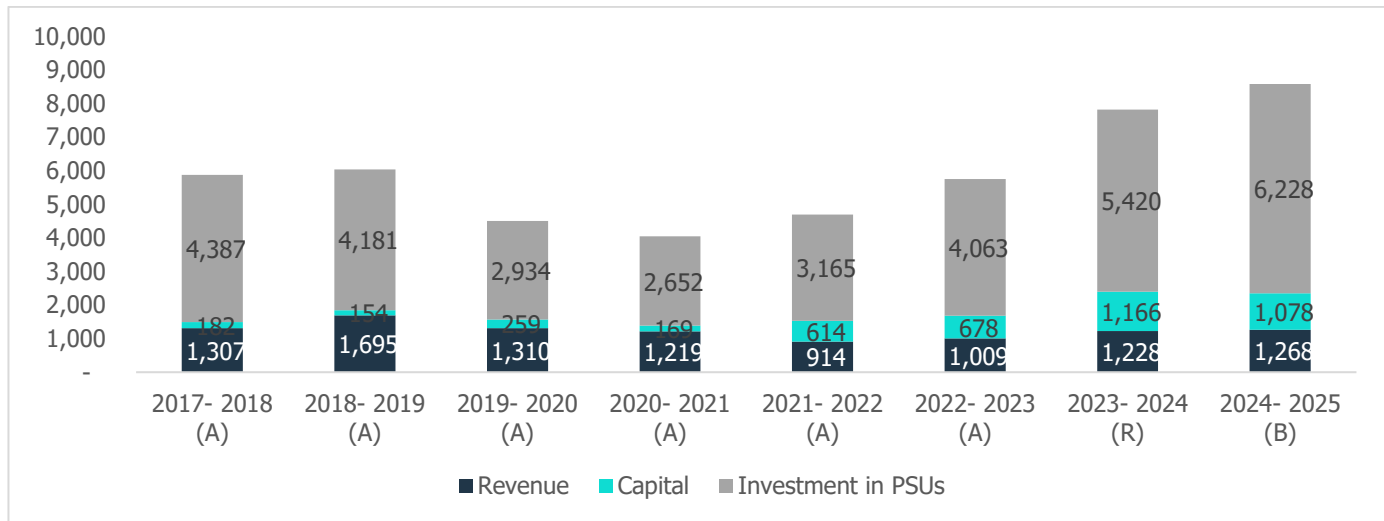
The TAMP Authority is statutorily mandated to frame the Scale of Rates and the Statement of Conditions for the services rendered by the Major Port Trusts and Private Terminals thereat as well as charges for use of port properties.

The Authority consists of a Chairman and two Members. The Chairman is of the rank of the Secretary to the Government of India, one Member from amongst economists and one Member with experience in finance. TAMP is functioning with Member (Finance) and Member (Economics) at present.

### **7.22 Government policies**

In Union Budget 2023-24, the government announced 100 transport infrastructure projects for end-to-end connectivity for ports, coal, steel and fertilizer sectors. Budgetary allocation of Rs 6,228 crores was announced to ministry of ports, shipping and waterways for FY25 as compared to Rs 5,420 crores in the previous budget, implying a growth of 15% y-o-y basis.

**Chart 49: Budgetary Support to Ministry of Ports, Shipping and Waterways**



Source: Budgetary Documents

Note: B – Budgeted, A – Actual; Budgetary allocation includes investment in Public Enterprises

Further government has introduced multiple initiatives to drive growth in sector:

- The Draft Indian Ports Bill 2021, announced in July 2021, sought to centralise the administration of minor ports that are controlled by state governments.
- The Inland Vessels Bill 2021 was approved by the Lok Sabha in July 2021 which will help domestic cargo movement with the potentially lower rates. This bill seeks to create a single law for the country, rather than different laws created by the states. Registration certificates issued for the vessels under the new law will be valid nationwide and will not require state government approval. The bill also envisages creation of a database to host information about ships and crews on a website.
- In July 2021, the Marine Aids to Navigation Bill 2021 was passed by the Parliament, incorporating global best practices, technological developments and India's international obligations in this field.
- The Finance Minister proposed to double the ship recycling capacity of approx. 4.5 million light displacement tonnes (LDT) by 2024 and it is expected to generate an additional ~1.5 lakh employment opportunities in India.

In February 2021, the Major Port Authorities Bill, 2020 was passed by the Parliament of India. The bill focuses on strengthening decision-making and effective management of major ports.

**Sagarmala Programme:** The maritime sector in India has been the backbone for the trade and has grown manifold over the years. With Sagarmala programme the Government aims to promote port led development in the country. The project will utilize the 7,517 km long coastline, 14,500 of potentially navigable waterways and key location on major international trade routes. The concept of the Sagarmala programme was approved by the Union Cabinet in the year 2015.

In Sagarmala programme, there are 802 projects worth Rs 5.40 lakh crore for implementation by 2035. Of the total 802 projects, 220 projects worth Rs 1.12 lakh crore have been completed and 231 projects worth Rs 2.07 lakh crore are

under implementation. Further, there are 351 projects worth Rs 2.07 lakh crore that are various stages of development. The projects will be implemented by the relevant central ministries, state governments, major ports and other agencies through either private or the PPP mode.

All these projects that will be implemented by various agencies will be monitored through an MIS tool. The projects are bifurcated into 5 pillars: port modernization, port connectivity, port led industrialization, coastal community development and coastal shipping & inland water transport.

Under the overall development of the coastal districts, a total of 567 projects that cost approximately Rs 58,000 crore have been identified.

Pillar	Completed		Under implementation		Under development		Grand total	
	#	TPC (Rs. Cr.)	#	TPC (Rs. Cr.)	#	TPC (Rs. Cr.)	#	TPC (Rs. Cr.)
Port Modernization	89	31214	63	64063	89	154383	241	249660
Port Connectivity	69	32005	67	76295	73	33926	209	142226
Port Led Industrialization	9	45865	21	72706	3	1275	33	119846
Coastal Community Development	20	1482	19	2577	43	7315	82	11375
Coastal Shipping and IWT	33	1705	61	5255	143	10275	237	17235
<b>Grand total</b>	<b>220</b>	<b>112271</b>	<b>231</b>	<b>220896</b>	<b>351</b>	<b>207174</b>	<b>802</b>	<b>540342</b>

Source – Ministry of Ports, Shipping & Waterways, CareEdge Research

Over the years, the Government has taken a number of mechanization, modernization and digital transformation measures to reduce cost and time in international trade and to improve the ease of doing business. The Government is focusing on expanding the port capacity and improving the efficiency of the ports, digitization of process to reduce human interference and to address the environment related concerns.

### 7.23 Growth drivers

1. **Sagarmala Project:** The Sagarmala project is a government initiative aimed at developing port infrastructure and optimizing logistics to reduce costs and improve efficiency in maritime trade. This project focuses on creating new ports, enhancing connectivity between ports and industrial corridors, and improving the overall logistics ecosystem.
2. **Dedicated Freight Corridors (DFCs):** India is building dedicated freight corridors, such as the Eastern Dedicated Freight Corridor and Western Dedicated Freight Corridor, to improve the transportation of goods and reduce transit time. These corridors will help in seamless movement of freight, decongest existing rail networks, and bring down logistics costs.
3. **E-marketplaces and Single Window Clearance:** The government has introduced e-marketplaces like GeM (Government e-Marketplace) and initiatives like Single Window Clearance to streamline procurement processes, reduce bureaucratic hurdles, and facilitate ease of doing business. These platforms help businesses connect with buyers, streamline supply chains, and improve competitiveness.
4. **Export Promotion Initiatives:** Various export promotion schemes and initiatives have been implemented, such as the Merchandise Exports from India Scheme (MEIS) and Services Exports from India Scheme (SEIS),

to provide incentives and support to exporters. These schemes aim to boost exports, enhance competitiveness, and diversify India's export basket.

By implementing these initiatives, India seeks to enhance its manufacturing capabilities, promote exports, and reduce logistical costs. These efforts are intended to make Indian products more competitive globally and attract foreign investments while fostering domestic production and economic growth.

According to Sagarmala Programme, it is expected that the cargo traffic of Indian ports will be about 2500 MMTPA by 2025 as compared to the current 1500 MMTPA. Factors like better rural connectivity, port advancements, growth in logistics industry in the country and lower turnaround time due to improved technology are expected to enhance the port traffic. Apart from this, demand for crude oil and containerization which will boost the port traffic, hence improving their revenues. There has also been increase in overall trade which is forecasted to grow only higher as the risk of pandemic has subdued and economies are recovering.

Government initiatives like 100% FDI under automatic route for ports and harbour construction and maintenance, Gati Sakti, Maritime India Vision 2030, Sagarmala Pariyojana etc. are also factors which will boost the port traffic and revenues. Under PM Gati Shakti, government had identified 101 projects worth Rs 60,872 Crore in ports and shipping out of which 13 projects worth Rs 4,423 Crore have been completed. There are 19 projects in the state of Gujarat worth Rs 20,400 Crore and 13 projects each in Maharashtra and Andhra Pradesh worth Rs 10,000 Crore and 5,900 Crore respectively.

## 7.24 Challenges

- 1. Inadequate infrastructure:** A lot of non-major ports do not have adequate berthing facility, number of berths and sufficient length for proper berthing of vessels. In order to facilitate a quick turnaround, most non-major ports do not even have proper material handling equipment in place. Draft is also a major limitation in our country as a lot of ports cannot cater to vessels beyond panama i.e draft over 13 meters in size, which are commonly used globally. Furthermore, many ports also lack adequate navigational aids, facilities and IT systems.
- 2. Higher turnaround time and port congestion:** In India, average ship turnaround time is over 2 days, however in Singapore is less than a day. Another major concern is shortage of handling equipment and container volume which leads to port congestion.
- 3. Sub-optimal transport modal mix:** Lack of necessary infrastructure for evacuation from major and non-major ports results in sub-optimal transport modal mix.
- 4. Limited hinterland linkages:** There is poor hinterland connectivity through rail, road, highways, inland waterways and coastal shipping which results in increased cost of transportation and cargo movement.
- 5. Issues pertaining to regulations:** Regulations vary for major and non-major ports and they fall under different jurisdictions. Additionally, the regulatory framework is also very rigid. For example, foreign-flagged vessels are not allowed to ship cargo from one Indian port to another as it remains a protected ground for domestic shippers.

## 7.25 Outlook

The growth of the port industry is driven by India's rising share in global trade, increase in economic activities and expected increase in domestic manufacturing led by initiatives such as Make in India. However, inflationary trends and global slowdown may impact India's exports in the near term and is the key monitorable for the industry. The government has set a target to achieve exports of USD 2 trillion by 2030 of which USD 1 trillion is expected to be

contributed by product exports. Several initiatives have been taken by the government to boost exports and increase competitiveness of India-manufactured products.

Over 150 initiatives have been identified by the Maritime India Vision 2030 to boost the maritime sector. The Maritime India Vision was launched in the year 2021 after consultation with over 350 public and private stakeholders across shipyards, ports, trade bodies, legal experts. This Vision acts as a blueprint to achieve growth and development covering all the facets of the maritime sector in the country.

Further, Bhavnagar in Gujarat is being developed as the container manufacturing hub in the country and the cruise shipping is also expected to grow in the country.

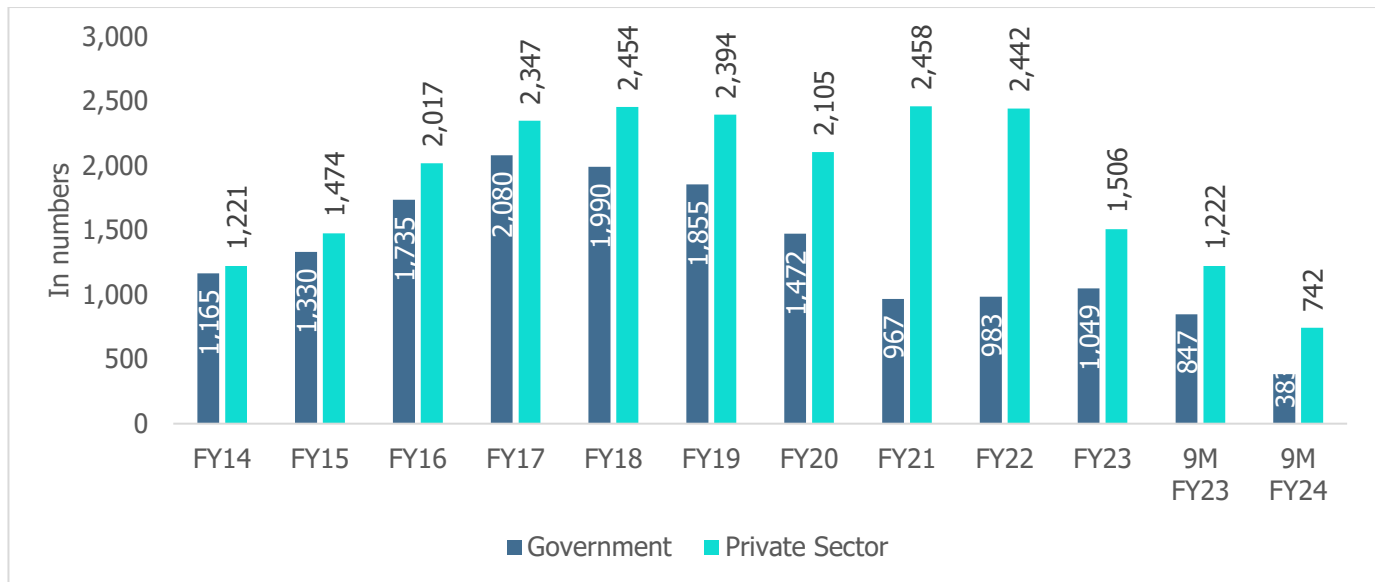
## 8. Industrial and buildings

### 8.1 Government and Private Investments

The private sector holds the majority of investments as compared to investments made by Government in the past 10 years. The total number of investments made across all industries by Government and private sector stood at 1,049 and 1,506 respectively, in FY23.

During 9M FY24 (April 2023 – December 2023) the private sector investments decreased by 480 as compared to the corresponding period in 9M FY23 (April 2022 – December 2022). The private sector remained the largest holding among the overall investments, despite the decline in investments.

**Chart 50: Trend in No. of Investments made in all industries in the past 10 years and during 9M FY24**



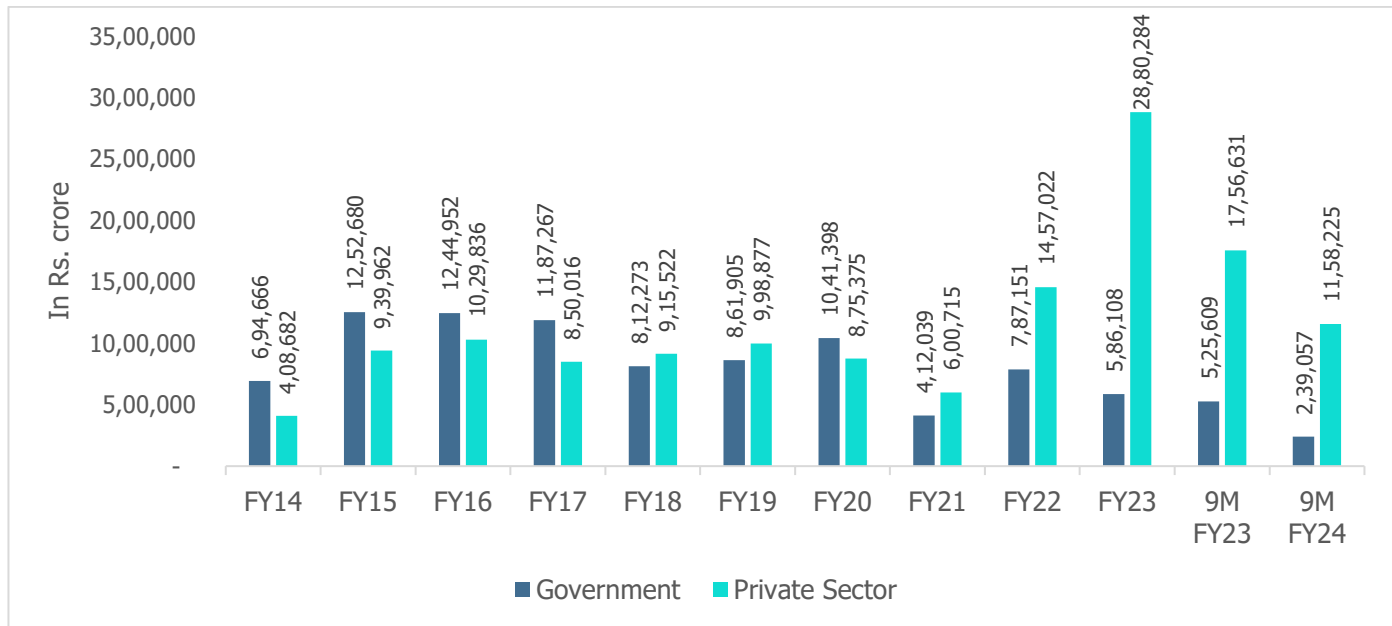
Source: CMIE

The trend in overall investments made across all industries in India increased with a CAGR of around 14% to Rs. 34,66,393 crores in FY23 from Rs. 11,03,349 crores in FY14.

The investments made by private sector grew with a CAGR of around 24% during the same period while the investments made by Government declined by 2% CAGR.

During 9M FY24, the total investments totalled to Rs. 13,97,282 crores out of which private sectors holds 83% and the remaining investments of about 17% is held by the Government.

**Chart 51: Trend in Value of investments made in all industries in the past 10 years and during 9M FY24**



Source: CMIE

## 9. Residential Real Estate Industry in India

### 9.1 Overview

The real estate industry is one of the most crucial and recognized sectors globally. The industry can be divided into four sub-segments, housing, commercial, retail, and hospitality. Of these, the residential segment contributes around 80% of the overall sector. The real estate industry's growth depends on advancements in the corporate environment and the subsequent demand for office space and urban & semi-urban accommodations. The construction industry is, therefore, one of the major sectors in terms of its direct, indirect, and induced impact on all sectors of the economy.

In India, the real estate industry is the second-largest employment generator after agriculture. Around three houses are built per 1,000 people per year as against the required construction rate of five houses per 1,000 individuals per year, according to industry estimates. This indicates that there is significant untapped potential for growth in the sector.

While the current shortage in housing in urban areas is estimated at around 100 lakh units, the shortage in affordable housing space is expected to be much higher considering the population belonging to that strata. Additionally, increased economic growth and the uptick in India's service sector have created additional demand for office space, which, in turn, is likely to result in greater demand for housing units in nearby vicinity.

India is in the top 10 price-appreciating housing markets worldwide. Therefore, it is also expected that this sector will incur more non-resident Indian (NRI) investment, both in the short term and the long term. The growing flow of funds through the FDI route in Indian real estate is encouraging increased transparency. Accordingly, developers, in order to attract funding, have revamped their accounting and management systems to meet due diligence standards.

### 9.2 Key Trends in Residential Real Estate

#### Investments in Residential Real Estate

The residential real estate segment was performing exceptionally well during the first half of the previous decade due to the thriving economy and the progressing services sector, facilitating migration to metros and propelling the demand

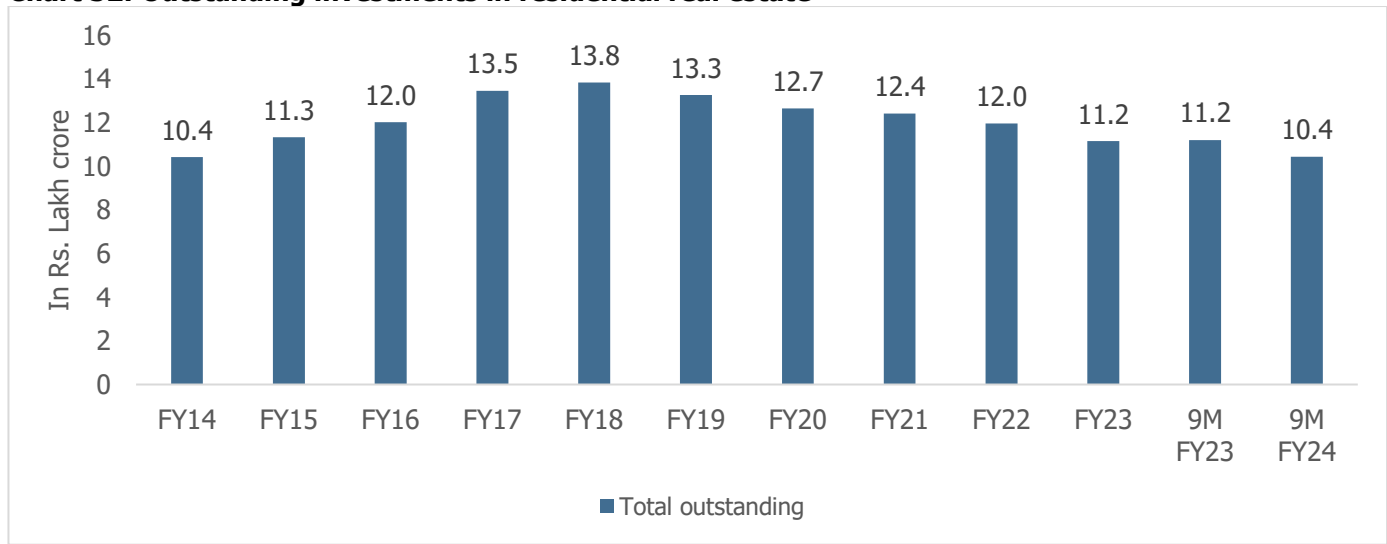


for housing units in these areas. However, problems associated with elevated property prices, delayed launches by developers, and stalled projects resulted in apprehensions toward the sector. Besides, from the point of view of financing, the IL&FS crisis created problems in the NBFC sector, which is a pivotal source of funding for real estate. To add to this, the COVID-19 outbreak in early 2020 and the concomitant lockdowns across the country caused acute stress to the residential real estate segment during H1CY20.

Moreover, after the reopening of the economy, there has been a notable increase in demand for residential properties, primarily driven by end-users in the affordable housing segment. Foreign investments continued to flow into the sector, aided by the easing pandemic situation, resumption of travel, favourable policies such as tax benefits, and advantageous currency exchange rates, further contributing to increased investments from Non-Resident Indians (NRIs), particularly in the residential sector.

**Trend in outstanding investments**

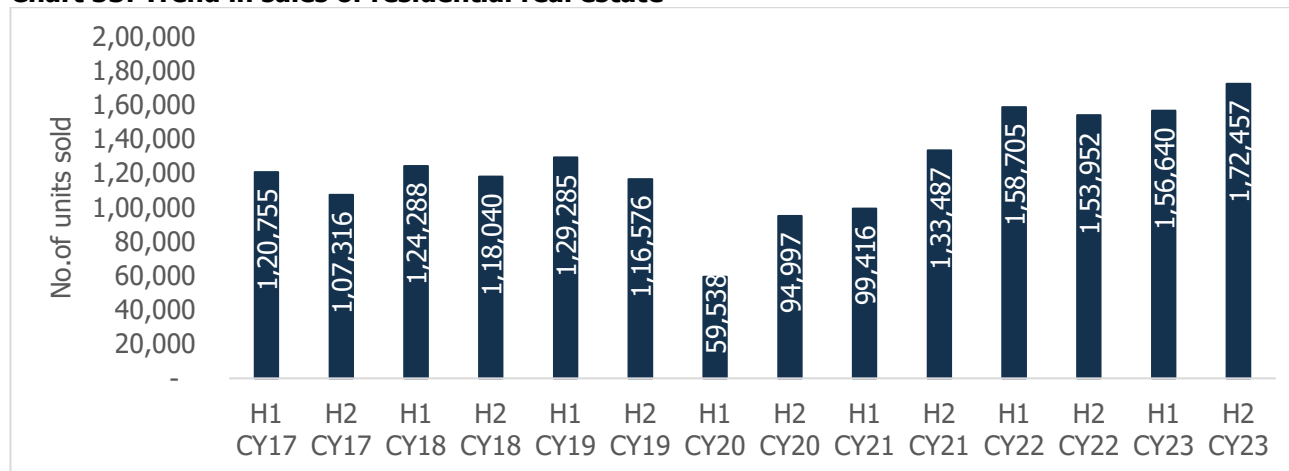
**Chart 52: Outstanding investments in residential real estate**



Source: CMIE & CareEdge Research

The chart above shows that outstanding investments across India rose for five consecutive years ending FY18. In the following year, the total outstanding investments dipped slightly and remained flat in FY20 and FY21. Investments fell slightly during FY22 as the economy and the real estate industry were recovering from the effects of COVID-19. However, the lockdown restrictions were eased in FY22. The investments have further declined in FY23 but are expected to grow in the coming years.

**Chart 53: Trend in sales of residential real estate**



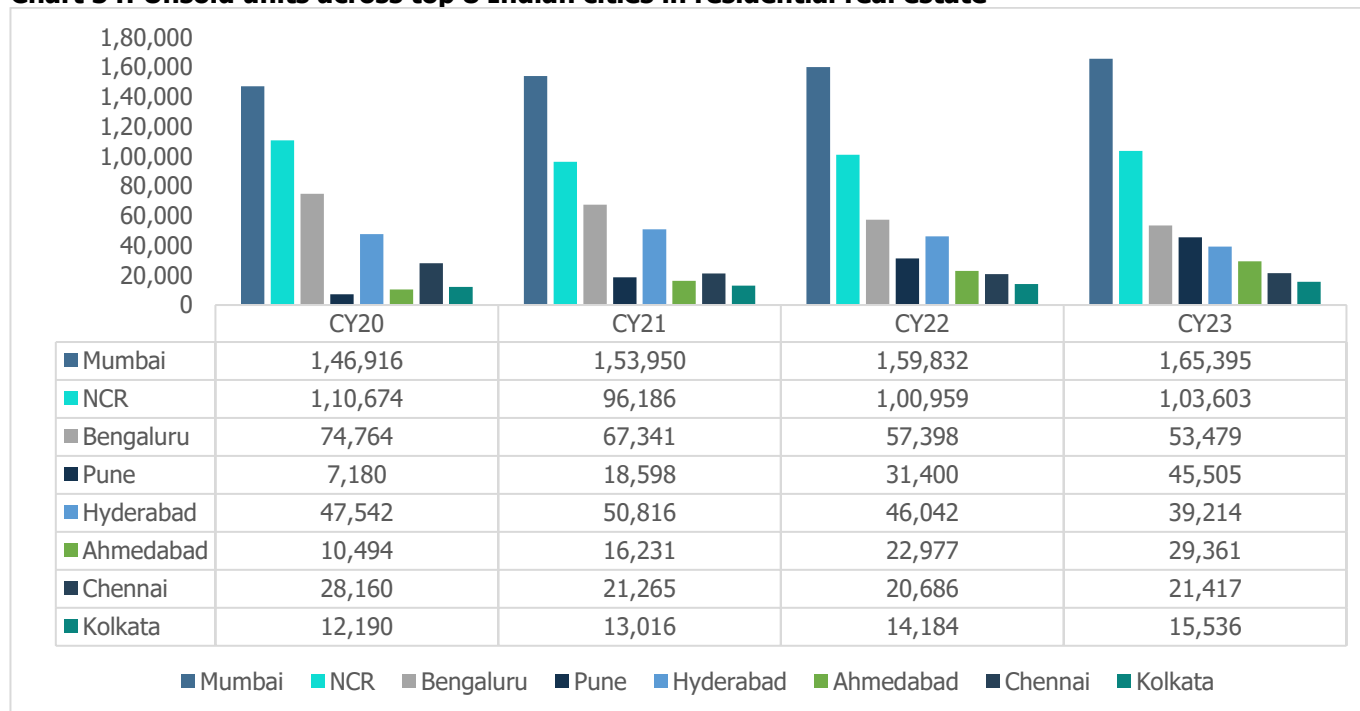
Source: Knight Frank & CareEdge Research

Furthermore, in the pre-pandemic period, the demand for residential real estate was on an upswing. This was indicated by sales of residential real estate units that remained elevated at over 100,000 units in each of the six-month periods prior to the pandemic. However, the demand for residential real estate dipped in the first half of CY20 on account of COVID-19. However, a resumption of normalcy and improved vaccinations enabled unit sales to increase gradually from H2 CY20 to H2 CY21.

During H1 CY22, the sales in residential real estate increased significantly by 60% on a y-o-y and continued to remain in the range till H1 CY23. During H2 CY23, the sales grew by 10% on a q-o-q and 12% on a y-o-y.

**Unsold inventory in residential real estate**

**Chart 54: Unsold units across top 8 Indian cities in residential real estate**



Source: Knight Frank & CareEdge Research

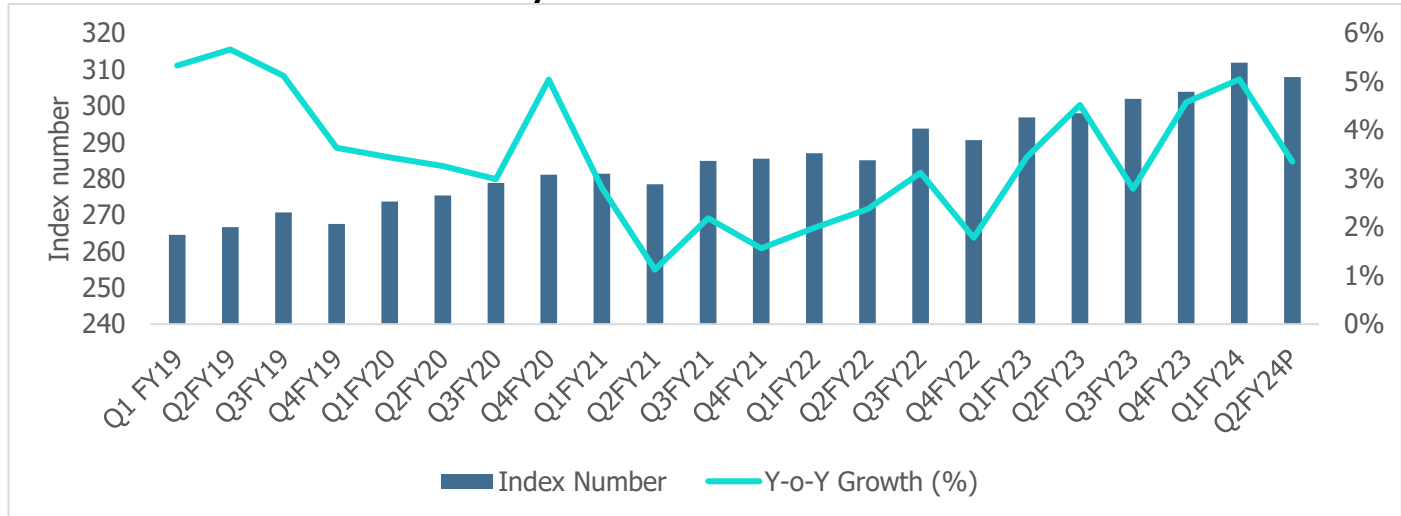
As new launches outpaced sales, the unsold inventory at various stages of construction in the markets across most of the cities has increased in CY23 except in Bengaluru and Pune where the sales have exceeded the launches. Mumbai, Delhi NCR, and Bengaluru together account for nearly 68% of unsold inventory.

The unsold inventory count stood at around 4,73,510 housing units during CY23 as compared to 4,53,478 housing units in CY22. Mumbai remained the market with the maximum quantum as well as value of unsold inventory followed by NCR and Bengaluru.

**Property Prices in residential real estate**

**RBI’s Housing Price Index**

**Chart 55: All India House Price Index by the Reserve Bank of India**



Source: RBI

The All India Housing Price Index by the RBI shows that average housing prices across India recorded an increase in both, absolute and growth terms. The index recorded a growth during the H1FY22 over the corresponding year-ago period and housing prices were 2.6% higher during Q2FY22 indicating a rise in demand and buyers' inclination to pay more than last year. At the same time, the 2.6% rise in housing prices during Q2FY22 was supplemented by subdued housing prices during the year-ago quarter. Besides, the broad momentum in housing prices has been positive even when compared to pre-pandemic times.

Further, the housing price index numbers show that index numbers registered from H2FY21 onward were higher than those prior to Q4FY20. The housing price index numbers stood at 287 and 285 during Q1FY22 and Q2FY22, respectively, and these levels were not surpassed even prior to the pandemic. This indicates that the demand conditions are higher not just due to a pandemic-led low base, but due to the thriving housing market. The housing price index numbers inched up further during Q3FY22 which coincided with the festive season. Q4FY22 did witness a slowdown in growth at 1.8% but this was partly on account of a high base of the corresponding year-ago quarter.

Moreover, housing prices strengthened during Q1FY23 - Q4FY23 despite an increase in benchmark policy rates due to the continued momentum in demand. Similarly, the residential prices exhibited an upward trend in FY23, reflecting pent-up demand following the pandemic. In Q4FY23, the HPI reached its highest level in the past two years, standing at 304, a growth of 4.6% y-o-y. This upward trajectory in housing prices can be attributed to the increased costs of construction materials and labour and the robust demand in the market. Further, HPI has increased by 2.6% on a q-o-q in Q1FY24 and reached 312. During Q2FY24, the HPI is projected at 308 according to the RBI.

Notably, the overall momentum in housing prices has been consistently positive, even surpassing the levels observed before the onset of the pandemic. Accordingly, the rising HPI indicates resilience in demand in the housing market and its ability to absorb higher prices. The sustained growth in the HPI also suggests a favourable market environment and a positive response from buyers, supporting the overall stability and strength of the housing sector.

### 9.3 Demand Drivers

#### 1. Economic Growth and Increased Urbanization to boost Demands

- The Indian economy has experienced steady growth in the past decade and is expected to be one of the fastest-growing economies in the post-pandemic era
- Whereas India's urban population is expected to reach over 5,000 lakhs by 2025 from an estimated 4,610 lakh in 2018.
- The rising income and employment opportunities have led to migration to urban areas, thereby creating a greater need for real estate in major Indian cities.

#### 2. Government Policies enable Demand through Greater Transparency

- The real estate segment has received a massive boost from Government initiatives such as the Affordable Housing Scheme, Goods and Services Tax (GST) and the Real Estate Regulation and Development Act, 2016 (RERA).
- While the initial months following the implementation of these initiatives created some disruption, the policies increased transparency and competence of the sector. As a result, the confidence of domestic and foreign investors in the real estate industry witnessed a boost leading to higher FDI in the sector.

#### 3. Rising Number of Nuclear Families

- The nuclear family concept is very well linked with the rapid urbanization of the country.
- According to the 2001 census, out of 19 crore households, 10 crore or a little over 50% were nuclear households. In the 2011 census, the share grew to 52.1% - 13 crore nuclear out of 24.9 crore households.
- Further, people migrate from one place to another in search of jobs, which ultimately increases the nuclear family counts.
- Therefore, an increase in nuclear families will lead to an eventual increase in demand for residential units.

#### 4. Repatriation of NRIs and HNIs

- Since India is on the cusp of becoming one of the fastest-growing economies in the world, many NRIs are repatriating to their origin as they are witnessing new opportunities in their own country.
- The shift to the homeland is estimated to have increased during the Coronavirus pandemic when individuals preferred to stay close to their family members.
- These NRIs are generally high net-worth Individuals and are comfortable purchasing apartments for their comfortable residence.

We expect such individuals to contribute to superior housing units having better amenities and more open spaces.

#### 5. Low Interest Rates and Increased Savings

- Home loan rates offered by banks are currently at record lows and are unlikely to stage a rebound in the near term. This is due to the government and the RBI prioritizing the recovery of the economy. This, in conjunction with higher savings of better-off individuals during the pandemic, may lead to consumers preponing their plans of buying or investing in new property.
- Banks, too, are likely to focus on disbursing collateralized housing loans to push their lending business as loan demand from traditional routes is low.

## 6. Relocations

- The pandemic made consumers from the middle-income and above categories aware of the shortfalls of their present residences. As the pandemic forced individuals to spend all their time within the confines of their homes, most families became acutely aware of the lack of space or limitations with respect to the facilities offered in their complexes.
- We expect such families, mostly from metros and tier-1 cities, to be motivated to relocate and make new purchases due to the want of more open space, modern amenities, proximity to their workplace, and desire to relocate closer to extended families and friends.

## 7. Shift in Buying Behaviour

- The coronavirus pandemic has shifted the attitude that resulted in consumers buying new homes. One, the financial uncertainty brought on by the pandemic is estimated to have led to many consumers considering a home as an essential financial security.
- Consumers are also giving serious thought to how they live and may want to move to larger homes considering their family size and the need to accommodate work-from-home and study-from-home
- Accordingly, the demand for projects with good architecture, uncluttered space, and recreational activities for children and the elderly is projected to increase.

## 8. Holiday and Second Homes

- The need for social distancing and pandemic-led cabin fever opened up a new avenue for realtors – second homes and holiday homes.
- Consumers, mainly those from affluent classes feel the need to own a holiday home for quick, short breaks over the weekend, workcations, or the want for socially distancing in second homes.
- Thus, the demand for holiday homes close to metros and tier-1 cities is likely to be on an upswing due to higher demand from consumers residing in these cities.

### 9.4 Challenges in Residential Real Estate

#### • Land Availability

Litigated land is one of the challenges faced by the real estate sector and the developers. According to a survey conducted by the MahaRERA, around 16% of projects and 31% of built-up spaces are or have been in legal disputes. In Mumbai, these figures tally to about 30% of the real estate projects and 50% of the built-up space. For Thane, the corresponding figures are 26% and 36 % respectively.

The unavailability of affordable land is one of the biggest barriers to affordable housing in cities. The government has several urban land banks which are currently not utilized. Such land can be allocated for affordable housing projects and creating affordable housing can be driven via a PPP model.

#### • Outdated Building Bylaws

India has a population of about 1.4 billion. With the current rate of population explosion, the demand for space is vital. Over 50% of the world's population lives in cities and the number is expected to rise by 250 crores by 2050. However, the current Floor Space Index (FSI) norms in the cities are not on par with the growing demands of consumers. As a

result, while the demand for more housing units is likely to be on the upside, outdated bylaws remain a critical hurdle on the supply side.

**• Changes in Tax Regime**

In addition to the aforementioned financial challenges, the implementation of the GST is another factor that impacted the real estate industry. Before the implementation of GST, a service tax of 4.5% was applicable in the case of an under-construction property. However, post-GST, the rate has risen sharply to 12%, impairing the attractiveness for property investors.

As buyers were paying registration charges and stamp duty on properties, the inclusion of GST increased the statutory cost of the property of the investor by 20%.

**• Approvals and Procedural Difficulties**

The real estate sector in India is heavily regulated by the Central and State Governments and local bodies. Real estate developers are required to comply with a number of laws and regulations, including policies and procedures established and implemented by local authorities in relation to land acquisition, transfer of property, registration, and use of land. These laws often vary from state to state. If the project is in the preliminary stages of planning any delay in obtaining approvals could warrant revised scheduling of project timelines. It not only delays a project but also increases the cost of the property for both buyers and developers.

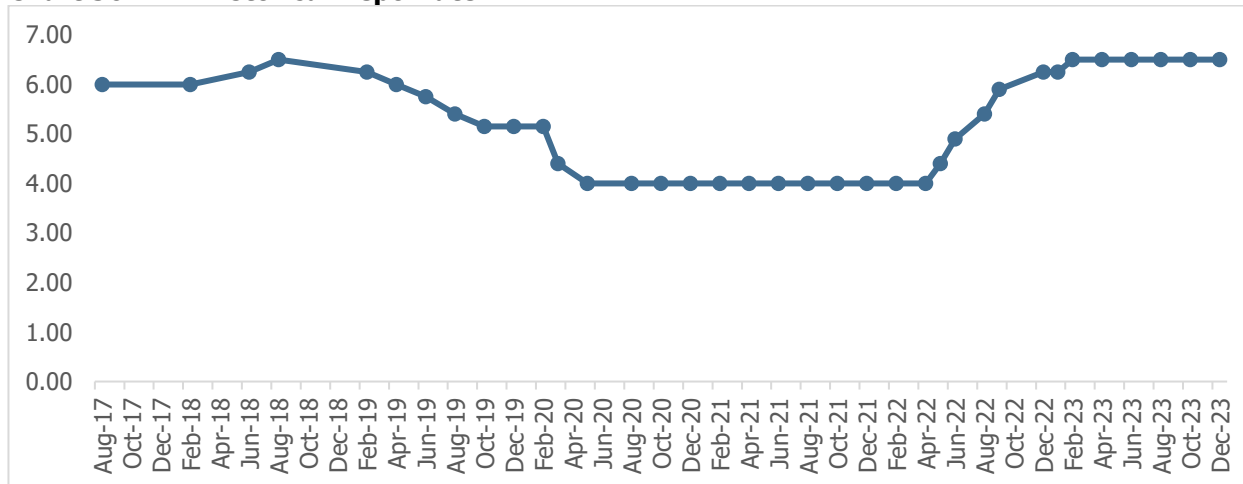
**• Speculation in Land and Property Prices**

The prices of land and real estate in India have increased exponentially in the last decade, leading to overpricing of commercial or residential property. On the other hand, real estate agents or brokers buy or sell property frequently with their own investments, surging the property prices.

**• Elevated Finance Costs**

The cost of funds is rising due to increasing policy rates. The RBI raised the repo rates from 4% in April 2022 to 6.25% in December 2022. This increase in the repo rate may result in a rise in house loan interest rates and affect the demand for affordable and lower middle-class housing sectors. The interest rate hike can even dampen the sentiments of homebuyers in the sector.

**Chart 56: RBI Historical Repo Rate**



Source: RBI

- **High Input Costs**

Real estate is a capital and labour-intensive industry. Therefore, a rise in the cost of labour and construction materials due to inflation impacts the margins of developers and also props up problems due to cash unavailability. The recent rally in steel and copper prices, along with increased cement prices, is likely to push up the cost of building new properties for real estate developers.

## **9.5 Regulatory Framework for the Residential Real Estate Sector**

### **1. Real Estate and Regulation Act (RERA)**

- The real estate sector has benefitted from RERA, which was implemented from May 01, 2017, despite it being subdued for a few months as developers put their operations on hold, to understand and comply with all the regulations.
- In the long run, RERA makes the real estate sector more transparent and process driven. RERA has a direct implication on the ceramic sector as well.
- In a medium time, frame, RERA is expected to bode well for the organized real estate sector as well as the ICTI.
- It was brought into force with effect from August 1971 with a view of regulating the import, manufacture, sale, transport, distribution and use of insecticides in order to prevent risk to human beings and animals.

### **2. Foreign Direct Investment (FDI)**

- In January 2018, the Government allowed 100% FDI in single-brand retail trading and construction development without Government approvals.
- The FDI caps were revisited for several industries and this promoted foreign agencies to bring in their technology, expertise and money into India.
- New companies setting shop in India meant more office spaces, larger built-to-suit technology centers and Special Economic Zones.
- Due to job creation, residential segments demand will increase.

### **3. Make in India**

- This initiative was boosted by Government of India in the year 2014.
- The main motive behind the campaign was to foster manufacturing within the country by focusing on bringing worldwide investment for this sector.
- The campaign has further heralded the development of townships, roads, bridges, hospitals and other infrastructure.
- It has boosted a lot of investment growth in India.
- The Ease of Doing Business (EoDB) Rank of India has improved from 184 in 2014 to 27 in 2019. This improvement has been mainly on the account of decrease in the number of procedures and time taken for obtaining construction permits in India.
- This will ultimately boost people to purchase residences near their office/business centers.

### **4. Smart Cities**

- The building and push towards SMART Cities also heralded the opportunity for infrastructure development which includes roads, railways, and commercial centers.
- And with Government easing the transaction and compensation process around land acquisition also helped developers overcome challenges and hurdles in development projects.
- Housing and inclusiveness - expand housing opportunities for all.



- Under the scheme, a total 1,722 projects costing Rs 56,298 crore are under construction and 6,237 projects costing Rs. 1,14,934 cr. have been completed as on November 2023, out of the total target of 8,019 projects in 100 cities.

#### **5. Land Acquisition Bill**

- In December 2014, the Government passed an ordinance amending the Land Acquisition Bill.
- This ordinance is intended to speed up the process for industrial corridors, social infra, rural infra, housing for the poor and defence capabilities.

#### **6. Benami Transactions Amendment Act, 2016**

- Before 1988, benami transactions were not illegal and there was no law for people who commit fraud by entering in such transactions. However, it was not allowed to recover the property by the real owner from the benamidar.
- The initial act was called the Benami Transaction (Prohibition) Act, 1988. It was amended in 2016 and was renamed as Benami Transaction (Prohibition) Amendment Act, 2016.
- Aimed towards regulating the unaccounted money into the economy, the said Act is expected to bring lucidity in the ownership of property and result into bolstering investor confidence.

#### **7. Real Estate Investment Trust (REIT)**

- Approved by the Securities and Exchange Board of India (SEBI), REIT is a platform to pool money from investors all across the country.
- The introduction of REITs is aimed towards allowing the investors to make safe investments into the real estate of India, and the amount so collected will subsequently be utilized towards the development of commercial properties in order to generate income.
- This is an initial step and may be in upcoming future, REITs may also come to fund residential segments
- Dividend payments to REITs and INVITs is proposed to be exempted from TDS
- Debt Financing of REITs by Foreign Portfolio Investors will be enabled by making suitable amendments in the relevant legislations.

#### **8. Change in Arbitration Norms for Construction Companies**

- A series of initiatives on arbitration norms were approved by the Cabinet Committee on Economic Affairs to provide a sigh of relief to the entities struggling with liquidation issues.
- The said initiative was meant to resolve the arbitration cases sooner keeping in mind the stalled construction of projects.

#### **9. Goods & Services Tax (GST)**

- A revolutionary tax reform rolled out in July 2017, GST has indeed helped to simplify the home buying process with its "One Nation, One Market, One Tax" principle.
- The introduction of GST has further helped to streamline the real estate sector by removing the possible ambiguities due to multiple taxation system, prevalent erstwhile.

#### **10. Insolvency & Bankruptcy Code (IBC), 2016**

- The fundamental features of the Code are that it allows creditors to assess the viability of a debtor as a business decision, and agree upon a plan for its revival or a speedy liquidation.
- The Code creates a new institutional framework, consisting of a regulator, insolvency professionals, information utilities and adjudicatory mechanisms, that will facilitate a formal and time bound insolvency resolution process and liquidation.

### 11. Pradhan Mantri Awas Yojana-Urban (PMAY-U)

- The Pradhan Mantri Awas Yojana – Urban was introduced as part of the 'Housing for All' initiative with the objective of facilitating the provision of affordable housing at a reduced cost by the deadline of December, 2024. In the Union Budget 2024-25, the government allocated Rs 26,170.61 crores towards this scheme, an increase of 18.4% y-o-y.
- Under the PMAY-Urban scheme, pucca houses are provided to individuals falling within the Economically Weaker Sections/Low Income Group (EWS/LIG) and Middle-Income Group (MIG) categories, including slum dwellers. As of 29th January, 2024, approximately 80.02 lakh houses have been completed, around 114.01 lakh houses have commenced construction, and approximately 118.63 lakh houses have received official sanction, while the total demand stands at approximately 112.24 lakh houses.

### 12. Affordable Rental Housing Complexes (ARHCs)

- Covid-19 pandemic has resulted in reverse migration of urban migrants/ poor in the country. Urban migrants stay in slums/ informal settlements/ unauthorized colonies/ peri-urban areas to save cost on housing. They need decent rental housing at affordable rate at their work sites.
- In order to address this need, Ministry of Housing & Urban Affairs has initiated Affordable Rental Housing Complexes (ARHCs), a sub-scheme under Pradhan Mantri AWAS Yojana- Urban (PMAY-U). This will provide ease of living to urban migrants/ poor in Industrial Sector as well as in non-formal urban economy to get access to dignified affordable rental housing close to their workplace.
- These complexes will ensure a dignified living environment for urban migrants/poor close to their workplaces at affordable rates.
- This will unlock existing vacant housing stock and make them available in urban space. It will propel new investment opportunities and promote entrepreneurship in rental housing sector by encouraging Private/Public Entities to efficiently utilize their vacant land available for developing ARHCs.

### 13. Pradhan Mantri Awas Yojana - Gramin (PMAY-G)

- Previously known as Indira Awas Yojna, this scheme focuses on providing pucca houses with basic amenities to homeless families.
- PMGAY aimed to aid in construction of 1 crore houses in rural areas over the period of 3 years from 2016-17 to 2018-19.
- The minimum unit (house) size is 25 sq.m including a dedicated area for hygienic cooking.
- Assistance of Rs. 1.2 lakh in plain areas and Rs. 1.3 lakh in hilly states, difficult areas and IAP districts is to be given as per the scheme.
- The PMAY-Gramin scheme aims to offer pucca houses to rural individuals lacking shelter or residing in kutchha (temporary) and dilapidated housing structures. As on 14<sup>th</sup> February 2024, a total of 256.13 lakh houses have been completed, indicating an 87% achievement rate in relation to the Ministry of Rural Development's (MoRD) target of 295 lakh houses.

### 14. State Government Housing Scheme

- Housing Schemes include those as Delhi Development Authority Housing Scheme, 2018; Tamil Nadu Housing Scheme Board (TNHB); Maharashtra Housing and Area Development Authority (MHADA), 2018; NTR Urban Housing Scheme.
- These State Government Schemes are generally divided into Lower Income Group (LIG), Middle-Income Group (MIG), High Income Group (HIG), and Economically Weaker Sections (EWS).
- These apartments are made and are given to the individuals based on their annual household income at a cost less than that quoted by private builders.

- These Schemes are linked to the Government's central linked schemes or specific states scheme.

## 15. Policies to boost Affordable Housing Segment

- Interest deduction benefit on affordable housing:

The Government in its attempt to boost affordable housing demand, proposed to extend additional tax benefit of Rs 1.5 lakh on interest paid on affordable housing loans by one year till March 2021. The additional deduction is over and above Rs 2 lakh which was introduced in the previous year's budget.

- Tax holiday for Affordable housing developers:

In order to encourage developers to focus on affordable housing projects, the Government extended the date of approval for these projects for availing tax holiday on profit earned by developers by one year till March 2021. The tax holiday which was being provided under section 80-IBA for approved projects during the period from June 1, 2016 to March 31, 2020 has been extended by a year.

- Rationalization of capital gains tax on difference between circle rate and transaction rate:

Earlier for real estate transactions, if the consideration value was less than circle rate by more than 5%, the difference was considered as income accruing to both the buyer and seller and hence taxable to both. In order to facilitate real estate transactions and provide relief to the sector, the government increased the limit from 5% to 10%.

- New income tax regime for taxpayers:

The Government introduced an alternative tax regime and in case an individual move to the new tax regime, the tax exemption including deduction repayment of principal (for Rs 1.50 lakh) and deduction on interest payable on housing loan has to be forgone, which is potentially negative for the sector.

### 9.6 Industry Outlook for Residential Real Estate

During FY23, the residential real estate market witnessed consistent growth, characterized by increased sales momentum and a healthy supply of properties, largely attributed to the absorption of past inventory levels. The overall housing market has been bolstered by the rise in commercial activities, the demand for upgraded infrastructure and living spaces, and an improved economic scenario. Additionally, the growing trend of urbanization and the subsequent rise in per capita income have contributed to increased demand for mid-segment housing projects.

Further, the government initiatives including the Pradhan Mantri Awas Yojna PMAY, the Urban Development Plan, and the digitization of land records, have played a pivotal role in stimulating growth within the sector. These measures have provided a conducive environment for the residential real estate market to thrive, catering to the evolving needs and aspirations of homebuyers across various segments.

Within the residential real estate segment, we expect the following trends to lead the growth in the sector:

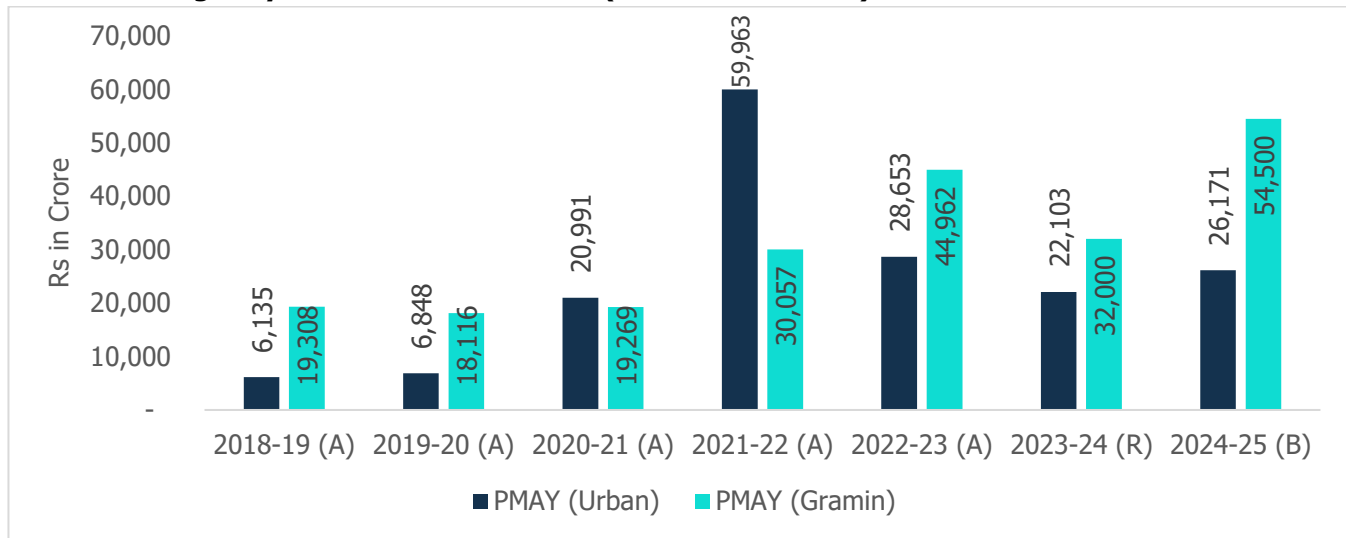
**Relocations and Shifting Buying Behaviour** – The pandemic-related restrictions led to individuals being confined to their living spaces. This spurred demand, as families wanted to relocate and make new purchases due to the want of more open space. Accordingly, the demand for projects with good architecture, uncluttered space, and recreational activities for children and the elderly is projected to increase.

**Growth in Technology** – The growth in digital transformation across the globe has helped companies grow at a faster pace. In India, IT is the major contributor to the job market, which has witnessed growth in the last few years. India, as a hub for IT talents, will facilitate an affordable corporate setup for MNCs. This will further complement residential

demand with the creation of jobs and higher income. Accordingly, there will be an increase in residential and commercial space demand across these areas.

**Government Policies** – There is a significant thrust on providing housing for all under the Pradhan Mantri Awas Yojna PMAY by the government and the scheme has been getting steady allocation under the union budget. Further, the sustained efforts in sanctioning and completing a substantial number of houses under both PMAY-Urban and PMAY-Gramin schemes demonstrate the government's commitment to promoting affordable housing and improving living conditions for individuals and families across the country.

**Chart 57: Budgetary Allocation Under PMAY (Urban and Gramin)**



Source: Budgetary Documents

Moreover, the increasing interest rates over the past year resulting from a series of hikes in the repo rate may potentially moderate the demand for housing in the near term. The cumulative increase of 250 basis points in the repo rate has led to a corresponding rise in home loan interest rates.

At the same time, the increase in interest rates could influence the affordability of housing loans and impact the purchasing power of prospective buyers, consequently dampening the demand for housing projects in the near term. However, given the persistent demand for housing and the upward trajectory of income levels, the long-term prospects for this segment remain promising.

## 10. Commercial Real Estate Industry in India

### 10.1 Overview

The Indian real estate industry witnessed a slowdown in the years prior to COVID-19 due to the general slowdown in the economy. However, this had little impact on the demand for office space. The demand for office space grew by leaps and bounds for the better part of the past decade with the unavailability of good quality supply being the only impediment to higher growth. We estimate the demand for office space, particularly in metros, to have outpaced supply prior to 2020.

The office segment growth was aided by investors with a keen interest in the commercial space. Alongside, NRIs also started investing in this segment, given the lucrative returns. A comparison of investments in commercial with residential sectors shows that returns from commercial are higher than those from residential. For instance, an increasing number of private equity funds showed interest in the commercial office space in 2018 which was followed by the same in 2019.

With residential real estate becoming end-user-driven, commercial real estate emerged as a more attractive investment proposition for individual investors and institutional funds. Due to the investment potential of commercial spaces, developers are also responding to the demand. A better performance of the office segment will eventually trickle to greater demand for the residential segment. As a result, the commercial space is crucial in terms of both, its impact and its linkages.

In India, commercial property gives the average rental yield of 8%-11%, while the rental yield from residential property is 1.5%-3%.

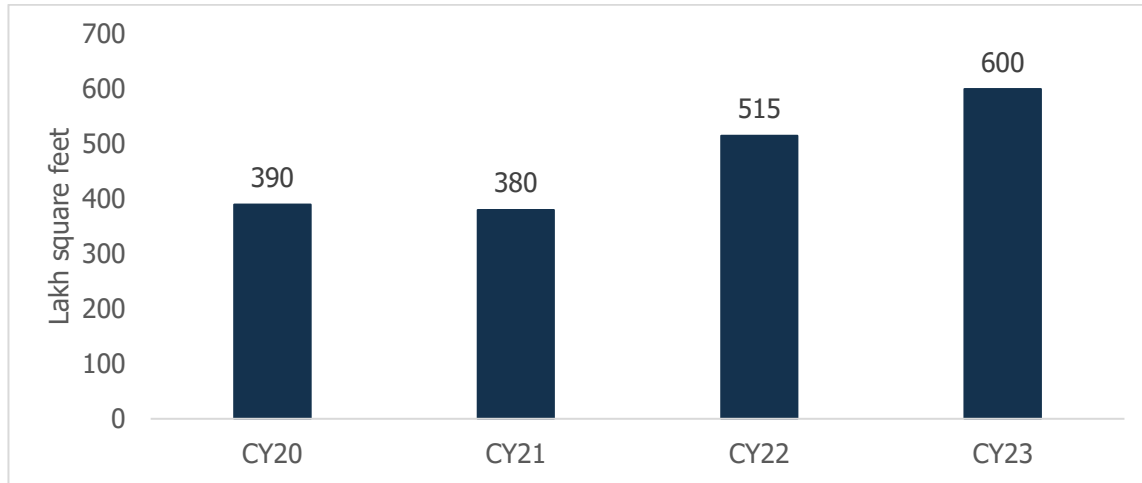
This segment, which includes industrial, retail, and warehousing, is thus projected to do well on account of a rapid growth of the warehousing segment and a gradual pick up in the office segment.

## 10.2 Key trends in Commercial Real Estate

### Current Demand in Commercial Real Estate

#### Transactions in commercial space

**Chart 58: Transactions in the commercial segment**



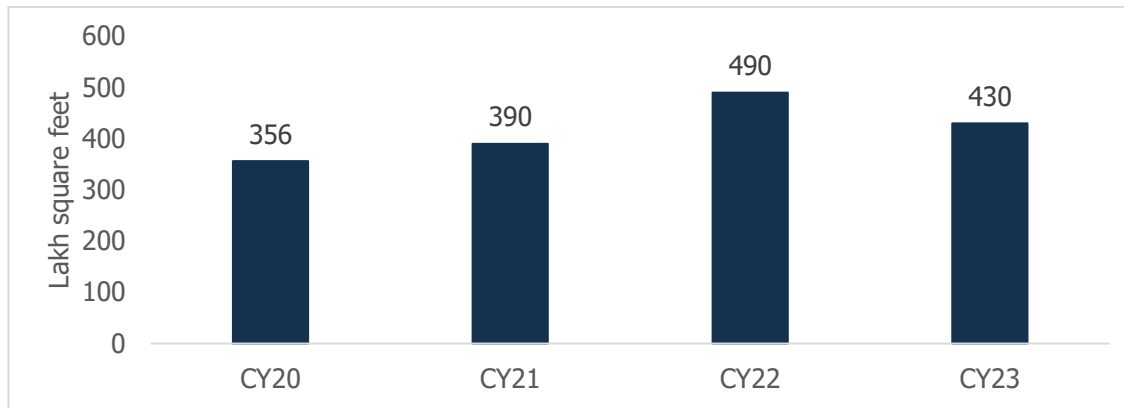
Source: Knight Frank & CareEdge Research

The 2019 calendar year was a year of record highs for the office space, according to estimates. Transactions in this space grew at a decadal high of 27% to an estimated 600 lakh square feet. Whereas the supply crunch witnessed at the start of the decade had normalised to an extent as the pace of growth in demand slowed down. As a result, new completions witnessed a spike and even exceeded annual transactions for the first time since 2013. While this satiated the demand for commercial real estate, it put pressure on rental growth.

Furthermore, the outbreak of the pandemic resulted in the near stoppage of business activities across all markets and the phased resumption amid economic slowdowns weighed heavily on occupiers' minds. This is evident in transaction volume data for the year.

Transactions stood at 390 lakh square feet during CY20. They inched up following the gradual resumption of economic activities in the second half. Whereas CY21 witnessed a fall of 2.6% in transactions on account of the lethal second wave. However, transactions picked up in CY22 to 515 lakh square feet, a growth of 35.5% y-o-y. During CY23, transactions have seen an increase and stood at 600 lakh square feet, registering a growth of 16.5% when compared to y-o-y.

**Chart 59: New completions in commercial real estate**



Source: Knight Frank & CareEdge Research

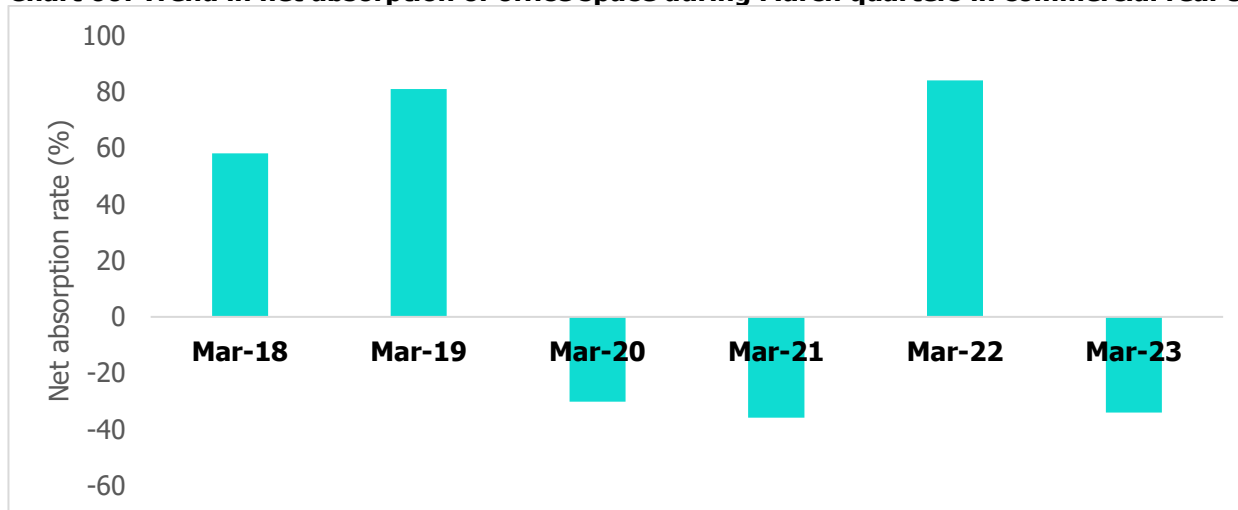
New completions witnessed a marginal drop during H2 CY20, possibly due to uncertainty surrounding the pandemic. These fell further during H1 CY21 before picking up in the second half. CY21 witnessed new completions to the tune of 390 lakh square feet.

CY22 registered an uptick when compared to CY20 and CY21 as developers stepped on the pedal with respect to the completion of projects amidst improved demand for office spaces as corporates began working from the office.

To an extent, the availability of labour, which had migrated to hometowns during the pandemic, also began returning to the construction sector in cities and this aided the pace of completions. For the CY22, new completions stood at 490 lakh square feet. There has been a decrease of around 12% y-o-y in new completions in CY23.

**Net absorption of office space in commercial real estate**

**Chart 60: Trend in net absorption of office space during March quarters in commercial real estate**



Source: JLL & CareEdge Research

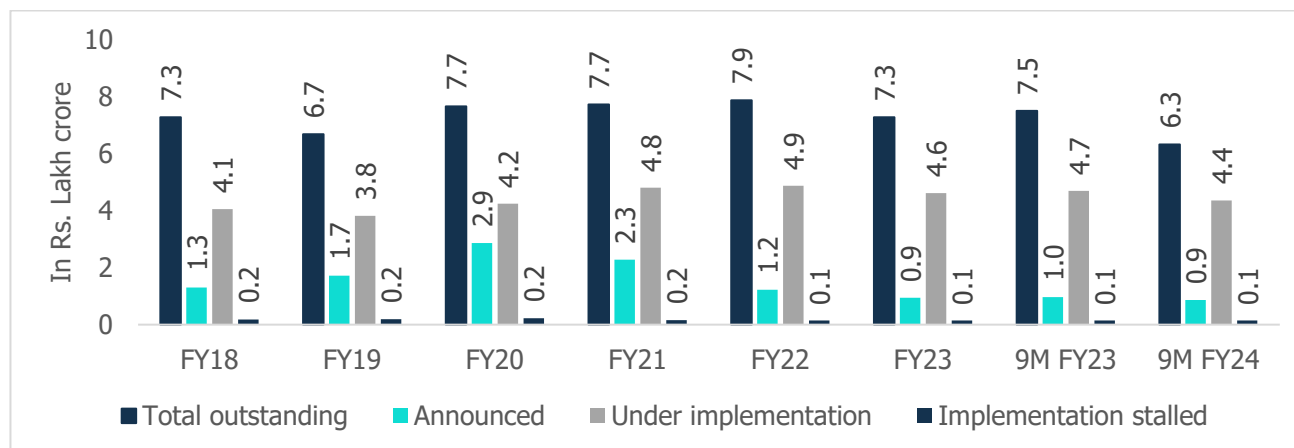
After dropping in Q1 CY17 mainly due to demonetization in November 2016, the net absorption witnessed a five-year high in Q1 CY19. While the net absorption continued witnessing strong growth until February 2020 (before the COVID-19 outbreak), post the outbreak many new leasing deals have been pushed back by a couple of months and are being renegotiated for the removal of lock-in periods and downward revision of rentals. Bengaluru, Mumbai, and Delhi NCR

accounted for nearly 75% of the net absorption in Q1 CY20, which was led by the IT/ITeS sector. Pre-commitments for Q1 CY20 accounted for 50% of the net absorption for the same period.

Further, the net absorption grew by about 84% in Q1 CY22 due to the reassuming of offices after the pandemic but declined by 34% in Q1 CY23 as the companies are hesitant about expansion among global uncertainties. Besides, hybrid workplace trends and reduced pre-commitments in new completions have also caused the slump.

### Investments in commercial Real Estate

**Chart 61: Trend in Investments in Commercial real estate**



Source: CMIE & CareEdge Research

The chart above shows that total outstanding investments across India dipped in FY19 after growing for three consecutive years. The value of announced projects increased for three straight years from FY18 to FY20. The value of new announcements peaked in FY20 following which it fell in FY21 due to COVID-19-related disruptions and uncertainty.

During FY22, the value of projects under implementation rose to a three-year high, while the value of stalled projects remained low. Whereas during FY23 and 9M FY24, the value of announced projects dipped, but the ticket size of projects under implementation was marginally lower than FY22 as demand stabilized.

### 10.3 Demand Drivers in Commercial Real Estate

#### 1. Increasing Population to result in Increased Workforce

India is the second-largest populated country in the world and its rising population will result in more individuals joining the workforce. For instance, China’s (most populated country in the world) population grew at a rate of 12% from 125 crores in 1999 to 140 crores in 2019 whereas India’s population increased by 32% from 104 crores to 137 crores during the same period. A higher number of employees will create more demand for office space, and will therefore, be a key demand driver in the future.

#### 2. Thriving E-Commerce: Key Driver for Warehousing

The e-commerce industry is likely to be the demand driver for the warehousing industry. Unlike most sectors, the e-commerce industry benefited from COVID-19. While the nationwide lockdown during the June 2020 quarter halted operations of online marketplaces selling non-essential products, the pandemic accelerated the shift to the online medium for shopping. Even consumers averse to using e-commerce websites to shop were forced to do so as retail stores remained shut and malls were not allowed to operate.



The reliance on online marketplaces selling groceries and medicines also increased. In times of distress, discounts and offers offered by these companies made them more attractive to consumers. The shifting buying habits of consumers are unlikely to change after the pandemic, which will create the demand for more storage facilities for online marketplaces.

### **3. Demand from Tier-2 and Tier-3 Cities is Surging**

E-commerce companies were already growing by leaps and bounds prior to the pandemic mainly due to increased penetration and demand from metros. As a result, most warehousing space occupied by these companies was near or in metros and tier 2 cities such as Mumbai, Delhi NCR, Bengaluru, Chennai, Ahmedabad, Kolkata, Hyderabad, and Pune.

However, with the growing absorption of online retail in India, the demand from smaller towns and cities will be on an upswing. E-commerce companies will consider investing in warehousing space in these cities to ensure seamless last-mile deliveries.

### **4. Government Initiatives and a Manufacturing Shift from China to aid growth**

In the industrial space, warehousing is expected to grow following the government's focus on the manufacturing sectors being self-reliant. The introduction of schemes such as the PLI will support the growth of the domestic manufacturing sector, which will consequently translate into higher storage space. Whereas demand for cold storage will also come in from the pharmaceutical industry, which will need warehousing space to store coronavirus vaccines.

In the coming years, demand will also come with the manufacturing shifting out of China. With many countries contemplating moving their manufacturing facilities from China to other countries, India could make an attractive destination due to the availability of labour and lower pricing. While advancement in warehousing will have to be developed, the shift of global giants out of China could work in the favour of the Indian warehousing industry.

### **5. Congestion at Ports and Food Grain Storage Capacities to support Demand**

Besides food grains, warehousing plays an important role in the EXIM trade of any country. Container Freight Stations (CFS), where cargo belonging to exporters and importers are stored before being exported or imported, and Internal Container Depots (ICDs) have assumed greater relevance in the pandemic times. CFS and ICDs essentially help in de-congestion at ports. This is relevant because, with different countries re-opening at different times, the problem with container shortage and delayed turnaround at ports is getting accentuated. Additional warehousing facilities close to ports will ease constraints and help streamline transportation. CareEdge Research expects this segment to see an improved demand in the post-pandemic era.

### **6. Favourable Demographics - An Important Avenue for the Hospitality Sector**

The estimated median age in India is 28.7 years in 2020. This is the lowest compared to the estimated median age in other leading economies in the world. For instance, it is 38.5 and 38.4 years in the USA and China respectively. The increasing size of the young population in the country has led to a fall in the dependency ratio (ratio of dependent people to working-age people, 15 to 64 years of age) and the ratio came down from 64% in FY2000 to 50% in FY19. This could lead to higher allocation for discretionary expenditure and promote growth in expenses on leisure and entertainment.

Further, the share of people in the age group of 15-64 years, which is the high-consuming class, is estimated to be nearly 50%. These factors are expected to enable the growth in hospitality and food services, which will support the

growth of warehousing. Moreover, the age group below 25 years is one of the highest spending age groups. So the current age dynamics are expected to boost the sales of the hospitality industry.

### **7. Demand for Cold Chain Logistics to increase due to pharma, packaged foods industries**

Cold chain logistics is another key demand driver for the supply chain industry. The cold chain logistics system allows for the safe transport of temperature-sensitive goods and products along the supply chain. This branch of logistics depends on science and technology to maintain the balance between temperature and perishability.

In the post-pandemic world where the safe transportation of vaccines and booster doses will remain crucial, cold chain logistics will propel the demand for efficient integrated supply chain management. Along with the pharma industry, another user of cold chain logistics is the grocery and meat products industries. With the advent of e-commerce and speciality companies offering varieties of meat and meat products in a time-sensitive manner, the reliance on cold chains, and consequently, on integrated supply chains will increase.

## **10.4 Challenges in Commercial Real Estate**

### **1. COVID-19 Pandemic**

The outbreak of COVID-19 and the resultant lockdowns during the June 2020 and June 2021 quarters have dealt a blow to the commercial real estate sector. While certain segments such as warehousing survived the trend and performed exceptionally well, major segments such as office space, retail, and hospitality have suffered hugely. All India office market completion dropped by 31% in H1FY21 mainly due to the lockdowns beginning March 2020.

Moreover, due to the uncertainties prevailing in the market and the emergence of newer virus variants, the office space occupied currently is low with some occupiers even surrendering their office space across cities. The COVID-19 crisis is similar to the financial crisis of 2008 in its severity and impact. However, given that the infection rate has plateaued and individuals are accustomed to the new normal with progress on the vaccination front, recovery, albeit slow, is expected in the office space in the medium term.

### **2. Cost of Transportation**

The logistics costs in India are considerably higher compared to the logistics costs in developed countries, which reduces the efficiency gains brought about by additional warehousing facilities. Higher logistics costs lead to higher export costs, which directly impact the competitiveness of Indian goods in international markets. Higher costs also result in increased time to deliver goods which can be an impediment for e-commerce companies.

### **3. Regulatory Obstacles**

The creation and operation of sound logistics infrastructure can be slowed down if multiple regulatory agencies are not brought under a single umbrella. Currently, hindrances with land acquisition and consolidation and changes in land use are major impediments. An absence or lack of transparency in compliance has added to the woes.

### **4. Unavailability of Skilled Staff in Warehousing**

While India's demography is an advantage, the lack of appropriately skilled labour is a cause for concern. The supply chain industry has experienced this crunch more sharply than other industries as it is primarily a support industry. The industry needs to build a group of skilled personnel comprising truck drivers, warehousing managers, quality inspection supervisors, and seafarers. This is because the unavailability of skilled workers is a consequence of inadequate training and the absence of proper leadership.

Besides, given the unorganized nature of the industry, it is characterized by poor working conditions and a low pay scale due to which it does not necessarily attract skilled personnel. There are also limited institutes aimed at operational and technical training, which further accentuates the problem.

Moreover, with new innovations and developments cropping up in the cold supply chain segment, specialized warehousing, it is imperative to develop a workforce that is well-equipped and efficient to avoid hiccups.

### 10.5 Regulatory Framework in Commercial Real Estate

- The Government announced that Covid-19 related disruption was to be treated as force majeure under Real Estate (Regulation and Development) Act provision and registration and project completion timelines would be extended by 6 months /9 months, depending on which part of the country the project is being constructed and if these were falling after 25 March 2020.
- The RBI had also announced certain relaxations towards the Real Estate sector where - NBFCs can extend commercial real estate loans by 1 year if projects delayed are due to reasons beyond the control of promoters without treating it as restructuring. This measure aimed to maintain adequate liquidity in the system to promote the credit flow through financial institutions as well as ease financial stress.
- Extension in the deadline for the Emergency Credit Line Guarantee Scheme - ECLGS 2.0 until March 31, 2021. Under ECLGS 1.0, collateral-free government-guaranteed additional credit was initially given to MSMEs units but it was extended towards the 26 stressed sectors (including real estate) identified by the Kamath Committee plus health care sector (with credit outstanding of above Rs.5,000 lakhs and up to Rs.50,000 lakhs). Under the scheme, the mid-sized real estate companies with loan outstanding of Rs 5,000-50,000 lakhs were to get a 100% collateral-free additional loan up to 20% of the loan outstanding as of 29 February 2020. There was no upper limit on annual turnover of these companies. The scheme intended to provide a much-needed relief by helping entities sustain employment, meet liabilities and offer liquidity support.
- FDI in Real Estate - The Government's move of liberalizing FDI norms in the construction industry provided a leg-up to the investments in the real estate industry. According to industry sources, real estate investment reached USD 1.35 billion during the September 2021 quarter, which indicated a nine-fold increase. FY23 saw investments worth USD 170.3 billion in overall infrastructure construction activities and USD 14.6 billion in the construction development sector including townships, housing, built-up infrastructure and construction development project.
- National Logistics Portal - The Government is launching a National Logistics Portal, an integrated IT Platform that will act as a logistics marketplace to help exporters, importers and service providers exchange documents seamlessly and transact business. The portal will be a single-window platform having linkages with the IT systems of railways, road transport & highways, aviation, CBEC and state transport departments.
- A new logistics division has been set up in the Department of Commerce to coordinate integrated development of the sector by way of policy changes. This is with an of improving existing procedures identification of bottlenecks and gaps and introducing technology-based interventions.
- Expenditure on investment in logistics including infrastructure is aimed at USD 500 billion a year by 2025.

- Multi Modal Logistics Parks Policy (MMPLs) are a key policy initiative of government of India to improve the country's logistics sector. This initiative will lower freight costs, reduce vehicular pollution and congestion and cut warehouse costs to promote domestic and global trade.
- Change in Arbitration Norms for Construction Companies. A series of initiatives on arbitration norms was approved by the Cabinet Committee on Economic Affairs to provide a sigh of relief to the entities struggling with liquidation issues. The said initiative was meant to resolve the arbitration cases sooner keeping in mind the stalled construction of projects.
- Real Estate Investment Trust (REIT) - Approved by the Securities and Exchange Board of India (SEBI), REIT is a platform to pool money from investors all across the country. The introduction of REITs is aimed towards allowing the investors to make safe investments into the real estate of India, and the amount so collected will subsequently be utilised towards the development of commercial properties in order to generate income.

### 10.6 Industry Outlook for Commercial Real Estate

The real estate industry is expected to progress during 2023-24. Diversified buyer pools and increasing FDI investors are revamping the real estate sector back to pre-COVID levels. The vaccination drives, removal of restrictions, office resumptions, and increase in footfalls in retail spaces have led to the recovery of the commercial real estate sector.

#### Office Spaces -

Co-working spaces are where people from different unrelated backgrounds assemble in a space to work independently on different projects, or even in a group to work on the same project. It is the better option because the scalability options are easily accessible, which allows the expansion of the workspace without any significant effort. In addition, by renting these office spaces, businesses can access the shared space's basic utilities and other services for a monthly fee. These factors are leading to rising demand for co-working space.

Further, the demand for office spaces will also be driven by the increase in hiring across various sectors like IT, E-commerce, etc., increased connectivity due to the augmentation of infrastructure, and overall economic growth in India. The government of India has taken multiple steps to improve the infrastructure and amenities in India like the National Industrial Corridor Development Programme. Moreover, initiatives like the establishment of the Real Estate Regulation Authority, clarification that FDI can be invested in under-construction projects, etc., are aimed at increasing transparency and domestic/foreign investments in the sector going forward.

Generally, leasing office space is a long-term contract and with major IT companies switching back to office mode, the demand for office spaces is expected to rise. Also, the hybrid mode has been adopted by many offices which require staff to attend the office a few days in month. This new mode has also created a separate demand for office spaces.

Real estate companies are also focusing on tier-II and tier-III cities since they are quickly urbanizing due to lower rental costs. The sophistication of commercial real estate is also rising as a result of the incorporation of new-age technologies including sensor-activated disinfectants, retina scanners for admission, digitized ventilation systems, and more.

#### Retail -

As the pandemic has subsided, people have gone back to daily routines which means a resumption of retail activities including mall and theatre visits, shopping, dining out, travelling, and outdoor activities. Many malls are coming up in tier-II and tier-III cities. Further, there has been an increase in discretionary spending which has led to retail sales growth beyond the pre-pandemic levels. Major spending is seen across supermarkets, hypermarkets, footwear, and

departmental stores. Higher youth population and increased disposable income especially in urban cities have also led to an increase the footfall in malls.

The entertainment category, which includes theatres and experience centres, is also one of the key reasons for the increase in footfalls in malls. Factors like increasing disposable income, availability of a wide range of brands and food options, multiple entertainment avenues, high brand consciousness, convenience, social media marketing, availability of international brands, etc., are expected to drive the retail sector growth in future, which, in turn, will lead to increased absorption of retail space in India.

### Warehousing -

The growth in the warehousing industry is expected to be healthy, driven by the thriving key end-user sectors such as e-commerce, manufacturing, FMCG, and pharmaceuticals. The increasing penetration of online retail across product categories and their expansion to tier-II and tier-II cities will also provide a fillip to warehousing demand in India. Furthermore, the government has been supporting the warehouse and logistics industry development in a bid to bring down the logistics cost to the global average. For faster and more efficient movement of goods, the government has identified 35 locations for the development of Multi Modal Logistics Parks (MMLPs) on Public Private Partnership (PPP) model at an estimated investment of Rs 50,000 Crore.

Following MMLPs have been awarded to date:

**Table 28: Awarded MMLPs**

Sr. No	Location	Awarded to	Area (acre)	Investment (Rs Crore)
1	Chennai	Reliance Industries Limited	184.27	1,424
2	Indore	G R Infraprojects Limited	255.17	1,111

The Indian warehousing and logistics industry is a dynamic and fast-growing sector and is expected to play an increasingly important role in the Indian economy. The sector faces certain challenges like the cost and time taken for land acquisition and significant escalation in construction material cost in the past two years. However, despite the challenges, the sector is well-positioned for long-term growth. With the increasing adoption of technology and the push of governments toward the digital economy, there is a great potential for logistics companies to leverage data analytics, artificial intelligence, and machine learning to improve operational efficiency and customer experience.

## 11. Smart Cities Mission

### 11.1 Overview

Smart Cities Mission (SCM) is an initiative launched by the government on 25 June 2015 to develop cities that provide core infrastructure across all the states in India in a sustainable way and improve the quality of life of the citizens through the application of smart solutions.

The mission aims to drive economic growth and improve the quality of life of people by enabling local development and harnessing technology as a means to create smart outcomes for citizens. 100 cities have been selected under this mission and mainly work on four pillars - social, economic, physical, and institutional pillars of the city.

The focus is on sustainable and inclusive development through the creation of replicable models that act as lighthouses to other aspiring cities.

The core infrastructure elements:

- Adequate water supply
- Assured electricity supply
- Sanitation, including solid waste management
- Efficient urban mobility and public transport
- Affordable housing, especially for the poor
- Robust IT connectivity and digitalization
- Good governance, especially e-governance and citizen participation
- Sustainable environment
- Safety and security of citizens, particularly women, children and the elderly, and
- Health and Education

Under this mission, 6,237 projects of value Rs 1,14,934 crore have been completed and 1,722 projects are under progress. The Urban Learning Internship Program (TULIP), one of the initiatives taken under this mission to cater to the learning needs of graduates to help them secure an internship has completed 6,713 and 40,085 students got posted.

**Table 29: Projects across Various Sectors of the Mission as on 17<sup>th</sup> November 2023**

Sector	Completed		Work in progress	
	Projects	Cost (Rs. Crore)	Projects	Cost (Rs. Crore)
Integrated Command and Control Centres (ICCC)	100	11,775	-	-
Smart Mobility	1,231	25,613	450	15,518
Smart Energy	603	12,840	84	1,778
Water, Sanitation and Hygiene (WASH)	1,217	36,335	308	18,183
Public Private Partnerships (PPP)	181	8,232	26	2,601
Vibrant Public Spaces	1,112	7,001	265	5,828
Economic Infrastructure	669	7,729	268	6,074
Social Infrastructure	704	8,338	169	4,348
Smart Governance	546	14,191	138	3,377

Source: Ministry of housing and urban affairs

## 11.2 Industry Trends

### Growing Usage of AI Tools

Large volumes of data are generated by smart cities from many sources. The authorities can simplify the data with the use of AI algorithms and data analytics tools. This helps them in the quick decision process, optimal allocation of resources, and enhancement of other services, such as traffic control and emergency response systems, by utilizing AI algorithms and advanced analytics.

### Development of Digital Infrastructure

There is increasing demand for robust digital infrastructure such as power efficiency systems and faster internet networks to support various technologies for the establishment of smart cities, given their general requirements. To promote this, GoI launched an initiative 'Digital India', which aims at providing services available digitally to citizens through improved digital infrastructure and internet connectivity in India. In addition, the Internet of Things Center of Excellence (IoT) was established to offer intelligent solutions for transport mechanisms, parking and waste management, among other things.

### Providing Mobility Solutions

One of the main aims of smart cities is to create efficient urban mobility across the country. This involves promoting electric and shared mobility options, integrating intelligent transportation management systems, monitoring traffic on a real-time basis, and implementing smart parking solutions. All these operations use technology for the analysis of data and provide mobility solutions.

### Skill Development and Capacity Building

The smart cities mission requires skilled labour to design, implement, and oversee various technologies. Skill development programs in areas such as data analytics, urban planning, IT, and sustainability are essential to support the growth of smart cities in India. Various initiatives are also undertaken under this mission to promote skill development and capacity building within the sector.

### Collaborative Approach

The 'smart cities' mission demands cooperation from a range of stakeholders, including the public sector, private companies, startups, academic institutions, and individuals. Moreover, the partnerships between public and private contribute to the successful execution of smart city projects increasingly depend on public-private collaborations and open innovation methods.

### Sustainability

One of the emerging industry trends in smart cities is the rise in the use of renewable sources. The increasing demand for sustainable energy has become important in recent times. The usage of solar panels, wind turbines, and electrical grids (smart grids) helps in minimizing carbon emissions and increasing energy efficiency.

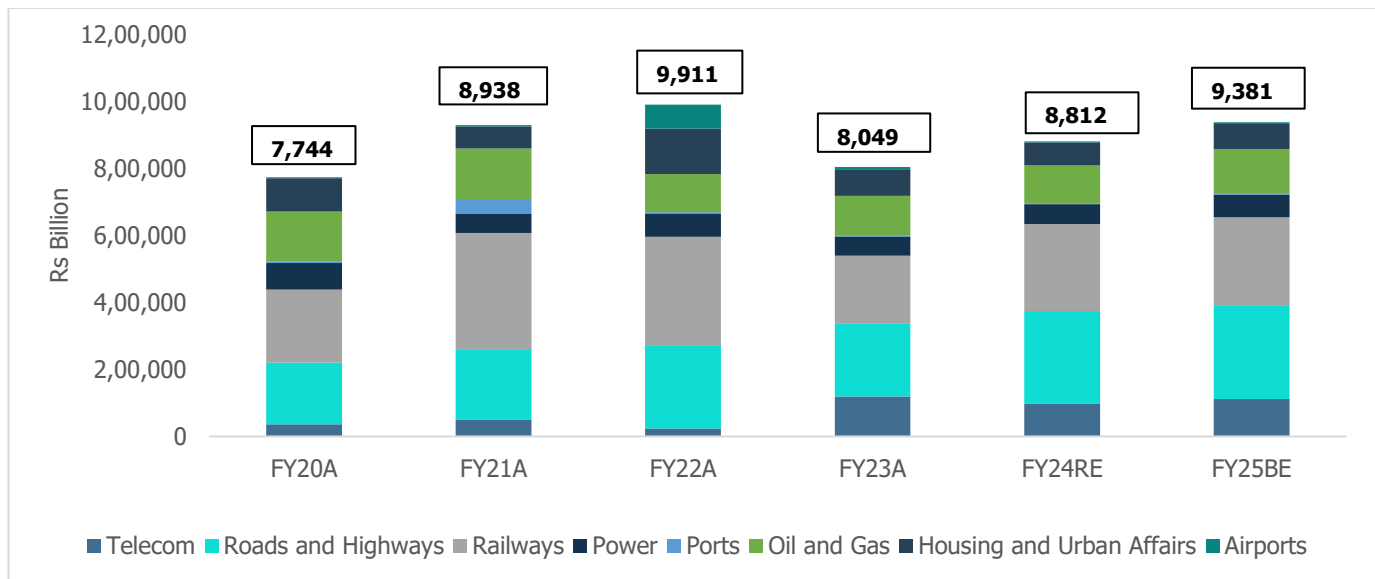
Further, this trend is also observed in the promotion of electric vehicles and the implementation of energy management systems.

### 11.3 Demand Drivers for Smart Cities

#### Continued Thrust on Construction and Infrastructure

One of the major drivers is the infrastructure investment thrust by the Government of India. In the Union Budget 2024-25, the government continued its focus on infrastructure development with budget estimates of capital expenditure toward the infrastructure sector of Rs. 9,381 Billion. Furthermore, continuous efforts by the Government of India to make the business environment convenient to operate and streamline the regulatory process will support the growth of investments in the infrastructure segment.

**Chart 62: Key Infrastructure Sectors for Capital Expenditure in Budget 2024-25**



Note: R - Revised, B – Budget; Source: Union Budget 2024-25 Analysis (includes Investment in PSU’s)

#### Growing Infrastructure due to Rising Population

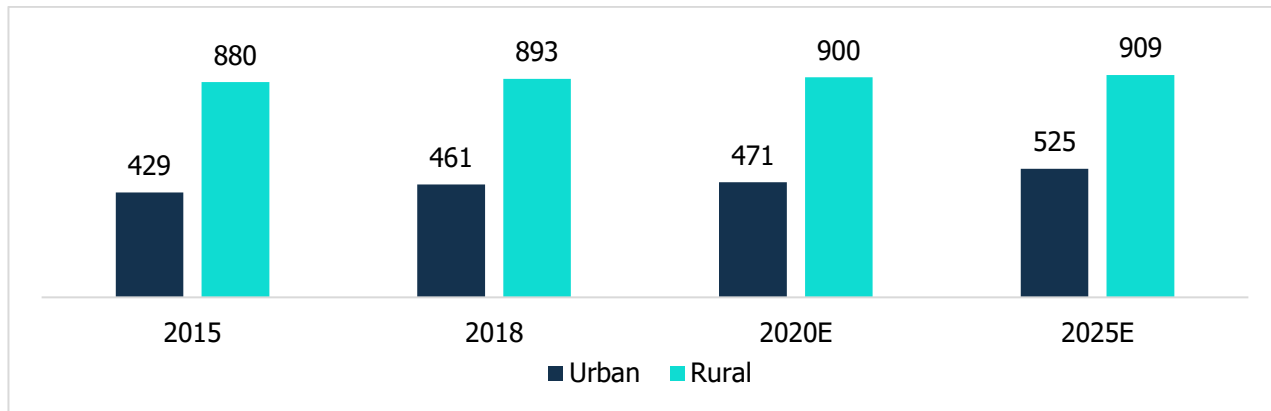
As per the United Nations – Population Division - Department of Economic and Social Affairs, the Indian age demographic has two-thirds of our population aged below 35. The share of people in the age group of 0-14 is 26.16% while the share of the working-age population (15-65 years) is 67.27%.

The demand for new infrastructure is steadily increasing as the pace of urbanization is expected to increase with the government’s focus on building new smart cities and a focus on Tier 2 cities, which have a population of around one million, and Tier 3 cities, which have a population of less than one million. Thus, CareEdge Research expects that surging growth and employment in these cities will prove to be a significant driver for people in the rural and semi-urban areas to shift to Tier 2 and Tier 3 cities.

Moreover, the Indian economy has experienced steady growth in the past decade and is expected to be one of the fastest-growing economies in the post-pandemic era. India's urban population is expected to reach over half a billion by 2025 from an estimated 461 million in 2018. Rising income and employment opportunities have led to migration to urban areas thereby creating a greater need for real estate in major Indian cities. The growth in the economy coupled with increased urbanization to expected to boost the demand for the housing industry.



**Chart 63: Population Breakdown of India (in millions)**



Source: Ministry of Home Affairs, CareEdge Research  
Note: E means estimate

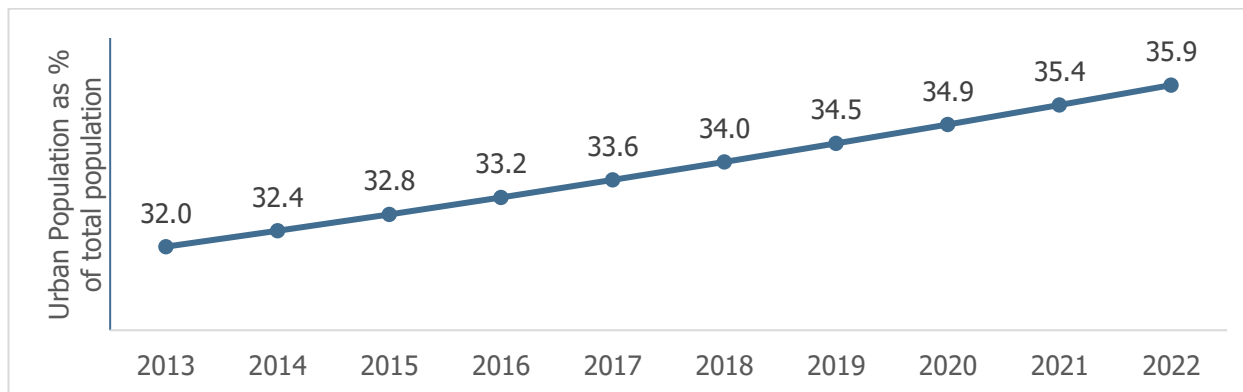
**Increase in Urbanization**

Rapid urbanization bodes well for the sector. India is the second-largest urban system in the world. Indian cities are home to about 11% of the total global urban population. Urban growth is expected to contribute to around 73% of the total population increase by 2036 according to the Ministry of Health and Family Welfare (MoHFW), 2019.

According to the Census of India 2011, India has an urbanization level of 31.1% which has only increased over the years. Earlier estimations indicate that about 416 million people will be added as urban dwellers in India between 2018 and 2050 according to a United Nations study dated 2018 and that India will be 50% urban by 2050 according to UN-Habitat, 2017.

Further, the growth in urbanisation will lead to increased demand for better urban infrastructure and resources. As a result, smart city solutions with respect to housing, water infrastructure, power, and transportation systems will cater to the needs of the rising population efficiently.

**Chart 64: Urbanization Trend in India**



Source: World Bank Database

**Technological Advancements:** Latest developments in technologies such as the Internet of Things (IoT) and artificial intelligence (AI) significantly contributed toward the growth of smart cities. These technologies help in the automation of various city functions, such as transportation, energy, waste management, etc., and bring efficiency to management.

**Growing Awareness of Environment Sustainability:** The growing need for sustainable development is increasing daily. One of the main objectives of the smart cities mission is to promote sustainable development by reducing the impact on the environment. Smart buildings, infrastructure, energy, and waste management systems can help in decreasing GHS (greenhouse gas) emissions and minimize power consumption. This will result in encouraging renewable energy sources.

**Improvement in Quality of Life:** The main aim of smart cities is to improve the quality of life of individuals by providing better services and infrastructure. Smart mobility, proper sanitization, water supply systems, advanced IT solutions, better healthcare facilities, and digitalization will give rise to comfortable living, convenience, safety, and well-being of citizens.

**Opportunities for Employment:** The building of smart cities will lead to more employment. This mission will help in creating employment opportunities for individuals across the country. As a result, the growth rate of unemployment will eventually decline.

**Support from Government:** The Government of India understands the importance of smart cities in the country. Various initiatives are taken under this mission to support development. Some of the initiatives include Smart Cities Open Data Initiative, Smartnet, The Urban Learning Internship Program (Tulip), National Urban Innovation Stack (NUIS), National Urban Digital Mission, ICT standards for smart cities, Data smart cities, capacity-building frameworks on the National Urban Learning Platform (NULP), etc.

#### 11.4 Key Challenges

**Rising Cybersecurity Concerns:** Smart cities involves the collection and analysis of large data, which is prone to security and privacy concern. The usage of the technologies is associated with risks such as data breaches and cyber-attacks. Hence, it gets difficult to keep a constant check on such threats and ensure there is transparency. There are many techniques that prevent these attacks, such as biometrics and encryption. However, the systems are still not secure. Furthermore, hackers are now able to outsmart the security algorithms that are currently in place with the latest technologies like artificial intelligence and machine learning.

**Huge Financing Costs:** Generally, large funds are required in developing a smart infrastructure as it involves huge costs. The government's focus on enhancing the country's digital supremacy to support optic fibre networks, sensor systems, urban planning, and advancements in modern technology requires large financial resources. Also, it can be challenging to ensure the scalability of used technologies and integrate them with the current infrastructure.

#### 11.5 Government Initiatives

On 25<sup>th</sup> June 2015, the Government of India launched the smart cities mission (SCM) to develop 100 cities as Smart Cities. 100 Smart Cities have been completed through 4 rounds of selection from January 2016 to June 2018.

This mission was developed under Union Ministry of Urban Development- the Minister of State for Housing & Urban Affairs (MoHUA) and is responsible for implementing the mission in collaboration with the state governments of the respective cities.

Further, under this mission, the government has developed 22 initiatives for the welfare and success of the programme. They are as follows:

- Indian Urban Pandemic Preparedness and Response (COVID-19)
- Capacity building frameworks on the National Urban Learning Platform (NULP)
- Cities Investments to Innovate Integrate and Sustain (CITIIS)

- City Innovation and exchange (City INX)
- ClimateSMART Cities Assessment Framework
- Consultation Paper on City GDP Measurement Framework
- Data Smart Cities
- Data Maturity Assessment Framework (DMAF)
- Ease of Living Index (EoI) and Municipal Performance Index (MPI)
- ICT Standards for Smart Cities
- India Cycles for Change (IC4C) Challenge
- India Smart Cities Awards Contest (ISAC)
- India Smart Cities Fellowship (ISCF)
- India Urban Data Exchange (IUDX)
- India Urban Observatory (IUO)
- National Urban Digital Mission
- National Urban Innovation Stack (NUIS)
- Nurturing Neighbourhoods Challenge
- Smart Cities Open Data initiative
- Smartnet
- Streets for People Challenge
- The Urban Learning Internship Program (Tulip)

**Latest updates on the mission:**

- The smart cities mission under Urban Rejuvenation Mission has been allocated Rs. 8,000 crores in the union budget 2023-24 and Rs. 2,400 crores in budget 2024-25.
- The Union Ministry of Urban Development has been initially given the timeline to complete the projects in between 2019 and 2023. However, the MoHUA extended the period upto June 2024 and all Smart Cities are expected to complete their projects within the stipulated time.
- As of 17th November 2023, 78% of the total projects have been completed which involved investments upto Rs. 1,14,934 crores while the remaining 22% are under progress.

## 12. Manufacturing Plants

### 12.1 Overview

India is one of the world's fastest-growing economies in the world. As of the quarter ended June 2023, the manufacturing sector in India accounts for nearly 18% of the total GVA of the industry. The manufacturing sector plays an important role in the economic growth and development of the country. Some of the key industries with significant manufacturing plants in India include pharmaceuticals, automobiles, textiles, chemicals & petrochemicals, electronics, consumer goods, and capital goods.

**Table 30: Yearly Estimates of GVA at Basic Prices (2011- 12) (Rs. Crore)**

Particulars	FY21	FY22	FY23	FY22 vs FY21 Y-o-Y (%)	FY23 vs FY22 Y-o-Y (%)
Manufacturing	23,25,438	25,82,473	26,17,059	11.1%	1.3%

Source: MoSPI

The manufacturing sector increased by 1.3% in FY23 as compared to its previous year FY22.

**Table 31: Half Yearly Estimates of GVA at Basic Prices (2011- 12) (Rs. Crore)**

Particulars	H1 FY22	H1 FY23	H1 FY24	FY23 vs FY22 Y-o-Y (%)	FY24 vs FY23 Y-o-Y (%)
Manufacturing	12,54,131	12,65,618	13,83,235	0.9%	9.3%

Source: MoSPI

The manufacturing and construction sectors contributed significantly towards the industrial growth. The industrial growth is estimated at 7.9% on y-o-y basis in FY24. Sub-industries under manufacturing such as pharma, rubber, plastic, non-metallic mineral products, metals, etc., recorded higher growth in production during H1FY24. This, in turn, supported the momentum in the manufacturing sector.

The manufacturing sector increased by around 1% and 9.3% y-o-y during H1 FY23 and H1 FY24 respectively.

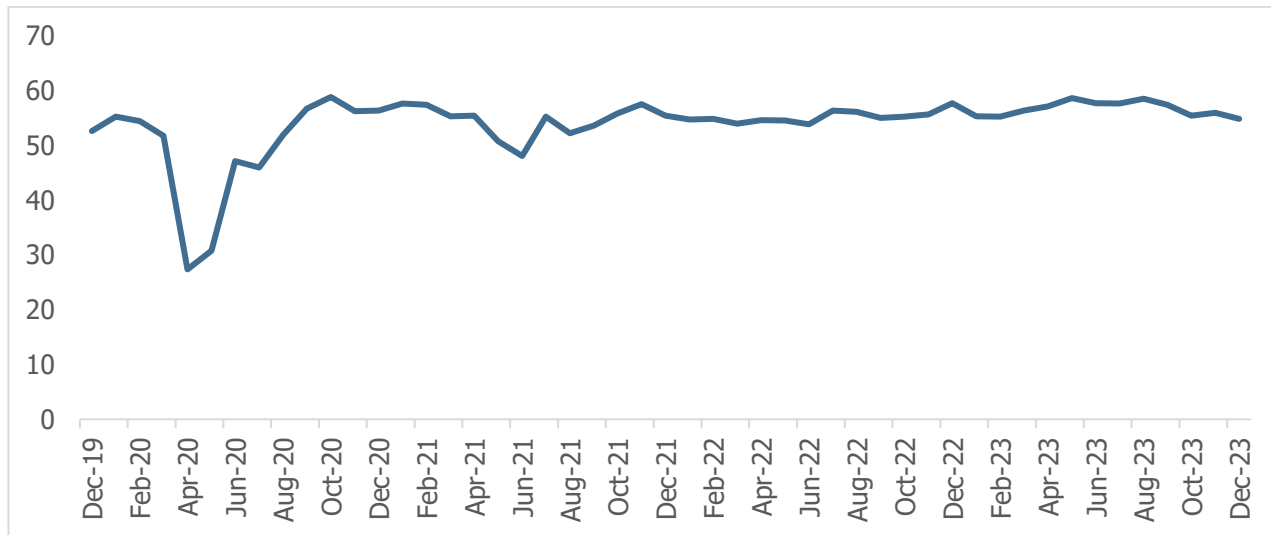
#### **Purchasing Managers' Index (PMI):**

The PMI manufacturing witnessed a declining trend during FY21 due to the pandemic, and as a consequence, the manufacturing activities were affected. During April 2020 to July 2020, the manufacturing PMI was the lowest and fluctuations gradually decreased throughout the year on account of improvement in demand.

At present, the PMI manufacturing remains in expansionary zone as the index value has been above 50 which reflects positive sentiments around the sector.

India's manufacturing activity as per PMI manufacturing continued to expand in December 2023 and stood at 54.9 on account of increased demand for industrial products.

**Chart 65: Trend in Purchasing Managers' Index**



Source: S&P Global Manufacturing PMI, Markit Manufacturing PMI

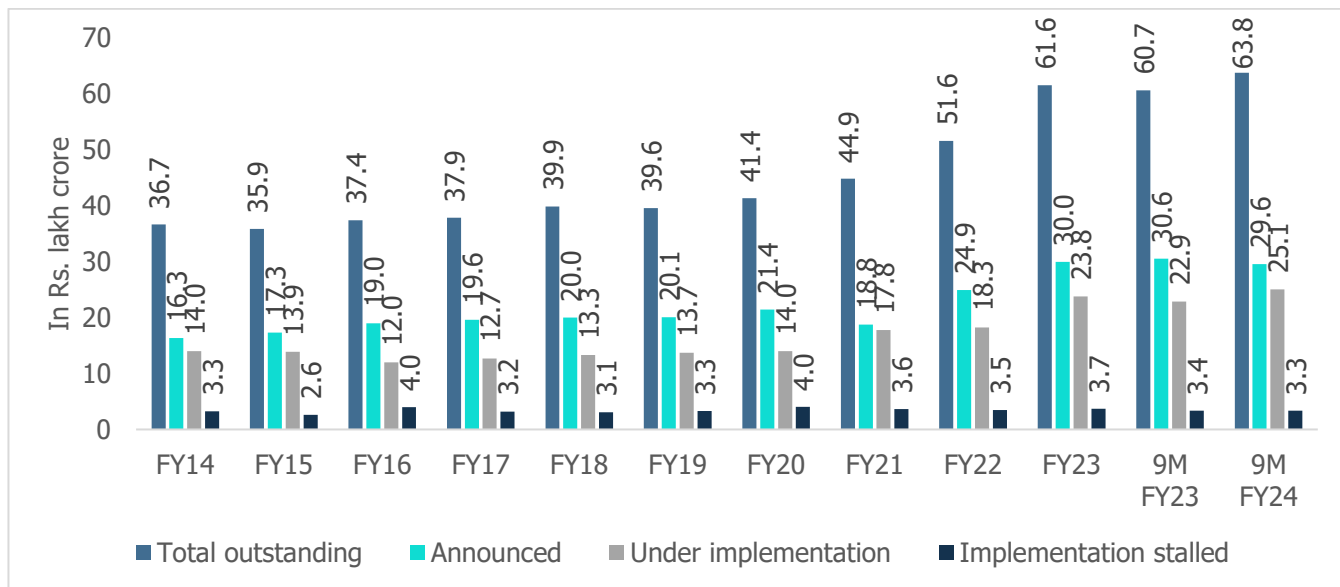
**12.2 Investments in Manufacturing Sector**

The total outstanding investments made in the projects undertaken in manufacturing sector grew with a CAGR of around 6% to Rs. 61.6 lakh crore in FY23 from Rs. 36.7 lakh crore in FY14.

During FY23, the value of total investments that have been announced totaled to Rs. 30 lakh crore, while those under implementation amounted to Rs. 23.8 lakh crore.

The value of outstanding investments during 9M FY24 accounted to Rs. 63.8 lakh crore, an increase of 5.2% on a y-o-y.

**Chart 66: Trend in Investments made in Manufacturing Sector over the past 10 years and during 9M FY24**



Source: CMIE

## 12.3 Industry Trends in Manufacturing Plants

### Technological Advancements

The continuous innovation and integration of digital technologies such as artificial intelligence, the Internet of Things, data analytics, etc., in the manufacturing sector are increasing as they give rise to efficient and smart-oriented solutions. The recent adoption of automation and robotics by manufacturing plants to enhance operations in terms of productivity, efficiency, and quality is driving the industry. This will help companies optimize resource utilization, reduce labour costs, and minimize the time taken, leading to overall improvement in the production process.

### Sustainability Initiatives

The move toward sustainability practices is driving the trend in the industry. The growing emphasis on sustainable manufacturing practices and awareness is contributing towards the growth of the economy. Manufacturing plants in the country are focusing on the implementation of energy-efficient processes, reduction of waste generation systems, and limitation of carbon emissions. Furthermore, investors keep track of the ESG compliance of the companies and are interested in investing in those companies that follow ESG practices.

### Increase in Customization

The continuous change in the preferences of consumers is leading to an increase in demand for customized products and services in various sectors. The manufacturers are continuously modifying their products and are adapting to the requirements. This also involves using technologies for manufacturing. Advancements in manufacturing processes to meet the demand for the goods desired by the customers are driving the trend in the industry and are contributing to the rise in manufacturing activities.

### Shift towards Renewable Energy

The gradual shift from traditional processes to renewable processes in manufacturing facilities is driving the industry. The government will leverage investments in the manufacturing sector in the coming years to foster continuous efforts to reduce operational costs and environmental footprint in India.

### Employment Creation

The rapid evolution in the manufacturing landscape and expansion plans by many companies will lead to the generation of employment in the country. Additionally, global companies are also planning to set up their manufacturing plants and are expected to bring more job opportunities for individuals in India. As per the Economic Survey 2021-22, in spite of COVID-related disruptions, there has been a trend of positive overall growth of Gross Value Addition (GVA) in the manufacturing sector. The total employment in this sector has increased from 57 million in the year 2017-18 to 62.4 million in the year 2019-20.

## 12.4 Demand Drivers

### Growing Population

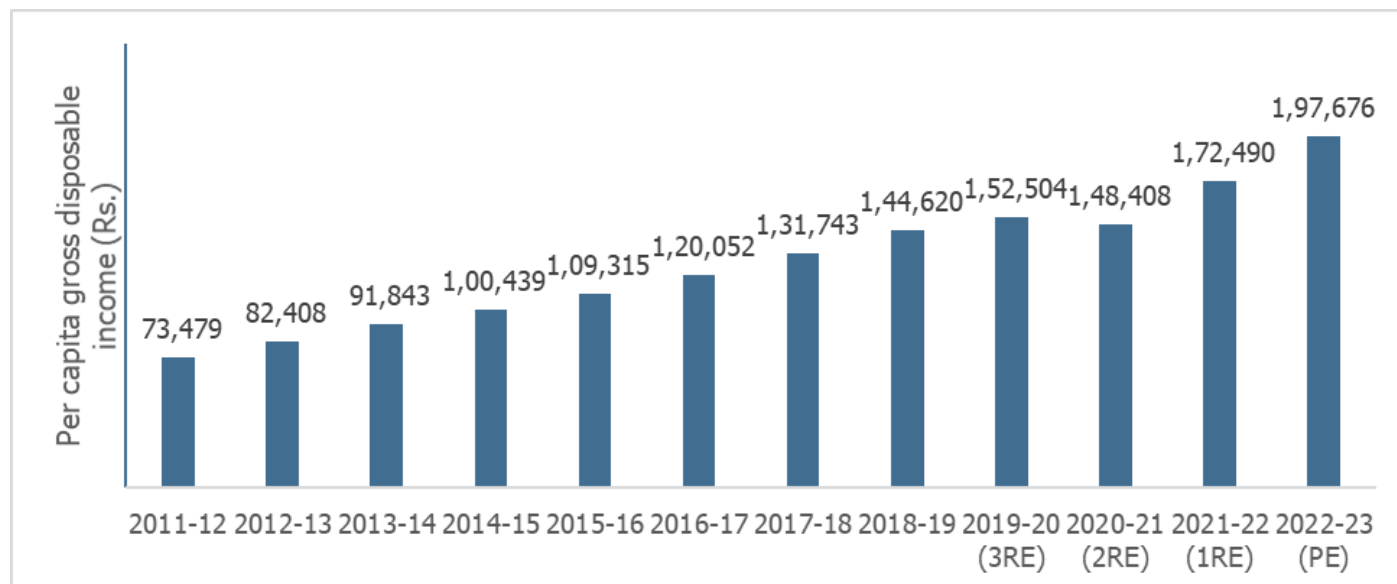
The Indian economy has experienced steady growth in the past decade and is expected to be one of the fastest-growing economies in the post-pandemic era. India's urban population is expected to reach over half a billion by 2025 from an estimated 461 million in 2018.

The increase in population leads to an increase in demand for various products, such as consumer goods, apparel, electronics, automobiles, etc. To meet the demand and supply requirements of consumers, the companies will expand their production capacities. As a result, there will be a rise in the number of manufacturing plants.

## Increasing Purchasing Power

The need for manufacturing facilities to manufacture a variety of goods in order to meet the growing demand is fueled by the increasing disposable income. The rising disposable income, which has grown at a CAGR of 9.4% between the period FY12 to FY23, is expected to lead to an increase in demand for manufacturing plants in India. The purchasing power of the consumer increases when there is a rise in per capita income. As a result, it will lead to higher demand for goods and services.

**Chart 67: Per Capita Gross National Disposable Income**



Source: MOSPI

Note: 3RE – Third Revised Estimate, 2RE – Second Revised Estimates, 1RE – First Revised Estimates, 2AE – Second Advanced Estimate;

## Increase in Urbanization

The demand for manufacturing is increasing, given the rapid urbanization in India. The shift of individuals from rural to urban is leading to higher demand for better infrastructure, housing, transportation, and consumer goods. This, in turn, is accelerating the need for manufacturing plants to meet these demands.

## Development of Infrastructure

The continuous spending on infrastructure including roads, railways, ports, building construction, and smart cities by the government will aid the growth in infrastructure development. These projects involve the use of construction materials, machinery, equipment, and other supplies. As a result, the development in infrastructure will contribute towards the expansion of manufacturing sector.

## Competitiveness among Global Players

India is growing as a global manufacturing hub due to its abundance of resources, raw material availability, cheap labour costs, and skilled workforce. This will attract global companies to set up their manufacturing plants in India. Consequently, it will raise the overall demand for manufacturing activities and lead to economic growth in the country.

### **Opportunities in Export Market**

India is known for its export of textiles, automobiles, pharmaceuticals, electronics, oil meals, petroleum products, engineering equipment, etc. The overall exports (Merchandise and Services) from India totalled \$770.2 billion in FY23, an increase of 13.8% as compared to FY22. Out of which, merchandise exports amounted to \$447.5 billion, registering a growth rate of around 6% on a year-on-year. The opportunities in the export market will continue to aid the growth of manufacturing activities.

### **Policy Support from the Government**

The government of India has taken various initiatives to promote domestic manufacturing and reduce the reliance on imports. This, in turn, will lead to the establishment of new manufacturing plants and help in expansion of the sector.

## **12.5 Key Challenges**

### **Rigid Regulatory Framework**

The regulatory system in the country can be challenging for the manufacturers as several approvals and licenses are required for setting up a manufacturing plant. This can result in delays and higher compliance costs. Also, the policy frameworks are subject to constant changes and involve complex procedures discouraging investors and may result in lower investments in projects. In addition, the customs duties and taxes also impact the competitiveness of Indian products in the international market. Various tax reforms and bans on export goods can lower export volumes and may result in a decrease in manufacturing activities.

### **Financing Cost**

The cost of capital is high in manufacturing facilities. It is difficult for manufacturers to set and operate their plants with access to low finance. Moreover, the interest rates offered by the financial institutions is usually high and it can be a time-consuming process to avail the loan facility particularly for micro, small and medium-sized enterprises (MSMEs).

### **Environmental Regulations**

Another challenge for manufacturing plants in India is compliance with respect to environmental regulations. Manufacturing of goods in factories generates waste and releases pollutants in the environment. In order to combat that, companies need to invest in pollution control measures. These manufacturing plants need to obtain environmental clearances for both new projects and old projects that have expansion plans. This process usually is cumbersome as the companies need to get approval from the concerned authorities and this may cause delays in the execution of the projects.

### **Adoption of Latest Technologies**

In India, the adoption of the latest technologies available and automation is relatively low. Many manufacturing plants are not well-equipped with new technology processes even though they result in cost optimization and good margins. Large companies have the capability to adopt advanced technologies while MSMEs have limited access to these technologies as they involve huge costs. The advancement in technology still remains a challenge for manufacturers lacking enough funds.

### **Global Slowdown**

According to IMF, the global economic growth for CY23 is estimated at 2.8%, down from 3.4% in CY22, a de-growth of around 18%. This is largely because of the turbulence in the financial sector, geo-political tensions, supply chain disruptions, tightening monetary policies, persistent inflation, and hikes in interest rates. Moreover, exports to other countries may be impacted owing to the recession, inflationary pressures, supply chain disruptions, etc., across the



world and can hamper the growth of the export market. As a consequence, there will be a decrease in production activities.

### 12.6 Recent Government Initiatives

Various initiatives have been taking by the Indian government to boost the manufacturing activities.

The Department for Promotion of Industry and Internal Trade (DPIIT) has undertaken various steps to promote manufacturing sector to boost domestic and foreign investments in India. Some of them include- introduction of Goods and Services Tax, reduction in Corporate tax, improving ease of doing business, FDI policy reforms, measures for reduction in compliance burden, policy measures to boost domestic manufacturing through public procurement orders and Phased Manufacturing Programme (PMP) and Quality Control Orders (QCOs)

Atmanirbhar packages, introduction of Production Linked Incentive (PLI) Scheme in various Ministries, investment opportunities under National Infrastructure Pipeline (NIP) and National Monetisation Pipeline (NMP), India Industrial Land Bank (IILB), Industrial Park Rating System (IPRS), soft launch of the National Single Window System (NSWS), etc. have been implemented by the GoI to improve the economic situation and convert the disruption caused by COVID 19 into an opportunity for growth. An institutional mechanism to fast-track investments has been put in place, in the form of Project Development Cells (PDCs) in all concerned Ministries/ Departments of Government of India.

**Make in India Initiative:** On 25<sup>th</sup> September 2014, an initiative named 'Make in India' was launched to facilitate investment, foster innovation, build best in class infrastructure and make India a hub for manufacturing, design and innovation. Due to this Initiative, FDI equity inflow in the manufacturing sector between 2014-2022 has increased by 57% over the previous 8 years i.e. 2006- 2014.

**Industrial Corridor Development Programme:** The GoI has adopted the strategy of developing Industrial Corridors in partnership with State Governments to accelerate growth in manufacturing. The objective of this programme is to develop Greenfield Industrial regions/areas/nodes with sustainable infrastructure & make available Plug and Play Infrastructure at the plot level. As part of National Industrial Corridor Program, 11 Industrial Corridors are being developed in 4 phases.

**Ease of Doing Business:** The objective is to improve Ease of Doing Business and Ease of Living by simplifying, rationalizing, digitizing and decriminalizing Government to business and citizen Interfaces across Ministries/States/UTs. The key focus areas of the initiative are simplification of procedures, rationalization of legal provisions, digitization of government processes, and decriminalization of minor, technical or procedural defaults.

**National Single Window System:** The setting up of NSWS was announced in the Budget 2020-21 with the objective to provide "end to end" facilitation and support to investors, including pre-investment advisory, provide information related to land banks and facilitate clearances at Centre and State level. Envisioned as a one-stop shop for investor related approvals and services in the country, the National Single Window System (NSWS) was soft-launched on 22nd September, 2021 by Hon'ble Commerce & Industry Minister. Large number of States/UTs Single Window Systems have been linked with the NSWS Portal thereby providing access to approvals of these States/UTs to be applied through NSWS.

**PM Gati Shakti National Master Plan (NMP):** NMP, a GIS based platform with portals of various Ministries/Departments of Government, was launched in October, 2021. It is a transformative approach to facilitate data-based decisions related to integrated planning of multimodal infrastructure, thereby reducing logistics cost.

Empowered Group of Secretaries (EGoS) and Network Planning Group (NPG) have been created as institutional arrangement.

**National Logistics Policy (NLP):** NLP was launched on 17<sup>th</sup> September 2022 and aims to lower the cost of logistics and lead it to par with other developed countries. It is a comprehensive effort to address cost inefficiency by laying down an overarching interdisciplinary, cross-sectoral, and multi-jurisdictional framework for developing entire logistics ecosystem. This is expected to boost economic growth, provide employment opportunities, and make Indian products more competitive in the global market.

**Production Linked Incentive Scheme:** Keeping in view India's vision of becoming 'Atmanirbhar', Production Linked Incentive (PLI) Schemes for 14 key sectors have been announced with an outlay of Rs. 1.97 lakh crore to enhance India's Manufacturing capabilities and Exports. These schemes have potential for creation of high production, economic growth, exports and significant employment in the coming years. As of 9<sup>th</sup> August 2023, 733 applications have been approved across the country in 14 sectors including Tamil Nadu.

**Indian Footwear and Leather Development Programme (IFLDP):** The Central Government has approved the Central Sector Scheme IFLDP in January, 2022 with an allocation of Rs.1700 crore till 31.03.2026 or till further review, whichever is earlier.

**North East Industrial and Investment Promotion Policy (NEIIPP), 2007:** NEIIPP, 2007 was notified for a period of 10 years from 1<sup>st</sup> April, 2007 to 31<sup>st</sup> March, 2017 with the purpose to boost industrialization of the region. The registered eligible units continue to receive benefits under grand-parenting of scheme.

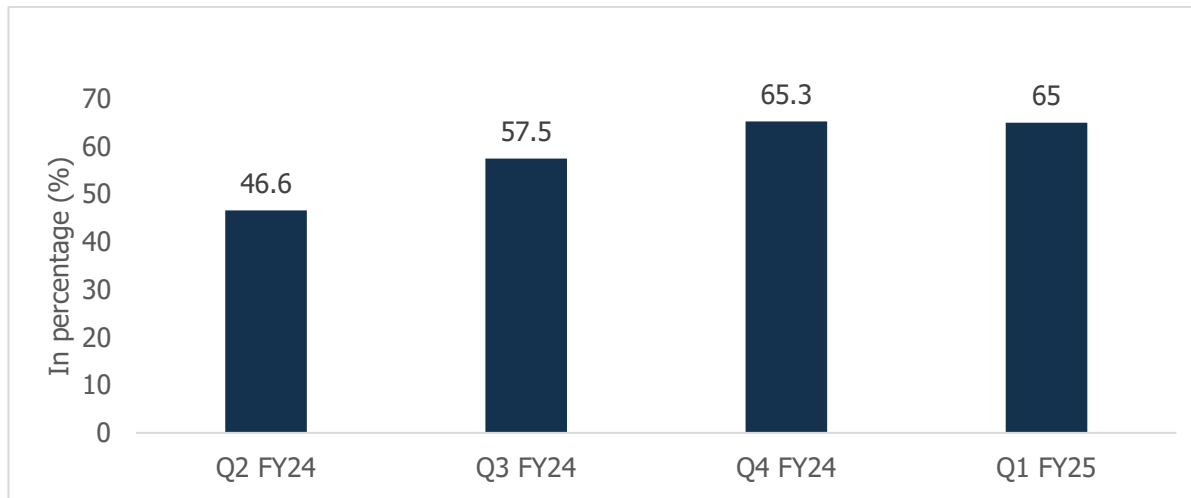
**One District One Product (ODOP):** The Government has launched another initiative in 2018 which aims at fostering balanced regional development across all districts of the country. The initiative aims to select, brand, and promote at least One Product from each District (One District - One Product) of the country for enabling holistic socioeconomic growth across all regions. The ODOP Initiative has identified a total of 1102 products from 761 districts across the country.

The policy support by the Government will contribute towards more investments in manufacturing plants and drives the demand in the sector.

## 12.7 Outlook

The manufacturing plants in India are spread across different states. They cater to the requirements of domestic demand and export market. Despite global headwinds and slowdowns, the manufacturing sector is witnessing significant growth and is contributing to the expansion of the industry.

Production in various manufacturing industries has increased on account of easing raw material costs and robust demand for the products. Whereas increased production and a fall in input costs (global commodity prices) are expected to improve the margins of the companies.

**Chart 68: Capacity Utilization in Manufacturing Sector**

Source: RBI

Moreover, the rebound in domestic consumption led by improved demand has also led to a rise in domestic capacity utilization. During Q2 FY24, the capacity utilization in the manufacturing sector stood at 46.6% and is expected to grow by around 39% to 65% by Q1 FY25, indicating a potential growth in the sector.

Furthermore, this expansion during FY24 and FY25 is expected to bring new investments to create additional capacities in the industries. Besides, the Indian government is making several efforts to improve the ease of doing business and promote the manufacturing sector, which will further facilitate more investments as a manufacturing hub and aid the sector's growth.

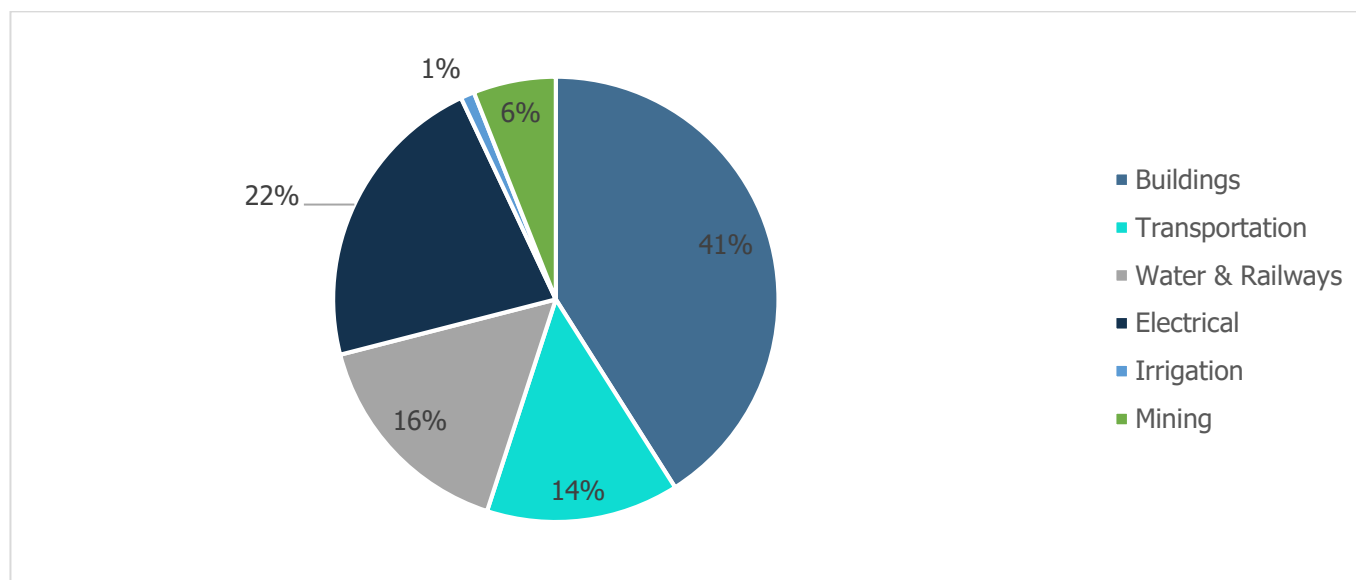
## 13. Competitor analysis of key listed players

### 13.1 NCC Ltd

NCC is a Hyderabad-based leading construction company with an expanded presence across varied verticals of infrastructure space. It is engaged in the construction of roads, buildings, irrigation, water and environment, electrical, metals, mining, and railways. The company has a presence in the Middle East through its subsidiaries in Muscat and Dubai.

The consolidated order book is robust at Rs. 57,440 crores as on December 31<sup>st</sup>, 2023. Key segments like Buildings, Transportation, Water & Railways, and Electrical form around 93% of the order book.

Order Book composition as on December 31<sup>st</sup> 2023:



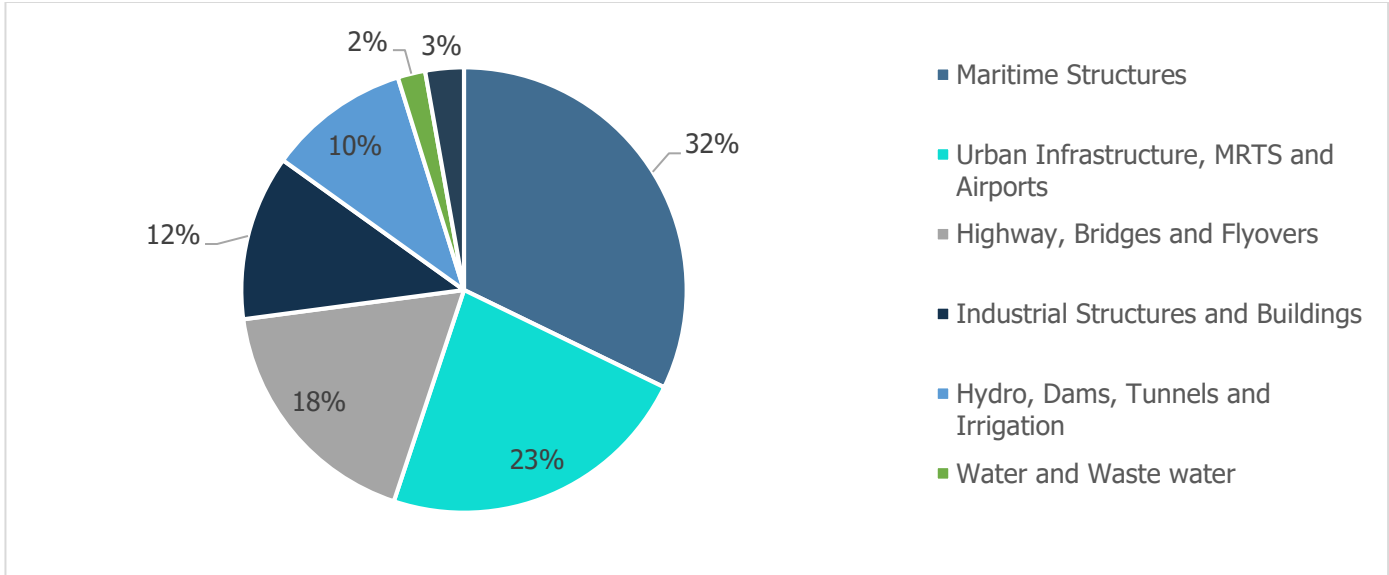
Source: Company Disclosures

### 13.2 ITD Cementation India Ltd

ITD Cementation is one of India's leading engineering procurement and construction (EPC) players in heavy civil and urban infrastructure and the maritime sector with a strong international parentage. The company has diversified its order book to minimize the risks of slowdowns in any business area.

The consolidated order book stands at Rs. 20,825 crores as on December 31<sup>st</sup>, 2023. It comprises Urban Infrastructure, MRTS and Airports, Highways, Bridges and Flyovers, Maritime Structures and Industrial structures, and Buildings forming ~85% % of the order book as of December 31<sup>s</sup>, 2023.

Order Book composition as on December 31<sup>st</sup> 2023:



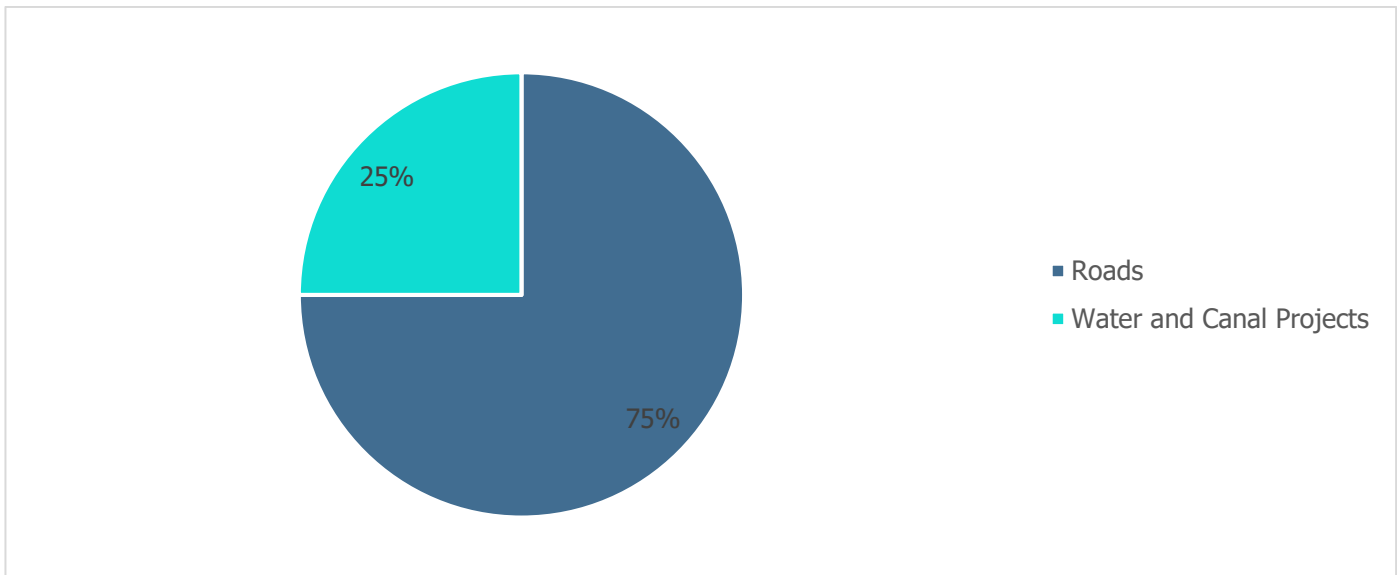
Source: Company Disclosures

### 13.3 PNC Infratech Limited

PNC Infratech Limited is an integrated infrastructure solutions provider with capabilities extending from investment to development, design, construction, operation & maintenance, and management of infrastructure projects with proven experience and expertise of three decades in airports, highways, expressways, bridges, flyovers, dedicated rail freight corridors, drinking water supply and related sectors, etc. The company has successfully executed more than 90 major infrastructure projects in various Indian states.

The company’s order book as on December 31<sup>st</sup>, 2023, including the new projects (five HAM projects worth Rs. 5,580 crores), was at Rs. 17,380 crores.

Order Book composition as on December 31<sup>st</sup> 2023:



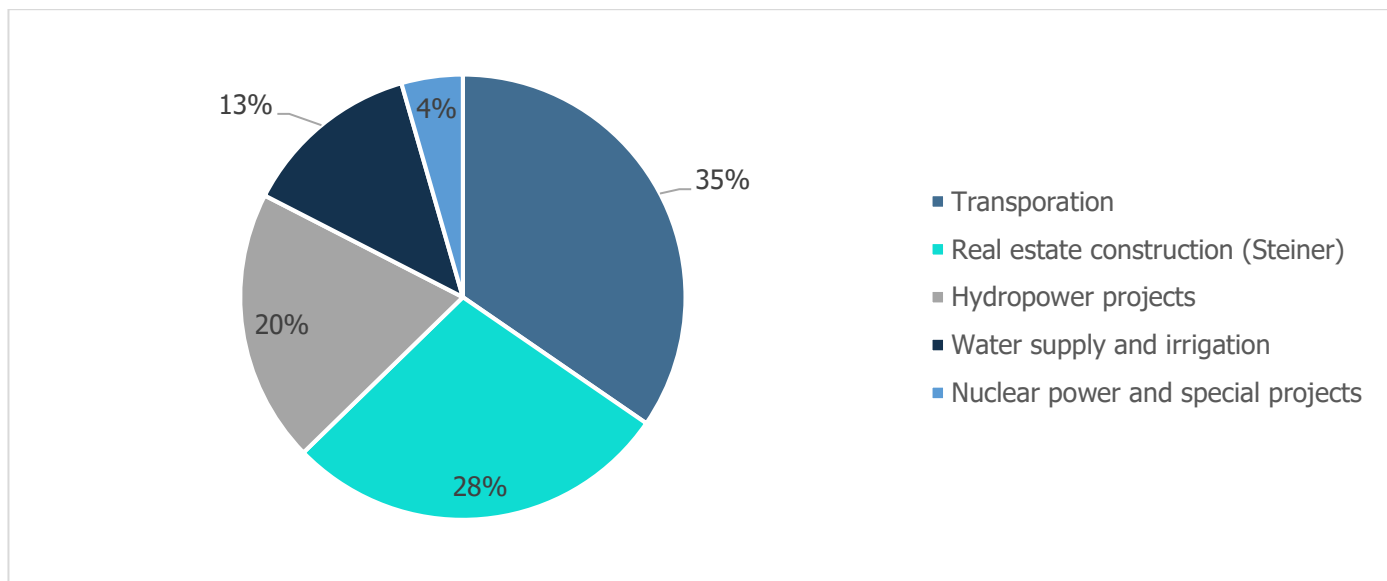
Source: Company Disclosures

### 13.4 Hindustan Construction Company Ltd.

The company is one of the oldest infrastructure development companies in India. The company's business operations primarily include three verticals, namely, (i) engineering and construction; (ii) infrastructure development operations and maintenance; and (iii) real estate. They have completed various projects related to Power (Hydro, Nuclear, Thermal), Transportation (Roads, Bridges, Metros, Ports), Water (Irrigation and Water Supply), and other Industrial projects. The company has a balanced portfolio having geographical spread across the country. The company was involved in various construction projects on nuclear power generation which accounted for about 60% of total nuclear power generation capacity in India.

The order backlog position of the company as of December 31<sup>st</sup>, 2023 is around Rs. 15,532 crores (includes Rs. 4,367 crore order book of Steiner AG) and it is spread largely across the transport sector, followed by real estate, Hydro, Water and Nuclear & Special projects.

Order Book composition as on December 31<sup>st</sup> 2023:



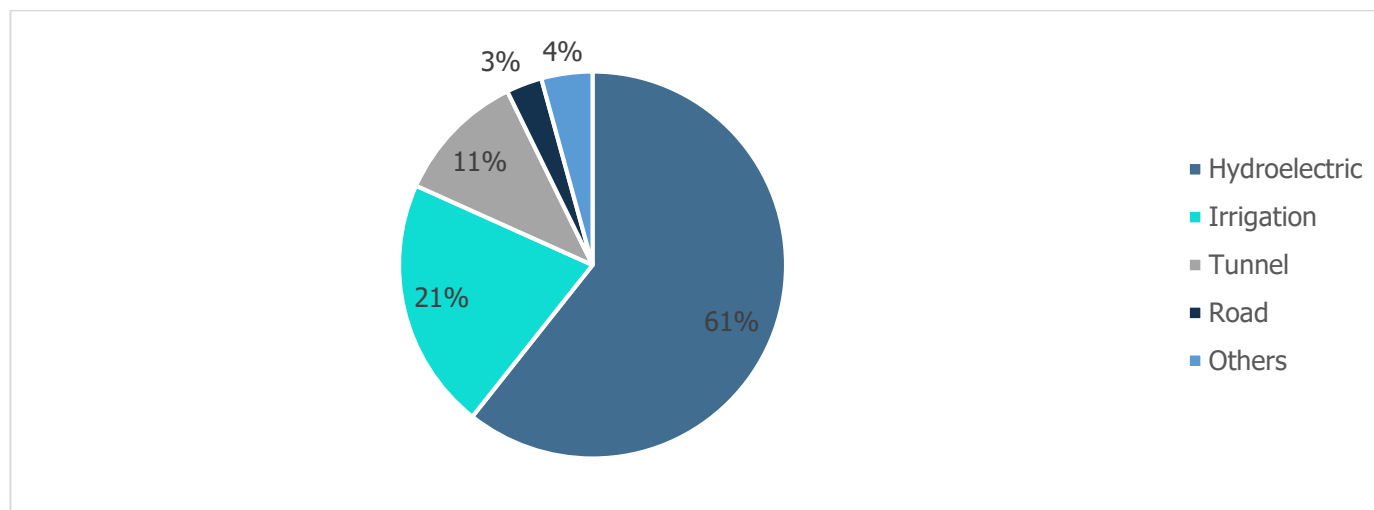
Source: Company Disclosures

### 13.5 Patel Engineering Ltd.

Patel Engineering Limited is one of the most integrated infrastructure and construction services conglomerates in India. It is a prominent player in the civil engineering construction segment and is engaged in the construction of dams, bridges, tunnels, roads, piling works, industrial structures, and other kinds of heavy civil engineering works. The company holds a robust presence in various high-margin technology-intensive areas like hydro, tunnelling, irrigation, water supply, urban infrastructure, and transport.

The company's order book stands at about Rs. 19,135 crores as of December 31<sup>st</sup>, 2023 with Hydroelectric (60.67%), Irrigation (21.05%) and Tunnel (11.02%) comprising a major chunk.

Order Book composition as on December 31<sup>st</sup> 2023:



Source: Company Disclosures

**Table 32: Financial Analysis as on March 31<sup>st</sup>, 2023 (In Rs. Crores)**

Particulars	NCC Ltd	ITD Cementation India Ltd	Hindustan Construction Company Ltd	PNC Infratech Ltd	Patel Engineering
<b>FY23</b>	<b>Consolidated</b>				
Net Sales	15,553	5,091	9,857	7,956	4,202
EBITDA	1,458	400	577	2,543	625
EBITDA Margin (%)	9.4%	7.9%	5.9%	20.1%	14.9%
Equity	126	17	151	51	77
ROCE (%)	17.6%	14.6%	9.8%	12.8%	15.2%
Asset Turnover (times)	0.9	1.0	0.7	0.6	0.5
Current Ratio (times)	1.3	1.0	1.1	1.7	1.4
Year of Incorporation	1990	1978	1926	1999	1949

Source: Company Disclosures

**Table 33: Financial Analysis as on December 31<sup>th</sup>, 2023 (In Rs. Crores)**

Particulars	NCC Ltd	ITD Cementation India Ltd	Hindustan Construction Company Ltd	PNC Infratech Ltd	Patel Engineering
<b>9MFY24</b>	<b>Consolidated</b>				
Net Sales	14,360	5,460	5,234	6,050	3,201
EBITDA	1,218	525	789	1,269	453
EBITDA Margin (%)	8.5%	9.6%	15.1%	21.0%	14.1%
Equity	126	17	151	51	77
Asset Turnover (times)*	1.1	1.3	0.7	0.6	0.5
Current Ratio (times)	1.3	1.0	1.1	1.6	1.4

Source: Company Disclosures

Note: \* The figures are annualized

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## About CARE Analytics and Advisory Private Ltd (CareEdge Research)

CareEdge (CARE Group) is a knowledge-based analytical group that aims to provide superior insights based on technology, data analytics capability and detailed research methods. CareEdge (CARE Ratings Limited) is one of the leading credit rating agencies in India. It has an impressive track record of rating companies for almost three decades and has played a pivotal role in developing the corporate debt market in India. CareEdge provides near real time research on all domestic and global economic developments. CARE Analytics & Advisory Private Ltd is a wholly owned subsidiary focused on providing advisory and consultancy services including the following:

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- Corporate Due Diligence
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- ESG Strategy and Roadmaps
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- Customized Sectoral Research
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for Global Fund Houses

### Grading Services



- ESG Grading
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- MFI & COCA Grading
- NGO Grading
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