

Assessment of the infrastructure EPC industry in India

September 2024

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1 Global macroeconomic assessment

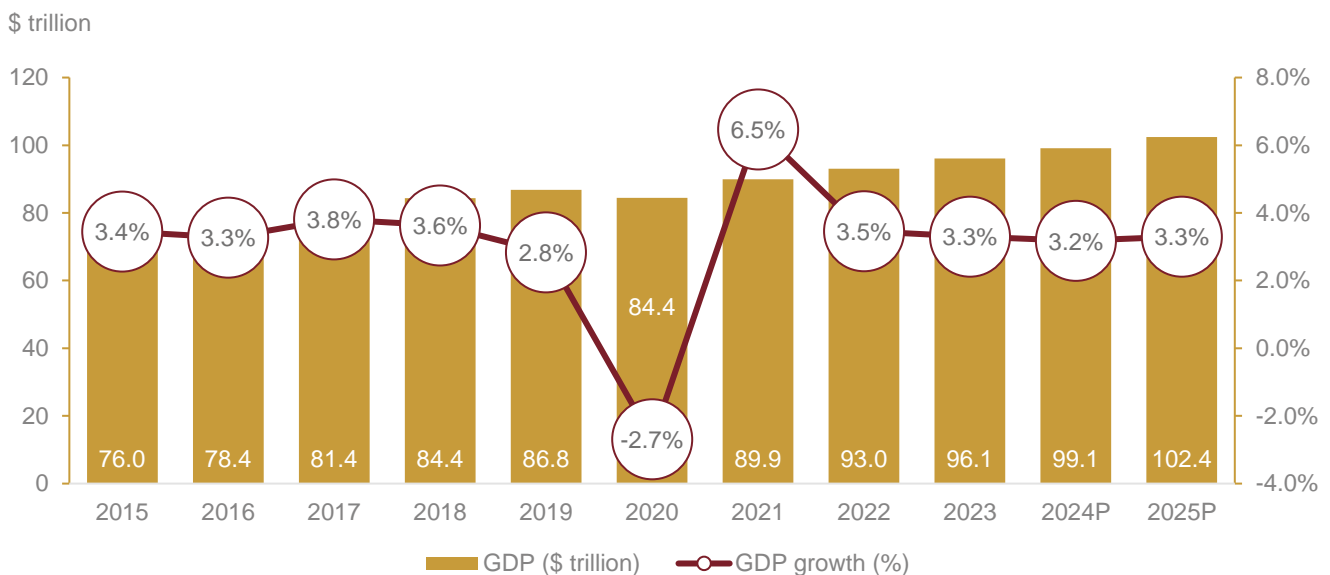
Global GDP outlook

Global GDP is estimated to grow at 3.2% and 3.3% in CY2024 and CY2025 respectively amid moderating inflation and steady growth in key economies

As per the International Monetary Fund's (IMF) July 2024 update, global gross domestic product (GDP) growth is estimated at 3.3% for 2023 and projected to grow at 3.2% and 3.3% during 2024 and 2025 respectively. The latest estimate for 2024 remains same as the IMF's previous forecast in April 2024. However, there is slight shift the dynamics with growth in advanced economies is expected to converge in coming quarters which is set off by the growth in emerging market and developing economies which is revised upward; and is supported by economic activity in Asia, particularly China and India.

With disinflation and steady growth, the likelihood of a hard landing has receded, and risks to global growth are broadly balanced. Amid favourable global supply developments, inflation has been falling faster than expected. On the upside, faster disinflation could lead to further easing of financial conditions. On the downside, new commodity price spikes from geopolitical shocks and supply disruptions or more persistent underlying inflation could prolong tight monetary conditions.

Global GDP trend and outlook (2018-2025P, \$ trillion)



Note:P: Projection

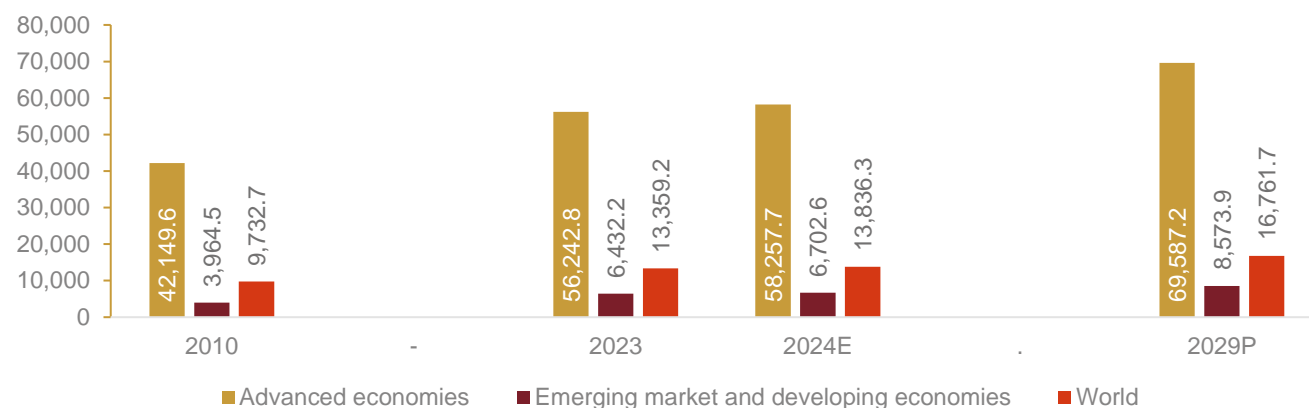
Source: IMF economic database, CRISIL Market Intelligence and Analytics (MI&A)

Emerging economies to drive global per capita growth

The global per capita expected to grow at a CAGR of 3.9% between CY2023 and CY2029 higher than CAGR of 2.5% between CY2010 and CY2023 in turn leading to overall GDP growth. Going ahead, the global per capita growth, is major driven by emerging markets and developing economies which are expected to see per capita growth of 4.9% during the aforementioned period. Among emerging markets and developing economies, major economies such as China, India, Brazil and Russia are expected to grow at a CAGR of 6.0%, 9.4%, 5.3% and 2.3% respectively.

GDP per capita, current prices (\$)

Current prices (\$)



Economic group	2010-23 (%) CAGR	2023-29P (%) CAGR
Advanced economies	2.2%	3.6%
Emerging market and developing economies	3.8%	4.9%
World	2.5%	3.9%

Notes: E – estimated; P – projected

Source: IMF, CRISIL MI&A

India among the world's fastest-growing key economies

Following the recovery from the COVID-19 pandemic, India exhibited a growth rate of 7.2% in FY23, surpassing both advanced economies at 2.6% and emerging and developing economies at 4.1%.

United States: In the United States, growth is projected to rise from 2.5% in CY2023 to 2.6% in CY2024 and 1.9% in CY2025, with the lagged effects of monetary policy tightening, gradual fiscal tightening, and a softening in labour markets slowing the aggregate demand.

United Kingdom: Growth in the United Kingdom is projected to rise modestly from an estimated 0.1% in CY2023 to 0.7% in CY2024, due to lagged negative effects of high energy prices wane. Then in CY2025, as disinflation allows an easing in financial conditions and permits real incomes to recover, the economy is expected to see a growth of 1.5%.

Euro zone: Growth in the euro area is projected to recover from 0.5% in 2023, which reflected relatively high exposure to the global conflicts, to 0.9% in CY2024 and 1.5% in CY2025. As per IMF estimates, the growth in is driven by strong household consumption as the energy prices subside and inflation falls, supporting the real income growth.

In terms of **emerging and developing economies**, growth is projected to be relatively stable at 4.3% in CY2024 and CY2025, respectively.

Real GDP growth comparison among India vs Advanced and emerging economies

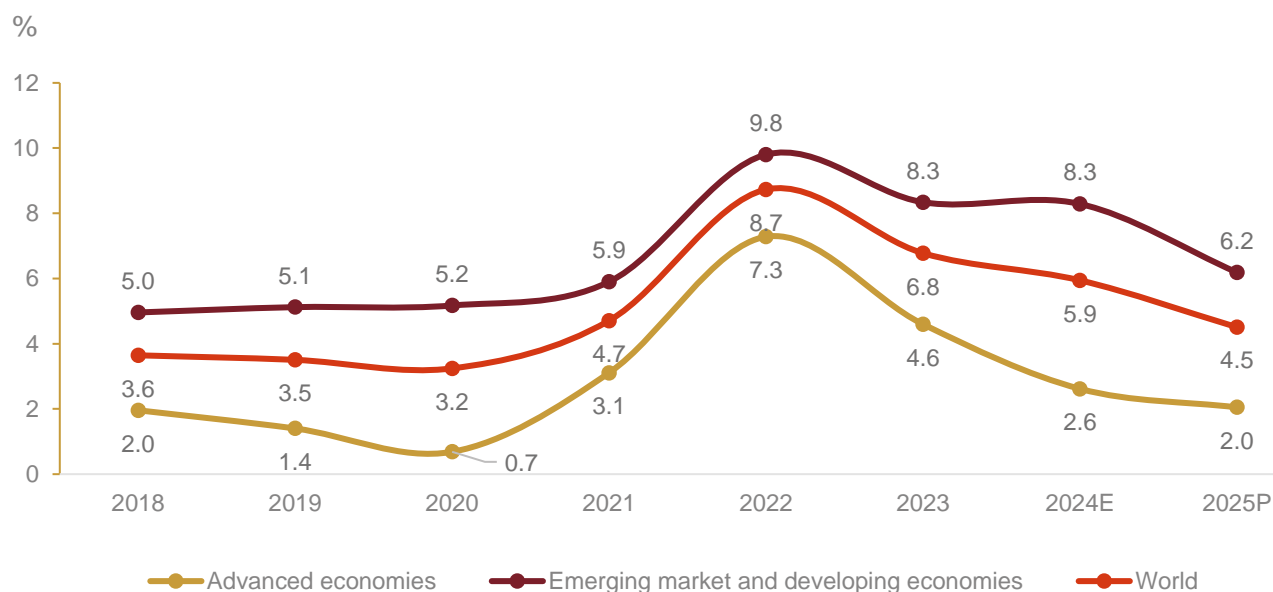
Real GDP growth (Annual % change)	CY2018	CY2019	CY2020	CY2021	CY2022	CY2023	CY2024P	CY2025P
Canada	2.7	1.9	-5.0	5.3	3.8	1.2	1.3	2.4
China	6.8	6.0	2.2	8.4	3.0	5.2	5.0	4.5
Euro Zone	1.8	1.6	-6.1	5.9	3.4	0.5	0.9	1.5
India*	6.5	3.9	-5.8	9.7*	7.0*	8.2*	7.0*	6.5
Japan	0.6	-0.4	-4.1	2.6	1.0	1.9	0.7	1.0
UK	1.4	1.6	-10.4	8.7	4.3	0.1	0.7	1.5
USA	3.0	2.5	-2.2	5.8	1.9	2.5	2.6	1.9

Note: P: Projected. * Numbers for India are for financial year (CY2020 is FY21 and so on) and as per the IMF's forecast. ^India GDP estimate for the FY24 is 8.2% according to provisional estimates from MoSPI. Note: Projection as per IMF update
Source: IMF economic database, World Bank national accounts data, OECD national accounts data, CRISIL MI&A

Global inflation to subside in the medium term

As per the IMF, global headline inflation is expected to decline from 6.8% in CY2023 (annual average) to 5.9% in CY2024 and 4.5% in CY2025. A more front-loaded decline is expected for advanced economies, where the inflation is expected to decline, in CY2024 is expected to see sharper decline of 200 basis points to 2.6%. While, in emerging market and developing economies, though, it is projected to remain constant at around ~8.3% in CY2024, in CY2025, it is expected to see decline to 6.2%.

Trend and outlook on inflation (average consumer prices)



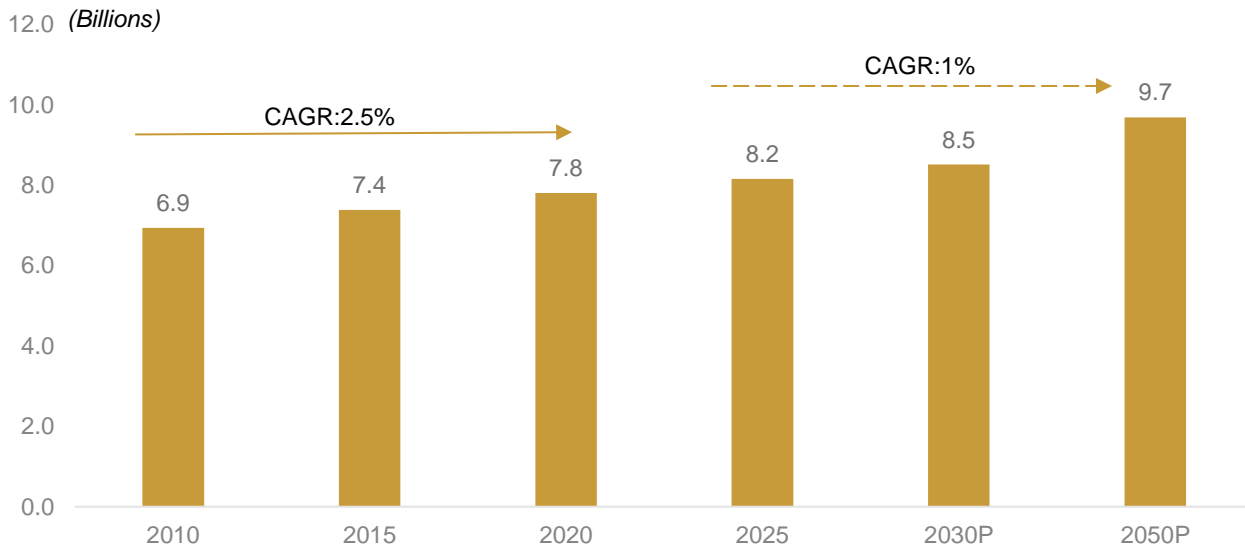
Notes: P – projected
Source: IMF, CRISIL MI&A

Qualitative overview of key drivers impacting global economy

Global population expected to reach 8.5 billion by CY2030

Owing to improved life expectancy and increased penetration, world population have increased at steady 2.5% CAGR from CY2010 to CY2020 to reach 7.8 billion in the year 2020. In CY2020, the growth rate of the global population fell under 1 per cent per year for the first time since 1950. The latest projections by the United Nations suggest that the world's population could grow to around 8.5 billion in CY2030 and 9.7 billion in CY2050.

Global population review and outlook

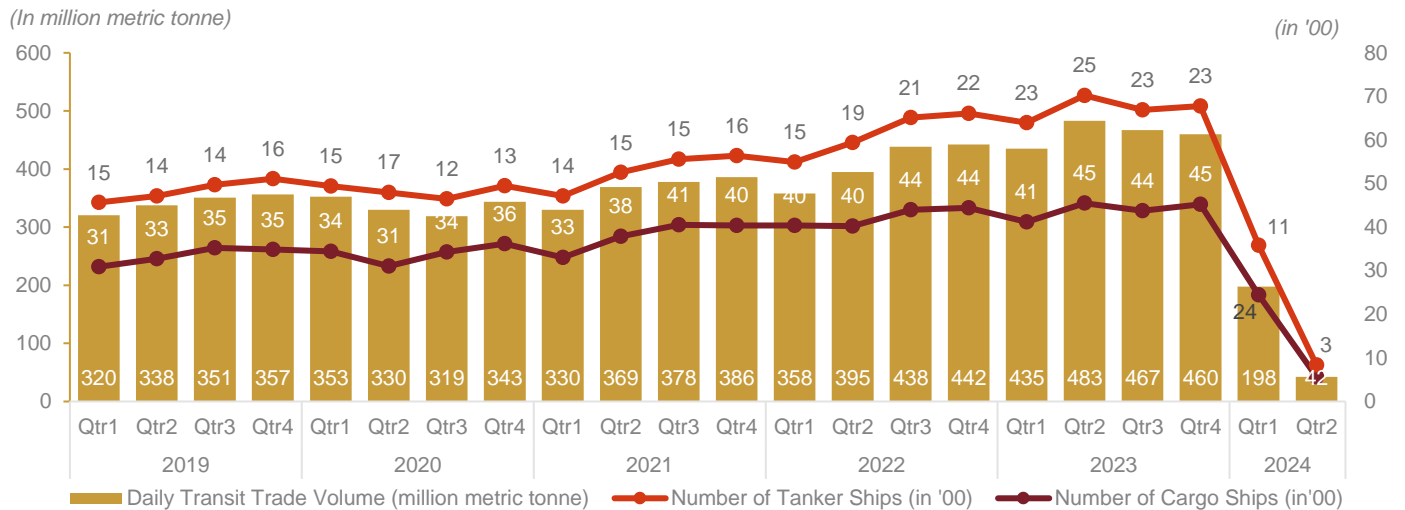


Source: United nations world population prospects 2022, CRISIL MI&A

Red crisis remains a key monitorable

Red Sea crisis which disrupted the global trade resulting to increased delivery times and disrupted supply chains. This has reduced the traffic through the Suez Canal due to which several shipping companies diverted their ships around the Cape of Good Hope, increasing the delivery times by 10 days or more on average, hurting companies with limited inventories. In the first two months of 2024, Suez Canal trade dropped by 50% from a year earlier while trade through the Panama Canal fell by 32%, disrupting supply chains and distorting key macroeconomic indicator. Moving forward, the overall stability and growth of MENA region will depend on the intensity the global conflict happening the region along with involvement/ restrained exercised by external countries and international organisations.

Trade through Suez Canal



Source: IMF Portwatch, CRISIL MI&A

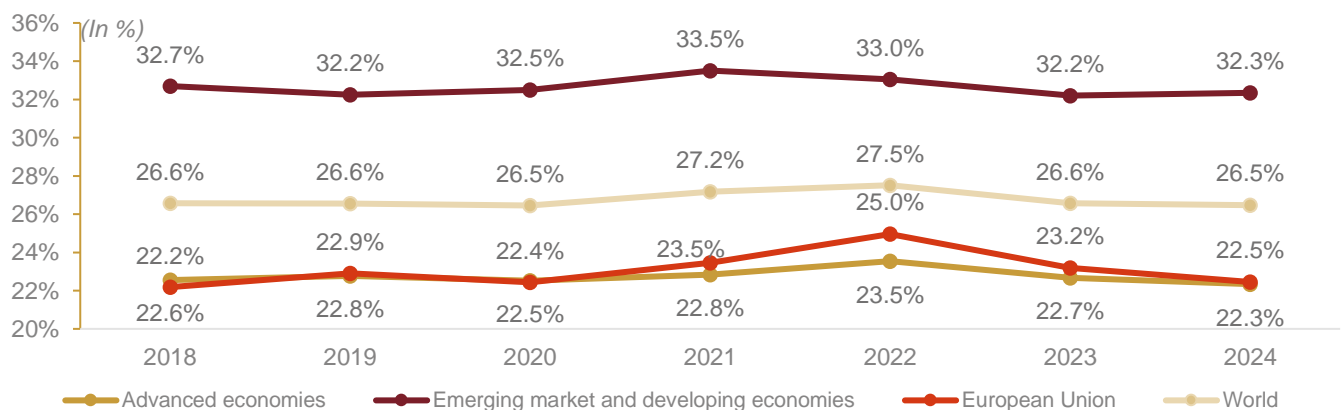
Investments in emerging and developed economies to lead the overall FDI growth

In 2023, global foreign direct investment (FDI) flows reached an estimated \$1.37 trillion, a 3% increase from 2022, despite initial recession fears and economic uncertainty. While developed economies faced challenges, investments in emerging and developing economies continued to grow, contributing to the overall global GDP growth.

In particular, ASEAN, China, India, and other emerging economies saw an increase in greenfield project announcements, indicating a promising future for FDI in these regions. Although some countries, such as China and India, experienced a decline in FDI inflows, they remained attractive destinations for investment, with stable numbers of new project announcements. Moreover, the ongoing diversification of supply chains due to geopolitical conflicts and a concentrated base in certain countries has led companies to explore alternative investment opportunities in emerging economies. As a result, these economies are now receiving increased investments, with FDI as a percentage of GDP standing at approximately 32% for emerging and developing economies, compared to 27% for the world overall.

Overall, the growth in FDI in emerging and developing economies is a positive trend that is expected to continue, contributing to the global economy's overall growth and development.

Investments as a percentage of GDP



Source: IMF, CRISIL MI&A

Lack of electricity access in key economies to drive investments in power distribution and transmission

As per International Energy Agency (IEA), world energy outlook 2023, there are around 600 million people without access to electricity in Africa and they constitute around 80% of the global population without access, displaying the critical need for electrical infrastructure in Africa. This lack of access to electricity across the African region has influenced public and private investments in the deployment of new transmission and distribution networks across the region.

Further, in Latin America and the Caribbean the power sector investment is also expected to increase to meet rising electricity demand and to modernise and expand grid infrastructure.

2 Macroeconomic overview of India

Review of India's real GDP growth

India's Real GDP registered a CAGR of 5.9% between fiscal 2012 and fiscal 2024

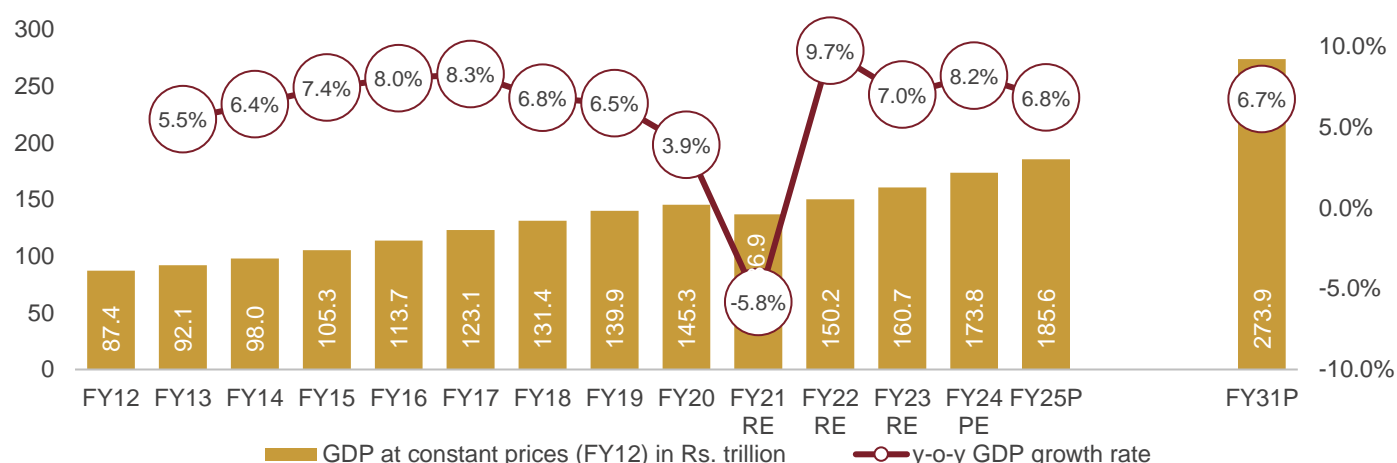
The country's gross domestic product (GDP) at constant prices increased at a compound annual growth rate (CAGR) of 5.9% to Rs 173.8 trillion in fiscal 2024 from Rs 87.4 trillion in fiscal 2012.

In fiscal 2022, the economy recovered from the pandemic-related stress as restrictions were eased and economic activity resumed, though inflation spiralled in the last quarter due to geopolitical pressures, with a real GDP growth of 9.7% vs -5.8% in fiscal 2021. In fiscal 2023, real GDP rose 7.0% on strong growth momentum propelled by investments and private consumption. The share of private consumption in GDP rose to a 11-year high of 58.0%. During the same period the investments occupied a share of 33.3% in GDP.

In fiscal 2024, real GDP has seen a growth of 8.2%. Even as the agricultural economy slowed sharply in fiscal 2024 following a weak monsoon, the surge in non-agricultural economy has more than offset it. The government-driven investment push, along with easing input cost pressures for industry, has also played a major role in shoring up growth. However, services have been slowing with waning pent-up demand (post pandemic), with the exception of financial, real estate and professional services, which has powered ahead on the back of robust growth in banking and real estate.

In fiscal 2025, CRISIL MI&A expects the country's real GDP to expand 6.8% on a Y-o-Y basis, driven by continued disinflation supporting the purchasing power of consumers, growth in agricultural sector coupled with gradual pick-up in the private sector capital expenditure..

Real GDP growth in India (new series) – constant prices



Note: RE: revised estimates, PE: Provisional estimates P: projected

These values are reported by the government under various stages of estimates

Only actuals and estimates of GDP are provided in the bar graph

Source: Central Statistics Office (CSO), Ministry of Statistics and Programme Implementation (MoSPI), CRISIL MI&A

Between fiscal 2025 and fiscal 2031, India's GDP growth is expected to average at 6.7%

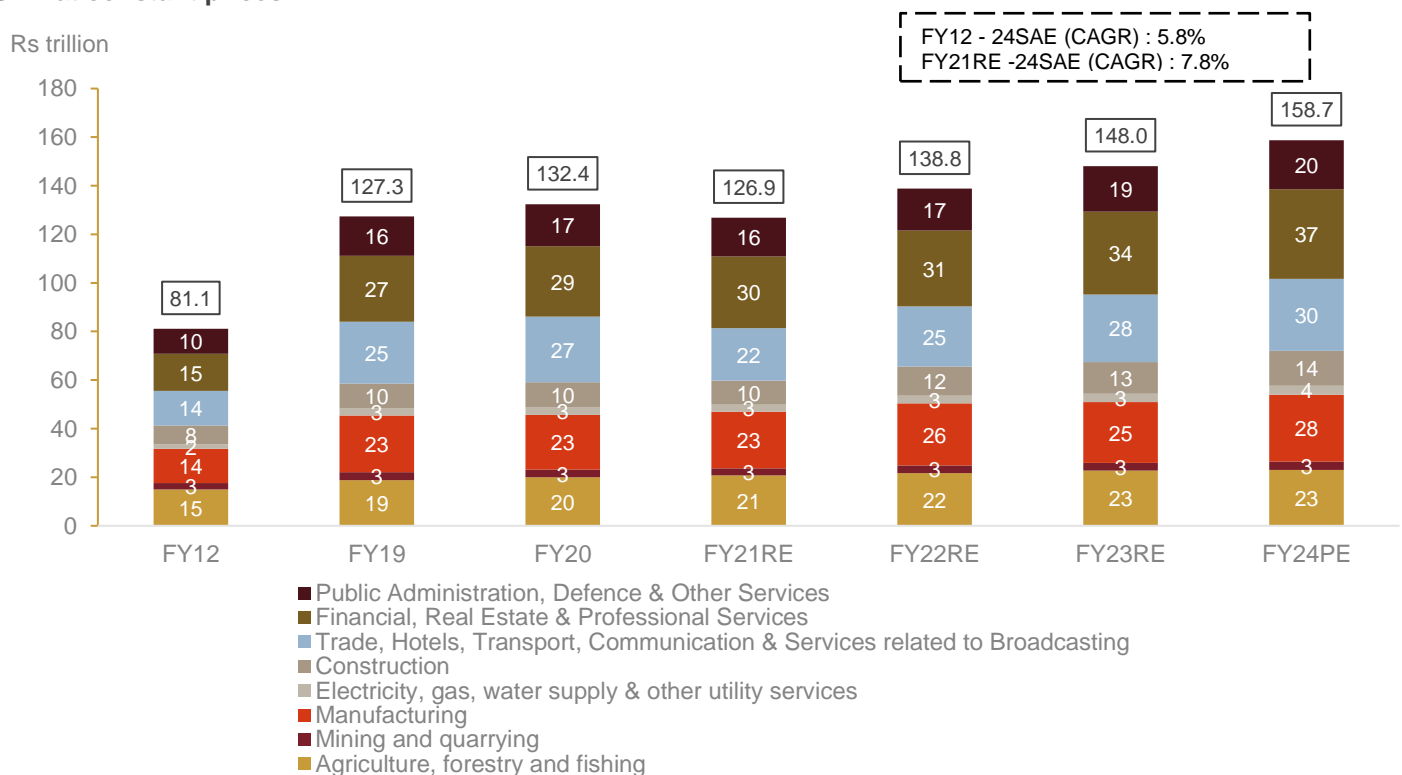
Between fiscal 2025 and fiscal 2031, CRISIL MI&A expects India to sustain average GDP growth of 6.7%, which will make India the third-largest economy in the world and lift per capita income.

Going ahead, in the near-term GDP growth is majorly characterised by rise in private sector investments and improved efficiency in domestic industries. As the government focuses on fiscal consolidation, its contribution to overall capital expenditure will partly diminish compared to past few years. Nevertheless, private sector investments are expected to gradually become more significant. Manufacturing sector is expected to grow faster than in the past decade between FY11 and FY20. Manufacturing and service sector is expected to grow at 9.1% and 6.9% respectively between FY25 and FY31. But service sector will remain the dominant driver of India's growth, contributing to 55.5% share in GDP by FY31 compared to 20.0% share of manufacturing sector in FY31, even as manufacturing sector catches-up on growth momentum.

India's GVA has grown by 7.2% in constant terms during fiscal 2024

Gross value added (GVA) at constant prices grew 6.7% in fiscal 2023, compared with 9.4% growth in fiscal 2022. In absolute terms, constant GVA was valued at Rs 148.0 trillion in fiscal 2023, up from Rs 138.8 trillion in fiscal 2022. Additionally, in fiscal 2024, GVA is estimated to have reached Rs 158.7 trillion, up from Rs 148.0 trillion, in fiscal 2023, registering a growth of 7.2%. Overall, GVA has registered a CAGR of 5.8% between fiscal 2012 and fiscal 2024. Within GVA, i) financial, real estate & professional services, ii) trade, hotels, transport, communication & services related to broadcasting and iii) manufacturing are the top three contributors to the overall GVA in fiscal 2024(SAE) with the share of 23.3%, 18.6% and 17.3% respectively.

GVA at constant prices



Note: RE: revised estimate, PE: provisional estimate, PE: Provisional estimates

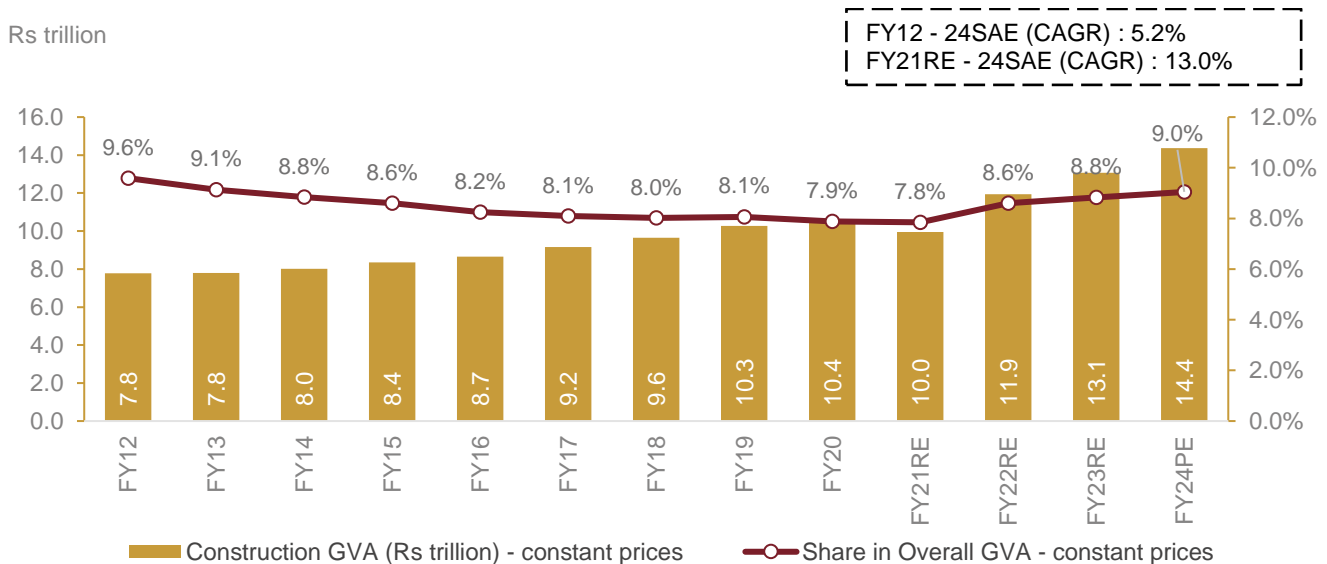
The value represented in boxes in the above bar graph indicates the overall GVA for the corresponding period

Source: MoSPI, CRISIL MI&A

Construction industry occupied a share of 9.0% in overall GVA at constant prices during fiscal 2024

The contribution of construction industry in India in the overall GVA of the country range between 7-10% during fiscal 2012 and fiscal 2024. Over the years, on back of strong government support through various initiatives such as Dedicated freight corridor, Bharatmala, Sagarmala, Smart cities, Pradhan Mantri Aawas Yojna, GVA of construction industry (in absolute terms) at constant prices grew to Rs 14.4 trillion in fiscal 2024, on a base of Rs 7.8 trillion in fiscal 2012, thereby registering a CAGR of 5.2%.

Construction GVA (constant prices)



Note: RE: revised estimate, PE: Provisional estimates

Source: Ministry of Statistics and Programme implementation, CRISIL MI&A

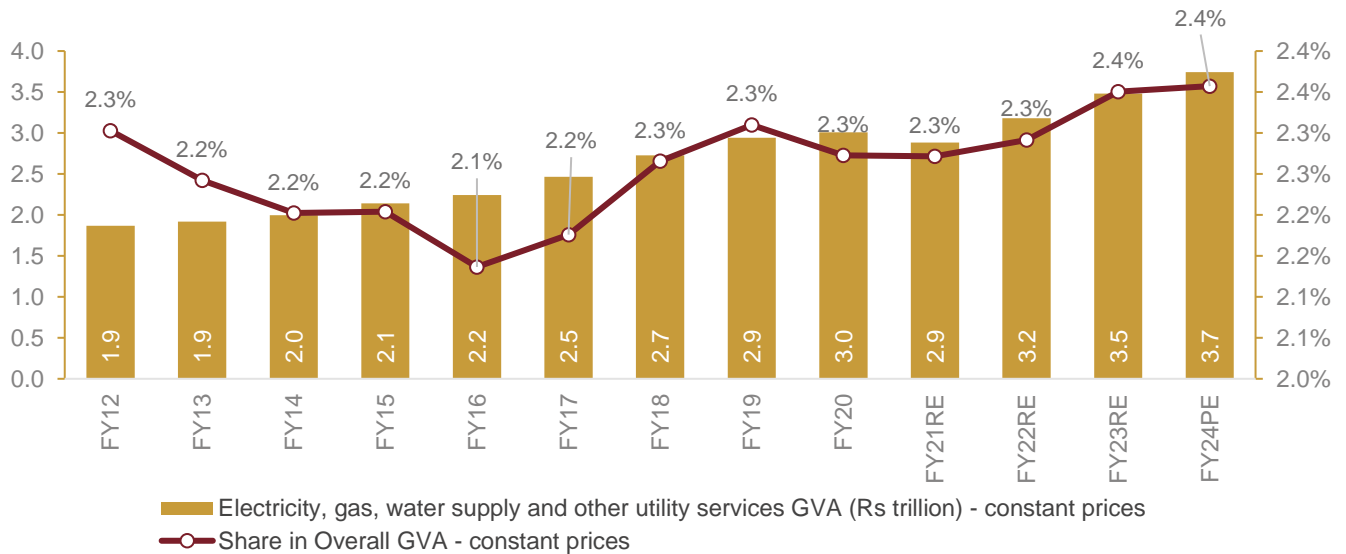
Electricity, gas, water supply and other utility services occupied a share of 2.4% in overall GVA at constant prices during fiscal 2024

The contribution of electricity, gas, water supply and other utility services in India in the overall GVA of the country range between 2-3% during fiscal 2012 and fiscal 2024. Over the years, on back of strong government support through various initiatives such as Pradhan Mantri Sahaj Bijli Har Ghar Yojana – Saubhagya, Deendayal Upadhyaya Gram Jyoti Yojana (DDUGJY) coupled with increased on renewable energy, GVA of the industry (in absolute terms) at constant prices grew to Rs 3.7 trillion in fiscal 2024, on a base of Rs 1.9 trillion in fiscal 2012, thereby registering a CAGR of 6.0%.

Electricity, gas, water supply and other utility services GVA (constant prices)

Rs trillion

FY12 - 24SAE (CAGR) : 6.0%
FY21RE - 24SAE (CAGR) : 9.1%



Note: RE: revised estimate, PE: Provisional estimates

Source: Ministry of Statistics and Programme implementation, CRISIL MI&A

Fundamental growth drivers of GDP

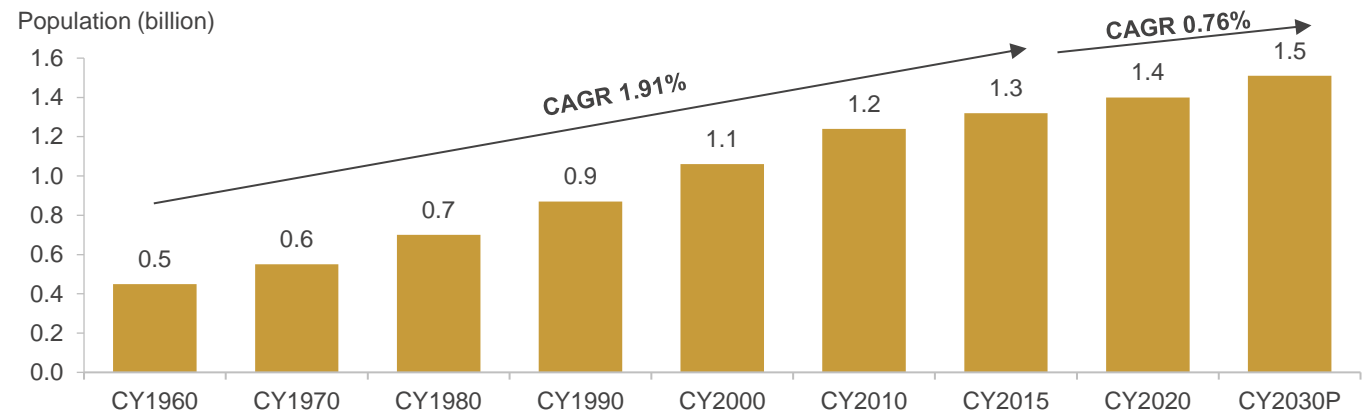
Growing population, increasing urbanisation and a young demographic profile to strengthen India's economic growth

India's population grew to ~1.21 billion according to Census 2011, at a CAGR of 1.64% between CY2001 and CY2011. As of 2010 census, the country had 249.50 million households. Additionally, as per United Nations Population Fund's (UNFPA), "State of World Population Report" of 2023, India's population by mid-year of 2023 is estimated to have surpassed China by around ~2.9 million. This demographic expansion along with increasing per capita income will lead to increase consumer spending in India in turn driving India's GDP.

Further, urbanisation has also seen an uptrend growing from 17.92% in 1960 to an estimated 32.78% in 2020. This growth in urbanisation necessitates enhancements in facilities such as housing, transportation and utilities to support the increased population density. This in turn has aided in increased spends toward urban infrastructure.

Going ahead, India's urban population is expected to continue to rise on the back of economic growth. The share of urban population is projected to increase to nearly 40.14% by 2030, according to a UN report on urbanisation.

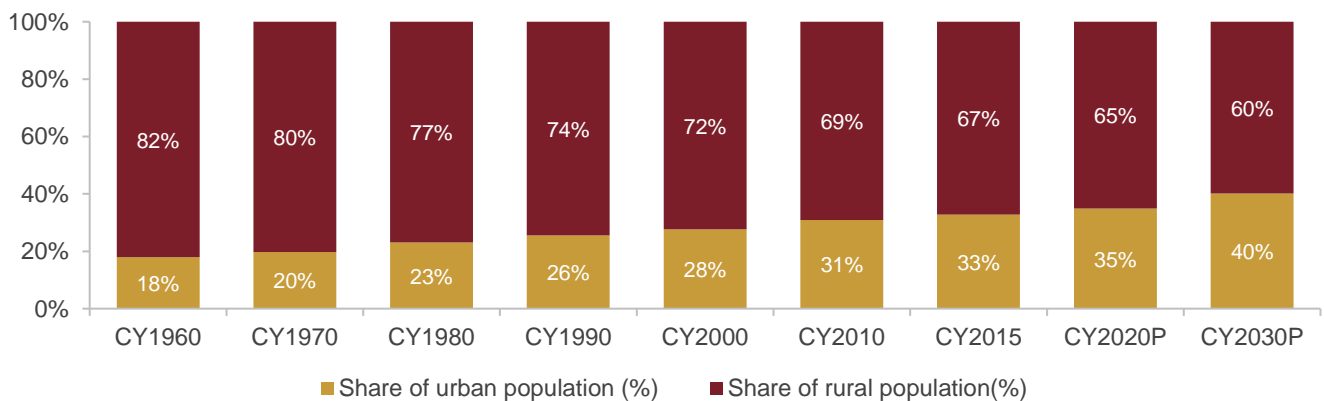
India's population growth



P: Projected

Source: UN Department of Economic and Social Affairs, World Population Prospects 2022, CRISIL MI&A

India's urban vs. rural population (in million)



P: projected

Source: World Urbanization Prospects: The 2018 Revision, UN, CRISIL MI&A

As per the United Nations' 2022 Revision of World Population Prospects, India's youth (0-24 years) accounted for nearly half its population in 2010, significantly higher than that for some of its peers (Brazil at 43%, China at 35% and the Russian Federation at 30%). The fact that 31% of the population is aged below 15 indicates the high proportion of the country's young population is expected to remain so in the coming years.

This share (0-24 years) is, in fact, expected to reach 39% by 2030, and remain significantly higher than that of its peers (Brazil at 32%, China at 25% and the Russian Federation at 26%). This also indicates a higher proportion of the population entering the workforce.

Age-wise population break-up (%) for key countries

Country	0-14 years	15-24 years	25-49 years	50-69 years	70+	Total
Brazil						
CY2010	25%	18%	38%	15%	4%	100%
CY2020	21%	16%	39%	18%	6%	100%
CY2030P	18%	14%	38%	21%	9%	100%
China						
CY2010	19%	17%	41%	18%	6%	100%
CY2020	18%	12%	38%	24%	8%	100%
CY2030P	13%	13%	34%	28%	12%	100%
India						
CY2010	31%	19%	34%	12%	3%	100%
CY2020	26%	18%	37%	15%	4%	100%
CY2030P	23%	16%	38%	17%	6%	100%
Russian Federation						
CY2010	15%	15%	38%	22%	10%	100%
CY2020	18%	10%	38%	24%	10%	100%
CY2030P	16%	13%	34%	24%	13%	100%
UK						
CY2010	18%	13%	35%	22%	12%	100%
CY2020	18%	12%	33%	23%	14%	100%
CY2030P	16%	12%	32%	24%	16%	100%
US						
CY2010	20%	14%	35%	22%	9%	100%
CY2020	19%	13%	33%	24%	11%	100%
CY2030P	17%	13%	34%	22%	15%	100%

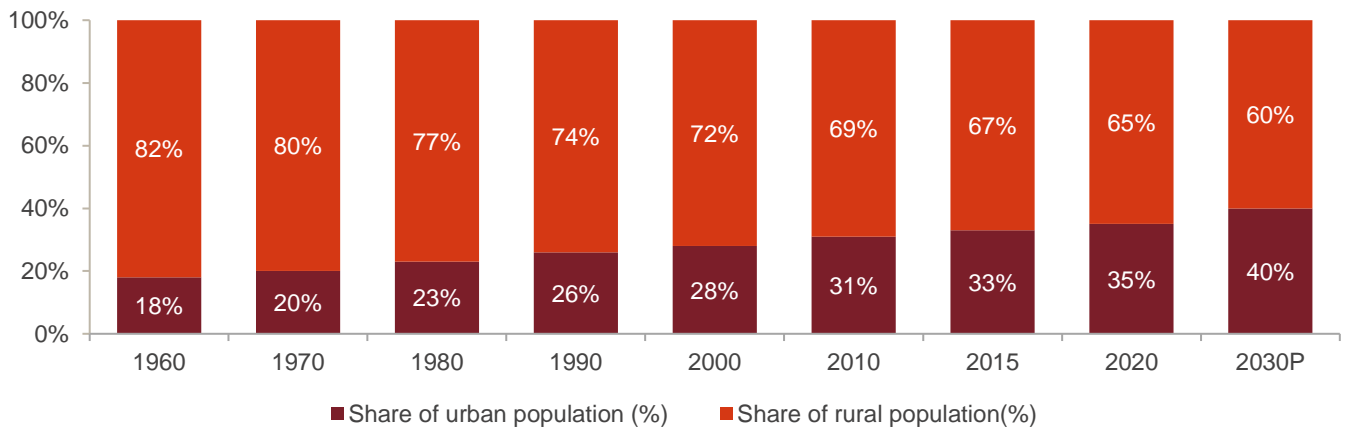
P: Projected

Source: United Nations, Department of Economic and Social Affairs, Population Division (2022); World Population Prospects 2022, CRISIL MI&A

Urbanisation likely to reach 40% by 2030

India's urban population has been increasing over the years. The trend is expected to continue as economic growth increases. From ~31% of the total population in 2010, urban population in the country is projected to reach nearly 40% by 2030, according to a UN report on urbanisation. People from rural areas move to cities for better job opportunities, education, and quality of life. Typically, migration can be of the entire family or a few individuals (generally an earning member or students).

India's urban population versus rural



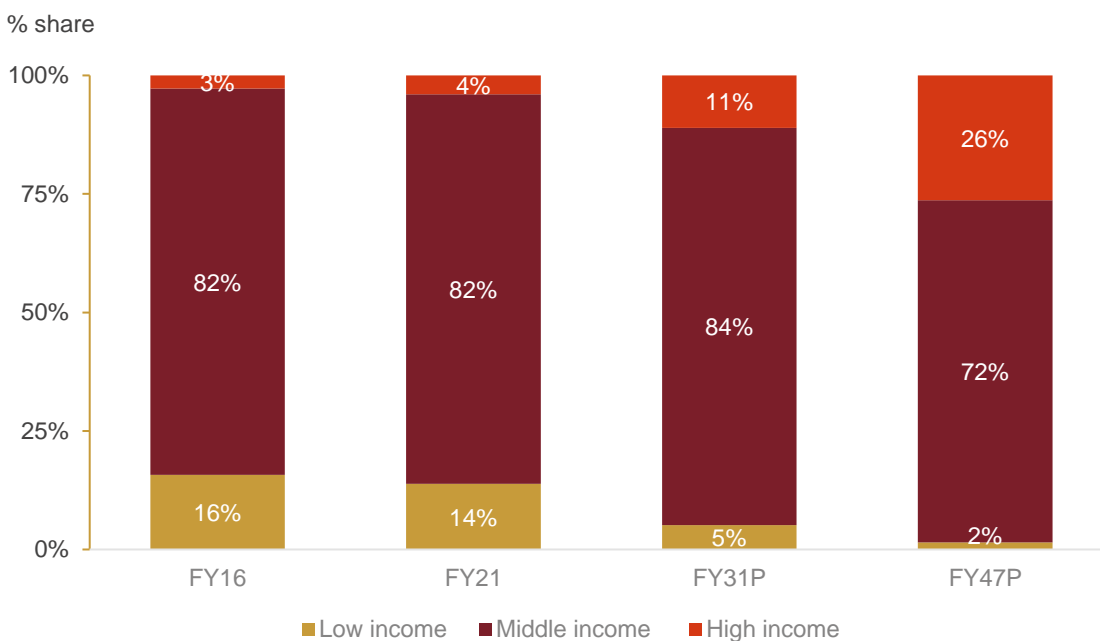
Note: P: Projected

Source: World Urbanization Prospects: The 2018 Revision, UN, CRISIL MI&A

Decline in poverty levels indicates rise in middle- and high-income group in India

The proportion of poor in India (defined as those living on Rs 125,000 per annum or less) declined from 15.71% in fiscal 2016 to 13.84% in fiscal 2021. Conversely, the proportion of those in the middle- and high-income groups increased from 84.29% to 86.16%. By fiscal 2031, this share is expected to reach 94.84%, supported by growth in per capita income.

Income-based split of the population



P: Projected

Note: Low-income group comprises those earning less than Rs 125,000 per annum; middle-income group comprises those earning between Rs 125,000 and Rs 3 million per annum, and high-income group comprises those earning more than Rs 3 million per annum; percent figures are rounded off

Source: People Research on India's Consumer Economy (ICE) 360° survey, CRISIL MI&A

Robust growth in per capita income over FY12-24

India's per capita income, a broad indicator of living standards, rose from Rs 63,461.7 in fiscal 2012 to Rs 99,403.9 in fiscal 2023, logging 4.2% CAGR. Growth was led by better job opportunities, propped up by overall GDP growth. Moreover, population growth remained stable at ~1% CAGR. Furthermore, according to second advance estimates for fiscal 2024, per capita net national income (constant prices) is estimated to have increased to Rs 106,743.8; thereby registering a y-o-y growth of 7.4%.

Per capita net national income at constant prices

	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21RE	FY22RE	FY23RE	FY24PE
Per-capita NNI (Rs)	63,461.7	65,538.5	68,572.5	72,804.6	77,659.2	83,003.0	87,585.8	92,132.8	94,420.0	86,034.2	94,054.2	99,403.9	106,743.8
Y-o-Y growth (%)		3.3%	4.6%	6.2%	6.7%	6.9%	5.5%	5.2%	2.5%	-8.9%	9.3%	5.7%	7.4%

Note: RE: revised estimates, PE: provisional estimates

Source: Second advance estimates of national income 2023-24, CSO, MoSPI, CRISIL MI&A

GFCF has seen growth led by government focus on infrastructure spending

Gross fixed capital formation (GFCF) the indicator for fixed investments done by both government and private sector, has seen a rise from Rs 30.0 trillion in fiscal 2012 to Rs 58.3 trillion in fiscal 2024 (as per advanced estimates) growing at a CAGR of 5.7%. Further, over the years, in terms of the share to the total GFCF (at constant prices), the highest contributor is non-financial corporations followed by household sector.

Overview of GFCF and share in GDP – at constant prices

	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21 RE	FY22 RE	FY23 RE	FY24 PE	CAGR FY12-FY24
GFCF (Rs trillion)	30.0	31.5	31.9	32.8	34.9	37.9	40.8	45.4	45.9	42.7	50.1	53.5	58.3	5.7%
Share of GFCF in GDP	34.3%	34.1%	32.6%	31.1%	30.7%	30.8%	31.1%	32.4%	31.6%	31.2%	33.4%	33.3%	33.5%	-

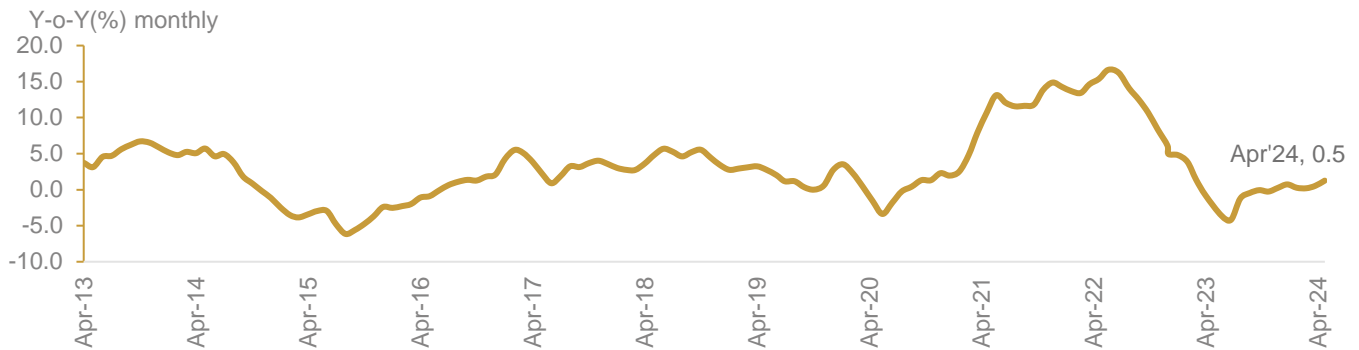
RE: Revised estimates, PE: Provisional estimates

Source: Second advance estimates of national income 2023-24, CSO, MoSPI, CRISIL MI&A

Review of WPI Inflation in India

Wholesale Price Index (WPI)-linked inflation accelerated to 1.3% in April from 0.5% in March and 0.2% in February, the highest print in over a year. Both food and non-food WPI inflation rose relative to the previous month. That said, non-food prices remained in deflation mode. Food inflation hardened to 5.5% from 4.6%, led by rising vegetables inflation (23.6% vs 19.5%). Crude petroleum inflation surged to 6.5% from -9.4%, tracking the increase in global oil prices. Prices of manufactured products fell at a milder pace on-year (-0.4% vs -0.8%).

Overview of WPI inflation



Source: MoSPI, CRISIL MI&A

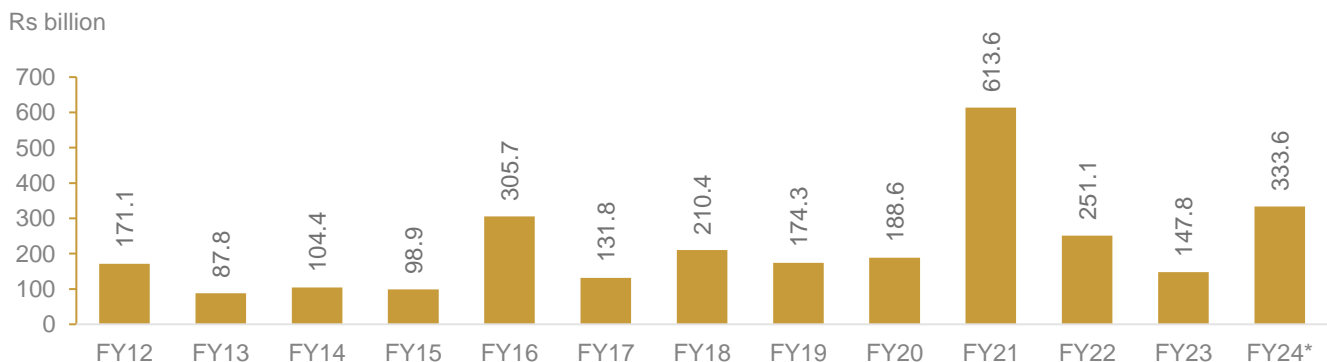
FDI inflows in Indian construction Industry

The Indian construction industry is a pivotal sector contributing significantly to the nation's economic growth, accounting for 9.0% of total GVA as of fiscal 2024. It includes residential, commercial, industrial, and infrastructure projects, and has seen a steady rise with a in construction GVA growing at 5.2% CAGR from fiscal 2012 to 2024, driven by rapid urbanization, government initiatives, and increased investments.

In 1990, India, with assistance from the World Bank and International Monetary Fund (IMF), initiated reforms to address a balance-of-payments crisis, opening its doors to foreign direct investments (FDI) and establishing the Foreign Investment Promotion Board (FIPB) to facilitate FDI. Although the FIPB was disbanded in 2017, individual departments now approve FDI proposals with the Department of Industrial Policy and Promotion (DIPP), positioning India as a key FDI destination.

In India, FDI can be done through the automatic route, not requiring government approval, or the government route, which requires prior approval. The construction sector attracts 100% FDI investments through automatic routes. The sector has seen highest FDI investment of Rs 613.6 billion in fiscal 2021, majorly driven by the rise of FDI investments in warehousing. As of fiscal 2023, the Indian construction industry saw an FDI inflow of Rs 147.8 billion.

Trend of FDI inflows in Indian construction industry



Note: The values mentioned above encompass Foreign Direct Investment (FDI) inflows within both India's construction and infrastructure sectors, as detailed under Construction (Infrastructure) activities and Construction development categories as published by DPIIT

*Data is for the period April 2023 to December 2023

Source: Department for Promotion of Industry and Internal Trade (DPIIT), CRISIL MI&A

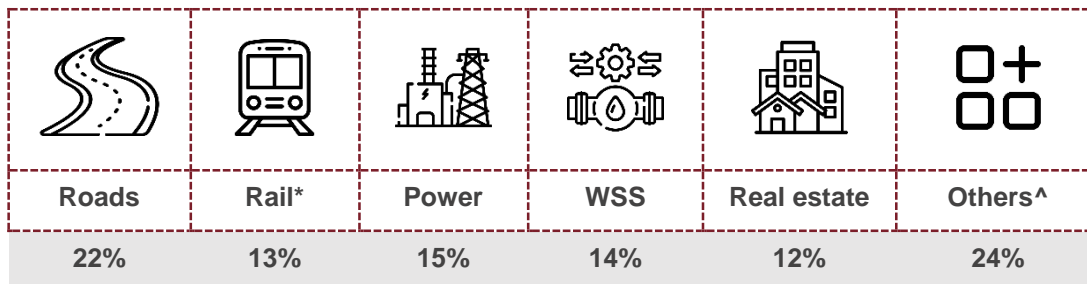
Overview of National Infrastructure Pipeline (NIP)

In fiscal 2019, Government of India has launched the National Infrastructure Pipeline (NIP) for fiscal 2020 – 2025, with an aim to improve India’s infrastructure and attract investments across various sectors. To draw up NIP, economic and social infrastructure projects worth more than Rs 1,000 million per project under construction, proposed greenfield projects, brownfield projects and those in conceptualisation stage were considered. These pipelines of projects are implemented by all the states and union territories of India and 22 infrastructure ministries under Government of India.

With various projects across sectors the NIP aims to create various employment opportunities while enhancing the standard of living. It also aims to increase investments in the projects by improving investors’ confidence through better project preparation, reducing aggressive bids/failure in project delivery and ensuring enhanced access to sources of finance.

Initially, the NIP started with 6,835 projects. By April 2024, this number has increased to 9,651 projects across 54 different sectors. Out of these, 2,104 projects are currently under development, showing progress in India’s infrastructure development efforts. The total investment target under NIP during the period, has been revised from Rs 111 trillion to Rs 147 trillion.

Transport, power, and water projects occupy major share under planned NIP spending of planned Rs 147 trillion



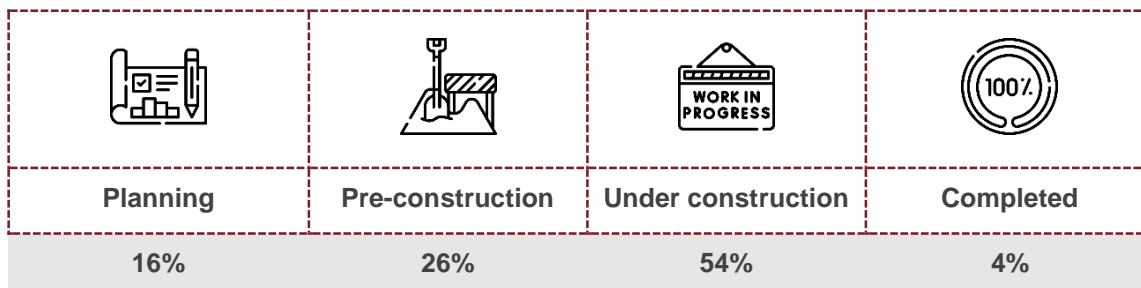
Note: Values are rounded-off to closest whole number

*Rail also includes investments under Mass Rapid Transit System (MRTS)

^Others include Others include irrigation, rural infra, ports, airports, health, petroleum, natural gas, education, etc

Source: India Investment Grid (IIG), CRISIL MI&A

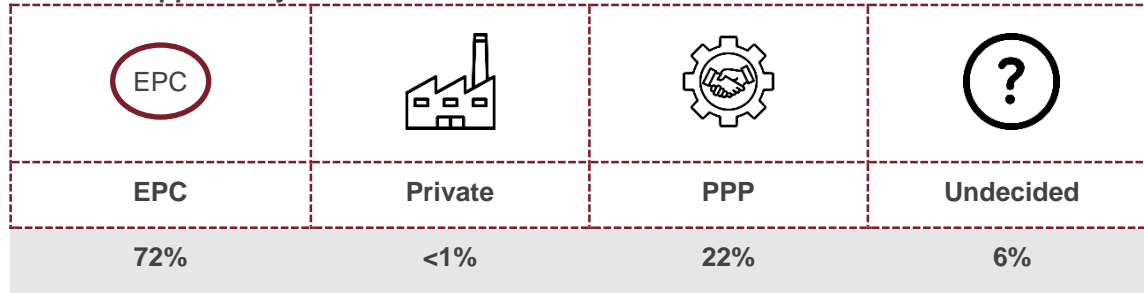
Half of the NIP projects (value terms) are under implementation



Note: Values are rounded-off to closest whole number

Source: India Investment Grid (IIG), CRISIL MI&A

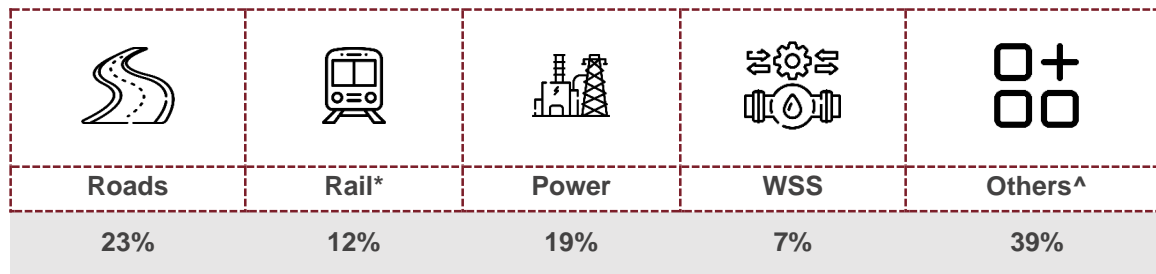
Total EPC opportunity at ~Rs 92 trillion



Note: Values are rounded-off to closest whole number

Source: India Investment Grid (IIG), CRISIL MI&A

Transport sector occupies the highest share among the total EPC contracts



Note: Values are rounded-off to closest whole number

*Rail also includes investments under Mass Rapid Transit System (MRTS)

^Others include Others include irrigation, rural infra, ports, airports, health, petroleum, natural gas, education, etc

Source: India Investment Grid (IIG), CRISIL MI&A

3 Overview of EPC industry in India

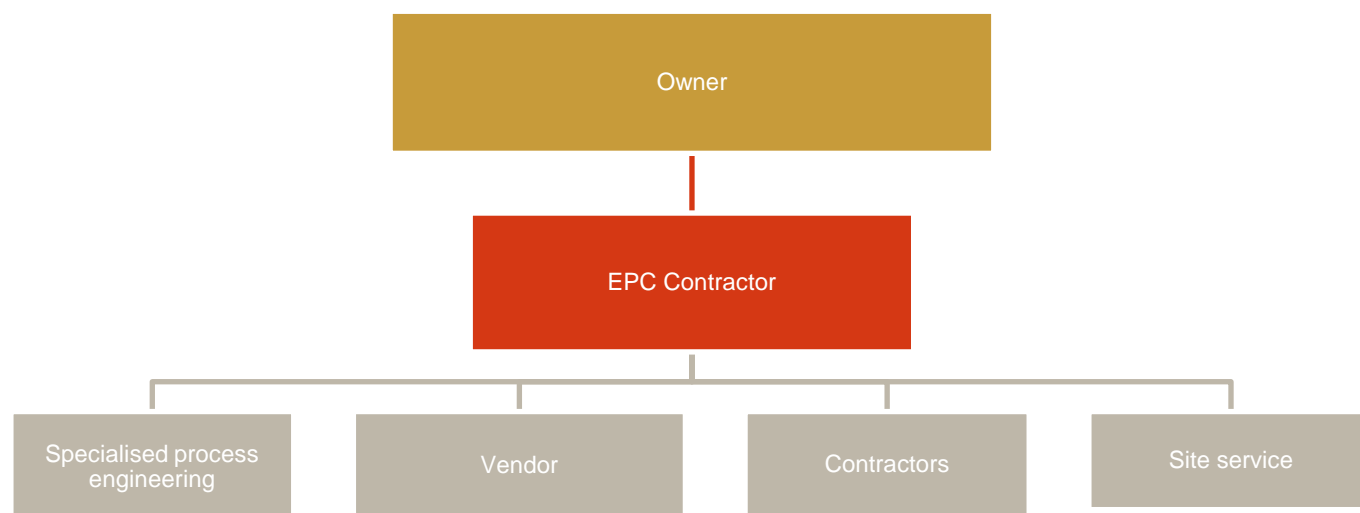
Qualitative overview of structure of EPC Market

Over the years, the infrastructure business has seen various contracting methods evolve. Traditional contracting models have been replaced by new approaches as projects have grown more complex. Gradually, the responsibility for project management has moved from the owner or developer to the contractor.

This shift is evident in the move from owner-managed projects to Engineering, Procurement, and Construction (EPC) contracts. In EPC contracts, the contractor assumes the risks of time and cost overruns, along with the responsibilities for design, material procurement, and construction. These contracts also shield the owner/developer from currency and interest rate fluctuations.

Unlike other contracts where procurement and design are separate processes, EPC contracts integrate them, reducing the overall project duration. Contract which requires heavy financial and technical requirement generally divided into smaller EPC projects.

EPC Model



Source: CRISIL MI&A

A typical EPC project covers design, civil works, equipment purchase and installation, and commissioning. Most of the EPC players provide integrated and customised solutions as per the client requirements through a consultative approach. Favourable government initiatives, increased infrastructure development in sectors such as roads, power, railways, irrigation etc have provided impetus to EPC contracts.

Overview of key client types in Indian EPC industry

In the Indian Engineering, Procurement, and Construction (EPC) industry, clients can be broadly categorized based on their sector and specific requirements. Here are some key client types:

1. Public Sector Institutions

These include government bodies and public sector undertakings (PSUs) involved in large-scale infrastructure projects.

Ministries and Government Departments: Various ministries such as the Ministry of Road Transport and Highways, Ministry of Power, and Ministry of Railways oversee significant infrastructure development.

Public Sector Undertakings (PSUs): Organizations like Oil and Natural Gas Corporation (ONGC), National Thermal Power Corporation (NTPC), and Indian Railways act as major clients for EPC contractors.

2. Private Sector Clients

Private companies across various industries also play a substantial role in the EPC industry.

Industrial Sector: Companies in sectors such as oil and gas, power, petrochemicals, and manufacturing frequently require EPC services for setting up plants and facilities.

Real Estate and Commercial: Real estate developers and commercial establishments often engage EPC contractors for large-scale construction projects.

3. International Clients

Foreign companies and multinational corporations looking to establish or expand their presence in India often require EPC services.

Multinational Corporations: Global players in industries such as energy, automotive, and chemicals may engage Indian EPC firms for their projects in India.

Development Agencies: International development agencies and financial institutions like the World Bank and Asian Development Bank often fund infrastructure projects, requiring EPC services for execution

Overview of key regulatory factors impacting the industry

The EPC market in India is subject to a range of regulatory influences that play a crucial role in ensuring the efficiency, safety, and longevity of projects in sectors like infrastructure, energy, and industrial development. The regulatory framework governing the EPC market in India is designed to address various aspects such as environmental impact, labour standards, project financing, and compliance with industry-specific guidelines.

- **Environmental Clearances:** Projects frequently need to obtain environmental clearances from the Ministry of Environment, Forest and Climate Change (MoEFCC) to guarantee that they adhere to environmental regulations. These clearances are essential to ensure that the projects do not have a negative impact on the environment and follow the necessary standards set by the ministry.
- **Pollution Control:** It is essential for EPC projects, particularly those in the industrial and infrastructure sectors, to adhere to the Air (Prevention and Control of Pollution) Act, 1981, and the Water (Prevention and Control of Pollution) Act, 1974. Compliance with these environmental regulations is mandatory to ensure that the projects do not have a negative impact on the air and water quality in the surrounding areas.
- **Environmental Impact Assessment (EIA):** Certain categories of projects are required to undergo Environmental Impact Assessment (EIA) to evaluate and address potential environmental impacts. This process is crucial for identifying any adverse effects on the environment and proposing appropriate measures to mitigate these impacts. EIA plays a significant role in ensuring that development projects are carried out in a sustainable and environmentally responsible manner, ultimately contributing to the protection and preservation of the natural environment.
- **Land Acquisition Act:** The Land Acquisition Act of 2013, also known as The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation, and Resettlement Act, is responsible for overseeing

the procedures involved in acquiring land, with a focus on providing fair compensation and proper rehabilitation for families impacted by the acquisition.

- **Labour Laws:** Compliance with labour regulations, such as the Occupational Safety, Health, and Working Conditions Code of 2020, is crucial to guarantee the well-being and safety of workers at construction sites.
- **Contract Law:** The Indian Contract Act of 1872 holds jurisdiction over the creation and implementation of contracts, which are essential for EPC (Engineering, Procurement, and Construction) agreements. This legislation outlines the legal framework for entering into agreements, ensuring that parties involved adhere to the terms and conditions set forth in the contract. The Act also provides guidelines for the enforcement of contracts, offering protection to parties in case of breaches or disputes. Understanding the provisions of this law is crucial for businesses and individuals engaging in contractual agreements within India.
- **Arbitration and Conciliation:** The Arbitration and Conciliation Act of 1996 establishes a structure for resolving disputes, a process that is frequently utilized in EPC projects.
- **Project Financing:** The funding of major EPC projects, such as infrastructure and energy projects, is overseen by regulations set forth by the Reserve Bank of India (RBI) and other financial authorities in India. These regulations play a crucial role in ensuring that project financing is conducted in a transparent and compliant manner, safeguarding the interests of all stakeholders involved. By adhering to the guidelines established by the RBI and other financial authorities, project sponsors and investors can navigate the complexities of financing large-scale projects.

Overview of key factors influencing EPC player selection



Source: CRISIL MI&A

Further in India, in general, a single stage two part system (referred to as the "Bidding Process") is used for selection of the EPC contractor in order to award the project. It includes technical evaluation and financial evaluation

1. Technical qualification: In this the eligibility and qualification criteria are evaluated based on years of experience and expertise of the contractor in the said industry in which EPC project is being executed, domicile of the executing contractor, availability of resources with the contractor and capabilities of such resources among others

2. Financial qualification: In this the average annual turnover of the EPC contractor over the past 3 financial years is considered which needs to be above the said criteria mentioned along with this the EPC contractor should have a minimum net worth (set forth in bid document) as per his financials. Further, in some cases a minimum amount of working capital as per its latest financials is also considered. In addition, the contractor is also asked to furnish financial statements for the necessary financial years.

Post this the EPC contractor with lowest bid value called the "L1 bidder" is selected to whom the contract is awarded. Further, in some of the bidding processes a weighted average of qualification criteria (technical and financial) and bid value is considered while awarding the contract.

Overall investments across sectors in India

Investments to grow by 1.5 times between fiscals 2025-29 compared to fiscals 2019-24

Growth in sector is expected to be propelled by the infrastructure segment over the medium to long term as the building construction and industrial sectors are expected to record sedate growth rates.

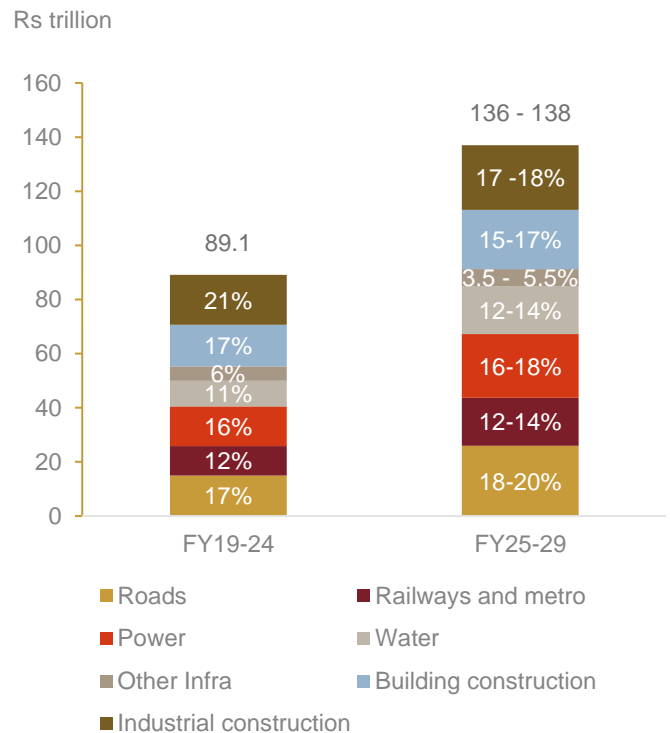
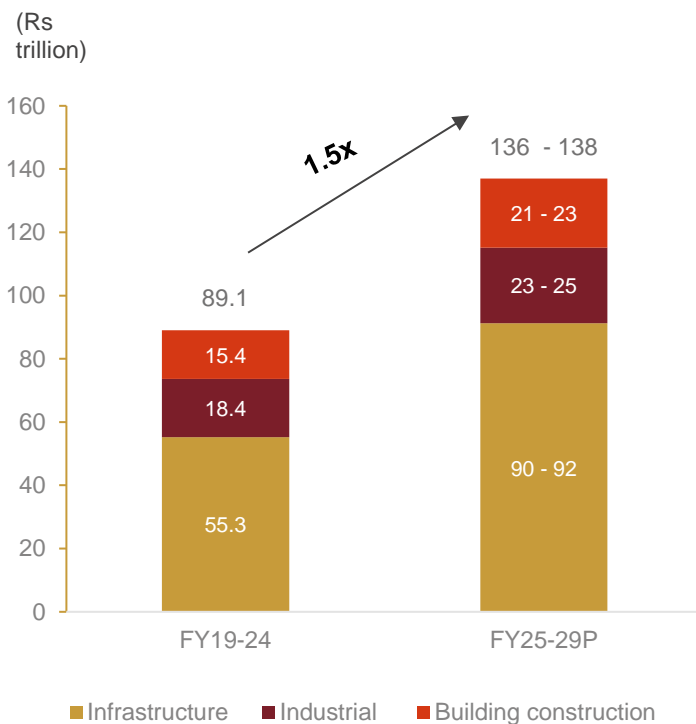
Over the long term, CRISIL MI&A projects the overall investments to rise by 1.5 times between fiscals 2025-29 compared with those over fiscals 2019-24.

The share of infrastructure projects is expected to increase to 66-68% of the overall investments for the fiscals 2025-29 as against 62% in the past five years (fiscal 2019-24), as infrastructure investments are expected to see faster growth than the other two segments (building construction and industrial) due to the Government's focus on Infrastructure under the National Infrastructure Pipeline (NIP), National Monetisation Pipeline (NMP) and the Gati Shakti initiative. The Central government's focus on roads, urban infrastructure and railways will boost infrastructure investments. At an investment level, investments in the infrastructure sector are expected to be 1.7x during fiscals 2025-29 compared to fiscals 2019-24.

Industrials segment investments are expected to increase by 1.3 times between fiscals 2025-29 compared with fiscals 2019-24. Investments in the sector are driven by the investments in oil and gas segments led by capital expansion plans by industry players as well as investments by upstream oil & gas and downstream natural gas players. Further to this, investments through PLI scheme in major capital intensive sectors such as auto and auto components, textiles and specialty steel are expected to aid the growth in investments.

Investments in building construction are expected to increase by 1.4 times, though its share is expected to fall to 16-18% between fiscals 2025-29 compared with a share of 21% between fiscals 2019-24. This growth is majorly driven by rise of investments in residential segment during the period.

Overall investments across sectors



Note:

Water includes WSS and Irrigation

Other infra includes investments in smart cities, airports, ports, telecom towers and warehouse and storage facilities

P stands for projected

Source: CRISIL MI&A

SWOT analysis of Indian EPC industry

<h1>S</h1> <p>(Strength)</p>	<ul style="list-style-type: none"> • Growing Economy: India's economic growth supports infrastructure development and construction activities. • Government Initiatives: Programs like Sagar mala, Bharat mala, development of metros, Jal Jeevan mission and significant investments in infrastructure projects boost the EPC sector. • Abundant Labor Supply: India has a large pool of skilled laborers, including masons, carpenters, and engineers, who are readily available for construction projects. • Low-cost labour: Labor costs in India are relatively low compared to other countries, making it an attractive destination for construction projects. • Growing Domestic Market: Growth in major sectors such as automobile, residential, commercial real estate, couple with population growth.
<h1>W</h1> <p>(Weakness)</p>	<ul style="list-style-type: none"> • Environmental concerns: The EPC industry in India has faced criticism for its impact on the environment, particularly in terms of waste generation and energy consumption. • High Capital investments: The EPC industry in India requires substantial upfront capital. This coupled with high borrowing costs can limit the capacity for construction in the EPC industry. • Input related risk: Rise in raw material costs would impact the profitability of the companies. However, presence of cost escalation clause in contract would aid in protecting the contractor • Working capital management : delay in payment from government agencies and security and retention money stretch working capital resulting in high interest costs.

<h2 style="font-size: 2em; margin: 0;">O</h2> <p style="margin: 0;">(Opportunities)</p>	<ul style="list-style-type: none"> • Urbanization: Rapid urbanization offers significant opportunities for residential, commercial, and infrastructure projects. • Renewable energy projects: The global shift towards sustainable energy sources is creating new demand for EPC services in renewable energy sectors such as wind, solar and hydroelectric power. This opens a vast opportunity for EPC firms. • Rural Development: Government focus on rural infrastructure development creates opportunities in new geographic areas.
<h2 style="font-size: 2em; margin: 0;">T</h2> <p style="margin: 0;">(Threats)</p>	<ul style="list-style-type: none"> • Economic Slowdown: Any downturn in the economy can significantly affect the infrastructure sector. • Regulatory challenges: Changes in regulations, such as safety standards and building codes. As EPC companies need to comply with these standards, this can impact the project costs and timelines. • Advancement in technology: EPC players should be abreast with latest technologies in order to optimise project management and improve execution efficiency. However, this requires capital investments towards skill development. Lack of such investments would make it difficult for players to obtain projects. • Competitive Pressure: The EPC industry is highly competitive with many firms vying for same projects. This intense competition can pressure profitability and reduce market share.

Source: CRISIL MI&A

Overview of entry barriers for EPC industry in India

The Engineering, Procurement, and Construction (EPC) industry in India is a vital part of the country's infrastructure development, encompassing sectors like infrastructure, and industrial projects. However, entering this industry comes with several barriers:

- **High Capital Requirements:** The EPC industry demands substantial initial investments for equipment, technology, and skilled manpower. Smaller firms may find it challenging to secure the necessary funding to compete with established players.
- **Regulatory and Compliance Issues:** The industry is heavily regulated, requiring companies to comply with various environmental, safety, and labour regulations. Navigating these regulations can be complex and costly affair, posing a significant barrier for new entrants.
- **Technical Expertise:** Some of the EPC projects often require specialized technical knowledge and expertise of the industry. Companies must possess a skilled workforce capable of handling complex engineering tasks and innovative construction techniques. Building such a team is a considerable challenge for newcomers.
- **Project Management Skills:** Managing large-scale EPC projects requires robust project management skills to ensure timely and cost-effective completion. New entrants might lack the experience and processes needed to manage such projects efficiently.
- **Financial Risks and Creditworthiness:** EPC projects often involve significant financial risks, including cost overruns and delays. New entrants must demonstrate strong financial stability and creditworthiness to secure contracts and financing, which can be challenging without a proven track record.
- **Competitive Landscape:** The EPC industry in India is highly competitive, with established players having strong market presence and relationships with key stakeholders. Breaking into this competitive landscape requires significant marketing efforts and the ability to differentiate from existing competitors.

Overview of key factors contributing to the final price of EPC

An Engineering, Procurement, and Construction (EPC) contract involves various factors that contribute to the final price:

- **Project Scope and Complexity:** The more complex and extensive the project, the higher the cost due to the need for advanced technology, specialized skills, and detailed planning.
- **Design Specifications:** Detailed and high-quality designs can increase costs due to the need for precise materials and engineering standards.
- **Material Costs:** Prices of raw materials and equipment can fluctuate, significantly impacting the final price. This includes transportation and storage costs.
- **Labor Costs:** Skilled labour is essential for EPC projects, and wages can vary based on location, demand, and project duration.
- **Permits and Regulations:** Obtaining necessary permits and adhering to local regulations can add to the cost, particularly if there are delays or additional compliance requirements.
- **Risk Management:** Provisions for potential risks such as delays, accidents, or unforeseen issues can be factored into the price as contingencies.
- **Timeline and Schedule:** Accelerated schedules may require additional resources and overtime, increasing costs. Conversely, extended timelines can lead to higher financing and operational costs.
- **Contractor's Overheads and Profit Margins:** The contractor's administrative costs, overheads, and desired profit margin are included in the final pricing.
- **Economic and Market Conditions:** Inflation, currency exchange rates, and economic stability can influence costs, especially for international projects

Key trends and growth drivers for Indian EPC industry

A combination of economic and demographic factors is expected to drive investments in the construction sector.

Growth driver / trends	Description and reasoning
Technological advancements	Advances in technology are driving the EPC industry forward, enabling more efficient and cost-effective project delivery. For example, the use of building information modelling (BIM) and other digital tools is improving project coordination and collaboration, and use of such tools is reducing construction time and costs.
Robotics and automation	The construction industry remains one of the most labour-intensive sectors, with numerous repetitive and time-consuming tasks that can be optimized through robotics and automation. By leveraging robotics, these tasks can be completed faster and with greater precision, reducing human-induced errors and losses due to fatigue.
Sustainability	Sustainability is a key priority for many construction projects across the country. Green building practices aim to reduce the environmental impact of construction projects from start to finish by implementing environmentally friendly measures throughout the project lifecycle. Green buildings use energy and resources efficiently, generate minimal waste during construction, and strive to achieve net zero carbon emissions.
Changing client	With increasing infrastructure investments there is change in client requirements for faster project execution, EPC contractors being better in project management, more efficient delivery, and greater transparency and

Growth driver / trends	Description and reasoning
needs	communication has aided the industry to evolve and adapt to meet these changing needs.
Government initiatives	To foster economic growth and development, Government of India has implemented several initiatives, including the National Infrastructure Pipeline, PM Gati Shakti, Sagarmala project, and Jal Jeevan Mission, to enhance the country's infrastructure. These initiatives have positively impacted the growth of the infrastructure industry in India, which in turn has contributed to the growth of the Engineering, Procurement, and Construction (EPC) industry.

Source: CRISIL MI&A

Overview of key upcoming projects

	Project name	Promoter	Cost (Rs Bn)
Infrastructure	Kaleshwaram Lift Irrigation Project	Kaleshwaram Irrigation Project Corpn. Ltd.	1278.7
	Kalpasar Dam Project	Narmada Water Resources, Water Supply & Kalpsar Department	1002.0
	Link Channel (Parbati-Kalisindh-Mez-Chakan-Banas-Ghanbhiri-Parwati) Project	Water Resources Department, Rajasthan	750.0
	High Speed Rail Corridor (Mumbai-Ahmedabad) Project	National High Speed Rail Corpn. Ltd.	1080.0
	Regional Rapid Transit System (Delhi-Gurgaon-Shahjahanpur-Behror) Project	National Capital Region Transport Corpn. Ltd.	1000.0
	East West Dedicated Freight Corridor Project	Dedicated Freight Corridor Corpn. of India Ltd.	738.0
	Etalin Hydro Electric Power Project	SJVN Ltd.	328.1
	Patratu Coal Based Power Project	Patratu Vidyut Utpadan Nigam Ltd.	320.0
	Hydro Electric Power (Dibang Valley) Project	NHPC Ltd.	318.8
	Ultra Mega Solar Park (Maharashtra)	Maharashtra State Power Generation Co. Ltd.	125.0
	Versova-Virar- Palghar Sea Link Project	Mumbai Metropolitan Region Devp. Authority	634.3
Hindu Hruday Samrat Balasaheb Thackeray Maharashtra Samruddhi Mahamarg	Nagpur-Mumbai Super Communication Expressway Ltd.	553.4	

	Project name	Promoter	Cost (Rs Bn)
	Expressway (Pune-Bengaluru) Project	National Highways Authority of India	492.4
Industrial	Passengers Cars (Gujarat) Project	Maruti Suzuki India Ltd.	350.0
	Electric Locomotives Factory (Dahod) Project	Indian Railways	260.0
	Electric Vehicle Complex (Baranga)	JSW Energy PSP Eleven Ltd.	250.0
	Refinery (Vadinar) Project - Expansion	Nayara Energy Ltd.	1300.0
	Petrochemical Complex (Cuddalore)	Haldia Petrochemicals Ltd.	783.0
	Refinery (Subarnarekha Port) Project	Haldia Petrochemicals Ltd.	782.3
Residential and commercial	Corporate Office Park (Jogeshwari) [Nexus]	RMZ Corp	210.0
	Urban Renewal Cluster (Kisan Nagar) Project	City & Industrial Devp. Corpn. of Maharashtra Ltd.	185.4
	Hyderabad Pharma City (Mucherla) Project	Hyderabad Pharma City Ltd.	164.0
	Artificial Intelligence Park (GIFT City) [Immerso AI Park]	Eros Investments Ltd.	160.0
	High Rise Residential Complex (Sector 76 & 77) [Privana West]	DLF Ltd.	148.7
	Jewellery Park (Mahape)	India Jewellery Park, Mumbai	144.7

Source: CRISIL MI&A

4 Assessment of power sector in India

Overview of power EPC in India

A typical EPC project covers design, civil works, equipment purchase installation, and commissioning. However, the scope of an EPC work has been evolved over the years and now may also include O&M (Operation and Management) services. Most of the EPC players provide integrated and customised solutions as per the client requirements through a consultative approach. The overall project works are classified as supply (material) contracts and services contracts. In a comprehensive package, most of the EPC providers offer 3-5 years of O&M services after commissioning of the project and after expiry of the services, the developer executes a separate long-term O&M agreement with a dedicated O&M service provider.

Mechanical, instrumentation, civil, electrical, operations & maintenance (O&M) and annual maintenance contracts (AMCs) are the key types of EPC works undertaken in the Indian power industry

Mechanical works / erection works is the most critical component when building a power plant due to its high complexity, necessitating involvement of highly specialised suppliers/contractors of power generation, material handling and instrumentation equipment. In terms of civil works, construction requires high design prowess and construction capability due to installation of specialized equipment. Instrumentation and electrical works are of medium complexity level, with equipment and power plant operations conforming to uniform industry standards. Environmental clearance is a must for all the projects. As per interactions with industry stakeholders, EPC contracting is the preferred route for power plants due to standardized process of power plant construction. EPC players typically subcontract different packages of civil, mechanical, instrumentation and electrical works, with specialized suppliers / vendors being awarded contracts for supply of equipment's such as boilers, turbines and generators (BTG), heaters and cooling systems.

Below is the overview of types of EPC works that are undertaken in the power sector. It majorly includes Erection, Testing and Commissioning (ETC) power plants, with complete boilers, turbines and generators (ETC-BTG) and balance of plant (BOP) works, for various sizes and scale. It also includes integrated construction services to power plants, which include responsibly sourced gas (RSG) reactors, waste heat recovery boilers (WHRB), circulating fluidized bed combustion (CFBC) boilers, steam turbine generators, steam generators including auxiliaries, electrostatic precipitators (ESPs), hydro turbines and BOP packages, including structural steel works, ash handling, coal handling, fuel oil systems, selective catalytic reduction (SCR) & flue gas desulphurization (FGD), high-pressure piping works

Overview of EPC works across generation, transmission and distribution in the power sector

Civil (15-20%)*	Mechanical/Erection works (50-55%)*	Instrumentation (10-15%)*	Electrical (10-15%)*	O&M and AMCs (8-12%)*	Miscellaneous (~5%)*
<ul style="list-style-type: none"> Includes Buildings, chimney, cooling tanks, land development, roads & boundary walls, erection and fabrication, substations, foundation for different machinery and material handling, etc. 	<ul style="list-style-type: none"> Erection, testing and commissioning including Various complex and heavy engineering equipment - Turbine-generator and boilers, heaters, cooling system, condensing system, SCR and FGD, substations etc. 	<ul style="list-style-type: none"> Instrumentation and process control requirement is high in case of power sector and various equipment involves: Distributed digital control monitoring, PLC based control, Control system of boiler, turbine & balance of plant etc. 	<ul style="list-style-type: none"> Electrical systems such as auxiliary transformers, generators, panels, electrostatic precipitators, switchgears and cabling, transmission lines, transmission towers, substations, electrification and distribution etc. 	<ul style="list-style-type: none"> Operation and maintenance of power plants Electrical network maintenance O&M contracts of exports 	<ul style="list-style-type: none"> Other components such as procuring licenses, contingencies, pre-operative expenses, other development costs, etc

Note: *Figures in brackets indicate estimated break-up of total project cost across various verticals shown above (civil, mechanical, instrumentation, electrical, O&M and miscellaneous)

Source: CRISIL MI&A

Overview of type of projects, mode of construction and customers in power EPC

Type of projects and key clientele for various segments in power sector

Segment	Type of projects	Clientele in the segment
Generation	End-to-end EPC projects for setting of generation power plants or sections of projects which include but not limited to Flue Gas Desulphurization (FGD) Systems, Boilers, Turbine and Generator systems, steam generator and its auxiliaries	<ul style="list-style-type: none"> Government and public sector enterprises such as NTPC Ltd Private power generation companies Industrial companies for captive usage
Transmission and distribution (T&D)	In T&D projects include but not limited to erection of various sub-stations such as transmission substation, distribution substation and converter substation, construction of transmission lines, underground and overhead distribution power line construction, smart metering	<ul style="list-style-type: none"> PGCIL, state transmission utilities, power producers, and DISCOMS

Source: CRISIL MI&A

Mode of construction in the power EPC segment

Nations, majorly developing ones, have been investing heavily on large infrastructure projects through public as well as private investments. To ensure efficient and timely construction, it is imperative to have an effective model which ensures timely project execution, minimise construction delays and improve transparency. The EPC model is primarily used in construction.

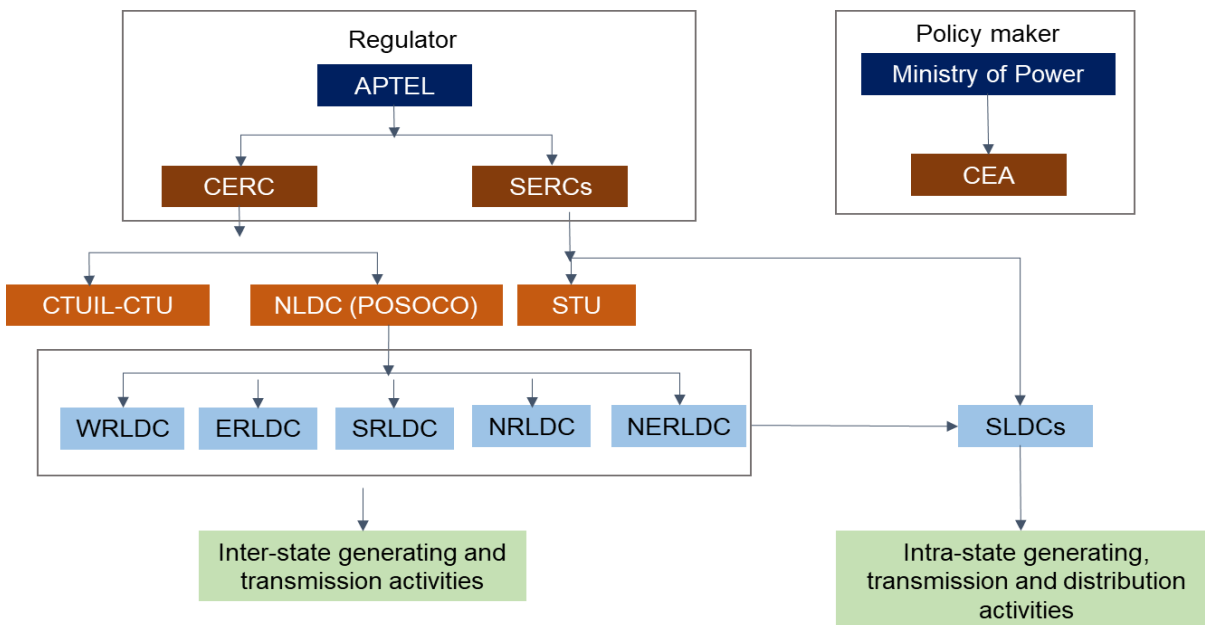
Type	Description
Turnkey projects	Under turnkey project structure, the contractor holds full responsibility of design and execution of the works, including EPC. Therefore, the contractor makes the facility ready to be used at the turn of a key. The project must be delivered at a pre-determined time and pre-determined cost and the contractor must adhere to project specifications. In case of deviations, the contractor is liable to pay monetary compensation.
Balance of plant	In case of balance of plant (BoP) structure, the entire project is broken into multiple packages with a major chunk contracted through EPC route and the rest through BoP. For coal based thermal plants, main plant equipment BTG (Boiler-Turbine-Generator) can be sourced singularly and BoP comprising of all Mechanical, Electrical, Instrumentation & Control systems and equipment as well as entire civil works along with system engineering and plant interfacing can be procured from various manufacturers.

Source: CRISIL MI&A

Regulating authorities and agencies in Indian power sector

The sector is highly regulated, with various functions being distributed between multiple implementing agencies. The three chief regulators for the sector are: the Central Electricity Regulatory Commission (CERC), the Central Electricity Authority (CEA), and the State Electricity Regulatory Commissions (SERCs).

Institutional and structural framework



Note: APTEL - The Appellate Tribunal for Electricity; CERC- Central Electricity Regulatory Commission; CEA - Central Electricity Authority; CTUIL: Central Transmission Utility of India Limited; WRLDC - Western Regional Load Despatch Centre; ERLDC - Eastern Regional Load Despatch Centre; SRLDC - Southern Regional Load Despatch Centre; NLDC: National Load Despatch Centre, NRLDC - Northern Regional Load Despatch Centre; NERLDC - North-Eastern Regional Load Despatch Centre; POSOCO: Power System Operation Corporation, SLDC - State Load Despatch Centre; CTU - Central Transmission Utility; STU - State Transmission Utility

Source: CRISIL MI&A

The Ministry of Power (MoP) works in close coordination with the CERC and CEA. While the CERC's role is more of a regulator for approving tariffs of central utilities, approving licenses, etc., the CEA is primarily a technical advisor focused on planning, i.e., estimating power demand and generation and transmission capacity.

Investments in Indian power sector

Infrastructure Investments in power sector expected to see a rise led by conventional capacity additions coupled with renewables

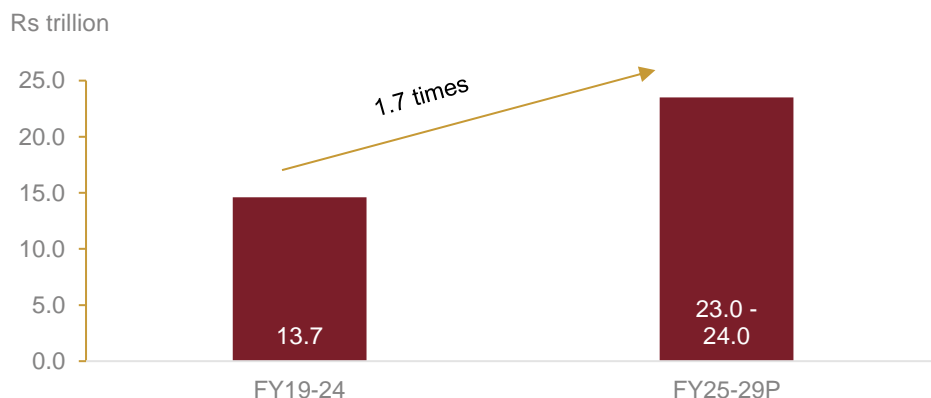
CRISIL MI&A expects investments in the power sector to see a rise of 1.7 times increasing, from Rs 13.7 trillion from fiscal 2019 to fiscal 2024, to Rs 22.5 – 24.5 trillion during fiscal 2025 to 2029. In the power sector, the generation segment drives investments with capacity additions aimed at clean energy, followed by distribution investments due to the Revamped Distribution Sector Scheme (RDSS) scheme and transmission investments.

Over the next four fiscals, between fiscal 2025 to 2029, investments in a generation will be led by renewable energy capacity additions, followed by investments in conventional generation and flue gas desulfurization (FGD) installations, indicating a shift in investment flow towards enhancing clean energy supply. Further, investments in new coal-based plants to meet the fast-growing peak load demand and increased installation of emission-controlling FGD equipment in thermal stations, will further bolster the investments.

Investments in distribution are expected to rise, on the back of the reforms-based and results-linked Revamped Distribution Sector Scheme (RDSS) envisaged over fiscal 2023 to 2026, coupled with the government's thrust on improving electricity access and providing 24x7 power to all.

Investments in the transmission segment are driven by upcoming interstate transmission system (ISTS) and green energy corridor projects. Further, the need for a robust transmission system to support generation additions, renewable energy push, and rural electrification will fuel the investments. In addition, the Government of India is planning to interconnect its national grid with neighbouring nations for effective resource utilisation which is also expected to drive investments in the segment.

Infrastructure investments in Indian power sector



Source: CRISIL MI&A

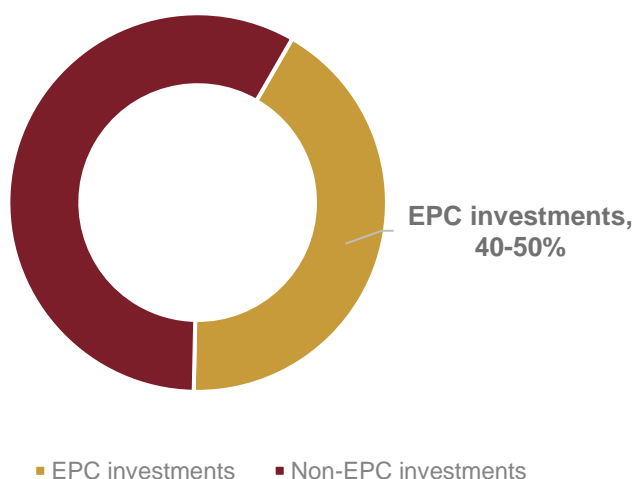
EPC projects make up 40-50% of investments in the power sector

In the power sector, EPC refers to a variety of activities which include design, construction of power plants, substations, transmission lines, procurement of equipments, machinery and materials etc. Projects in the Indian power sector are usually allotted via three primary routes namely EPC, Public Private Partnership (PPP) or the project is executed in-house by the internal teams. Largely, projects are given out via EPC and PPP route barring a few brown field projects which are taken up in-house by power companies.

Indian power EPC sector has witnessed strong growth over the last few years, driven by the increasing demand for electricity, government initiatives, and rising investments in the sector. Specifically, from the construction point of view, activities involve buildings, chimney, cooling tanks, land development, roads & boundary walls, erection and fabrication, substations, foundation for different machinery and material handling, etc. Most of the small and mid-sized projects in the sector happen via the EPC route, while some bigger projects happen via PPP route on an itemized basis. Some brownfield expansions also happen in-house using internal teams by the companies.

CRISIL MI&A estimates that out of the total investments flowing in the power sector in the country, 40-50% are coming via EPC mode of projects.

EPC investments in the power sector



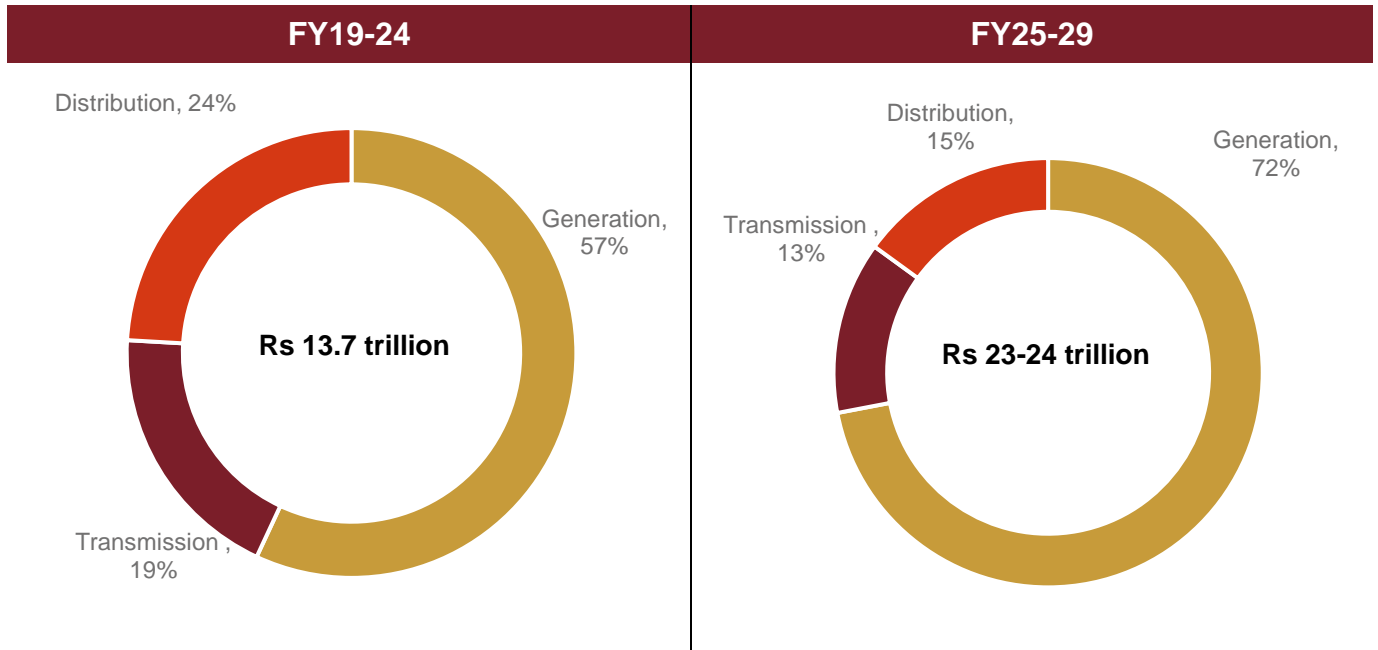
Source: CRISIL MI&A

Overview of investments in power sector across segments

Investments in power sector to grow by 1.6 times during fiscal 2025-29 over fiscal 2019-24

Investments of Rs 23-24 trillion are expected in the power sector over fiscals 2025 to 2029. Generation segment to drive investments with large scale clean energy additions expected followed by distribution and transmission investments.

Segment-wise investment in power sector

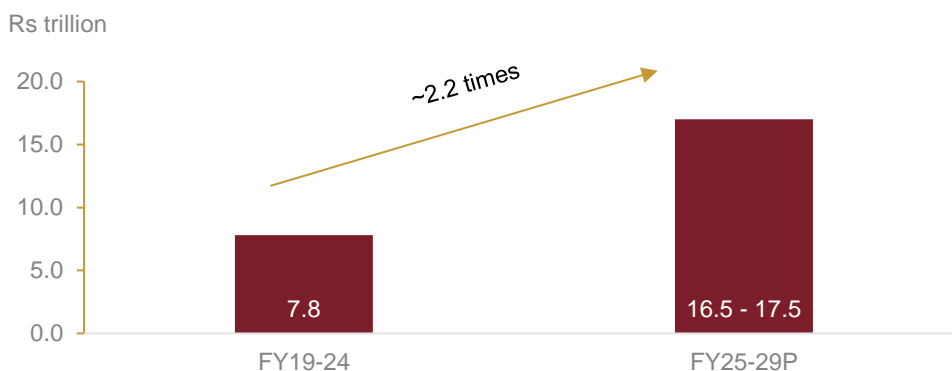


Source: CRISIL MI&A

Investments in generation to be driven by renewable capacity additions between fiscal 2025-2029

Over the next five years, investments in generation will be led by renewable energy capacity additions, followed by investments in conventional generation and FGD installations, indicating a shift in investment flow towards enhancing clean energy supply. Investments in RE capacity, which are expected to double over the next five years, will constitute over 70% of overall generation investments. Total generation investments are expected to grow 2.2 times over fiscals 2025 to 2029 compared with fiscals 2019 to 2024.

Investments in generation segment of power sector



Source: CRISIL MI&A

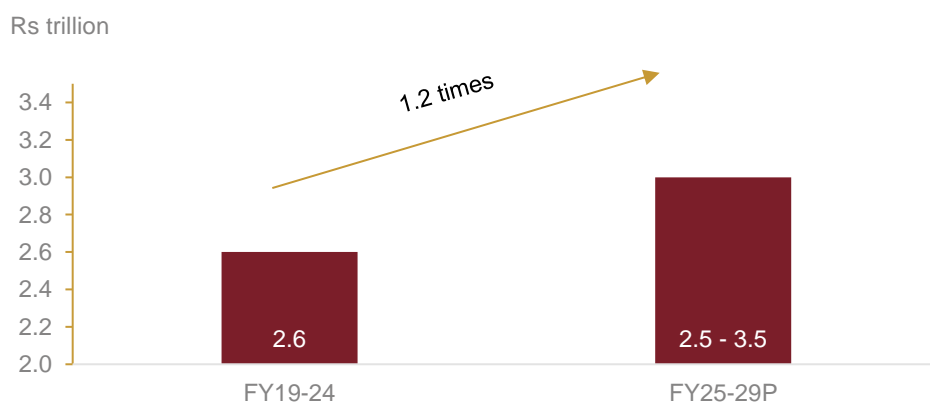
Renewable energy evacuation, ISTS network expansion and upgradation to boost investment in transmission

To service a large generation installed base, the estimated investment in the transmission sector is expected to cumulatively reach Rs 2.5-3.5 trillion over fiscals 2025-29. Investments in the sector are expected to be driven by the need for a robust and reliable transmission system to support continued generation additions and the strong push to the renewable energy sector as well as rural electrification.

As capacity additions in the country are not evenly distributed geographically, few regions in the country will be in deficit and others in surplus. To cater to this, there will be need to import/export from/to regions. Several inter-regional transmission corridors have been planned, and some of these high-capacity transmission corridors are in various stages of implementation. Newly sanctioned projects under the North-Eastern System Strengthening Scheme and system strengthening schemes focused in the Ladakh region are also expected to augment investments in the transmission segment.

In addition to this, upcoming transmission lines with neighbouring countries of Bhutan and Bangladesh along with on-going feasibility study for submarine cable between India and Sri Lanka would further add to the investments.

Investments in transmission segment of power sector



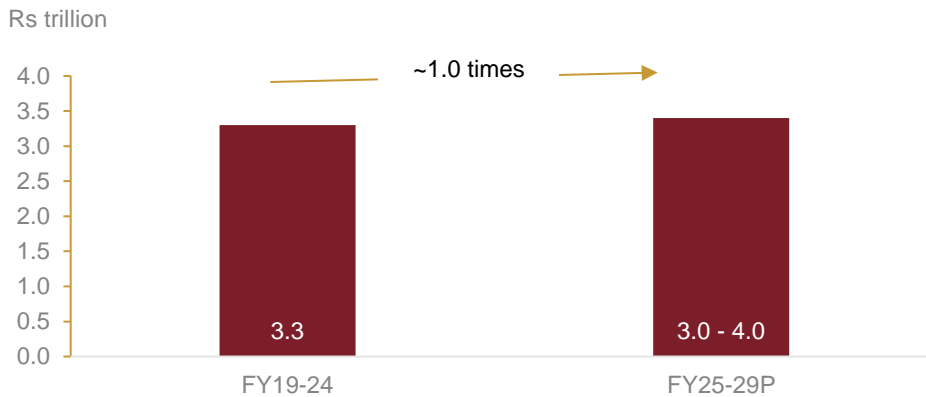
Source: CRISIL MI&A

Distribution investments to be aided by Revamped Distribution Sector Scheme (RDSS) spending

State distribution companies (discoms), the major players undertaking investment in the distribution space, have been reeling under severe financial burden for the last few years on account of collection inefficiencies and mounting receivables to power generation companies (gencos). In the Union Budget 2021-22, the government announced the Revamped Distribution Sector Scheme worth Rs 3.04 trillion for state discoms, to be allocated over the next five years. Rs 2.52 trillion worth of DPRs have been sanctioned by nodal agencies (PFC and REC) as of December 2023. While the amount is sanctioned, disbursement under the scheme will be contingent upon work undertaken that was proposed under DPR.

Investments in the segment are likely to gradually pick up fiscal 2023 onwards with central / state government(s) expected to provide the required funding support. The distribution segment is expected to attract investments worth Rs 3.0-4.0 trillion over fiscals 2025 to 2029 vis-à-vis ~Rs 3.3 trillion between fiscal 2019-2024 led by the government's thrust on the Revamped Distribution Sector Scheme, improving access to electricity and providing 24x7 power to all. In addition, several foreign institutions such as Japan International Cooperation Agency (JICA) and Asian Development Bank (ADB) are also expected to extend credit to the distribution sector.

Investments in distribution segment of power sector



Source: CRISIL MI&A

Overview of key schemes in Indian power sector

Generation

India is committed 500 GW of non-fossil capacities by 2030 as a part of its climate commitment goals. To achieve those goals and to drive the solar capacity additions in the country, GoI has introduced various schemes.

Scheme for Harnessing and Allocating Koyala (Coal) Transparently in India (SHAKTI)

SHAKTI policy aimed at alleviating stress on account of non-availability of domestic coal. The new coal allocation policy for the power sector, was introduced in 2017 which proposes to replace the old linkage allocation policy with more transparent bidding-based linkages. It segregates coal-based power plants in India in the six categories and stipulates different mechanisms to provide fuel supply to plants not having coal linkages.

The biggest beneficiaries of the policy will be those private sector developers who have long-term PPAs and letters of assurance (LoA), since they would get linkages at the notified price. This would keep their generation cost low and ensure increased plant availability with assured fuel supply.

Jawaharlal Nehru National Solar Mission (JNNSM)

JNNSM was launched as part of India's National Action Plan on Climate Change (NAPCC) in 2010. This mission aims at establishing solar power in India. The mission was launched with a target of 20 GW grid connected solar power generation capacity by 2022. However, in June 2015, this target was increased to 100 GW. The 100 GW solar power capacity has been divided into rooftop solar electricity generation (40 GW) and large and medium-scale grid-connected solar projects (60 GW).

Ultra-Mega Solar Parks

In December 2014, MNRE introduced a scheme to establish a minimum of 25 solar parks and Ultra Mega Solar Power Projects, adding over 20 GW of installed solar power capacity, which was later increased to 40 GW to develop a minimum of 50 solar parks of 500 MW and above capacity each by the financial year 2019-20. Later, in July 2018, the Ministry of New and Renewable Energy (MNRE) extended the timeline to develop solar parks and ultra-mega solar projects totalling 40 GW from 2019-20 to 2021-22. As on October 2023, 50 Solar Parks with an aggregate capacity of 37.5 GW have been sanctioned in 12 States in the country.

The Central Government provides financial support for the construction of these solar parks. According to MNRE, such projects can be set up by any CPSU, state PSU, other state government organizations, or their subsidiaries or a joint venture between two or more entities.

State solar policies

Till 2011-12, only Gujarat and Rajasthan had a state solar policy. Post the success of Gujarat state solar policy, various states such as Andhra Pradesh, Tamil Nadu, Karnataka, Madhya Pradesh and Telangana have also announced solar policies and have invited bids to set up solar projects in past years.

Transmission and distribution

RDSS Scheme

Revamped Distribution Sector Scheme (RDSS), launched by Government of India with the objective of improving the quality and reliability of power supply to consumers through a financially sustainable and operationally efficient Distribution Sector, has an outlay of Rs. 3.04 trillion having Gross Budgetary Support of Rs. 0.98 trillion from Government of India over a period of five years from fiscal 2022 to fiscal 2026 and will subsume other schemes (DDUJY, IPDS) under its ambit. RDSS is mainly focused on strengthening of sub-transmission and distribution network of project areas for the benefit of consumers.

The main objectives of RDSS are:

- Reduction of AT&C losses to pan-India levels of 12-15% by FY 2024-25
- Reduction of ACS-ARR gap to zero by FY 2024-25
- Improvement in the quality, reliability, and affordability of power supply to consumers through a financially sustainable and operationally efficient distribution sector

Prepaid Smart metering is the critical intervention envisaged under RDSS with an estimated outlay of Rs 1.5 trillion with GBS of Rs 0.2 trillion and 250 million prepaid smart meters are targeted to be installed during the Scheme period. Along with the prepaid Smart metering for consumers, system metering at feeder and DT level with communicating feature along with associated Advanced Metering Infrastructure (AMI) would be implemented under TOTEX mode (Total expenditure includes both capital and operational expenditure) thereby allowing the Discoms for measurement of energy flows at all levels as well as energy accounting without any human interference.

Integrated Power Development Scheme (IPDS)

Government of India launched the Integrated Power Development Scheme (IPDS) in December, 2014 under which Distribution Infrastructure projects for strengthening of sub-transmission and distribution networks in urban areas metering of distribution transformers / feeders / consumers in the urban areas, IT enablement works; Enterprise Resource Planning (ERP); smart metering; Gas Insulated Sub-stations (GIS); and, Real Time Data Acquisition System (RT-DAS) were executed.

Current status of the scheme (as of 10th July 2024)

Project name	No. of project areas	Total Govt grant approved (Rs Bn)	Total grant released (Rs Bn)
IPDS System Strengthening	510	178.2	163.6
IPDS IT Phase-II	34	4.5	3.3
ERP	0	4.4	3.3
Smart metering	0	1.4	0.8
RT-DAS	0	0.8	0.6
GIS	58	5.3	4.5
Total	602	194.7	176.2

Source: IPDS, CRISIL MI&A

Discom liquidity package

State discoms' payables to gencos against power purchased have been a pain point for a significant period, as the pending payments cause liquidity issues for generators and affect their working capital management as well as debt repayment ability.

To address the liquidity pangs of state discoms, the central government introduced a Rs 900 billion stimulus for state distribution utilities within the economic relief package announced by the government to tide over the economic crisis induced by Covid-19, which was further enhanced to Rs 1.2 trillion. The relief package is aimed to help discoms clear a significant portion of their outstanding dues to power generators. The package is expected to be provided in the form of concessional loans (moratorium, lower interest rates) to state distribution utilities, secured by discom receivables and state guarantees. Power Finance Corporation (PFC) and Rural Electrification Corporation (REC) have been identified as key lenders for this package. The package was eventually increased further to Rs ~1.35 trillion, with the full amount being sanctioned as of November 2021, whereas disbursement to the tune of Rs ~1.12 trillion has been achieved as of December 2023. The disbursement under the long-term transition loans has been linked to discoms undertaking specified reform measures.

Key growth drivers in the power EPC

Key growth drivers	Description
Government push towards reducing coal imports	At present, India depends on coal imports along with its domestic production to meet the power demand in the country. In order to reduce the dependence on imports, the government is planning to increase the domestic coal production aiming to increase availability and reduce dependence on imported coal. This would lead to infrastructure growth, in turn boosting the EPC segment
Increase focus on renewable energy	India has set a goal of 500 GW of non-fossil fuel-based capacity by 2030. In line with this, India has made a significant shift in its energy landscape towards Renewable energy (RE) with more than 70% of new capacity addition came from RE in fiscal 2024. Further additions of renewable energy infrastructure coupled with government support through schemes such as JNNSM and Ultra mega solar parks would further aid the growth in EPC industry

Key growth drivers	Description
Development of T&D infrastructure	In December 2023, CEA has notified the draft National Electricity Plan (Volume II) for transmission which is under finalisation. The tentative transmission line and capacity addition as per the draft NEP is estimated to increase by ~1.2 times to 580,293 ckm by fiscal 2027 from 485,544 ckm in fiscal 2024. Similarly, transmission line capacity is expected to increase to 685,293 ckm by fiscal 2032 while the substation capacity is expected to rise by ~1.3 times. This will aid the growth of projects in EPC segment of transmission and distribution.
Rising power demand	Power demand is directly linked to GDP. With rising India's GDP coupled with other factors such as urbanisation, rise in population, rise in industrial output the power demand is expected to see a growth of 5-7% between fiscal 2025 and 2029. In order to meet the rising demand the power sector is expected to see a capacity addition from 442 GW in fiscal 2024 to 700-710 GW in fiscal 2029. This addition of capacities will further aid the construction under power EPC industry.

Source: CRISIL MI&A

Key threats and challenges in the power EPC

Key challenges	Description
Distribution continues to be the achilles heel in the Indian power sector	Distribution is the final and critical link in the power sector value chain. However, the financial position of the distribution sector has significantly deteriorated over the past decade owing to irregular tariff hikes, high AT&C losses, and delays in subsidy payments by state governments. This has adversely impacted power offtake by distribution companies (discoms). Though government has implemented schemes such as RDSS, Late payment surcharge (LPS) scheme. The impact of these on the distribution sector needs to be monitored. Any further losses would hinder the infrastructure development in the sector.
Cost overruns and delays	Regulatory complexities specially for land acquisition, permissions/approvals required from multiple agencies may lead to delay in project execution and increased operational costs. Similarly, due to increase in material costs, improper estimation can result in cost overruns. Significant cost overrun may affect the project returns.
Market competition	The market competition in the EPC sector is intense, characterized by a multitude of competitors competing for the same projects. This coupled with rising input costs will make it difficult for the EPC players to further pass on the costs to their customers. Further, staying abreast of with technologies in power generation and storage poses a significant challenge, necessitating ongoing investments in research and development to remain competitive in the market.

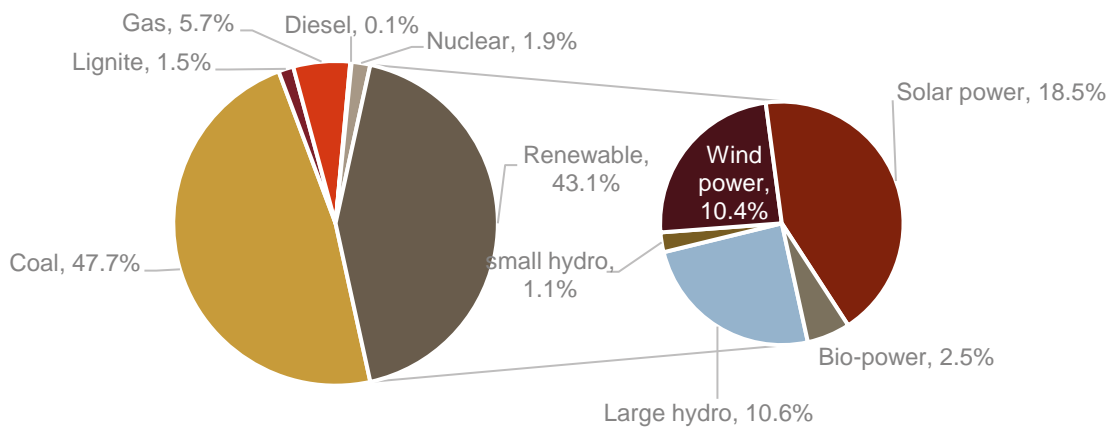
Source: CRISIL MI&A

Assessment of existing electricity capacities

Power supply mix

The total installed generation capacity at the end of March 2024 was 442 GW, of which ~86 GW of capacity was added over fiscals 2019-24. The overall installed generation capacity has grown at a CAGR of 4.4% over fiscals 2019-24. Coal and lignite-based installed power generation capacity has maintained its dominant position over the years and accounts for ~49% as of March 2024. However, RE installations (including large hydroelectric projects), have reached ~191 GW capacity as on March 2024, compared with 63 GW as on March 2012, constituting ~43% of total installed generation capacity as of fiscal 2024. This growth has been led by solar power, which rapidly rose to ~82 GW which grew by ~24% between fiscal 2019 and 2024.

Installed capacity as of March 2024



Source: CEA, CRISIL MI&A

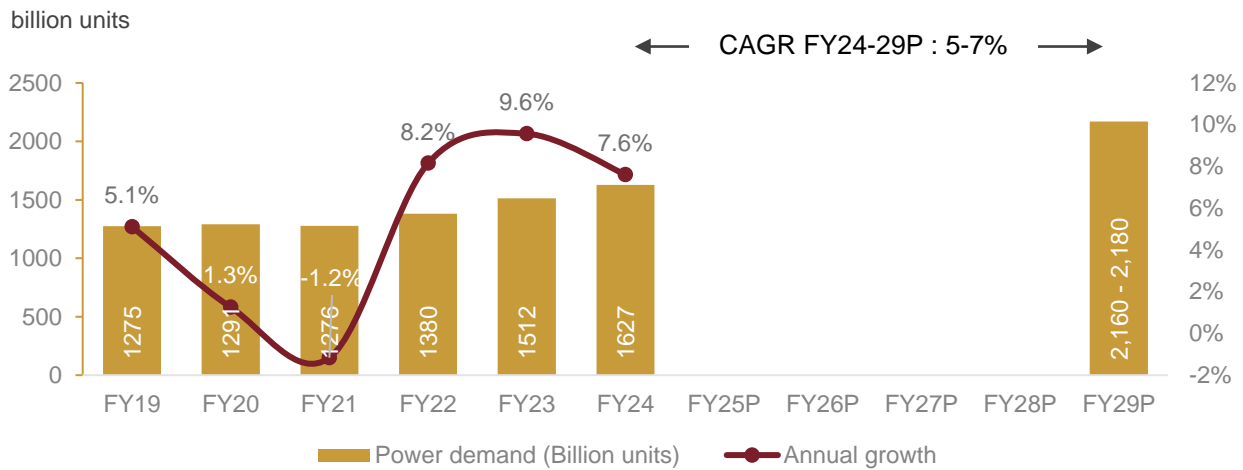
Overview of power demand in India

Power demand to maintain healthy momentum slated to grow at 5-7% CAGR over fiscals 2025-2029

India's electricity requirement has risen at a CAGR of ~5.0% between fiscals 2019 and 2024. Power demand surged in the first quarter of fiscal 2023 on the back of a severe heatwave raging through the nation, apart from continued momentum in economic activity. As a result, power demand registered a 9.6% on-year growth fiscal 2023 despite a high base. Further, in fiscal 2024 power demand to grow at a rate of 7.6% driven by El-Nino led warmer temperatures along with an 8.2% increase in GDP growth despite a high base of 7.0% in fiscal 2023.

Over fiscals 2025 to 2029, power demand is expected to gradually pick up, logging a CAGR of 5-7% to reach 2,160-2,180 BUs, on the back of healthy economic growth and expansion of the power footprint via strengthening of distribution infrastructure. Major reforms initiated by the central government for improving the overall health of the power sector, particularly that of state distribution utilities, are expected to improve the quality of power supply, thereby supporting power demand.

Power demand in billion units (BU)



Source: CRISIL MI&A

Overview of key demand segments for power demand

Industrial and commercial, domestic and agriculture are major end use segments for power demand in India.

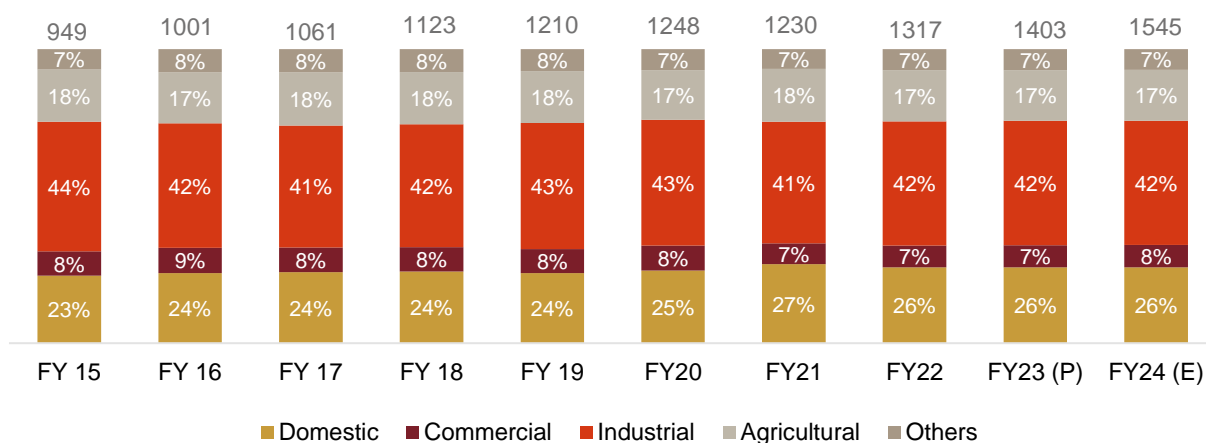
Industrial and commercial consumers are the largest consumers of electricity in absolute terms. Going forward, India's economy is expected to continue to expand beyond fiscal 2022, with industrial activity gradually picking up over the medium term. Trickle-down effect of Aatmanirbhar Bharat relief package, government spending on infrastructure through the National Infrastructure Pipeline, commissioning of the dedicated freight corridors, expansion of the services industry, rapid urbanization, and increased farm income from agriculture-related reforms are key macroeconomic factors fostering the power demand. Significant policy initiatives such as PLI schemes and low corporate tax rates, among others have aided large scale manufacturing in India which will further boost power demand in the country. In fact, several sectors including automobiles, mobile handsets and tablets, solar, lithium-ion batteries, food & beverages and defence are expected to witness fresh investments including foreign direct investments from global majors.

Further, railway electrification, rapid transition to EVs, increased urbanisation and Industrialisation, smart city projects, upcoming metro projects primary tailwinds providing impetus to power demand. A confluence of these factors is expected to drive energy sales to the industrial and commercial consumer segment.

Further, domestic consumption has increased over the years due to the rising urbanisation rate, improvements in the standard of living, increase in air conditioning requirements to mitigate soaring temperatures and offering free units upto a certain level to some category/regions of India. Pradhan Mantri Sahaj Bijli Har Ghar Yojana (Saubhagya), which was launched by the GoI in September 2017, has helped achieve universal household electrification across the country. Under the scheme, 28.6 million households were electrified in the country. The scheme is completed and, in turn, drives electricity demand. The programme also aims to ensure 24x7 power supply to separate agriculture and non-agriculture feeders, facilitating judicious fostering of supply to agricultural and non-agricultural consumers in rural areas and strengthening the sub-transmission and distribution infrastructure in rural areas, including metering of distribution transformers/feeders/consumers. It is also expected that electricity currently being supplied through back-up facilities, such as invertors and DGs, may move back to the grid with increased quality of supply.

Consumer segment-wise energy sales in India

(%, BU)



P: Provisional; E: Estimated

Source: MoSPI, CRISIL MI&A

Overview of power supply additions in India

India's installed generation capacity, which stood at 356 GW at the end of fiscal 2019 has reached to ~442 GW in fiscal 2024 (as of March 2024) on the back of healthy renewable capacity additions (including solar, wind, hybrid, and other renewable sources) even as additions in coal and other fuels have declined. In fiscal 2024, renewables (excl. large hydro) accounted for ~33% of the installed capacity, whereas coal-based capacity tapered to ~49% over the same period.

Capacity additions in the conventional power generation segment of about 35-40 GW are expected over fiscals 2025 to 2029 driven by higher than decadal average power demand. Fresh project announcements are limited as players are opting for the inorganic route for expansion given the availability of assets at reasonable valuations. In fact, 4.8 GW of stressed power assets are awaiting debt resolution. However, the need for generation capacity equipped for flexible operations to ramp up-down quickly is critical to meet peak demand as generation from renewable capacities is infirm in nature. Going ahead, 20-30 GW of coal-based power is expected to be commissioned over fiscals 2025-29. Coal capacity additions are expected to be driven entirely by central and state sectors, as major private gencos continue to focus on adding RE capacity.

Nuclear power capacity additions are expected during the period as ongoing projects at Kakrapara, Kalpakkam, and Rajasthan are nearing completion. As of January 2024, Unit 1 of KAPP has been commissioned with Unit 2 expected by end of fiscal 2024.

Further, 7-9 GW of hydro power installations further, an addition of 7-8 GW pumped hydro storage projects (PSP) capacity additions over fiscals 2025-2029.

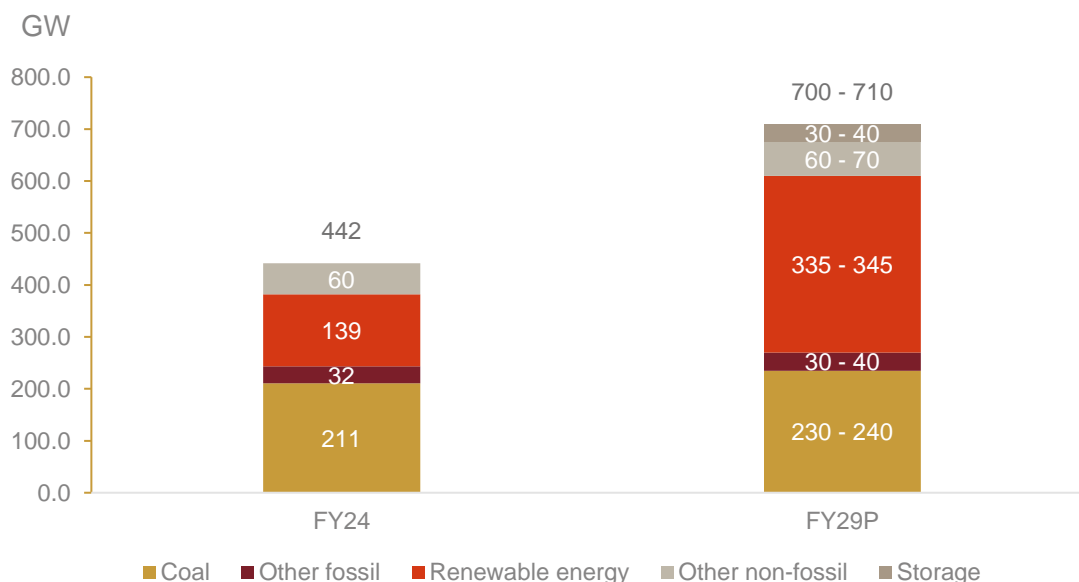
Old and inefficient coal plants to the tune of 14-15 GW (mainly state-owned) were to be retired. However, as per CEA notification issued on January 20, 2023, power utilities have been advised to not retire any thermal units until 2030 and carry out renovation and maintenance (R&M) for life extension and improve the flexibility and reliability of thermal units

By fiscal 2029, Renewable energy (RE) capacity additions (excluding large hydro) are expected driven by various government initiatives, favourable policies, competitive tariffs, innovative tenders, development of solar parks and

green energy corridors, etc. RE capacity is estimated to account for about 50% of the installed capacity by fiscal 2029.

Battery energy storage system (BESS) capacity additions, aimed at storing renewable energy during off-peak hours of power demand to support peak supply, are expected to commission starting fiscal 2025, with 23-24 GW of BESS capacity likely to be added through fiscal 2029.

All India installed estimated capacity addition by fiscal 2029 (in GW)



Note: RE includes solar, wind, hybrid, and other renewable sources.

Other fossil fuels include lignite, gas, and diesel.

Other non-fossil fuels include hydro and nuclear.

Storage includes BESS and PSP

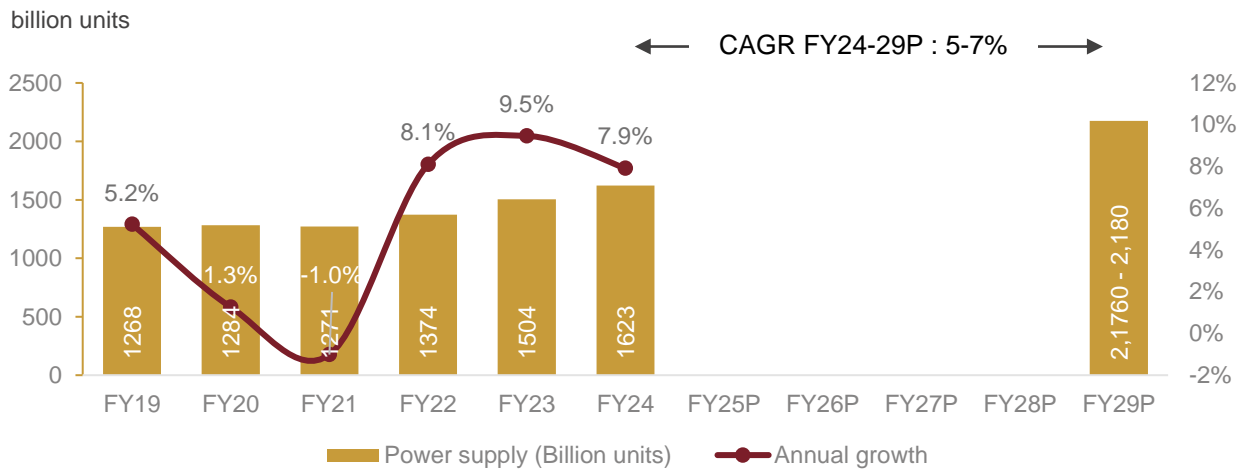
Source: Central Electricity Authority (CEA), CRISIL MI&A

Power supply to grow by 5-7% during fiscal 2025-29

During fiscal 2019 to 2024, the power demand in India, has grown at CAGR of 5.0%. To support the rising demand, the capacity has also grown from 356 GW to 442 GW at a CAGR of 4.4%, leading to a growth of 5.1% CAGR in the overall power supply. As a result, the energy deficit declined to 0.5% in fiscal 2023 and further reduced to 0.3% in fiscal 2024 from 0.7% in fiscal 2018. Also, strengthening of inter-regional power transmission capacity over the past years has further supported the fall in deficit levels as it reduced supply constraints on account of congestion and lower transmission corridor availability.

Going ahead, as the capacity increases to 700 -710 GW during till fiscal 2029, the power supply is expected to grow by 5-7% between fiscal 2025 and 2029 in line with the growth in power demand during the same period.

Power supply in billion units (BU)



Source: CRISIL MI&A

Overview of solar power capacity additions

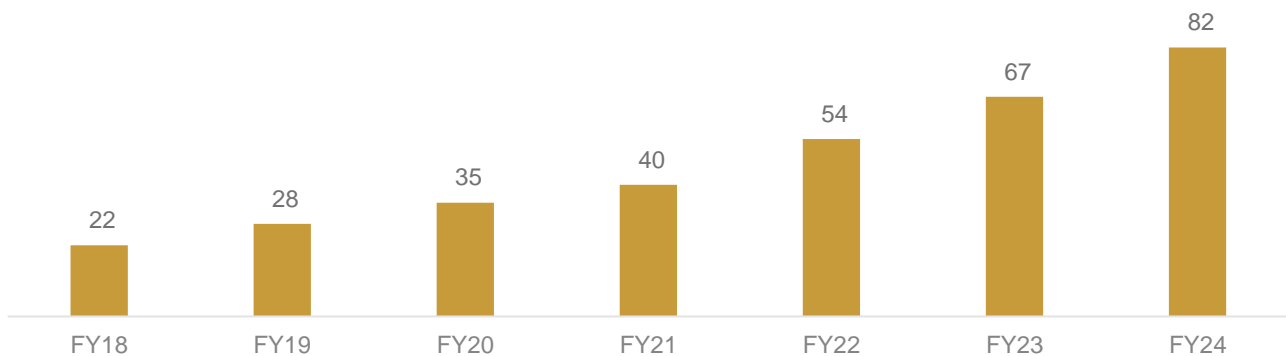
In the renewable energy basket (including large hydro) as of March 2024, solar energy accounted for a share of 43%. Growth in the solar power sector over the last five years has been robust. As much as ~54 GW capacity was added in the segment over fiscals 2019-24, registering a CAGR of ~23.8%, although on a low base. Despite the second wave of COVID-19 infections, fiscal 2022 witnessed solar capacity additions of ~14 GW. In a relief to developers, the MNRE provided total extension of seven-and-a-half months for the projects affected by the first and second waves of pandemic. This is estimated to have delayed commissioning in fiscal 2022, leading to a spillover into fiscals 2023 and 2024. In fiscal 2023, solar capacity additions stood at ~13 GW. Similarly, in fiscal 2024, solar capacity additions stood at ~15 GW.

The GoI imposing solar Renewable Purchase Obligation (RPOs) across Indian states in 2011, coupled with the sharp drop in capital costs, led to most states releasing solar policies. This resulted in a spur in solar sector investments. Till fiscal 2012, only Gujarat and Rajasthan had state solar policies. After the success of Gujarat's solar policy, other states such as Andhra Pradesh, Tamil Nadu, Karnataka, Madhya Pradesh, and Telangana introduced their respective solar policies.

During fiscals 2018-2023, ~45 GW of solar capacity has been commissioned compared with the expected commissioning of 60-65 GW. Despite the second pandemic wave, ~14 GW of solar capacity was added in fiscal 2022. The momentum continued in fiscal 2023 and 2024, with robust solar capacity additions of ~13 GW and ~15 GW respectively.

Trend in cumulative solar capacity installation in India

(GW)



Source: MNRE, CEA, CRISIL MI&A

Going ahead, CRISIL MI&A expects 137-142 GW of solar capacity additions over fiscal 2025-2029. This will be driven by additions under:

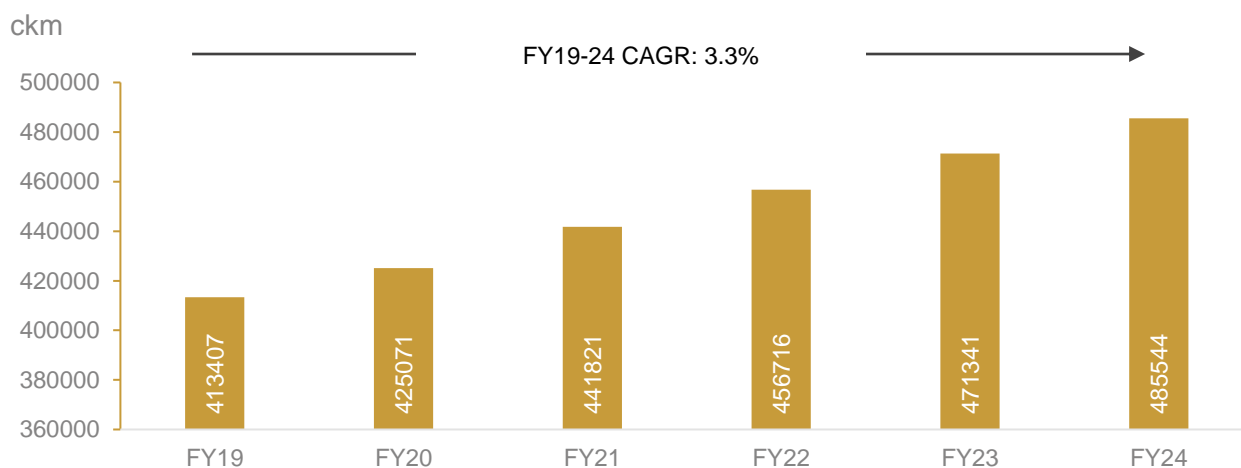
- **National Solar Mission (NSM):** The entire NSM Phase II Batch II Tranche I of 3,000 MW has been commissioned. Under NSM Phase II, Batch III, and Batch IV, Solar energy corporation of India (SECI) through its state specific Viability Gap Funding (VGF) has tendered out ~7 GW of capacities, most of which has been completed.
- **Other central schemes:** SECI has also started tendering projects outside the Jawaharlal Nehru National Solar Mission (JNNSM) Batch programme. It has initiated the Inter State Transmission System (ISTS) scheme, wherein projects are planned for connection with the ISTS grid directly. Under this, SECI has already tendered and allocated ~35 GW (including hybrid).
- **State solar policies:** ~24 GW of projects are under construction and are expected to be commissioned over the fiscal 2025-2029. Based on tendered capacities by states at the end of June 2024, a further ~24 GW capacity of solar projects is expected to be up for bidding over the same duration.
- **PSUs:** The CPSU programme under JNNSM has been extended to 12 GW in February 2019. The government is also encouraging cash-rich PSUs to set up renewable energy projects. NTPC has already commissioned a total of over ~2,120 MW of capacities, allocated ~5 GW, and tendered a further ~1 GW, under various schemes. It has a target of installing ~35 GW of renewable energy capacities by fiscal 2028. Similarly, NHPC had allocated 2 GW of projects in 2020, while the Indian Railways has committed to 20 GW of solar power by 2030. Other PSUs such as NLC, defence organizations, and governmental establishments are also expected to contribute to this addition.
- **Rooftop solar projects:** CRISIL MI&A expects 20-22 GW of rooftop solar projects (under the capex and opex mode) to be commissioned by fiscal 2029, led by PM Surya Ghar Yojana and industrial and commercial consumers under net/gross metering schemes of various state.
- **Open-access solar projects:** 13-15 GW of open-access solar projects (under the capex and opex mode) are expected to be commissioned by fiscal 2028, led by green energy open access rules 2022, sustainability initiatives/RE 100 targets of the corporate consumers, better tariff structures and policies of states such as Uttar Pradesh and Karnataka, which are more long term in nature.
- **Push for Green hydrogen:** Production for green hydrogen is expected to start from fiscal 2026 with production of 0.5-1 million tonnes of production. Government has set the target production of 5 million tonnes of green hydrogen by 2030. As per announcement, we expect 2.0-2.2 MTPA of green hydrogen to commission which can lead to further upside of solar capacity of 32-37 GW, by fiscal 2029. However, since developers may tie-up via grid / open access and not go to the captive route generation under this segment will remain a monitorable.

Overview of transmission infrastructure in India

The transmission sector, a crucial part of the power industry, required more attention to meet the growing demand for electricity and the expanding generation capacity. Existing investments from budgets, internal funds, and PSU loans were insufficient to meet this demand. To address this issue, the Electricity Act allowed private companies to participate in the power transmission sector through a competitive bidding process called tariff-based competitive bidding (TBCB). The National Tariff Policy of 2006 provided guidelines for this process, aiming to promote competition, attract private investment, and increase transparency in constructing transmission infrastructure. India stands out as one of the few countries that have opened its transmission sector to private participation, generating significant interest from private businesses. The Electricity Act, 2003 coupled with TBCB for power procurement, encouraged private participation in the power transmission sector and has supported the growth of transmission lines in India sector.

Robust generation capacity addition over the years and government's focus on 100% rural electrification through last mile connectivity has led to extensive expansion of the T&D system across the country. The total length of domestic transmission lines rose from 413,407 circuit kilometres (ckm) in fiscal 2019 to 485,544 ckm in fiscal 2023.

Total transmission length in India (above 220kV)

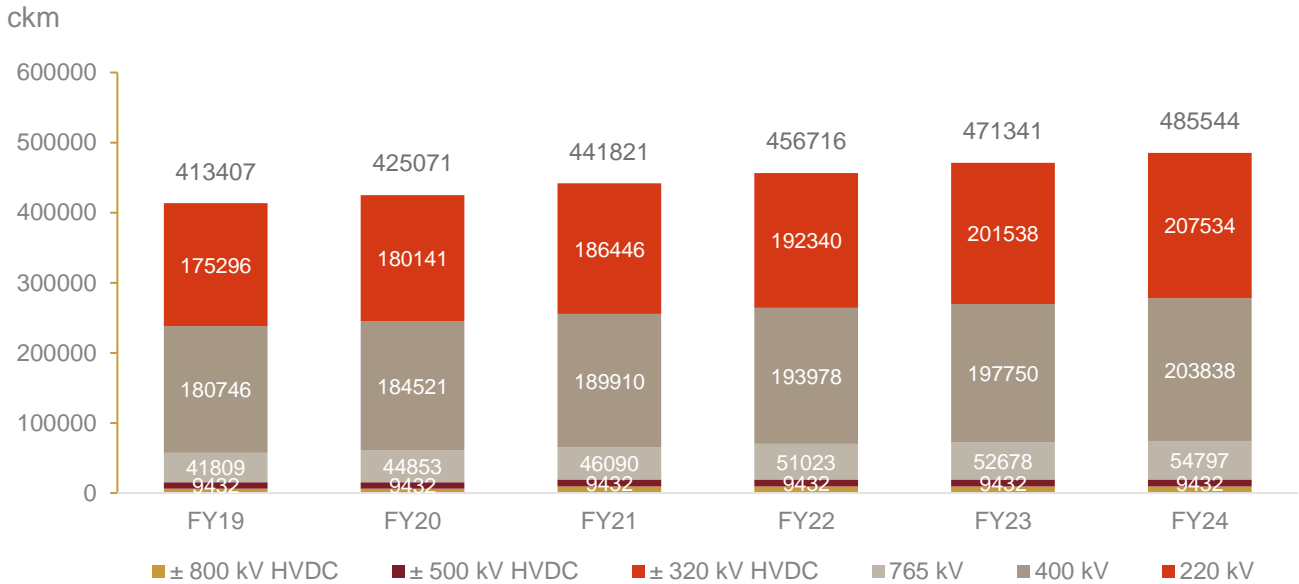


Source: CEA, CRISIL MI&A

There has been strong growth in the transmission system at higher voltage levels and substation capacities. This is a result of increased requirement of the transmission network to carry bulk power over longer distances and at the same time optimise the right of way, minimise losses and improve grid reliability.

The total transmission line length (above 220 kV) has increased at 3.3% CAGR from fiscal 2019 to fiscal 2024. This increase can also be attributed to an increase in the commissioning of the 765kV lines, growing at a CAGR of 5.6% over the same period. 765 kV lines have higher transfer capacity and lower technical losses thereby reducing the overall number of lines and rights of way required to deliver equivalent capacity. Performance in a transmission line improves as voltage increases and as 765 kV lines use one of the highest voltage levels, they experience comparatively lesser amount of line loss. 800 kV lines have also shown strong growth momentum, rising at 9.5% CAGR over the last 5 fiscals, majorly owing to strong investments by the central sector.

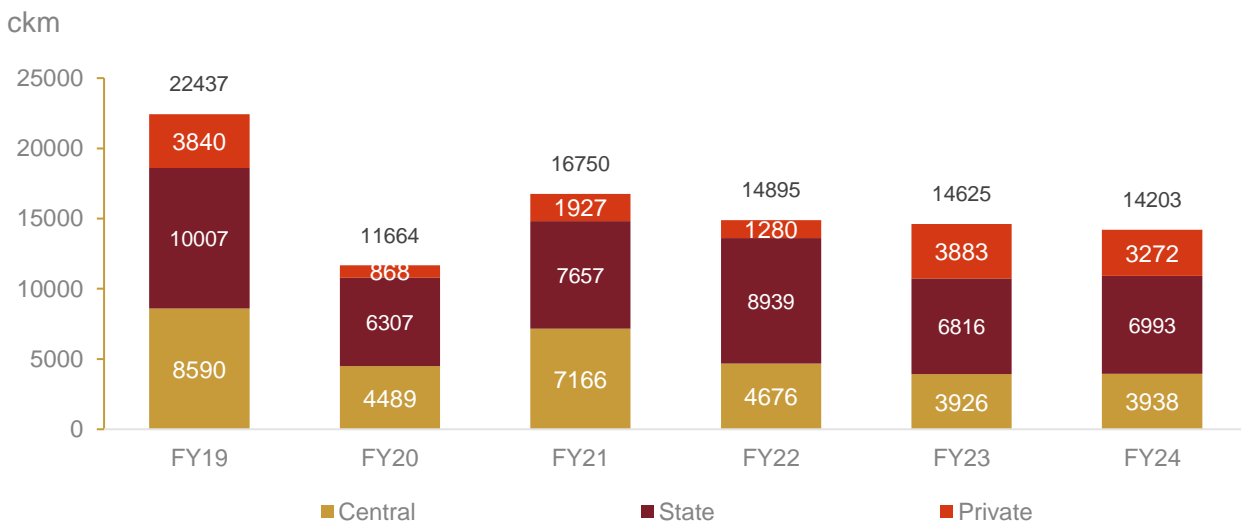
Breakup of transmission lines across voltages (220kV and above)



Source: CEA, CRISIL MI&A

Investments in transmission line additions continue to be dominated by the central and state sectors. During 2017-2022, a total of 88,865 ckm was set up in the country, with the central and state sectors contributing to 38% and 50%, respectively. The trend continues in fiscal 2024, with central and state sectors contributing to a share of 77%.

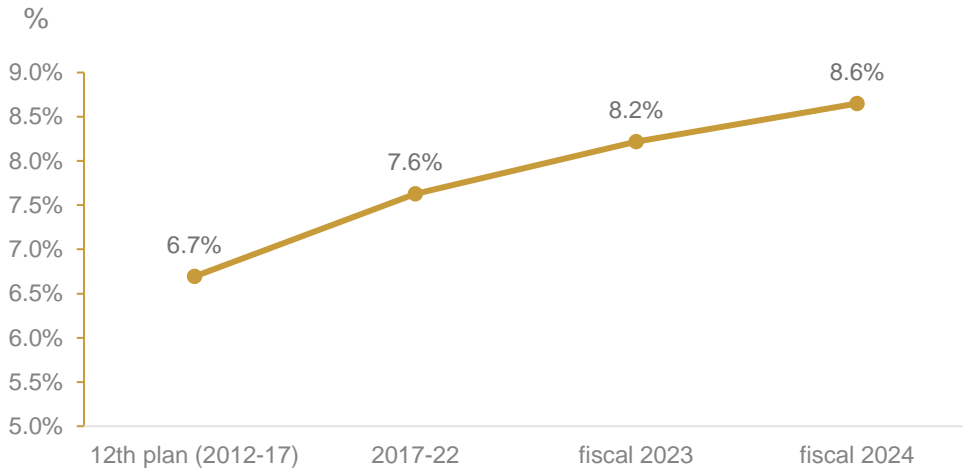
Sector-wise share of year-wise transmission line additions (220kV and above)



Source: CEA, CRISIL MI&A

Although central and state dominate the contribution towards the transmission lines additions, share of private players has seen a continuous rise over the years from 6.7% during the 12th five year plan (fiscal 2012-17) to 8.6% in fiscal 2024.

Share of private players in addition of transmission lines

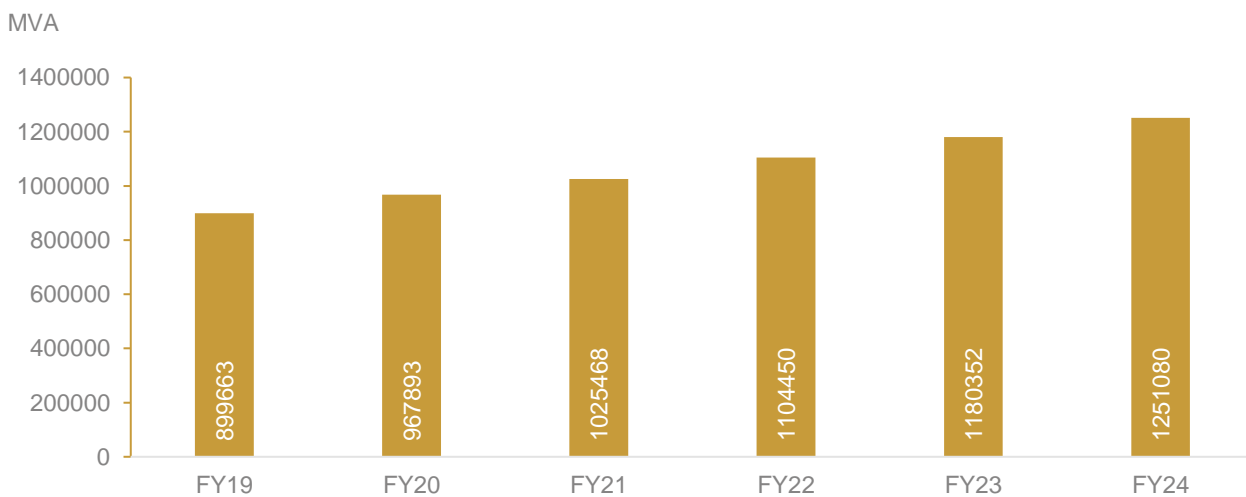


Source: CEA, CRISIL MI&A

Although to encourage private-sector participation in building transmission capacity, the central government notified power-transmission schemes to be undertaken through Tariff Based Competitive Bidding (TBCB), but still lower private player penetration in the transmission sector necessitates higher allotment of transmission lines to private players by the central transmission utilities.

Sub-station capacities in the country have grown from 899,663 MVA in fiscal 2019 to reach 1,251,080 MVA in fiscal 2024, at a CAGR of 6.8%.

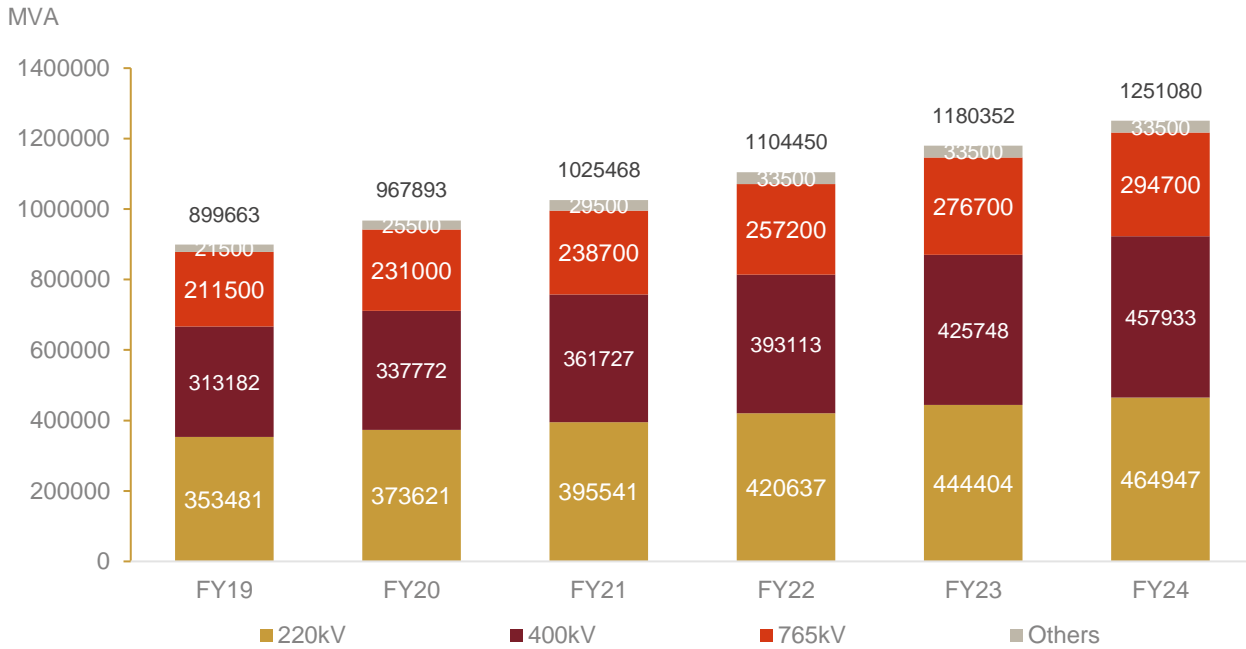
Substation capacity in India



Source: CEA, CRISIL MI&A

The growth in sub-station capacities has majorly seen traction in 220 kV, 400 kV and 765 kV segments, contributing to 32%, 41% and 24% of the incremental additions between fiscals 2019 and fiscal 2024.

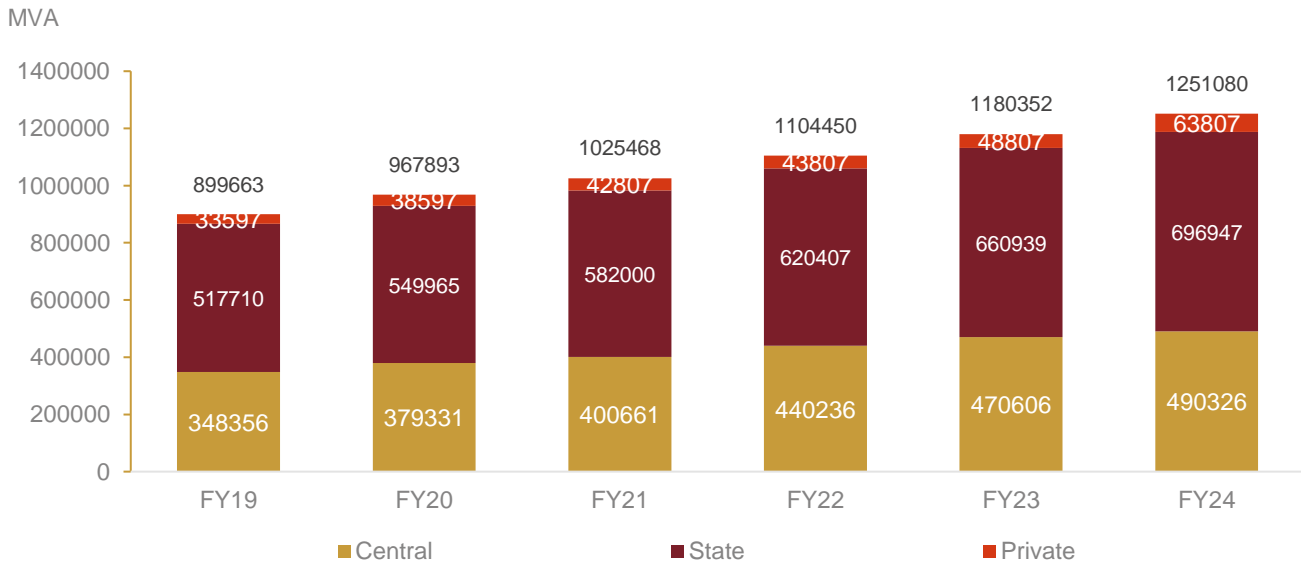
Voltage wise breakup of substation capacity in India



Note: Others include 320kV, 500kV, 800kV
 Source: CEA, CRISIL MI&A

Substation additions have been dominated by the central sector and state sector, contributing to 39% and 56% of the cumulative capacity as of fiscal 2024 respectively.

Sector wise breakup of substation capacity in India



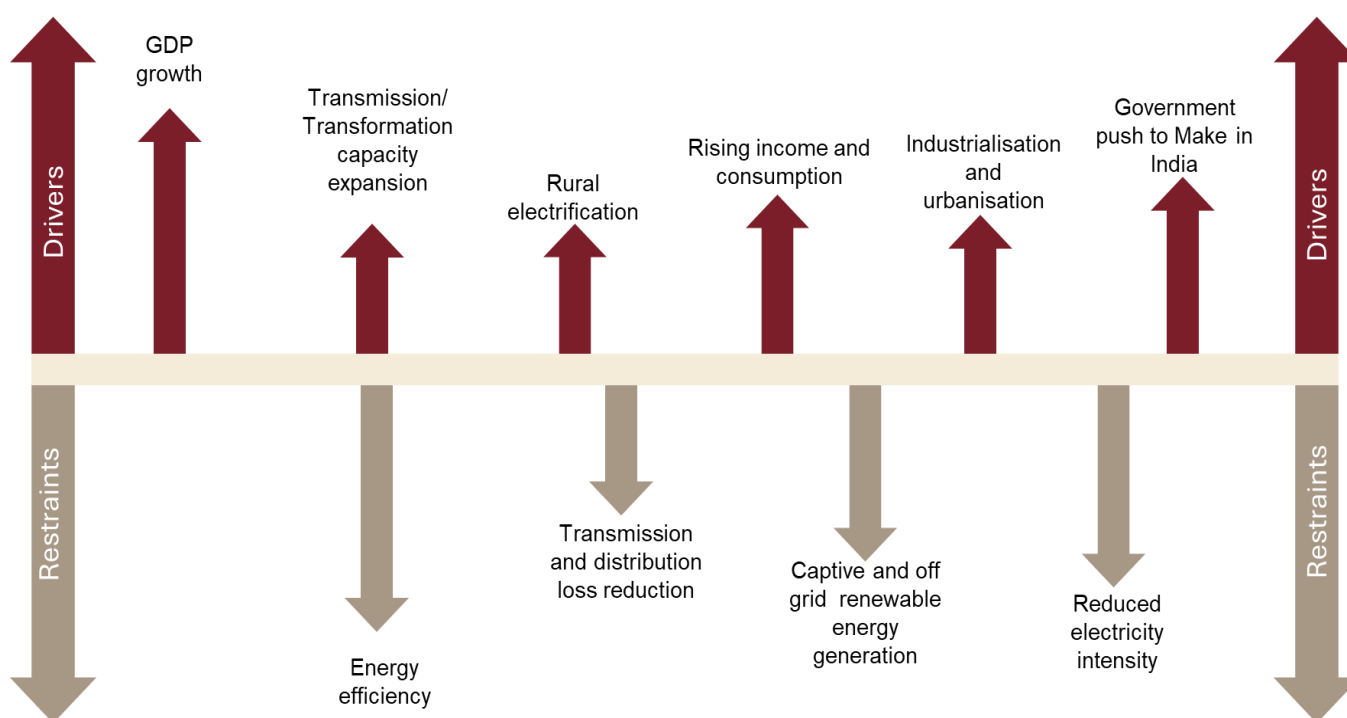
Source: CEA, CRISIL MI&A

Overview of growth drivers in Indian power sector

Long term Demand drivers and constraints

Power demand is closely associated with a country's GDP. Healthy economic growth leads to growth in power demand. India is already the fastest-growing economy in the world, with average GDP growth of 5.9% over fiscal 2012-24. The trickle-down effect of government spending on infrastructure through the National Infrastructure Pipeline, expansion of the services industry, rapid urbanisation, and increased farm income from agriculture-related reforms are key macroeconomic factors that are expected to foster power demand. Significant policy initiatives such as 24x7 power for all, Sahaj Bijli Har Ghar Yojana (SAUBHAGYA) scheme to provide electricity connections to all households, green energy corridor to facilitate evacuation of RE power, green city scheme to promote the development of sustainable and eco-friendly cities, PLI scheme and low corporate tax rates among others are expected to further support power demand in the country.

Factors influencing power demand



Source: CRISIL MI&A

Apart from macroeconomic factors, power demand would be further fueled by railway electrification, upcoming metro rail projects, growing demand for charging infrastructure due to increased adoption of electric vehicles, higher demand from key infrastructure and manufacturing sectors. However, increasing energy efficiency, a reduction in technical losses over the longer term, and captive as well as off-grid generation from renewables would restrict growth in power demand.

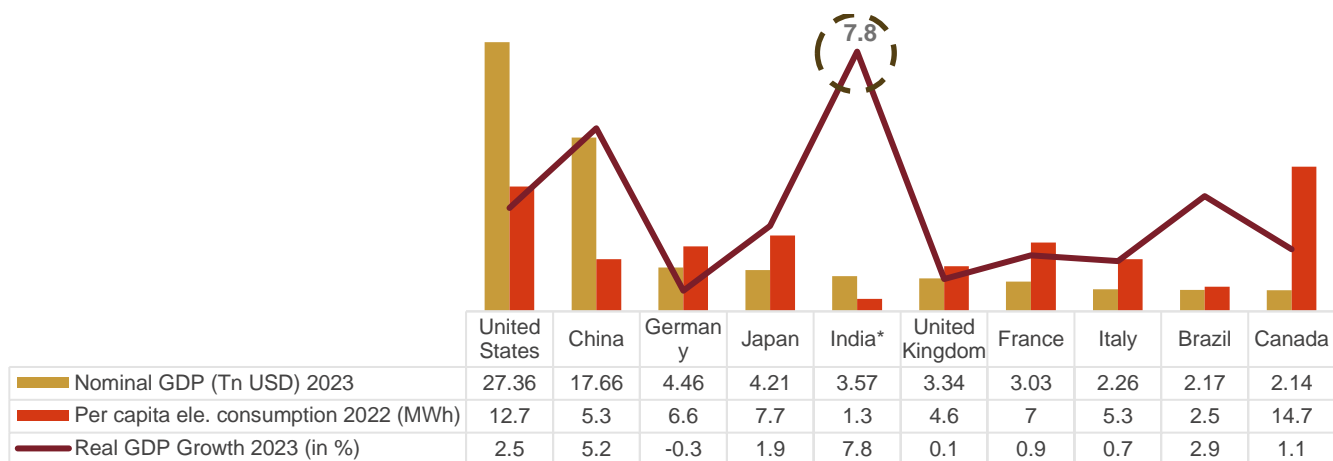
Lower per capita power consumption compared to other global peers indicates potential for growth

Electricity consumption per person rose to 1,331 kWh in fiscal 2023 (as per CEA's provisional data), from 1,010 kWh in fiscal 2015 at a CAGR of 3.5%, primarily led by large capacity additions coupled with strengthening of the transmission and distribution (T&D) network. Post successive on-year growth in consumption, demand declined in fiscal 2021, particularly from high-consuming industrial and commercial categories on account of weak economic

activity following outbreak of the COVID-19 pandemic. In fiscal 2022, though, per capita consumption rebounded to 1,255 kWh on the back of recovery in demand, with a similar trend estimated in fiscal 2023. Similarly, the energy requirement grew at 4.4% CAGR over fiscals 2015 to 2023.

Despite this healthy increase, the per-capita electricity consumption remains significantly lower than other major economies. Developing countries, such as Brazil and China, have significantly higher per-capita electricity consumption than India.

Comparison of India's economy with other major nations



*India Financial Year, Source: World Economic Outlook Database (April-2024) by IMF; IEA, CEA, CRISIL MI&A

Going ahead, per capita consumption is expected to gradually improve, as power demand picks up on the back of improvement in access to electricity, in terms of quality and reliability, rising per capital income, increasing EV penetration, railway electrification, on account of intensive rural electrification, resulting in realisation of latent demand from the residential segment, increased penetration of consumer durables. However, there are few factors which could restrict the growth such as improved energy efficiency, focus on T&D loss reduction, sustainability targets and increasing share of services in GDP.

Railway electrification and metro rail to drive majority of the incremental power demand

As of March 2024, of the 65,775 rkms (route kms) Broad Gauge (BR) electrification on Indian Railways has been extended to 62,119 rkms constituting more than 94%. In a bid to become net zero emitter by 2030 the government aims to achieve 100% electrification of Indian Railways by December 2023, however delayed electrification works due to pandemic induced lockdown coupled with sluggish pace of electrification 100% electrification is expected to be achieved by fiscal 2025. This is expected to lead to an incremental power demand, also driven by new track laying by the Indian Railways which is already electrified. Ministry of Railways has been allocated a capital outlay of Rs 2.52 lakh crore in the Union Budget 2024-25. This also is expected to provide impetus to the sector in terms of creation of new lines, doubling existing lines and electrification of existing lines.

Metro rail has also seen substantial growth in India in recent years, and the rate of growth is expected to rise further with multiple cities requiring the need for metro rail to meet daily mobility requirements. As of May 31, 2024, around 902 kms of metro routes are operational across 18 cities of India. Around 712 kms of metro line is under construction and 1,878 kms of metro lines are proposed further. Electricity consumption from the aforesaid categories is expected to add an average incremental power demand. Currently metro projects constitute a marginal share of the total incremental demand, but the share is expected to increase in the future due to a large quantum of planned metro projects.

Further, EV charging requirements are likely to boost power demand over the medium term, with a gradual increase in the share of EVs in the vehicle population.

List of ongoing / upcoming projects in Indian power sector

Project name	Promoter	Cost (Rs Bn)
Nuclear Based Power (Kudankulam) Project [Unit 3 & 4]	Nuclear Power Corpn. of India Ltd.	398.5
Jaitapur Nuclear Power Project	Nuclear Power Corpn. of India Ltd.	330
Etalin Hydro Electric Power Project	SJVN Ltd.	328.1
Patratu Coal Based Power Project	Patratu Vidyut Utpadan Nigam Ltd.	320
Hydro Electric Power (Dibang Valley) Project	NHPC Ltd.	318.8
Oju Hydro Electric Project	Oju Subansiri Hydro Power Corporation Pvt. Ltd.	313.6
Solar & Wind Power (Nandyal) Project	Hero Future Energies Pvt. Ltd.	300
Yadadri Coal Based Power Project	Telangana State Power Generation Corpn. Ltd.	299.7
Talabira Coal Based Power Project [Phase-I]	NLC India Ltd.	270
Saidongar & Junnar Pumped Storage Hydel Power Project	Torrent Power Ltd.	270
Hydro Power (Tamil Nadu) Project	Adani Green Energy (Tamil Nadu) Ltd.	245
Wind Power Plant (Kudlgi & Kotur)	JSW Green Hydrogen Ltd.	210
Ultra Mega Solar Photovoltaic Power (Sambhar Lake) Project	Sambhar Salts Ltd.	200
Wind/Solar Hybrid Renewable Energy Park (Khavda)	NTPC Renewable Energy Ltd.	190
Coal Based Power (Raikheda, Gaitara & Chicholi) Project - Expansion	Adani Power Ltd.	136
Patgaon Pumped Storage Hydel Power Project	Adani Green Energy Ltd.	131.7

Project name	Promoter	Cost (Rs Bn)
Ultra Mega Solar Park (Maharashtra)	Maharashtra State Power Generation Co. Ltd.	125
Transmission Line (Multi States) Project	Power Grid Corpn. of India Ltd.	120.3
Wind & Solar Power (Karnataka) Project	Ayana Renewable Power Pvt. Ltd.	120
Shoma Pumped Storage (Sonbhadra) Hydel Power Project	Torrent Power Ltd.	120
Coal Based Power (Kawai) Project [Phase-II]	Adani Power Rajasthan Ltd.	115.6
Solar Power (Junuthala) Project	Greenko Energies Pvt. Ltd.	103.5
Sashnai Pumped Storage Hydel Power Project	Torrent Power Ltd.	81.2
Transmission Line (Kudus-Aarey Colony) Project	Adani Electricity Mumbai Ltd.	80
Transmission System (Gujarat) Project [Phase-I]	Power Grid Corpn. of India Ltd.	69
Transmission System (Tamil Nadu) Project	Power Grid Corpn. of India Ltd.	62.4

Note: The above set of projects is an indicative list and not an exhaustive list of projects

Source: Projects Today, CRISIL MI&A

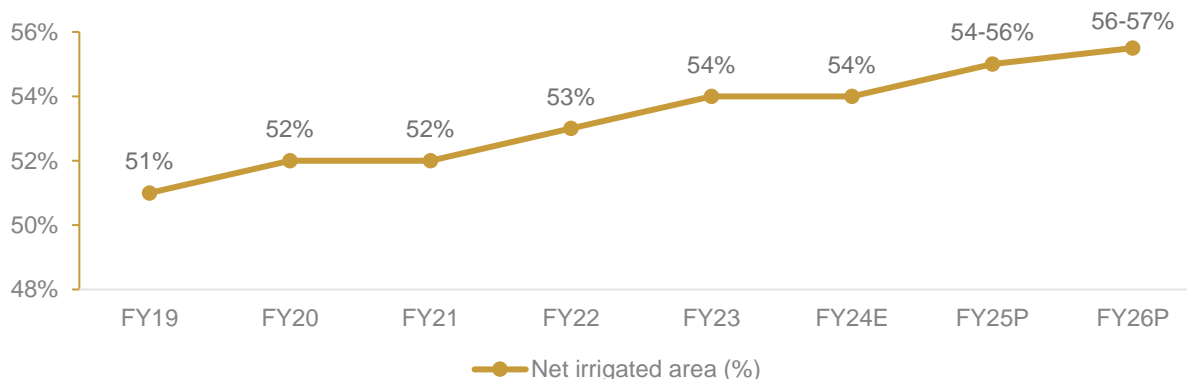
5 Assessment of water sector (Irrigation + water distribution) in India

Overview of Irrigation sector in India

Irrigation, the process of supplying water to crops through artificial means such as canals, pipes and sprinklers, is the backbone of agriculture. It makes farmers less dependent on rainfall and helps them grow multiple crops on the same plot across agricultural seasons. Irrigation is the basic determinant of agricultural production as irrigation lack constrains crop yields

High dependence on monsoon causing penetration levels to be low but is marginally improving. Irrigation penetration in India is low, but efforts are on to improve it. As per CRISIL estimates, ~54% of the net sown area has been irrigated as of fiscal 2024. With only 54% of land irrigated, the country has huge potential to develop irrigation. Going ahead, aided by various initiatives such as Pradhan Mantri Krishi Sinchayee Yojana (PMKSY), Command Area Development and Water Management (CADWM) coupled with increase in investments towards development of infrastructure facilities, irrigation penetration levels in India are expected to rise reaching to the levels of 56-57% by fiscal 2026.

Improvement in irrigation penetration levels over the years in India



Note: 1. Irrigation penetration is net irrigated area over net sown area

2. Irrigation penetration is estimated by taking Rs 0.8 million as capital expenditure for irrigating 1 hectare of land

Source: Ministry of Agriculture, CRISIL MI&A

Overview of type of projects and customers in water EPC

Type of projects and key clientele in the sector

Segment	Type of projects	Clientele in the segment
Irrigation	construction of dams, barrages, canals, lift irrigation, micro irrigation and tunneling	Most of the tenders for the development of irrigation and water projects are given out by respective state government departments.
Water supply	Intake facilities, storage reservoirs, distribution systems, treatment plants, laying of pipelines, rainwater harvesting,	

Source: CRISIL MI&A

Overview of investments in water sector in India

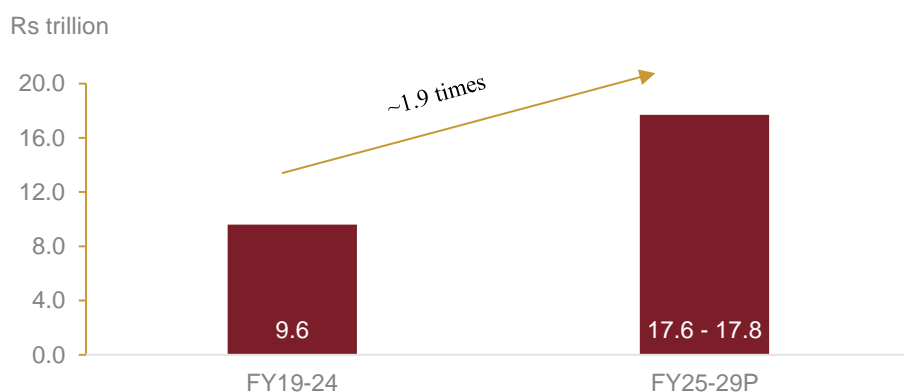
Investments in water sector (irrigation + WSS) expected to see a rise led by completion of major irrigation projects and increase in water infrastructure under on-going schemes

During fiscal 2019-24, due to rise in investment expenditure across major agriculture states, coupled with central government focus on schemes such as 56rishi56 mantri 56rishi sinchayee yojana (PMKSY), accelerated irrigation benefits programme (AIBP) and command area development and water management (CAD&WM) Programme, the sector has attracted a total investment of ~Rs 5.2 trillion. In the future, an investment of Rs 7.7 – 7.9 trillion is estimated over the next five years between fiscal 2024 and 2028, which is an increase of ~1.5 times over the past five years, owing to the push from state governments to increase irrigation penetration in states.

The demand for irrigation infrastructure is driven by the need to enhance agricultural productivity, support rural livelihoods and ensure food security. Despite significant agricultural activity, many regions in India still rely on unpredictable monsoons due to low irrigation levels. Limited water resources further necessitate resilient irrigation systems. Investments in advanced irrigation methods help in better water usage, increase crop yields and ensure consistent agricultural productivity.

In case of water supply and sanitation, during fiscal 2019-24 the sector has seen a total infrastructure investment of Rs 4.4 trillion which are expected to grow by ~2.3 times during fiscal 2025-29 reaching a total of Rs 9.9 trillion. This growth is majorly poised by support from government through various schemes such as Swachh Bharat Mission (SBM), Jal jeevan mission and the National Mission for Clean Ganga (NMCG). In addition to these schemes such as Atal Mission for Rejuvenation and Urban Transformation (AMRUT), which focuses on development of water supply and sanitation facilities among others along the infrastructure growth in urban regions.

Investments in Indian water sector (irrigation + WSS)



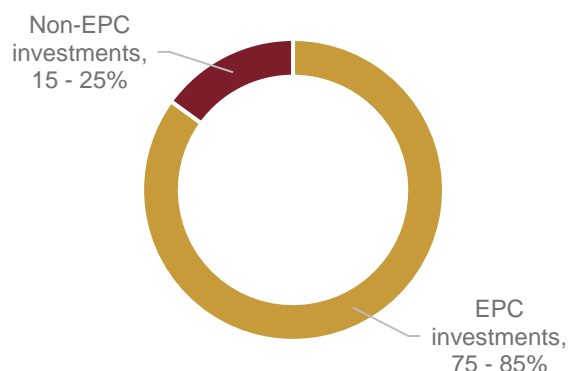
Source: CRISIL MI&A

EPC projects among the overall infra investments for water sector to remain at 75-85%

We have assessed water supply for agriculture and urban areas, as well as water sanitation, wastewater management, and water treatment plant projects within the irrigation sector, to evaluate investments through the EPC (Engineering, Procurement, and Construction) route.

Purely for water supply projects, more than 95% of project investments happen via the EPC route. Considering wastewater treatment and water supply projects together, it is estimated that 80-90% of investments in the sector happen via the EPC route, while the rest happen via public private partnership (PPP).

EPC investments in the water (irrigation + WSS) sectors



Source: CRISIL MI&A

Overview of irrigation spending by key states in India

Water resources is a state subject. Hence, state governments are responsible for regulating the use of water. The development of irrigation projects is entrusted to state departments and corporations. While the irrigation/water resources department in a state handles all types of irrigation projects, minor irrigation projects can also be implemented by the agriculture department, zilla parishads/panchayats, and minor irrigation corporations.

The allocation of funds for the irrigation sector is of utmost importance due as it plays a crucial role in the development of infrastructure, enabling the construction and maintenance of essential irrigation facilities and implementation of water management practices. This aids in building a reliable water supply for agriculture, environmental sustainability by minimizing water wastage, and preserving ecosystems.

Under irrigation there are three types of projects - major, medium and minor, based on the cultivable command area they cover. Major and medium irrigation projects mostly comprise dams, canals and lift irrigation schemes. Minor irrigation schemes include wells, tube wells, mud canals, etc.

Budget allocation under Irrigation and flood control across various states

State	FY23	FY24RE	FY25BE	FY25BE vs FY24RE (% change)
Assam	25.3	29.8	38.6	29.6%
Bihar	39.5	59.5	53.9	-9.4%
Gujarat	78.0	129.9	174.4	34.2%
Haryana	46.0	48.7	63.2	30.0%
Himachal Pradesh	8.0	9.5	13.8	45.9%
Karnataka	231.1	190.6	191.9	0.7%
Punjab	20.7	21.7	21.1	-2.7%
Tamil Nadu	63.0	71.5	77.6	8.6%
Uttar Pradesh	123.1	197.7	228.4	15.5%
Uttarakand	8.8	10.8	21.9	102.5%

State	FY23	FY24RE	FY25BE	FY25BE vs FY24RE (% change)
Chhattisgarh	16.8	26.2	29.2	11.6%
Jharkhand	17.5	18.2	22.3	22.5%
Kerela	9.8	11.0	12.4	13.4%
Meghalaya	1.4	2.3	2.4	6.1%
Mizoram	0.4	1.0	1.0	3.3%
Nagaland	0.5	1.6	3.3	107.0%
Tripura	1.3	2.6	2.3	-13.0%

Note: The data is a indicative list and not an exhaustive list based on the latest budget data available

Source: State budget documents, CRISIL MI&A

Budget allocation under water supply and sanitation across various states

State	FY23	FY24RE	FY25BE	FY25BE vs FY24RE (% change)
Chhattisgarh	29.2	57.2	54.4	-4.9%
Himachal Pradesh	21.4	23.0	20.0	-13.0%
Jharkhand	21.6	39.8	47.1	18.3%
Kerala	20.0	15.5	13.1	-15.5%
Punjab	14.6	14.3	15.5	8.2%
Tamil Nadu	29.5	44.3	69.9	57.8%
Uttar Pradesh	131.9	233.0	280.5	20.4%
Uttarakand	11.6	17.5	11.9	-32.2%
Assam	13.8	21.3	23.4	9.9%
Bihar	38.6	99.6	38.4	-61.5%
Gujarat	63.1	66.7	70.3	5.3%
Haryana	32.9	51.8	47.5	-8.3%
Karnataka	17.7	70.5	93.7	32.9%
Meghalaya	7.1	7.3	9.0	23.2%
Mizoram	5.0	6.5	2.9	-55.8%
Nagaland	1.9	2.1	1.8	-14.7%
Tripura	3.5	5.2	6.6	27.1%

Note: The data is a indicative list and not an exhaustive list based on the latest budget data available

Source: State budget documents, CRISIL MI&A

Overview of key policies and schemes in the sector

Pradhan Mantri Krishi Sinchayee Yojana (PMKSY)

Aiming to converge irrigation investment at the field level to maximise its impact, the government initiated PMKSY in fiscal 2016, with a spending target of Rs 500 billion until 2020. It was approved by the Cabinet Committee on Economic Affairs on July 1, 2015.

PMKSY is an umbrella scheme, consisting of two major components being implemented by Ministry of Jal Shakti, namely, Accelerated Irrigation Benefit Programme (AIBP), and Har Khet Ko Pani (HKKP). HKKP, in turn, consists of four sub-components: (i) Command Area Development & Water Management (CAD&WM); (ii) Surface Minor Irrigation (SMI); (iii) Repair, Renovation and Restoration (RRR) of Water Bodies; and (iv) Ground Water (GW) Development. Further, in 2016, CAD&WM sub-component of HKKP was taken up for implementation with AIBP.

In addition, PMKSY also consists of Watershed Development component (WDC) which is being implemented by Department of Land Resources, Ministry of Rural Development. Further, Per Drop More Crop (PDMC) component being implemented by Department of Agriculture and Farmers Welfare (DoA&FW) was also a component of PMKSY during 2016-21 and is now being implemented separately by DoA&FW.

Further, The Government of India has approved implementation of Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) for 2021-26 with an outlay of Rs 930.7 billion to benefit about 22 Lakh farmers. Total additional irrigation potential creation targeted during 2021-26 under AIBP is 13.88 Lakh hectare. Apart from focused completion of 60 ongoing projects including their 30.23 lakh hectare command area development, 8 additional projects have been taken up as of January 2024. In addition, two national projects, namely Renukaji Dam Project (Himachal Pradesh) and Lakhwar Multipurpose Project (Uttarakhand) have also been included.

A. Accelerated Irrigation Benefit Programme (AIBP)

Accelerated Irrigation Benefits Programme (AIBP) is one of the components of PMKSY, whereby partial financial assistance is being provided by Government of India for identified major/ medium irrigation projects.

During fiscal 2017, Government of India approved funding of the 99 prioritized irrigation projects (and 7 phases) with an estimated balance cost of Rs. 775.9 billion (Central share ~40%, State share ~60%) for completion in phases. The works include both the AIBP and Command Area Development (CAD) works with a target to create a irrigation potential of about 34.63 Lakh hectares.

Against the target an Irrigation Potential of about 25.50 Lakh hectares has been created through AIBP works of the prioritized projects during fiscal 2017 to fiscal 2023.

As of January 2024, AIBP works of 56 prioritized projects out of identified 99 projects (and 7 phases) were reported to be completed.

B. Ground Water (PMKSY-HKKP-GW)

Pradhan Mantri Krishi Sinchayee Yojana Har Khet Ko Paani Ground Water scheme, envisages to provide irrigation facility for small and marginal farmers in areas having sufficient potential for future development of ground water. Since 2019, 13 projects were sanctioned under this scheme in 10 States namely Arunachal Pradesh, Assam, Gujarat, Nagaland, Manipur, Mizoram, Tripura, Tamil Nadu, Uttar Pradesh, and Uttarakhand. As on 30th November 2023, 29,777 wells have been constructed, 87,243 ha command area have been created and 67,902 small & marginal farmers have been benefitted.

C. Command Area Development & Water Management (CADWM)

The scheme was launched with an aim to enhance physical access of water on farm and expand cultivable area under assured irrigation. 99 prioritized Projects have been identified for expeditious completion adopting innovative funding through creation of 'Long Term Irrigation Fund' under NABARD. The targeted Culturable Command Area (CCA) of the presently 88 included projects are 45.08 lakh Ha. and estimated central assistance (CA) is Rs 82.3 billion. During 2016-17 to 2022-23, CA amounting to Rs 29.6 billion was released while the CCA progress reported by States is 17.87 Lakh ha.

Atal Bhujal Yojana

Atal Bhujal Yojana (Atal Jal) is a Central Sector Scheme of Government of India with an outlay of Rs 60 billion which is being implemented from 1st April 2020 for a span of 5 years . This unique scheme aims at increasing the capacity of States to manage their ground water resources and for ensuring their long-term sustainability with active participation of the local communities. It also envisages convergence of various ongoing schemes for implementation of interventions for improving ground water availability with emphasis on demand management and also optimal use of available water resources.

Under this scheme, 8,213 water stressed areas across seven states which include Gujarat, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan and Uttar Pradesh have been identified. The scheme is partly funded by World Bank.

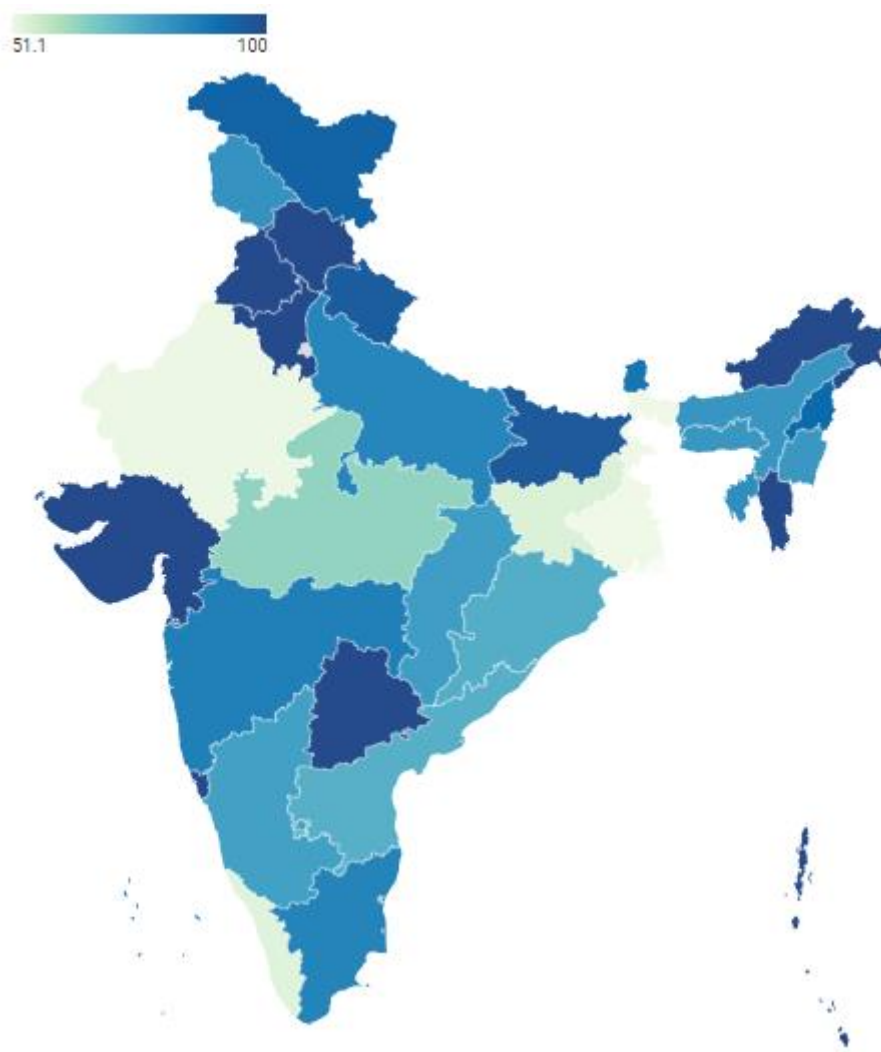
Jal Jeevan Mission

The Government of India has made a commitment to ensure that all rural households in the country have access to safe and potable tap water in sufficient quantity and of a specified quality on a regular and long-term basis. To achieve this goal, the Jal Jeevan Mission (JJM) was launched in August 2019, in collaboration with the states. As drinking water falls under the jurisdiction of the states, the responsibility for planning, approval, implementation, operation, and maintenance of drinking water supply schemes, including those under the JJM, lies with the State/UT Governments. The Government of India provides support to the states by offering technical and financial assistance.

Since the inception of the Jal Jeevan Mission, significant progress has been made in improving access to tap water for rural households. At the beginning of the mission in August 2019, only 32.3 million rural households had tap water connections. However, as of 29.07.2024, ~117.8 million additional rural households have been provided with tap water connections under JJM, this accounts for ~77.8% of rural households in India having tap water supply in their homes. During the current year of 2024 around 10.6 million being provided till date (from Jan 2024 – 29th July 2024).

For the current financial year, 2023-24, an allocation of Rs. 700 billion has been made under the Jal Jeevan Mission. Out of this amount, Rs. 546.4 billion has already been released to the eligible States/UTs.

Status of tap water supply for households across India as of 29th July 2024



Note: The above visualization has been made using Datawrapper

Source: Jal Jeevan Mission, CRISIL MI&A

In addition to above, the **Micro Irrigation Fund (MIF)** provides loans to state governments to promote micro-irrigation technologies. **The National Mission for Sustainable Agriculture (NMSA)** focuses on promoting sustainable agricultural practices, including efficient water resource utilization, supporting irrigation methods that enhance water use efficiency and encourage conservation techniques like rainwater harvesting. **The Pradhan Mantri Fasal Bima Yojana (PMFBY)**, primarily a crop insurance scheme, indirectly impacts irrigation by providing coverage for crop losses due to inadequate or excess rainfall, incentivizing farmers to invest in improved irrigation practices. **The Jal Shakti Abhiyan**, a water conservation and security campaign by the Ministry of Jal Shakti, promotes efficient water management and conservation practices essential for sustainable irrigation, contributing to enhanced agricultural productivity and supporting the irrigation sector in India.

Overview of key water projects (irrigation + water supply) in India

India has various key irrigation ongoing projects aiming to play a crucial role in supporting agriculture, managing water resources, and enhancing rural livelihoods. These projects are instrumental in enhancing agricultural productivity, ensuring water security, and supporting the livelihoods of millions of people in India

Some of the announced / on-going key irrigation projects

Project name	Promoter	Cost (Rs Bn)
Kaleshwaram Lift Irrigation Project	Kaleshwaram Irrigation Project Corpn. Ltd.	1278.7
Kalpasar Dam Project	Narmada Water Resources, Water Supply & Kalpsar Department	1002.0
Link Channel (Parbati-Kalisindh-Mez-Chakan-Banas-Ghanbhiri-Parwati) Project	Water Resources Department, Rajasthan	750.0
Polavaram Irrigation Project	Irrigation & CAD Department, Andhra Pradesh	555.5
Eastern Rajasthan Canal Project	Water Resources Department, Rajasthan	370.0
Palamuru-Rangareddy Lift Irrigation Scheme	Irrigation & CAD Department, Telangana	352.0
Telangana Drinking Water Supply Scheme	Telangana Drinking Water Supply Corpn. Ltd.	428.5
Kondhane Water Supply Scheme	City & Industrial Devp. Corpn. of Maharashtra Ltd.	52.4
Pipe Water Supply Scheme (Mathura)	Uttar Pradesh State Water & Sanitation Mission	33.1
Water Supply Scheme (Gargai-Pinjal)	Municipal Corpn. of Greater Mumbai	31.1
Pipe Water Supply Scheme (Narora Barrage)	Uttar Pradesh State Water & Sanitation Mission	30.7

Note: The above set of projects is an indicative list and not an exhaustive list of projects

Source: Projects Today, CRISIL MI&A

Overview of key trends and drivers in the water sector

Trends / drivers	Description
Adoption of Micro-Irrigation Systems	Increasing adoption of drip and sprinkler irrigation systems for water-efficient irrigation. These systems help in conserving water and enhancing crop yields. Subsidies and financial incentives provided by the government under schemes like Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) would further aid in the adoption of micro-irrigation.
Technological Innovations	Integration of Internet of Things (IoT), sensors, and automation in irrigation systems to optimize water use and monitor soil moisture levels in real-time. Use of Geographic Information Systems (GIS) and remote sensing for efficient water resource management and planning. Adoption of continuous advancements in irrigation technologies, such as precision irrigation, automated systems, and remote monitoring would support growth in irrigation penetration
Sustainable Water Management Practices	Sustainable water management practices aid in optimizing water usage and reduce wastage of water. Techniques such as drip irrigation, rainwater harvesting and soil moisture management support growth in crop output. Further, these practices also aid in reduction of operational costs, making irrigation more affordable for farmers.
Increasing agriculture demand	The growing demand for food due to the rising population drives the need for enhanced agricultural productivity. Efficient irrigation systems are essential for maximizing crop yields. As the agriculture sector expands, so does the demand need for irrigation infrastructure. Export opportunities for agriculture products also incentive farmers to adopt advanced irrigation methods further driving the demand.
Government Policies and Schemes	Government scheme like Pradhan Mantri Krishi Sinchayee Yojana (PMKSY), Atal Bhujal Yojana (ABY), Accelerated Irrigation Benefits Programme (AIBP), Command Area Development and Water Management (CADWM) Programme and more have initiated to aimed at expanding irrigation coverage and improving water use efficiency through on focus on sustainable groundwater management through community participation and scientific approaches

Source: CRISIL MI&A

Overview of key threats and challenges in the industry

Threats / Challenges	Description
Aging Infrastructure	Much of India's irrigation infrastructure is build long ago and deteriorating, leading to inefficiencies and water losses. Canals and reservoirs, built decades ago, often suffer from poor maintenance and structural weaknesses. This aging infrastructure fails to meet the growing demands of modern agriculture, resulting in uneven water distribution and reduced irrigation efficiency. Delays in infrastructure modernization may hinder productivity of the agriculture sector.
Financial Constraints	Small and marginal farmers, who constitute the majority of the agricultural population, often lack the financial resources to invest in modern irrigation systems. The high initial costs of installing advanced technologies like drip and sprinkler irrigation deter

Threats / Challenges	Description
	widespread adoption. Moreover, access to credit and financing options remains limited, especially in rural areas. Ensuring financial inclusivity and affordable financing solutions is crucial for the industry's growth.
Technological Adoption	Despite the availability of advanced irrigation technologies, their adoption rate among farmers is relatively low. This is partly due to a lack of awareness and technical knowledge about the benefits and operation of these systems. Bridging this knowledge gap requires targeted education and capacity-building initiatives. Collaborative efforts between government agencies, private sector players, and agricultural universities can facilitate wider adoption of innovative irrigation solutions.
Environmental Concerns	Inefficient irrigation methods can lead to excessive water use, resulting in soil degradation and reduced agricultural productivity. Moreover, the overreliance on chemical fertilizers and pesticides in irrigated areas contributes to water pollution and ecosystem disruption. Promoting sustainable and environmentally friendly irrigation practices is vital for preserving natural resources.

Source: CRISIL MI&A

6 Assessment of railway and metro sector in India

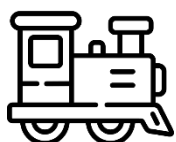
History of Indian Railways

The British laid the foundation

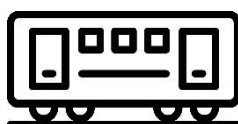
The railway, as a mode of transport, was introduced in India in the 19th century. The first passenger train took about 400 people from Mumbai to Thane for a 21-mile journey. In the south the first line was opened on 1st July 1856 by the Madras Railway Company. It ran between Vyasarpadi Jeeva Nilayam (Veyasarpany) and Walajah Road (Arcot), a distance of 63 miles. In the North a length of 119 miles of line was laid from Allahabad to Kanpur on 3rd March 1859. These were the small beginnings which in due course developed into a network of railway lines all over the country. By 1880 the Indian Railway system had a route mileage of about 9000 miles. INDIAN RAILWAYS, the premier transport organization of the country is the largest rail network in Asia and the world's second largest network under one management.

Indian Railways is a government-owned organization with a monopoly in rail transportation in the country. Its operations are overseen by the Railway Board, which, in turn, is headed by the Ministry of Railways. The Railway Board comprises a chairman and six members. The Minister of Railways, two Ministers of State for Railways, and the Railway Board constitute the Ministry of Railways.

Figure 1: Indian Railways: At a glance as on year 2021-22



13,215 locomotives



84,863 coaches and 318,896 freight wagons



7,308 railway stations



300 yards



2,300 goods sheds



1.2 million workforces

The focus and functioning of Indian Railways took a turn for the better following the announcement of the Railway Budget 2016-17 that outlined the five-year capex, along with steps to ensure minimal populism, key structural reforms such as delegation of power, mooted an independent Rail Development Authority for setting tariff and performance norms, expediting project sanctioning and hosing resources into priority projects

Overview of Indian railways

India's rail network is a multi-gauge, multi-traction system

Gauge, also called Railway Gauge, in railroad transportation, the width between the inside faces of running rail. In India Gauges are of three types: Broad Gauge (1.676m width), Meter gauge (1 m width) & Narrow Gauge (0.762m & 0.610 m in width).

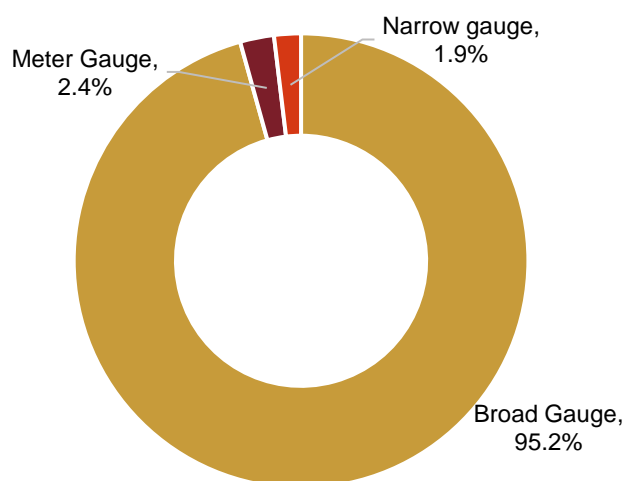
Traction system, system which causes propulsion of train vehicle in which driving force is obtain from various device such as Diesel or Electric. Indian Railway uses both Diesel and Electric traction system through its locomotives.

Gauge type and Route covered

Gauge type	Route Kilometers
Broad gauge (1.67m)	65,093 km
Meter gauge (1.00m)	1,656 km
Narrow gauge (0.76m/0.61m)	1,294 km
Total	68,403 km

Source: Indian Railway statistics, CRISIL MI&A

Share of various gauges in the overall network



Source: Indian Railway statistics 2021-22, CRISIL MI&A

Overview of investments in Indian railway and metro sector

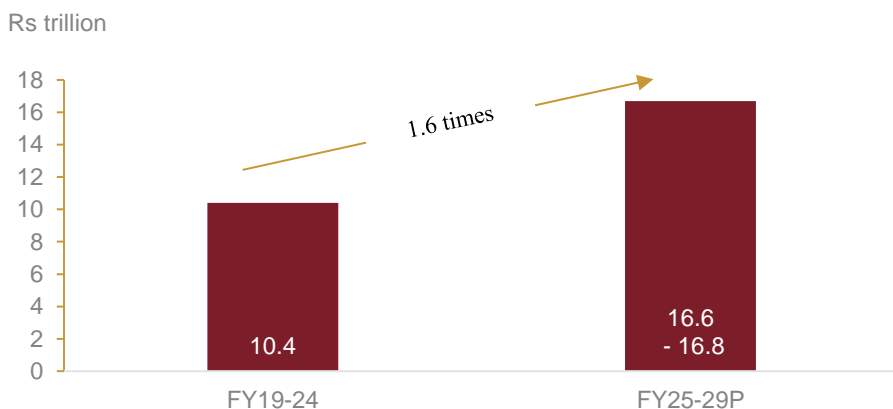
Investments in railway infrastructure to rise during fiscal 2025-29 led by Amrit Bharat station scheme and high-speed rail among others

During fiscal 2019-24, on account of the government's focus on completing dedicated freight corridor (DFC) projects, traction in high-speed rail, investment in newer avenues such as Vande Bharat trains, and focus on the station redevelopment program, the sector has attracted a total infrastructure investment of Rs 10.4 trillion.

In the future, a infrastructure investment of Rs 16.6 - 16.8 trillion is estimated over the next five years between fiscal 2025 and 2029, which is an increase of 1.6 times compared to fiscal 2019-24, led by investments in network decongestion, Amrit Bharat station development scheme, and high-speed rail projects. With investments over fiscal 2024 to 2029 expected to nearly double, raising funds through external agencies, IEBR, and via PPP would be a key monitorable.

Further, the railway infrastructure development is also driven by the need to support economic growth, enhance freight efficiency and improve long distance passenger connectivity. Government initiative such as dedicated freight corridor and high-speed rail projects aim to modernise and expand the existing national rail network. Increased industrial trade and tourism activity require better logistics and transportation facilities. Additionally, the push towards sustainable transportation is also driving the investments in railway electrification and modernisation.

Investments in Indian railway sector



Source: CRISIL MI&A

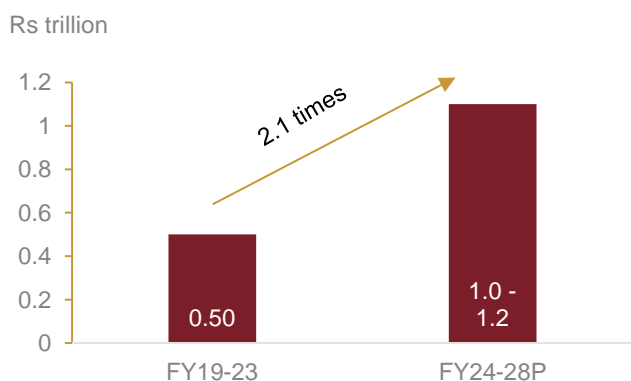
Metro projects to see infrastructure investments of Rs 1.0 – 1.2 trillion between fiscal 2025-29

CRISIL MI&A estimates that infrastructure spends on metro projects in India will increase 2.1 times from Rs 0.5 trillion during fiscal 2019-24 to Rs 1.0 – 1.2 trillion over fiscals 2025 to 2029. Bulk of the metro projects are under construction and have achieved financial closure, with the lockdown and migration of labour the only impediments that drove investments lower in fiscal 2021, while deferral of investments led to revival in fiscal 2022 with the momentum continuing during next two fiscals.

Going ahead, new project announcements, as well as completion of under construction projects, by state governments to aid growth in the sector. In addition, new metro rail policy was announced during the Union Budget (2018) to develop private interest in the segment.

To increase the viability of metro projects and make them available across cities with lesser populations, Government of India has announced Metro-Neo and Metro-Lite. These are cheaper to construct and operate and are suited for cities with lower population densities.

Investments in Indian metro sector



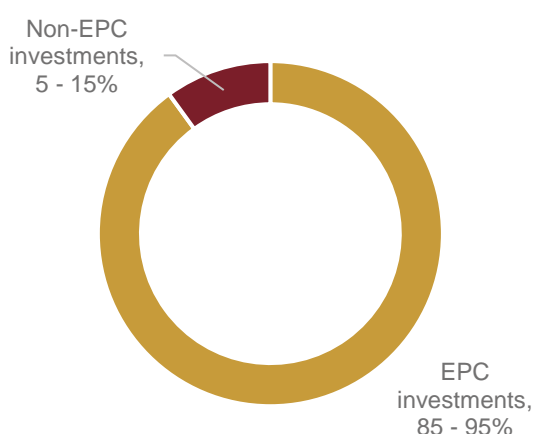
Source: CRISIL MI&A

EPC projects make up 85-95% of investments in railway and metro sector combined

Indian Railways previously used conventional item rate contracts for construction projects, where the authority provided detailed designs and quantity estimates, and payments were based on measurements of completed work. This method often led to time and cost overruns due to design delays, variations in items and quantities, and inadequate funding, with the authority bearing most construction risks. Project engineers spent considerable time managing these variations and adjusting contract prices. To meet the growing economic demand and enable faster expansion of the freight network, improved project execution capabilities are essential. Therefore, Indian Railways decided to adopt the Engineering, Procurement, and Construction (EPC) mode of contracting for construction projects.

As per CRISIL MI&A estimates, barring a few PPP projects being given out for station redevelopment, and a handful of projects to run private trains in the country, rest 85 - 95% of the projects in Indian railways are executed via EPC route.

EPC investments in the railway and metro sectors



Source: CRISIL MI&A

List of ongoing / upcoming projects in Indian railway and metro sector

Project name	Promoter	Cost (Rs Bn)
High Speed Rail Corridor (Mumbai-Ahmedabad) Project	National High Speed Rail Corporation Ltd.	1080.0
Regional Rapid Transit System (Delhi-Gurgaon-Shahjahanpur-Behror) Project	National Capital Region Transport Corporation Ltd.	1000.0
East West Dedicated Freight Corridor Project	Dedicated Freight Corridor Corporation of India Ltd.	738.0
Kerala Semi High Speed Rail Corridor (Thiruvananthapuram-Kasargod) Project	Kerala Rail Development Corporation Ltd.	664.1
Ahmedabad Metro Rail Project [Phase-II]	Gujarat Metro Rail Corporation (GMRC) Ltd.	650

Project name	Promoter	Cost (Rs Bn)
Chennai Metro Rail Project - Phase II	Chennai Metro Rail Ltd.	632.5
East Coast Corridor Project	Dedicated Freight Corridor Corporation of India Ltd.	567.5
Delhi Metro Rail Project - Phase IV	Delhi Metro Rail Corporation Ltd.	550.0
Eastern Freight Corridor Project	Dedicated Freight Corridor Corporation of India Ltd.	512.2
Western Freight Corridor Project	Dedicated Freight Corridor Corporation of India Ltd.	461.8
Udhampur-Qazigund-Srinagar-Baramula BG Railway Line	Northern Railway	411.2
Light Metro Rail (Bhopal) Project	Madhya Pradesh Metro Rail Co. Ltd.	225
Light Metro Rail (Indore) Project	Madhya Pradesh Metro Rail Co. Ltd.	223
Surat Metro Rail Project	Gujarat Metro Rail Corporation (GMRC) Ltd.	152.3
Metro Rail (Kanpur) Project	Uttar Pradesh Metro Rail Corpn. Ltd.	137.2
Metro Rail (Agra) Project	Uttar Pradesh Metro Rail Corpn. Ltd.	130
Metro Rail (Nagpur) Project - Phase II	Nagpur Metro Rail Corporation	67.1

Note: The above set of projects is an indicative list and not an exhaustive list of projects

Source: Projects Today, CRISIL MI&A

Key trends and growth drivers of the industry

Key trends and growth drivers	Description
Urbanisation and population growth	Rising urbanization and population growth in India are driving the demand for efficient railway network in the country. New metro systems are being constructed in order to accommodate the increasing the number of commuters in urban areas and also to reduce the traffic congestion as well as pollution in the urban cities.
Technological advancements	In the recent years, Indian railways has also seen rise in technological adoption. High speed trains, automated signaling systems, and GPS enabled tracking of trains are being integrated to improve operational efficiency and passenger safety along with travel

Key trends and growth drivers	Description
	convenience. Further, Indian railways has also introduced 'KAVACH', the domestically developed Train Collision Avoidance System.
Enhanced intermodal and last-mile connectivity	Improved railway and city rail metro integration with freight corridors, airports, well-connected highways, bus terminals, and inland ports would further aid in better scheduling of timed transfers and reduction in logistical wait-time.
Government thrust	Increase in government focus for overall development of infrastructure through schemes and policies such as Station redevelopment, modernization of 40,000 normal bogies to vande-bharat bogies, national rail plan (NRP-2030) under which GoI aims to increase share of railways in freight to 45% and reduce the transit time among others.

Source: CRISIL MI&A

Key threats and challenges of the industry

Threats /Challenges	Description
Complex projects	Railways and metro projects are highly complex in nature with regards to their scale, technical expertise, financial capabilities, legal and regulatory requirements. This complexity increases risks and costs making private investors hesitant to participate.
Cost overrun and execution delays	Several railways and metro projects have been experiencing cost overrun and executive delays primarily on account with delays in land acquisition, inadequate planning, project financing issues, approval from several authorities, complex engineering requirement, unforeseen ground conditions on an ongoing basis.
Overcrowding	Indian Railways carry large number of passengers on a daily basis. This high volume of passengers coupled with aging infrastructure of Indian Railways creates pressure on the system leading to delays and passenger discomfort

Source: CRISIL MI&A

Overview of key policies and schemes in the sector

National Rail Plan – 2030

Indian Railways have prepared a National Rail Plan (NRP) for India – 2030. The Plan is to create a 'future ready' Railway system by 2030. The NRP is aimed to formulate strategies based on both operational capacities and commercial policy initiatives to increase modal share of the Railways in freight to 45%. The objective of the Plan is to create capacity ahead of demand, which in turn would also cater to future growth in demand right up to 2050 and also increase the modal share of Railways to 45% in freight traffic and to continue to sustain it.

To achieve this objective, following main features of the National Rail Plan have been identified:

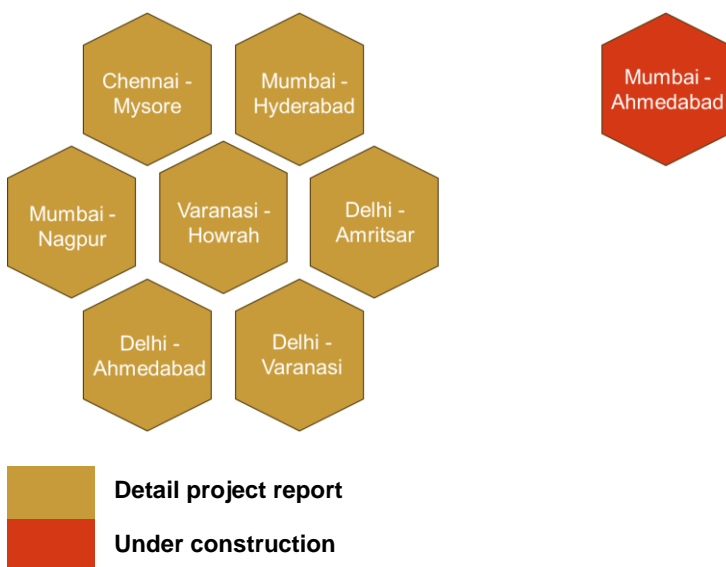
- Formulate strategies based on both operational capacities and commercial policy initiatives to increase modal share of the Railways in freight to 45%
- Reduce transit time of freight substantially by increasing average speed of freight trains to 50Kmph
- Identify new Dedicated Freight Corridors

- Identify new High Speed Rail Corridors
- Assess rolling stock requirement for passenger traffic as well as wagon requirement for freight.
- Assess Locomotive requirement to meet twin objectives of 100% electrification (Green Energy) and increasing freight modal share.
- Assess the total investment in capital that would be required along with a periodical break up.
- Sustained involvement of the Private Sector in areas like operations and ownership of rolling stock, development of freight and passenger terminals, development/operations of track infrastructure etc.

High speed rail projects

The Government of India has envisaged development of high speed rail (HSR) corridors and has identified 8 corridors for constructing HSR projects of which the Mumbai Ahmedabad corridor is under construction while DPR preparation of the remaining projects is under preparation.

Status of HSR projects



Source: CRISIL MI&A

Mumbai-Ahmedabad High Speed Rail (MAHSR) project passes through high growth rate States of Gujarat and Maharashtra connecting business centres of Mumbai, Surat, Vadodara and Ahmedabad. The sanctioned cost of the MAHSR project is Rs. 1,080.0 billion. As of 9th February 2024, 290.64 km of pier foundation, 267.48 km of pier construction, 150.97 km of Girder Casting and 119.00 km of Girder launching have been completed.

Dedicated freight corridors

Ministry of Railways has taken up construction of two Dedicated Freight Corridors (DFCs) which are Eastern Dedicated Freight Corridor (EDFC) and Western Dedicated Freight Corridor (WDFC). EDFC pans from Ludhiana to Sonnagar (1337 Km) and WDFC from Jawaharlal Nehru Port Terminal (JNPT) to Dadri (1506 Km). The construction of Dedicated Freight Corridors will aid in reducing the logistic cost with higher axle load trains, Double Stack Container trains(DSC) and faster access to Northern hinterland by Western Ports and will also lead to development of new industrial hubs and Gati Shakti Cargo Terminals.

As of 9th February 2024, Construction of EDFC has been fully completed and 1220 Km out of 1506 Km of WDFC has been completed and train operations are going on in the completed sections.

Amrit Bharat Station Scheme

Launched on 6th August 2023, the Amrit Bharat Station Scheme aims to transform and revitalize 1,309 railway stations nationally. The scheme involves

- Preparation and implementation of master plans to improve the amenities at the stations.
- The scheme also envisages improvement of the building, integrating the station with both sides of the city, multimodal integration, amenities for Divyangjans, sustainable and environment-friendly solutions, provision of ballastless tracks, 'roof plazas' as per necessity, phasing and feasibility and creation of city centres at the station in the long term.

On 26th February 2024, the Government of India, as part of the Amrit Bharat Station Scheme, proposed 553 railway stations with an overall cost of Rs 190.00 billion.

In addition, it also proposed 1,500 infrastructure redevelopment projects like overbridges and underpasses at an overall cost of Rs 215.20 billion. It will be providing an overall opportunity of Rs 410.00 billion

Kisan Rail

Small and marginal farmers often struggle to transport their produce over long distances. To address the issue and help them access larger markets, the Government of India in the Union Budget of 2020-21 announced 'Kisan Rail'. The major aim of Kisan Rail services is to transport perishable goods such as dairy products, poultry, fruits, vegetables, meat, fishery, etc from regions of high production to regions of high consumption. Up to 31 October 2022, Indian Railways have operated 2,359 Kisan Rail services, transporting approximately 7,91,000 lakh tonnes of perishables including fruits and vegetables.

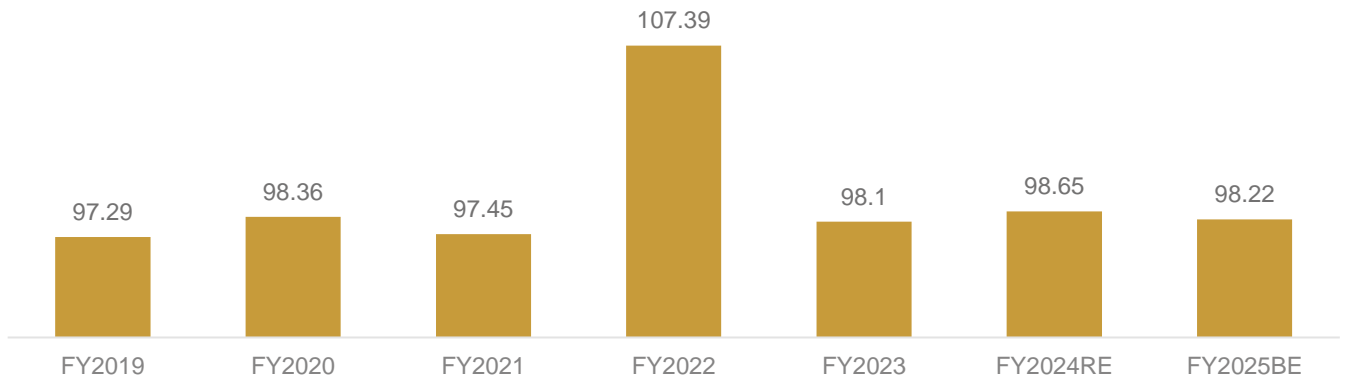
Rail Budget 2024-25

The total Capital Outlay for the Ministry of Railways for the year 2024-25 has been kept at Rs. 2,650 billion of which Rs 2,520 billion are met through Gross Budgetary Resources (GBR) and rest through Internal and Extra Budgetary Resources (IEBR). The 2024-25 budgeted capital outlay is 2% higher than the revised estimates of 2023-24, while the GBR has seen an increment of 5% during the same period. The key announcements under the current 2024-25 includes the development of three targeted corridors a) energy, mineral and cement, b) port connectivity and c) high traffic density which are planned to be developed under PM Gati Shakti.

Additionally, 40,000 normal rail bogies are planned to be upgraded to Vande Bharat standards in order to enhance passenger safety and convenience.

Operating Ratio (%) of IR

(%)



Note: RE-Revised Estimate, BE: Budget Estimate

Source: Budget Documents, CRISIL MI&A Consulting

Indian Railways' operating ratio (OR) declined slightly to 97.45 in fiscal 2021 from 98.36 in fiscal 2020. The OR for fiscal 2022 deteriorated as it climbed to 107.39. The operating ratio is estimated at ~98.22 in fiscal 2025 as per budget estimates.

7 Competitive analysis

In this section, CRISIL MI&A has analysed key EPC players operating in the Indian industry. Data in this section has been obtained from publicly available sources, which include annual reports and investor presentations, regulatory filings, rating rationales, and/or company websites. Financials in this section have been re-classified by CRISIL, based on annual reports and financial filings by the respective players. Financial ratios used in this report may not match with the reported financial ratios by the players on account of standardisation and re-classification done by CRISIL.

Note: The list of peers considered in this section is not an exhaustive but an indicative list. Key Indian infrastructure and EPC players with offering similar product / service portfolio as Vikran Engineering Limited have been considered in this segment.

Following nomenclature has been considered in this section of the report:

- Bajel Projects Ltd : Bajel
- Kalpataru Projects International Limited: Kalpataru
- K E C International Limited: KEC International
- RPP Infra Projects Limited: RPP Infra
- Shreem Electric Limited: Shreem
- Sterling and Wilson Private Limited : Sterling and Wilson
- SPML Infra Limited: SPML Infra
- Techno Electric & Engineering Company Limited: Techno
- Texmaco Rail & Engineering Ltd : Texmaco
- Transrail Lighting Limited: Transrail
- Vikran Engineering Limited: Vikran

Operational parameters

Brief overview of the company

Company name	Brief description
Bajel	Bajel Projects Limited (Bajel), incorporated in January 2022 (formerly a wholly owned subsidiary of Bajaj Electricals Ltd). In September 2023, the Engineering & Projects (E&P) or the EPC business of Bajaj Electricals Ltd was demerged into Bajel as a part of a scheme of demerger. The company has presence in power transmission, power distribution, international EPC projects and monopoles.
Kalpataru	Established in 1981 by Mr Mofatraj P Munot, the company undertakes turnkey contracts for setting up transmission lines and substations for extra-high-voltage power transmission. Over the years, it has diversified into civil contracts, railways, and oil and gas pipeline construction.
KEC International	Established in 1945, KEC International Limited is the flagship company of the Harsh Goenka faction of the RPG group. The company executes power transmission and distribution, railways, civil and solar projects on an EPC basis. The company is also into manufacturing of transmission towers along with power and telecom cables.
RPP Infra	Established in 1988, RPP Infra Projects Limited is a construction company with registered office located at Erode, Tamil- Nadu. The company operates in the Power, Irrigation and Water supply, Industrial structure, Roads and Buildings segments. The company's focuses on small government projects as short-medium tenure projects
Shreem	Shreem Electric Limited was incorporated in 1976. The company is involved in turnkey projects for electricity transmission and distribution sector. Along with this the company is also involved in the manufacturing of wide range of medium and high/ low voltage capacitors, capacitor banks, circuit breakers, control, and relay panels among others
Sterling and Wilson	Sterling and Wilson was formed in 1973. The companies projects are spread across six key businesses including turnkey data centers, renewable energy, MEP, industrial EPC, transmission and distribution and generators.
SPML Infra	SPML Infra Limited is engaged in infrastructure development on engineering, procurement and construction (EPC) basis which include water infrastructure and management, wastewater treatment, rural electrification and distribution, solid waste management and other civil infrastructure.
Techno	The Kolkata-based Techno Electric & Engineering Company Limited has been set up by the promoter, Mr PP Gupta. The company undertakes turnkey EPC projects, predominantly in the power sector, across generation, transmission, and distribution segments.
Transrail	Transrail was incorporated as Transrail Engineering Company Limited in 1984 by Mr. D. C. Bagde. In October 2016, the T&D business division of Gammon India Ltd (GIL) was transferred to Transrail through a business transfer agreement (BTA). The company is into EPC with primary focus on power transmission and distribution business and integrated manufacturing facilities for lattice structures, conductors, and monopoles

Company name	Brief description
Texmaco	Texmaco Rail & Engineering Ltd. is a multi-unit Engineering and Infrastructure Company, with 6 manufacturing units. The Company is involved in the business of manufacturing of Rolling Stock, such as Wagons, Coaches, EMUs, Loco shells & parts, etc., Hydro Mechanical Equipment's, Steel Castings, Rail EPC, Bridges and other steel structures.
Vikran	<p>Vikran Engineering Limited was incorporated in the year 2008 and was acquired by the promoter Mr Rakesh Markhedkar in the year 2014. The company has a technical workforce of 442 employees out of total employee strength of 674 and total supplier base of 3,500 vendors across various states.</p> <p>Vikran Engineering Limited provides end-to-end services from conceptualisation, design, supply, installation, testing and commissioning on a turnkey basis and has presence across multiple sectors including power, solar, water, and railway infrastructure. Within the Power sector, the company has presence in both- power transmission and power distribution and has completed projects under various schemes in Power Transmission (up to 400kV level), extra high voltage (EHV) substations (up to 765kV level) including construction of 132 KV transmission line and bay extension projects as part of railway electrification. The company also has experience in Solar EPC of ground mounted solar projects and smart metering. In the Water sector, its projects include underground water distribution and surface water extraction, overhead tanks, and distribution networks.</p> <p>The company's key competencies encompass inhouse design and engineering and timely project execution. Vikran Engineering Limited, has successfully executed projects for government entities, public sector undertakings and private companies. The company's focus on operational excellence, and efficient cost structure, and has enabled it to deliver high-value projects that meet stringent regulatory and quality standards. The company has also implemented SAP S/4 HANA system in the organization.</p>

Source: Company website, Company filings, CRISIL MI&A

Presence in sectors

Presence in segments	Roads	Railways*	Power	Water^	Building construction	Industrial construction
Bajel	✘	✘	✓	✘	✘	✘
Kalpataru	✘	✓	✓	✓	✓	✓
KEC International	✘	✓	✓	✓	✓	✓
RPP Infra	✓	✘	✓	✓	✓	✓
Shreem	✘	✘	✓	✘	✘	✘
Sterling and Wilson	✘	✘	✓	✓	✓	✓
SPML Infra	✘	✘	✓	✓	✘	✘
Techno	✘	✘	✓	✘	✘	✓
Transrail	✓	✓	✓	✘	✘	✘
Texmaco	✘	✓	✓	✓	✘	✓
Vikran	✘	✓	✓	✓	✘	✘

* Railways include railways and metro

^ Water includes irrigation and water supply

Industrial construction : This includes construction segments such as oil and gas, automobiles, metals and cement

Building construction: This is construction of Residential, Commercial and social infrastructure

Source: Company website, Company filings, CRISIL MI&A

Key projects executed

Below is the list of key projects executed by the company. The below list is in no particular order and, is indicative in nature and not exhaustive.

Company name	Key projects -indicative (Industry)
Bajel	<ul style="list-style-type: none"> ○ MPPTCL monopole 132kV monopole, Indore, Madhya Pradesh ○ PSPCL 66kV transmission line project on monopole, Punjab
Kalpataru	<ul style="list-style-type: none"> ○ Commissioning of Multi villages 30-50 MLD Capacity Surface Water Supply Scheme (792 km), Bihar ○ Commissioning of 24 MLD Lahchura Water Supply Scheme in Uttar Pradesh ○ Commissioning of 765kV, 190km transmission line in Uttar Pradesh
KEC International	<ul style="list-style-type: none"> ○ Commissioning of 220 kV AIS Substation at Raxaul in Bihar ○ Commissioning of Viaduct at Chennai Metro Rail Project ○ Commissioning of Third railway Line Between Mathura, Uttar Pradesh & Dholpur, Rajasthan
RPP Infra	<ul style="list-style-type: none"> ○ Sub Station at KPTCL, Karnataka ○ Construction of Contour Canal for 49.30 Kms at Udumalpet ○ Apgenco Project, Andhra Pradesh
Shreem	<ul style="list-style-type: none"> ○ Commissioning of 400 KV Substation, Thervoy Kandigai, Tamilnadu ○ Commissioning of 132 KV Substation, Mungeli, Chhattisgarh ○ Commissioning of 132 KV Substation, Jeerapur, Madhya Pradesh
Sterling and Wilson	<ul style="list-style-type: none"> ○ 450 MWp SECI III Solar PV Project, Rajasthan, India ○ Ahmedabad, Metro Project (East-West Corrido) Gujarat, India ○ Cairn Oil & Gas, Vedanta Limited Barmer, Rajasthan, India
SPML Infra	<ul style="list-style-type: none"> ○ Commissioning of Water Supply Project for Sawaimadhopur and Pali town, Rajasthan ○ Commissioning of Water Intake and Water Supply project for Bakreshwar Thermal Power project, West Bengal. ○ Rural Electrification project for Bangalore Rural, Kolar & Tumkur, Karnataka
Techno	<ul style="list-style-type: none"> ○ Commissioning of 765 kV substation at Chhattisgarh and Madhya Pradesh ○ Commissioning of 765 kV substation at Bikaner, Rajasthan ○ Commissioning of 400 kV substation and installation of STATCOM at Lucknow (UP), Nalagarh (HP), and Gwalior (MP)
Transrail	<ul style="list-style-type: none"> ○ Transmission Line Package for Khetri-Jhatikara 765kV D/C line and Khetri-Sikar(PG) 400kV D/C line ○ 765kV DC transmission line from Ariyalur to Thiruvallur and LILO of PugalurKalivanthapattu 400 kV DC line ○ 10 numbers of 400 kV and 765 kV lines in Central India region

Company name	Key projects -indicative (Industry)
Texmaco	<ul style="list-style-type: none"> ○ 110/25 KV Traction Substation Installation for Southern Railway at Tambaram – Chennai. ○ Bhairab Railway Bridge. Bangladesh ○ 220/25 KV Traction Substation Installation for Central Railway at Panvel – Mumbai
Vikran	<ul style="list-style-type: none"> ○ Commissioning of 765 kV AIS Bays / 400 kV Bays in Raipur Substation for PGCIL. ○ Commissioning of 90 KM of Ashta -- Ujjain 400 kV DCDS Transmission Line on twin Moose Conductor for MPPTCL in Madhya Pradesh. ○ Commissioning of 220 kV UG EHV Cable work of Bhachau Project for CORE Railway in Gujarat. ○ Commissioned 400 kV Bina Substation with 80 MVA Reactor for MPPTCL. ○ Commissioned 220 kV Sub station & Associated line in REWA Region for MPPTCL in Madhya Pradesh. ○ Commissioned 220 kV GIS for Muzaffarpur substation for PGCIL in BIHAR. ○ PGCIL 400 kV Substation with 500 MVA Power Transformer at Muzaffarpur in BIHAR. ○ Commissioning of Power Distribution Projects in Bihar, Madhya Pradesh, Maharashtra. ○ Executed OHE 25kV, 50 Hz AC Railway Electrification Project between Sengottai & Punalur section of Tamil Nadu for CORE. ○ Commissioned 220 kV Substation Bays for PGCIL at Samba in Jammu and Kashmir Region.

Source: Company website, Company filings, CRISIL MI&A

Key financial parameters

Fiscal 2022

Parameter		Bajel**^	Kalpataru	KEC International	RPP Infra	Shreem	SPML Infra	Sterling and Wilson	Techno	Texmaco	Transrail	Vikran*
Revenue from operations	Rs million	N.A	147,773.80	137,422.60	8,016.80	2,922.98	9,517.73	25,921.90	9,991.68	16,217.36	23,500.15	4,742.12
Operating EBITDA	Rs million	N.A	11,895.60	9,035.00	188.50	416.61	(56.80)	(6,066.00)	1,580.37	1,402.15	2,061.65	251.94
Operating EBITDA Margin	%	N.A	8.05%	6.57%	2.35%	14.25%	(0.60%)	(23.40%)	15.82%	8.65%	8.77%	5.31%
EBITDA	Rs million	N.A	12,585.90	9,169.30	331.30	482.31	243.24	(3,863.80)	3,332.50	1,709.54	2,128.52	305.49
EBITDA Margin	%	N.A	8.52%	6.67%	4.13%	16.50%	2.56%	(14.91%)	33.35%	10.54%	9.06%	6.44%
PAT	Rs million	N.A	5,350.60	3,320.80	53.60	58.96	(1.39)	(6,095.00)	2,638.92	205.28	647.07	65.91
PAT Margin	%	N.A	3.62%	2.42%	0.67%	2.02%	(0.01%)	(23.51%)	26.41%	1.27%	2.75%	1.39%
Return on Equity (ROE)	%	N.A	12.11%	9.17%	1.59%	1.63%	(0.04%)	(84.28%)	14.37%	1.55%	9.76%	7.39%
Return on Net capital employed (RONCE)	%	N.A	12.59%	12.03%	5.40%	7.21%	0.57%	(19.99%)	17.13%	7.03%	16.66%	14.29%
Total Net Worth	Rs million	N.A	44,174.70	36,199.30	3,366.60	3,608.25	3,265.50	7,231.70	18,367.58	13,283.39	6,629.69	892.12
Debt to Equity Ratio	times	N.A	0.84	0.79	0.28	0.80	5.55	2.24	0.00	0.53	0.71	1.33
Fixed Assets Turnover Ratio	times	N.A	9.08	13.58	13.02	1.63	9.76	14.73	2.36	4.52	7.22	46.13
Inventory to cost of sales	times	N.A	12.54	13.45	52.40	5.29	11.86	54.95	50.50	4.42	83.92	14.12
Order Book	Rs million	N.A	327,610.00	237,160.00	26,640.00	N.A.	25,000.00	N.A.	14,413.50	26,000.00	59,075.87	5,173.49
Order Book to Revenue from Operations	%	N.A	221.70%	172.58%	332.30%	N.A.	262.67%	N.A.	144.26%	160.32%	251.39%	109.10%

N.A: Not Available; N.Ap : Not Applicable

^ Bajel Projects Limited (Bajel), incorporated in January 2022 (formerly a division of Bajaj Electricals Ltd). FY22 financials for the same are not available

*Financials are considered on a standalone basis

Source: Company filings, CRISIL MI&A

Fiscal 2023

Parameter		Bajel* [^]	Kalpataru	KEC International	RPP Infra	Shreem	SPML Infra	Sterling and Wilson	Techno	Texmaco	Transrail	Vikran*
Revenue from operations	Rs million	6,636.86	163,614.40	172,817.10	10,403.30	2,663.62	8,831.43	19,954.10	8,294.99	22,432.77	31,521.56	5,243.05
Operating EBITDA	Rs million	(408.71)	13,695.40	8,297.30	387.70	364.39	288.04	(6,890.60)	866.69	1,454.08	2,929.62	797.13
Operating EBITDA Margin	%	(6.16%)	8.37%	4.80%	3.73%	13.68%	3.26%	(34.53%)	10.45%	6.48%	9.29%	15.20%
EBITDA	Rs million	133.99	14,092.40	8,610.50	641.70	391.88	563.74	(5,439.20)	2,515.62	1,860.54	3,138.14	845.87
EBITDA Margin	%	2.02%	8.61%	4.98%	6.17%	14.71%	6.38%	(27.26%)	30.33%	8.29%	9.96%	16.13%
PAT	Rs million	(15.81)	4,350.20	1,760.30	289.60	17.64	3.38	(7,656.80)	1,868.58	258.05	1,075.68	428.40
PAT Margin	%	(0.24%)	2.66%	1.02%	2.78%	0.66%	0.04%	(38.37%)	22.53%	1.15%	3.41%	8.17%
Return on Equity (ROE)	%	(0.28%)	9.27%	4.67%	7.93%	0.49%	0.10%	(519.74%)	9.68%	1.86%	13.94%	32.67%
Return on Net capital employed (RONCE)	%	1.27%	13.44%	10.21%	11.99%	6.25%	2.36%	(42.79%)	11.96%	6.51%	22.05%	29.01%
Total Net Worth	Rs million	5,573.60	46,938.60	37,714.20	3,650.60	3,618.95	3,490.07	1,473.20	19,302.02	13,897.72	7,713.97	1,311.35
Debt to Equity Ratio	times	0.00	0.78	0.85	0.22	0.67	5.02	9.24	0.00	0.71	0.78	1.18
Fixed Assets Turnover Ratio	times	15.04	8.26	16.19	15.52	1.49	9.47	12.23	17.35	5.60	8.75	57.38
Inventory to cost of sales	times	N.Ap	12.90	14.93	57.18	4.79	9.35	80.55	11.60	4.04	97.01	13.12
Order Book	Rs million	N.A	459,180.00	305,530.00	32,000.00	N.A.	N.A.	N.A.	37,718.70	90,330.00	96,192.79	20,457.86
Order Book to Revenue from Operations	%	N.Ap	280.65%	176.79%	307.59%	N.A.	N.A.	N.A.	454.72%	402.67%	305.17%	390.19%

N.A: Not Available; N.Ap : Not Applicable

[^] Bajel Projects Limited (Bajel), incorporated in January 2022 (formerly a division of Bajaj Electricals Ltd).

*Financials are considered on a standalone basis

Source: Company filings, CRISIL MI&A

Fiscal 2024

Parameter		Bajel*^	Kalpataru	KEC International	RPP Infra	Shreem	SPML Infra	Sterling and Wilson	Techno	Texmaco	Transrail	Vikran*
Revenue from operations	Rs million	11,692.12	196,264.30	199,141.70	13,534.10	N.A	13,189.67	N.A	15,023.81	35,028.70	N.A	7,859.48
Operating EBITDA	Rs million	104.15	16,285.70	12,145.70	572.40	N.A	132.54	N.A	2,094.14	2,635.19	N.A	1,332.95
Operating EBITDA Margin	%	0.89%	8.30%	6.10%	4.23%	N.A	1.00%	N.A	13.94%	7.52%	N.A	16.96%
EBITDA	Rs million	357.15	16,925.60	12,669.80	1,069.70	N.A	571.24	N.A	3,429.53	3,498.63	N.A	1,387.84
EBITDA Margin	%	3.05%	8.62%	6.36%	7.90%	N.A	4.33%	N.A	22.83%	9.99%	N.A	17.66%
PAT	Rs million	42.87	5,159.00	3,467.80	572.00	N.A	(16.06)	N.A	2,684.55	1,129.79	N.A	748.31
PAT Margin	%	0.37%	2.63%	1.74%	4.23%	N.A	(0.12%)	N.A	17.87%	3.23%	N.A	9.52%
Return on Equity (ROE)	%	0.76%	10.09%	8.47%	13.44%	N.A	(0.35%)	N.A	12.41%	4.46%	N.A	25.69%
Return on Net capital employed (RONCE)	%	6.56%	14.54%	13.57%	20.95%	N.A	5.27%	N.A	15.00%	10.59%	N.A	30.88%
Total Net Worth	Rs million	5,661.72	51,128.10	40,957.00	4,254.40	N.A	4,634.88	N.A	21,632.31	25,303.16	N.A	2,912.80
Revenue (FY22-24) CAGR	%	N.Ap	15.24%	20.38%	29.93%	N.Ap	17.72%	N.Ap	22.62%	46.97%	N.Ap	28.74%
Operating EBITDA (FY22-24) CAGR	%	N.Ap	17.01%	15.94%	74.26%	N.Ap	N.M	N.Ap	15.11%	37.09%	N.Ap	130.02%
PAT (FY22-24) CAGR	%	N.Ap	(1.81%)	2.19%	226.67%	N.Ap	N.M	N.Ap	0.86%	134.60%	N.Ap	236.94%
Debt to Equity Ratio	times	0.00	0.76	0.93	0.10	N.A	1.18	N.A	0.00	0.25	N.A	0.63
Fixed Assets Turnover Ratio	times	22.51	9.83	17.45	20.99	N.A	219.25	N.A	34.98	8.18	N.A	91.00
Inventory to cost of sales	times	12.23	13.94	15.91	69.20	0.00	20.12	0.00	20.38	4.63	0.00	15.11
Order Book	Rs million	35,978.80	584,150.00	296,440.00	30,099.20	N.A.	13,000.00	N.A.	92,189.70	78,780.00	N.A.	21,148.02
Order Book to Revenue from Operations	%	307.72%	297.63%	148.86%	222.40%	N.A.	98.56%	N.A.	613.62%	224.90%	N.A	269.08%

N.A: Not Available; N.Ap : Not Applicable, N.M : Not Meaningful

^ Bajel Projects Limited (Bajel), incorporated in January 2022 (formerly a division of Bajaj Electricals Ltd).

*Financials are considered on a standalone basis

Source: Company filings, CRISIL MI&A

Formulae for financials considered

Parameter	Formulae considered
Revenue from operations	Revenue from operation is calculated as sum of Revenue from operating activities of the company during a particular period under consideration.
Operating EBITDA	Operating EBITDA means Earnings before interest, taxes, depreciation and amortisation expense, which has been arrived at by obtaining the profit before tax/ (loss) for the year and adding back finance costs, depreciation and amortisation and impairment expense and reducing other income;
Operating EBITDA Margin	Operating EBITDA Margin is calculated as Operating EBITDA as a percentage of revenue from operations;
EBITDA	EBITDA is calculated as total income (including share of profit/loss from JV / associates and profit/loss from discontinuing operations) minus total expenses plus finance costs and depreciation/amortisation
EBITDA Margin	EBITDA Margin is calculated as EBITDA as a percentage of revenue from operations;
PAT	PAT represents total profit after tax for the year / period
PAT Margin	PAT Margin is calculated as PAT divided by total income
Return on Equity (ROE)	ROE is calculated as PAT divided by Total Net worth
Return on Net capital employed (RONCE)	RONCE is calculated as EBIT divided by net capital employed where (i) EBIT means EBITDA minus depreciation and amortisation expense and less interest income (ii) Net capital employed means Total Net worth + total current & non-current borrowings– cash and cash equivalents and other bank balances;
Total Net Worth	Total Net worth has been defined as the aggregate value of the paid-up equity share capital and all reserves.
CAGR	CAGR = Compounded Annual Growth Rate
Debt to Equity Ratio	Debt Equity Ratio: This is defined as total debt divided by total equity. Total debt is the sum of total current & non-current borrowings; total equity means sum of equity share capital and other equity
Fixed Assets Turnover Ratio	This is defined as revenue from operations divided by net block (PPE). Figures for net block do not include capital work-in-progress.
Inventory to cost of sales	Inventory to cost of sales is calculated by dividing cost of sales during the period with average inventory. Cost of sales is calculated as Total expenses minus finance costs and depreciation / amortisation
Order Book	Order Book is calculated as sum of value of unexecuted contract as on a particular date. In EPC industry, the order book holds importance as it represents the estimated contract value of the unexecuted portion of a company's existing assigned EPC contracts and provides visibility on future revenues.
Order Book to Revenue from Operations	Calculated as order book divided by revenue from operations

Source: CRISIL MI&A

Key observations

- Vikran Engineering Limited is one of the fast-growing Indian Engineering, Procurement and Construction (EPC) company, among the peers compared. In terms of growth in revenue from operations, Vikran Engineering Limited, had the third fastest growth among the peers compared during fiscal 2022-24.
- Among the peers compared, Vikran Engineering Limited had the fastest growth in profitability between fiscal 2022 and 2024. Vikran Engineering Limited's, PAT registered a CAGR 236.94% between fiscals 2022-2024.
- Vikran Engineering Limited's, revenue from operations registered a CAGR 28.74% between fiscals 2022-2024.
- During fiscal 2022-24, among the peers compared, Vikran Engineering Limited, had the fastest growth in terms of operating EBITDA at 130.02% CAGR.
- Vikran Engineering Limited has a diversified project portfolio, with majority revenue from energy and water infrastructure segments (contributing 49% each) which have a high growth potential in the medium term.
- During fiscal 2024, Vikran Engineering Limited has highest Return on Equity (ROE) and highest Return on Net capital employed (RONCE) among the peers compared.

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