



Infrastructural Growth to Drive Steel Consumption

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institutions that contribute to social well being. IISI, Brussels had also observed that infrastructure development is good for a country for its economy and in the generation of steel demand. The steel industry's interest coincides with national interest on this issue. The steel industry, has therefore, an enlightened interest in promoting the need for increased spending for infrastructure development.

In successful completion of any infrastructure project, steel acts as its backbone.

From highways, bridges, railway tracks, locomotives, coaches, wagons, power generation and its distribution, ports, plant and workshops, airports, aircrafts, defence products, irrigation including building of dams, to construction of townships, high rise buildings, sports stadia, shopping malls, steel plays a major role.

Though steel has a relatively high strength to weight ratio and steel products are prone to corrosion, the alternative materials have not been able to make a significant dent on its volume of consumption in infrastructure projects. Infact, steel products are almost exclusively used in infrastructure development.

Infrastructure may be defined as a set of assets which underline the society and its various economic activities mentioned above which not only benefits the society but also helps in a country's economic growth. A renowned economist has defined the role of infrastructure in an economy as an umbrella for many activities referred to as "SOCIAL OVER HEAD CAPITAL". The

infrastructure sector has one of the strongest linkages with the various segments of the economy of a country and, therefore, has a strong multiplier effect.

The path to the economic growth of a developing country like India is very closely linked to the development of its physical infrastructure. Any developing nation needs to attract capital to ensure its economic growth and to attract such capital, the country's basic infrastructure has to be strong enough.

Long ago, IISI, Brussels (now World Steel Association) had observed that inadequate infrastructure in a country holds back its economic growth and acts as a deterrent to its industry's competitiveness, harming the quality of life of its people.

Those countries that have neglected their infrastructure development are falling behind their competitors where facilities are better. IISI observed that infrastructure is not only an input to the production process but also a public good. There is social benefit in having road and railway network, sewerages, water treatment plants, hospitals, housing, educational

Why Steel is a Preferred Material for Use in Infrastructure Projects ?

Steel has been accepted as a preferred material for use in infrastructure projects due to the following reasons:

- Easy fabrication and erection facility.
- Speedy application, better durability and aesthetics.
- Superior strength, toughness and better ductility.
- Greater flexibility for maintenance, change of use and replacement whenever required.
- High strength to weight ratio.
- Improved durability, resistance to corrosion, fatigue, fire and earthquake.
- Lower life cycle cost.
- Improved safety in construction and operation at site without causing disturbance in the locality.
- Easy transportation facility.

Sectors / Segments where Use of Steel is Vital

Various infrastructure sectors where steel plays a vital role are mentioned below:

- Agriculture & agro-based industries.

- Housing including multi storied buildings, high rise office premises etc.
- Educational, sports stadia and recreational facilities
- Defence : Its roads, bridges, naval yards, airstrips etc.
- Health Organisations.
- Power – its generation, transmission and distribution
- Non-conventional energy
- Community Development
- Roads and Railway transportation
- Ports and Shipyards
- Irrigation : Dams for flood control
- Telecommunication

Criteria for Selection of Steel Products for Infrastructure Projects

The criteria for selection of steel products are usually based on the following factors and may vary according to end-use:

- Strength
- Brittleness
- Resistance against corrosion, abrasion etc.
- Weldability and durability
- Ductility
- Resistance against fatigue
- Fire resistance
- Weather resistance
- Earthquake resistance

Major Applications of Steel Products in Infrastructure Projects

Major applications of various steel products in infrastructure projects are mention in Table-1.

Promotion of Steel Consumption in Infrastructure Projects

Steel experts and economists has made the following prescription for promotion of steel consumption in the infrastructure projects.

- To boost investment by the public and private sectors.
- Quick sanction of projects, timely release of funds and time-bound implementation of infrastructure projects to avoid time and cost over runs.
- To take up infrastructure projects only after solving land acquisition problem and after obtaining environmental clearance.
- Accelerating the implementation of infrastructure projects in sectors like power, road & railway transportation, ports, irrigation and housing (in semi-urban and rural areas).

TABLE-1 : MAJOR APPLICATIONS OF VARIOUS STEEL PRODUCTS IN INFRASTRUCTURE PROJECTS

STEEL PRODUCTS	MAJOR APPLICATIONS IN INFRASTRUCTURE PROJECTS
Wires drawn from Wire Rods Wire Rods	Wire for reinforcements, netting, fencing etc. Fasteners, reinforcements, concrete sleepers for railway, house buildings, irrigation, dams, stayware bridges etc.
Re-bars	Buildings, warehouses, LPG/LNG storage foundation work etc.
High Quality Bars & Rods	Structural parts
TMT Bars	Concrete reinforcement in high-rise building, bridges, construction exposed to marine or underground environment – underground mine support, slope, stabilisation in hills and construction in seismic zones.
Sections and High Strength Structural Steels	Building construction, bridges, ships and vessels, railways and transport industry.
Universal Beams, Wide Beams, H-Beams	Building columns, structural flange members, frames, girders and flyovers etc.
Heavy Beams	Offshore construction, high-rise buildings, truss etc.
Hollow Sections	Buildings
Rails & Railway Materials	Railway tracks, bridges Railways, merry-go-Round lines for industrial units
Tubular Products	Water, steam, slurry pipelines, high pressure hydraulic system, structural construction, pipes pylons etc.
Plates	Construction of steel structures, industrial machinery. Port construction, oil and gas drilling rigs, line pipes, LPG/LNG storage tanks, ship building and shipyards, nuclear reactors, Hydro Power plants etc.
HR Coils, Sheets & Strips	Structural materials, welded pipes, Hamilton poles
CR Sheets	Industrial construction tanks and containers, railways, automobiles
Galvanised Sheets	Roofings, side-claddings, fencing, auto, factory sheds, railway platforms.
Organic Coated Sheets	Buildings, interior decorations, roofs, panelling
Closed Structural	Structural fabrication like space frame, industrial sheds, auto chasis etc.

● Allocation of larger funds for infrastructural development in rural areas.

● Steel industry to ensure timely availability of steel materials in exact size and according to the quality and specification as per the design and requirement of the projects.

● Strict and regular monitoring of the progress of the projects at site by competent authority.

Sub-sectors of Infrastructure where Steel has Major Use

Sub-sectors of infrastructure where steel has major use are shown in Table-2 below :

Infrastructure has Highest Share in Construction Sector

Construction sector accounts for about 60 percent of India's total finished steel consumption. According to experts, the

TABLE-2 : SUB-SECTORS OF INFRASTRUCTURE WHERE STEEL HAS MAJOR USE

SUB-SECTOR	WHERE STEEL HAS MAJOR USE
Transport	Roads, Bridges, Flyovers, Port and Shipyards, Inland Waterways, Airports, Railway Tracks and Bridges, Railway Coaches & Wagons, Urban Public Transport etc.
Energy	Power Generation and Distribution, Oil & Gas Pipelines, LPG / LNG Storage Facility and Oil Drilling Platforms.
Water and Sanitation	Solid Water Management, Water Treatment Plants and Pipelines, Overhead Tanks
Communication	Telecommunication, I.T. Sector
Commercial and Social Infrastructure	Educational Institutions, Hospitals, SEZs, Shopping Malls, Fertilizers, Cold Storage, Silos etc



TABLE-3 : NORMS OF STEEL CONSUMPTION IN INFRASTRUCTURE PROJECTS

PROJECTS	STEEL CONSUMPTION	REMARKS
Roads (National Highway Development Programme)	100 tonnes for every kilometre of road.	Additional demand for flyovers / elevated roads.
Railways	300 tonnes for a double line per Km. 30 tonnes per wagon.	Additional demand for railway bridges.
Power Projects	33,000 kg for a 500MW capacity plant	Additional demand for CRNO/CRGO steel
Power Transmission	35 tonnes per km of high voltage 400KV line	
Oil & Gas Well Platform	200 tonnes of structural steel per well platform	
Oil & Gas Process Platform	10,000 tonnes of steel per platform	
One 6-Mtpy Capacity Petroleum Refinery	85,000 tonnes of steel per platform	
An One-Million Tonne Capacity Steel Plant	50,000 tonnes of steel materials	

Source : JPC Bulletin – December 2012

construction sector in India consists of the following:

- Infrastructure - 54 Percent
- Industrial Expansion - 36 percent
- Residential & Commercial - 10 percent

Total 100 percent

Norms of Steel Consumption in Various Infrastructure Projects

Steel plays a vital role in various infrastructure projects. Consumption of steel products in infrastructure projects may vary marginally in different type of projects depending on the design and use of higher grades of steel and the degree of engineering skill available at the time of actual operation at the site of the project. The volume of steel consumption in various infrastructure projects are shown in Table-3.

Reasons behind Poor Infrastructure Growth in India

The major reasons for the poor state of infrastructure in India may be summed up as follows:

- **Power** : Cost of power is almost comparable but its supply is erratic and unreliable, and low plant factor. Power shortage often leads to the use of generators which enhances cost.

- **Energy** : 27 percent T&D losses, 14% peaking deficit and logistics cost impacted by low grade infrastructure.

- **Roads** : Poor roads and increased freight. Only 20 percent of National Highways have 4 lanes, 50 percent are 2 lanes and 30 percent are single lanes. State roads in some part of the country are not properly maintained and become unusable during the monsoon.

- **Logistics** : Average speed of trucks and container in India is 40 kmph against 60 kmph in China and over 90 kmph in the U.S. This leads to increased logistic costs.

- **Ports** : The average turnout in the Indian ports is 84 hours as against 10 hours in Thailand and 17 hours in Sri Lanka. Besides, Indian ports suffer from poor connectivity, inadequate berth availability as well as low draft constraints.

Precautions Required for Steel Use in Infrastructure

Indian architects and engineers engaged in infrastructure projects are moving towards the utilisation of the full potential of steel intensive infrastructural construction keeping in mind the following:

- Improper selection of steel, inadequate maintenance and design deficiencies are the main reasons for the high cost of infrastructure projects.

- Design accuracy is very important and steel structures should be properly protected against over loading, corrosion, fire and fatigue.

- Increasing the strength if steel used in infrastructure projects by grain refinement and precipitation is a better option than increasing the carbon content in steel as the former provides better strength, better ductility and better toughness.

- Infrastructure structures built in areas subjected to vibration and cyclic loading must be designed taking fatigue strength into consideration.

- Depending on requirement, special steel grades like corrosion resistant, earthquake resistant as well as high performance steels are to be selected.

- Use of parallel beams should be used more in infrastructure projects to ensure safety.

- The reinforcement bars used in infrastructure projects should have adequate ductility and bendability to avoid brittle failures.

Investment on Infrastructure Development

Total investment on infrastructure development in the country during the 11th Five Year Plan was planned at Rs. 20,56151 crore. Sector wise investment planned are shown in Table-4.

TABLE-4 : SECTOR WISE INVESTMENT PLANNED ON INFRASTRUCTURE DEVELOPMENT DURING THE 11TH PLAN (2007-08 TO 2011-12)

SECTOR	TOTAL INVESTMENT RS. CRORE	SHARE IN INVESTMENT (%)	
		PUBLIC SECTOR	PRIVATE SECTOR
Power (Incl. NCE)	6,66,525	74	26
Roads & Bridges	3,14,152	64	36
Telecommunication	2,58,439	35	65
Railways	2,61,808	80	20
Irrigation	2,53,301	100	0
Water Supply and Sanitation	1,43,730	97	3
Ports	81,995	26	74
Airports	30,968	39	61
Storage	22,378	50	50
Oil & Gas Pipelines	16,885	68	32
TOTAL	20,56,151		

Source : Planning Commission

Except Telecommunication and Airports, all other sector failed to reach the targeted investment in 11th Plan. Private Sector investment excepting the above sectors was very inadequate. In June, 2013, Finance Ministry, Government of India, estimated that 215 infrastructure projects worth about Rs. 6.73 lakh crore were held up, for which bank funding were made available, for lack of environmental, forest clearance, absence of coal supply and land disputes.

The Government envisaged that investment in the development of physical infrastructure in the country should be increased from 5 percent of GDP achieved during the 10th Five Year Plan to about 9 percent of GDP by 2011-12 (the terminal year of the 11th Plan). However, according to experts, investment in infrastructure projects reached about 6 percent of GDP during the 11th Five Year Plan. Overall, investment on infrastructure development reached 45 percent of the target for the 11th Plan period.

Investment During 12th Plan

The UPA Government had earmarked an investment of USD 1 trillion (Rs. 55,50,000 crore) during the 12th Five Year Plan (2012-13 to 2016-17) for the development of India's physical infrastructure which would ensure a share of 9.75 % in the country's GDP of the total investment. Private sector was expected to provide 50 percent of the total investment.

According to planning commission sources, the following investments were planned for some major infrastructure sectors during the 12th Five Year Plan period.

SECTOR	INVESTMENT (RS. CRORE)
Power	1,499,914
Road & Bridges	920,071
Telecommunication	884,204
Railways	456,743
Irrigation (Incl. Watershed)	430,103

The investment planned for the above major sectors taken together accounts for 75.5 percent of the total investment earmarked for the 12th Five Year Plan period.

However, according to experts, there has been a massive shortfall of about 79 percent in the target investment in the first two years of the 12th Plan (2012-13 and 2013-14) after which the UPA Government was replaced by N.D.A.

There was a sharp decline in investment by the private sector. According to World Bank, the investment by private sector in India's infrastructure development came down from USD 71,967 million in 2010 to USD 13,519 million in 2013.

The reasons for the above low investment by private sector explained by the corporate sector spokesmen may be summarised as follows:

- There is no money with the India's Corporate Sector to invest in infrastructure projects and the PPP model will not work unless the Government gives guaranteed returns on investment.

- India's Corporate Sector is not able to put money in the new infrastructure projects because of past experience that has severely impacted their business.

- Bank loans have been dried up.

Reserve Bank of India's Governor, Raghuram Rajan in a statement has warned the Government of over dependence on banks for financing infrastructure projects and also cautioned of over borrowing by some corporate for investing in the infra sector.

The New NDA Government & Infrastructure Development

The new NDA Government which came to power at the Centre in May, 2014 has

dismantled the Planning Commission and has replaced it by NITI AAYOG.

In the budget for 2015-16, Indian Finance Minister has given a major thrust on infrastructure development in the country. The Minister promised tax-free Bonds for infrastructure projects and setting up of the National Investment and Infrastructure Fund (NIIF) which will have an annual flow of Rs. 20,000 crore from the centre. This will enable the TRUST to raise debt and, in turn, invest as equity in infrastructure bodies such as IRFC and NHB. The Minister also said that the PSUs will raise capital expenditure by Rs. 80,444 crore to Rs. 317,889 crore in 2015-16. Thus, the total investment in infrastructure development will go up by Rs. 70,000 crore in 2015-16 over 2014-15.

The Union Budget for 2015-16 proposed a "PLUG-AND-PLAY" model for big ticket infrastructure projects. This meant that the winner of contract could start implementing the project immediately without waiting about all regulatory clearances and Coal / Gas linkages, which were the biggest causes for many stalled projects.

The Government also promised to bear major part of the risks involving PPP projects. Many projects under the PPP model have failed leading to complaints from the private sector companies, that they bear the burnt of setbacks while the government is not under pressure to resolve the difficulties.

Investments Proposed for Major Infrastructure Sectors

In the Budget for 2015-16, Government has indicated massive investments in some major infrastructure sectors which are mentioned below:

● **Power** : The budget proposed setting up of five Ultra Mega Power Projects of 400MW capacity each at an investment of Rs. 1 lakh crore on "Plug and Play" model. An investment of US\$ 100 billion to create one lakh MW of solar power and 60,000 MW of wind power have also been proposed in the Budget.

● **Roads** : The budget for 2015-16 also proposed massive expansion / acceleration of road building by completing the 1 lakh km of highways already under construction and embark upon a further new projects of 1 lakh km. The allocation on road sector was increased by 37 percent in 2015-16 at Rs. 45,751 crore over Rs. 33,305 crore in the previous year. With muted private sector participation, rise in public funds will be made for N. H. Execution by 5,600 km annually. Tax-

free bonds for roads and the NIIF will provide additional funds.

● **Railways** : In the Railway Budget for 2015-16, the Railway Minister announced a Five Year Action Plan to transform the railways at an investment of Rs. 8.56 lakh crore. In the short-term, the Minister asserted to fast track the already sanctioned works on 7,000 km and also to commission another 1,200 km at an investment of Rs. 8,681 crore in 2015-16 to decongest the clogged lines. The Minister also sanctioned 77 new projects covering 9,400 km of doubling / trebling works with electrification at a cost of Rs. 96,182 crore.

The Railways have managed to get a funding of Rs. 1.5 lakh crore from the Life Insurance Corporation of India (LIC) for modernisation and up-gradation in the next five years starting 2015-16. A MoU has been signed between LIC and Indian Railways by which investment will be made in Bonds issued by various railway entities like IRFC. There will be a five year moratorium on interest and loan payment.

● **Ports** : In the Budget for 2015-16, the Government has proposed to corporatorize the major ports under the Public Sector. This will allow these major ports authorities to access private capital markets and provide them with greater financial autonomy which will lead to increased efficiency. As a result, this will result in quick decision making and reduced regulatory hurdles.

Availability of funds will be provided by NIIF and judicious rationalisation of taxes by Infrastructure Investment Trusts.

Infrastructure Development in 2016-17

In the Union Budget and Railway Budget for 2016-17, taken together, a total capital expenditure of Rs. 2,18,000 crore has been proposed for infrastructure development in the country. Proposals for major sectors are mentioned below:

● **Roads** : The Budget allocation for 2016-17 for both development of rural road under Pradhan Mantri Gram Sadak Yojana (PMGSY) and Highways has been increased to Rs. 97,000 crore. Of this, Rs. 19,000 crore has been allocated for PMGSY in 2016-17. State's share in addition to this allocation, will be about Rs. 27,000 crore in 2016-17. The Government aims to connect the remaining 65,000 eligible habitations by constructing 2.23 lakh km of roads in rural areas.

The Budget for 2016-17 has provided Rs. 55,000 crore for Roads & Highways. This will

be further topped up by an additional Rs. 15,000 crore to be raised by NHAI through Bonds.

The Finance Minister also announced that there were more than 70 road projects stalled covering 8,300 kms involving more than Rs. One lakh crore of investment. After Government efforts, about 85 percent of these have now been put on track.

● **Railways** : In the Railway Budget for 2016-17, Rs. 1,21,000 crore has been allocated for the development of Indian Railways. Major proposals mentioned in the Railway Budget are as follows:

(I) New railway track of 5,300 km will be built in 2016-17. Seventeen states have agreed to help railways in this effort.

(II) In 2016-17, another 2,800 km new line will be constructed and 2,000 km of lines will be electrified.

(III) Two Railway workshops with ancillaries will be built in 2016-17

(IV) Two railway corridors, East-West and North-South along with the country's first Railway Hub in Chennai has also been proposed in the railway budget for 2016-17.

(V) The Operating Ratio of the Indian Railways in 2016-17 has been fixed at 92 percent as against 90 percent in 2015-16.

● **Power** : In the Budget speech for 2016-17, the Finance Minister said that the Government is drawing up a comprehensive plan, spanning next 15 to 20 years to augment the investment in nuclear power generation. Budgetary allocation upto Rs. 3,000 crore per annum together with public sector investments, will be leveraged to facilitate the required funds for this purpose.

The proposal to double clean energy cess on coal to Rs. 400 per tonne will increase generation cost by 10-12 paise per unit. The Budget also announced that power will be made available to all villages by May, 2018. A 92 percent increase in outlay for distribution schemes to Rs. 8,500 crore is expected to improve rural power demand, increased investment in distribution segment and lower losses.

However, nothing has been mentioned about the progress of the five Ultra Mega Power Projects, solar power and wind power projects announced in the Budget for 2015-16.

● **Ports** : Sagarmala project has been rolled out. Government has planned to develop new Greenfield ports both in the eastern and western coasts. The work on National



Waterways is also been expedited and Rs. 800 crore has been provided for these initiatives.

- **Airports** : An investment of Rs. 25,000 to Rs. 27,500 crore – excluding the proposal to revitalise about 160 old airports is expected between 2016-17 and 2020-21. More than 80 percent of the investment will be earmarked for Greenfield projects by 2020-21.

- **Irrigation** : The Finance Minister announced that about 80 lakh hectare of land will be brought under irrigation in the next five years. About 23 of the 89 projects will be completed by March, 2017 involving on expenditure of Rs. 17,000 crore.

Other Significant Proposals

- **Smart Cities** : Centre's smart cities initiative has listed 20 cities for development. The focus of the Mission includes provision of clean water, setting up of sanitation and solid waste management, efficient mobility and public transportation, affordable housing and 24X7 hour power supply. A total investment of Rs. 50,802 crore will be made for five years. About 60 percent of the total investment will be allocated for infrastructure development.

- **MGNREGA** : The Budget for 2016-17 has earmarked Rs. 38,500 for MGNREGA. This allocation, if properly utilised, will help in job creation particularly in rural areas.

Subsidised LPG Connection for BPL Women in Rural Areas

The budget for 2016-17 has proposed launching of "UJJWALA" scheme by which

Rs. 2,000 crore will be invested to provide clean fuel connection to 1.5 crore women from BPL families. The Government will provide Rs. 1,600 as subsidy for each connection which will be given in the name of the lady of BPL household.

CORE SECTOR Growth

The CORE SECTOR representing the eight infrastructure industries has a share of about 40 percent in India's Index of Industrial Production (IP).

The growth of CORE SECTOR between 2009-10 and 2015-16 are shown below :

YEAR	CORE SECTOR GROWTH (%)
2009-10	5.5
2010-11	5.9
2011-12	4.3
2012-13	4.5
2013-14	2.6
2014-15	3.5
2015-16 (E)	2.5

Source : Ministry of Commerce & Industry (E) = Estimated

The growth has declined in recent years. Despite massive investments planned on infrastructure development, actual implementation of the projects are poor due to problems of land acquisition, forest and environmental clearances and poor performance by private sector.

Conclusion

Planning does not ensure implementation. The actual completion of projects without cost and time overruns is the real index of successful performance. Actual investment and project completion during the 11th Five Year Plan and in the first two years of the 12th Plan was discouraging.

Massive investments have been planned by the NDA Government for 2015-16 and 2016-17 with some projects to be stretched to next 4/5 years. The Government is banking on income from spectrum sales, disinvestment of PSUs and increased tax on sale of petroleum products. Bank loans have dried up. The Government has decided to grant Rs. 25,000 crore to bail out the 16 nationalised banks in 2016-17. These banks have lost about Rs. 38,873 crore to frauds between 2011-12 and 2014-15. Due to resource crunch, the Private Sector may not be able to play their expected role in PPP projects. This will adversely affect infrastructure development in the country. According to trends, steel consumption may grow by about 3 percent in 2015-16.

Taking the above facts into consideration, economists and steel experts have observed the infrastructure growth in the country may be marginal in the short-term and likely to show some improvement in the middle-term. India's steel consumption will also follow the same pattern. After all steel consumption depends on infrastructure growth to a great extent.