



# *Higher Construction Activity Boosts Steel Consumption*

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## **Introduction**

Construction sector builds the basic framework of the economy. The construction industry has one of the strongest linkages with other sectors of the economy and has a strong multiplier effect.

According to an analysis conducted by SAIL, India's construction industry grew at a compounded annual growth of 16.5 percent during the seven year period up to 2007-08, accounting for almost 7.2 percent of India's GDP. Construction constitutes nearly 42 percent of the total investment in infrastructure. The SAIL analysis observes that even in the year 2008-09, despite the global economic and industrial recession (which also affected adversely India to some extent), the country's construction activity grew by over 9 percent.

Construction activity, being labour intensive, has generated employment for about 33 million people



and is the second largest economy after agriculture, the analysis said.

The analysis of SAIL has pointed out that the construction sector has a multiplier effect because of the backward and forward linkages it has with various sectors like steel, cement, timber, brick and a host of other minor segments. A unit increase in expenditure in construction thus generalises as high as five times the amount.

Construction and infrastructure development in a country are inter-linked. Indeed, the construction sector plays a vital and significant role in the development of most of the infrastructure projects. It has been found by experts that the construction component in most infrastructure projects on an average is about 70 percent. In case of roads, bridges, flyovers, house building projects, the construction component lies between 85 to 90 percent. For hydro-electric and irrigation projects it is in the range of 70 to 80 percent. Even in case of thermal and nuclear power projects, the construction component lies between 30 to 35 percent.

### Construction Enjoys Highest Consumption of Steel

Currently, the construction sector has the highest share in the sectorwise consumption of steel in India. In the 11th Five Year Plan (up to 2011-12) and in 2019-20, the top position of the construction sector will remain unchanged as will be evident from Table - 1 below:

Characteristics	Grade Zone	Minimum Admissible*	Maximum Admissible*
Yield Strength Re MPa	500	485	650
Stress Ratio (Rm/Re)	≥ 1.5 to ≤4.35	1.13	1.38
Uniform Elongation Agt (%)	≥ 7.5	6.0	==

\*Conditions apply, refer to BS 4449 : 2005

zones 3, 4 and 5.

Table - 1 : Sectorwise Steel Consumption Matrix

Major Segment	Current (2006-07) Consumption (Mt)	Projected Consumption 2011-12 (Mt)	Projected Consumption 2019-20 (Mt)	CAGR (%) 2006-07 to 2019-20
Manufacturing	10.0	16.0	37.0	10.6
Construction	13.3	31.0	70.0	13.6
Tube Making	3.0	5.0	9.0	8.8
Cold Reducing	5.2	8.0	17.0	9.5
Railways	1.5	2.0	4.5	8.8
Household / Appliances	1.5	2.5	5.0	9.7
Auto	3.0	3.5	8.5	8.3
Oil & Gas	2.8	8.0	25.0	18.3
Others	4.0	6.0	8.0	-
<b>Total Finished Steel</b>	<b>44.3</b>	<b>82.0</b>	<b>184.0</b>	<b>11.6</b>

Source: Article by Sushim Banerjee, E.D (Comm), SAIL, published in Steel Scenario Journal - July - September, 2008.

### Improved Steel Products for use in Construction

#### • Thermax and Tempcore TMT Bars

Globally, the basic requirement of reinforcement bars (rebar) for use in construction at present is low cost deformed bars with guaranteed 500N/mm<sup>2</sup> yield strength with adequate ductility for seismic (earthquake prone) zones. Nearly 55- 60 percent of India falls under seismic

Effective January, 2006 - BS 4449:2005 with yield strength of 500 MPa has only been specified for earthquake prone zones. The new high ductility grade 500C for use in the seismic zones, as BS 4449:2005 has the parameters.

Both Thermax and Tempcore TMT bars have the yield strength up to 500 N/mm<sup>2</sup> and with good ductility ensure adequate safety while using in seismic zones and provides saving in steel consumption.

Thermax TMT bars saves steel consumption by 15 to 19 percent while for the Tempcore TMT bars, the same is usually, between 15 to 16 percent.

#### • Galvanised Rebars

Galvanised coatings provide important advantages for the protection of reinforcement.

It has been found by research that the corrosion resistance of galvanised steel reinforcement to be superior to uncoated steel, while the bond strengths of both galvanised and black steel bars with concrete are not significantly different.

The major benefits of using galvanised reinforcement are:

(I) Protection of steel during storage and construction prior

## Focus

to placing the concrete.

- (ii) Diminished effect of variations in concrete quality.
- (iii) Safeguards against poor workmanship, especially misplacement of reinforcement, poor compaction and inadequate curing.
- (iv) Delayed initiation of corrosion and onset of cracking.
- (v) Reduced likelihood of surface staining.
- (vi) Increased structural life of concrete particularly where chloride contamination is high.

Galvanised rebars has been successfully used in the following areas:

- a) Immersed or buried elements that are subject to ground water effects and tide fluctuations.
- b) Coastal and marine structures.
- c) Transport infrastructure including bridge decks, roads and crash barriers.
- d) High risk structures in aggressive environment.

### • Stainless Steel Rebars

Stainless steel rebars are being used in India in the following areas :

- a. Architectural applications.
- b. All stainless steel railway coaches.
- c. Coal Wagons.
- d. AISI 316N has been developed by SAIL's Alloy Steel Plant at Durgapur which can with stand seismic effects.

## Infrastructure

Infrastructure is a set of assets which underlines the society and its economic activities especially, the roads, railways, bridges, power generation and its distribution, water treatment plants, educational institutions, housing, hospital and such other facilities.

IISI, Brussels (now World Steel Association) maintains that infrastructure development in a country is good for its economy and is helpful in generating the demand for steel. The steel industry's interest coincides with national interest on this issue. The steel industry, therefore, has an enlightened self interest in promoting the need for increased spending on infrastructure development.

In India, no major thrust was given on the development of infrastructure up to the 9th Five Year Plan period. During the 10th Plan period, the total estimate investment on infrastructure was Rs. 880,515 crore or US\$ 214.76 billion. But the infrastructure sectors like powers, roads, water supply and sanitation, ports and airports remained in a bad shape.

## Bharat Nirman Programme

The Bharat Nirman Programme launched by the Government for the development of rural infrastructure in the country has detailed six goals for the development of the rural areas. The goals are :

### (i) Provision of Electricity by 2009

The project will involve connecting 125,000 villages and nearly 2.3 crore rural households. This will require at least one 33/11 KV substation in each block and at least one



distribution transformer in each village.

### (ii) All Weather Roads

Every inhabitant over 1000 population (500 in hilly areas) to be provided by all weather roads. This measure will involve in connecting about 66,800 rural inhabitants by the year 2009.

### (iii) Supply of Safe Drinking Water

Each inhabitant in rural areas will have a source of safe drinking water. A total of 55,607 inhabitants are to be covered by 2009.

### (iv) Creation of Additional Irrigation Capacity

About 10 million hectare of additional irrigation capacity is to be created.

### (v) Housing for Rural Poor

Sixty lakhs houses are to be built for the rural poor by 2009.

### (vi) Each Village to be Connected by Telephone

About 66,822 villages have been targeted to be connected by telephone by 2007- 08.

### Allocation under Bharat Nirman (Rs. Crore)

2007-08 (RE)	2008-09 (BE)	2008-09 (RE)	2009-10 (BE)
43,113	50,118	50,118	40,900

The above goals cannot be achieved by 2009 and the Government now feels these may be completed by 2011- 12.

## Massive Investments for Infrastructure Development during 11th Plan

A total of Rs. 2,027,169 (US\$ 494.33 billion) investment for the development of infrastructure in the country during the 11th Five Year Plan period has been planned. The

**Table – 2 : Sectorwise Projections of Investment on Infrastructure during the 11th Plan Period – Bottom up Estimates (Rs. Crore at 2006-07 Prices)**

Sector	2007-08	2008-09	2009-10	2010-11	2011-12	Total 11th Plan
Electricity (Incl. NCE)	74,205	92,829	116,541	146,914	186,038	616,526
Roads	51,352	54,318	58,729	67,901	79,516	311,816
Telecom	33,075	39,834	50,293	63,408	80,390	267,001
Railways Incl. MRTS)	33,206	39,965	48,626	59,738	76,466	258,001
Irrigation (Incl. Watershed)	27,002	33,839	42,625	53,946	65,718	223,131
Water Supply & Sanitation	25,840	31,110	37,868	46,555	57,754	199,127
Ports	9,691	11,740	14,271	17,397	20,841	73,941
Airports	6,223	6,459	6,814	7,296	7,956	34,748
Storage	3,777	4,098	4,446	4,824	5,234	22,378
Gas	2,984	3,454	4,005	4,651	5,407	20,500
<b>Total Investment (Rs. Cr)</b>	<b>267,355</b>	<b>317,646</b>	<b>384,217</b>	<b>472,630</b>	<b>585,321</b>	<b>2,027,169</b>
<b>Total (US\$ Billion)</b>	<b>65.21</b>	<b>77.47</b>	<b>93.71</b>	<b>115.28</b>	<b>142.76</b>	<b>494.43</b>
<b>Investment as % of GDP</b>	<b>5.95</b>	<b>6.45</b>	<b>7.19</b>	<b>8.12</b>	<b>9.22</b>	<b>7.53</b>

Source : Planning Commission – October, 2007

Note: Totals may not agree in some cases due to rounding off.

sectorwise projection of investment on the development of the country's infrastructure during the 11th Five Year Plan is shown in Table – 2.

In most of the segments of infrastructure development, the government is focusing on the Public – Private Partnership (PPP) model to achieve faster execution of the projects. The planned shares of the private sector during the 11th Plan period are power – 26 percent, roads – 36 percent, railways – 20 percent, ports – 74 percent, airports – 61 percent, storage – 50 percent and gas – 32 percent.

The participation of the private sector in the infrastructure development in the country during the 10th Plan period was not satisfactory. It remains to be seen what happened during the 11th Five Year Plan period.

**Provisional Physical Targets for Infrastructure Development during the 11th Plan Period**

Some of the physical targets provisionally set by the Planning Commission for the country's infrastructure development are presented below sectorwise.

• **Electricity Generation**

- a) Additional power generation capacity of 70,000 MW.
- b) Reaching electricity to all un-electrified hamlets and providing access to all rural household through Rajiv



**Gandhi Grameen Vidyutikaran Yojna.**

- **National Highways**
  - a) Six-laning of 6,500 kms of the Golden Quadrilateral and some selected highways.
  - b) Four-laning of 6,736 kms of North – South and East – West corridors.
  - c) Four-laning of 12,109 kms of National Highways.
  - d) Development of 1,000 kms of Expressways.
  - e) Constructing of 8,737 kms roads, including

3,846 kms of National Highways in the North Eastern region.

- f) Widening of 20,000 kms of National Highways to two lanes.

• **Rural Roads**

- a) Constructing of 165,224 Km of new rural roads.
- b) Renewing and upgrading the existing 192,464 kms of rural roads covering 78,304 rural inhabitants.

• **Railways**



- a) Constructing dedicated freight corridors between Mumbai and Delhi as well as between Ludhiana and Kolkata.
- b) Laying of 10,300 kms of railways lines, gauge conversion of over 10,000 kms of railways.
- c) Modernization and redevelopment of 21 railway stations.
- d) Introduction of private entities in container trains for rapid additions to the existing rolling stock and capacity.

• **Ports**

Major thrust would be given to the capacity expansion of major and minor ports. Capacity additions for 485 Mt major ports and 385 Mt in minor ports will be taken up in the



different parts of the country.

• Airports

- a) Modernisation and redevelopment of 4 Metro and 35 Non- metro airports.
- b) Construction of seven greenfield airports.
- c) Construction of 3 airports in the North – East region.
- d) Upgrading of CNS / ATM facilities.

• Telecommunication & I.T.

- a) Achieving a telecom subscriber base of 600 million with 200 million rural telephone connections.
- b) Achieving a broadband coverage of 20 million as well as 40 million internal connections.

• Irrigation

Development of irrigation facilities in 16 million hector through major, medium and minor irrigation schemes.

**Norms of Steel Demand for Various Infrastructure Projects**

**Table – 3 : Norms of Steel Demand in Infrastructure Projects**

Investment Programme	Demand for Steel (Norms / Illustration)
<b>NHDP</b>	100 tons for Rs. 50 million spent i.e. 1.11 Mt plus additional demand for flyovers / elevated roads.
<b>Railways</b>	300 tons for a double line per kilometer, 24-30 tons for each wagon, additional demand for old bridges.
<b>Power Projects</b>	33,000 tons for a 500 MW capacity power projects, additional demand for special steels such as CRNO/CRGO
<b>Power Transmission</b>	7,000 tons for a stretch of 200 Km, 400 KV (double circuit line)
<b>Oil and Gas</b>	Well platform requires 2,000 tons of structural steel and a process platform requires 10,000 tons of steel. A 6 – Mtpy capacity refinery requires about 85,000 tons of steel.
<b>Housing</b>	Residential blocks typically require 1000 to 2000 tons of steel, mainly long products, per block.

Source : Compiled on the basis of paper presented by Shoeb Ahmed, Director (Commercial) SAIL at the 3rd Raw Material Conference held in Delhi in 2007

Norms of steel demand for various infrastructural projects are shown in Table – 3.

According to sectorwise projection of investment on infrastructure development in the country during the 11th Five Year Plan as shown in Table – 2, major thrust areas are power, road, telecom and the railways.

**Pattern of Steel Consumption in Various Sectors of the Economy**

**Table – 4 : Pattern of Steel Consumption in India**

Sector	Consumption Share (%)	Pattern of Consumption (%)		
		Longs	Flats	Total
Construction	45	71	29	100
Steel Units	18	1	99	100
Machinery Manufacturing & Engineering	30	52	48	100
Automobiles	4	10	90	100
Furniture & Hardware	2	42	58	100
Consumer Durables	1	6	94	100
<b>Total</b>	<b>100</b>	<b>49</b>	<b>51</b>	<b>100</b>

Source : IMACS Analysis (As published in December, 2009 issue of Iron & Steel Review : P. 160)

The overall consumption of finished steel in India during the period from April to September, 2009 i.e. H1 of 2009- 10 has increased by 6.47 percent over the corresponding period of the previous year. The consumption of long products has gone up by 7.67 percent and that of flat products has risen by 6.11 percent.

The sectorwise pattern of steel consumption in India is presented in Table – 4.

It may be observed from the above table that the construction sector enjoys the highest share of 45 percent in the total steel consumption of the country. In this sector, the share of long product consumption is 71 percent while that of flat products is 29 percent.

In the overall steel consumption shown in the

## Focus

above table, the share of long products is 49 percent and that of flat products is 51 percent.

However, according to the JPC data, during H1 of 2009- 10, the share of long products was 55 percent while that of flat products was 45 percent in the total consumption of finished steel in India after accounting for double counting.

### Steel Demand for Construction / Infrastructure Sectors to Increase

According to steel and economic experts, the domestic demand for construction / infrastructure sectors is likely to show remarkable growth in the second half of 2009- 10. The Senior Director of Deloitte India has observed that "with the government allowing the state - run infrastructure financing form IIFCL to raise Rs. 40,000 crore through tax - free bonds for refinancing PPP Projects, as part of its fiscal packages, steel demand is likely to look up."

The government has decided to continue with the stimulus package up to March, 2010.

### Right to Information for Implementation of Infrastructure Projects

The Joint Founder of 'Feed Back Ventures' and the Chairman of CII's Infrastructure Board, Binayak Chatterjee in a statement issued on 18.03.2009, said that the 'Right to Information' criteria should also be applied to inform about the huge amount of money that is being planned for infrastructure development in the country and the details of the projects which are being actually completed.

He said that two years of the 11th Five Year Plan is going to expire on 31.03.2009. Hence, it is essential to know the details of the implementation of the infrastructural projects as these are regarded as the most important contributors to the economic development.

He also said that the government has announced big stimulus packages for infrastructure development to tide over the present economic slowdown.

The Planning Commission has proposed to raise the share of infrastructure development in GDP from 5 percent in the 10th Five Year Plan to 9 percent in the 11th Five Year Plan period.

Chatterjee observed that mere planning does not ensure actual development. Monitoring and execution are essential for this. Hence like GDP, Inflation Index etc. another index 'Gross Capital Formation in Infrastructure' should be created to provide the detailed information on infrastructure development in the country, on a regular basis.

### Conclusion

Construction contributes to the country's industrial and economic development in a major way. Thanks to Governments stimulus package, India's a construction - cum - infrastructure development has picked up in the last one year.

There are some apparent constraints to the rapid growth of construction and infrastructure development. Land



acquisition problems have prevented the construction of some big greenfield steel projects. Some of the Power Plant constructions have also been held up due to the same reason.

Some big construction work like the Bandra - Worli Sea Link which connects the Mumbai city with its Western suburbs has been completed successfully. The 340 Km - long J&K Railway line which, joins the Kashmir Valley with the Indian Railways network, in an area which falls in the Seismic Zone V, is another example of high technological achievement.

But at the same time, the inefficiency of the building contractors has led to some mishaps in the construction of flyovers in Delhi and other places. As a result, the projects are being delayed, human lives lost and huge amount of money is being wasted.

There are cases where lack of co-ordination among the different agencies engaged to ensure smooth construction of projects, have led to time and cost overruns.

The Government should keep a strict vigil, through its agencies, on what is happening in the construction site and ensure regular monitoring of projects under construction.

The growth of construction sector holds the key to the economic and industrial development of the country and paves the ways for a higher consumption of steel.