

Assessment of pre-engineered steel buildings industry in India

Final Report

January 2024

Consulting

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Macroeconomic assessment of India

Gross domestic product outlook

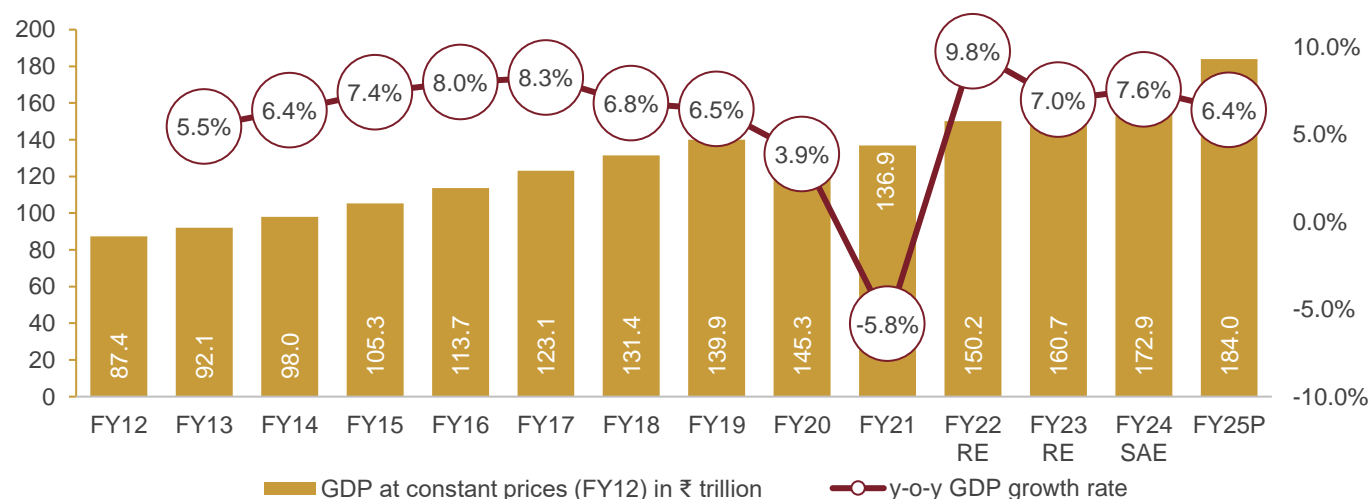
GDP saw a CAGR of 5.7% between Financial Year 2012-2023

The country's gross domestic product (GDP) increased at a compound annual growth rate (CAGR) of 5.7% to ₹ 160 trillion in Financial Year 2023 from ₹ 87 trillion in Financial Year 2012.

In Financial Year 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 GDP growth of 9.8% vs -5.8% in Financial Year 2021. In Financial Year 2023, GDP rose to 7.0% on strong growth momentum propelled by investments and private consumption.

In Financial Year 2024, real GDP is estimated to grow by 7.6%. Even as the agricultural economy slowed sharply in Financial Year 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 Financial Year 2025, CRISIL expects the country's GDP to expand 6.4%, driven by the manufacturing sector, strong growth in investments and resilient domestic demand. However, it will be slower than Financial Year 2024 due to slowing global growth, impact of rising interest rates, waning of pent-up demand for services and increasing geopolitical uncertainty.

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



Note: RE: revised estimates, SAE: Second Advance 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.






FY: Financial Year (Indian financial year 1st April to 31 March of the following year)

Source: Provisional estimates of national income 2022-2023 and quarterly estimates of GDP for the fourth quarter of Financial Year 2023, Central Statistics Office (CSO), Ministry of Statistics and Programme Implementation (MoSPI), CRISIL MI&A

South India was the highest contributor to India's GDP followed by North India in Financial Year 2022

In Financial Year 2022, southern states had a combined Gross State Domestic Product (GSDP) of ₹ 45.6 trillion, followed by Northern states, which had the combined GSDP of ₹ 40.2 trillion. Contribution of southern states, and northeastern states to India's overall GDP has increased in Financial Year 2022 compared to Financial Year 2018, whereas contribution of northern and western states in India's overall GDP has decreased in Financial Year 2022 compared to Financial Year 2018. Contribution of eastern states have remained constant at 12.3%.

Additionally, southern states have registered the highest growth CAGR (Financial Years 2018 - 2022) of ~4.4% followed by North-eastern states at 4.3% CAGR (Financial Years 2018 - 2022). Both the regions outperformed India's GDP growth, which registered a CAGR of ~ 3.8% during the same period.

Region	States	GSDP (Constant) ₹ trillion			Contribution to India's GDP*	
		FY18	FY22	CAGR (FY18-22)	FY18	FY22
 North	Chandigarh, Delhi, Haryana, Himachal Pradesh, Jammu and Kashmir, Punjab, Rajasthan, Uttar Pradesh, Uttarakhand	35.1	40.2	3.4%	26.9%	26.5%
 South	Andhra Pradesh, Karnataka, Kerala, Tamil Nadu, Andaman and Nicobar Islands	38.4	45.6	4.4%	29.4%	30.0%
 East	Bihar, Orissa, Jharkhand, West Bengal	16.1	18.6	3.7%	12.3%	12.3%
 West	Goa, Maharashtra, Gujarat, Madhya Pradesh, Chhattisgarh	37.5	43.2	3.7%	28.7%	28.5%
 Northeast	Assam, Sikkim, Nagaland, Meghalaya, Manipur, Mizoram, Tripura and Arunachal Pradesh	3.6	4.2	4.3%	2.7%	2.8%

Note: Analysis over five-year period ending Financial Year 2022 is considered to ensure consistency as GSDP Financial Year 2023 data of multiple states is not available as of February 2024. *Contribution: (Summation of GSDP of all the states/ union territories in the particular region)/ (Summation of GSDP of all the states/ union territories)

Source: RBI, CRISIL MI&A Research

India among the world's fastest-growing large economies.

India was one of the fastest-growing economies in calendar year 2018 and calendar year 2019. In calendar year 2020, GDP of most countries, including developed ones such as the US and the UK, except China, contracted due to the pandemic. India's GDP shrank 5.8% in calendar year 2020 (Financial Year 2021). In calendar year 2021, GDP

growth of all major economies rebounded as economic activity resumed and due to the low base of calendar year 2020. Among major economies, India, with a growth rate of ~9.8%, was the fastest growing in calendar year 2021 (Financial Year 2022), followed by China at 8.4%. The country also overtook the UK as the fifth-largest economy in the world in the April-June quarter of calendar year 2022 and registered a GDP growth of 7.0% in calendar year 2022 (fiscal 2023). Moving forward, India's GDP is projected to grow at ~7.6% and 6.8% in calendar year 2023 (fiscal 2024) and calendar year 2024 (fiscal 2025) respectively. Additionally, India is expected to grow faster than China as well as the global average in calendar year 2024 (fiscal 2025).

Real GDP growth by geographies

Regions	CY2018	CY2019	CY2020	CY2021	CY2022E	CY2023E	CY2024P	CY2025P
US	2.9	2.3	-2.8	5.9	1.9	2.5	2.1	1.7
Euro area	1.8	1.6	-6.1	5.6	3.4	0.5	0.9	1.7
UK	1.7	1.6	-11.0	7.6	4.3	0.5	0.6	1.6
China	6.8	6.0	2.2	8.5	3.0	5.2	4.6	4.1
India*	6.5	3.9	-5.8	9.8*	7.0*	7.6*	6.8*	6.5
Advanced economies	2.3	1.7	-4.2	5.6	2.6	1.6	1.5	1.8
Emerging market and developing economies	4.6	3.6	-1.8	6.9	4.1	4.1	4.1	4.2
World	3.6	2.8	-2.8	6.3	3.5	3.1	3.1	3.2

P: Projected. * Numbers for India are for financial year (2020 is fiscal 2021 and so on) and as per the CRISIL's forecast for 2024 and as per IMF's forecast for 2025 to 2028. India GDP estimate for the current fiscal is 7.6% according to second advanced estimate from the Ministry of Statistics and Programme Implementation (MoSPI).

CY: Calendar year

Note: Projection as per IMF update in January 2024

Source: IMF economic database, World Bank national accounts data, OECD national accounts data, CRISIL MI&A

Robust growth in per capita income over Financial Year 2012-2023

India's per capita income, a broad indicator of living standards, rose from ₹ 63,462 in Financial Year 2012 to ₹ 99,404 in Financial Year 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 (SAE), per capita net national income (constant prices) is estimated to have increased to ₹ 106,134; thereby registering a year-on-year growth of ~6.8%.

Per capita net national income at constant prices

	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21RE	FY22RE	FY23RE	FY24SAE
Per-capita NNI (₹)	63,462	65,538	68,572	72,805	77,659	83,003	87,586	92,133	94,270	86,054	94,054	99,404	106,134
Y-o-Y growth (%)		3.3	4.6	6.2	6.7	6.9	5.5	5.2	2.3	-8.7	9.3	5.7	6.8

Note: RE: revised estimates, SAE: Second Advance estimates

Source: Provisional Estimates of Annual National Income, 2022-23, CSO, MoSPI, CRISIL MI&A

Demographic factors support India's growth.

India's per capita GDP has grown faster than global average.

Global GDP per capita clocked a CAGR of 1.8% between calendar year 2012 and calendar year 2022, as per the (International Monetary Fund) IMF data. Meanwhile, India's corresponding figure registered a CAGR of 5.2%.

Per capita GDP at current prices (USD)

	CY2012	CY2013	CY2014	CY2015	CY2016	CY2017	CY2018	CY2019	CY2020	CY2021	CY2022	CAGR CY12-22
India	1,434.0	1,438.1	1,559.9	1,590.2	1,714.3	1,958.0	1,974.4	2,050.2	1,913.2	2,238.1	2,391.9	5.2%
World	10,747.8	10,922.7	11,077.2	10,330.1	10,378.0	10,906.0	11,456.9	11,500.2	11,077.3	12,468.4	12,895.4	1.8%

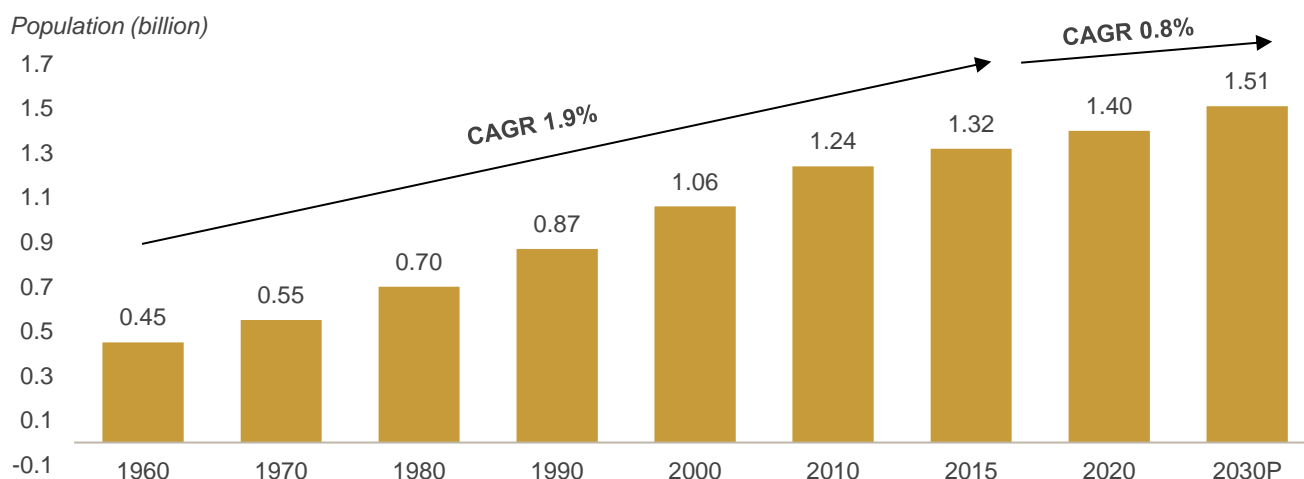
Source: IMF, CSO, MoSPI, CRISIL MI&A

India's population projected to log 0.8% CAGR between 2020 and 2030

Census 2011 estimated India's population at ~1.2 billion, clocking a CAGR of 1.9% between calendar year 2001 and 2011. The number of households was estimated at ~246 million.

As per the United Nations Population Fund's (UNFPA) *State of World Population Report* of 2023, India's population by mid-2023 is estimated to have surpassed China by ~2.9 million.

India's population growth



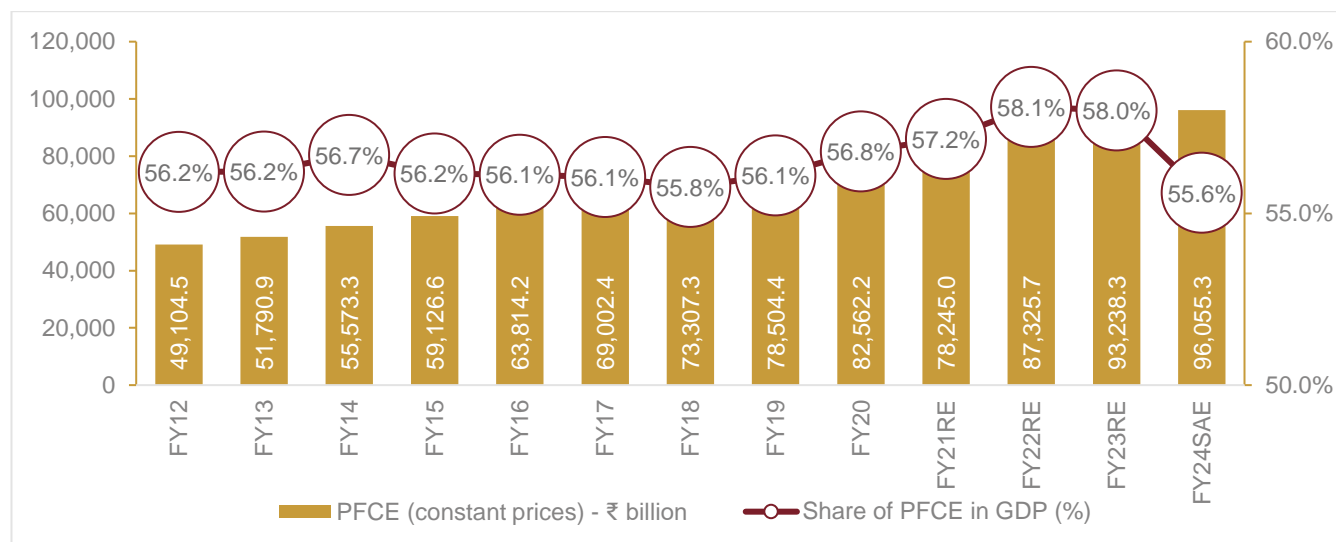
Note: P: projected

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

PFCE to maintain dominant share in India's GDP

Private final consumption expenditure (PFCE) at constant prices clocked 6% CAGR between Financial Year 2012-2023, maintaining its dominant share of ~58.0% in Financial Year 2023 (~₹ 93,238 billion in absolute terms, up 6.8% year-on-year). Growth was led by healthy monsoon, wage revisions due to the implementation of the Seventh Central Pay Commission's (CPC) recommendations, benign interest rates, growing middle age population and low inflation.

PFCE at constant prices



Note: RE: revised estimates; SAE: Second Advance estimates

Source: MoSPI, CRISIL MI&A

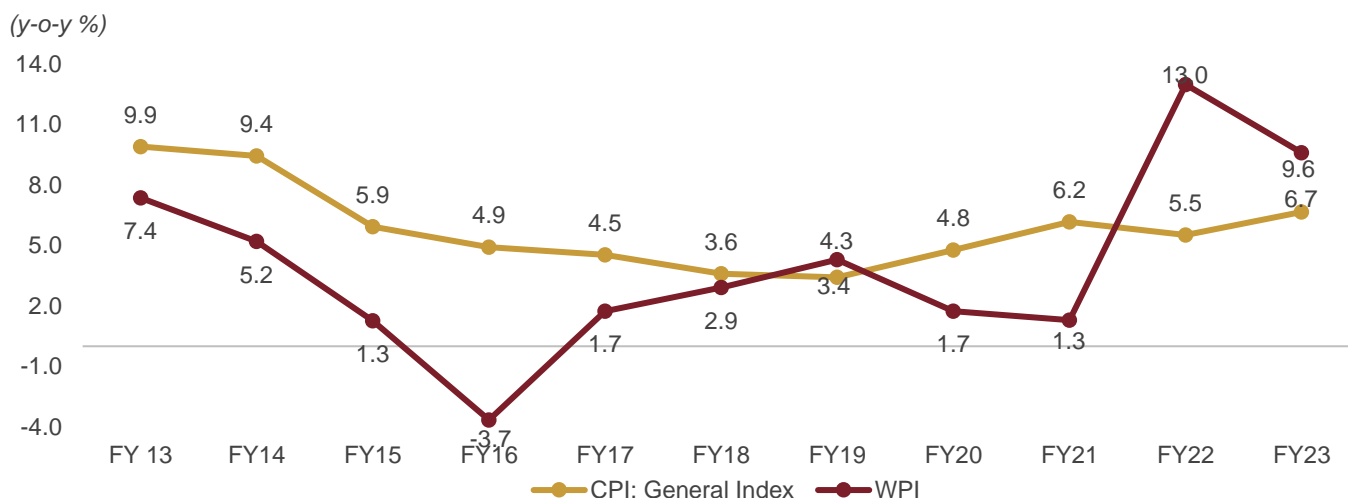
WPI eased to 9.6% in Financial Year 2023 from a high of 13% in Financial Year 2022

India's wholesale price index (WPI), which has a higher weight for items linked to global prices, has seen wild swings in the aftermath of the pandemic and geopolitical tensions. From 1.7%, on average, in Financial Year 2020, WPI inflation, averaged around ~1.3% in Financial Year 2021, before touching a high of 13.0% in Financial Year 2022. In Financial Year 2023, WPI inflation moderated to 9.6% from a high of 13.0% in Financial Year 2022. Broadly, a fall in global energy and commodity prices has eased pressures on WPI inflation. This, along with sluggish demand, will continue to drive down inflation through the rest of Financial Year 2024.

Furthermore, consumer price index (CPI) based inflation was 6.7% in Financial Year 2023, above the Reserve Bank of India's (RBI) upper tolerance limit of 6%. Input costs had sharply escalated in the past two years following the pandemic and geopolitical tensions. By mid-2022, however, oil and commodity prices started declining and cost pressures abated. But retail price hikes by manufacturers continued, as the pass-through of high input costs during these years had remained incomplete. Prices also stayed high as global supply chain snarls had not quite resolved fully, impacting costs of other inputs, transport and shipping. Additionally, weaker demand for inputs from advanced economies as well as uneven recovery in China in calendar year 2023, after initial exuberance post lifting of restrictions, has contributed. With this, pressures on manufacturers to pass on high costs to retail prices have abated, too. While some sectors where demand is strong could still see price pass-throughs, in most others, they seem to have diminished. This, in conjunction with slower expected demand in the second half of the current Financial Year, means retail prices will increase at a slower pace than calendar year 2022.

Furthermore, CRISIL's inflation (CPI average) forecast for Financial Year 2024 is 5.0%, on an average. However, this forecast faces upside risks from high global food prices and the prediction of a possible setback from evolving El Niño conditions.

Inflation (year-on-year %)



Note: WPI data from Financial Year 2014 is as per the 2011-12 base
Source: Ministry of Commerce and Industry, CRISIL MI&A

Overall cost of construction jumped in Financial Year 2023

Construction cost inflation index rose to 136.0 in Financial Year 2023 from 113.8 in Financial Year 2021, registering annual inflation of 9.3%, on high steel prices and rise in cost of flooring, painting and electrical products. Price inflation saw some respite till August 2024, with the inflation index reducing 3% to 132.

Building materials such as steel structures, cement, concrete, sand, clay, bitumen, gravel, aluminium, copper, paints, electricals, flooring, etc are used in the construction industry. Cement and steel together account for nearly 35-40% of the total material cost. Other major components considered for this index include bricks and concrete, with a given weightage of ~13% and ~9%, respectively.

The overall cost of construction raw materials jumped in Financial Year 2022 and Financial Year 2023, due to material increase in prices of components such as steel, flooring, plumbing, electrical and painting. In Financial Year 2022, majorly steel and electrical components registered high inflation of 28.8% and 25.7% respectively. The overall inflation of construction index was in line with the broader WPI inflation, which reached to 13.0% in Financial Year 2022. Furthermore, the inflation of overall construction index cooled down to 6.1% and -3.0% in Financial Year 2023 and Financial Year 2024(August), majorly due to decrease in the inflation of steel prices and flooring amid weak demand.

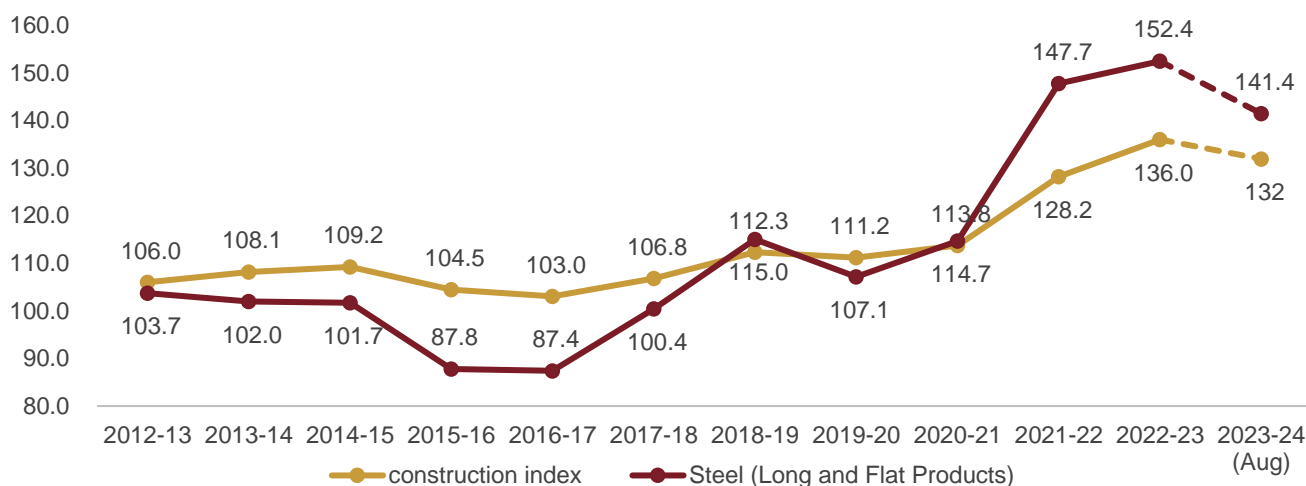
Additionally, in Financial Year 2022, revenue, and profit of major PEB players increased compared to Financial Year 2021, signifying their capability to maintain margins despite high inflation. Moving forward, profitability of PEB players will depend on demand- supply dynamics as well as their ability to pass on high prices to the customers. Notably, owing to the commercial nature of PEB applications, delays arising from inflated prices are less prevalent in comparison to residential projects, where inflation often prompts project deferrals. This suggests a higher likelihood for PEB players to effectively relay these escalated costs to their clientele.

Inflation of key construction materials

Commodity	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24E (Aug)
Cement	2.9%	2.8%	0.6%	1.1%	2.1%	2.9%	1.1%	-0.5%	3.2%	5.1%	2.6%
Steel	-1.7%	-0.3%	-13.7%	-0.4%	14.8%	14.6%	-6.9%	7.0%	28.8%	3.2%	-7.2%
Concrete	3.5%	4.5%	-3.4%	-0.9%	4.9%	8.0%	4.4%	3.4%	2.7%	7.1%	1.4%
Bricks	3.6%	-9.6%	0.1%	0.2%	-3.5%	0.1%	0.4%	-4.3%	3.9%	1.2%	-3.1%
Flooring	3.0%	5.4%	4.4%	-3.3%	-2.5%	-2.1%	-2.6%	1.5%	5.9%	21.1%	-11.0%
Plumbing	4.5%	8.8%	-11.8%	-6.2%	-5.1%	-2.3%	3.6%	5.0%	8.9%	13.4%	-4.4%
Painting	3.6%	2.2%	-1.7%	-1.1%	-0.3%	3.5%	1.3%	0.3%	14.1%	14.6%	-2.0%
Electrical	2.2%	-0.8%	-5.3%	-6.7%	7.4%	5.5%	-0.9%	5.2%	25.7%	-0.1%	-0.5%
Construction Index	2.0%	1.0%	-4.4%	-1.4%	3.7%	5.1%	-1.0%	2.3%	12.7%	6.1%	-3.0%

Source: Ministry of Commerce and Industry, CRISIL MI&A; Note: % inflation above 6% is highlighted in red and below -6% is highlighted in green

Inflation in construction index

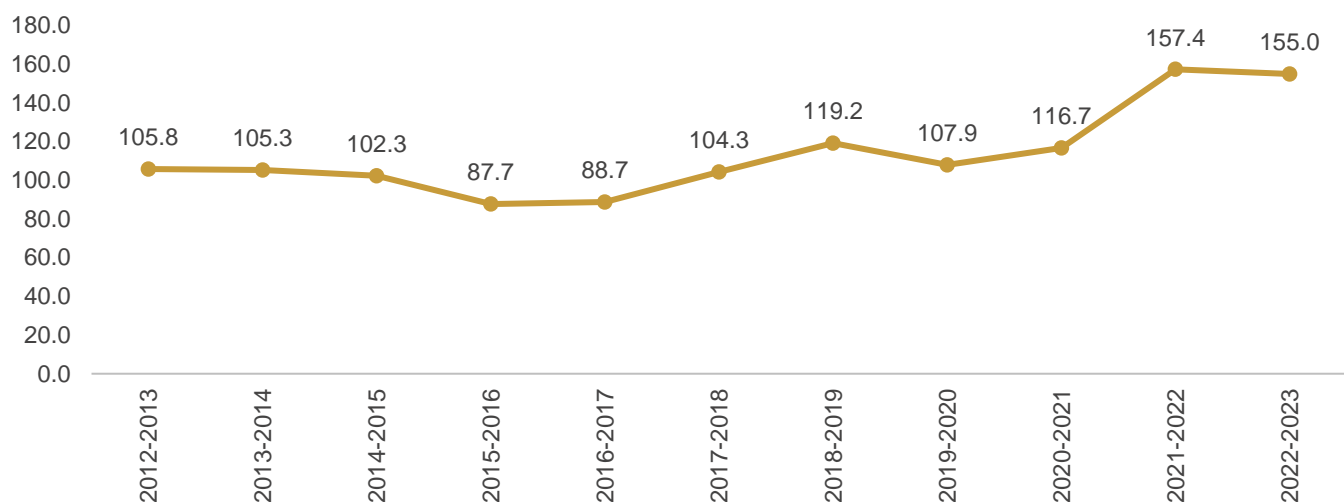


Source: Office of Economic Advisor, CRISIL MI&A

Steel inflation decreased in Financial Year 2023 due to muted global demand

The Russia-Ukraine conflict has had a profound impact on the commodities market. Regions heavily reliant on materials from these nations faced heightened concerns, leading to a substantial increase in input costs and finished product prices. The escalation in export prices also caused domestic prices to rise, thereby impacting local demand negatively. To address soaring prices, the government implemented export duties on iron ore, steel, and pig iron from May to November 2022. Simultaneously, import duties on coking coal were abolished. This policy shift led to an immediate correction in prices. Additionally, factors such as muted global demand, cheaper imports and better realisations in the domestic market also helped in price correction in Financial Year 2023. This price correction in steel had been a favourable development for suppliers in the pre-engineered building (PEB) sector, given that steel constitutes a significant input cost for PEB construction. Notably, the operating and profitability margins of almost all major PEB players showed improvement in Financial Year 2023 compared to Financial Year 2022, reflecting the positive impact of the steel price correction on the sector.

Trend in steel prices – hot rolled coils and sheets, including narrow strips (long and flat products)



Source: Office of Economic Advisor, CRISIL MI&A

Construction GVA

Healthy growth in Financial Year 2023 in line with GDP growth

On the supply side, gross value added (GVA) grew at ~6.7% in Financial Year 2023, as per the revised estimates (compared with 9.4% growth in Financial Year 2022). In absolute terms, real GVA was ₹ 148.0 trillion in Financial Year 2023, up from ₹ 138.8 trillion in Financial Year 2022. Additionally, as of Financial Year 2024SAE, GVA is expected to reach ₹ 158.3 trillion, up from 148.0 trillion, registering a growth of ~6.9%.

Construction sector had 8.4% share in overall GVA Financial Year 2023

Construction GVA is an important indicator of economic activity and represents the value generated by the construction sector, which includes activities related to building infrastructure, real estate and other construction projects. In India, construction GVA has grown from ₹ 7.8 trillion in Financial Year 2012 to ₹ 13.1 trillion in Financial Year 2023, at a CAGR of 4.8%.

Several factors contributed to this growth: economic growth; the government's commitment to infrastructure development, particularly in roads, railways and energy projects; and increase in foreign direct investment (FDI), which boosted private sector investments. Furthermore, increasing demand for affordable housing, driven by rising urbanisation and an expanding middle-class population, has also played a significant role in elevating construction GVA.

Despite steady growth, there were minor fluctuations in the percentage share of the construction sector in the country's total GVA in Financial Year 2021 due to the Covid-19 pandemic and its adverse effect on the economy. However, in Financial Year 2022, the share of construction GVA in the overall GVA rebounded to 8.6%. This is estimated (provisional) to have increased to 8.8% in Financial Year 2023. Additionally, construction GVA is expected at ₹ 14.5 trillion in Financial Year 2024SAE. Thereby, contributing to 9.1% in overall GVA in Financial Year 2024SAE.

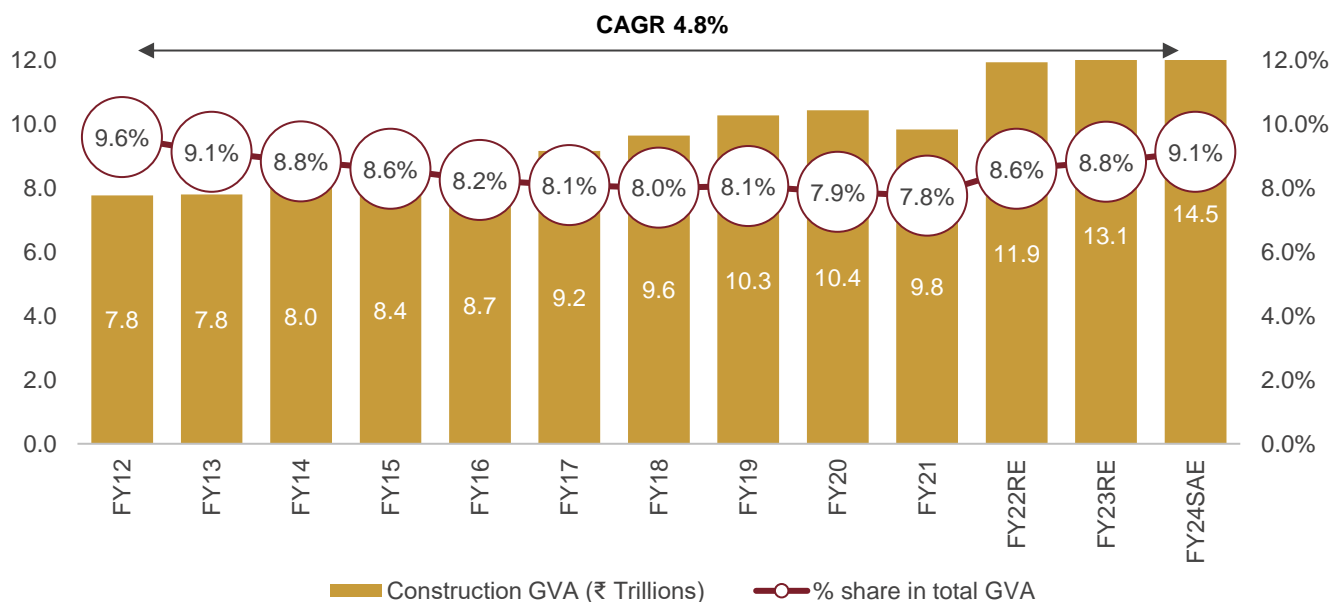
GVA at constant prices

₹ trillion	FY12	FY19	FY20	FY21	FY22R E	FY23R E	FY24 SAE	Share in GVA FY24	Annual growth in FY24
Agriculture, forestry and fishing	15.0	18.8	19.9	20.8	21.7	22.7	22.9	14.5%	0.7%
Mining and quarrying	2.6	3.3	3.2	2.9	3.1	3.2	3.4	2.2%	8.1%
Manufacturing	14.1	23.3	22.6	23.3	25.6	25.0	27.2	17.2%	8.5%
Electricity, gas, water supply & other utility services	1.9	2.9	3.0	2.9	3.2	3.5	3.7	2.4%	7.5%
Construction	7.8	10.3	10.4	9.8	11.9	13.1	14.5	9.1%	10.7%
Trade, Hotels, Transport, Communication & Services related to Broadcasting	14.1	25.4	26.9	21.6	24.8	27.8	29.6	18.7%	6.5%
Financial, Real Estate & Professional Services	15.3	27.1	29.0	29.6	31.2	34.1	36.8	23.3%	8.2%
Public Administration, Defence & Other Services	10.3	16.3	17.3	16.0	17.2	18.8	20.2	12.8%	7.7%
Total GVA at current prices	81.1	127.3	132.4	126.8	138.8	148.0	158.3	0.0%	6.9%

Note: RE: revised estimate, SAE: Second Advance Estimates

Source: MoSPI, CRISIL MI&A

Construction GVA



PE: provisional estimate

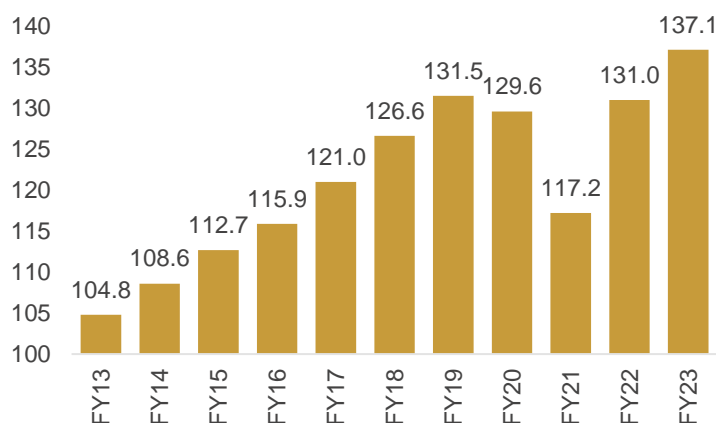
Source: MoSPI, CRISIL MI&A

Manufacturing IIP bounced back to normal in Financial Year 2023, after pandemic-induced decline

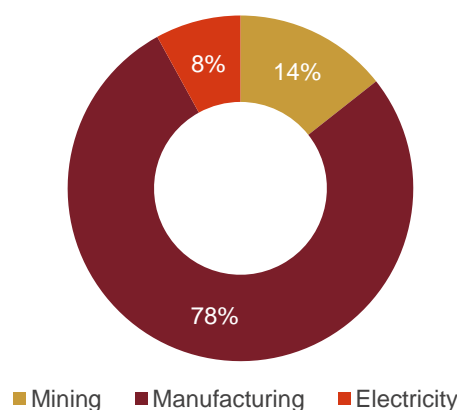
The Index of Industrial Production (IIP) for manufacturing saw growth from 104.8 in Financial Year 2013 to 137.1 in Financial Year 2023. The manufacturing sector is a significant contributor to the country's overall industrial growth, with 78% weightage in the overall IIP as of Financial Year 2023.

Even though manufacturing IIP declined significantly in Financial Year 2020 to 129.6 and to 117.2 in Financial Year 2021, due to the pandemic, it recovered to 131.0 in Financial Year 2022 because of various factors such as the easing of restrictions, government stimulus measures, increasing consumer demand and efforts to revitalise the manufacturing sector. Furthermore, the manufacturing IIP stood at 137.1 in Financial Year 2023, showing an improvement in the indicator.

Manufacturing IIP (FY13-23)



Weight of manufacturing in IIP (FY23)



* Figures for Financial Year 2023 are provisional
Source: MoSPI, CRISIL MI&A

India’s manufacturing value added as a percentage of GDP has potential to increase

In calendar year 2022, India's manufacturing value added, expressed as a percentage of the country's GDP, stood at 13.3%. India fared better than countries like Brazil (11.1%) and UK (8.4%). However, India’s manufacturing value as percentage of GDP was lower than the world average of 16.2%, suggesting scope for further improvement.

Increased infrastructure spending by the government, coupled with increase in the industrial capex driven by sectors like metal and oil and gas, is expected to have favourable effect on the manufacturing sector in India. This boost in manufacturing sector in India, will also indirectly increase the demand the pre-engineered buildings in the country.

Manufacturing value added as a percentage of GDP

Country	CY2018	CY2019	CY2020	CY2021	CY2022
Bangladesh	20.8	21.2	20.6	21.2	21.8
Brazil	10.5	10.3	10.7	10.2	11.1
China	27.8	26.8	26.3	27.5	27.7
India	14.9	13.5	14.1	14.5	13.3
Malaysia	21.5	21.4	22.3	23.5	23.5
South Asia	14.9	14.1	14.5	14.9	14.2
UK	8.8	8.7	8.7	8.7	8.4
US	11.3	11.1	10.6	10.7	N.A.
World	16.4	16.0	16.0	16.5	16.2

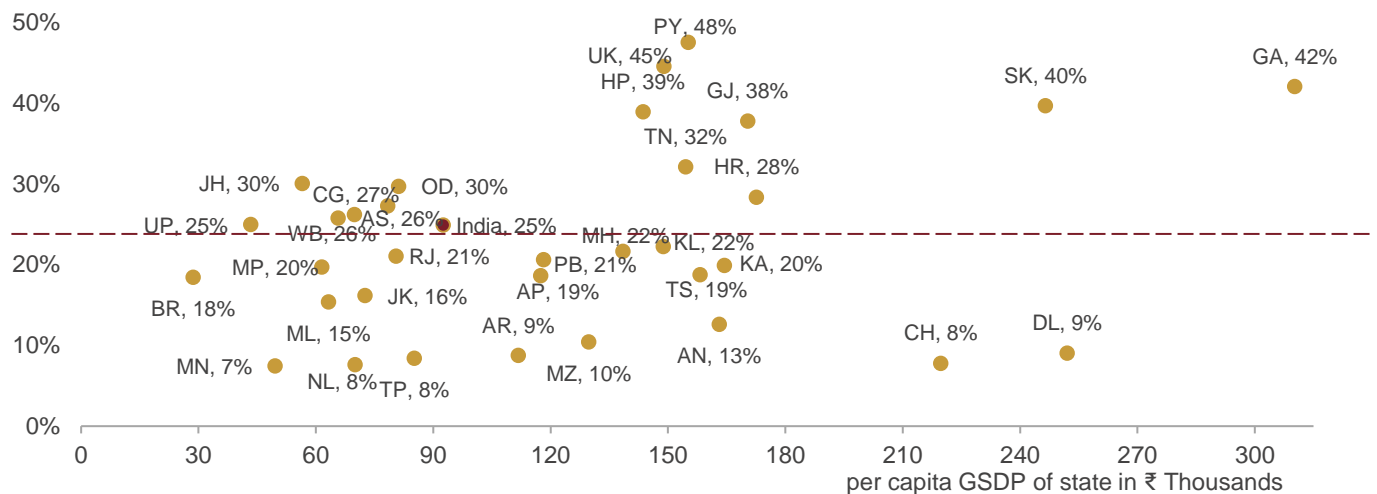
Source: World Bank, CRISIL MI&A

Increased focus on manufacturing and construction by state governments

Manufacturing and construction sectors in India have seen resurgence with rise in private investments and government schemes and initiatives such as Production Linked Incentive (PLI), Make in India, National Infrastructure Pipeline (NIP), National Monetisation Pipeline (NMP), India Industrial Land Bank (IILB), Industrial Park Rating System (IPRS), soft launch of the National Single Window System (NSWS), National Logistics Policy etc. As of Financial Year 2022, contribution of construction and manufacturing GVA as a percent of India’s overall GDP stood at 25%, with multiple states like Puducherry, Uttarakhand and Goa having construction and manufacturing GVA contribution in their GSDP at 48%, 45%, and 42% respectively.

Additionally, contribution of manufacturing and construction GVA to overall GSDP of states like West Bengal (26%), Jharkhand (30%) and Assam (26%) stood close to the national average of 25% as of Financial Year 2022. However, their manufacturing and construction GVA have grown at a faster rate compared to their GSDP between Financial Years 2018-2022, indicating further growth in these sectors.

Construction and manufacturing GVA as % of GSDP (Financial Year 2022)



Source: RBI, Crisil MI&A

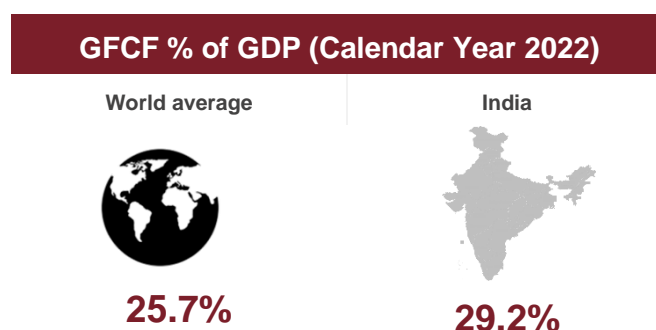
Certain states like Madhya Pradesh, and Bihar have seen higher growth in construction/ manufacturing GVA compared to their GSDP (Gross state domestic product) growth. However, as of Financial Year 2022, contribution of construction and manufacturing GVA of these states to their total GSDP is still lower than the national average of ~25%, suggesting further scope of improvement in the construction and manufacturing sectors.

Nonetheless, increased focus by state governments through schemes/ projects like Electronics Policy and Development and Promotion of Electric Vehicle (EV) (Telangana), Industrial Investment Promotion Policy (Bihar), infrastructure development projects by government (MP), along with central government policies is expected to boost manufacturing and construction in these states, thereby boosting overall construction and manufacturing industry in India.

Furthermore, governments of states like Arunachal Pradesh and Kerala, which had a relatively low share of manufacturing and construction GVA in their GSDP, have launched schemes like State Industrial and Investment policy 2020 (Arunachal Pradesh) and Kerala Industrial Policy 2023, which can potentially provide boost to manufacturing/ construction industry of the state.

States	GSDP (constant prices)		Construction GVA (constant prices)		Manufacturing GVA (constant prices)	
	In ₹ million	CAGR (FY18-22)	In ₹ million	CAGR (FY18-22)	In ₹ million	CAGR (FY18-22)
Andhra Pradesh	70,488.9	4.3%	4,979.3	3.2%	8,160.3	5.6%
Arunachal Pradesh	1,980.1	6.2%	154.4	-2.8%	19.2	-15.1%
Assam	26,252.3	4.5%	2,254.1	5.1%	4,514.5	7.8%
Bihar	39,993.0	3.8%	3,649.6	3.6%	3,732.7	5.1%
Jharkhand	24,334.8	3.7%	1,987.7	4.1%	5,328.0	6.3%
Karnataka	122,971.3	4.8%	6,187.8	1.6%	18,313.2	2.0%
Kerala	57,274.7	2.6%	6,928.6	2.0%	5,819.3	-1.1%
Madhya Pradesh	60,068.9	4.8%	4,840.0	4.7%	6,999.6	5.1%
Punjab	43,376.9	3.7%	2,712.2	5.0%	6,231.2	4.8%
Rajasthan	73,892.2	4.1%	5,605.0	4.1%	9,950.0	7.9%
Telangana	67,437.1	4.9%	3,246.7	3.9%	9,400.6	7.3%
West Bengal	78,775.8	3.2%	7,831.5	7.0%	12,808.1	6.0%

Source: RBI, Crisil MI&A

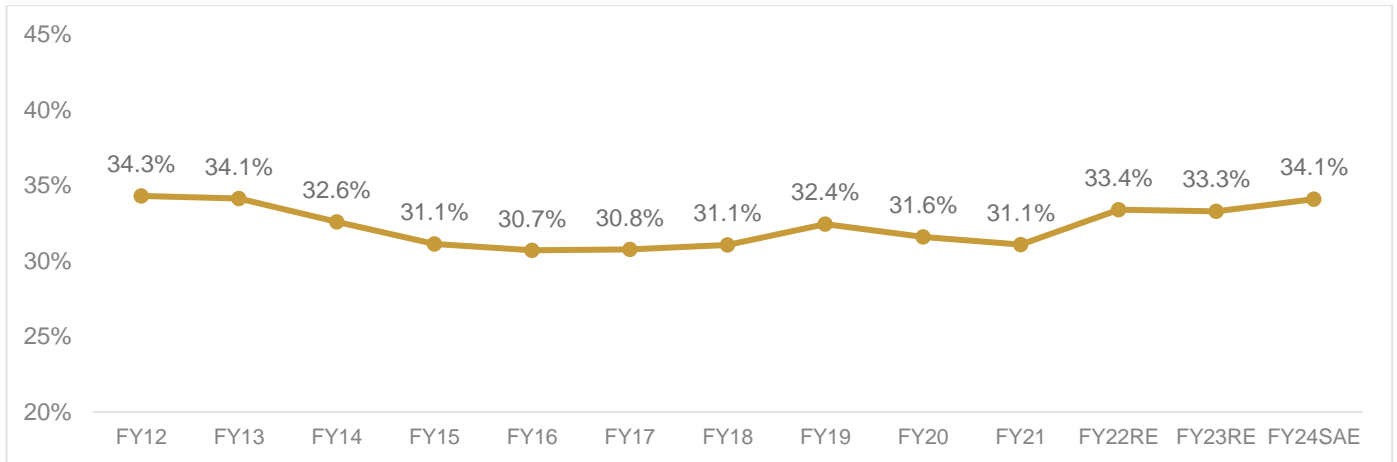


Source: World Bank, Crisil MI&A

Gross fixed capital formation (GFCF) is a critical economic indicator that measures the level of investment in creating physical assets and infrastructure, which plays a crucial role in fostering economic growth and development. As of calendar year 2022, India's GFCF as a percent of GDP stood at 29.2%, above the world average of 25.7%

In Financial Year 2020 and Financial Year 2021, GFCF dropped to 31.6% and 31.1% of GDP respectively as investments in physical assets saw a negative impact of the unprecedented disruptions in supply chains and business operations due to the pandemic. It, however, recovered to 33.4% of GDP in Financial Year 2022 and 33.3% of GDP in Financial Year 2023. The recovery can be attributed to various factors, including the easing of pandemic-related restrictions, the government's focus on infrastructure development, economic reforms and general increase in urbanisation, which boosted demand for affordable housing. As of Financial Year 2024SAE, GFCF as % of India's GDP as further increased to 34.1%.

GFCF as % of India's GDP (Financial Years 2012-2024SAE)



Note: RE: revised estimate, PE: provisional estimate, SAE: Second Advance Estimates
Source: MoSPI, Press Information Bureau of India (PIB), CRISIL MI&A

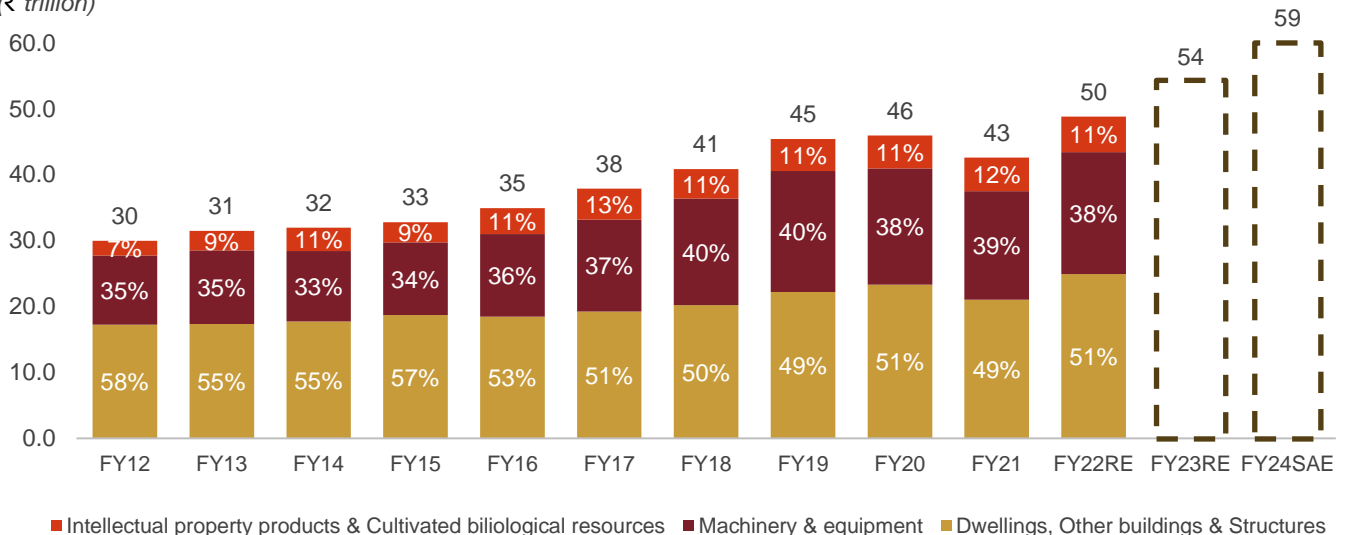
Dwellings, other buildings and structures comprise prominent vertical of GFCF

India's GFCF has been on a positive trajectory over the years, except for the decline in Financial Year 2021, which is primarily attributable to the adverse impact of the pandemic and subsequent economic slowdown. It rebounded in Financial Year 2022, reaching ₹ ~50 trillion, a notable ascent from the ₹ 30 trillion in Financial Year 2012, increasing at ~5.3% CAGR. Furthermore, GFCF increased to ₹ ~54 trillion in Financial Year 2023. Additionally, as per Financial Year 2024SAE, GFCF has further increased to ₹ 59 trillion.

Dwellings, other buildings and structures had a significant 51% weightage in the GFCF as of Financial Year 2022. The important factors contributing to the prominent share include economic growth; the government's commitment to infrastructure development, particularly in roads, railways, and energy projects; and increase in foreign direct investment (FDI) that boosted private sector investment. Additionally, the growth of the middle class and increasing urbanisation further drove demand for housing and commercial properties, stimulating investment in the construction sector.

GFCF- India

(₹ trillion)



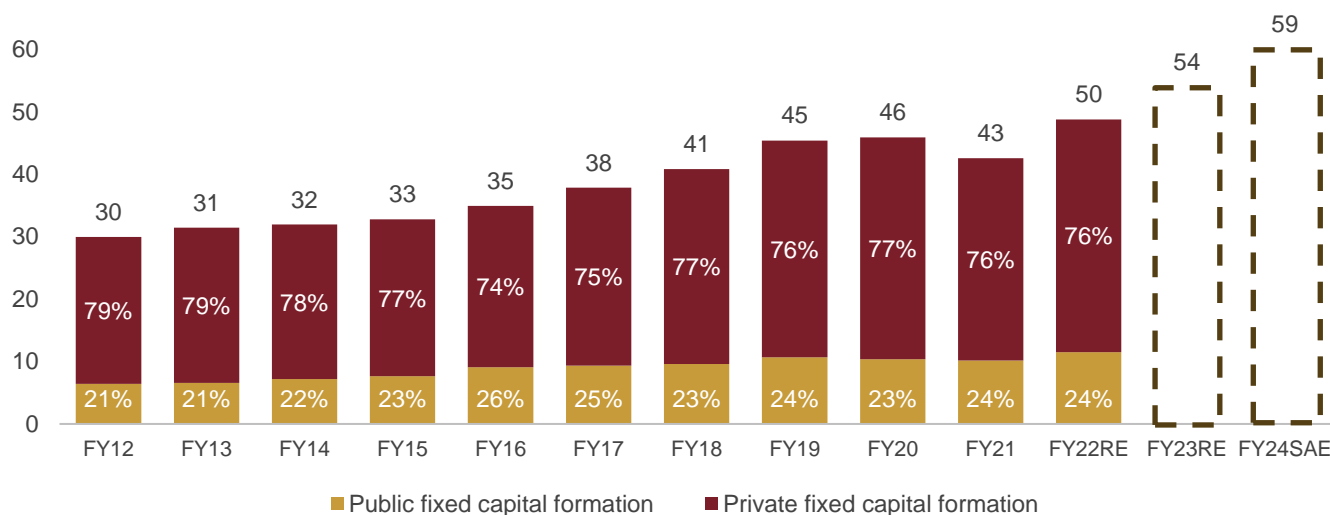
Source: MoSPI, CRISIL MI&A

Private sector is a major contributor to GFCF

The distribution of GFCF between the private and public sectors has remained relatively constant in India, with the private sector consistently emerging as the predominant contributor. In Financial Year 2022, the private sector accounted for 76% of the total GFCF, while the public sector accounted for 24%.

Share of public and private sectors in GFCF

(₹ trillion)



Note: Private fixed capital formation includes the household sector

Source: MOSPI, CRISIL MI&A

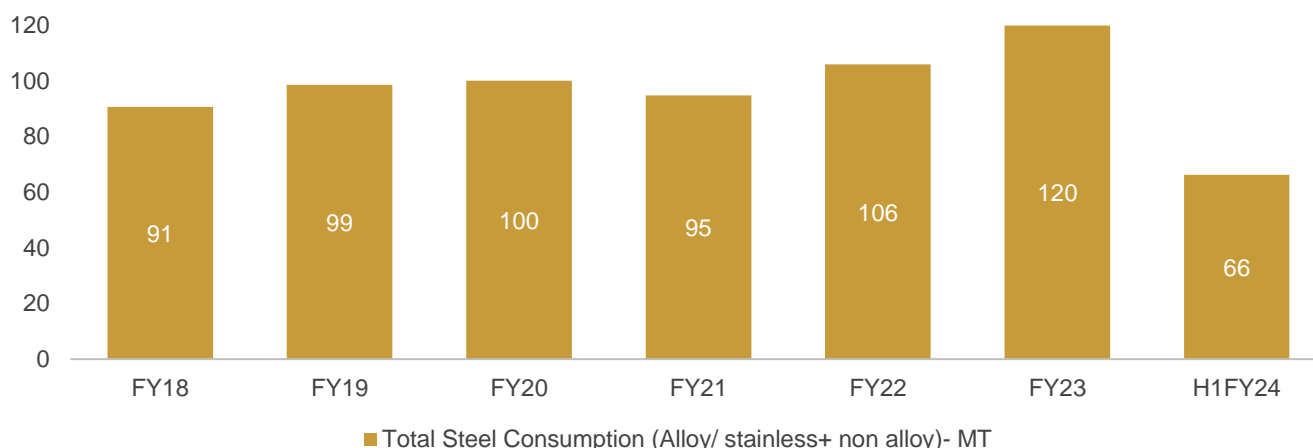
India steel consumption growth is expected to rise with investment in infrastructure

Steel consumption grew from Financial Year 2018 to Financial Year 2023 from 91 million tonne (MT) to 120 MT. The growth was barring Financial Year 2021, when it declined to 95 MT due to the pandemic. However, there was a robust rebound in Financial Year 2022, with steel consumption surging to 106.0 MT. The government's initiatives, such as Make in India, Smart Cities Mission, Production Linked Incentive (PLI) and Pradhan Mantri Awas Yojana have also supported the steel demand during the period.

However, India has considerable scope to enhance steel usage across various sectors. As of calendar year 2022, the country's annual per capita steel consumption stands at 81 kg per annum, compared to the world's average of 222 kg.

Moving forward, CRISIL estimates demand in Financial Year 2024 to increase 10-13% to 130-140 MT due to strong demand from allied sectors and the government's capital spending drive. Additionally, as steel demand is driven by the infrastructure boom in roads and railways and Financial Year 2024 is a pre-election year, a surge in the government's capital expenditure in infrastructure is expected, which will likely drive domestic steel growth.

Finished steel (alloy/stainless + non-alloy) consumption in India

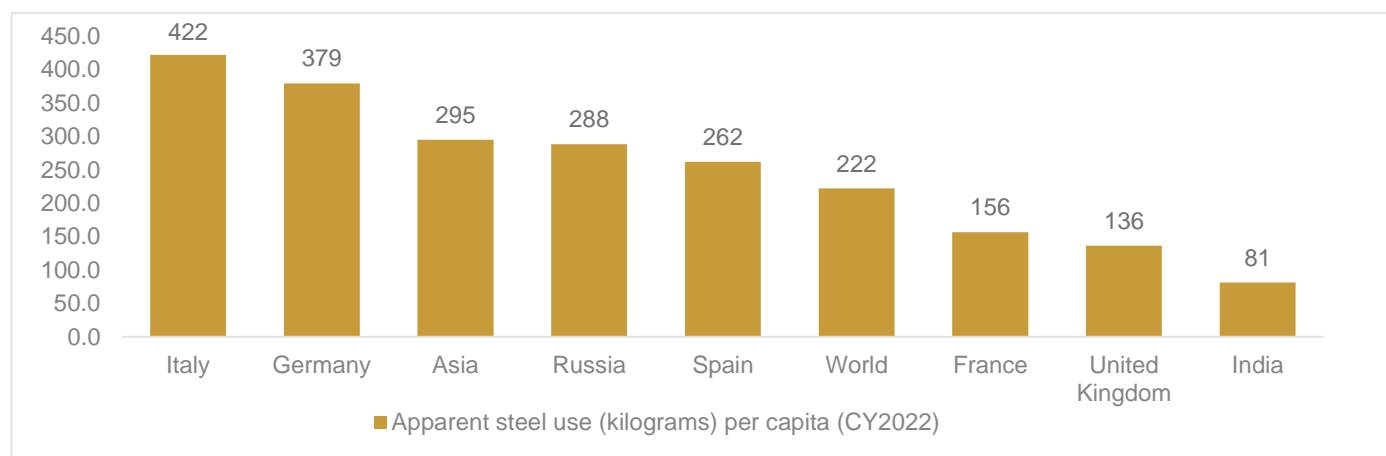


Note: P: Projected

H1 numbers of Financial Year 2024 numbers are provisional

Source: Ministry of Steel annual report, Joint Plant Committee (JPC), CRISIL MI&A

Apparent steel use (kilograms) per capita (Calendar year 2022)



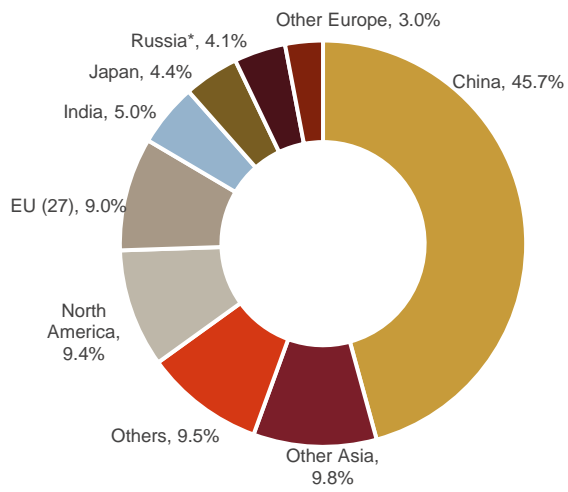
Source: World Steel Organisation, CRISIL MI&A

India finished steel products consumption increased from calendar years 2012 to 2022

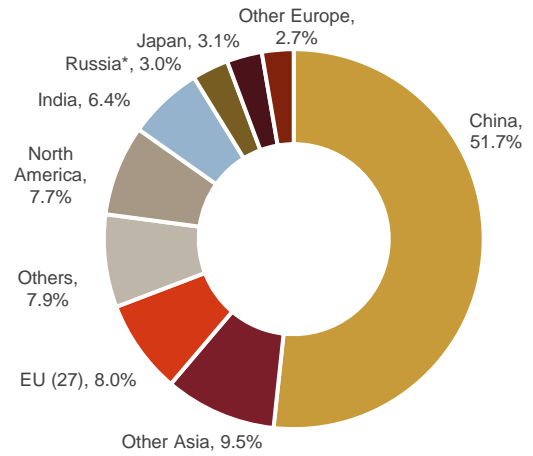
Finished steel products consumption in India contributed to 6.4% of the global finished steel product consumption in calendar year 2022, up from 5.0% in calendar year 2012. On the other hand, the percentage contribution of the European Union, Japan and North America in global finished steel product consumption decreased in calendar year 2022 compared with calendar year 2012. However, India still trails China, which contributes to 51.7% of the global finished steel product consumption in calendar year 2022, up from 45.7% in calendar year 2012, suggesting scope for improvement.

Apparent steel use (finished steel products in million tonnes (MT))

2012 (World Total: 1445 MT)



2022 (World Total: 1781 MT)



*Note: *Russia and other CIS+ Ukraine*

Others comprises of Africa, Middle east, Central and South America and Australia and New Zealand

Source: World Steel Organisation, CRISIL MI&A

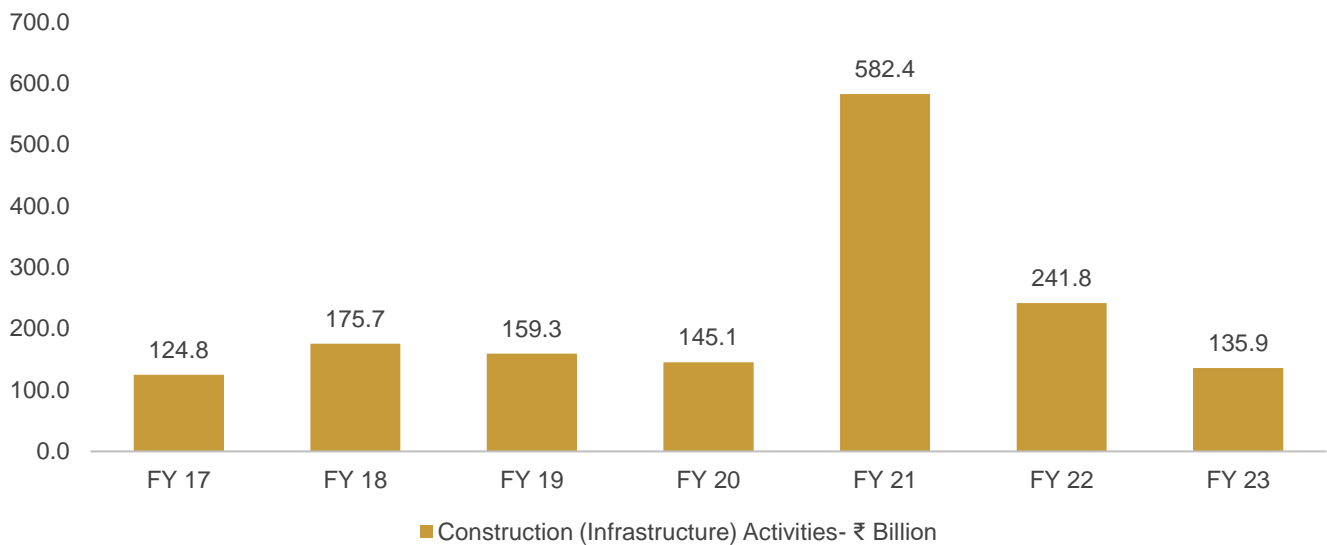
Assessment of construction capex in India

Construction among top 10 sectors to attract Foreign Direct Investment

Foreign Direct Investment “FDI” plays an important role in propelling India's economic growth and development, particularly in the construction sector. Currently, key construction (development) projects, including townships, residential and commercial premises, roads, bridges, hotels, hospitals, educational institutions, recreational facilities, and city and regional-level infrastructure are open to 100% FDI through the automatic route. Moreover, FDI limits for real estate projects within Special Economic Zones (SEZ) and industrial parks have been raised to 100% in the construction sector through the automatic route.

In the construction (infrastructure) sector, FDI stood at ₹ 135.9 billion in Financial Year 2023, compared to ₹ 124.8 billion in Financial Year 2017.

FDI equity inflow in construction (infrastructure) activities



Source: Department of Industry Policy & Promotion, CRISIL MI&A

Capital investment outlay

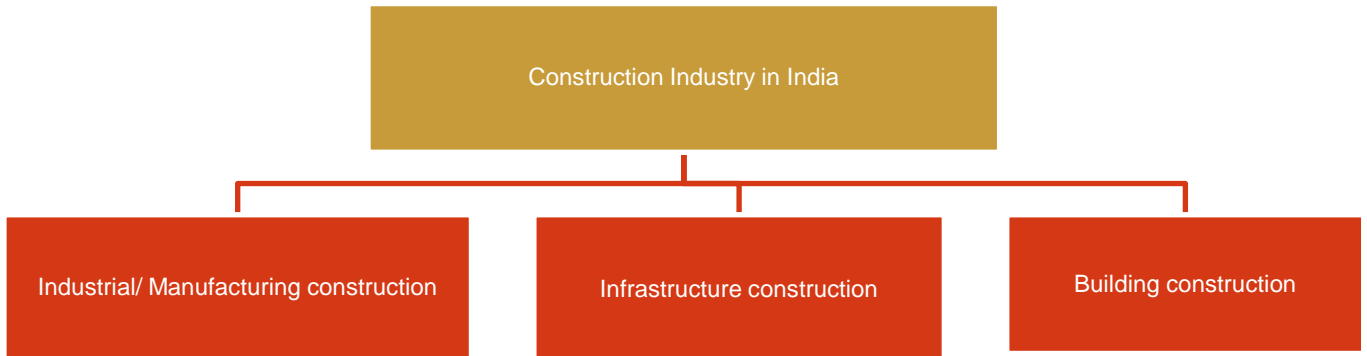
The aggregate budgetary support for capital expenditures (including capital outlay, grants for capital creation, and internal and external budgetary resources) has received a significant boost in Financial Year 2024, reaching ₹ 18.6 trillion. This marks a substantial 28% increase compared with the estimates of the Financial Year 2023E.

The share of 11 core infrastructure ministries (road transport and highways, housing and urban affairs, civil aviation, power, railways, shipping, rural development, water resources, new and renewable energy, defence and petroleum and natural gas) accounts for nearly ~60% of the overall capex. The aggregate budgetary support for capex for these ministries is up 19% at ₹ 10.9 trillion in the Financial Year 2024 budget.

Further, the central government plans to provide a noteworthy boost to the infrastructure development of states by:

- offering a 50-year interest-free loan totalling ₹ 1.3 trillion; and
- focusing on urban infrastructure through formation of the Urban Infrastructure Development Fund (UIDF), which will aid urban infrastructure in Tier 2 and 3 cities

Construction sector



Source: CRISIL MI&A

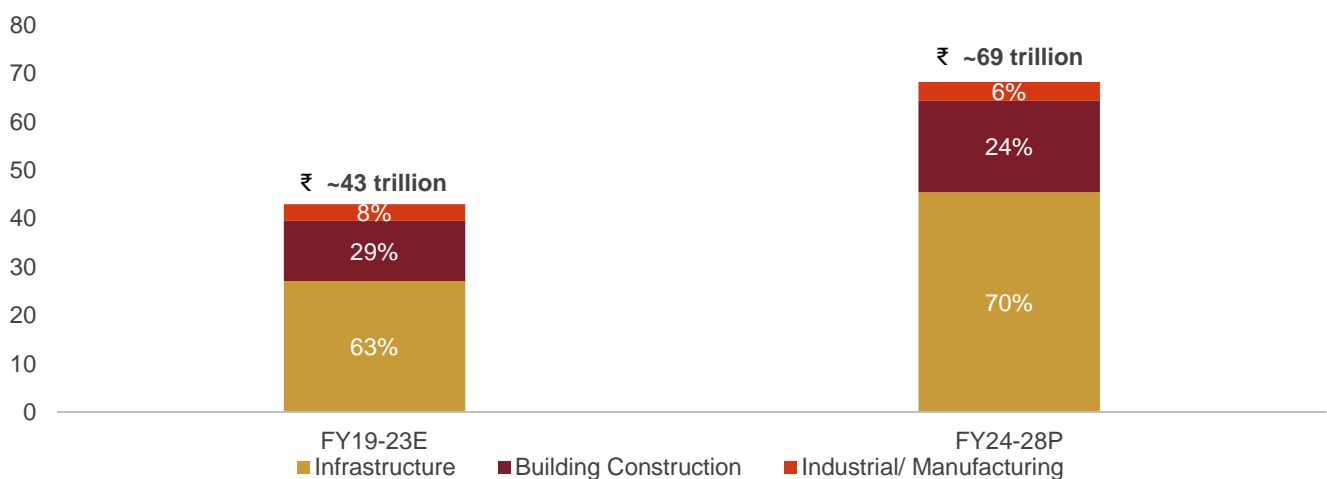
The construction sector in India can be broadly classified into Building Construction, Industrial/ Manufacturing construction, and Infrastructure construction.

Industrial/manufacturing construction includes manufacturing plants, factories, power plants, and other highly specialised facilities. Infrastructure construction includes warehouses, bridges, dams, roads, airports, canals, etc. and building construction includes constructing buildings for residential uses such as houses, residential towers, etc. as well as non-commercial buildings like hospitals, educational institutions as well as buildings for commercial use such as offices, retail malls, etc.

The further classification of these verticals into conventional and unconventional construction methods has been discussed in Section 3 (3.1 Overview of construction industry).

Domestic construction sector

Break-up of the domestic construction sector



Note: E - Estimated, P – Projected

Infrastructure vertical includes warehouse

Building construction includes residential, commercial and non-commercial verticals

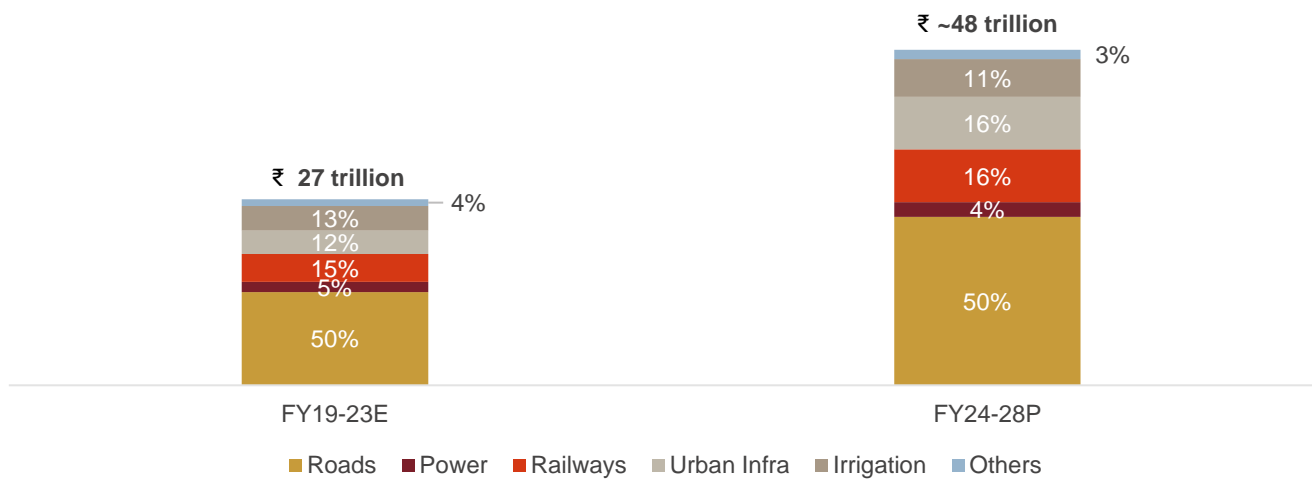
Source: CRISIL MI&A

CRISIL estimates, total construction investments of ₹ 43 trillion between Financial Years 2019- 2023 and the same is expected to increase to ₹ ~69 trillion between Financial Years 2024- 2028 (P). Investments in construction sector are estimated to have grown 16-18% in in Financial Year 2023 attributable to rising focus on infrastructure growth by government coupled with deferred investments in building & construction sector as well as capacity additions in industrial sector.

Moving forward, CRISIL estimates the construction sector would grow 10-13% in Financial Year 2024. Expansion of the infrastructure sector will drive the growth on the back of the development of roads and urban infrastructure along with a boost provided by central and state capex.

Infrastructure

Share of infrastructure investments by sector



Note: E-Estimated, P-Projected
Source: CRISIL MI&A

Infrastructure investments are seen growing faster than the other two sectors due to the government's focus under the National Infrastructure Pipeline (NIP), National Monetization Pipeline (NMP) and the Gati Shakti initiatives. Total construction investments in this sector is expected to attract investments of ~₹48.3 trillion between Financial Years 2024-2028(P), up from ₹ 26.6 trillion between Financial Years 2019 to 2023. This upsurge aligns with the focus on infrastructure, evident in the increased capex allocations within central and state budgets. Within the infrastructure space, road projects will be a critical investment driver from Financial Year 2024-2028. CRISIL MI&A expects investment in roads to rise 10-12% year-on-year Financial Year 2024. It will be led by a strong pipeline of awarded and under-execution national highway projects, execution of higher value expressways and recovery in state road investments.

Additionally, in railways, a 12-14% rise in investment is expected in Financial Year 2024, led by an increase in budget allocation for the sector, implementation of high-value projects such as the Mumbai-Ahmedabad Bullet train, gaining traction in station redevelopment and completion of the freight corridor. The rise is post an expected 32-34% increase in investment in the railways in Financial Year 2023. This is owing to the government's focus on completion of Dedicated Freight Corridor projects, traction in high-speed rail, investment in newer avenues such as Vande Bharat trains and rising focus on station redevelopment programme. CRISIL MI&A expects construction expenditure in railway projects to double between Financial Years 2024-2028 to ₹ 7.3-7.8 trillion compared with ₹ 3.7-4.2 trillion in the preceding five Financial Years 2019-2023.

Consulting

Furthermore, CRISIL MI&A expects increased investment in power, urban infrastructure as well as irrigation. Investment in urban infrastructure is expected increase 31-33% in Financial Year 2024, led by water supply and sanitation under schemes such as Swachh Bharat Mission, Jal Jeevan Mission, AMRUT and deferred investments in Metro projects, a bulk of which were under implementation and have achieved financial closure. In the long term, CRISIL MI&A expect ₹ 7.0-7.5 trillion spend on urban infrastructure between Financial Years 2024-2028, which is nearly 2.2x of the amount invested in the previous Financial Years 2019-2023.

Construction spending on power is expected to rise 4-6% year-on-year in Financial Year 2024. It can be attributed to investment in conventional coal-based capacity additions to meet the power demand, coupled with a sharp pick-up in renewable investments to meet the 300GW target till 2030 set out by the Prime Minister. Investment is estimated to increase by 13% in Financial Year 2023 due to deferred investment from Financial Year 2021 and Financial Year 2022. The deferred investment is on the back of extensions granted due to the pandemic and supply chain issues plaguing the sector. Overall, construction investment over the Financial Years 2024-2028P is projected at ~ ₹ 2 trillion, up from ₹ 1.4 trillion over the past Financial Years 2019-2023. It will be led a rise in the addition of renewable and non-renewable generation capacity, investment in the transmission and distribution sector and revival of stalled hydel projects and traction in pump storage investments.

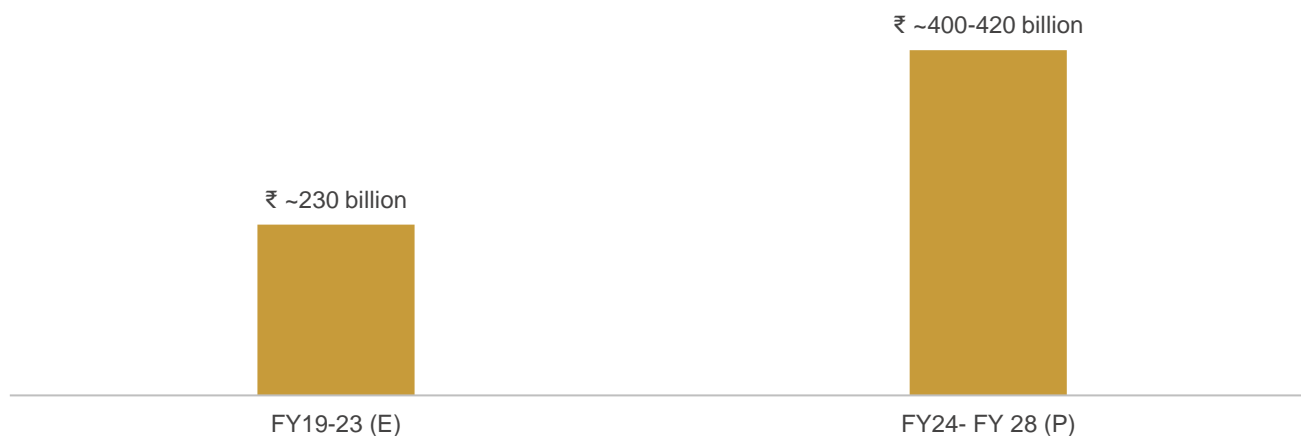
Similarly, construction capex in irrigation is expected to rise 6-8% year-on-year in Financial Year 2024. Construction spend in irrigation is projected to rise to ₹ 5-5.5 trillion over Financial Years 2024-2028 from ₹ 3.5 trillion over the Financial Years 2019-2023 owing to the push from state governments to increase irrigation penetration in states.

Moving forward, CRISIL MI&A expects the construction sector to grow at 10-13% in Financial Year 2024, driven by growth in the infrastructure sector.

Warehouses

Pursuant to the change of the indirect tax regime, there is a huge demand for warehouses. Additionally, the entry of several retail giants in India and increased penetration of e-commerce players is expected to lead the demand for Grade A warehousing infrastructure and upgradation of old-style warehousing into Grade A modern warehousing in India, which would contribute to the demand of pre-engineered steel structures.

Construction investments warehousing and cold storage



Source: Union Budget documents (Financial Year 2019-Financial Year 2023), CRISIL MI&A

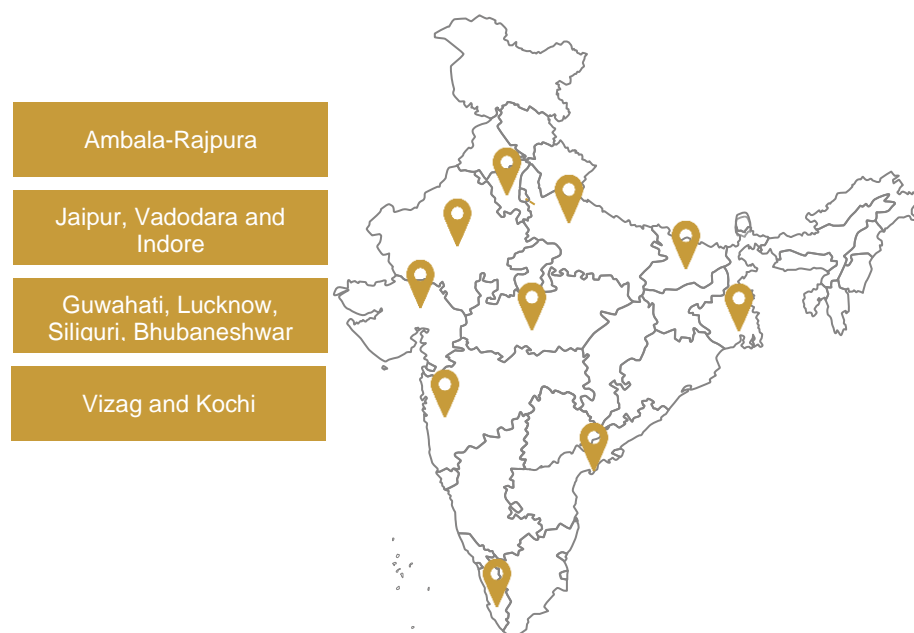
CRISIL projects construction investments in the warehousing (agricultural and industrial) and cold-storage (single- and multi-commodity) sectors to rise to ₹ 400-420 billion over the Financial Years 2024-2028 on expectations of increased demand. Industrial warehousing is likely to account for 85-90% of total investments. Investments in the

sector of multipurpose cold storages are expected to rise due to their faster return on investment compared to single-commodity storages. The multipurpose facilities offer the advantage of accommodating various types of perishable goods simultaneously, ensuring a better capacity utilization, thereby making it a more economically viable option.

In Financial Year 2023, the supply addition was estimated at 35-40 msf (million square feet) as developers were awaiting some amount of demand realisation, or a reduction in vacancy levels. Furthermore, due to elevated raw material prices, many developers deferred construction of industrial warehouses. In Financial Year 2023, due to dropping vacancy levels and softening commodity prices, supply addition is expected to increase 15-20% year-on-year. This would translate to addition of 43-48 msf during the year.

Over the long term, the annual demand for Grade A and B warehouses in top eight Indian cities is expected to log 10-15% CAGR between Financial Years 2024-2028. The annual supply is also expected to rise at the same rate.

Smaller hubs are also emerging due to rising e-commerce demand



Source: CRISIL MI&A

Furthermore, CRISIL MI&A also expects the warehousing industry to evolve structurally over the long term – led by automation and investment in technology and reduced dependence on labour. Most end-user industries are also expected to automate their supply chains and warehouse management services.

3PL vertical to be the largest driver of industrial warehousing demand Financial Year 2024

Robust demand is anticipated from third-party logistics (3PL) providers, particularly in sectors such as electronics, white goods, retail, and fast-moving consumer goods (FMCG). These sectors are leveraging 3PL services to optimise inventory management and reduce costs. Overall, the annual demand in warehousing, driven by e-commerce and 3PL end-use sectors, is expected to contribute significantly, accounting for 55-60% of the overall demand.

PEB warehouses gained prominence post GST implementation

The warehousing industry in India is fragmented with unorganised players occupying a majority share in volume terms. They have smaller reinforced cement concrete (RCC) warehouses with small shelves, build small warehouses

and have an asset heavy strategy. Typically, they do not provide value-added services such as packaging, labelling, inventory management, etc.

In the pre-GST scenario, players used to prefer setting up warehouses in every state to save on inter-state taxes.

But in the past 4-5 years, the industry has started gaining traction due to implementation of GST; many large players have started investing in huge, modernised warehouses which are PEB structures. This was on account of end-user industries moving towards a hub-and-spoke model as the need to establish warehouses in each states diminishes. Larger PEB warehouses of 1,00,000-2,00,000 sq ft are being set up as hub warehouses and smaller warehouses of 20,000-30,000 sq. ft. which would serve as the key 'spoke' warehouses. The PEB warehouses generally have a height of 22-24 feet (typically higher than RCC).

Realignment towards the hub-and-spoke model is expected to result in major business opportunities for organised 3PL players operating large-sized warehouses in key geographies. They not only provide huge modernised PEB storage but also warehouses equipped with racking and storage solutions, forklifts and reach trucks, and value-added services. The 3PL players also have an asset light model. They take warehouses on lease from warehousing developers which, in turn, acquire the land and construct.

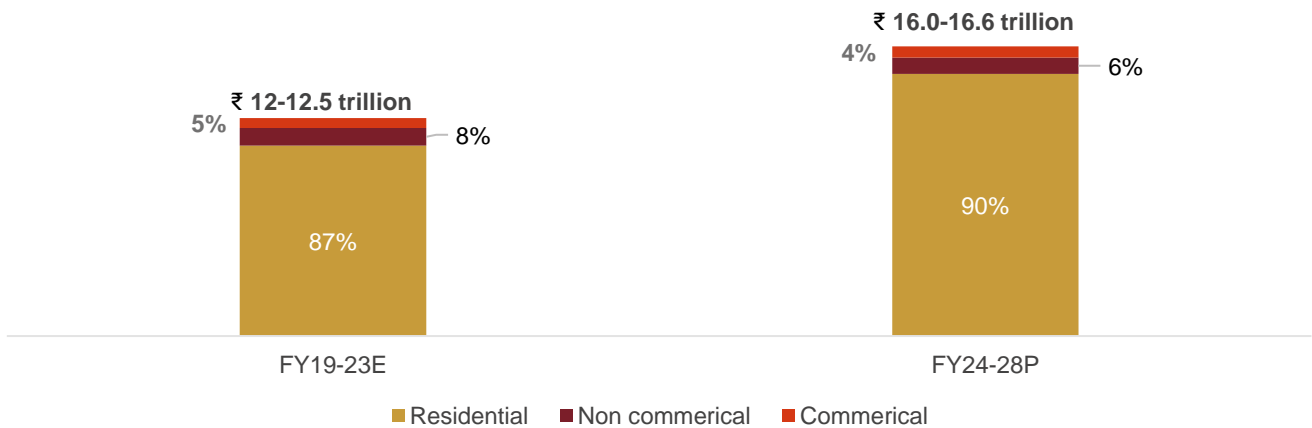
Building and construction to grow in the medium term led by housing demand

CRISIL MI&A estimates the building and construction sector to grow at 4-6% in Financial Year 2024, with demand in the real estate sector slowing along with rising inventory levels in key cities. Increase in the execution of deferred projects and government schemes such as PMAY provide the required boost to the sector.

The sector is estimated to rise by 10-14% in Financial Year 2024, surpassing pre-Covid levels, led by rising demand from end-user sectors. This can be attributable to low interest rates, return of normalcy across the sector, increasing demand for owned and larger properties post the pandemic, and improvement in the financial profile of buyers.

The sector is expected to rise to ₹ 16-16.6 trillion between Financial Years 2024-2028P from an investment of ₹ 12-12.5 trillion between Financial Years 2019-2023, growing ~1.3 times.

Share of commercial and residential buildings



Note: E-Estimated, P-Projected
Source: CRISIL MI&A

Residential

Residential forms the largest vertical within building construction, occupying 87% as of Financial Year 2019-Financial Year 2023. The real estate industry has been facing changes and challenges with developments such as demonetisation, enactment of the Real Estate (Regulation and Development) Act, 2016 (RERA), and implementation of the Goods and Services Tax (GST). The pandemic further significantly impacted the sector in Financial Year 2021. Although Financial Year 2022 came with its own set of challenges given the second wave, easing of curbs in various states, increase in vaccination across the country and deferred project completions from Financial Year 2021 helped the sector rise 95-105% in Financial Year 2022, returning to pre-Covid levels and creating a high base for Financial Year 2023. The increase in budgetary allocations for the PMAY scheme and announcements by state governments of stamp duty cuts has helped in the recovery of sectors to pre-Covid levels.

Non-commercial

Non-commercial vertical includes educational institutions and healthcare facilities. It currently forms ~8% of total building construction. Investment in India's educational services is expected to decline at negative 3-4% CAGR between Financial Years 2024-2028. CRISIL MI&A expects ₹ ~0.7 trillion in construction investment, excluding land cost, to be ploughed into the sector during the period. However, this represents 15-18% decline over the ₹ 0.8 trillion invested over Financial Years 2018-2022 as pandemic has also led to a rise and acceptance of digital schools and universities, which will constrain additional investment in the sector.

Additionally, CRISIL MI&A expects the healthcare services sector grow at 8-10% over Financial Years 2023-2028, recording a construction spend of ₹ 340-360 billion compared with ₹ 277 billion over Financial Years 2019-2023, on the back of increased allocation by state governments as well as private entities.

Commercial

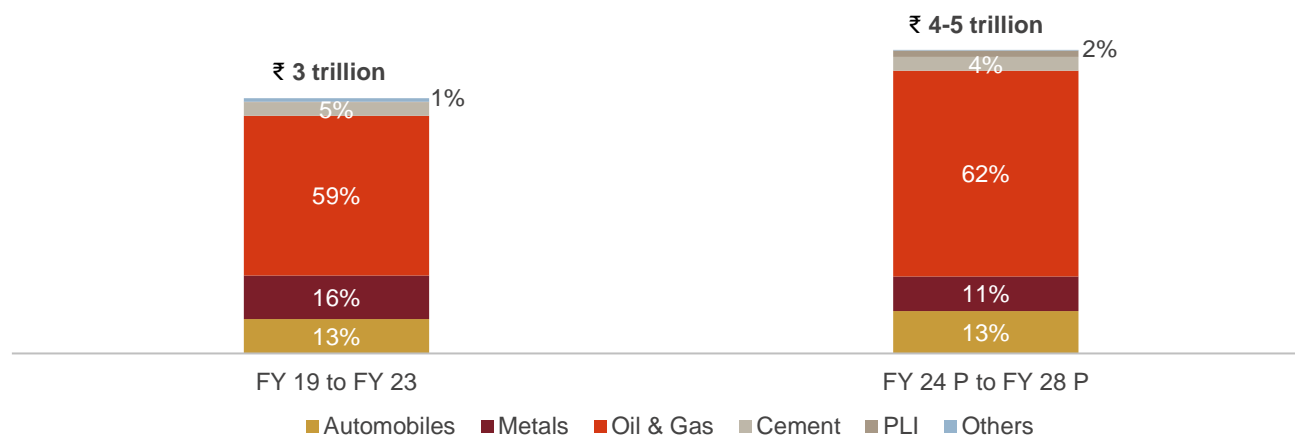
Demand for commercial real estate is expected to grow at 2.5-3% between Financial Years 2024-2028 compared with 3.5-4% between Financial Years 2018-2022 (despite a sharp decline in calendar year 2021 owing to the pandemic).

Pivot towards hybrid work models, increased acceptance of work-from-home and digital means of communication such as video conferencing are expected to result in muted growth in commercial area uptake. However, in prime micro markets, where the supply is limited and vacancy level is low, CRISIL MI&A expects an increase in lease rentals.

In the retail space, owing to already available supply and vacancy levels, very limited supply is likely in the short term. Lease rentals, which had been impacted due to the pandemic, are now back to pre-Covid levels and have even surpassed them in some markets led by a return to normalcy.

Industrial/ manufacturing sector

Share of industrial construction investment in India by sector



Note: E-Estimated, P-Projected;

Source: CRISIL MI&A

Construction spends within industrial/ manufacturing sector are seen rising 6-8% in Financial Year 2024, driven by expansion in the oil and gas and metals verticals. The growth is on a high base of Financial Year 2023, when the sector grew due to deferred investments from Financial Year 2021 and Financial Year 2022 and capex investments from the PLI scheme picking up. The latter is a time-bound incentive scheme wherein the government rewards companies by 5-15% of their annual revenue based on them meeting pre-decided targets for incremental production and/or exports and capex over a base year.

Based on an analysis of eight key sectors, CRISIL MI&A estimates construction investment in the industrial sector at ₹ 4-5 trillion between Financial Years 2024-2028, rising 1.2 times over spends seen in Financial Years 2019-2023. The rise in investment is projected due to inclusion of the PLI scheme in the capex investments of the industrial sector. While the PLI scheme covers 13 sectors, CRISIL have only considered 3 capex-intensive sectors, viz., auto and auto components, textiles and specialty steel for inclusion in our estimates.

Within the industrial sector, the oil and gas sector is estimated to provide ₹ 2.5-2.6 trillion in construction opportunities (upstream and downstream) over the five-year period, thereby comprising 55-60% of total industrial construction expenditure. Investments in the sector will be driven by refinery expansions at HPCL's Barmer, Vizag, IOCL Barauni, Numaligarh, capacity expansion plans announced by RIL and increasing investments towards retail outlets.

Other sectors that will contribute to the increased demand includes automobiles, where investment is expected to rise to ₹ 520-560 billion over Financial Years 2024-2028, from Financial Years 2019-2023 level of ₹ 400-450 billion. Investments are expected to rise to ₹ 120-150 billion in Financial Years 2024-2028 in petrochemicals, against ~₹ 85 billion in Financial Years 2019-2023. Investments in PLI and cement are expected to increase to ~₹ 200 billion and ₹ ~172 billion, respectively.

However, overall, industrial investment between Financial Years 2024-2028 is expected to rise 20-25% over the Financial Years 2019-2023 with the bump-up attributable to the PLI scheme.

Key growth drivers in Indian construction industry

Key drivers	Description
Increased urbanisation	India's rapid urbanisation, coupled with a growing middle-income group, has been a major growth driver for the construction sector as it has led to increased demand for affordable housing as well as better public infrastructure connectivity through roads and railways.
Smart City Mission	The government's Smart Cities Mission that aims to develop 100 smart cities across India, serves as a prominent growth driver for the construction industry. Furthermore, smart city investments are expected to grow to ₹ 0.6 trillion over Financial Years 2024-2028 (P) from a comparatively low base of ₹ 0.2 trillion Financial Years 2018-2022.
Growing investments in renewable energy	Growing commitment by companies to renewable energy has led to a surge in the construction of solar and wind power projects. Furthermore, deferred investments from Financial Years 2021 due to the pandemic, coupled with a rise in investments in Financial Years 2023 for meeting the renewable energy target of the government, will boost the construction industry.
Increased spending on warehousing	With rapid growth of the e-commerce sector, there has been a surge in demand for efficient warehousing and cold storage facilities in India for better connectivity. For example, Haryana is increasingly finding favour as a consumer-durable-and-FMCG hub given its position as one of the highest consumption markets in the National Capital Region and proximity to major markets.
Favourable government initiatives	Indian government has introduced various initiatives and policies to boost the construction sector, such as the Make in India, Production-Linked Incentive (PLI) scheme, National Infrastructure Pipeline (NIP), NMP and the Gati Shakti initiative. These programmes have led to an increase in capex investments in the overall construction industry and proved to be a significant growth driver.

Source: CRISIL MI&A

Major government initiatives to boost the construction industry

Key Government of India's initiatives, such as, 'AatmaNirbhar Bharat', PLI scheme, Bharatmala Pariyojana, Sagar Mala, PMAY-G and PMAY-U are expected to drive growth of the PEB industry in India.

PLI scheme

The PLI scheme was introduced by the Indian government to boost domestic manufacturing, attract investments, and enhance exports by offering incentives. It has overall financial limits of ₹ 1.97 trillion for implementation across 14 sectors. As of March 2023, actual investments of ₹ 625 billion had been realised, resulting in incremental production/sales of over ₹ 6.75 trillion and employment generation of around 3,25,000.

The PLI scheme will also provide a fillip to the Industrial sector. The three major sectors covered under PLI, viz., auto, and auto components, textiles and speciality steel are together expected to catalyse investments of ₹ 20,000 crore in the industrial sector alone.

NIP

The NIP aims to improve project preparation and attract investments in infrastructure. It is expected to positively impact the construction industry through a projected infrastructure investment of around ₹ 111 trillion over Financial Years 2020-2025, to provide high quality infrastructure across the country to build robust infrastructure and boost the economy by increasing employment opportunities and enhancing living standards. Sectors such as energy (24%), roads (19%), urban (16%), and railways (13%) comprise ~70% of the projected capital expenditure in infrastructure in India over this period (Financial Years 2020-2025).

As of January 2023, NIP had 8,964 projects with a total investment of more than ₹ 108 trillion under different stages of implementation. It has been proposed to integrate NIP and Project Monitoring Group (PMG) portals.

Bharatmala Pariyojana

Bharatmala Pariyojana is an umbrella project of the central government since 2015, that aims to improve efficiency in the roads sector. It is expected to supersede the National Highways Development Project (NHDP) and envisages the construction of 65,000 km of highways under the following categories: national corridor (north-south, east-west, and golden quadrilateral), economic corridor, inter-corridor roads, and feeder roads. Further, in order to reduce congestion on the proposed corridors, enhance logistic efficiency and reduce logistics costs of freight movements, 35 locations have been identified for development of multimodal logistics parks.

As per the ministry, Bharatmala, along with schemes currently undertaken, could require a total outlay of ₹ 6.9 trillion. Phase-I of the scheme envisages development of about 24,800 km length of national highways/roads, plus residual 10,000 km of NHDP between Financial Years 2018-2022. Awarding under Bharatmala has begun from Financial Year 2018 and is likely to stretch till Financial Year 2025 for Phase 1.

Atmanirbhar Bharat Abhiyan

Prime Minister Narendra Modi launched the Atmanirbhar Bharat Abhiyan on May 12, 2020, to make the country self-reliant through five pillars: economy, infrastructure, system, vibrant demography, and demand.

As Atmanirbhar Bharat places a strong emphasis on infrastructure development, including roads, highways, bridges, airports, urban projects as well as local manufacturing and production, it is not only expected to drive demand for infrastructure construction through construction of roads and highways but also facilitate growth of allied industries such as cement and metals.

Urban infra projects: WSS and Metro projects

Government schemes focused on urban infra such as AMRUT, Smart Cities Mission and the implementation of Metro projects are set to drive significant growth in the construction sector.

In May 2015, the Jawaharlal Nehru National Urban Renewal Mission (JNNURM) was succeeded by the Atal Mission for Rejuvenation and Urban Transformation (AMRUT) to prioritise essential infrastructure services, including water supply, sewerage (sewage system), stormwater drains, transportation, and the development of green spaces and parks in urban areas.

Additionally, the government's emphasis on urban infrastructure projects, including the Smart Cities Mission and Metro projects should fuel substantial growth in the construction sector. According to CRISIL estimates, Metro projects are the second-highest contributors to urban infrastructure investments at approximately ₹ 1.2 trillion over Financial Years 2024-2028 (P). Furthermore, Smart Cities Mission will also boost the construction sector as construction-intensive verticals such as housing, roads, non-residential development, and sewage systems will constitute a considerable portion of total investments.

Sagarmala

Sagarmala is the flagship central sector scheme of the Ministry of Ports, Shipping and Waterways to promote port-led development in the country which was approved by the Union Cabinet on March 25, 2015. Main purpose of this project is to promote port-led development in the country by taking advantage of India's 7,500 km long coastline, 14,500 km long potentially navigable waterways and the strategic location on major maritime trade routes. As a part of Sagarmala, more than 800 projects at an estimated cost of around ₹ 5.48 trillion have been identified for implementation. Sagarmala projects includes those from various categories such as modernisation of existing ports and terminals, new ports, terminals, RoRo and tourism jetties, enhancement of port connectivity, inland waterways, lighthouse tourism, industrialisation around port, skill development, and technology centres. The construction of these

new ports, terminals and related facilities in various states will require extensive construction work, thereby driving the overall construction sector.

Overall, 14 projects related to development of new ports at an estimated investment of ₹ 1,257.8 billion are part of the Sagarmala programme. These projects are spread across coastal states/union territories including Andhra Pradesh, Maharashtra, Gujarat, Karnataka, Andaman & Nicobar Islands and Tamil Nadu.

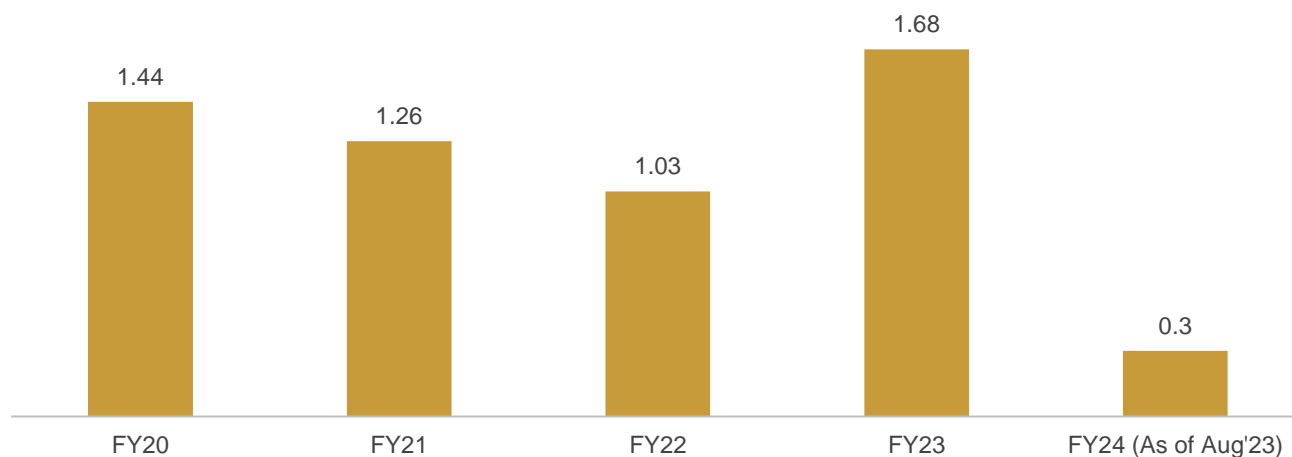
Pradhan Mantri Awas Yojana - Urban (PMAY-U)

PMAY-U under Housing for All is one of the major flagship programmes being implemented by Government of India to provide all-weather pucca houses to all eligible beneficiaries in the urban areas of the country through states/UTs/central nodal agencies. The scheme covers all urban areas of the country, i.e., all statutory towns as per Census 2011 and towns notified subsequently, including notified planning/development areas.

In Financial Year 2023, construction pace recovered with fast-paced execution of ~1.68 million units during the fiscal after seeing a low of ~1.03 million units constructed in Financial Year 2022. While most of the targeted houses have been sanctioned (~11.9 million as of August 2023), over ~7.6 million have already been completed (~64%), another ~3.7 million are under various stages of construction.

Progress in urban housing (number of housing units)

in million units



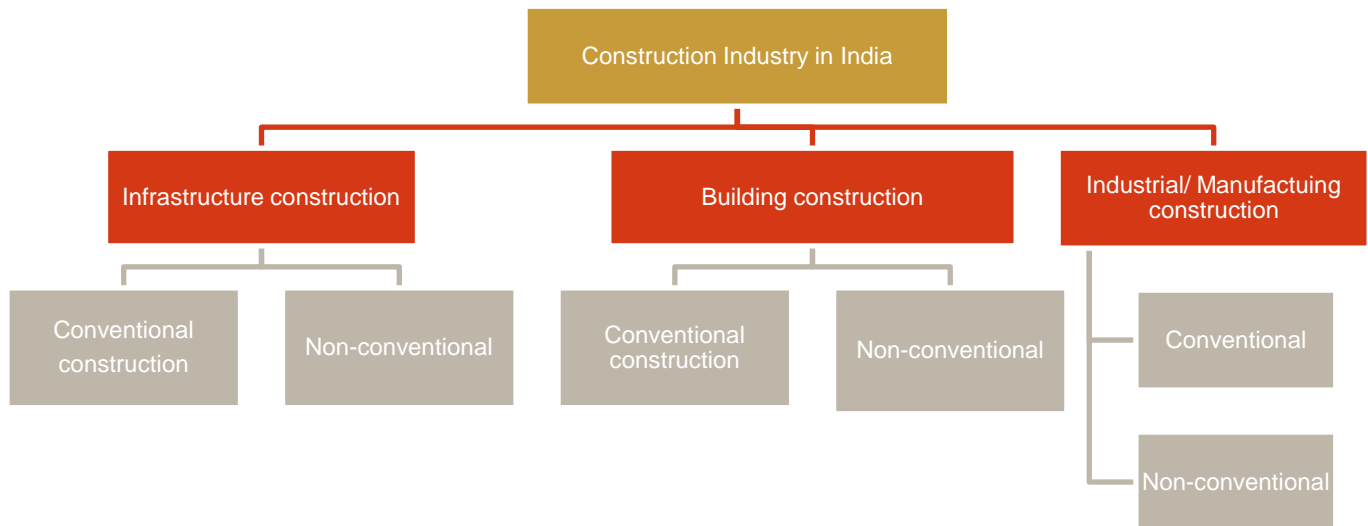
Source: MoHUA, CRISIL MI&A

Pradhan Mantri Awas Yojana – Gramin (PMAY-G)

In order to achieve the target of “Housing for All” in rural areas, the Ministry of Rural Development is implementing the PMAY-G to provide assistance to construct 29.5 million pucca houses with basic amenities. The initial timeline for PMAY-G was 2022, which has now been extended to March 2024. Of the overall target of 29.5 million houses under PMAY-G, a target of 29.4 million houses has already been allocated to states/union territories (UTs). Of this, 28.5 million houses have already been sanctioned to the beneficiaries by various States/UTs and 22.2 million houses have been completed as on March 24, 2023.

Assessment of Pre- engineered steel building industry in India

Overview of construction industry



Source: CRISIL MI&A

As discussed in the section 2.3 (Construction sector), the construction sector is bifurcated into building construction, industrial/manufacturing, and infrastructure construction. Furthermore, the construction industry can be further categorised into conventional methods and non-conventional based on type of construction method / structure. Non-conventional structure can be further divided into:

- **Pre- cast:** These structures are manufactured/produced in factories out of concrete components. Once cast, these components are transported to the construction site and assembled, creating the final building.
- **Prefabricated:** In this, entire structures or modules are manufactured in the factory, including all necessary components and finishes and then transported to the site as completely built units or in semi-knocked-down form, where it is directly installed without the need for further on-site assembly (e.g., guard rooms). It is important to note that prefabricated structures are generally not used in industrial settings.
- **Pre-engineered steel buildings:** In these, steel structures are fabricated in the factories in a controlled environment and then transported to the construction site where the final assembly takes place.

Furthermore, within conventional construction, RCC and steel buildings are prominent methods of construction. Steel players like Tata Steel, Nippon Steel, ArcelorMittal Nippon Steel India, Steel Authority of India Limited, Jindal Steel & Power Ltd., Jindal Steel, etc. provide structural steel long products for construction of steel buildings, which is further used by EPC players, PEB players as well as directly by steel players themselves to provide steel buildings.

Overview of pre-engineered products and their applications

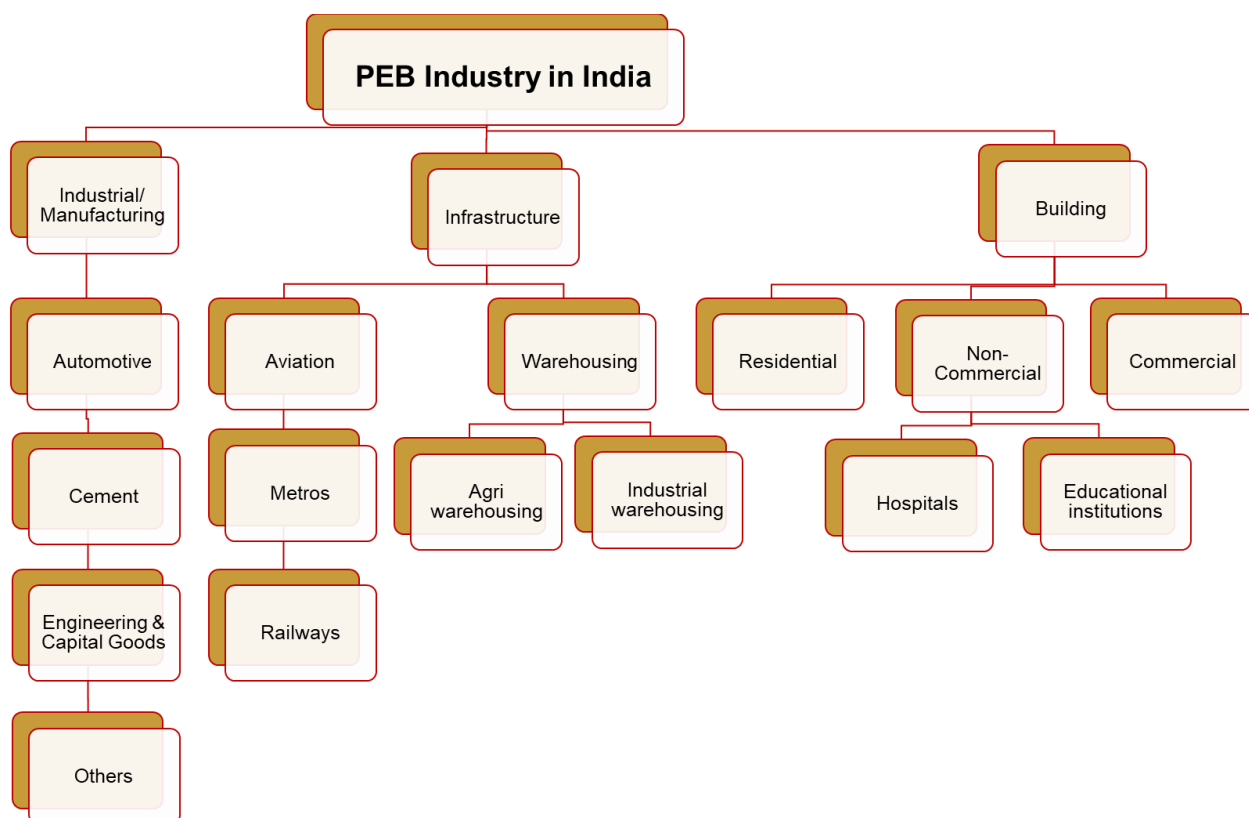
Pre-engineered steel construction has emerged as an innovative building method due to rapid growth of automation in the construction industry. Furthermore, a shortage of skilled labour, combined with the inherent advantages of these structures in terms of speed, cost-effectiveness, and environmental impact, is significantly propelling their popularity in the construction sector.

Pre-engineered structures/units are more eco-friendly than traditionally constructed ones and provide common benefits such as reduced material wastage, enhanced quality control, and improved on-site safety. The controlled manufacturing process minimises material wastage, promoting sustainable building practices, while rigorous quality control ensures consistent and durable structures.

Key components/sub-structures of pre-engineered steel buildings:

- 1. Main frame or primary structure:** This frame is the main load-carrying and support structure of a pre-engineered building, made of rigid steel frames. The primary structure consists of columns, rafters, and other supporting structures. The shape and size of these structures differ based on their application and requirements. The frame is constructed by bolting the end plates of connecting sections together.
- 2. Secondary structure:** Secondary structure consists of purlins, grits, and eave struts, used to support the wall and roof panels. Purlins are employed on the roof, grits on walls, and eave struts at the intersection of the sidewall and roof.
- 3. Roof, wall panels, and insulation:** These components are used for sheeting and are generally made of ribbed steel sheets. They are used as roof and wall sheeting, roof and wall liners, partition, and soft sheeting. Steel sheets are generally produced from steel coils.

Pre-engineered steel buildings industry segmentation by end user



Source: Ministry of Housing and Urban Affairs, CRISIL MI&A

Pre-engineered steel construction is gaining popularity in the commercial, infrastructure, and industrial landscape, such as in the automobile, cement, paper sectors, offices, aircraft hangers, warehouses and logistics, and data centres. Use of pre-engineered constructed units allows companies to accelerate the construction process in a cost-effective manner without compromising on quality. In fact, the absence of external, uncontrollable factors such as

adverse weather in pre-engineered construction allows for better control on quality through standardised operations and streamlined processes.

In the realm of building construction, pre-engineering is reshaping the construction industry by decreasing the overall construction duration for commercial complexes, hospitals, office buildings, high-rise buildings, and so on, without compromising on construction quality. The institutional and recreational field also constructs pre-engineered steel structures in the form of schools, exhibition halls, hospitals, theatres, auditoriums, gymnasiums, and indoor sports courts.

Difference between RCC and pre-engineered steel construction

Parameter	Traditional RCC construction	Pre-engineered steel construction
Major component	Concrete and reinforced steel bars	Steel and metal accessories
Raw materials used	Cement, steel, sand, bricks, etc	Steel, anchors, channels, etc
Construction location	Completely on site	The entire structure is manufactured in controlled environments such as factories, only assembling of structures happens onsite. Foundation in Pre-engineered steel buildings is similar to RCC construction; but the requirements of foundation may vary with the weight of the pre-engineered steel building structures.
Construction time	Construction time depends largely on the type (industrial, residential, etc), height and area of construction. However, RCC construction usually takes more construction time than pre-engineered steel building construction	Pre-engineered steel building construction requires lesser time than RCC construction as majority of components are manufactured in a controlled environment and only assembling of parts takes place on site. According to industry sources, construction of pre-engineered steel buildings takes 40%-50% lesser time than RCC construction
Manpower	Demands a substantial workforce since the entire construction process, including moulding and shaping concrete, occurs on-site	Requires less manpower as only assembling of the final structure happens on site. According to industry sources, manpower required in construction of pre-engineered steel buildings is approximately 25% lesser than the conventional method
Applications	Residential as well as industrial; even infrastructural	Largely industrial and warehouse or shed requirements at infrastructure setup
Effect on environment	RCC construction has a more adverse environmental impact owing to the generation of significant waste and landfill mass during on-site construction activities.	Owing to the streamlined nature of construction in a controlled environment, it minimises its environmental footprint by minimising wastage. Additionally, pre-engineered steel building components can be recycled, which optimises the use of raw materials and minimises construction waste
Modifications	RCC structures face challenges in modifications once the concrete has hardened, making alterations complex and costly	Pre-engineered steel offers superior flexibility as modifications involve changing the assembly of prefabricated components, adjusting to make it more manageable and cost-effective
Cost efficiency	Construction of RCC structures is a highly labour-intensive work in an uncontrolled environment, which makes it more costly than pre-engineered steel building structures. But the cost is dependent on the size and type of structure, span, etc, and varies from project to project	Pre-engineered steel structures are comparatively lighter, requires less material, needs shorter construction time, comparatively less labour on-site, contributing to lower cost as compared to RCC structures. But the cost is dependent on the size and type of the structure, span, etc, and varies from project to project

Source: Ministry of Housing and Urban Affairs, CRISIL MI&A

Advantages of pre-engineered steel buildings over traditional construction

1. Technical difficulties and shortage of labour in traditional construction

Scarcity of on-site skilled labour in the conventional construction industry is expected to be a major driver for the pre-engineered construction industry. Traditional construction methods rely heavily on on-site skilled workers for on-site assembly and intricate tasks, the current shortage of such labour poses challenges to timely and efficient project completion.

Hence, pre-engineered construction offers a viable solution as majority of the construction is done in controlled factory environments, reducing the need for on-site labour. Moreover, companies are achieving economies of scale with improved manufacturing processes, further boosting growth of the pre-engineered construction industry, enabling faster component production, and ensuring greater accuracy and consistency in final structures.

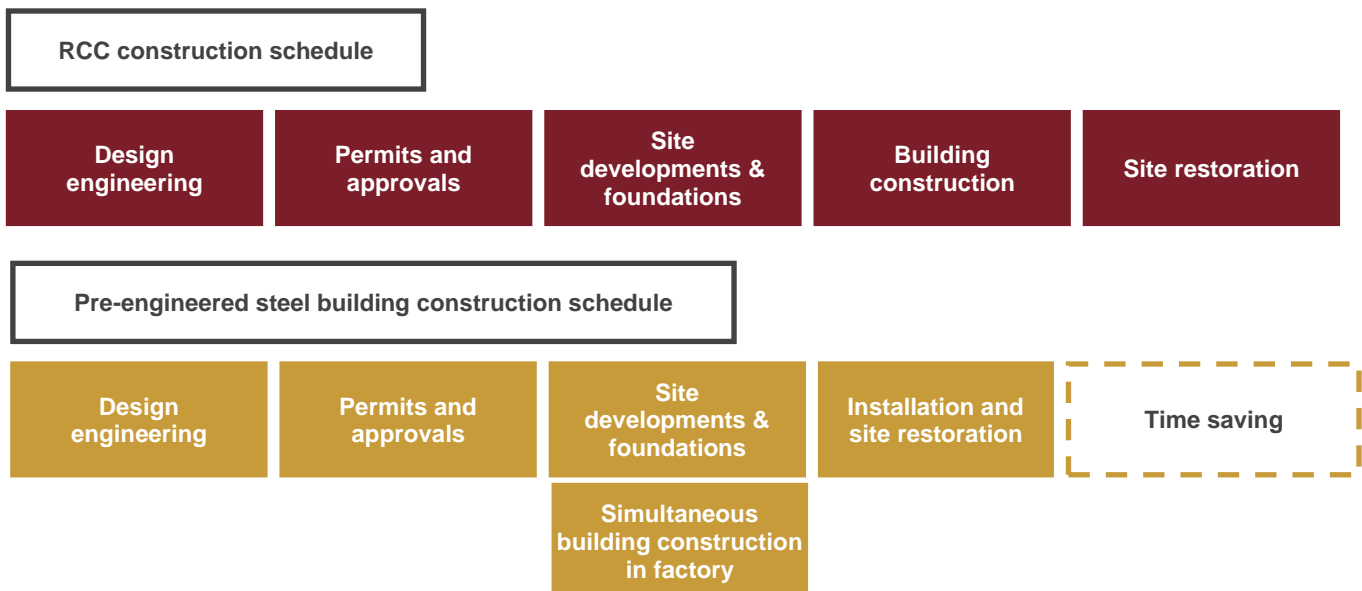
2. More sustainable

As considerable parts of the structures are built offsite in the case of pre-engineered construction, it causes less disturbance to the construction site's surroundings. Furthermore, factories and manufacturing plants allow standardising processes and streamlining procedures, which helps reduce wastage and reduces the carbon footprint, directly impacting the environment.

3. Faster construction timelines and cost optimisation

Pre-engineered construction accelerates project timelines without compromising on deliverable quality. As pre-engineered construction involves components being first manufactured in factories/manufacturing plants, it allows simultaneous preparation of the foundation at the construction site. This not only helps accelerate project timelines, but also allows cost optimisation by decreasing overhead site costs, including labour costs. Furthermore, as pre-engineered structures are manufactured within factories/manufacturing plants, they allow standardising processes, which ensures good quality of structures. Additionally, as these structures are manufactured in factories/manufacturing plants, they also prevent project delays stemming from external factors such as adverse weather.

Construction schedule: RCC v/s pre-engineered steel buildings



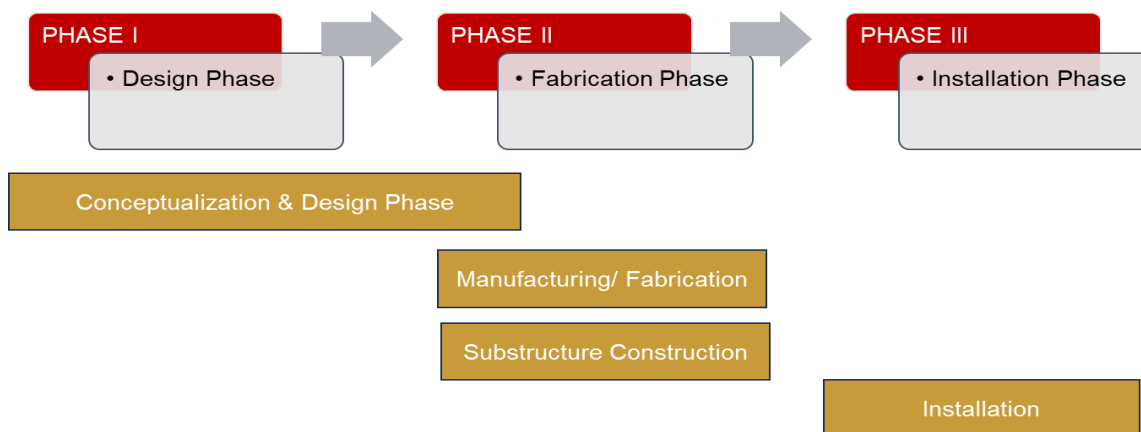
Source: CRISIL MI&A

Construction plan for pre-engineered steel buildings construction

Similar to the construction plan for RCC structures, the pre-engineered steel buildings construction plan is also structured into three primary phases, though the activities scheduled in each of the three phases—design, fabrication, and installation—differ. The initial Design phase encompasses critical tasks such as site preparation, finalising the design specifications, and obtaining the requisite approvals.

The design phase is followed by the fabrication phase, in which there is focus on the manufacturing of pre-engineered steel structures as well as on construction of substructures which not only enhances cost-efficiency but also accelerates project timelines significantly. Hence, this simultaneous approach contributes to substantial savings in both time and resources. Finally, the concluding phase of pre-engineered steel buildings construction involves the transport of individual pre-engineered steel building components to the designated construction site, where the final pre-engineered steel structure is installed with precision.

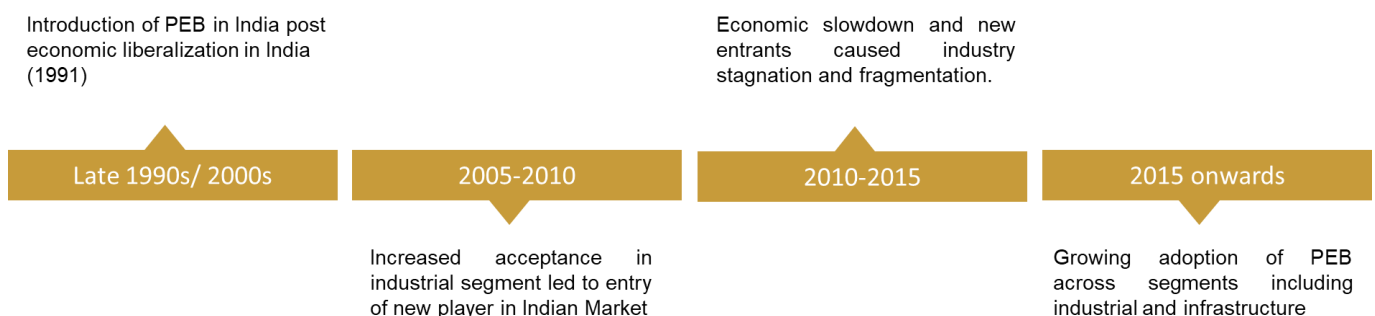
Design plan of pre-engineered steel construction



Source: CRISIL MI&A

Evolution of pre-engineered steel structure market in India

Pre-engineered steel buildings were introduced in India during the late 1990s/2000s with the onset of India's economic growth post liberalisation in 1991. However, the acceptance among consumer verticals began in early 2000 with good growth during 2005-2010. Pre-engineered steel buildings started gaining prominence following a strong fixed capital formation in India and increased adoption by the customers. This period of high growth saw new players enter the fray. With the slowdown of India's economic growth, the Indian pre-engineered steel building industry stagnated between 2010 and 2015. Post that, the industry saw good adoption but suffered some slowdown as capex declined during the pandemic, leading to a drop in revenue in Financial Year 2021.



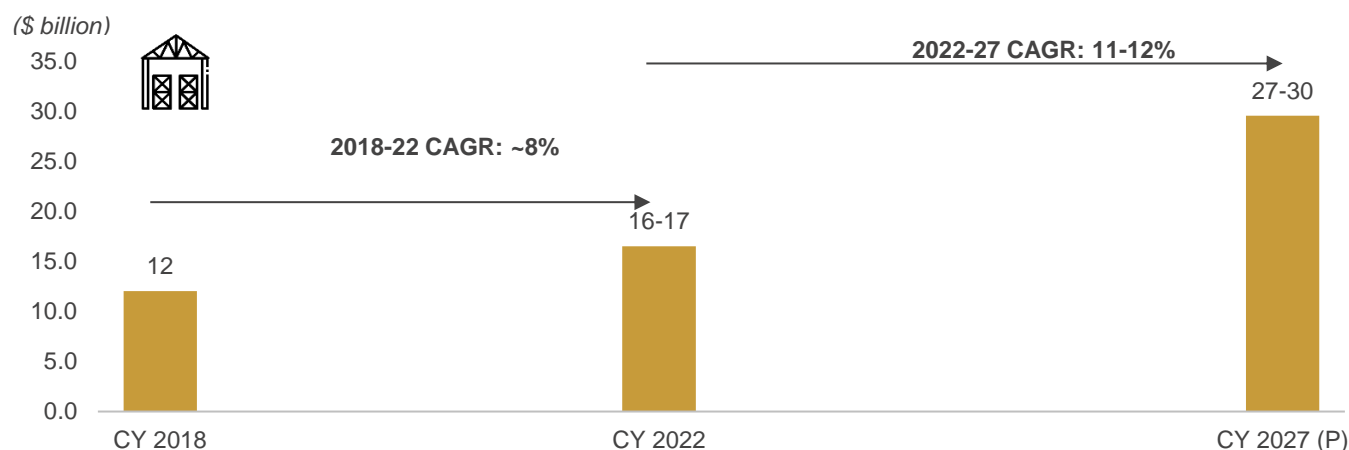
Source: CRISIL MI&A

Global pre-engineered steel buildings market estimated at USD 16-17 billion as of calendar year 2022

The global pre-engineered steel buildings market is estimated at \$16-17 billion as of calendar year 2022 and is expected to clock 11-12% CAGR over the medium term till calendar year 2027. The industrial and commercial sector, the mainstay of the global pre-engineered steel buildings market, is expected to drive demand for pre-engineered steel buildings. Furthermore, increasing investments in public infrastructure, growing urbanisation, and increasing awareness of benefits of pre-engineered construction vis-à-vis the traditional onsite model are also expected to boost the global pre-engineered steel buildings market.

The pre-engineered steel buildings market is expected to see good growth on account of increasing awareness regarding modern off-site construction techniques as well as rising demand for green buildings globally which has resulted in shift in focus from traditional steel buildings to pre-engineered steel buildings. Pre-engineered steel buildings consume less energy and generate less on-site wastage during and post construction.

Global pre-engineered steel buildings market



Source: CRISIL MI&A

Asia-Pacific region: Fastest growing market for pre-engineered steel buildings

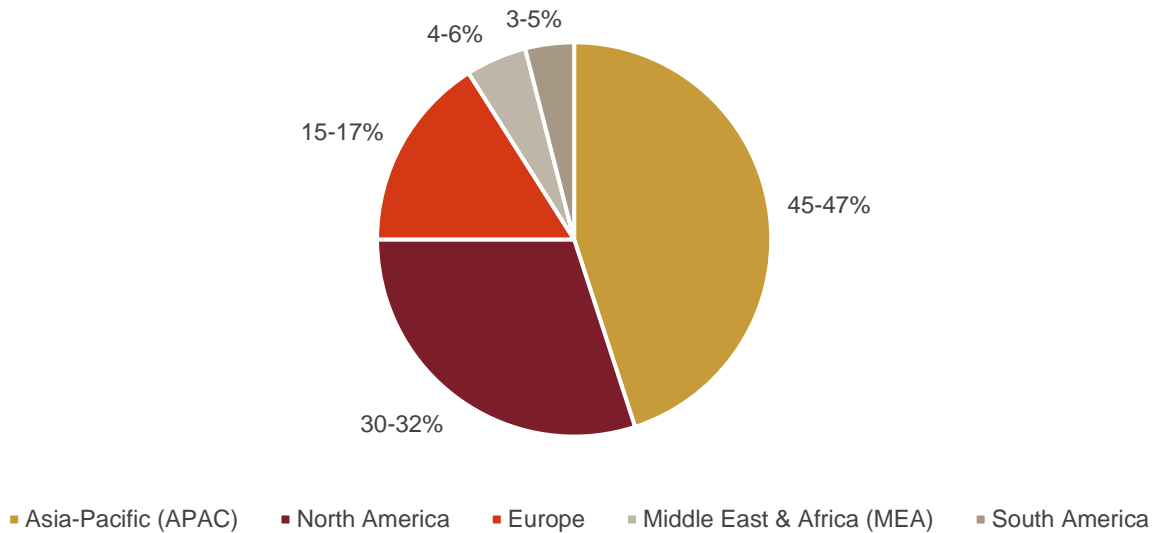
As of 2022, the Asia-Pacific region had the largest share of pre-engineered steel building at 45-47%, followed by North America (30-32%) and Europe (15-17%). Within the Asia-Pacific region, countries such as China and India held a significant market share owing to growing demand for infrastructure as well as surge in commercial and industrial construction on account of favourable government policies. As of 2022, the pre-engineered steel building market in India was valued at ~USD 2.1 billion, thereby forming 26-29% of the APAC market.

Additionally, key factors contributing to the Asia-Pacific region's dominance include rapid industrialisation, urbanisation, and the high adoption rate of advanced construction practices. Additionally, tourism and e-commerce sectors are expected to boost demand for commercial and industrial structures such as warehouses, restaurants, hotels, etc, which will facilitate the growth of pre-engineered steel buildings.

Major factors contributing to growth of the pre-engineered steel building market in North America include the booming e-commerce and construction sectors, which are positively contributing to the industrial and commercial construction. Additionally, in Europe, growing demand for pre-engineered steel building is stemming from the flourishing automotive and aerospace and defence sectors, which require proper industrial infrastructure such as warehouses, manufacturing plants, etc.

Furthermore, growing demand from the industrial and commercial sector coupled with the rising adoption of construction technologies is expected to facilitate the growth of the pre-engineered steel building market in the Middle East & Africa (MEA), and South Africa.

Share of key geographies in global pre-engineered steel building market in calendar year 2022



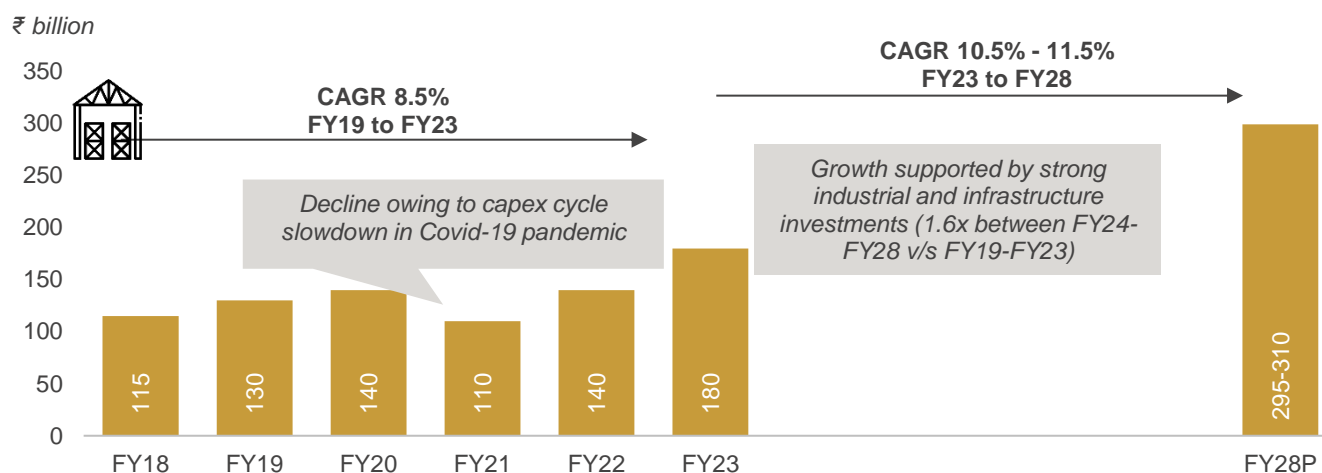
Source: CRISIL MI&A

Market size of pre-engineered steel buildings in India and potential

The industry expanded at a CAGR of ~8.5% over Financial Years 2019-2023, growing from ₹ 130 billion in Financial Year 2019 to ₹ 180 billion in Financial Year 2023. In Financial Year 2024, it is expected to grow to ₹ 195-200 billion. The medium-term outlook is optimistic, with the industry growing at a strong 10.5-11.5% CAGR between Financial Years 2023-2028 to ₹ 295-310 billion, supported by investments in the industrial and infrastructure sectors such as warehouses and logistics as well as expressways (way-side amenities and toll plazas).

Structural steel is seeing good potential and application in metro station structures, airport structures, telecommunication towers, broadcasting towers, floodlight towers, power transmission towers, among others, which is supporting growth in the pre-engineered steel buildings industry in India. The Indian government’s impetus on the infrastructure investments will also drive demand for steel construction-related structures.

Pre-engineered steel building industry in India



P: Projected

Source: CRISIL MI&A

Large, organised players grow at faster clip than overall pre-engineered steel building industry

Within the overall industry, the top six players have grown at a faster growth rate as compared to the rest of the players. This higher growth of the top players can be attributed to higher reliability and capability, high quality raw materials used, good track record for execution and capability to provide innovative and effective solutions to customers.

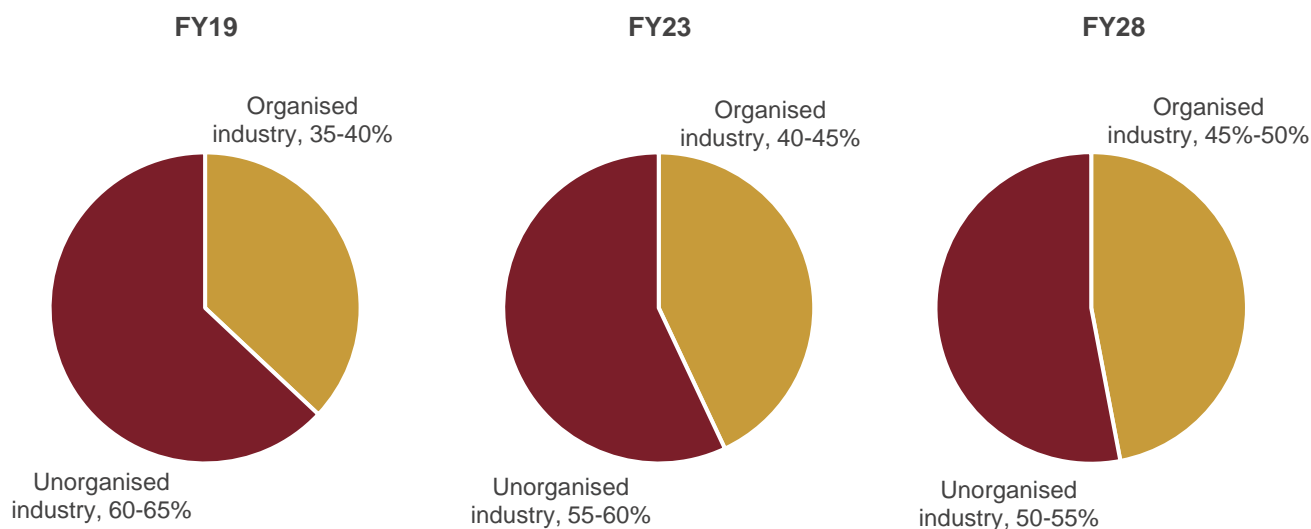
Industry players	Revenue FY19 (₹ billion)	Revenue FY23 (₹ billion)	CAGR FY19-FY23 (%)
Top six players	42	65	11.4%
Rest of the industry	88	115	7.0%
Total industry	130	180	8.5%

Note: Top six players in terms of Financial Year 2023 revenue are as follows: Kirby Building Systems & Structures India Pvt Ltd, Pennar Industries Ltd, Interarch Building Products Ltd, Zamil Steel Buildings India Pvt Ltd, Phenix Building Solutions/M&B Engineering, Everest Industry in no particular order

Source: CRISIL MI&A

Pre-engineered steel building market remains competitive with large unorganised vertical; organised sector remains superior to unorganised sector

As of Financial Year 2023, the organised industry held a 40-45% revenue market share in the overall industry. Key players such as Interarch Building Products Limited and Kirby Building Systems accounted for 40-50% of the market share in the organised industry. The organised industry is consolidated with six key players, accounting for 80-85% of the organised industry, which, in turn, held 35-40% of the overall industry in Financial Year 2023. The six key players include Interarch, Kirby, Pennar, Phenix / M&B Engineering, Everest Industries and Zamil, in no particular order. The remainder is the fragmented unorganised industry. The unorganised industry accounts for 55-60% of the overall market, as high capital investment is not required for entering the market. However, the organised sector has an edge over the unorganised sector in terms of a reliable track record, maximised supply chain capabilities, quality engineering services and products due to which there has been a growing shift towards the organised sector. This shift is also expected to augment the revenue of players in the organised market.



Source: CRISIL MI&A

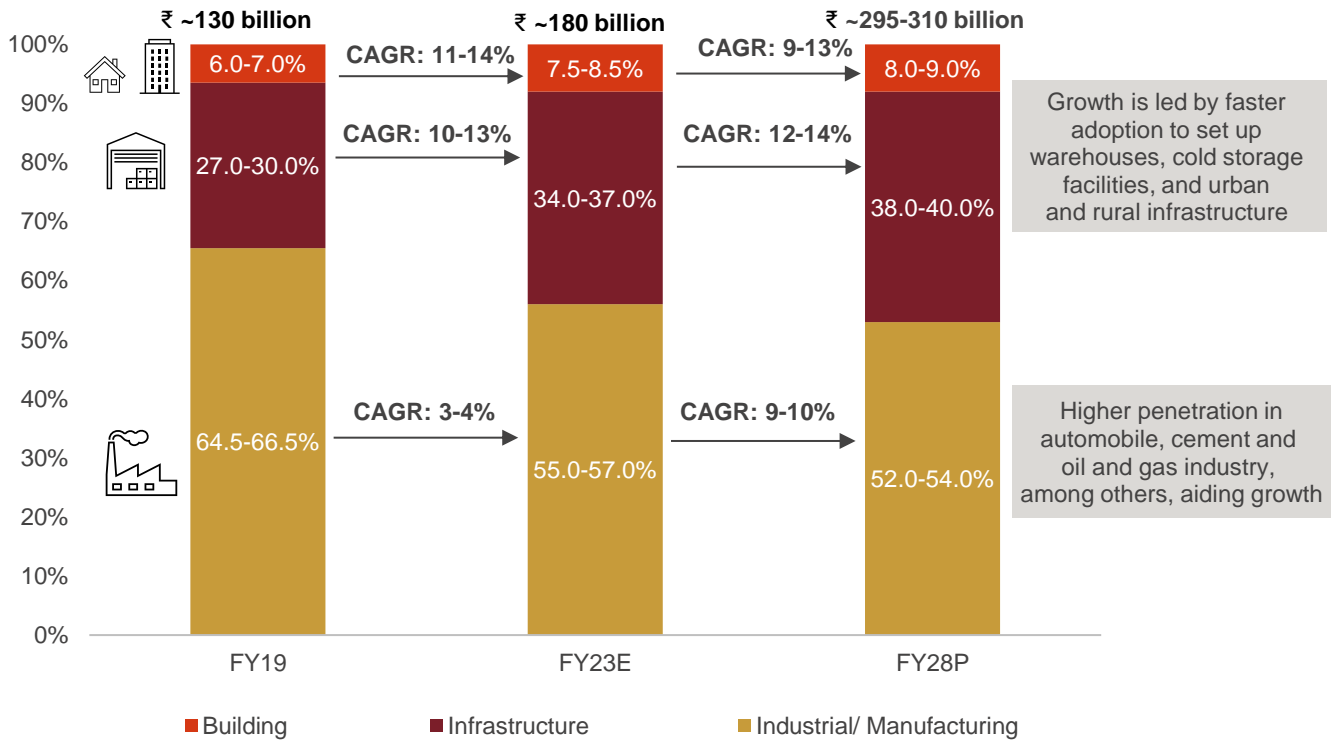
Share of infrastructure in the pre-engineered steel building market to increase

The pre-engineered steel building market in India can be divided into three broad end-use sectors: industrial, infrastructure, and building (residential, commercial and non-commercial). The industrial sector, which held the largest market share of 55-57% in Financial Year 2023, is expected to account for 52-54% of the market by Financial Year 2028. The industrial sector's share in the pre-engineered steel building market is led by higher penetration in the automobile, cement, and oil and gas markets, among others. It is expected to grow at a CAGR 9-10% between Financial Years 2023-2028 led by higher adoption of pre-engineered steel building structures based on cost advantage.

The infrastructure sector's share in the pre-engineered steel building market, which was 34-37% in Financial Year 2023, is expected to increase to 38-40% by Financial Years 2028. Pre-engineered steel buildings in the sector include warehouses, cold storage facilities, data centres, power plants, aircraft hangers and railway yards. The sector is expected to grow at a CAGR of 12-14% between Financial Years 2023-2028, led by increased adoption of these buildings in warehouses, cold storage facilities and data centres.

The building sector share in the pre-engineered steel building market, which was low at 7.5-8.5% in Financial Year 2023, is estimated to remain range bound at 8-9% in Financial Year 2028. The sector is expected to grow at a CAGR 9-13% over Financial Years 2023-2028, led by growing adoption of pre-engineered steel buildings.

Market segmentation by end-use sectors, Financial Year 2023-2028



Infrastructure sector includes warehouse
 Building includes residential, commercial and non-commercial sectors
 P: Projected; E: Estimated
 Source: CRISIL MI&A

Overview of construction costs of pre-engineered steel structures

As per primary research, the cost of a pre-engineered steel building is estimated to be at times 15-35% lower than conventional structures for sheds, warehouses, and depots or at times 20-25% more expensive than a traditionally constructed building depending on the building’s design and usage requirements. However, the higher upfront cost of pre-engineered steel buildings is offset by faster construction time, flexibility to expand these buildings, lower maintenance costs, better durability and higher salvage value, among others, which ultimately result in cost savings over the entire lifespan of the building. Further, pre-engineered steel buildings not only accelerate the overall construction process, but also save labour costs and enable quicker occupancy/commencement of operations, leading to potential revenue generation at an earlier stage.

Additionally, due to the flexibility to shift these structures to other locations, pre-engineered steel structures help to reduce potential capex costs, enabling organisations to adapt to changing operational needs without the financial burden of constructing new buildings.

Pre-engineered steel buildings more cost-effective for smaller structures

According to research published in the International Research Journal of Engineering and Technology (Comparative Study of Pre-Engineered Building And Conventional Steel Structures), cost-saving advantages of PEB increases as the span of the structure increases till an inflection point, after which cost savings diminish.

For instance, in the case of 10m clear span structures (span denotes the distance between the two intermediate support structures), PEB provides a commendable ~40% cost savings compared to conventional steel structures (CSB). PEB provides similar cost savings in case of clear span of 20m and 30m structures, where use of PEB helps in cost savings of approximately ~50% and ~42%, respectively. However, this trend experiences a significant inflection point at 50m span, where the cost-saving benefit of PEB diminishes considerably, offering only marginal savings of approximately 2.8% compared to CSB.

The accompanying table delineates the cost per square metre for both pre-engineered and conventional steel structures.

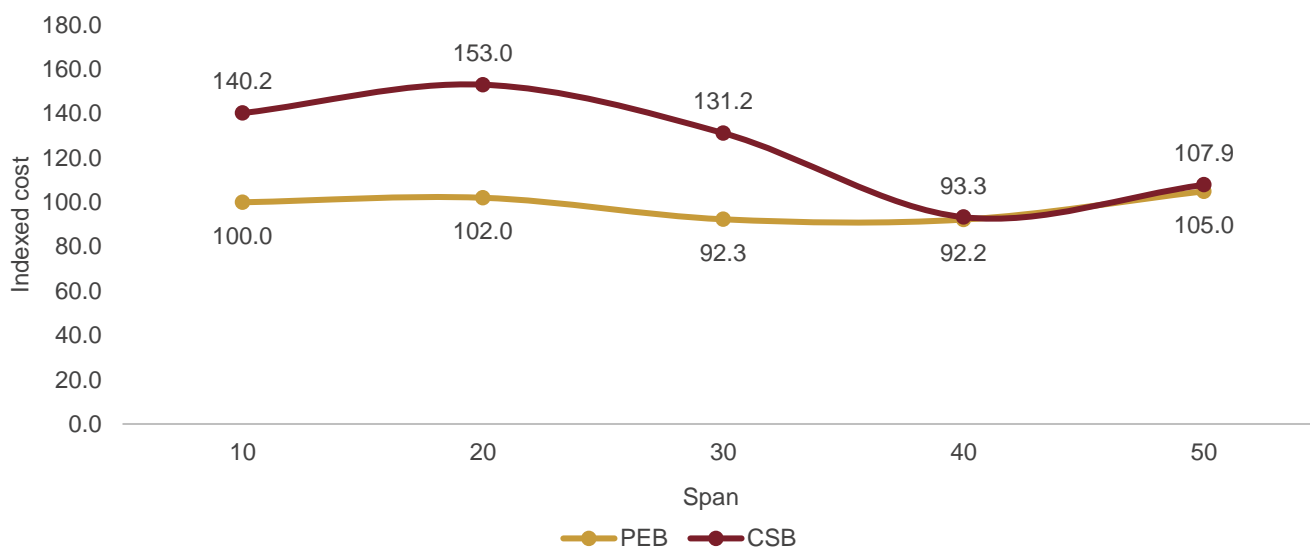
Cost of per square metre of pre-engineered building and conventional steel structure

Clear span (m)	PEB	CSB	Cost saving (%)
10	100.0	140.2	40.2%
20	102.0	153.0	50.0%
30	92.3	131.2	42.1%
40	92.2	93.3	1.2%
50	105.0	107.9	2.8%

Note: Cost is indexed with cost per square foot for PEB (Span 10) as base

Source: Comparative Study Of Pre-Engineered Building And Conventional Steel Structures, International Research Journal of Engineering and Technology, CRISIL MI&A

Cost of per square metre of pre-engineered building and conventional steel structure



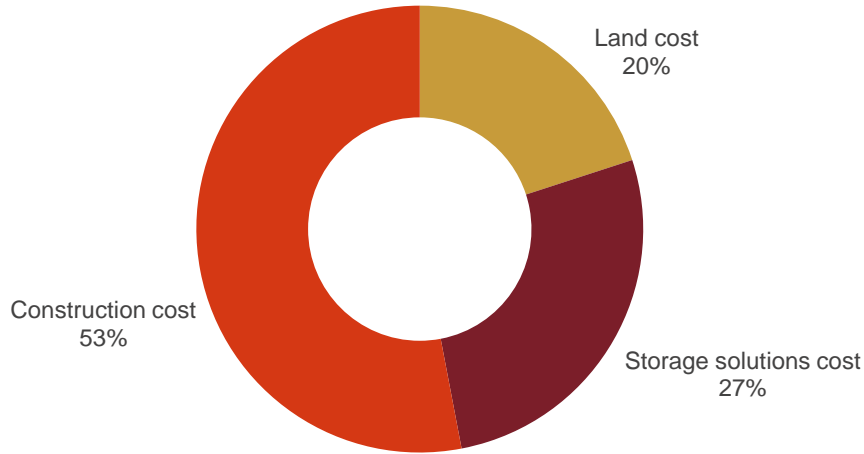
Note: Costs are indexed; with cost of 10 span PEB considered as base (100)

Source: Comparative Study Of Pre-Engineered Building And Conventional Steel Structures, International Research Journal of Engineering and Technology, CRISIL MI&A

Warehousing project cost

The warehousing project cost comprises land, construction, and storage solution costs. Land cost differs significantly from one location to another on account of the demand-supply scenario, infrastructure quality and connectivity via different modes of transport in a particular location. Construction cost is relatively similar across locations.

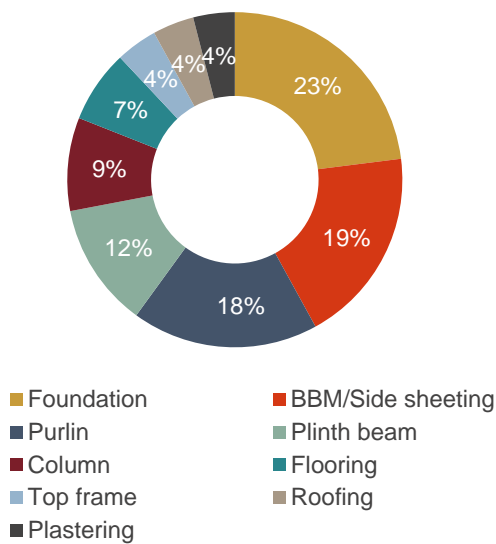
Warehouse cost breakup



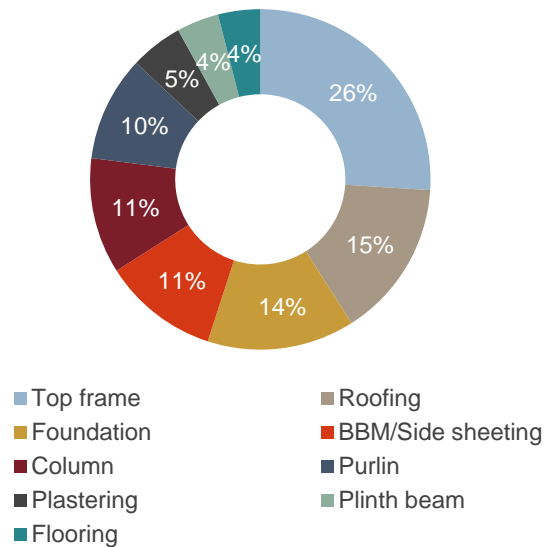
Source: Industry interaction, CRISIL MI&A

Within construction costs, the cost of setting up a warehouse depends largely on the type of warehouse, i.e., pre-engineered building (PEB) or reinforced cement concrete (RCC) structure. The primary difference is the construction of roof which includes roofing and top frame cost. Steel structures are used in PEB, which gives them higher clear height, while RCC cement as well as steel rods are used in conventional buildings. Considering the complete life cycle of a warehouse, a pre-engineered steel building is more economical than an RCC building largely on account of extensive usage of steel which requires less maintenance and has scrap value. Also, the longevity of steel roofs is high, and they are not prone to leakages, while RCC roofs require significant labour and time for execution.

PEB cost breakup



RCC cost breakup



Source: Industry interaction, CRISIL MI&A

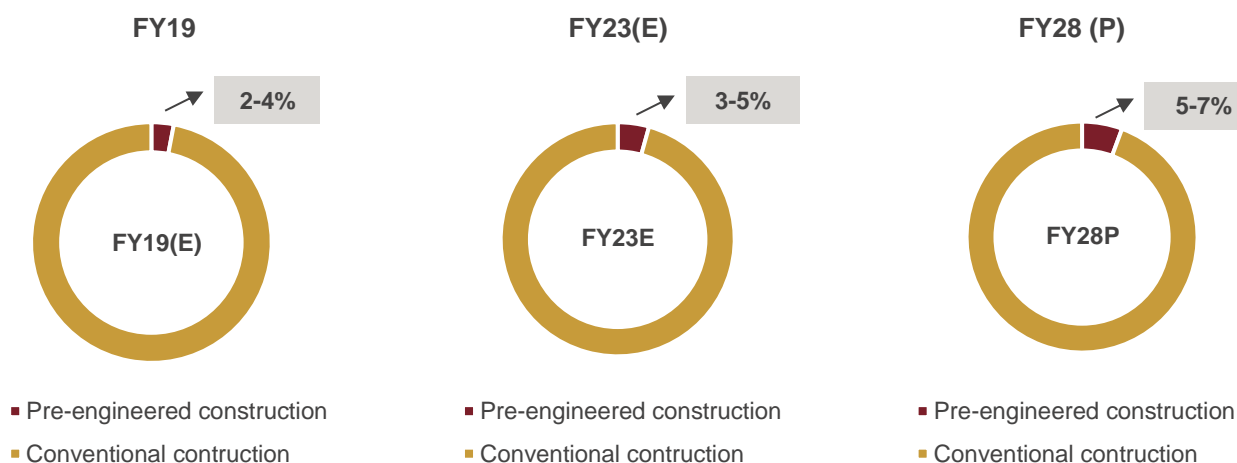
Key growth drivers

In this section, CRISIL has covered overall growth drivers of prefabricated industry followed by sector (i.e., infrastructure, industrial and building) specific growth drivers:

Low share of pre-engineered construction in overall construction indicates high growth potential

The pre-engineered construction industry in India, even though gaining acceptance, is still in its infancy. As of Financial Year 2023, penetration of pre-engineered construction in the overall construction sector is estimated to be around 3-5%, compared to 2-4% in Financial Year 2019. This low share of pre-engineered buildings in India combined with the increasing awareness of benefits of pre-engineered buildings over RCC, provides a substantial growth potential of pre-engineered buildings in India. This will help in increasing the share of pre-engineered construction in overall construction to 5-7% by Financial Year 2028.

Share of pre-engineered construction in overall construction



P: Projected; E: Estimated

Source: CRISIL MI&A

Low steel consumption in India

As of calendar year 2022, the country's annual per capita steel consumption stands at 81.1 kg per annum, compared to the world's average of 221.8 kg. Favourable government policies like National Steel Policy aims to increase per capita steel consumption of India and create a technologically advanced and globally competitive steel industry in India to promote self-sufficiency in steel production as well as economic growth. The National Steel Policy focuses on the following three main aspects:

- increase in consumption of steel through major sectors (segments) of infrastructure, automobiles and housing
- to achieve 300MT of steelmaking capacity by 2030
- to increase per capita steel consumption from around 60 Kgs in 2017 to the level of 160 Kgs by 2030

This is expected to aid pre-engineered building industry by positively impacting the quality of steel available, which is the dominant raw material required for pre-engineered buildings. Additionally, increasing penetration of pre-engineered buildings in infrastructure projects coupled with National Steel Policy's aim to boost steel consumption in infrastructure sector is expected to positively impact pre-engineered buildings.

Furthermore, the government has also implemented Domestically Manufactured Iron & Steel Products (DMI&SP) policy for promoting Made in India steel for Government procurement. Additionally, in 2021, government approved the Production Linked Incentive (PLI) Scheme for speciality steel. The duration of the scheme will be five years, from Financial Year 2024 (2023-24) to Financial Year 2028 (2027-28). With a budgetary outlay of ₹ 63.2 billion, the scheme is expected to bring in investment of approximately ₹ 400.0 billion and capacity addition of 25 MT for speciality steel. These steps will positively impact the availability and quality of steel as a raw material, supporting the PEB industry.

Shift from RCC to PEB due to growing awareness of pre-engineered structures

Growing awareness of PEB structures along with its benefit over traditional RCC construction have led to an increase in PEB projects. Use of PEB not only helps in expediting the project timelines but is also more sustainable due to less wastage. As a result, pre-engineered construction structures are garnering greater acceptance over traditional on-site construction practices of erecting entire structures on-site. This positioning is expected to serve as a catalyst for the growth of pre-engineered structures in the construction industry.

Increased industrial capex and planned capacity expansion to boost PEB sector

Overall industrial capex is expected to rise to nearly ₹ 5.7 trillion on average between Financial Years 2023-2027 compared with ₹ ₹ 3.7 trillion in the past five Financial Years 2018-2022 driven by sectors like oil and gas, cement and metals. Nearly half of this incremental capex will be driven by PLI and new-age sectors, which contributes to 15-17% of the total industrial capex.

Additionally, several sectors including automobiles and auto components and telecom and networking products are expected to drive higher investments in manufacturing, leading to expansion of the pre-engineered construction sector as companies invest in modern and efficient construction methods to meet the growing demand. Furthermore, within auto sector, schemes like FAME (Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles) I, FAME II, PM-eBus Sewa as well reduction of GST on electric vehicles from 12% to 5% is expected to increase the demand of EV vehicles in India. Additionally, increased focus on EV infrastructure, around 32000 EV charging stations are expected to be installed in India by Financial Year 2032, will also positively influence the sales of EV. As a result, share of EVs in the overall automobiles sales in India is likely to reach ~30% by 2030.

Sectors like metals, cement, oil and gas may continue to account for higher capex as larger companies gained market share during the recovery from pandemic and benefited from a sharp improvement in profitability because of the commodity upcycle, which improved their credit profiles.

Increased capex in these industries is anticipated to indirectly boost the demand for pre-engineered steel structures, especially in large and complex industrial construction projects. Pre-engineered steel construction may be preferred for large and complex industrial projects, depending on the size, structure, and construction span of the building due to its hi-speed, engineering efficiency, sustainability, and quality advantages.

Increasing popularity of green and sustainable buildings

Increasing popularity of green and sustainable buildings among large corporations as well as logistics players are also driving growth of pre-engineered steel buildings as streamlined processes minimise material waste significantly and make these buildings more sustainable than traditional buildings. Additionally, steel is a major component in pre-engineered steel building construction which is highly recyclable.

Moreover, use of pre-engineered steel building structures supports deconstruction and reconstruction, enabling the building components to be reused or recycled at the end of their life cycle. This approach significantly reduces the amount of construction-related waste sent to landfills, leading to a more sustainable construction industry. Overall,

the growing shift of logistics players towards green logistics is expected to support the pre-engineered steel building sector.

Infrastructure development and investments will support demand for PEB

India's focus on infrastructure is increasing owing to government policies such as metro rail projects and the National Infrastructure Pipeline, which are expected to be major growth drivers for the pre-engineered construction industry in India. Between Financial Years 2018-2022, investments in infrastructure in India increased at a CAGR of 7% to ₹ 11 trillion. Within this, central government accounted for 49% of the pie and states for 29%, with the private sector accounting for the balance.

CRISIL expects focus on infrastructure development to continue going forward. Effective central government capex (capex + grants in aid for creation of capital assets) is budgeted to rise to 4.5% of GDP in Financial Year 2025. This will cushion the economy through its relatively large multiplier effect, and at the same time is expected to crowd in private investment, especially in infrastructure linked sectors such as steel and cement. Additionally, infrastructure capex is expected to log a CAGR of 11% between Financial Years 2023-2027, rising 67% compared with the Financial Years 2018-2022, led again by government spend. This increased government spending on infrastructure along with growing awareness of pre-engineered buildings over traditional construction is expected to boost the demand of pre-engineered buildings in India.

Increased focus on renewable energy capacity addition

In renewable energy space, CRISIL expects strong capacity additions of 290-300 GW till Financial Year 2030. Within the total capacity additions, solar and wind will see the highest capacity additions of 180-190 GW and 55-60 GW respectively. Additionally, CRISIL expects share of non-fossil in generational mix to increase to 45% by Financial Years 2030, with solar accounting for 50% of incremental non fossil generation. These capacity additions will require substantial capex in development of needed infrastructure. CRISIL expects capex of ~ ₹ 30.3 trillion in renewable energy space between Financial Years 2024-2030.

Warehouse and cold storage expansion to be major contributors to PEB demand

Due to increasing e-commerce penetration and changing customer preferences, companies are also investing in warehousing and cold storage facilities. Additionally, due to rapid urbanisation and economic growth in developing countries, various companies seek faster and more cost-effective ways to construct their warehouses. Pre-engineered steel buildings are preferred for their cost-effectiveness and speedy construction compared with RCC buildings as they require less manpower and construction time, leading to cost savings. Increased adoption of pre-engineered steel building in warehouse construction will boost overall pre-engineered market growth. Overall, CRISIL projects construction investments in the warehousing (agricultural and industrial) and cold storage (single- and multi-commodity) sectors to rise to ₹ 400-420 billion over Financial Years 2024-2028P from ₹ 230 billion in Financial Years 2019-2023(E) on expectations of increased demand. Additionally, as of Financial Year 2023, penetration of PEB in warehousing is estimated at ~37-40%, which is expected to increase to ~57-60% by Financial Year 2028. This increased penetration of PEB in warehousing, along with increased demand of warehouses, will provide boost to the overall pre-engineered building industry.

Increasing demand of data centres in India

As per the draft Data Centre Policy 2020, data centres to be declared as an Essential Service under The Essential Services Maintenance Act, 1968 (as amended). Furthermore, Data Centre Economic Zones will also be set up for the long-term growth of data centres in India. CRISIL expects installed data centre IT capacity to increase from 780 MW in Financial Year 2023 to ~1,700 MW by Financial Year 2026, thereby registering a CAGR of ~30%. Additionally,

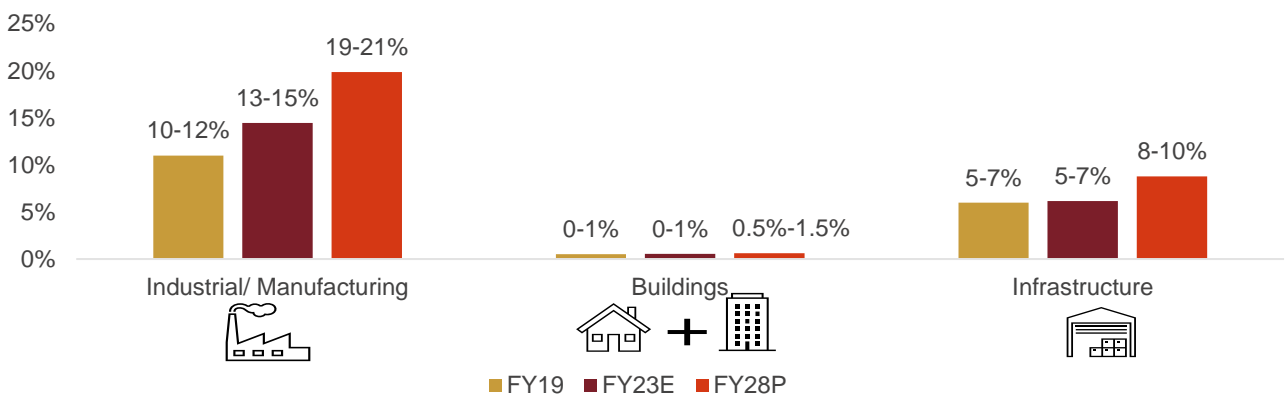
revenue is expected to grow ~2x to reach ~₹ 200 billion by Financial Year 2026 from ~ ₹ 84.5 billion in Financial Year 2023.

These policies combined with the RBI mandate advising all payment system providers to store entire data related to payment systems operated by them in a system only in India is expected to provide impetus to data centre in India, which in turn is expected to boost the demand of pre-engineered steel buildings.

Low penetration of PEB in building sector

In Financial Year 2023, share of PEB in building sector is estimated at 0-1%, which is sizeably lower than the penetration of PEB in industrial and infrastructure sector, where penetration stood at 13-15% and 5-7% respectively. However, growing awareness of benefits of PEB over traditional construction methods combined with low penetration of PEB in building sector provides room of further growth in this sector. Additionally, shortage of suitable healthcare infrastructure during Covid-19 has also increased the awareness of PEB in healthcare space which is also expected to positively impact demand of PEB in building sector.

Share of pre-engineered construction in various sectors



Infrastructure includes warehouse. Building includes residential, commercial and non-commercial verticals
P: Projected; E: Estimated
Source: CRISIL MI&A

Rise in government-led innovative construction projects

Policy and regulatory factors play a crucial role in shaping the demand, growth and adoption of prefabrication and pre-engineering in the construction sector. For example, government schemes such as PMAY have been instrumental in driving the demand and growth of the pre-fabrication and pre-engineering industry, especially in the housing sector. Light house projects under the ambit of Pradhan Mantri Awas Yojana- Urban (PMAY- U) use distinct technologies to offer affordable and quality housing in an accelerated timeframe.







The increased focus of both central and state governments on providing low-cost housing in India is expected to boost the demand of cold form structures in the future. Additionally, government initiatives such as the light house project are expected to encourage wider adoption of such technologies across India, thereby driving the demand of prefabricated and pre-engineered construction structures.

Summary of growth drivers

Sector	Growth drivers
Overall	<ul style="list-style-type: none"> Low per capita steel consumption in India along with government schemes like National Steel Policy, which aims to boost domestic steel production is expected to help the PEB industry which is highly dependent on few steel suppliers. Approval of specialty steel under Production Linked Incentive (PLI) Scheme with a budgetary outlay of ₹ 63.2 billion and capacity addition of 25 MT will positively impact the availability as well as quality of steel as a raw material.
Industrial/ Manufacturing	<ul style="list-style-type: none"> Overall industrial capex is expected to rise to nearly ₹ 5.7 trillion on average between Financial Year 2023-2027 compared with PLI and new-age sectors contributing to 15-17% of the total industrial capex. Construction investment in the industrial sector is projected at ₹ 4-5 trillion between Financial Years 2024-2028, rising 1.2 times over spends seen in Financial Years 2019-2023. The rise in investment is projected due to inclusion of the PLI scheme in the capex investments of the industrial sector. Construction investments in oil and gas sector are expected to increase to ₹ 2.5-2.6 trillion over Financial Years 2024-2028. These investments will be driven by refinery expansions at HPCL's Barmer, Vizag, IOCL Barauni, Numaligarh, capacity expansion plans announced by RIL and increasing investments towards retail outlets. Increasing popularity of green and sustainable buildings, along with the benefits of faster construction time and reduced material wastage is expected to increase adoption of PEB. Growing penetration of EV vehicles in India led by favourable government initiatives like FAME, reduction of GST will require robust EV infrastructure.
Infrastructure	<ul style="list-style-type: none"> Infrastructure capex is expected to log a CAGR of 11% between Financial Years 2023-2027, rising 67% compared with the Financial Years 2018-2022. This is expected to boost the demand of pre-engineered buildings in India. Growing demand from warehouses and cold storage due to increase in the penetration of ecommerce in India. Additionally, post implementation of GST as well as shift to hub and spoke models, large PLI players have started investing in PEB warehouses. Increase in the demand of data centres in India along with RBI mandate to store payment data locally in India, will boost the demand of pre-engineered buildings in India owing to increasing penetration of PEBs in data centres. Growing focus on renewable energy capacity additions will require substantial Capex in this field. CRISIL, expects capex spends of ~ ₹ 30.3 trillion in renewable energy space between Financial Years 2024-2030.
Building	<ul style="list-style-type: none"> Low share of pre-engineered construction in building (residential + commercial + non-commercial) construction (~0-1% as of Financial Year 2023 (E)) along with increasing awareness of PEB in India will positively impact the demand of PEB. Investments in building sector is expected to rise to ₹ 16-16.6 trillion between Financial Years 2024-2028 from an investment of ₹ 12-12.5 trillion between Financial Years 2019-2023, growing ~1.3 times. Construction spends of ₹ 340-360 billion over the Financial Years 2024-2028 are expected in healthcare space. Additionally, shortage of suitable healthcare infrastructure during Covid-19 has increased the awareness of PEB in healthcare space with MoHFW consulting experts from notable institutions regarding suitable options available for pre-engineered structures (panels) in case of healthcare infrastructure. Rise in government-led innovative construction projects like Light house project under the ambit of PMAY-U will provide more awareness of non-conventional construction technologies like PEB in India.

Source: CRISIL MI&A

Key selection criteria for pre-engineered steel building suppliers

Brand	Design capability	Prior experience	Pricing	Manufacturing capacity	Project Management Expertise
					

Source: CRISIL MI&A

Brand

Having a reputed brand name is a key success factor for pre-engineered steel building suppliers as companies prefer brands for ensuring reliability and quality of raw materials. Furthermore, established brands are also known to adhere to industry standards and codes, ensuring that product quality remains consistent.

Additionally, choosing a reputed brand instils confidence in the project's key stakeholders and reduces the risks associated with dealing with lesser-known suppliers in the unorganised sector. Furthermore, established players invest in research and development and modern technology, resulting in better product quality due to more efficient processes. This, in turn, guarantees that clients receive a high level of quality in their pre-engineered steel projects. Therefore, opting for a well-known brand name is not just a preference but a practical necessity to ensure the success and quality of pre-engineered steel projects.

Design capability

Companies prefer pre-engineered steel building suppliers who have reputed design/architecture teams and established design capabilities as these factors directly influence the functionality and the aesthetics of the building. Pre-engineered steel building suppliers with expertise in architectural and structural design can optimise the building's layout, ensuring efficient space utilisation and seamless integration of various components.

Additionally, the importance of an experienced design team becomes more pronounced in pre-engineered steel building projects compared with traditional construction methods such as RCC as these projects demand greater coordination among various stakeholders and precise planning and execution from the start to ensure seamless integration of pre-engineered components. Hence, the emphasis on design capability remains a crucial factor in the decision-making process for companies engaged in pre-engineered steel projects.

Prior experience

Even though adoption of pre-engineered steel buildings is increasing due to inherent benefits such as cost savings and a lower environmental impact, the market is still in a nascent stage in India. Hence, companies prefer pre-engineered steel building suppliers with a proven track record to ensure their projects are completed on time. Furthermore, having prior experience also helps in gaining confidence of key project stakeholders as more experience translates into better knowledge of building codes, industry regulations and terrain requirements. Additionally, experienced suppliers often have well-established networks with other stakeholders such as erectors to ensure smooth coordination during the project lifecycle.

Pricing

The fragmented structure of the pre-engineered steel building industry grants customers significant bargaining power. Hence, competitive pricing is imperative for success. However, pre-engineered steel building suppliers must ensure a balance between affordability and quality, along with a transparent cost structure.

Manufacturing capacity






A robust manufacturing capability ensures timely production and delivery of building components, as the construction industry is frequently dogged by missed project deadlines and cost overruns.



Furthermore, it also enables pre-engineered steel building suppliers to streamline their processes, optimise their operations and handle multiple projects simultaneously. Additionally, the ability to handle larger volumes of pre-engineered steel buildings provides them more bargaining power with suppliers of raw materials, thereby optimising costs.

Project Management Expertise

Project management expertise is a pivotal factor in the evaluation of pre-engineered steel building suppliers as construction industry is usually riddled by long projects. Hence, project management expertise becomes extremely important to ensure timely completion and avoid costs overrun as it helps in the adherence to timelines, budget constraints, and high-quality standards.

Critical factors in the pre-engineered steel building industry

Success factor	Description
 Quality material	<ul style="list-style-type: none"> The use of quality raw materials ensures structural integrity, compliance with relevant codes and standards, proper safety of pre-engineered steel buildings and a higher life span of buildings. Furthermore, it positively influences reputation and helps gain the confidence of potential clients.
 Research and development	<ul style="list-style-type: none"> Investing in research and development enables pre-engineered steel building suppliers to provide better quality products to their clients and gain competitive advantage. Furthermore, suppliers could ensure pre-engineered steel structures are customised according to the terrain, enabling them to expand their product portfolio and gain potential clientele.
 Design expertise	<ul style="list-style-type: none"> Possessing design expertise is a must as the nascent stage of the industry further underscores the significance of specialised design expertise, which plays a pivotal role in ensuring both functionality and aesthetics of pre-engineered steel buildings.
 Standardisation	<ul style="list-style-type: none"> Establishing standardised processes and specifications is a critical factor for the industry as it ensures consistency and quality across pre-engineered steel building structures. Having standardised products also decreases the chances of structural failures and collapse of pre-engineered steel building structures during erection. Overall, standardisation streamlines the manufacturing process, reduces the chances of mishaps during the erection process, thereby enabling pre-engineered steel building suppliers to deliver reliable, cost-effective and high-quality solutions consistently.
 Technology	<ul style="list-style-type: none"> Pre-engineered steel building suppliers can leverage technology through use of proper design software and new construction technologies such as 3 D printing to optimise their design process as well as accelerate their manufacturing process. Utilising the latest technological innovations related to construction not only helps pre-engineered steel building players in saving cost and time, but also helps them gain competitive advantage.

Success factor	Description
 Experience of handling complex projects	<ul style="list-style-type: none"> Prior experience of handling complex projects is paramount for success in the pre-engineered steel building industry as it provides invaluable insights about streamlining operations and optimizing resource allocation, thereby facilitating smoother project execution. Additionally, having prior experience of handling complex projects for high ticket clients also provides credibility to the pre-engineered steel building players.
 Project management and global safety practices	<ul style="list-style-type: none"> Efficient project management, along with compliance to safety measures, is a prerequisite for success of the pre-engineered steel building industry. While effective project management ensures efficient planning, budget control, and quality assurance, adherence to safety measures includes strict compliance to codes, training programmes for workers, provision of safety equipment, regular audit of work practices at sites as well as promoting awareness on security norms among all key stakeholders. Hence, the synergy between efficient project management and stringent safety compliance is a critical factor for the pre-engineered steel building industry.

Source: CRISIL MI&A

Key challenges

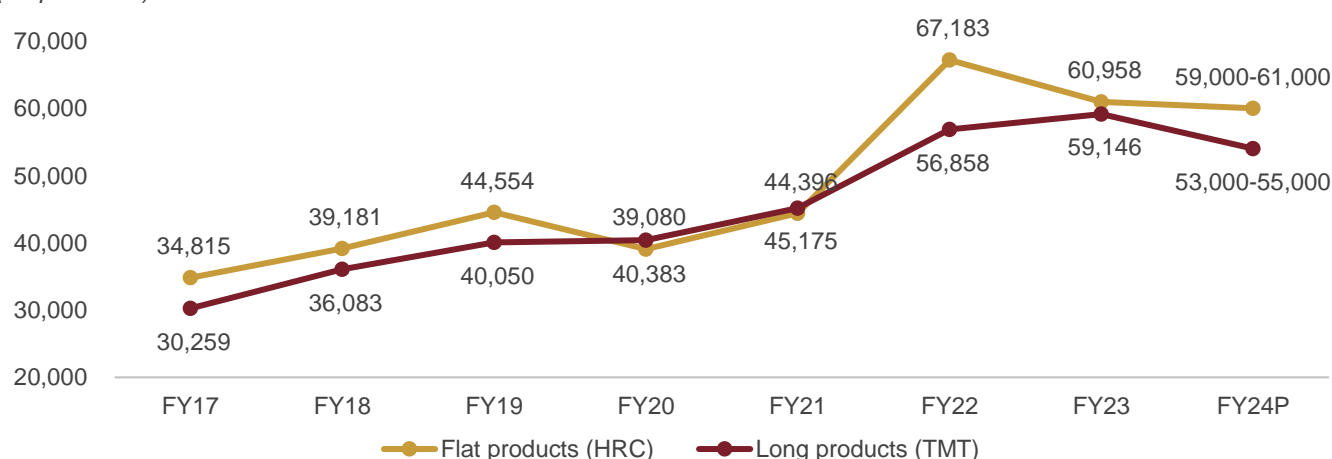
Vulnerability to fluctuations in raw material prices

The prices of raw materials, mainly steel, could affect project costs, profitability and project timelines. According to industry sources, the pre-engineered steel building industry relies heavily on a limited number of high-quality steel suppliers including Tata Steel, Nippon Steel, ArcelorMittal Nippon Steel India, Steel Authority of India Limited, Jindal Steel & Power Ltd. and Jindal Steel for raw materials such as hot-rolled (HR) coils, high-grade S345 MP, etc. The limited base gives these suppliers significant negotiating power and the dependence on a small pool of suppliers makes the industry susceptible to supply chain issues.

Due to high dependence on steel, the ability of players to tackle challenges related to input costs and working capital become crucial for the industry's success. Additionally, steel prices are also susceptible to global geopolitical events such as the Russia-Ukraine war, which further emphasises the need for strategic resource planning.

Domestic steel price outlook

(Rs per tonne)



Note: P: Projected; domestic prices are pan-India average selling prices (excluding duties); for long products, prices are indicative of primary steel manufacturers

Source: CRISIL MI&A

Domestic prices averaged ₹ 59,146 per tonne for long steel and ₹ 60,958 per tonne for flat steel in Financial Year 2023. Moving ahead, with cooling of raw material prices, the average prices are expected to be ₹ 53,000-55,000 per tonne for long steel and ₹ 59,000-61,000 per tonne for flat steel by Financial Year 2024.

Transportation challenges

As pre-engineered structures are manufactured offsite, transportation of these structures to the construction site involves logistics expenses, which are a function of the distance and the complexity of the transportation process and can significantly impact the overall project cost. Furthermore, these components are susceptible to damage during transportation and handling and may require rework or replacement, which, in turn, could lead to additional costs and project delays.

Additional safeguards to withstand natural disasters

Construction projects, including pre-engineered structures, must adhere to proper building standards to ensure they can withstand earthquakes and other seismic events. However, the intensity and frequency of seismic events such as earthquakes depends on the geological setting and may vary based on the location. Hence, pre-engineered structures should be designed after due consideration and study of the seismic classification and history of the construction site. However, this can complicate their design and manufacturing process and may involve incorporating additional engineering measures and special materials to enhance the structural durability of such prefabricated structures.

Furthermore, even in the event of a fire, certain components of pre-engineered buildings, such as flange braces, sag rods, and cross bracing rods, are susceptible to damage. Flange braces and sag rods are particularly prone to snapping, while cross bracing rods may lose their tensile strength, thereby compromising the overall stability of the building. The use of fire-retardant intumescent paint, while highly effective, is often limited due to its prohibitive cost. Consequently, its application is reserved for specialised cases, highlighting the need for alternative methods and materials to safeguard pre-engineered structures against fire-related risks.

Medium capital outlay and fragmented industry

The pre-engineering industry does not require significant upfront capital investments in terms of manufacturing facilities and suitable technology, leading to fragmentation with multiple manufacturers, suppliers and contractors operating independently. Hence, intense competition is impacting margins of players.

Moreover, the players in the unorganised industry may compromise on quality standards to ensure price competitiveness, which may weaken the structural security of the building. For instance, a metal building collapsed in 2014 near Nagpur due to structural instability and the intervention of multiple stakeholders: there was a different design engineer, supplier of plates, fabricator of primary frame, supplier of cold formed sections and sheeting. Multiple erectors tried to erect the pre-engineered steel structure, but it eventually collapsed. Additionally, according to a study published in International Research Journal of Engineering and Technology (IRJET), most of the pre-engineered steel structures collapse due to neglect of cross bracing and most of the structures, categorised as impending and deemed failures, are often executed by unorganised fabricators.

Design limitations

Standardisation of pre-engineered components often results in modular sizes and shapes, limiting the freedom to create highly unique or unconventional designs that require non-standard dimensions. Structural constraints must be carefully considered in manufacturing pre-engineered structures to ensure the stability and safety of the structure. This imposes limitations on architects/designers in terms of design that can be structurally feasible. Furthermore, the

seamless integration of pre-engineered structures with traditional on-site construction can introduce additional challenges, which can exacerbate in difficult terrains.

Limited knowledge and lack of skilled manpower

The pre-engineered construction industry in India is in its infancy, because of which there is a shortage of skilled personnel with adequate technical knowledge of these structures. Designers play a crucial role in creating designs for the successful implementation and integration of pre-engineered steel buildings; however, not all designers may possess adequate knowledge and experience in modular construction techniques. Despite the growing awareness about pre-engineered structures, traditional construction methods often dominate architectural education and practice. This results in a knowledge gap in understanding the specific requirements of pre-engineering.

Policy and Regulatory framework

There is no existing regulatory or policy framework particularly for pre-engineered steel buildings in India. However, there are various codes, which are discussed below, for the use of steel in construction. The pre-engineered construction industry in India adheres to guidelines and quality standards set by authorities such as the International Organization for Standardization (ISO), Bureau of Indian Standards (BIS), Building Materials and Technology Promotion Council (BMTPC), and Ministry of Housing and Urban Affairs (MoHUA).

The National Building Code (NBC) is designed by BIS, which is responsible for setting guidelines for construction activities, including the use of prefabricated/ pre-engineered components. Civil Engineering Division (CED) Committee number 2 to CED Committee number 59 of BIS are related to construction. Furthermore, CEDs like CED 32, CED 51 and CED 46 are related to prefabricated/ pre-engineered construction. Other standards include IS-800 (Indian Standard- General Construction in Steel - Code of practice), IS-875-PART- I to V (Loads and Combinations) and IS-1893 Criteria for Earthquake Resistant Design of Structure (R-5). Model Building Bye-Laws, 2016, published by Town and Country Planning Organisation, MoHUA, plays a vital role in formulating policies and regulations for the construction industry, offering guidance and support for adopting new technologies. For instance, Sections 6.1.1 and 6.4 of the provisions for structural safety provide specific details for pre-engineered systems. Moreover, depending on the nature of the project, specialised agencies may be involved in regulating specific aspects of pre-engineered construction for infrastructure projects. For instance, during the pandemic, the Ministry of Health and Family Welfare consulted experts from institutions such as IITs of Delhi, Roorkee and Madras, as well as MIT Pune, regarding suitable options available for pre-engineered structures (panels) in case of healthcare infrastructure.

ISO 9001:2015, ISO 14001:2015, OHSAS 18001:2017, ISO 14001:2004 and OHSAS 18001:2007 (South-East Asia) are few of the quality standards and guidelines adhered to by the PEB industry in India. These standards cover the design, fabrication and supply of pre-engineered steel buildings and structural steel works. Other international standards include the Metal Building Manufacturers Association (MBMA), American Institute of Steel Construction (AISC) and American Welding Society (AWS).

Few applicable codes and standards as per Indian standards for PEBs/ steel construction/ prefabricated structures






Code	Description
IS:875-I	Code of practice for design dead loads for buildings and structures
IS:875-II	Code of practice for design imposed loads for buildings and structures
IS:875-III	Code of practice for design loads (other than earthquake) for buildings and structures
IS:1893	Criteria for earthquake resistant design of structures
IS:4326	Code of practice for earthquake resistant design and construction of buildings
IS: 800	Code of practice for use of structural steel in general building construction

Code	Description
IS: 801	Code of practice for use of cold-formed light gauge steel structure members
IS:811	Specification for cold formed light gauge structural steel sections
IS: 4923-III	Hollow steel sections for structural use - Specification
IS:8629	Code of practice for protection of iron and steel structures from atmospheric corrosion
IS: 4000	High strength bolts in steel structures
IS: 14142	Code of practice for design and construction of floors and roofs with prefabricated brick panel
IS: 11447	Code of practice for construction with large panel prefabricates
IS: 15917	Building Design and Erection Using Mixed / Composite Construction - Code of Practice
IS: 15916	Building Design and Erection Using Prefabricated Concrete
IS :14213	Code of practice for construction of walls using precast concrete stone masonry blocks

Note: The above list is indicative and not exhaustive representation of quality standards for PEBs in India

Source: CRISIL MI&A

Porter's five forces analysis

Porter's five forces	Description
 Threat of new entrants: High	<ul style="list-style-type: none"> The threat of new entrants in the pre-engineered construction industry is high due to its moderate capital-intensive nature, as it does not require substantial investments in terms of manufacturing facilities/factories, specialised equipment, and skilled labour. However, high-value clients prefer credible manufacturers of pre-engineered structures with a proven history of successful experience, which further makes it difficult for new entrants to capture the market. However, lack of stringent regulatory policies and a high-capacity utilisation ratio make the industry more attractive to new entrants.
 Power of customers: High	<ul style="list-style-type: none"> The industry's fragmented nature, coupled with lack of undifferentiated products and services, provides high bargaining power to customers. In case of large projects, the presence of a limited number of big-ticket suppliers, such as contractors and construction developers, reduces the bargaining power of buyers as the vendor choice becomes limited. Tier 1 service providers compete on quality and pricing. Overall, the highly fragmented nature of the pre-engineered steel structure industry, coupled with inability to provide product differentiation, provides high negotiation power to customers, thereby negatively impacting revenue of players in the pre-engineered steel building market.
 Power of suppliers: High	<ul style="list-style-type: none"> Supplier power is high as there are few large and credible suppliers of raw materials and components, allowing them to influence the industry. SAIL, Tata Steel and JSW hold 40-45% of the steel production market. Large pre-engineering companies that have established long-term relationships with these suppliers have an advantage in negotiations, leading to a more balanced power dynamic.
 Competitive rivalry: High	<ul style="list-style-type: none"> The industry exhibits high competitiveness, driven by fragmentation (52-57% share held by unorganised players) and a limited number of big-ticket clients. Furthermore, due to the increasing demand for standardised pre-engineered structures, the scope of product differentiation becomes limited, which puts additional price pressure.
 Threat of substitutes: Low	<ul style="list-style-type: none"> The threat of substitutes is low. One of its major alternatives is traditional on-site built construction. However, the advantages of pre-fabrication, such as cost savings, faster construction times and more eco-friendly nature, are positively impacting its demand. Traditional construction still holds the major share in overall construction.

Source: CRISIL MI&A

Assessment of competitive landscape of pre-engineered buildings industry in India

In this section, CRISIL has analysed some key players operating in the integrated pre-engineered buildings industry in India. Integrated PEB players are considered to be providing complete end-to-end PEB solutions, including, design, engineering, fabrication of the structure, and onsite delivery and installation. Major steel players such as Steel Authority of India Limited (SAIL), Rashtriya Ispat Nigam (RINL), Tata Steel Limited Group (TSL), ArcelorMittal and Nippon Steel (AM/NS), Jindal South West Group (JSWL) & Jindal Steel & Power Limited (JSPL), are not considered in this section. Major business of these steel players come from manufacturing of steel and steel products including structural steel products. These steel players are suppliers to the integrated PEB players.

Note: The list of competitive landscape peers considered in this section is not exhaustive but an indicative list. Only players which provide integrated pre-engineered steel building offerings within a comparable revenue range are considered in this section.

Data has been obtained from publicly available sources, including annual reports available in the public domain/ filed with the RoC, investor presentations of listed players, regulatory filings, rating rationales, and/or company websites and social media pages. Financials in the competitive section have been re-classified by CRISIL, based on annual reports available in the public domain/ filed with the RoC and financial filings by the relevant 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.

Overview of key players

Company name	Year of incorporation	Business overview ¹
EPack Polymers Pvt Ltd	1999	EPack Polymers Pvt Ltd is a group company of EPack and has over 24 years of experience. The company offers prefabricated and pre-engineered solutions across multiple sectors including airports, hospitals, and schools.
Everest Industries Ltd	1934	Everest Industries is a pre-engineered steel building manufacturer in India and has approximately 90 years of experience in supporting industrial projects, warehousing infrastructure, multi-storey process buildings, composite structures and pipe racks, among others.
Interarch Building Products Ltd	1983	Interarch Building Products, which has 40+ years of experience in pre-engineered steel construction, has integrated facilities for design, manufacture, logistics, supply, and project execution. It has worked with industry leaders in project development and construction, providing support to critical industrial, commercial and infrastructure projects.
Kirby Building Systems & Structures India Pvt Ltd	2005 ²	Kirby Building Systems & Structures India is part of Kirby Building Systems, which established its presence in PEB technology in the Middle East in 1976. Kirby Building Systems & Structures India executes projects in multiple industries, including healthcare, industrial construction, education, and infrastructure.

Company name	Year of incorporation	Business overview ¹
M & B Engineering Ltd	1981	M & B Engineering Ltd is a parent company of Phenix Construction Technologies and Proflex Roofing Solutions, and a part of M&B Group. The group provides customer-specific turnkey solutions for engineering and infrastructure projects. The company deals in pre-engineered buildings, structure steels, steel roofing and components thereof.
Pennar Industries Ltd	1975	Pennar Industries has experience of over 48 years in offering multiple products/ services including pre-engineered buildings and structural steel buildings across sectors, like commercial and high rises, industrial and distribution facilities, health and education buildings and stadium & leisure centres.
Phenix Building Solutions Pvt Ltd	2007	Phenix Building Solutions is a part of M&B Group, which was established in 1951 and has experience of providing prefabricated structures across multiple industries, including manufacturing, automobiles, warehousing, power, railways and commercial buildings.
Smith Structures (India) Pvt Ltd	2011	Smith Structures (India) has been operating for over 10 years and offers multiple products and services related to pre-engineered steel buildings and structures across sectors like automobile, food and agro, chemicals, pharmaceuticals, packaging, textiles, tyre, warehousing, steel, electrical and electronics, cold supply chain, etc.
Zamil Steel Buildings India Pvt Ltd	2003 ³	Zamil Steel Buildings India is the subsidiary of Zamil Steel Pre-Engineered Buildings Co. Ltd, which was established in 1977 in Dammam, Saudi Arabia. Zamil Steel Pre-Engineered Buildings is a key global structural steel/pre-engineered steel building supplier, having supplied over 90,000 steel structures in 90 countries.

¹ Details about clients and sector presence of companies are taken from their respective websites and are not exhaustive.

² Kirby Building Systems & Structures India is part of Kirby Building Systems, which established its presence in PEB technology in the Middle East in 1976

³The establishment of Zamil Steel in India was announced in 2006, and it started its commercial operations in 2008. It is the subsidiary of Zamil Steel Pre-Engineered Buildings Co. Ltd, which was established in 1977 in Dammam, Saudi Arabia.

Note: This list is indicative only and non-exhaustive

Source: Company websites, annual reports available in the public domain/ filed with the RoC, CRISIL MI&A

A few global PEB players

Company	Type	Presence*	Overview
ATAD Steel Structure Corp.	Private	Southeast Asia	Established in 2004, ATAD has implemented more than 3,500 steel buildings across 40 countries and territories with a network of 11 companies and representative offices in Myanmar, Indonesia, Thailand, the Philippines, Cambodia, Sri Lanka, Bangladesh and Uganda
BlueScope Steel	Public	North America, Australia, Asia, New Zealand and the Pacific Islands	Established in 2002, BlueScope Steel Ltd has global presence and provides customized and fully engineered steel building solutions. In 2004, it acquired Butler Manufacturing Company and in 2008, it acquired Varco Pruden Buildings.

Company	Type	Presence*	Overview
Cornerstone Building Brands Inc. (Shelter Solutions)	Public	Principally in the U.S. with limited operations in Canada	Under its Shelter Solutions reportable vertical, the company designs, engineers, manufactures and distributes an extensive line of metal products for the low-rise commercial construction market under multiple brand names and through a nationwide network of manufacturing plants and distribution centres. Low-rise commercial construction is defined as building applications of up to five stories
Kirby International	Private	Middle East, Southeast Asia, Indian Subcontinent, Africa, Europe	Established in 1976, Kirby is present across 70 countries and has an annual production capacity of 400,000 MT. The company is a 100% subsidiary of Kuwait-based multinational and multi-billion-dollar business conglomerate Alghanim Industries
Nucor Buildings Group	Parent company Nucor Corp.** is a public entity	North America	Nucor produces metal buildings and components throughout the US under the following brands: Nucor Building Systems, American Buildings Company, Kirby Building Systems and CBC Steel Buildings. Nucor Buildings Group currently has an annual capacity of approximately 360,000 ton. The group acquired the insulated metal panels, or IMP, business of Cornerstone Building Brands, Inc in August 2021
Rigid Global Building	Private	United States	Rigid Global Buildings has experience of more than 30 years in production of pre-engineered metal buildings. Currently, the company offerings include metal buildings for industries' including commercial, government, schools, self-storage, etc.
Whirlwind	Private	United States	Whirlwind Manufacturing Inc was founded in Houston, Texas, in 1955 by the Sturdivant family. By 1961, Whirlwind had expanded into the manufacture and sale of metal building components, including panels, secondary structural framing, and trim. As of Jan 2024, Whirlwind Steel has a combined total of almost 500,000 -square feet of manufacturing capacity turning out over 100,000,000 pounds of steel products every year.
Zamil Steel	Private	GCC, Middle East, Asia, Africa and Far East	Established in 1977 in Dammam, Saudi Arabia, Zamil Steel Pre-Engineered Buildings specialises in the design, manufacture, and supply of pre-engineered steel buildings. The company has commissioned more pre-engineered buildings factories in Egypt, India, the UAE, and Vietnam, expanding total PEB production capacity to 360,000 MT per annum. Since 1977, the company claims to have supplied more than 90,000 buildings to more than 95 countries worldwide, from Panama and Mexico in the West to the Philippines, China, Japan, and South Korea in the East

Note: * list is only indicative and not exhaustive

Source: CRISIL MI&A

Manufacturing plants and PEB related capacity

Company name	International presence	Manufacturing plants*	Installed capacity (MT/ annum)	
Kirby Building Systems & Structures India Pvt Ltd	Yes	3 ¹	300,000 ²	
Interarch Building Products Ltd	Yes	4	141,000 ³	
Zamil Steel Buildings India Pvt Ltd	Yes	1 ⁴	100,000 ⁵	
Pennar Industries Ltd	Yes	1 ⁶	90,000 ⁷	
Everest Industries Ltd	Yes	2 ⁸	72,000 ⁹	
M & B Group and related parties	Phenix Building Solutions Pvt Ltd	Yes	1	72,000 ¹⁰
	M & B Engineering Ltd@@	Yes	N.A.	N.A.
Smith Structures (India) Pvt Ltd	Yes	1 ¹¹	50,000 ¹¹	
EPack Polymers Private Limited	No**	3 ¹²	N.A.	

N.A.: Not available

@ M & B Engineering Ltd has international subsidiary Phenix Construction Technologies Inc. (US); manufacturing plants and installed capacity of M & B Engineering Ltd are not available

* Related to PEB/structural steel

**In Financial Year 2022, total domestic turnover formed 100% of revenue from operations for EPack Polymers limited

¹Kirby Building Systems has seven manufacturing plants across the globe as per the company's website accessed on 11th March 2024

²Kirby Building Systems network produces ~565,000 MT across all plants globally as per its website accessed on 11th March 2024

³Interarch has a manufacturing capacity of 141,000 MT per annum as of September 2023 across PEB steel structures, metal ceilings and corrugated roofing, light gauge framing system and site roll forming roofing.

⁴Zamil Steel operates 12 manufacturing facilities around the world as per its website accessed on 11th March 2024

⁵Global fabricated steel manufacturing capacity of Zamil Steel is more than 500,000 MT as per its website accessed on 11th March 2024. Figure in the table represents capacity of the Pune manufacturing plant of the company.

⁶ Pennar Industries has 13 manufacturing plants as of Q3, Financial Year 2024 globally.

⁷Pennar Industries has a manufacturing facility near Hyderabad with a production capacity of 90,000 MT per annum for steel buildings as per its website accessed on 11th March 2024.

⁸According to rating rationale dated April 2023, Everest group has total of 8 manufacturing plants. According to Everest Industries website, accessed on 11th March 2024, the group has 7 manufacturing plants. Everest has two manufacturing facilities related to PEB in Gujarat and Uttarakhand as per its website accessed on 11th March 2024.

⁹According to rating rationale dated February 2024, Everest Industries Ltd steel building capacity stood at 72,000 MT per annum as on December 31st, 2023.

¹⁰Phenix has a production facility situated in Gujarat, India with the production capacity of 72,000 MT per annum as per company's website accessed on 11th March 2024. However, the company's fabrication partners are established across the U.S. The total annual capacity is 80,000 MT.

¹¹Numbers in the table as per rating rationale dated Oct 2023.

According to company's website accessed on 11th March 2024. Smith Structures (India) has a facility at Gandhidham and Kheda, Gujarat, with an annual production capacity of 70,000 MT.

¹² Number in the above table represents manufacturing plants related to pre-engineered/prefabricated structures and insulated sandwich panels of EPack group. In total, EPack group has 11 plants as per its website accessed on 11th March 2024.

Note: M & B Engineering Ltd and Phenix Building Solutions Pvt Ltd have same promoters

Source: Company filings, annual reports available in the public domain/ filed with the RoC, company websites, CRISIL MI&A

Key services and offerings

Company name		PEB and accessories ¹	Structural engineering design services/advisory services - PEB	Cold storage solutions/ warehousing PEB solutions
Kirby Building Systems & Structures India Pvt Ltd		✓	✓	✓
Interarch Building Products Ltd		✓	✓	✓
Zamil Steel Buildings India Pvt Ltd		✓	✓	✓
Pennar Industries Ltd		✓	✓	✓
Everest Industries Ltd		✓	✓	✓
M & B Group and related parties	M & B Engineering Ltd	✓	✓	✓
	Phenix Building Solutions Pvt Ltd			
Smith Structures (India) Pvt Ltd		✓	✓	✓
EPack Polymers Private Limited		✓	✓	✓

Players have been arranged according in the descending order of their installed capacity mentioned in the table Manufacturing plants and PEB related capacity

¹PEB products include steel frames, roofing and wall solutions

Note: The above list is indicative and not exhaustive representation of the offerings of the company

Source: Company websites, CRISIL MI&A

Overview of key financial parameters

Vertical overview

Company	Vertical Information	Revenue contribution (FY23) @@
Kirby Building Systems & Structures India Pvt Ltd [#]	1. Manufacture and construction of Pre-Engineered Buildings/ Steel Structural / Industrial Racking and components of iron and steel. It also provides designing, drafting, and engineering services for construction of Pre-Engineered Buildings/ Steel Structural/ Industrial Racking and components of iron and steel.	100%
Interarch Building Products Ltd*	1. Manufacturing, supply, erection and installation of complete pre-engineered steel construction buildings, metal roofing and corrugated roofing, and light gauge framing system	100%
Zamil Steel Buildings India Pvt Ltd*	1. Manufacturing of steel structural materials and parts thereof	100%
Pennar Industries Ltd	1. Diversified Engineering (railways-wagons, steel, solar module mounting solutions, industrial boilers & heaters, chemicals & fuel additives, solar panels, precision tubes, BIW, hydraulics and auto components.)	50.1%
	2. Custom designed building solutions & auxiliaries (Pre-engineered Buildings, construction equipments and Engineering Services) ^{##}	49.9%
Everest Industries Ltd	1. Building Products (includes manufacturing and trading of roofing products, boards and panels, other building products and accessories)	69%
	2. Steel Buildings (consist of manufacture and erection of pre-engineered and smart steel buildings and its accessories)	31%
M & B Group and related parties	M & B Engineering Limited [†] 1. Pre-Engineered Buildings, Structure Steels, Steel Roofing and Components thereof	100%
	Phenix Building Solutions Pvt Ltd*- 2. Construction of Building Solutions (Prefabricated structures)	100%
Smith Structures (India) Pvt Ltd ^{*1}	1. Design and Engineering Services	12.2%
	2. Retail Trade (related to prefabricated buildings/ construction)	87.7%
EPack Polymers Pvt Ltd ²	1. Thermacol	N.A.
	2. PUF Panels	N.A.

Players have been arranged according in the descending order of their installed capacity mentioned in the table Manufacturing plants and PEB related capacity

* These financials are standalone as these companies do not have subsidiaries

The subsidiaries of the company reported zero revenue in calendar year 2021 and calendar year 2020. Hence, standalone financials have been considered in the above table

@@ Revenue contribution is considered as disclosed in the respective company's annual report and have not been reclassified by CRISIL

##Pennar industries' custom designed building solutions & auxiliaries vertical includes revenue from pre-engineered buildings, construction equipments and engineering services

¹ For Smith Structures (India) Pvt Ltd, vertical represent types of principal product or services as disclosed in the company's annual report. Furthermore, revenue contribution is calculated on the basis of turnover of product or service category divided by revenue from operations

² According to EPACK Polymers Pvt Ltd annual report, the company has identified Thermocol and PUF Panels verticals as its primary vertical. In Financial Year 2022, Thermocol and PUF Panels formed 31.9% (Rs 1,450.4 million) and 68.1% (Rs 3,094.3 million) of revenue from operations, respectively

Note: Financials for Kirby Building Systems & Structures India are on a calendar year basis (e.g., in the above table, Financial Year 2022 is calendar year 2021, etc)

Source: Company annual reports available in the public domain/ filed with the RoC, CRISIL MI&A

Vertical revenue (PEB related)

Vertical revenue (₹ million)		FY21	FY22	FY23	CAGR (FY21-23)
Kirby Building Systems & Structures India Pvt Ltd ^{#1}		11,914.2	17,248.1	23,321.2	39.9%
Interarch Building Products Ltd ^{*2}		5,760.6	8,349.4	11,239.3	39.7%
Zamil Steel Buildings India Pvt Ltd ^{*3}		3,496.8	5,307.3	6,227.9	33.5%
Pennar Industries Ltd ⁴		6,903.1	10,446.2	15,050.1	47.7%
Everest Industries Ltd ⁵		2,547.6	3,195.0	5,091.8	41.1%
M & B Group and related parties	M & B Engineering Ltd [@]	4,145.2	6,882.2	8,804.7	45.7%
	Phenix Building Solutions Pvt Ltd ^{*6}	968.3	2,475.9	2,907.4	73.3%
Smith Structures (India) Pvt Ltd ^{*7}		1,748.6	3,769.6	4,559.0	61.5%
EPack Polymers Pvt Ltd ⁸		1,156.4	3,094.3	N.A.	N.A.

Players have been arranged according in the descending order of their installed capacity mentioned in the table Manufacturing plants and PEB related capacity

Note: Financials for Kirby Building Systems & Structures India are on a calendar year basis (e.g., in the above table, Financial Year 2022 is calendar year 2021, etc.)

* These financials are standalone as these companies do not have subsidiaries

The subsidiaries of the company reported zero revenue in calendar year 2021 and calendar year 2020. Hence, standalone financials have been considered in the above table.

@According to the company's Financial Year 2023 consolidated annual report, the company deals in pre-engineered buildings, structural steels, steel roofing and components thereof, and hence revenue from operations is considered for all the years.

¹According to Kirby Building Systems & Structures India Pvt Ltd annual report, manufacture of pre-engineered steel buildings and steel structures forms 100% of the company's turnover. The company is engaged in the manufacture and construction of pre-engineered buildings/steel structurals/industrial racking and components of iron and steel. Also, the company provides related designing, drafting, and engineering services. Hence, total revenue from operations is considered.

²According to Interarch Building Products Ltd annual report, the Company's operating businesses are organised and managed on a single vertical considering activities of manufacturing, supply, erection and installation of pre-engineered steel buildings and related services as one single operating vertical. Hence, total revenue from operations is considered.

³According to Zamil Steel Buildings India Pvt Ltd's annual report, the company's activities predominantly involve one business vertical, i.e., manufacturing of steel structural materials and parts thereof (in Financial Year 2023, Financial Year 2022, Financial Year 2021), which is considered as a single business vertical. Hence, profit after tax from the profit and loss statement is considered

⁴Vertical revenue of the custom-designed building solutions & auxiliaries vertical which includes pre-engineered buildings, construction equipment and engineering services is considered for Pennar Industries

⁵Vertical revenue of steel buildings is considered for Everest Industries

⁶Revenue from prefabricated structure forms 100% of revenue from operations. Hence, total revenue from operations is considered

⁷Total revenue from operations is considered for all the years.

⁸E-Pack Polymers Pvt Ltd is engaged in the business of manufacturing expandable beads known as thermocol and prefabricated housing material. Revenue from the manufacture of PUF panels is considered.

Source: Company annual reports available in the public domain/ filed with the RoC, CRISIL MI&A

Vertical profit (PEB related)

Vertical profit (₹ million)		FY21	FY22	FY23	CAGR (FY21- FY23)
Kirby Building Systems & Structures India Pvt Ltd ^{#1}		1,034.4	1,074.3	1,374.3	15.3%
Interarch Building Products Ltd ^{*2}		64.4	171.3	814.6	255.7%
Zamil Steel Buildings India Pvt Ltd ^{*3}		-29.8	-204.4	-66.2	n.m.
Pennar Industries Ltd ⁴		437.6	651.5	1,049.3	54.8%
Everest Industries Ltd ⁵		-186.6	-116.8	401.0	n.m.
M & B Group and related parties	M & B Engineering Ltd [@]	59.0	193.8	341.4	140.5%
	Phenix Building Solutions Pvt Ltd ^{*6}	4.6	18.2	23.0	124.3%
Smith Structures (India) Pvt Ltd ^{*7}		34.2	77.6	138.7	101.4%
EPack Polymers Pvt Ltd ⁸		33.9	205.0	N.A.	N.A.

Note:

n.m. not meaningful

Players have been arranged according in the descending order of their installed capacity mentioned in the table Manufacturing plants and PEB related capacity.

*These financials are standalone as these companies do not have subsidiaries

#The subsidiaries of the company reported zero revenue in calendar year 2021 and calendar year 2020. Hence, standalone financials have been considered in the table above

Note: Financials for Kirby Building Systems & Structures India are on a calendar year basis (e.g., in the table above, Financial Year 2022 is calendar year 2021, etc.)

@According to the company's Financial Year 2023 consolidated annual report, the company deals in pre-engineered buildings, structural steels, steel roofing and components thereof, and hence revenue from operations is considered for all the years.

¹According to Kirby Building Systems & Structures India Pvt Ltd's annual report, manufacture of pre-engineered steel buildings and steel structures forms 100% of the company's turnover. The company is engaged in the business of manufacture and construction of pre-engineered buildings/ steel structurals/ industrial racking and components of iron and steel. Also, the company provides designing, drafting, and engineering services for construction of pre-engineered buildings/ steel structurals/ industrial racking and components of iron and steel. Hence, profit after tax from the profit and loss statement is considered

² According to Interarch Building Products Ltd annual report, the Company's operating businesses are organised and managed on a single vertical considering activities of manufacturing, supply, erection and installation of pre-engineered steel buildings and related services as one single operating vertical. Hence, total revenue from operations is considered.

³According to Zamil Steel Buildings India Pvt Ltd's annual report, the company's activities predominantly involve one business vertical, i.e., manufacturing of steel structural materials and parts thereof (in Financial Year 2023, Financial Year 2022, Financial Year 2021), which is considered as a single business vertical. Hence, profit after tax from the profit and loss statement is considered

⁴Vertical profit before depreciation, finance, tax expense and share of non-controlling interest of custom designed building solutions and auxiliaries vertical which pre-engineered buildings, construction equipment and engineering services is considered for Pennar Industries

⁵Vertical profit before unallocated expenses (net of income), finance cost and tax expense of steel buildings is considered for Everest Industries

⁶Revenue from prefabricated structure forms 100% of revenue from operations. Hence, profit after tax from the profit and loss statement is considered

⁷Profit after tax from the profit and loss statement is considered

⁸ Vertical profit/ vertical operating profit related to PUF panel vertical is considered for EPack Polymers Pvt Ltd.

Source: Company annual reports available in the public domain/ filed with the RoC, CRISIL MI&A

Half yearly performance (H1 Financial Year 2024)

Company (₹ Million)	Net sales	Profit Before Interest; Depreciation and Tax	PAT
Interarch Building Products Ltd ^{\$\$}	5,915.3	441.1	345.8
Pennar Industries Ltd ^{^^}	15,630.2	1,321.8	441.7
Everest Industries Ltd ^{^^}	7,917.5	185.7	117.5

Note: Players have been arranged according in the descending order of their installed capacity mentioned in the table Manufacturing plants and PEB related capacity

^{\$\$}Dedicated pre-engineered/ prefabricated/ steel building players.

^{^^}Financial numbers of these companies include vertical other than PEB related and are reported at company level, which may not be completely and directly comparable with the financial numbers of other PEB focused players.

Numbers reclassified as per CRISIL standards and may not match company reported numbers

*on consolidated basis

Source: Company annual reports available in public domain/ filed with the RoC, CRISIL MI&A

Half yearly performance: PEB vertical related (H1 Financial Year 2024)

Company (₹ Million)	Vertical Revenue	Vertical Profit
Interarch Building Products Ltd ¹	5,915.3	345.8
Pennar Industries Ltd ^{*2}	7,929.6	670.3
Everest Industries Ltd ^{*3}	1,756.1	-32.1

Notes: Players have been arranged according in the descending order of their installed capacity mentioned in the table Manufacturing plants and PEB related capacity

*On consolidated basis

Vertical revenue and profit are as reported by the companies and are not CRISIL reclassified

¹According to Interarch Building Products Ltd annual report, the company's operating businesses are organised and managed on a single vertical considering activities of manufacturing, supply, erection and installation of pre- engineered buildings and related services. Hence, revenue from operations and profit after tax from is considered

²Vertical revenue and profit of Custom designed building solutions & auxiliaries

³Vertical revenue and profit of steel buildings vertical

Source: Company annual reports available in public domain/ filed with the RoC, CRISIL MI&A

Operating income

Operating income (₹ million)		FY21	FY22	FY23	CAGR (FY21- FY23)
Kirby Building Systems & Structures India Pvt Ltd ^{\$\$}		11,914.2	17,248.1	23,321.2	39.9%
Interarch Building Products Ltd ^{\$\$}		5,760.8	8,349.6	11,239.4	39.7%
Zamil Steel Buildings India Pvt Ltd ^{\$\$}		3,496.8	5307.3	6,232.4	33.5%
Pennar Industries Ltd ^{^^}		15,337.8	22,723.1	28,946.2	37.4%
Everest Industries Ltd ^{^^}		12,179.2	13,647.1	16,557.5	16.6%
M & B Group and related parties ^{\$\$}	M & B Engineering Ltd	4,148.1	6,883.7	8,804.7	45.7%
	Phenix Building Solutions Pvt Ltd [*]	968.3	2,475.9	2,907.4	73.3%
Smith Structures (India) Pvt Ltd ^{\$\$}		1,748.6	3,769.6	4,559.0	61.5%
EPack Polymers Pvt Ltd ^{^^}		2,408.3	4,544.8	N.A.	N.A.

Players have been arranged according in the descending order of their installed capacity mentioned in the table Manufacturing plants and PEB related capacity

^{\$\$}Dedicated pre-engineered/ prefabricated/ steel building players.

^{^^}Financial numbers of these companies include vertical other than PEB related and are reported at company level, which may not be completely and directly comparable with the financial numbers of other PEB focused players.

*These financials are standalone as these companies do not have subsidiaries

#The subsidiaries of the company reported zero revenue in calendar year 2021 and calendar year 2020. Hence, standalone financials have been considered in the table above

Note: Financials for Kirby Building Systems & Structures India are on a calendar year basis (e.g., in the table above, Financial Year 2022 is calendar year 2021, etc.)

Numbers reclassified as per CRISIL standards and may not match company reported numbers:

Source: Company annual reports available in public domain/ filed with the RoC, CRISIL MI&A

Operating profit before depreciation, interest and taxes (OPBDIT)

OPBDIT (₹ million)		FY21	FY22	FY23	CAGR (FY21- FY23)
Kirby Building Systems & Structures India Pvt Ltd ^{\$\$}		1,598.4	1,733.4	2,124.0	15.3%
Interarch Building Products Ltd ^{\$\$}		133.7	344.0	1,051.5	180.5%
Zamil Steel Buildings India Pvt Ltd ^{\$\$}		47.4	-96.6	84.8	33.8%
Pennar Industries Ltd ^{^^}		1,013.7	1,780.1	2,211.9	47.7%
Everest Industries Ltd ^{^^}		1,161.5	746.7	756.4	-19.3%
M & B Group and related parties ^{\$\$}	M & B Engineering Ltd	270.3	450.2	672.9	57.8%
	Phenix Building Solutions Pvt Ltd*	7.0	26.2	30.1	106.8%
Smith Structures (India) Pvt Ltd ^{\$\$}		79.6	197.8	275.7	86.1%
E-Pack Polymers Pvt Ltd ^{^^}		234.1	383.4	N.A.	N.A.

Players have been arranged according in the descending order of their installed capacity mentioned in the table Manufacturing plants and PEB related capacity.

^{\$\$}Dedicated pre-engineered/ prefabricated/ steel building players.

^{^^}Financial numbers of these companies include vertical other than PEB related and are reported at company level, which may not be completely and directly comparable with the financial numbers of other PEB focused players.

*These financials are standalone as these companies do not have subsidiaries

#The subsidiaries of the company reported zero revenue in calendar year 2021 and calendar year 2020. Hence, standalone financials have been considered in the table above

Note: Financials for Kirby Building Systems & Structures India are on a calendar year basis (e.g., in the table above, Financial Year 2022 is calendar year 2021, etc.)

Numbers reclassified as per CRISIL standards and may not match company reported numbers

Source: Company annual reports available in public domain/ filed with the RoC, CRISIL MI&A

PAT

PAT (₹ million)		FY21	FY22	FY23	CAGR (FY21- FY23)
Kirby Building Systems & Structures India Pvt Ltd ^{#\$\$}		1,034.4	1,074.3	1,374.3	15.3%
Interarch Building Products Ltd* ^{\$\$}		64.4	171.3	814.6	255.7%
Zamil Steel Buildings India Pvt Ltd* ^{\$\$}		-29.8	-204.4	-66.2	n.m.
Pennar Industries Ltd ^{^^}		15.1	419.6	754.3	606.8%
Everest Industries Ltd ^{^^}		563.9	440.9	423.6	-13.3%
M & B Group and related parties ^{\$\$}	M & B Engineering Ltd	59.0	193.8	341.4	140.5%
	Phenix Building Solutions Pvt Ltd*	4.6	18.2	23.0	124.3%
Smith Structures (India) Pvt Ltd* ^{\$\$}		34.2	77.6	138.7	101.4%
E-Pack Polymers Pvt Ltd ^{^^}		80.7	202.2	N.A.	N.A.

Notes:

n.m.: not meaningful

Players have been arranged according in the descending order of their installed capacity mentioned in the table Manufacturing plants and PEB related capacity.

^{\$\$}Dedicated pre-engineered/ prefabricated/ steel building players.

^{^^}Financial numbers of these companies include vertical other than PEB related and are reported at company level, which may not be completely and directly comparable with the financial numbers of other PEB focused players.

*These financials are standalone as these companies do not have subsidiaries

#The subsidiaries of the company reported zero revenue in calendar year 2021 and calendar year 2020. Hence, standalone financials have been considered in the table above

Note: Financials for Kirby Building Systems & Structures India are on a calendar year basis (e.g., in the table above, Financial Year 2022 is calendar year 2021, etc.)

Numbers reclassified as per CRISIL standards and may not match company reported numbers

Source: Company annual reports available in public domain/ filed with the RoC, CRISIL MI&A

Interarch is one of the leading turnkey pre-engineered steel construction solution providers in India with integrated facilities for design and engineering, manufacture, on-site project management capabilities for the installation and erection of PEBs.

Interarch has been awarded for Best Innovation PEB Project Award of the Year (2022) from Bam Awards for Rudraksha Project and Outstanding Company in Pre-Engineered Buildings award by EPC World Awards (2023).

Interarch was ranked third in terms of operating revenue from the pre-engineered steel building business in Financial Year 2023 among the integrated PEB players in India considered above. It had the second largest aggregate installed PEB capacity of 141,000 MT per annum among the PEB players considered above and a market share of 6.1% in terms of operating income in Financial Year 2023.

Interarch's market share (on basis of operating income) in India's pre-engineered steel building industry increased from 5.4% in Financial Year 2022 to 6.1% Financial Year 2023

Profit margins

Efficiency margins		FY21		FY22		FY23	
		OPBDIT%	PAT%	OPBDIT%	PAT%	OPBDIT%	PAT%
Kirby Building Systems & Structures India Pvt Ltd ^{#\$\$}		13.4	8.7	10.0	6.2	9.1	5.9
Interarch Building Products Ltd ^{*\$\$}		2.3	1.1	4.1	2.1	9.4	7.2
Zamil Steel Buildings India Pvt Ltd ^{*\$\$}		1.4	-0.9	-1.8	-3.9	1.4	-1.1
Pennar Industries Ltd ^{^^}		6.6	0.1	7.8	1.8	7.6	2.6
Everest Industries Ltd ^{^^}		9.5	4.6	5.5	3.2	4.6	2.6
M & B Group and related parties ^{\$\$}	M & B Engineering Ltd	6.5	1.4	6.5	2.8	7.6	3.9
	Phenix Building Solutions Pvt Ltd*	0.7	0.5	1.1	0.7	1.0	0.8
Smith Structures (India) Pvt Ltd ^{*\$\$}		4.6	2.0	5.2	2.1	6.0	3.0
E-Pack Polymers Pvt Ltd ^{^^}		9.7	3.4	8.4	4.4	N.A.	N.A.

Players have been arranged according in the descending order of their installed capacity mentioned in the table Manufacturing plants and PEB related capacity.

^{\$\$}Dedicated pre-engineered/ prefabricated/ steel building players.

^{^^}Financial numbers of these companies include vertical other than PEB related and are reported at company level, which may not be completely and directly comparable with the financial numbers of other PEB focused players.

*These financials are standalone as these companies do not have subsidiaries

#The subsidiaries of the company reported zero revenue in calendar year 2021 and calendar year 2020. Hence, standalone financials have been considered in the table above

Note: Financials for Kirby Building Systems & Structures India are on a calendar year basis (e.g., in the table above, Financial Year 2022 is calendar year 2021, etc.)

OPBDIT % = OPBDIT / operating income

PAT % = PAT / operating income

Source: Company annual reports available in public domain/ filed with the RoC, CRISIL MI&A

In Financial Year 2023, Interarch Building Products Ltd had the highest OPBDIT and PAT margins of 9.4% and 7.2%, respectively, among the above-considered players. It was followed by Kirby Building Systems & Structures India Pvt Ltd with OPBDIT and PAT margins of 9.1% and 5.9%, respectively.

ROCE

ROCE		FY21	FY22	FY23
Kirby Building Systems & Structures India Pvt Ltd ^{#\$\$}		51.3	85.6	90.5
Interarch Building Products Ltd ^{*\$\$}		4.9	9.4	31.1
Zamil Steel Buildings India Pvt Ltd ^{*\$\$}		-0.2	-10.8	1.2
Pennar Industries Ltd ^{^^}		6.7	10.3	13.4
Everest Industries Ltd ^{^^}		17.4	12.7	12.0
M & B Group and related parties ^{\$\$}	M & B Engineering Ltd	10.8	18.5	23.0
	Phenix Building Solutions Pvt Ltd*	15.2	44.2	41.8
Smith Structures (India) Pvt Ltd ^{*\$\$}		15.6	26.7	35.3
E-Pack Polymers Pvt Ltd ^{^^}		13.2	22.7	N.A.

Players have been arranged according in the descending order of their installed capacity mentioned in the table Manufacturing plants and PEB related capacity.

^{\$\$}Dedicated pre-engineered/ prefabricated/ steel building players.

^{^^}Financial numbers of these companies include vertical other than PEB related and are reported at company level, which may not be completely and directly comparable with the financial numbers of other PEB focused players.

*These financials are standalone as these companies do not have subsidiaries

#The subsidiaries of the company reported zero revenue in calendar year 2021 and calendar year 2020. Hence, standalone financials have been considered in the table above

Note: Financials for Kirby Building Systems & Structures India are on a calendar year basis (e.g., in the table above, Financial Year 2022 is calendar year 2021, etc.)

Note: Ratios calculated as per CRISIL MI&A standards, may not match with company reported numbers:

RoCE = Profit before interest and tax (PBIT) / [total debt + tangible net worth]

Source: Company annual reports available in public domain/ filed with the RoC, CRISIL MI&A

In Financial Year 2023, Kirby Building Systems & Structures India Ltd had the highest ROCE of 90.5% among the considered players. Interarch Building Products Ltd had the fourth highest ROCE of 31.1%.

Asset turnover ratio

Asset turnover ratio		FY21	FY22	FY23
Kirby Building Systems & Structures India Pvt Ltd ^{#\$\$}		10.6	13.6	17.2
Interarch Building Products Ltd ^{*\$\$}		4.0	5.2	6.6
Zamil Steel Buildings India Pvt Ltd ^{*\$\$}		2.1	3.2	3.7
Pennar Industries Ltd ^{^^}		1.7	2.4	2.7
Everest Industries Ltd ^{^^}		2.7	2.8	3.1
M & B Group and related parties ^{\$\$}	M & B Engineering Ltd	2.8	4.3	5.1
	Phenix Building Solutions Pvt Ltd [*]	309.6	791.8	929.8
Smith Structures (India) Pvt Ltd ^{*\$\$}		19.1	14.6	9.6
E-Pack Polymers Pvt Ltd ^{^^}		1.9	2.8	N.A.

Players have been arranged according in the descending order of their installed capacity mentioned in the table Manufacturing plants and PEB related capacity.

^{\$\$}Dedicated pre-engineered/ prefabricated/ steel building players.

^{^^}Financial numbers of these companies include vertical other than PEB related and are reported at company level, which may not be completely and directly comparable with the financial numbers of other PEB focused players.

*These financials are standalone as these companies do not have subsidiaries

#The subsidiaries of the company reported zero revenue in calendar year 2021 and calendar year 2020. Hence, standalone financials have been considered in the table above

Note: Financials for Kirby Building Systems & Structures India are on a calendar year basis (e.g., in the table above, Financial Year 2022 is calendar year 2021, etc.)

Note: Ratios calculated as per CRISIL MI&A standards, may not match with company reported numbers

Asset turnover ratio = Operating income / gross block

Source: Company annual reports available in public domain/ filed with the RoC, CRISIL MI&A

ROE

ROE		FY21	FY22	FY23
Kirby Building Systems & Structures India Pvt Ltd ^{#\$\$}		32.0	48.6	53.6
Interarch Building Products Ltd ^{*\$\$}		2.4	5.5	22.7
Zamil Steel Buildings India Pvt Ltd ^{*\$\$}		-2.3	-17.7	-6.5
Pennar Industries Ltd ^{^^}		0.2	6.0	10.1
Everest Industries Ltd ^{^^}		11.8	8.4	7.6
M & B Group and related parties ^{\$\$}	M & B Engineering Ltd	5.0	15.0	21.8
	Phenix Building Solutions Pvt Ltd [*]	8.9	29.0	27.5
Smith Structures (India) Pvt Ltd ^{*\$\$}		30.7	46.9	50.5
E-Pack Polymers Pvt Ltd ^{^^}		10.2	22.1	N.A.

Players have been arranged according in the descending order of their installed capacity mentioned in the table Manufacturing plants and PEB related capacity.

^{\$\$}Dedicated pre-engineered/ prefabricated/ steel building players.

^{^^}Financial numbers of these companies include vertical other than PEB related and are reported at company level, which may not be completely and directly comparable with the financial numbers of other PEB focused players.

^{*}These financials are standalone as these companies do not have subsidiaries

[#]The subsidiaries of the company reported zero revenue in calendar year 2021 and calendar year 2020. Hence, standalone financials have been considered in the table above

Note: Financials for Kirby Building Systems & Structures India are on a calendar year basis (e.g., in the table above, Financial Year 2022 is calendar year 2021, etc.)

Note: Ratios calculated as per CRISIL MI&A standards, may not match with company reported numbers:

RoE = PAT / tangible net worth

Source: Company annual reports available in public domain/ filed with the RoC, CRISIL MI&A

Cash conversion cycle

Cash conversion cycle		FY21	FY22	FY23
Kirby Building Systems & Structures India Pvt Ltd ^{#\$\$}		99.1	100.9	80.9
Interarch Building Products Ltd ^{*\$\$}		72.3	71.3	73.8
Zamil Steel Buildings India Pvt Ltd ^{*\$\$}		73.9	70.7	26.6
Pennar Industries Ltd ^{^^}		79.8	56.5	38.3
Everest Industries Ltd ^{^^}		17.0	31.1	77.5
M & B Group and related parties ^{\$\$}	M & B Engineering Ltd	53.5	30.5	54.5
	Phenix Building Solutions Pvt Ltd [*]	32.5	14.0	16.9
Smith Structures (India) Pvt Ltd ^{*\$\$}		18.7	38.6	18.6
E-Pack Polymers Pvt Ltd ^{^^}		31.3	3.5	N.A.

Players have been arranged according in the descending order of their installed capacity mentioned in the table Manufacturing plants and PEB related capacity.

^{\$\$}Dedicated pre-engineered/ prefabricated/ steel building players.

^{^^}Financial numbers of these companies include vertical other than PEB related and are reported at company level, which may not be completely and directly comparable with the financial numbers of other PEB focused players.

^{*}These financials are standalone as these companies do not have subsidiaries

[#]The subsidiaries of the company reported zero revenue in calendar year 2021 and calendar year 2020. Hence, standalone financials have been considered in the table above

Note: Financials for Kirby Building Systems & Structures India are on a calendar year basis (e.g., in the table above, Financial Year 2022 is calendar year 2021, etc.)

Note: Ratios calculated as per CRISIL MI&A standards, may not match with company reported numbers

Cash conversion cycle= Receivable days + inventory days - payable days; Receivable days: Total receivables/ (Gross sales+ traded goods sales)*365; Inventory days: Total Inventories/ Cost of sales *365; Payable days: Creditors for goods/ (Material Costs+Traded Goods Purchased+|Accretion| : Decretion to Stocks)*365

Source: Company annual reports available in public domain/ filed with the RoC, CRISIL MI&A

Credit rating

	Issuer	Credit rating	Date
Everest Industries Ltd	CRISIL Ratings	A+	Apr 2023
E-Pack Polymers Pvt Ltd	ICRA	A-	Feb 2023
Interarch Building Products Ltd	CRISIL Ratings	A-	Jan 2024
Kirby Building Systems & Structures India Pvt Ltd	ICRA	AA-	Jul 2023
Pennar Industries Ltd	CARE Ratings	A-	Dec 2022
M & B Group and related parties	M and B Engineering Ltd	CRISIL Ratings	A-
	Phenix Building Solutions Pvt Ltd	N.A.	
Smith Structures (India) Pvt Ltd	CRISIL Ratings	B+	Oct 2023
Zamil Steel Buildings India Pvt Ltd	India Ratings and Research	Withdrawn	Jul 2020

Source: Quantix, CRISIL MI&A

Valuation ratios

Company	FY21	FY22	FY23
Reported Post Tax Price Earnings Ratio			
Everest Industries Ltd	7.9	25.3	28.0
Pennar Industries Ltd	153.0	11.7	12.6
Market Price to Adjusted Book Value			
Everest Industries Ltd	0.9	2.1	2.1
Pennar Industries Ltd	0.3	0.7	1.2

Note:

Ratios calculated as per CRISIL MI&A standards, may not match with company reported numbers

Closing price as of 31st march is considered for Financial Year 2021 to Financial Year 2023

Source: Company annual reports available in public domain/ filed with the RoC, BSE, CRISIL MI&A

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