सत्यमेव जयते

INFRASTRUCTURE STATISTICS -2014
(Third issue, VOL. I)

CENTRAL STATISTICS OFFICE
MINISTRY OF STATISTICS AND PROGRAMME IMPLEMENTATION
GOVERNMENT OF INDIA
NEW DELHI
www.mospi.nic.in

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FOREWORD

India is one of the fastest growing economies in the world today. To sustain this economic growth we must have a matching infrastructure. For better infrastructure investment plans we need to anticipate the future requirement and capacity. Otherwise the infrastructure becomes inadequate in a few years leading to the same gap as before. For effective investment policies we must target where needed and in a holistic manner. Policies made in isolation ignoring interconnected infrastructure may not give desired results leading to investment failures. Government's commitment to improve and expand infrastructure in the country is reflected in the investment in infrastructure during twelfth plan. The total investment in infrastructure during twelfth plan is projected at Rs. 5574663 crore as compared to Rs. 2424277 crore during eleventh plan (at 2011-12 prices).

For effective infrastructure planning and investment decisions a comprehensive database on infrastructure is needed. To meet this requirement, Central Statistics Office has compiled infrastructure statistics under six major sub sectors of infrastructure viz. Transport, Energy, Communication, Drinking Water and Sanitation, Irrigation and Storage. This is the third issue of the publication providing data that would enable to assess the status of current infrastructure, its adequacy and project the future requirements. This issue of the publication is in two volumes. Volume I includes metadata and key indicators on Infrastructure statistics and volume II gives state profiles for each infrastructure sub sector with time series data for latest five years along with graphical analysis, wherever possible.

I congratulate the staff of Economic Statistics Division of Central Statistics Office in bringing out this publication.

(T.C.A. Anant)
Chief Statistician of India
and Secretary, MOS&PI

September, 2014

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Preface

The importance of Infrastructure Statistics was first emphasized by the Rangarajan Commission in its report in 2001. It recommended that Infrastructure is an emerging sector and will play a major role in the growth and development of India's economy. Measuring infrastructure is, therefore, required for decision making purposes to improve the availability and capacity of existing infrastructure.

Infrastructure has been used as an umbrella term for many activities. Due to various descriptions, it becomes difficult to analyze infrastructure statistics in a comparable way and draw meaningful conclusions. Basically, two types of infrastructure are identified: economic and social infrastructure. The notion of infrastructure was extensively discussed in its report by the Rangarajan Commission. The Commission recommended six pertinent characteristics for identification of infrastructure sub sectors viz. natural monopoly; non-tradability; bestowing externalities; high sunk cost or asset specificity; non- rivalness and possibility of price exclusion. Based on these parameters a list of infrastructure sub sectors was prepared with a provision to extend it if more sub sectors fulfilling the criteria are identified.

The Central Statistics Office constituted a Standing Committee on Infrastructure Statistics (SCINS) to harmonize the concept of infrastructure and identify the sub sectors conforming to this concept. Presently six broad sectors of infrastructure viz. Transport, Energy, Communication, Drinking Water Supply and Sanitation, Irrigation and Storage are covered under infrastructure.

The first issue of the publication "Infrastructure Statistics 2010" was prepared by the Economic Statistics Division under the guidance of SCINS. This publication contained data on infrastructure sub sectors classified under five indicators viz. accessibility, quality, fiscal cost & revenue, utilization and affordability. Thereafter, a manual on infrastructure statistics containing concept, definitions and classification of infrastructure statistics was also prepared.

The present publication “Infrastructure Statistics 2014” is the third issue of the publication incorporating the latest available data on each sub sector. The publication is now in two volumes. While volume I includes metadata and key indicators of infrastructure statistics, volume II highlights the state profiles for each infrastructure sub sector. Efforts have been made to include data over a uniform period viz. up to 2011-12 including previous four years. Graphical analysis of data, wherever applicable, is also provided for better understanding.

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(A.K.Mehra)
Director General

September, 2014

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INFRASTRUCTURE STATISTICS- METADATA

Metadata is description of data. In other words, it is information about information. The primary role of metadata is to facilitate information sharing and appropriate interpretation of statistics by both users and producers of data. It includes the definitions, data sources, compilation practices, computation methods, accessibility and availability for key indicators. This chapter covers metadata on infrastructure statistics, presented in three sections: section 1.1 describes the general information about compilation, computation, accessibility and availability of infrastructure statistics, section 1.2 describes the data sources and compilation methodology at data source level and section 1.3 describes concepts and definitions of some important infrastructure indicators.

1.1: GENERAL INFORMATION ABOUT INFRASTRUCTURE STATISTICS

1.1.1. Contact

1.1.1.1.	Contact organisation	Central Statistics Office, M/o Statistics & Programme Implementation (MOSPI), New Delhi.
1.1.1.2.	Contact organisation unit	Economic Statistics Division, CSO
1.1.1.3.	Contact mail address	9th Floor, Jeevan Prakash Building,25 K.G.Marg, New Delhi-110001
1.1.1.4.	Contact emails	gc.manna1@gmail.com drschitkara.2009@gmail.com kundrajaspreet@yahoo.co.in
1.1.1.5.	Homepage	http://www.mospi.nic.in

1.1.2.Statistical presentation

1.1.2.1. Data sources

The data has been sourced from concerned line Ministries of the Government of India, in respect of different sub sectors of infrastructure. These Ministries are Ministry of Road Transport & Highways, Ministry of Railways, Ministry of Shipping, Ministry of Civil Aviation, Ministry of Coal, Ministry of Petroleum & Natural Gas, Central Electricity Authority, Department of Telecommunications, Department of Posts, Central Water Commission, Planning Commission, Ministry of Drinking Water & Sanitation, National Sample Survey Office, and Central Warehousing Corporation.

1.1.2.2. Data description

The statistics present information about the sub sectors of infrastructure viz Transport, Energy, Communication, Irrigation, Drinking Water & Sanitation and Storage indicating their accessibility, quality, Fiscal Coast and revenue generated, utilization and affordability.

1.1.2.3. Sector coverage

- Transport-Road, Railway, Inland Water Transport, Sea & Coastal Transport, Air Transport
- Energy-Coal, Petroleum & Natural Gas, Electricity
- Communication-Telecommunication, Postal
- Irrigation- Major and Medium irrigation potential and its utilization
- Drinking Water & Sanitation- Households having access to drinking water and sanitation facilities
- Storage – Storage and distribution facilities

1.1.2.4. Data Content

The Statistics are given under five categories of indicators viz. Access, Quality, Fiscal Cost & Revenue, Utilization and Affordability.

1.1.2.5. Statistical Unit

Data are aggregated appropriately at national and state level.

1.1.2.6. Statistical population

Data covers six sub-sectors of Infrastructure viz Transport, Energy, Communication, Irrigation, Drinking Water & Sanitation and Storage covering all Indian states and UTs.

1.1.2.7. Reference Area

All Indian States and UTs are covered.

1.1.2.8. Time coverage

In the current publication data is given for the period 2007-08 to 2011-12 and is based on statistics compiled by data source ministries as mentioned above at 1.1.2.1.

1.1.2.9. Base Period

2007-08

1.1.2.10. Statistical concepts and definitions

The main Concepts and Definitions are given in 1.3 of this chapter.

1.1.3.Unit of Measure

The data are recorded in physical units relevant to the indicator included (e.g. Road Length in Kilometers, Electricity in GWh etc.)

1.1.4.Reference period

Reference period of the publication of "Infrastructure Statistics 2014" is the financial year 2011-12 ending on March, 2012 and the previous financial years since 2007-08.

1.1.5.Institutional mandate

1.1.5.1. Legal acts and other agreements

No legal acts; however this statistics is collected in view of the mandate of the Ministry in allocation of Business rules.

1.1.5.1. Data Sharing

The publication is disseminated on the website of the Ministry of Statistics and Programme Implementation (MOSPI) and is available free of cost.

1.1.6.Confidentiality

1.1.6.1. Confidentiality-policy and data treatment

Confidentiality of the data is maintained by the data source ministries.

1.1.7.Release Policy

1.1.7.1. Release calendar

Two issues of the publication have been released earlier - first in December 2010, second in March, 2013 and this is the third issue being released in September, 2014. Once streamlined, the proposed calendar of release is March every year.

1.1.7.2. User access

MOSPI disseminates economic statistics on its website in an objective, professional and transparent manner in which all users are treated equitably. The detailed arrangements are governed by the dissemination policy of Government of India.

1.1.8.Dissemination format

1.1.8.1. News release

News of latest publication is flashed on the Ministry's website.

1.1.8.2. Publications

Annual publication is available on the website of MOSPI.

1.1.9.Accessibility of documentation

1.1.9.1. Documentation on methodology

Information on concepts, definitions, classification and sources of statistics is available in the manual on Infrastructure Statistics available at the link

http://mospi.nic.in/mospi_new/upload/Manual_Infrastructure_Statistics_28_mar12.pdf

1.1.10. Accuracy and reliability

1.1.10.1. Overall accuracy

Data on infrastructure is published on the basis of information received from the source agencies. The Economic Statistics Division of Central Statistics Office (CSO) in the MOSPI compiles and classifies data received from the source agencies and then presents the same in the form of a publication.

1.1.11. Timeliness and punctuality

1.1.11.1. Timeliness

Preliminary data on various sub sectors of Infrastructure are collected, compiled and published by the source ministries in their annual publications. The relevant statistics are then compiled under appropriate indicators to give a meaningful picture of the infrastructure status of the country at national and state levels. Since this is a new publication, only three issues are released during last five years. Once stabilized it will be an annual publication.

1.1.11.2. Punctuality

This being a new publication is still in the evolution stage. The formats of data presentation and flow of data are still being streamlined. Once it is stabilized, the annual publication will be released every year in the month of March.

1.1.12. Data revision

1.1.12.1. Data revision-policy

The annual publication provides data on the last (i.e. latest available) reference year and revisions for the year before. Revisions of entire time series when made by source agencies due to specific survey or data revision are incorporated in due time.

1.1.12.2. Data revision-practice

Preliminary data on some Infrastructure statistics is published in current publication. Final data, if revised by source ministry, is given in the next publication.

1.1.13. Statistical processing

1.1.13.1. Source data

Infrastructure statistics are collected from the source agencies as stated at 1.1.2.1 above.

1.1.13.2. Frequency of data collection

Annual

1.1.13.3. Data collection

Data is collected through e-mail or by post from the source ministries.

1.1.14. Data validation

Checks are carried out to the data before publishing it.

1.1.15. Data compilation

Data is classified under six indicators viz. Access, Quality, Fiscal Cost & Revenue, Utilization and Affordability indicators at both National and State Level.

1.1.16. Adjustment

No seasonal adjustment or temperature correction of infrastructure statistics is applied.

1.2: DATA SOURCES AND COMPILATION OF INFRASTRUCTURE STATISTICS

The infrastructure statistics relate to various sub sectors identified as infrastructure. Each of these infrastructure sub sectors is handled by a separate Ministry/ Department and the related statistics are collected by the concerned Ministry. The sources of these statistics and the system of their collection are described below:

1.2.1. Transport Infrastructure Statistics

Transport has four subsectors and data on each subsector is collected by different Ministry/ department. The sector wise collection of statistics is described below:

1.2.1.1. Road Transport

The Ministry of Road Transport & Highways is the nodal Ministry to collect data pertaining to Road Transport System. The Transport Research Wing of Ministry of Road Transport and

Highways is primarily concerned with the compilation and updating of Road Statistics. The four major publications brought out under the aegis of M/o Road Transport & Highways are:

i. Basic Road Statistics of India
ii. Road Transport Yearbook
iii. Road Accidents in India
iv. Review of the Performance of State Road Transport Undertaking

The Transport Research Wing usually collects data from over 280 source agencies spread all over the country. The Wing assists the Ministry with providing the analytical inputs and technical comments on transport related issues useful for policy making. It also advises ministry on selection of research studies, projects in the field of Road Transport Sector. The information on physical and financial performance of State Road Transport Undertakings (SRTU) is prepared on the basis of information supplied by 38 SRTU's. The information for the publication "Road Accidents in India" is collected from States/UTs in the 19-item format devised under Asia Pacific Road Accident Data (APRAD)/Indian Road Accident Data (IRAD) project of United Nations' Economic and Social Commission for the Asia and the Pacific (UN-ESCAP).

The major source agencies at the grass-root level include State Public Works Department, State Rural Works Department, State Panchayati Raj Departments, Local Self-Government Departments, National Rural Development Agency of M/o Rural Development, State Departments of Municipal Administration/Urban Affairs, Offices of State Transport Commissioners/UT Administrations, Society of Indian Automobile Manufacturers and Directorate of Data Management, Central Excise & Custom Duties.

1.2.1.2. Rail Transport

The organization for compilation and interpretation of statistics in the Ministry of Railways (Railway Board) is under the charge of the Director, Statistics and Economics who works under the Financial Commissioner for Railways. The statistical compilation work on individual Railways is generally under the charge of a Statistical Officer assisted by a compilation Officer functioning as a part of the Financial Advisor and Chief Accounts Officer's organization.

The Compilation Offices on the Railways undertake the processing of important types of statistics only, namely, operating and commercial statistics, which between them constitute the bulk of

statistical information supplied to the Railways and the Railway Board. The actual compilation of the statistics reported for accidents, claims, marshaling yard operations, terminal operations, rolling stock, workshops, staff, etc. is generally undertaken by the Departments concerned, although in some cases these may be consolidated and reported by the Statistical and Compilation Offices.

The data from which statistics are compiled are taken from various initial documents sent by divisions, stations, sheds, yards, etc, to the Central Statistical (Compilation) Sections/divisions of different Railway Administrations.

Statistical reports and information received from different railways are consolidated and processed further for gauge wise totals and averages, and for the grand totals for all railways. These are collated finally into the different statistical publications of the Railway Board, domestic statistics of each Railway and General Manager's Annual Report to the Railway Board. Based on the information received from the Railways, the statistical brochures, publications, etc, are compiled and issued by the Railway Board. These publications are listed below:

- **Periodical**

  Tri-monthly Statement of approximate gross earnings of Indian Railways for every 10/11 day period (for circulation in Board's Office only).

- **Monthly/Quarterly/Half Yearly**

  i. Monthly Statement of Revenue Earning Goods traffic on Indian Railways
  ii. Monthly Railway Statistics presenting the principal statistical results of Indian Railways relating to earnings and traffic, commercial statistics, operating statistics and rolling stock performance, etc.
  iii. Supplement to Monthly Railway Statistics containing residual information of the Railway performance.
  iv. Monthly Statistics of Passenger and Freight Traffic.
  v. Monthly Digest of current trends in Economic conditions and Rail transport.
  vi. Quarterly Review of Accident Statistics.
  vii. Half yearly Operating Statistics of Marshalling Yards, Terminal Goods Stations and Break-of-Gauge Transhipment Points.

- **Annual**

  i. Indian Railways Annual Report and Accounts.

ii. Indian Railways Year Book.
iii. Indian Railways Annual Statistical Statements.
iv. Goods Revenue Statistics of Government Railways.
v. Accidents Statistics of Indian Railways.
vi. Locomotive, Carriage and Wagon Workshop Repairs Statistics.
i. Passenger Zone Statistics, i.e., distance zone-wise data of passenger traffic
ii. Goods Zonal Statistics, i.e. distance zone-wise data of goods traffic

1.2.1.3. Waterways

The Ministry of Shipping encompasses within its fold shipping and ports sectors which include shipbuilding and ship-repair, major ports, national waterways, and inland water transport. Ministry of Shipping has been entrusted with the responsibility to formulate policies and programmes on these subjects and their implementation. The Transport Research Wing is the nodal agency for data collection, compilation and dissemination for both Ministry of Shipping & Ministry of Road Transport and Highways.

The Major Publications which depict the quantity and quality of data collected in respect of marine transportation system include:

i. Basic Port Statistics of India
ii. Statistics of Inland Water Transport
iii. Ship Building & Ship Repair Statistics
iv. Indian Shipping Statistics

The Agencies at the grass-root level which supply data include State Maritime Boards, State Governments and the Indian Ports Association.

1.2.1.4. Air Transport

Statistical Division of the Director General of Civil Aviation is responsible for maintaining civil aviation traffic statistics. This Division collects data pertaining to Civil Aviation from various sources viz. Air India, Indian Airlines, Private Operators, Foreign Airlines and various airports managed by Airports Authority of India. Airports Authority of India (AAI) manages a total of 125 Airports, which includes 11 International Airports, 8 Customs Airports, 81 Domestic Airports and 25 Civil Enclaves at Defence Airfields. AAI also provides Air Traffic Management Services

(ATMS) over entire Indian Air Space and adjoining oceanic areas with ground installations at all Airports and 25 other locations to ensure safety of aircraft operations. The data collected from all above mentioned source agencies are compiled and published annually in a publication entitled "India Air Transport Statistics."

The publication includes traffic statistics in respect of scheduled and non-scheduled air services of domestic as well as foreign carriers; detailed information on fleet strength, aircraft utilization, staff strength, financial results of Air India, Indian Airlines and Airport statistics for both international and domestic airports. Further, it includes statistics in respect of international traffic to/from India to various countries, domestic traffic carried by scheduled, non-scheduled and air taxi operators and traffic carried on tourist charter flights and flights operated under Open Sky Policy for all-cargo services. The data on passengers, freight & mail relates to revenue traffic only.

1.2.2. ENERGY INFRASTRUCTURE STATISTICS

1.2.2.1. Petroleum & Natural Gas

The information on Petroleum & Natural gas sector is based on data collected from various Public and Private Sector Companies under the purview of the Ministry of Petroleum & Natural Gas. The Ministry of Petroleum & Natural Gas has an Economics Division which brings out the major statistical publication "Basic Statistics on Indian Petroleum & Natural Gas" that forms a major data source for this Publication.

Petroleum Planning and Analysis Cell in the Ministry of Petroleum and Natural Gas renders effective assistance to the Ministry in the discharge of its responsibilities, particularly monitoring and analysis of trends in prices of crude oil, petroleum products and natural gas and their impact on the oil companies and consumers, and prepares appropriate technical inputs for policy making. It collects, compiles and disseminates data on the domestic oil and gas sector in a continuous manner and maintains the data bank and ensures quality of data in terms of prescribed parameters such as accuracy, completeness and timeliness. It also prepares periodic reports on various aspects of oil and gas sector.

1.2.2.2. Electricity

Central Electricity Authority under Ministry of Power collects statistics concerning generation, transmission, trading, distribution and utilization of electricity as per the provisions of the Electricity Act, 2003. The publication "General Review" contains All India Electricity Statistics pertaining to generation, transmission, distribution, trading and consumption of electricity by different sectors in the country.

The data for "All India Electricity Statistics -General Review" is collected from Utilities & Non-Utilities of the Indian Electricity Sector, Central Electricity Regulatory Commission, Planning Commission and Ministry of New and Renewable Energy Sources. The General Review contains data on various categories of electricity consumption like domestic, agriculture, industrial power, street lighting, water pumping schemes, traction etc., and also details about the number of consumers and the connected load. Data pertaining to utility sources and Captive Power Plants in Industries having demand of 1 MW and above is also included.

1.2.3. COMMUNICATION INFRASTRUCTURE STATISTICS

1.2.3.1. Telecommunication

The statistics related to telecommunication is compiled by Department of Telecommunication and Telecom Regulatory Authority of India (TRAI), under Ministry of Communication & Information Technology.

The statistics relating to telecom network i.e. exchanges, switching capacity, direct exchange lines, rural DELs, Tax, VPTs, Microwave and OFC is being obtained only from Public Operators. Subscriber data in respect of Public Operators is collected from BSNL and MTNL and that of Private operators is obtained from Association of Unified Telecom Service Providers of India (AUSPI) and Cellular Operators Association of India (COAI).

1.2.3.2. Postal Communication

The Department of Post compiles information on various parameters of postal communication. Information on post offices, post boxes etc. is obtained from concerned postal circles and compiled into a publication named "Book of Information".

1.2.4. IRRIGATION INFRASTRUCTURE STATISTICS

Central Water Commission (CWC), under Ministry of Water Resources maintains and publishes statistical data relating to water resources and its utilization including quality of water throughout India and acts as the central bureau of information relating to water resources. It also undertakes monitoring of selected major and medium irrigation projects, to ensure the achievement of physical and financial targets. Monitoring of projects under Accelerated Irrigation Benefit Programme (AIBP), and Command Development (CAD) programme has also been included in its field of activities.

CWC undertakes necessary surveys and investigations as and when so required and prepare designs and schemes for the development of river valleys in respect of power generation, irrigation by gravity flow or lift, flood management and erosion control, anti-water logging measures, drainage and drinking water supply. It also undertakes construction work of any river valley development scheme on behalf of the Government of India or State Government concerned. It initiates studies on socio-agro-economic and ecological aspects of irrigation projects for the sustained development of irrigation. It also conducts and coordinates research on various aspects of river development schemes such as flood management, irrigation, navigation, power development, etc., and the connected structural and design features. It conducts studies on dam safety aspects for the existing dams and stand related instrumentation for dam safety measures.

Some of the data is also collected from Water Resources Division of the Planning Commission. The subjects broadly dealt with in this Division are:-

(i) Major and Medium Irrigation

(ii) Minor Irrigation

(iii) Flood Control

(iv) Command Area Development Activities in the country.

1.2.5. DRINKING WATER & SANITATION INFRASTRUCTURE STATISTICS

The data for Drinking Water & Sanitation is taken from Ministry of Drinking Water & Sanitation and National Sample Survey (NSS) Reports on Housing Condition and Amenities in India released from time to time. The data in this issue is taken from the 65th round of NSS, the details of which are given below:

The 65th round (July 2008 – June 2009) of NSS was a multi-subject survey on 'Domestic Tourism', 'Housing Condition' and 'Urban Slums'. Information was collected on the particulars of living facilities, such as major source of drinking water, availability of bathroom, use of latrine, type of latrine, whether the household has electricity for domestic use, etc. Some aspects of this survey are described below:

- Geographical Coverage: The survey covered the whole of the Indian Union except (i) interior villages of Nagaland situated beyond five kilometres of the bus route and (ii) villages in Andaman and Nicobar Islands which remained inaccessible throughout the year.
- Period of survey: The fieldwork of 65th round of NSS was conducted during 1st July, 2008 to 30th June, 2009.
- Method of data collection: The survey used the interview method using a detailed schedule for data collection from a sample of randomly selected households. A stratified multi-stage design was adopted for the 65th round survey. The first stage units (FSU) were the 2001 census villages (Panchayat wards in case of Kerala) in the rural sector and Urban Frame Survey (UFS) blocks in the urban sector. For towns where no UFS frame was available (applicable to Leh and Kargil towns of J & K), each town was treated as an FSU. The ultimate stage units (USU) were households in both the sectors.

1.2.6. STORAGE INFRASTRUCTURE STATISTICS

Department of Food & Public Distribution under Ministry of Consumer Affairs, Food & Public Distribution undertakes formulation and implementation of national policies relating to procurement, movement, storage and distribution of food grains. It also provides for storage facilities for the maintenance of central reserves of food grains and promotion of scientific storage. The major Central Public Sector Enterprises & Regulatory Authorities include Food Corporation of India (FCI) and Central Warehousing Corporation (CWC). Functions of FCI primarily relate to procurement, storage, movement, distribution and sale of food grains on behalf of central governments. The main function of CWC is to provide scientific storage facilities for agricultural implements and produce and other notified commodities.

The data on storage infrastructure is compiled by Food Corporation of India and Central Warehousing Corporation.

1.3: CONCEPTS AND DEFINITIONS OF INFRASTRUCTURE STATISTICS

In India the notion of infrastructure was first discussed extensively by the Rangarajan Commission while examining the statistical system of India. The Commission in its report stated that infrastructure is an important input for industrial and overall economic development of a country. However, there is no clear cut definition of infrastructure nor its characteristics defined which can differentiate infrastructure sector from other sectors. Based on the necessity of infrastructure activities like power, transport, telecommunication, water, sanitation, disposal of waste etc. which are central to the activities of household and economic production, one could view these activities as essential inputs to the economic system. Infrastructure, therefore, tends not to be user or user specific and typically have long-lived engineering structures. It indicated six pertinent characteristics for identification of infrastructure sub-sectors, viz. (a) natural monopoly; (b) non-tradability of output; (c) bestowing externalities on society; (d) high-sunk costs or asset specificity; (e) non-rivalness (up to congestion limits) in consumption; and, (f) possibility of price exclusion; and, suggested that the following sub-sectors had all six characteristics:

- Railway tracks, signalling system, stations
- Roads, bridges
- Runaways and other airport facilities
- Transmission and distribution of electricity
- Telephone lines, telecommunications network
- Pipelines for water, crude oil, slurry, etc.
- Waterways, port facilities
- Canal networks for irrigation
- Sanitation or sewerage.

Initially, the above-listed infrastructure facilities was suggested by the Commission for taking up for data collection. Thereafter, considering characteristics (d) high-sunk costs or asset specificity, (e) Non-rivalness in consumption, and (f) Possibility of price exclusion only, the above list of infrastructure facilities may be extended.

To prepare statistical publication on infrastructure, a Standing Committee was constituted by CSO which finalised the coverage of sectors and sub sectors under infrastructure as given in the table below:

Infrastructure Sector	Sub-Sector	Coverage
Transport	Road Transport	Roads & bridges, tunnels, motor vehicles
	Rail Transport	Railways, signalling, communication system, rail yards, stations
	Inland Water Transport	Inland waterways, inland water vessels
	Sea and Coastal Transport	Seaports Ships and other vessels
	Air Transport	Airports, aircrafts
Energy/ Power	Electricity (Thermal, Hydro, Nuclear)	Generation plants, wind mills, transmission and distribution lines, electric substations Coal reserves, coal fields/ mines, coal washeries
	Petroleum and Natural Gas	Oil and gas pipeline networks Distribution terminals, gas fields/ wells, refineries
Drinking Water Supply and Sanitation	Drinking Water Supply	Water supply pipelines, filtration and treatment plants
	Sanitation	Sewage treatment plants, drainage pipelines, on site sanitation facilities, landfills, incinerators
Irrigation	Irrigation	Major and minor irrigation structures, command areas, irrigation canals, reservoirs, water shed development
Communication	Telecommunication	Telephone network (landlines,

		mobiles) internet servers, communication satellites, cable television network
	Postal Communication	Postal network, courier mail service
Storage	Storage	Food grain storage, cold storage, warehouses

The infrastructure statistics for each sub sector are classified under five indicators viz. Access, Quality, Fiscal Cost & Revenue, Utilization and Affordability. The definitions of some important statistics are given in the following sections. For detail concepts, classification and definitions, the manual on Infrastructure Statistics may be consulted.

1.3.1. TRANSPORT INFRASTRUCTURE

1.3.1.1. Road Infrastructure Statistics

- Road

A way on land with a right of way for the public

- Village Roads

These roads serve as the feeder roads as well as the roads for inter village movements. They pass through rural areas connecting the village to one another and to the nearest road of higher category viz. District Roads, State highways and National highways etc.

- District Roads

The branch roads of the State and National Highways to serve as the main roads for intra-district movements. They traverse the length and breadth of a district to connect the areas of production and marketing in the district to one another and to the national highways.

- Major District Roads

District Roads for which higher specifications are prescribed.

- Other District Roads

District Roads for which lower specifications are prescribed.

- Rural Roads

Other District Roads plus village Roads for which the specifications prescribed are lower.

- Urban Road

A road within the limits of the area of Municipality, Military Cantonment, Port or Railway Authority

- Project Road

A road within the limits of the area of a development project of a public authority for the exploitation of resources such as forest, irrigation, electricity, coal, sugarcane, steel etc.

- Highway

It is a main road for travel by the public between important destinations, such as cities and states

- National Highways

The arterial roads of the country for inter-State movement of goods and passengers. They traverse the length and width of the country connecting the national and State capitals, major ports and rail junctions and link up with border roads and foreign highways.

- State Highways

The arterial roads in a State for inter-district movements. They traverse the length and width of a state connecting the state capital, district headquarters and important towns and cities and link up with the national Highways and adjacent state highways.

- Road Density
    - Land

      Road Length/ Geographical Area
    - Population

      Road Length/ Population
- Surfaced Road

The surface of roads made with bitumen as a binder.

- Registered Vehicles

Vehicle registration is usually the compulsory registration of a vehicle with a government authority. Vehicle registration's purpose is to facilitate government regulation, punishment, or taxation of motorists or vehicle owners. Vehicles are often uniquely identified by a vehicle identification number. Registered vehicles typically display a vehicle registration plate. Registration of vehicles in India is done by the local Regional Transport Offices (RTO) of that state. Commercial vehicles registered in one state cannot enter another state without a permit,

which usually costs a lot. Passenger vehicles registered in one state, are allowed to pass through other state, but are not allowed to stay in another state for longer than 30 days.

- Transport Vehicle

Transport Vehicle means a public service vehicle or a goods vehicle.

- Route

Route means a line of travel which specifies the highway which may be traversed by a motor vehicle between one terminus and another.

- Traffic signs

Traffic signs include all signals, warning sign posts, direction posts, marking on the road or other devices for the information, guidance or direction of drivers of motor vehicles.

- State Transport Undertaking

State Transport Undertaking means any undertaking providing road transport service, where such undertaking is carried on by:

(i) the Central Government or a State Government

(ii) any road Transport Corporation established under section 3 of the Road Transport Corporation Act, 1950

(iii) Any municipality or any corporation or company owned or controlled by the Central Government or one or more State Governments, or by the Central Government and one or more State Government.

1.3.1.2. Rail Transport

- Route Kilometres

This represents the length of the railway routes open for traffic at the end of each year. In calculating the length of the route, double or more than double lines are counted only once.

- Track kilometer

Distance of each gauge owned by a railway including its worked lines treated as a single line and the extra distance due to double, treble, etc, tracks as also the length of sidings, etc.

- Running track kilometer

In addition to the route kilometrage the extra distance of multiple tracks i.e. double treble etc, tracks shall be treated as two or three or more tracks but shall exclude the tracks in sidings yards and crossings at stations.

- Train Kilometres

This represents the kilometres run by trains carrying passengers or goods or both as well as the kilometres run by empty trains. No deduction is made for departmental trains.

- Seat kilometer

Unit of measuring the carrying capacity of a passenger vehicle which is equivalent to the movement of one seat available in a coach or motor vehicle over a distance of one kilometer.

- Tone kilometer

Unit of measure which represents the movement of one tone over a distance of one kilometre.

- Gauge

Indian Railways uses four rail gauges: 1,676 mm (5 ft 6 in) Broad Gauge (BG) (Indian gauge), 1,000 mm (3 ft 3 3⁄8 in) Metre Gauge (MG) and two Narrow Gauges, 762 mm (2 ft 6 in) & 610 mm (2 ft).

- Number of Passengers and Metric Tonnes carried

The figures represent the number of passengers and weight in metric tonne of goods, originating on all Railways, treating passengers travelling or goods carried over two or more Railways as single journey.

- Passenger Kilometres and Net Tonne Kilometres

These figures represent the real indices of the volume of passengers and goods traffic handled. These are arrived at by multiplying the total number of passengers carried and the total tonnage of goods carried by the respective number of kilometres, over which they are moved.

- Wagon

Railway vehicle used for the carriage of goods.

- Density

The volume of traffic moving between any two points on the railway system. It is expressed in terms of passenger kilometres or net tonne kilometres and train kilometres per running track kilometre or route kilometre.

- Length of electrified lines

Length of lines provided with an overhead trolley wire or with a conductor rail.

- Carrying Capacity of a vehicle or wagon Passenger

The extent to which the vehicle can normally be loaded as shown by the wagon or van marking. The capacity is expressed for passenger stock in the number of seats/berths available.

- Rolling stock

All railway tractive and transport vehicles including travelling cranes

- Tonnes carried

This represents the quantum of goods originating on each railway as well as the quantum of goods received from other railways/gauges and also those crossing the railway.

- Average speed of passenger and goods trains

The average speed of trains- train kilometres per train engine hour- is not the average running speed but the average time taken over the division or section, including all stops at stations.

If the average speed of trains on a section is low, the running of trains should be carefully analysed and it will generally be found that the low average is due to delays on certain block sections or at one or more stations and that it is possible to increase the average speed by:-

(i) changing the timings of the trains; and /or

(ii) providing extra loops or other facilities

The stations at which the heaviest delays take place should be dealt with first until by a process of elimination there are no especially bad stations.

- Passengers carried

Refers to the number of passengers originating on each railway as well as the number of passengers received from other railways and also those crossing the railway.

- Passenger kilometer

Unit of measure of passenger traffic corresponding to the conveyance of a passenger over a distance of one kilometre.

1.3.1.3. Inland, Sea and Coastal Transport

- Port

A sheltered harbour where marine terminal facilities are provided, consisting of piers or wharves at which ships berth/dock while loading or unloading cargo, transit sheds and other storage areas where ships may discharge incoming cargo, and warehouses where goods may be stored for longer periods while awaiting distribution or sailing.

- Major Port and Non Major Port

The Major Ports are ports which are under the administrative purview of the Union Government while the Non-major Ports are under the administrative jurisdiction of the respective State Governments/UTs.

- Navigable Inland Waterways

A stretch of water, not part of the sea, over which craft of a carrying capacity not less than 50 tonnes can navigate when normally loaded. This term covers both navigable rivers and lakes (natural water courses, whether or not they have been improved for navigation purposes) and canals (water ways constructed primarily for the purpose of navigation).

- Length of Waterways

The length of rivers and canals is measured in mid channel and length of lakes, as well as lagoons, is counted as the length between the most distant points between which the transport is performed.

- Inland Waterways

An inland waterway forming a common frontier between two countries is reported by both.

- Inland Water Transport (IWT) Craft

Craft having a minimum carrying capacity of 20 tonnes designed for the carriage of goods by inland waterways.

- National Waterways

National Waterways means an Inland Waterway of India designated as a National Waterway by the Government.

- Vessels

Vessel includes any ship or boat or any description of a vessel or boat, or any artificial contivance used or capable of being used as a means of transportation on water.

- Freight

It denotes goods which are in the process of being transported from one place to another.

- Passenger Ship

A ship carrying more than twelve passengers.

- Cargo Ship

A ship which is not a passenger ship.

- Dead Weight tonnage (DWT)

Deadweight tonnage (often abbreviated as DWT for deadweight tonnes) is the displacement at any

loaded condition minus the lightship weight. It includes the crew, passengers, cargo, fuel, water, and stores. Like Displacement, it is often expressed in long tons or in metric tons. This presents the actual carrying capacity of a ship. Lightship or Lightweight measures the actual weight of the ship with no fuel, passengers, cargo, water, etc. on board.

- Cargo

Cargo is the goods or produce transported generally for commercial gain by ship or any other mode of transport.

- Cargo Handled

Cargo handled at the port is the key data of the port as it reflects the nature of port activity. It comprises cargo loaded, cargo unloaded and Trans-shipment.

- Containerised Cargo

Cargo packed in containers for easy handling and transporting of the same as a unit.

- Overseas traffic

The traffic between ports in two different countries, with the inward movement of goods termed 'Imports' and outward movements termed 'exports', both movements comprising the country's foreign trade.

- Average Stay at Working Berth

$$\frac{\text{Total Stay at Working Berth of Vessels sailed}}{\text{Total Number of Vessels sailed}}$$

- Average Pre-Berthing Waiting Time

$$\frac{\text{Total Pre-Berthing Time of Vessels sailed}}{\text{Total Number of Vessels sailed}}$$

1.3.1.3. Air Transport

- Traffic

For air transport purposes, traffic means the carriage of passengers, freight and mail.

- Seat Kilometres available

Seat kilometer is available when a seat is flown one kilometer. Seat kilometres available are equal to the sum of products obtained by multiplying the number of passenger seats available for sale on each flight stage by the stage distance.

- Tonne-kilometres available

A metric tonne of available payload space flown one kilometer. Tonne-kilometres available equals the sum of the products obtained by multiplying the number of tonnes available for the carriage of revenue load (passengers, freight and mail) on each flight stage by the stage distance.

- Freight (or mail) tonne-kilometres (performed)

A metric tonne of freight or mail carried one kilometre. Freight tonne-kilometres equal the sum of products obtained by multiplying the number of tonnes of freight, express, diplomatic bags carried on each flight stage by the stage distance. Cargo and freight includes express and diplomatic bags but not passenger's baggage. Mail tonne- kilometres are computed in the same way as freight tonne kilometres.

- Scheduled services

Services provided by flights scheduled and performed for remuneration according to a published timetable, or so regular or frequent as to constitute a recognizably systematic series, which are open to use by members of the public; extra revenue flights occasioned by overflow of traffic on scheduled flights; and preliminary revenue flights on planned new air services.

1.3.2. ENERGY INFRASTRUCTURE

1.3.2.1. Coal Mining and Quarrying

- Coal Washery

A Coal Washery or Coal Preparation Plant is a plant which removes ash from the coal to improve its quality as a commercial product.

- Coal Reserve

The economically mineable part of the coal resource, as defined in the JORC Code. It includes diluting materials and allowances for losses.

- Coal Resource

Coal in the ground with reasonable prospects for eventual economic extraction, as defined in the JORC Code.

- Coal Sizing Plant

Plant used to size, crush or screen coal to market specifications.

- Opencast

Open excavation made when extracting coal from the surface.

- Coke

The solid product obtained from carbonization of coal or lignite at high temperature.

- Coal Grades

The gradation of non-coking coal is based on Useful Heat Value (UHV), the gradation of coking coal is based on ash content and for semi coking / weakly coking coal it is based on ash plus moisture content , as in vogue as per notification.

- Grades of Coking Coal

Grade	Ash Content
Steel Grade –I	Not exceeding 15%
Steel Grade -II	Exceeding 15% but not exceeding 18%
Washery Grade -I	Exceeding 18% but not exceeding 21%
Washery Grade -II	Exceeding 21% but not exceeding 24%
Washery Grade -III	Exceeding 24% but not exceeding 28%
Washery Grade -IV	Exceeding 28% but not exceeding 35%

- Lignite

Often referred to as Brown coal is a soft brown coal with a low degree of coalification (process of formation of coal from vegetal matter). It's gross calorific value is 5,700 Kilo calorie/kilogram or less on an ash-free but moist basis.

1.3.2.2 Petroleum and Natural Gas

- Crude Oil (Crude petroleum)

Crude oil is a mineral oil consisting of a mixture of hydrocarbons of natural origin and associated impurities, such as sulphur. It exists in the liquid phase under normal surface temperature and pressure and its physical characteristics (density, viscosity, etc.) are highly variable.

- Petroleum Products

Petroleum products are any oil based products which can be obtained by distillation and are normally used outside the refining industry. The exceptions to this are those finished products which are classified as refinery feedstocks.

- Compressed natural gas (CNG)

CNG is natural gas for use in special CNG vehicles, where it is stored in high-pressure fuel

cylinders. CNG's use stems in part from its clean burning properties, as it produces fewer exhaust and greenhouse gas emissions than motor gasoline or diesel oil. It is used most frequently in light-duty passenger vehicles and pickup trucks, medium-duty delivery trucks, and in transit and school buses.

- Fuel oil

This covers all residual (heavy) fuel oils (including those obtained by blending). Kinematic viscosity is above 10 cSt at 80°C. The flash point is always above 50°C and density is always more than 0.90 kg/l.

  - Low sulphur content: heavy fuel oil with sulphur content lower than 1%.
  - High sulphur content: heavy fuel oil with sulphur content of 1% or higher.

- Natural gas

It comprises gases, occurring in underground deposits, whether liquefied or gaseous, consisting mainly of methane. It includes both "non associated" gas originating from fields producing hydrocarbons only in gaseous form, and "associated" gas produced in association with crude oil as well as methane recovered from coal mines (colliery gas).

- Liquefied natural gas (LNG)

Natural gas cooled to approximately –160°C under atmospheric pressure condenses to its liquid form called LNG. LNG is odourless, colourless, non-corrosive and non-toxic.

- Liquefied petroleum gases (LPG)

LPG are light paraffinic hydrocarbons derived from the refinery processes, crude oil stabilisation and natural gas processing plants. They consist mainly of propane (C3H8) and butane (C4Hl0) or a combination of the two. They could also include propylene, butylene, isobutene and isobutylene.

LPG is normally liquefied under pressure for transportation and storage.

- Oil Refinery

It converts crude oil into high-octane motor fuel (gasoline/petrol), diesel oil, liquefied petroleum gases (LPG), jet aircraft fuel, kerosene, heating fuel oils, lubricating oils, asphalt and petroleum coke etc.

1.3.2.3. Electricity

- Small Hydro Power

In India, hydro power projects with a station capacity of up to 25 megawatt (MW) each fall under the category of small hydro power (SHP).

SHP projects are classified based on capacity as follows.

• Micro hydro : up to 100 kW

• Mini hydro : 101–1000 kW (i.e. 1 MW)

• Small hydro : above 1 MW up to 25 MW

- Hydropower

Potential and kinetic energy of water converted into electricity in hydroelectric plants. Pumped storage should be included. Detailed plant sizes should be reported net of pumped storage.

- Solid biomass

Covers organic, non-fossil material of biological origin which may be used as fuel for heat production or electricity generation. It comprises:

- *Charcoal:* Covers the solid residue of the destructive distillation and pyrolysis of wood and other vegetal material.
- *Wood, wood wastes, other solid wastes:* Covers purpose-grown energy crops (poplar, willow, etc.), a multitude of woody materials generated by an industrial process (wood/paper industry in particular) or provided directly by forestry and agriculture (firewood, wood chips, bark, sawdust, shavings, chips, black liquor, etc.) as well as wastes such as straw, rice husks, nut shells, poultry litter, crushed grape dregs, etc. Combustion is the preferred technology for these solid wastes. The quantity of fuel used should be reported on a net calorific value basis.

- Utilities

A public utility (usually just utility) is an organization that maintains the infrastructure for a public service (often also providing a service using that infrastructure).

- Plant Load Factor

Plant load Factor is a measure of the output of a power plant compared to the maximum output it could produce.

1.3.3. COMMUNICATION INFRASTRUCTURE

1.3.3.1. Postal Communication

- Average number of persons served by post offices

Average number of persons served by one post office is an indicator for the access to postal network. It is calculated by dividing the population of an area by the number of post offices in that area during the reference period.

1.3.3.2. Telecommunication

- Fixed telephone lines

Fixed telephone line (previously called main telephone line in operation) is an active line (Active lines are those that have registered an activity in the past three months) connecting the subscriber's terminal equipment to the Public Switched Telephone Network (PSTN) and which has a dedicated port in the telephone exchange equipment. This term is synonymous with the terms *main station* or *Direct Exchange Line (DEL)* that are commonly used in telecommunication documents. It may not be the same as an access line or a subscriber. This should include the active number of analog fixed telephone lines, ISDN channels, fixed wireless (WLL), public payphones and VoIP subscriptions. If not included, specify in a note.

- Mobile cellular telephone subscriptions (post-paid + prepaid)

It refers to the subscriptions to a public mobile telephone service and provides access to Public Switched Telephone Network (PSTN) using cellular technology, including number of pre-paid SIM cards active during the past three months. This includes both analogue and digital cellular systems (IMT-2000 (Third Generation, 3G) and 4G subscriptions, but excludes mobile broadband subscriptions via data cards or USB modems. Subscriptions to public mobile data services, private trunked mobile radio, tele point or radio paging, and telemetry services should also be excluded. This should include all mobile cellular subscriptions that offer voice communications.

- Percentage of the population covered by a mobile cellular telephone network

Mobile cellular coverage of population in percent. This indicator measures the percentage of inhabitants that are within range of a mobile cellular signal, irrespective of whether or not they are subscribers. This is calculated by dividing the number of inhabitants within range of a mobile cellular signal by the total population. Note that this is not the same as the mobile subscription density or penetration. When there are multiple operators offering the service, the maximum amount of population covered should be reported.

- Total fixed (wired) Internet subscriptions

The number of total Internet subscriptions with fixed (wired) Internet access, which includes dial-up and total fixed (wired) broadband subscriptions. Only active subscriptions that have used the system within the past 3 months should be included.

- Dial-up Internet subscriptions

Number of Dial-up Internet subscriptions. Dial-up is a connection to the Internet via a modem and fixed telephone line, which requires that the modem dial a phone number when Internet access is

needed. Only active subscriptions that used the system during the past three months should be included.

- Estimated Internet users

The estimated number of Internet users out of total population. This includes those using the Internet from any device (including mobile phones) in the last 12 months. A growing number of countries are measuring this through household surveys. In countries where household surveys are available, this estimate should correspond to the estimated number derived from the percentage of Internet users collected. In situations where surveys are not available, an estimate can be derived based on the number of Internet subscriptions.

- Tele density

Tele density is the number of telephone connections for every 100 individuals living within an area.

1.3.4. IRRIGATION INFRASTRUCTURE

- Irrigation Potential Created

The total gross area proposed to be irrigated under different crops during a year by a scheme. The area proposed to be irrigated under more than one crop during the same year is counted as many times as the number of crops grown and irrigated.

- Irrigation Potential Utilised

The gross area actually irrigated during reference year out of the gross proposed area to be irrigated by the scheme during the year.

- Minor Irrigation(M.I.) Scheme

A Scheme having CCA up to 2,000 hectares individually is classified as minor irrigation scheme.

- Medium Irrigation Scheme

A scheme having CCA more than 2,000 hectares and up to 10,000 hectares individually is a medium irrigation scheme.

- Major Irrigation Scheme

A scheme having CCA more than 10,000 hectares is a major irrigation scheme.

- Culturable Command Area (CCA)

It is the area which can be physically irrigated from a scheme and is fit for cultivation.

- Gross command area (GCA)

The total area lying between drainage boundaries which can be commanded or irrigated by a canal system. G.C.A = C.C.A + unculturable area

- Ultimate irrigation potential

The ultimate irrigation potential is the gross area that can be irrigated from a project in design year for the projected cropping pattern and assumed water allowance on its full development. The gross irrigated area will be the aggregate of the areas irrigated on the different crop seasons, the areas under two seasonal and perennial crops being counted only once in a year.

The Ultimate irrigation potential of ground water may however, be taken as the total area that can be irrigated by utilizing the Annually Rechargeable Ground Water Resources available for irrigation considering the gross irrigation requirement of crops grown in an unit area.

1.3.5. WATER SUPPLY AND SANITATION INFRASTRUCTURE

- Water Supply Coverage

This indicator is determined by the number of households connected directly to the piped water supply system and the total number of households in the area served by the water utility.

- Coverage of toilets

It denotes the extent to which citizens have an access to a toilet in a service area.

- Service Area

It implies a specific jurisdiction in which service is required to be provided.

2

KEY INFRASTRUCTURE INDICATORS, 2014

2.1. INFRASTRUCTURE AND ECONOMIC GROWTH

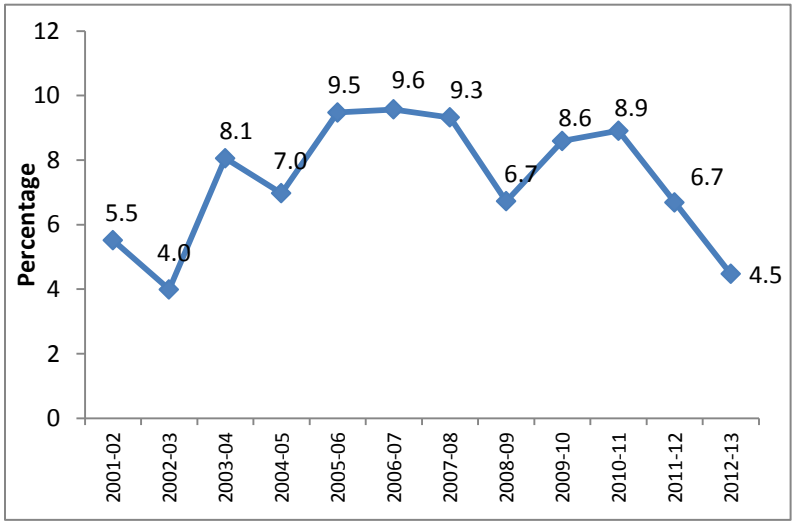
Infrastructure is one of the important factors that drive the economic growth of a country. Good infrastructure is the basic requirement for any production process to work efficiently. Infrastructure itself may not be the part of the production process, but is important for the services it provides. It is an important input to the production process and raises the productivity of other sectors. Infrastructure connects goods to the markets, workers to industry, people to services and the poor in rural areas to urban growth centers. Infrastructure lowers costs, enlarges markets and facilitates trade. Thus, infrastructure provides services that support economic growth by increasing the productivity of labor and capital thereby reducing the costs of production and raising profitability, production, income and employment.

A country's development is strongly linked to its infrastructure strength and its ability to expand trade, cope with population growth, reduce poverty and produce inclusive growth. The World Bank in its "World Development Report 1994" pointed out that productivity growth is higher in countries with an adequate and efficient supply of infrastructure services. Provision of infrastructure services to meet the demands of business, households and other users is one of the major challenges of economic development. In many surveys conducted by World Bank Group, private investors have cited reliable infrastructure services as an important consideration in their investment decisions. The report also points out that "infrastructure capacity grows step by step with economic output – a one percent increase in the stock of infrastructure is associated with a one percent increase in gross domestic product (GDP) across all countries". In an increasingly globalizing world, availability of good quality infrastructure is a crucial factor in attracting foreign investments. Availability and accessibility of adequate infrastructure in a country on par with international community is an indicator of the presence of high quality of life.

In Millennium Development Goals also the role of infrastructure in reducing poverty has been recognized. It has set increasing access to water supply and sanitation service as targets to be achieved by 2015. Infrastructure services contribute to poverty reduction and improvements in living standards in several ways. Greater access of the poor to education and health services, water and sanitation, employment, credit and markets for produce is needed. Lack of access to product and factor markets, prevents the rural poor to be a part of growth process. Making markets work for poor is the key element in reducing poverty. Infrastructure development enables the markets to expand and fall within the reach of the poor, thus making them part of the growth process.

India has emerged as one of the steadily growing economies in the world. The GDP Growth was remarkably above 9% during 2004-05 to 2008-09. It fell to 6.7% in 2008-09 as a consequence to world economic recession. It recovered immediately to 8.6% in 2009-10 and remained at 8.9 % in 2010-11. However, it slowed down to 6.7% in 2011-12 and then fell to 4.5% in 2012-13, the worst it has been in last nine years.

Graph 1: GDP growth rate at Factor Cost



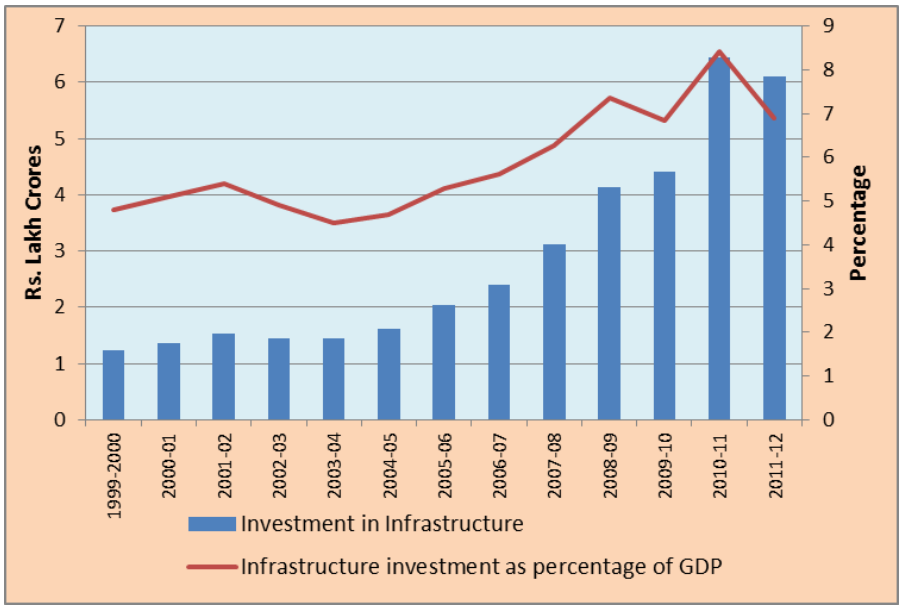
Source: National Account Statistics, CSO

Lack of high quality infrastructure has been an impediment in India's economic growth. To revive the economy a number of efforts are being undertaken, of which investment in infrastructure is one.

2.2. INFRASTRUCTURE INVESTMENT

The 11th five year plan laid special emphasis on the development of infrastructure and proposed strategies for better investment in infrastructure. With a projected GDP growth averaging 9% per year for the Eleventh Plan, the plan document estimated almost doubling infrastructure spending from 5% of GDP in 2006-07 to 9% by 2011-12 (terminal year of the Eleventh Plan). In its mid-term appraisal of the Eleventh Five Year Plan, the Planning Commission revised the estimates of total investment in infrastructure. Investment in infrastructure reached 7.18% of GDP in 2009-10 and was expected to increase to 8.37% in the terminal year of the plan.

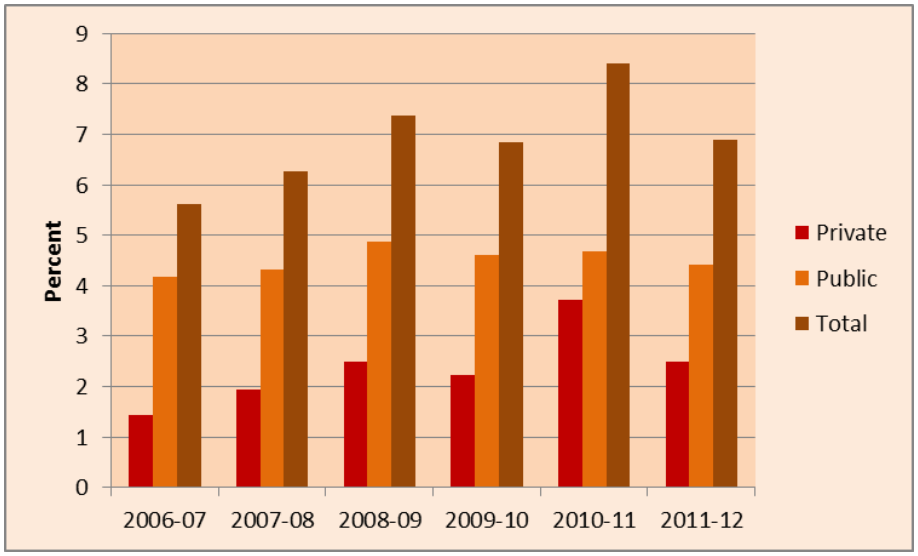
Graph 2: Investment in Infrastructure



Source: Plan Documents 11th and 12th plan. Planning Commission

To meet the eleventh plan projections, 30 % of the required investment was targeted to be met from private sector. Government took several steps to provide enabling environment for private sector participation. It has also set up the India Infrastructure Finance company for providing up to 20 % of the project costs by way of long term debt.

Graph 3: Share of Private Investment in Infrastructure Investment



Source: Plan Documents 11th and 12th plan. Planning Commission

The investment projection for 12th plan period stands at Rs. 5574663.0 crore as compared to Rs. 2424277 crore during 11th plan period. The sub sector with highest investment of 1502 thousand crores is electricity, followed by 944 thousand crore in telecommunications, 914 thousand crores in roads and bridges, 519 thousand crores in railways and 504 thousand crores in irrigation.

Table 1: Projected investment in Infrastructure-12th Plan

(Rs Crore at Current Prices)

	Total Eleventh Plan	Twelfth Plan Projections					Total Twelfth Plan
		2012-13	2013-14	2014-15	2015-16	2016-17	
Roads & bridges	453121	150466	164490	180415	198166	221000	914536
Railways	201237	64713	78570	96884	121699	157355	519221
MRTS(Mass Rapid Transport System)	41669	13555	17148	22298	29836	41322	124158
Airports	36311	7691	10716	15233	21959	32116	87714
Ports(including ILW)	44536	18661	25537	35260	49066	69256	197781
Electricity	728494	228405	259273	294274	333470	386244	1501666
Non-Conventional energy	89220	31199	42590	58125	79075	107637	318626
Oil & Gas Pipelines	62534	12211	16604	23833	36440	59845	148933
Telecommunications	384962	105949	136090	176489	230557	294814	943899
Irrigation (including watershed)	243497	77113	87386	99178	112506	128186	504371.0
Water Supply & Sanitation	120774	36569	42605	49728	58084	68333	255319.0
Storage	17921	4480	6444	9599	14716	23202	58441.0
Total	2424277	751012	887454	1061316	1285573	1589308	5574663.0

Source: Twelfth five year plan (2012-2017), Volume1, Planning Commission
http://planningcommission.nic.in/plans/planrel/12thplan/pdf/12fyp_vol1.pdf

2.3. INFRASTRUCTURE GROWTH

The investment strategies along with reform policies during eleventh plan period have improved the status of infrastructure in India. The sector showing tremendous increase is the telecom sector with internet and wireless subscribers increasing manifold with CAGR of 44% during 2006-07 to 2011-12. The wireless subscriber base showed maximum growth of 58% during 2007-08 but tumbled thereafter which may have resulted due to disconnection of inactive mobile subscribers by the telecom service providers and other policy changes during this period. The road transport in India has expanded significantly after independence, both in terms of spread (total road length & road density) and capacity (number of registered vehicles on road and the volume of passengers and freight traffic handled). The CAGR of road length during 2006-07 to 2011-12 is 3.3% with a steady annual growth of more than 2 % every year. The railways have not shown much increase in terms of rail track length as indicated by less than 1% CAGR during the above period. In aviation sector passenger air traffic and total cargo carried by air has shown significant growth with CAGR of 15.4% and 8.5% respectively. Accessibility of irrigation resources has increased in terms of

irrigation potential created over the plan periods; the maximum percentage growth registered was during 2010-11, with a CAGR of 2.5% during 2008-09 to 2011-12. Electrical power is of great importance due to country's climate and industrial base. Even a temporary loss of electricity can cause not only minor and major inconveniences, but also significant losses to our economy. Electricity generation has shown a CAGR of 7.2% during 2006-07 to 2011-12. In India coal is the critical input for major infrastructure industries like power, steel and cement. Coal production has increased over the years but its percentage growth declined to 0.12% in 2010-11 after constant growth rate of about 7.8% from 2008 to 2010**.**

Table 2: Growth of Infrastructure sub- sectors

Sector	Growth(%)						
	2006-07 over 2005-06	2007-08 over 2006-07	2008-09 over 2007-08	2009-10 over 2008-09	2010-11 over 2009-10	2011-12 over 2010-11	CAGR
Road Length	3.41	2.32	5.55	2.48	2.35	3.73	0.033
Rail track Length	0.17	1.46	1.36	0.44	0.37	0.90	0.008
Passenger air traffic	36.23	23.39	-7.13	15.22	17.02	12.46	0.154
Cargo carried by air	20.72	14.80	0.89	5.86	18.12	-6.67	0.085
Coal Production	5.84	6.09	7.81	7.97	0.12	1.36	0.048
Electricity generation	7.89	8.06	4.09	7.05	6.59	9.44	0.072
Wireless subscribers	62.07	58.14	50.05	49.15	38.90	13.25	0.443
Irrigation potential created			21.28	-53.92	163.63	-25.03	0.025

2.4. OVERVIEW OF INFRASTRUCTURE SUB – SECTORS

The statistics of key infrastructure indicators along with developments in each sub-sector of Infrastructure sector, wherever possible, are described in the following sections. For each sub sector the status of country as a whole is discussed followed by state level data for some key indicators for the latest available year. More detailed tables giving data for five years are given in the Volume II of the publication "Infrastructure Statistics -2014" which is available in electronic form on the website of the Ministry www.mospi.nic.in .The details of concepts, framework, classification and definitions of Infrastructure statistics are available in the manual on Infrastructure statistics also available on the website of the Ministry.

2.4.1. Transport Infrastructure

A modern transportation infrastructure network is necessary for our economy to function, and is a prerequisite for future growth. Businesses depend on a well-functioning transport infrastructure system to obtain their supplies, manage their inventories, and deliver their goods and services to markets**.** Furthermore, it also opens up rural areas for development and makes cities internationally competitive**.** Transport infrastructure facilitates the transportation of people and goods and provides them access to markets, employment and investment opportunities. An efficient transportation system can have a multiplier effect on the economy whereas a deficient transportation system can result in economic loss. For efficient transport system, an adequate infrastructure is very important. With growing population there is a need to provide matching transport infrastructure to avoid overcrowding, overloading and poor maintenance of the available infrastructure. Transportation can be provided by various modes depending on the surface over which one has to travel – land (road, rail, and pipelines), water (shipping) and air.

2.4.1.1. Road Transport

Road transportation is large consumer of space and has high maintenance costs, both for vehicles and infrastructures. They are mainly linked to light industries where small batches of freight are required to be transported. They are useful for everyday movement of people to their workplaces or to meet every day needs. For efficient road transportation we need good quality roads with proper signage and traffic regulation.

The road transport infrastructure in India has expanded manifold during more than six decades after independence, both in terms of spread (total road length & road density) and capacity (number of registered vehicles on road and the volume of passenger and freight traffic handled). Indian road network consists of National Highways, Expressways, state highways, major district roads, village roads etc.

Table 3: Indian Road Network (as on 31st March, 2012)

Indian Road Networks	Length(km)	Surfaced Road(km)	Surfaced Road(%)
National Highway	76818	76818	100
State Highway	164360	162950	99.14
Rural Roads	1938220	929789	47.97
Urban Roads	464294	339131	73.04
Other Roads	1747864	1327889	75.97
Total	**4865394**	**2698590**	**55.46**

Source: Basic Road Statistics, Ministry of Road Transport & Highways

Whereas national highways and state highways are well maintained, with more than 90 percent being surfaced; urban and rural roads are not in good condition. Only 48 percent of rural roads are surfaced.

The total road length has increased from 4.0 lakh km. in 1951 to about 48.7 lakh km in 2012, an increase to more than 12 times. The total length of National highways has increased from 22.2 thousand Km in 1951 to 76.8 thousand km in 2012, an increase to about 3.5 times.

Table 4: Trend in Indian Road Network

Year	Length of Roads (Thousand Km)	Length of National Highways (Thousand Km)	Length of state Highways (Thousand Km)	Share of Surfaced roads to total (%)
1951	400.0	22.2	NA	39.25
1961	524.5	23.8	NA	50.10
1971	915.0	24.0	56.8	43.50
1981	1485.4	31.7	94.4	46.00
1991	1998.2	33.7	127.3	51.30
2001	3373.5	57.7	132.1	47.48
2011	4690.3	70.9	163.9	49.92
2012	4865.4	76.8	164.4	55.46

Source: Basic Road Statistics published by Transport Research Wing, M/o Road Transport & Highways

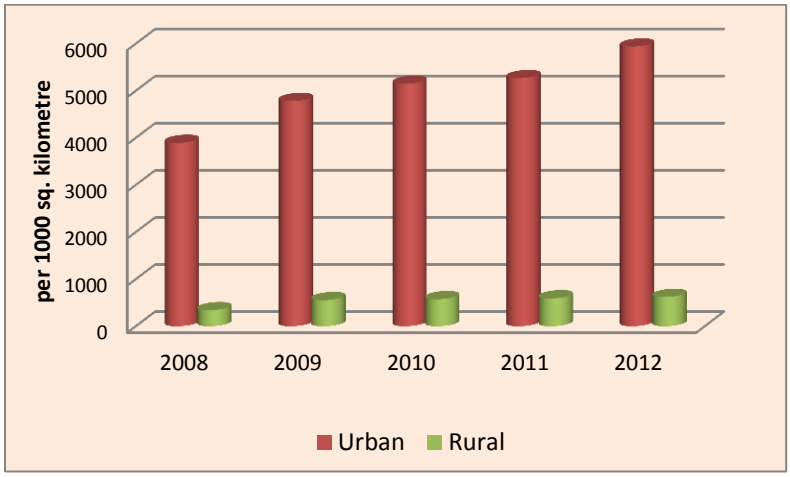
The road density is calculated both for area and population as accessibility and congestion indicators of roads. The road length per 1000 population has increased from 3.70 km in 2007-08 to 4.03 km in 2011-12, registering a CAGR of 2.2 %. In terms of availability of roads per unit area, the road length per 1000 sq. km increased from 1288.74 km in 2007-08 to 1480.07 km in 2011-12.

Table 5: Road Accessibility Indicators

Road Density	Km As on 31st March,2012
Road Length per 1000 sq. km	1480.07
Urban	5940.05
Rural	621.58
Road Length per 1000 Population	4.03
Urban	1.27
Rural	2.3

Comparison of rural and urban road density indicates significant increase in urban road network whereas that in rural area has remained almost same during last five years. Rural areas are lagging behind in accessibility to roads whereas urban roads are more congested with only 1.27 Km. of road per 1000 persons.

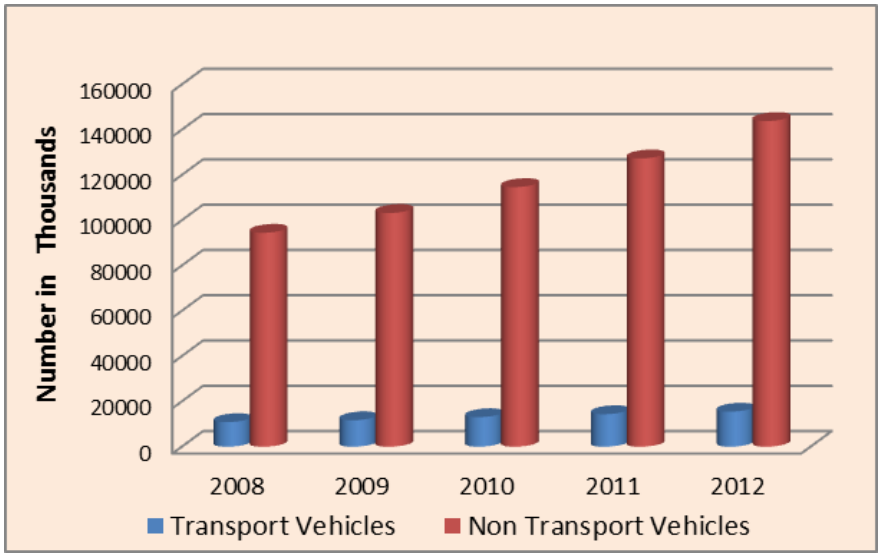
Graph 4: Road Density



The number of registered motor vehicles per thousand persons increased from 92.03 in 2007-08 to 132.02 in 2011-12(see Table 7) indicating improvement in accessibility of means of transport for

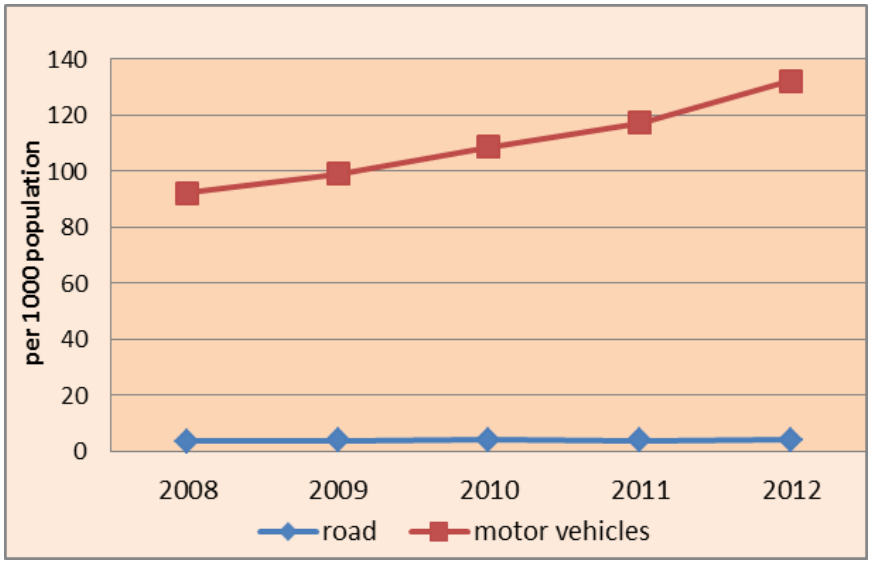
the people. As on 31st March, 2012, non-transport vehicles are 90% of the total number of registered motor vehicles in the country and thereby they are largely responsible for increase in road congestion. Out of the non-transport vehicles, two wheelers alone account for about 80% share in registered non-transport motor vehicles in the country.

Graph 5: Registered Transport and Non- Transport Vehicles



There has been a staggering increase in the number of motorized vehicles, but the expansion in the road network has not been commensurate with this increase. While the motor vehicle population has grown from 105 million in 2007-08 to over 159 million in 2011-12 with CAGR of 11% the road network has expanded from approximately 4.2 million km in 2007-08 to 4.8 million km in 2011-12, at a CAGR of 3.4% only. Consequently, the number of registered vehicles per km. of road has increased from about 25 to 33 during this period, adding to the road congestion. The total number of road accidents has increased from about 4.8 lakh in 2007-08 to 4.9 lakh in 2011-12.(Table 8) .The number of casualties from accidents has increased from 6.4 lakhs to about 6.5 lakhs during the above period.

Graph 6: Road Density vs. Motor Vehicle Density



Some important road infrastructure indicators at state level for the year 2011-12 (up to 31st March) are given in tables 6 to 8.

Table 6: State-wise Road Network Indicators (as on 31st March, 2012)

States	Total Road Length	Surfaced Road	Road Density	Road Density
	(km)	(%)	(per 1000 sq. km)	(per 1000 population)
Andhra Pradesh@	256448	67.18	932.39	3.00
Arunachal Pradesh	14980	87.83	178.88	11.94
Assam	284232	18.83	3623.65	9.19
Bihar	138517	47.18	1471.03	1.40
Chhattisgarh	75742	75.91	560.26	3.08
Goa	11082	70.63	2993.52	6.10
Gujarat	163149	89.84	832.29	2.73
Haryana	42638	90.71	964.40	1.65
Himachal Pradesh	50449	70.43	906.17	7.36
Jammu & Kashmir	36353	60.46	163.58	3.06
Jharkhand	26277	71.68	329.64	0.82
Karnataka	303128	65.58	1580.51	5.05
Kerala	215438	57.50	5543.52	6.19
Madhya Pradesh	201261	63.57	652.93	2.74
Maharashtra	396685	84.55	1289.14	3.47
Manipur	19252	54.32	862.27	7.77
Meghalaya	12103	65.45	539.61	4.57
Mizoram	11293	71.72	535.70	11.12
Nagaland	35189	47.84	2122.50	15.47
Odisha	254709	23.89	1635.82	6.20
Punjab	93871	89.18	1863.93	3.35
Rajasthan	248604	81.49	726.40	3.61
Sikkim	5616	86.57	791.43	9.07
Tamil Nadu	230200	81.71	1769.98	3.39
Tripura	29248	49.74	2789.24	8.00
Uttar Pradesh	403102	7.26	1673.12	1.97
Uttarakhand	52628	589.80	984.01	5.22
West Bengal	315404	41.82	3553.77	3.49
A & N Islands	1319	89.54	159.90	2.60
Chandigarh	1928	99.74	16912.28	1.28
D & N Haveli	810	99.63	1649.69	2.19
Daman & Diu	237	100.00	2116.07	0.84
Delhi	30711	71.72	20708.70	1.62
Lakshadweep	202	100.00	6312.50	2.62
Puducherry	2585	88.78	5396.66	1.78
Total	**3965394**	**63.43**	**1206.29**	**3.28**

*Total includes Rural Roads constructed under Jawahar Rozgar Yojana as on 31st March,1996

Source:Basic Road Statistics published by Transport Research Wing, M/o Road Transport & Highways

@:Andhra Pradesh includes the present state of Telangana.

Table 7: State- Wise Transport and Non-Transport Registered Vehicles (as on 31st March, 2012)

States	Registered Transport Vehicles	Registered Non Transport Vehicles	Total Registered Motor Vehicles	Registered Motor Vehicles
	(numbers)	(numbers)	(numbers)	(per 1000 population)
Andhra Pradesh@	1331416	11092912	12424328	145.33
Arunachal Pradesh			151279	120.54
Assam	309186	1497934	1807120	58.40
Bihar	272594	2840286	3112880	31.44
Chhattisgarh	184918	2919120	3104038	126.26
Goa	100749	764860	865609	476.39
Gujarat	1462815	12950902	14413717	241.03
Haryana	584573	5393537	5978110	231.23
Himachal Pradesh	140440	596164	736604	107.44
Jammu & Kashmir	154995	761903	916898	77.28
Jharkhand	965287	2192699	3157986	98.98
Karnataka	1062081	9847520	10909601	181.75
Kerala	1622543	5270771	6893314	198.07
Madhya Pradesh	467206	7676953	8144159	111.04
Maharashtra	1983759	17448602	19432361	170.18
Manipur	29942	184581	214523	86.57
Meghalaya	59934	137904	197838	74.63
Mizoram	22758	79072	101830	100.23
Nagaland	128748	147670	291438	128.10
Odisha	392443	3366087	3758530	91.44
Punjab	317191	5945748	6262939	223.83
Rajasthan	738280	8247198	8985478	130.43
Sikkim	14306	29028	43334	70.01
Tamil Nadu	1545346	15866902	17412248	256.58
Tripura	44663	159555	204218	55.83
Uttar Pradesh	608433	14836841	15445274	75.62
Uttarakhand	97379	1146663	1244042	123.37
West Bengal	465613	3395128	3860741	42.75
A & N Islands	7679	69384	77063	152.00
Chandigarh	34365	1024043	1058408	701.86
D & N Haveli	13419	71102	84521	228.44
Daman & Diu	9043	75813	84856	301.98
Delhi	280469	7069651	7350120	387.19
Lakshadweep	1355	8542	9897	128.53
Puducherry	28200	727076	755276	520.52
Total	**15482128**	**143842151**	**159490578**	**132.02**

Source: Road Transport Year Book published by Transport Research Wing, M/o Road Transport & highways

@: Andhra Pradesh includes the present state of Telangana

Table 8: State-Wise Traffic Accidents, Casualties and Persons Killed (2011-12)

States	Road Traffic Accidents	Accidents	Accidents	Casualties	Casualties	Persons killed	Persons killed
	(numbers)	per 1000 vehicles	per 1000 km road	(numbers)	per 1000 road accidents		%Killed out of casualties
Andhra Pradesh@	42524	3.42	165.82	66516	1564.20	14964	22.50
Arunachal Pradesh	251	1.66	16.76	537	2139.44	138	25.70
Assam	6535	3.62	22.99	9000	1377.20	2291	25.46
Bihar	10320	3.32	74.50	12198	1181.98	5056	41.45
Chhattisgarh	13511	4.35	178.38	16684	1234.85	3167	18.98
Goa	4312	4.98	389.10	2378	551.48	292	12.28
Gujarat	27949	1.94	171.31	35467	1268.99	7817	22.04
Haryana	10065	1.68	236.06	13898	1380.82	4446	31.99
Himachal Pradesh	2899	3.94	57.46	6357	2192.83	1109	17.45
Jammu & Kashmir	6709	7.32	184.55	10920	1627.66	1165	10.67
Jharkhand	5711	1.81	217.34	7792	1364.38	2818	36.17
Karnataka	44448	4.07	146.63	68107	1532.28	9448	13.87
Kerala	36174	5.25	167.91	46201	1277.19	4286	9.28
Madhya Pradesh	51210	6.29	254.45	64169	1253.06	8175	12.74
Maharashtra	66316	3.41	167.18	57180	862.24	13333	23.32
Manipur	771	3.59	40.05	1549	2009.08	158	10.20
Meghalaya	483	2.44	39.91	541	1120.08	219	40.48
Mizoram	110	1.08	9.74	249	2263.64	77	30.92
Nagaland	42	0.14	1.19	105	2500.00	56	53.33
Odisha	9285	2.47	36.45	14416	1552.61	3701	25.67
Punjab	6341	1.01	67.55	8817	1390.47	4820	54.67
Rajasthan	22969	2.56	92.39	37663	1639.73	9528	25.30
Sikkim	158	3.65	28.13	391	2474.68	55	14.07
Tamil Nadu	67757	3.89	294.34	94523	1395.03	16175	17.11
Tripura	888	4.35	30.36	1509	1699.32	272	18.03
Uttar Pradesh	29972	1.94	74.35	38304	1277.99	16149	42.16
Uttarakhand	1472	1.18	27.97	2421	1644.70	844	34.86
West Bengal	12290	3.18	38.97	19170	1559.80	5397	28.15
A & N Islands	236	3.06	178.92	313	1326.27	25	7.99
Chandigarh	419	0.40	217.32	483	1152.74	136	28.16
D & N Haveli	85	1.01	104.94	175	2058.82	53	30.29
Daman & Diu	50	0.59	210.97	68	1360.00	29	42.65
Delhi	6937	0.94	225.88	8499	1225.17	1866	21.96
Lakshadweep	3	0.30	14.85	3	1000.00	0	0.00
Puducherry	1181	1.56	456.87	1322	1119.39	193	14.60
Total	**490383**	**3.07**	**123.67**	**647925**	**1321.26**	**138258**	**21.34**

Source: Road Accidents in India published by Transport Research Wing, M/o Road Transport & Highways

@: Andhra Pradesh includes the present state of Telangana

2.4.1.2. Rail Transport

Heavy industries are linked by Rail transportation. The total route length of railway network has increased only marginally from 63273 kilometer in 2007-08 to 64600 kilometer in 2011-12 showing an increase of 1327 kilometers. The total track length increased from 111599 kilometer as on 31st March, 2008 to 115062 kilometer as on 31st March, 2012, showing an increase of 3463 kilometer during the period.

Table 9: Railway Network in India (as on 31st March, 2012)

Route Kilometre	64600
Track Kilometre	115062
Rail Density	
Route	
Per 1000 sq. km	19.65
Per 1000 Population	0.05
Track	
Per 1000 sq. km	35.00
Per 1000 Population	0.10
Average number of Passenger Trains Running per Day	12335
Average number of Passengers Carried per Day(in lakh)	225.33
AverageSpeed(Km/hr)	
Goods	25.00
Passenger	50.30
Passenger km(in crores)	104652.24
Tonnes km(in lakhs)	6686181.61

Source: Indian Railways Yearbook 2011-12, Railway Board, Ministry of Railways

The improvement in accessibility of rail transport is reflected in increase in average number of passenger trains running per day from 10385 in 2007-08 to 12335 in 2011-12 and increase in average number of passengers carried per day from 17.88 million in 2007-08 to 22.5 million in 2011-12. Rail travel shows significant improvement in quality in terms of positive growth in electrification of track and gauge conversion from narrow gauge, meter gauge to broad gauge. The percentage share of broad gauge route kilometers in total route kilometers increased from 81% in 2007-08 to 87% in 20011-12. (Table10).

Table 10: State –Wise Share of Broad Gauge in Total Route Kilometer
(As on 31st March 2012)

States	Gauge	Metre Gauge	Gauge	Share of Broad Gauge
Andhra Pradesh@	5264	0	0	100
Arunachal Pradesh	0	1	0	0
Assam	1470	989	0	60
Bihar	3039	559	0	84
Chhattisgarh	1098	0	89	93
Goa	69	0	0	100
Gujarat	3507	1192	559	67
Haryana	1536	14	3	99
Himachal Pradesh	50	0	246	17
Jammu & Kashmir	256	0	0	100
Jharkhand	2040	0	0	100
Karnataka	3090	0	0	100
Kerala	978	72	0	93
Madhya Pradesh	3944	349	661	80
Maharashtra	5037	106	459	90
Manipur	0	1	0	0
Meghalaya	0	0	0	0
Mizoram	0	2	0	0
Nagaland	11	2	0	87
Odisha	2469	0	0	100
Punjab	2144	0	12	99
Rajasthan	4756	979	87	82
Sikkim	0	0	0	0
Tamil Nadu	3250	693	0	82
Tripura	0	151	0	0
Uttar Pradesh	284	61	0	82
Uttarakhand	7685	1114	2	87
West Bengal	3758	63	179	94
A & N Islands	0	0	0	0
Chandigarh	16	0	0	100
D & N Haveli	0	0	0	0
Daman & Diu	0	0	0	0
Delhi	183	0	0	100
Lakshadweep	0	0	0	0
Puducherry	22	0	0	100
Total	**55956**	**6347**	**2297**	**87**

Source: Railway Board, M/o Railways
@: Andhra Pradesh includes the present state of Telangana

Table 11: State wise Rail density (Area and Population)

(As on 31st March 2012)

States	Route Kilometrage	Rail Density	Rail Density
	(numbers)	(per 1000 sq. km)	(per 1000 population)
Andhra Pradesh@	5264.16	19	0.06
Arunachal Pradesh	1.26	0	0.00
Assam	2458.93	31	0.08
Bihar	3598.09	38	0.04
Chhattisgarh	1187.47	9	0.05
Goa	69.31	19	0.04
Gujarat	5257.22	27	0.09
Haryana	1553.05	35	0.06
Himachal Pradesh	296.26	5	0.04
Jammu & Kashmir	255.67	1	0.02
Jharkhand	2040.04	26	0.06
Karnataka	3090.43	16	0.05
Kerala	1049.74	27	0.03
Madhya Pradesh	4954.32	16	0.07
Maharashtra	5601.62	18	0.05
Manipur	1.35	0	0.00
Meghalaya	0	0	0.00
Mizoram	1.5	0	0.00
Nagaland	12.85	1	0.01
Odisha	2468.57	16	0.06
Punjab	2155.39	43	0.08
Rajasthan	5822.28	17	0.08
Sikkim	0	0	0.00
Tamil Nadu	3942.78	30	0.06
Tripura	151.4	14	0.04
Uttar Pradesh	344.91	1	0.00
Uttarakhand	8800.4	165	0.87
West Bengal	4000.38	45	0.04
A & N Islands	0	0	0.00
Chandigarh	15.7	138	0.01
D & N Haveli	0	0	0.00
Daman & Diu	0	0	0.00
Delhi	183.23	124	0.01
Lakshadweep	0	0	0.00
Puducherry	22.16	46	0.02
Total	**64600.47**	**20**	**0.05**

Source: Railway Board, M/o Railways
@: Andhra Pradesh includes the present state of Telangana

2.4.1.3. SEA AND COASTAL TRANSPORT

For sea and coastal transport, ports provide the sheltered harbor where marine terminal facilities are provided. It consists of piers or wharves at which ships berth/dock while loading or unloading cargo. They provide critical capability for international trade connectivity. The major ports are ports which are under the administrative purview of the Union Government while the Non-Major Ports are under the administrative jurisdiction of the respective State Governments/U.T.s. Number of major ports and non - major ports are 12 and 200 respectively as on 31st March,2012. Accessibility of sea and coastal transport improved in terms of cargo and passenger traffic handled. Total cargo handled at major and non-major ports increased from 726 million tonnes in 2007-08 to 914 million tonnes in 2011-12. Similarly total passenger traffic handled increased from 16.6 million in 2007-08 to 21.4 million in 2011-12.

Table 12: Key Port Statistics (As on 31st March, 2012)

Major Ports	
Number	12
Cargo Traffic Handled (in million tonnes)	560.19
Cargo (in million tonnes) handled per port	46.68
Passenger Traffic Handled (in thousand numbers)	465.00
Passenger traffic (in thousand numbers) per port	38.75
Non -Major Ports	
Number	200.00
Cargo Traffic Handled (in million tonnes)	353.74
Cargo (in million tonnes) handled per port	1.77
Passenger Traffic Handled (in thousand numbers)	20974.40
Passenger traffic (in thousand numbers) per port	104.87

Source: Basic Port Statistics of India, Ministry of Shipping.

Graph 7: Cargo Handled by Major Ports

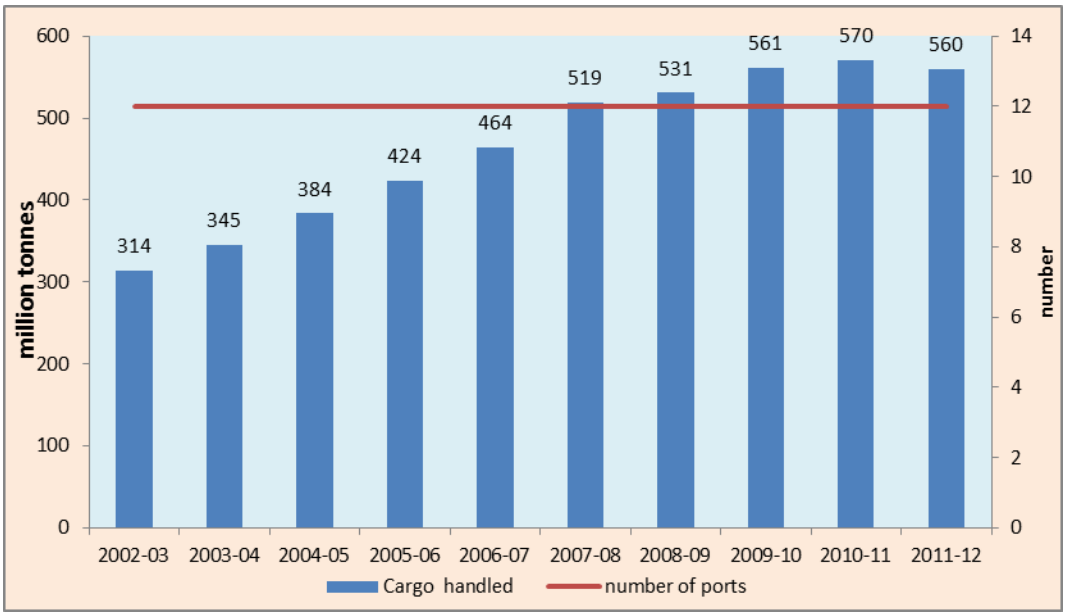


Table13: Cargo handled by Ports (Major and non- major) (2011-12)

States	Major Port		Non -Major Port		Total
	(1000 tonnes)		(1000 tonnes)		(1000 tonnes)
	Overseas	Coastal	Overseas	Coastal	
Andhra Pradesh@	44753	22667	39922	5711	113053
Goa	37914	1135	14470	0	53519
Gujarat	72361	10140	221314	37736	341551
Karnataka	27027	5914	435	157	33533
Kerala	13300	6790	6	98	20194
Maharashtra	102625	19291	12617	7330	141863
Odisha	41297	12957	5064	20	59338
Tamil Nadu	79201	19567	308	902	99978
West Bengal	35837	7411			43248
A & N Islands	_	_	10	1198	1208
Lakshadweep	_	_		26	26
Puducherry	_	_	6408	13	6421
Total	**454315**	**105872**	**300554**	**53191**	**913932**

Source : Transport Research Wing , M/o Shipping ,
@:Andhra Pradesh includes the present state of Telangana

2.4.1.4. AIR TRANSPORT

Air transportation has unlimited routes but are constrained by site for landing and takeoff of planes, climate, fog and aerial currents. Air transportation is especially useful in long distance mobility of people and has been one of the most important factors in the globalization.

As an infrastructure segment it has played vital role in facilitating the growth of business and economy in India. A robust civil aviation set-up is key to seamless flow of investment, trade and tourism, with significant multiplier effects through the economy. This sector not only provides air transport for passengers and goods, but also is a strategic element for employment generation. Civil aviation industry is an important engine for innovation and technological progress in a world of decreasing barriers to trade. Air transport sector has shown a notable increase in accessibility, in terms of fleet size and available seat kilometers, with increased participation by the private carriers. The fleet size of national carriers decreased from 146 aircrafts in 2007-08 to 126 aircrafts in 2011-12 and that of private carriers was 235 aircrafts in 2007-08 and 229 aircrafts in 2011-12.

Table14: Traffic Handled at Airports (2011-2012)

Passengers(in million numbers)		
International	407.96	
Domestic	121.51	
Total		529.47
Cargo(in 1000 Tonnes)		
International	1467.90	
Domestic	812.09	
Total		2279.99
Aircraft movements(in 1000 numbers)		
International	309.29	
Domestic	1235.36	
Total		1544.65
Source:Airports Authority of India		

The available seat kilometers for domestic traffic increased from 60 billion in 2007-08 to 78 billion in 2011-12 showing a CAGR of 6.8%. The available seat kilometers for international traffic increased from 54 billion in 2007-08 to 72 billion in 2011-12 showing a CAGR of 7.4%. Share of private carriers in available seat kilometers has rapidly increased during 2007 to 2011. For domestic traffic it increased from 78% in 2007-08 to 81% in 2011-12. Similarly the share of

private carriers in available seat kilometers for international traffic increased from 23% in 2007-08 to 45% in 2011-12. Number of operational airports increased from 109 to 120 during 2007-08 to 2011-12. Average number of flights handled per day increased from 2931 to 3385 and average number of passengers handled per day increased from 2.4 lakhs to 3.3 lakhs during 2007-08 to 2011-12, indicating increase in airport congestion.

Table15: State Wise Number of Airports (As on 31st March, 2012)

States	Number of Airports		
	Domestic	International	Total
Andhra Pradesh@	9	1	10
Arunachal Pradesh	2		2
Assam	7	1	8
Bihar	4	2	6
Chhattisgarh	2		2
Goa		1	1
Gujarat	9	1	10
Haryana			0
Himachal Pradesh	4		4
Jammu & Kashmir	2	1	3
Jharkhand	1		1
Karnataka	3	2	5
Kerala		3	3
Madhya Pradesh	8		8
Maharashtra	5	3	8
Manipur	1		1
Meghalaya	1		1
Mizoram	1		1
Nagaland	1		1
Odisha	2		2
Punjab	2	1	3
Rajasthan	5	1	6
Sikkim			0
Tamil Nadu	4	3	7
Tripura	4		4
Uttar Pradesh	6	2	8
Uttarakhand	2		2
West Bengal	5	2	7
A & N Islands		1	1
Chandigarh	1		1
D & N Haveli			0
Daman & Diu			0
Delhi	1	1	2
Lakshadweep	1		1
Puducherry	1		1
Total	**94**	**26**	**120**

Source: Material Supplied by Airports Authority of India
@: Andhra Pradesh includes the present state of Telangana.

Table16: State Wise Airport Traffic Indicators (2011-12)

States	Average Number of Flights Handled Per Day		Average Number of Passengers Handled Per Day		Average Cargo Handled Per Day	
	(number)		(number)		(tonnes)	
	Domestic	International	Domestic	International	Domestic	International
Andhra Pradesh@	283	39	21132	5286	97	120
Arunachal Pradesh						
Assam	95	1	7285	74	24	0
Bihar	29	3	2843	225	9	0
Chhattisgarh	29		2199		8	
Goa	65	11	8064	1584	11	6
Gujarat	120	15	13374	2041	63	32
Haryana						
Himachal Pradesh						
Jammu & Kashmir	71	0	7929	0	14	0
Jharkhand	18		1331		5	
Karnataka	295	55	30058	7174	229	388
Kerala	99	130	9141	17549	28	291
Madhya Pradesh	58		4189		15	
Maharashtra	617	202	71373	26868	603	1281
Manipur	23		1993		14	
Meghalaya						
Mizoram						
Nagaland						
Odisha	40		3434		6	
Punjab	16	10	1353	1091	0	19
Rajasthan	71	5	5976	637	18	1
Sikkim						
Tamil Nadu	299	112	28753	14236	254	753
Tripura	27		2292		19	
Uttar Pradesh	62	10	6430	1150	11	2
Uttarakhand						
West Bengal	253	44	25887	4357	228	120
A & N Islands	21	0	1674	0	7	0
Chandigarh	23	0	2197	0	8	0
D & N Haveli						
Daman & Diu						
Delhi	599	211	68855	29452	549	1008
Lakshadweep						
Puducherry						
Others	174	1	5134	46	4	0
Total	**3385**	**847**	**332895**	**111771**	**2225**	**4022**

Source:Material supplied by Airports Authority of India

@Andhra Pradesh includes the present state of Telangana

2.4.2. Energy Infrastructure

An effective energy infrastructure is the backbone of every modern economy. Economic development cannot go ahead if there is not sufficient energy to fuel it and no headway can be made with living conditions either. Growing economies like India need to have stable and sustainable sources of energy supply as it is an important input in the production process. Indirectly, it also affects the health and education system of the country. Affordable energy directly contributes to reducing poverty, increasing productivity and improving quality of life. An efficient energy system provides better opportunities for industries and production processes. A number of energy sources are used in India. In rural India, the main source is biomass. Most electricity supplies are generated by fossil fuels.

Coal is the most important and abundant fossil fuel in India. Coal and lignite together account for about 53.65% of the country's energy need. Considering the limited reserve potentiality of petroleum and natural gas, eco-conservation restriction on hydel project and geo-political perception of nuclear power, coal will continue to occupy center-stage of India's energy scenario. Natural gas is fast emerging as an alternative source of energy. For petroleum India is mainly dependent on imports. For transportation of oil and petroleum products, cross country pipeline networks play a key role to meet the country's demand of energy. These pipelines transport crude oil from import terminals as well as domestic sources to inland refineries and finished products from refineries to major consumption centers. The most visible form of energy, which is often identified with progress in modern civilization, is power, commonly called electricity. It is a critical component of infrastructure that determines the economic development of a country. To increase the availability of electricity, India has adopted a blend of thermal, hydel and nuclear resources. Out of these, coal based thermal power plants and in some regions hydro power plants have been the mainstay of electricity generation.

Energy infrastructure normally includes:

- The physical infrastructure required for the exploration, development and production of energy.

• Transformation of energy, such as electric power generation and oil refining.

• Transmission and distribution of energy, such as electric power transmission lines, oil and gas pipelines.

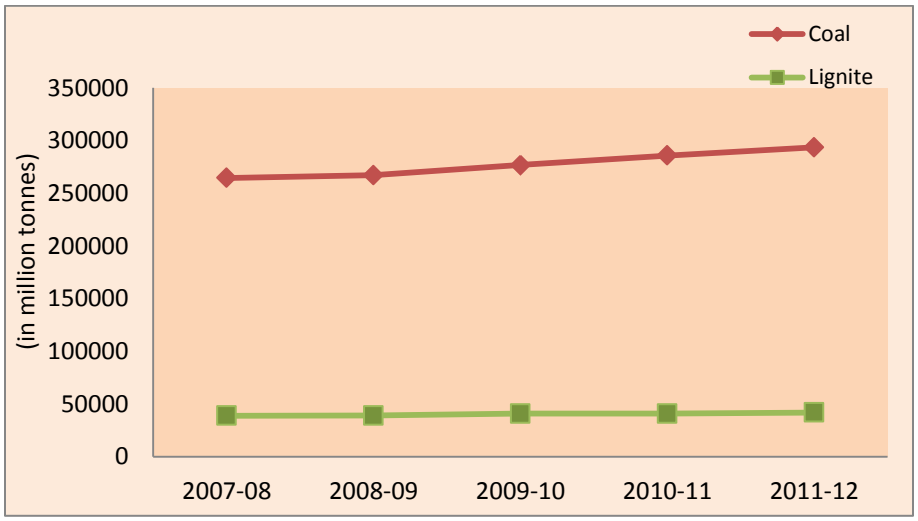
• Storage of energy products.

Considering these aspects the infrastructure statistics for energy is classified under three Sub sectors viz. Coal, Petroleum & Natural Gas and Electricity.

2.4.2.1. Coal Mining And Quarrying

The reserve capacity for coal production increased from 264 billion tones in 2007-08 to 293 billion tones in 2011-12 showing a CAGR of 2.64% per annum. The reserve capacity for lignite production increased from 39 billion tones in 2007-08 to 42 billion tones in 2011-12 showing a CAGR of 1.9% per annum.

Graph 8:Reserve Capacity of Coal & Lignite



2.4.2.2. Petroleum And Natural Gas Extraction

Total capacity has increased from 149 million tonne in 2007-08 to 187 million tonne in 2011-12. The crude oil reserves in India have decreased from 770 million tonnes in 2007-08 to 760 million tonnes in 2011-12 whereas natural gas reserves have increased from 1090 billion cubic meter to 1330 billion cubic metre.

The pipeline network has increased from 26166 km to 36494 km during 2007-08 to 2011-12.The crude oil production has increased from 34118 thousand tonnes to 38090 thousand tonnes during 2007-08 - 2011-12.The crude oil processed has increased from 156103 to 204121 thousand tonnes during 2007-08 - 2011-12.The capacity utilization of refineries in both public and private sector is running to full capacity indicating a need to set up new refineries.

Table 17: Installed Capacity of Refineries of Crude Oil, LPG Consumers & Distributors

(As on 31st March, 2012)

States	Installed Capacity of Refineries of crude oil	Crude Oil processed	LPG	
	(1000 tonnes/annum)	(Thousand Metric Tonnes)	(number)	(000' number)
			Distributors	Consumers
Andhra Pradesh@	8366	8751	1184	15600
Arunachal Pradesh			32	183
Assam	7000	6693	284	2448
Bihar	6000	5730	516	3825
Chhattisgarh			192	1380
Goa			53	490
Gujarat	84200	95432	570	6811
Haryana	15000	15496	303	4162
Himachal Pradesh			133	1528
Jammu & Kashmir			165	1677
Jharkhand			213	1464
Karnataka	15000	12798	570	8126
Kerala	9500	9472	422	7022
Madhya Pradesh			658	5980
Maharashtra	18500	20861	1241	17265
Manipur			39	285
Meghalaya			36	156
Mizoram			33	242
Nagaland			33	186
Odisha			262	2036
Punjab			469	5841
Rajasthan			635	6364
Sikkim			8	173
Tamil Nadu	11500	10565	817	13637
Tripura			35	332
Uttar Pradesh	8000	8202	1453	14591
Uttarakhand			181	1980
West Bengal	7500	8072	580	7383
A & N Islands			5	63
Chandigarh			27	380
D & N Haveli			2	55
Daman & Diu			2	56
Delhi			316	5073
Lakshadweep			1	2
Puducherry			19	323
Total	**213066**	**204121**	**11489**	**137119**

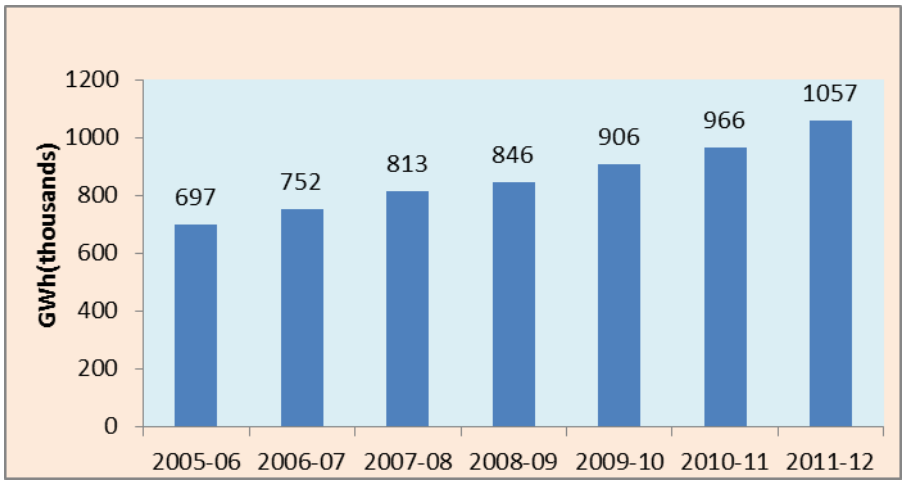
Source: M/o Petroleum & Natural Gas

@:Andhra Pradesh includes The present state of Telangana.

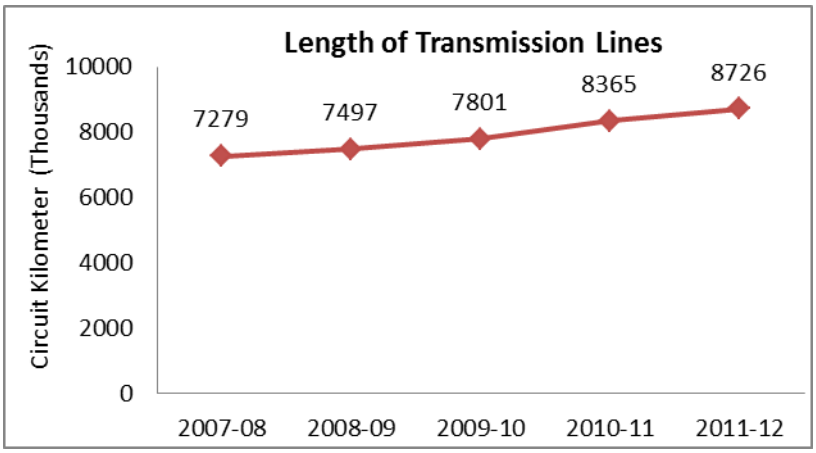
2.4.2.3. Electricity

To increase the availability of electricity, India has adopted a blend of thermal, hydel and nuclear resources. Out of these coal based thermal power plants and in some regions hydro power plants have been the mainstay of electricity generation. The noticeable feature of installed generating capacity is higher growth rates shown by renewable energy during 2007-08 to 2011-12 as compared to fossil fuels. The installed generating capacity in utilities over the above period increased from 143 thousand GWh to 200 thousand GWh (Table 18) showing a CAGR of 8.7%. During the same period installed capacity in non - utilities has shown a CAGR of 5%. Access to power has increased in terms of per capita electricity consumption, which has increased from 508 kilowatt hour to 883 kilowatt hour during 2007-08 -2011-12. Length of transmission and distribution lines increased from 7.3 million circuit km to 8.7 million circuit km. showing a CAGR of 4.5% during 2007-08 to 2011-12; while electricity sales grew at 7.96% during the same period.

Graph9: Actual Generation of Electricity

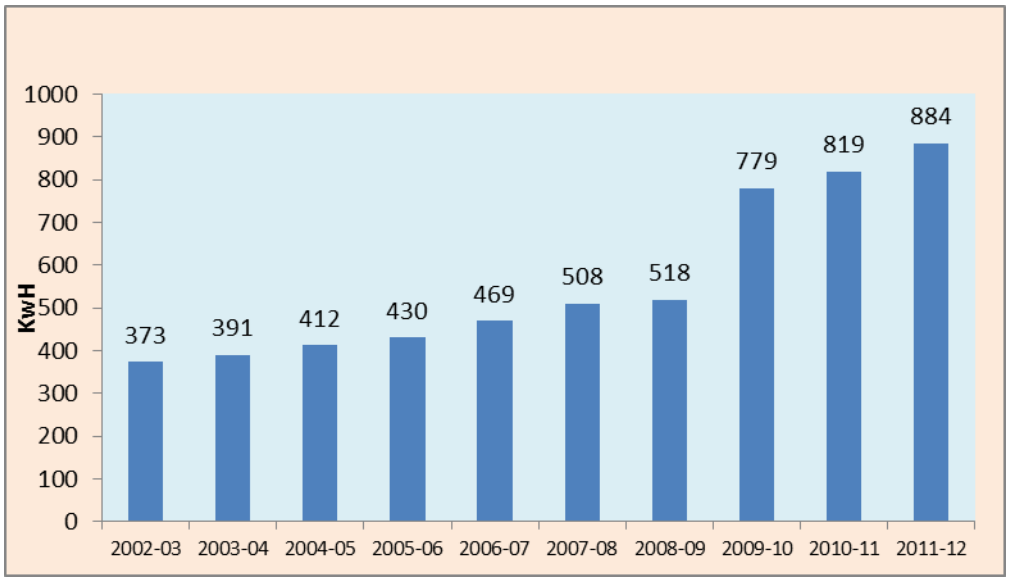


Graph10: Length of Transmission Lines

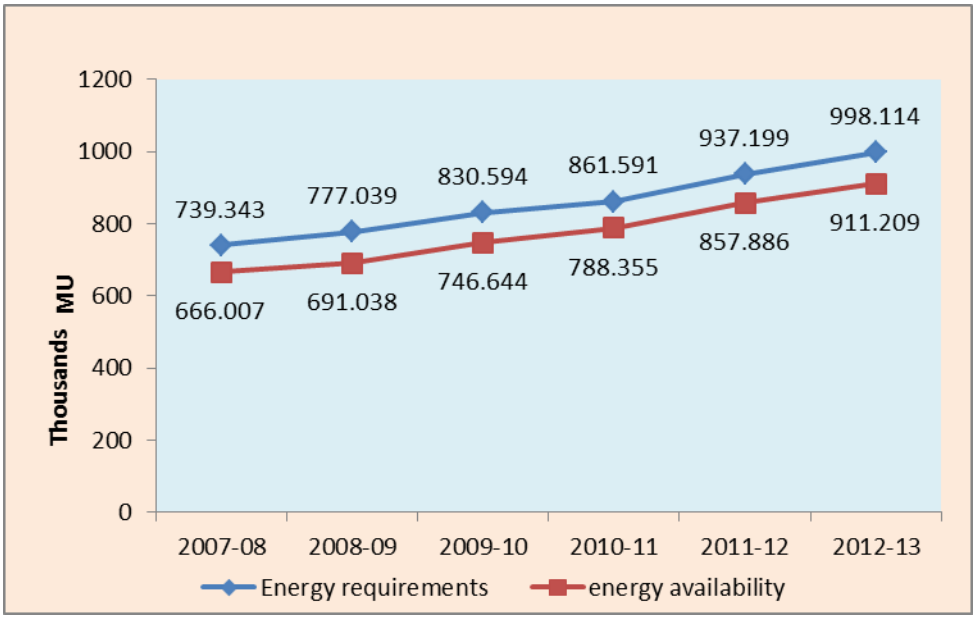


The share of nuclear energy generation increased from 2.3% to 3.5%. The percentage of villages electrified has increased from 81% to 94% during 2007-08 -2011-12.

Graph11: Per Capita Consumption of Electricity



Graph12: Demand and Supply Mismatch of Electricity



Source: Ministry of Power, http://powermin.nic.in/JSP_SERVLETS/internal.jsp

Table18: State- Wise Installed Generating Capacity of Electricity (As on 31st March, 2012)

States	Installed Generating Capacity (GWh)				
	Hydro	Thermal	Nuclear	Renewable	Total
Andhra Pradesh@	3734.52	8377.7	0	885.34	12998
Arunachal Pradesh	0	15.88	0	79.26	95
Assam	100	381.39	0	31.11	513
Bihar	0	430	0	79.8	510
Chhattisgarh	120	3613	0	274.15	4007
Goa	0	48	0	30.05	78
Gujarat	772	14728.7	0	3498.64	18999
Haryana	884.51	3848.92	0	122.7	4856
Himachal Pradesh	2071.6	0.13	0	526.77	2599
Jammu & Kashmir	780	183.94	0	130.53	1094
Jharkhand	130	1550	0	8.05	1688
Karnataka	3599.8	5014.42	0	3183.23	11797
Kerala	1881.5	430.44	0	281.24	2593
Madhya Pradesh	1703.67	2807.468	0	477.06	4988
Maharashtra	3331.83	13388	0	3630.05	20350
Manipur	0	45.41	0	5.45	51
Meghalaya	240	2.05	0	31.03	273
Mizoram	0	51.858	0	36.48	88
Nagaland	0	2	0	28.67	31
Odisha	2061.93	2220	0	97.3	4379
Punjab	2230.23	2655.00	0	353.58	5239
Rajasthan	987.96	4598.83	0	2365.55	7952
Sikkim	0	5.00	0	52.11	57
Tamil Nadu	2122.2	4657.96	0	7219.46	14000
Tripura	0	153.35	0	16.01	169
Uttar Pradesh	524.1	7117.00	0	686.98	8328
Uttarakhand	1652.15	0.00	0	185.87	1838
West Bengal	977	6483.57	0	161.45	7622
A & N Islands	0	60.05	0	5.35	65
Chandigarh	0	0.00	0	0.00	0
D & N Haveli	0	0.00	0	0.00	0
Daman & Diu	0	0.00	0	0.00	0
Delhi	0	1543.40	0	18.53	1562
Lakshadweep	0	9.97	0	0.75	11
Puducherry	0	32.50	0	0.03	33
Damodar Valley Corporation	143.2	6840.00	0	0.00	6983
Central Sector All India	8942.2	40307.23	4780	0.00	54029
Total	**38990.4**	**131603.17**	**4780**	**24503.45**	**199877**

Source: All India Electricity Statistics, Published by Central Electricity Authority, M/o Power

@: Andhra Pradesh includes the present state of Telangana

Table19: State-Wise Actual Generation of Electricity (2011-2012)

States	Installed Generating Capacity (GWh)				
	Hydro	Thermal	Nuclear	Renewable	Total
Andhra Pradesh@	3734.52	8377.7	0	885.34	12998
Arunachal Pradesh	0	15.88	0	79.26	95
Assam	100	381.39	0	31.11	513
Bihar	0	430	0	79.8	510
Chhattisgarh	120	3613	0	274.15	4007
Goa	0	48	0	30.05	78
Gujarat	772	14728.7	0	3498.64	18999
Haryana	884.51	3848.92	0	122.7	4856
Himachal Pradesh	2071.6	0.13	0	526.77	2599
Jammu & Kashmir	780	183.94	0	130.53	1094
Jharkhand	130	1550	0	8.05	1688
Karnataka	3599.8	5014.42	0	3183.23	11797
Kerala	1881.5	430.44	0	281.24	2593
Madhya Pradesh	1703.67	2807.468	0	477.06	4988
Maharashtra	3331.83	13388	0	3630.05	20350
Manipur	0	45.41	0	5.45	51
Meghalaya	240	2.05	0	31.03	273
Mizoram	0	51.858	0	36.48	88
Nagaland	0	2	0	28.67	31
Odisha	2061.93	2220	0	97.3	4379
Punjab	2230.23	2655.00	0	353.58	5239
Rajasthan	987.96	4598.83	0	2365.55	7952
Sikkim	0	5.00	0	52.11	57
Tamil Nadu	2122.2	4657.96	0	7219.46	14000
Tripura	0	153.35	0	16.01	169
Uttar Pradesh	524.1	7117.00	0	686.98	8328
Uttarakhand	1652.15	0.00	0	185.87	1838
West Bengal	977	6483.57	0	161.45	7622
A & N Islands	0	60.05	0	5.35	65
Chandigarh	0	0.00	0	0.00	0
D & N Haveli	0	0.00	0	0.00	0
Daman & Diu	0	0.00	0	0.00	0
Delhi	0	1543.40	0	18.53	1562
Lakshadweep	0	9.97	0	0.75	11
Puducherry	0	32.50	0	0.03	33
Damodar Valley Corporation	143.2	6840.00	0	0.00	6983
Central Sector All India	8942.2	40307.23	4780	0.00	54029
Total	**38990.4**	**131603.17**	**4780**	**24503.45**	**199877**

Source: All India Electricity Statistics, Published by Central Electricity Authority, M/o Power

@: Andhra Pradesh includes the present state of Telangana.

Table20: State – Wise Consumption of Electricity& Per Capita Consumption (2011-12)

States	Electricity Consumption					Per Capita Consumption
	(GWh)					(kWh)
	Domestic	Industrial	Agriculture	Others	Total	
Andhra Pradesh@	16914.47	29528.47	19076.05	11735.69	77254.68	1156.52
Arunachal Pradesh	143.56	128.50	0.00	163.99	436.05	683.13
Assam	1487.80	2554.99	31.99	1155.02	5229.80	249.82
Bihar	2368.10	1834.40	348.37	1802.87	6353.74	133.61
Chhattisgarh	3313.35	17904.95	2181.05	2009.08	25408.43	1319.56
Goa	713.92	1773.50	21.63	545.36	3054.42	2025.46
Gujarat	10008.87	47979.07	13492.34	5159.48	76639.76	1663.23
Haryana	5751.66	8653.05	9471.67	4730.73	28607.11	1628.31
Himachal Pradesh	1399.00	4383.76	70.41	1077.95	6931.12	1289.39
Jammu & Kashmir	1431.98	852.78	140.67	1844.82	4270.25	1015.19
Jharkhand	3353.99	15101.04	95.93	1757.77	20308.73	790.20
Karnataka	8771.53	20983.22	15965.68	8650.91	54371.34	1081.35
Kerala	7772.99	4812.83	295.29	3719.30	16600.42	671.54
Madhya Pradesh	6619.24	11372.59	8018.04	6355.89	32365.76	671.54
Maharashtra	20843.55	39408.60	24725.14	16834.24	101811.52	1204.38
Manipur	173.72	29.26	0.83	121.02	324.83	235.86
Meghalaya	344.72	613.27	0.41	209.82	1168.22	657.57
Mizoram	170.92	2.09	0.09	78.95	252.05	506.74
Nagaland	202.36	16.09	0.04	99.00	317.49	257.18
Odisha	3983.12	25472.72	151.45	2670.08	32277.37	1145.79
Punjab	8635.93	12578.33	10248.62	3843.97	35306.85	1799.01
Rajasthan	7262.27	17880.30	15351.69	5427.12	45921.38	927.36
Sikkim	115.70	162.84	0.00	92.08	370.62	886.36
Tamil Nadu	17332.00	31490.42	10761.00	10349.00	69932.42	1276.57
Tripura	262.23	89.61	39.74	162.39	553.97	253.82
Uttar Pradesh	18200.00	22522.45	8756.00	11793.00	61271.45	449.89
Uttarakhand	1675.92	5260.63	325.02	1446.26	8707.83	1232.17
West Bengal	9689.41	18229.22	1295.83	6976.63	36191.09	563.78
A & N Islands	93.98	10.89	0.00	93.75	198.62	501.40
Chandigarh	525.79	255.63	1.27	519.98	1302.67	1217.37
D & N Haveli	58.00	4049.22	2.00	34.00	4143.22	13766.56
Daman & Diu	74.37	1654.83	0.00	42.50	1771.69	7785.22
Delhi	10839.24	3037.75	35.60	9103.50	23016.09	1586.73
Lakshadweep	23.37	0.40	0.00	9.77	33.54	550.25
Puducherry	546.54	1663.88	0.00	279.88	2490.30	2124.71
Total	**171103.60**	**352291.26**	**140960.42**	**120839.24**	**785194.52**	**883.63**

Source: All India Electricity Statistics, Published by Central Electricity Authority, M/o Power
@: Andhra Pradesh includes the present state of Telangana

2.4.3. Communication Infrastructure

Communication is an important part of economic development. It facilitates exchange of commercial activities and integrates the nation economically and socially. Communication system connects a place to rest of the world and provides facilities to trade both nationally and internationally. Telecommunication and posts are the two main constituents of communication system.

2.4.3.1. Postal Communication

Postal communication system had been the main method of communication in India for nearly a century and half. It is viewed as the most dependable means of written communication. Postal services have provided other services as well in addition to delivery of letters. These are:

- Delivery of letter and other mail
- Savings Bank operations
- Money transfer
- Provision of Life Insurance

It is used as the most reliable means of sending money through money orders and for delivering articles of value. The banking services provided by Post Offices attract a large number of people both from rural and urban areas due to easy accessibility and wide network of post offices. India has the largest postal network in the world. Postal network is showing a declining trend during 2007-2010 in terms of number of post offices, post boxes/ post bags rented by public.

While on one hand network expansion in terms of post offices is showing negative growth trend, there is appreciable increase in computerization and modernization of post offices. Number of computerized post offices increased from 9939 in 2007-08 to 24969 in 2011-12 showing a high CAGR of 25.9%. Revenue earned through postal services has increased from 549490 lakh rupees in 2007-08 to 789935 lakh rupees in 2011-12 showing a CAGR of 9.5%, while net expenditure on Postal Sector has increased at a rate of 18.26% during the same period. Mail Traffic, Air Mail Traffic, Inland Money Order are all showing declining trend during 2007-08 to 2011-12 indicating a decline in the utilization of post

services. This can be attributed to the increased use of modern communication tools like cellphones, cheaper internet services etc.

Table 21: Average number of persons served by post offices, Mail traffic and inland money order (2011- 2012)

States	Average number of persons served by post offices	Mail Traffic		Inland Money Order
	(number)	(in thousand)		(in lakh number)
		Registered	Unregistered	
Andhra Pradesh@	5297	12604	490536	14
Assam	7723	4400	107502	3
Bihar	10935	4273	102140	3
Chhattisgarh	7862	2408	48853	3
Delhi	32957	8662	185972	8
Gujarat	6660	11276	525668	6
Haryana	9705	2150	123725	2
Himachal Pradesh	2468	1810	55884	9
Jammu & Kashmir	7000	902	32226	2
Jharkhand	10308	2601	36611	2
Karnataka	6186	9357	442865	144
Kerala	6867	11509	509208	11
Madhya Pradesh	8822	4180	191761	5
Maharashtra	8880	21025	954762	41
North -East	15205	1525	58049	4
Odisha	5036	4420	114270	7
Punjab	7270	5155	178644	9
Rajasthan	6673	8447	240387	57
Tamil Nadu	5625	16752	717801	336
Uttar Pradesh	11560	20829	369127	11
Uttarakhand	3710	4058	52225	3
West Bengal	9967	32803	240501	19
Total	**7803**	**191146**	**5778717**	**699**

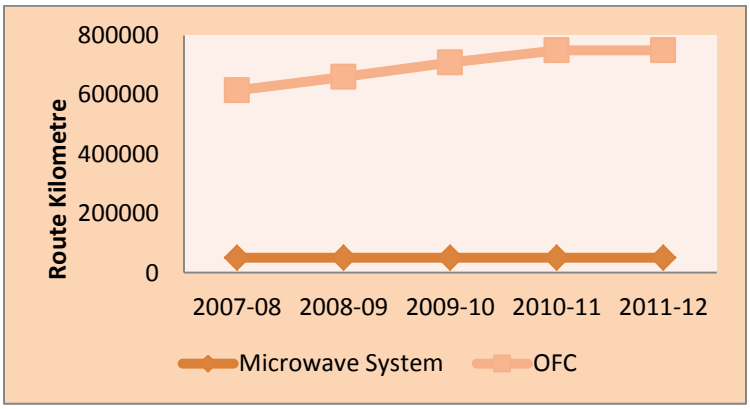
Source: Department of Posts

@: Andhra Pradesh includes the present state of Telangana.

2.4.3.2. Telecommunication

The telecommunications sector plays an increasingly important role in the Indian economy. It contributes to economic growth and generates revenue for the government and creates employment. There are continuous technological changes and evolving regulatory climate. Mobile phones are popular due to their personal, portable, and digital nature, enabling people to be always connected. There are increasing innovations, especially development of mobile applications. The low cost of handsets in India and the innovative telecom network have lowered the barrier to entry of consumers to the market. The increase in teledensity has mainly been driven by the increase in mobile phones. Planned investment outlay in the telecommunications sector has increased over time. Majority of investment over the decade has come from the private sector. During 2007-08 to 2011-12 telecom network capacity has increased in terms of total switching capacity, rural direct exchange lines and trunk auto exchange lines. Total number of exchanges decreased from 38702 in 2007-08 to 38189 in 2011-12.Public sector switching capacity increased from 959.76 lakhs to 1379 lakhs at a high CAGR of 9.48. The length of optical fibre cable (OFC) Route Kilometers increased from 5.6 lakh km to 6.98 Lakh kilometers showing a positive CAGR of 5.7%.On the other hand, the microwave system Route kilometer have remained unchanged during the period.

Graph 13:Length of Telecom Lines



The wire line connections have declined from 394 lakhs in 2007-08 to 322 lakhs (Table 22) in 2011-12,whereas wireless subscribers have increased significantly from 2611 lakhs

in 2007 to 9192 lakhs in 2011-12.Teledensity has shown enormous increase from 2.622 per thousand population to 7.866 per thousand population during 2007-08 to 2011-12.The internet connections have doubled during the period from 11 million to 23 million, of which broadband connections have increased from 4 million to 14 million whereas wireless internet connections have increased from 66 million to 449 million.

Graph 14:Total Wireless subscribers

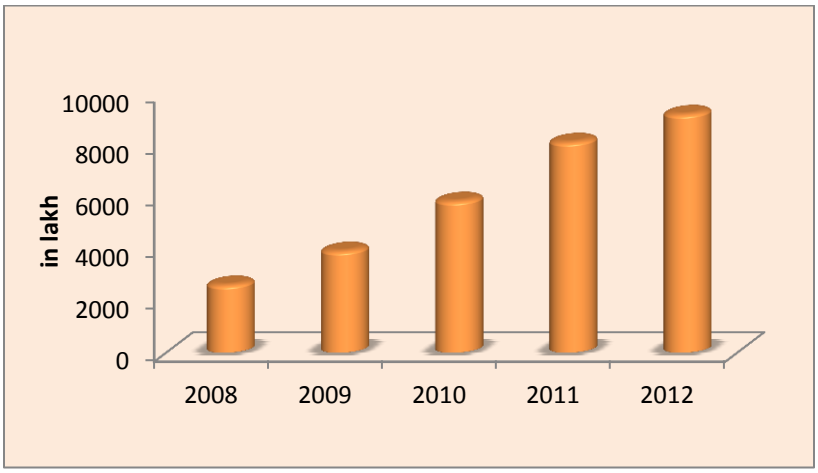


Table 22: Wire line connections, wireless subscribers & tele density (As on 31st March, 2012)

States	Wireline connections	Wireless subscribers	Teledensity
	(in lakh)	(in lakh)	per 1000 population
Andhra Pradesh@	23.61	668.27	8.09
Assam	2.30	142.08	4.66
Bihar	6.10	634.81	4.89
Chhattisgarh	INCLUDED IN MADHYA PRADESH		
Gujarat	18.31	533.22	9.11
Haryana	5.92	225.58	8.94
Himachal Pradesh	3.08	79.71	12.07
Jammu & Kashmir	2.04	63.07	5.48
Jharkhand	INCLUDED IN BIHAR		
Karnataka	26.91	557.14	9.72
Kerala	31.90	340.16	10.66
Madhya Pradesh	11.39	516.22	5.38
Maharashtra	26.46	704.69	7.72
North East	2.52	85.18	6.57
Odisha	4.63	266.19	6.58
Punjab	14.42	319.54	11.31
Rajasthan	11.64	491.60	7.30
Tamil Nadu	31.92	776.78	11.66
Uttar Pradesh-(East)	12.72	750.74	6.09
Uttar Pradesh-(West)	7.97	536.37	#
Uttarakhand	INCLUDED IN UTTAR PRADESH-WEST		
West Bengal	6.81	462.73	6.15
A & N Islands	INCLUDED IN WEST BENGAL		
Delhi	29.13	424.89	23.86
Kolkata	11.83	249.90	17.22
Mumbai	30.10	362.85	18.35
Total	**321.71**	**9191.75**	**7.87**

Source: Material supplied by Department of Telecommunications & Department of Information Technology

#: Included in Uttar Pradesh-East

@: Andhra Pradesh includes the present state of Telangana.

2.4.4. Irrigation Infrastructure

Irrigation is an essential component of agriculture in India as the rains occur only for three to four Months. During rest of the year irrigation is the only source of water for agriculture. Access to good irrigation allows people to increase their productivity. They can also diversify to other crops. Irrigation reduces the vulnerability of farmers to unpredicted rains and other external shocks, thus enhancing their chances of higher productivity and better incomes. Availability of irrigation facilities encourage farmers to switch from low value subsistence production to high valued market oriented production. They can substitute low yielding crops with high yielding and more profitable crops. Irrigation through canals, wells and other sources is considered as a catalyst of economic development of a country. Government of India has made massive investment in developing irrigation sources (major, medium and minor) in the country since independence. The Government gave high priority to the construction of major irrigation related infrastructure. These investments in turn have largely impacted the economic and social development of the country. Assured water supplies have consistently increased crop yields on irrigated land than yields from rain fed agriculture, thereby promoting national food security. Because of these created storage works it has now become possible to provide assured irrigation in the command area, to ensure supply for hydropower and thermal power plants located at different places and to meet requirement for various other uses. Flood moderation could be effected in flood prone basins, where storage has been provided. Besides, supply of drinking water in remote places throughout the year has become possible in different parts of the country.

Irrigation projects in India are classified into three categories –major, medium & minor according to the area cultivated. The classification criteria are as follows:-

i. Major irrigation projects: projects which have a cultural command area (CCA) of more than 10,000 ha but more than 2,000 ha utilize mostly surface water resources.

ii. Medium irrigation projects: projects which have CCA less than 10,000 ha. but more than 2,000 ha. utilizes mostly surface water resources.

iii. Minor irrigation projects: projects with CCA less than or equal to 2,000 ha. utilizing both ground water and local surface water resources.

Ground water development is primarily done through individual and cooperative effort of farmers with the help of institutional finance and their own savings.

Command Area Development Programme (CADP): This scheme, sponsored by the central government was launched in 1974-75 with the objective of bridging the gap between irrigation potential created and that utilized for ensuring efficient utilization of created irrigation potential and increasing the agricultural productivity from irrigated lands on a sustainable basis. The Programme envisages integrating various activities relating to irrigated agriculture through a multi-disciplinary team under an area development authority in a coordinated manner.

Table 23: Irrigation Potential (As on 31st March, 2012)

States	Irrigation Potential
	(1000 hectares)
Andhra Pradesh@	120.37
Arunachal Pradesh	2.5
Assam	240.08
Bihar	406.2
Chhattisgarh	115
Goa	4.12
Gujarat	275
Haryana	NF
Himachal Pradesh	6.5
Jammu & Kashmir	70
Jharkhand	60.87
Karnataka	69.45
Kerala	NF
Madhya Pradesh	140
Maharastra	52
Manipur	26.5
Meghalaya	4.76
Mizoram	3.68
Nagaland	8.5
Odisha	90.81
Punjab	NF
Rajasthan	35.5
Sikkim	1.5
Tamil Nadu	NF
Tripura	18.2
Uttar Pradesh	434.3
Uttaranchal	13.97
West Bengal	30.97
UT Total	2.1
India Total	**2177.42**

Source: Water Resource Division, Planning Commission

NF: Not furnished by the state.

@: Andhra Pradesh includes the present state of Telangana.

2.4.5. Drinking Water Supply And Sanitation Infrastructure

Water is a precious natural resource. Our connection to this invaluable resource is clear, without water a person could die of dehydration in a matter of days, even hours. But it is its scarcity which is the cause of concern in today's time. It is the most basic need to sustain all forms of life on earth. Yet its denied access is the problem with which the world is grappling with.

Directly or indirectly, it affects the economic position of the country and hence an important barometer of a country's condition. Lack of improved sanitation facilities and unsafe drinking water sources kills and sickens thousands of children every day and leads to impoverished and diminished opportunities for thousands more. Poor sanitation, water and hygiene have many other serious repercussions. Children and particularly girls are denied right to education because their schools lack private and decent sanitation facilities. Women are forced to spend large part of day fetching water.Poor farmers and wage earners are less productive due to illness. And hence national economies are ultimate sufferers. Without WASH (water, sanitation and hygiene) sustainable development is impossible.

Table24: Number of households having access to Tap water & Toilet facilities

State	Number of Households having Access to Tap Water Facilities per 1000 Households *		Toilet Facilities**
	Urban	Rural	
	2008-09	2008-09	2011-12
	(number)		(in lakh numbers)
Andhra Pradesh@	754	638	102.79
Arunachal Pradesh	872	798	1.62
Assam	366	63	44.31
Bihar	290	11	55.44
Chhattisgarh	605	76	20.83
Goa	877	850	1.02
Gujarat	838	580	57
Haryana	769	612	27.23
Himachal Pradesh	885	780	13.3
Jammu & Kashmir	909	655	9.1
Jharkhand	491	35	18.4
Karnataka	913	702	53.01
Kerala	416	158	51.41
Madhya Pradesh	668	91	73.17
Maharastra	889	569	90.74
Manipur	656	247	3.6
Meghalaya	956	506	3.5
Mizoram	720	146	1.57
Nagaland	257	286	2.99
Odisha	636	58	43.55
Punjab	821	363	19.03
Rajasthan	866	285	52.84
Sikkim	982	674	1.49
Tamil Nadu	814	873	80.57
Tripura	606	274	10.23
Uttar Pradesh	750	24	211.54
Uttaranchal	473	608	10.84
West Bengal	704	78	110.82
Andaman & Nicobar Islands	989	831	0.21
Chandigarh	991	891	0.15
Dadar & Nagar Haveli	802	298	0.06
Daman & Diu	938	555	0.07
Delhi	880	464	1.07
Lakshadweep	95	225	0.05
Puducherry	944	991	0.18
Total	**743**	**301**	**1173.75**

***** : NSS Report no.535: Housing Condition & Amenities in India: July 2008-June 2009.

****:** Material Supplied by M/o Drinking Water & Sanitation

@: Andhra Pradesh includes the present state of Telangana.

2.4.6. Storage Infrastructure

Storage of goods is of vital importance not only in the agriculture sector but also in the industrial sector. In the primary sector that is agriculture, storage is necessary at the farm and fields level; in the secondary sector that is industry, storage is essential at the processing and manufacturing level and in the tertiary level it is inevitable for the domestic, import and export trade.

The necessity for storage arises primarily because of lack of adjustment between the time and place of production of goods and time and place of their consumption. Warehouses play a vital role in the flow of goods from producers to consumers. It helps in combating annual and seasonal fluctuation in production and prices. Provision of facilities for food grains comes under the purview of Department of Food and Public Distribution. There are three agencies in the public sector which are engaged in building large scale storage/ warehousing capacity- Food Corporation of India (FCI), Central Warehousing Corporation (CWC) and 17 State Warehousing Corporations (SWCs). In addition to storage of food grains, storage also includes industrial warehousing, custom-bounded warehouses, container freight stations, inland clearance depots and air cargo complexes.

Table25: Number of Food grain storages, cold storages, warehouses and container depots

(As on 31st March, 2012)

States	Food grain Storages (in MT)	Cold Storages (in number)	Warehouses (in number)	Container Depots (in number)
Andhra Pradesh@	995098		47	2
Arunachal Pradesh				
Assam	29971		6	
Bihar	87675		16	
Chhattisgarh	204080		12	
Goa	0		2	1
Gujarat	187086		26	7
Haryana	490737		28	
Himachal Pradesh	6170		3	
Jammu & Kashmir				
Jharkhand	19300		3	
Karnataka	222989		33	2
Kerala	4436	1	13	1
Madhya Pradesh	310839		26	
Maharashtra	282969	1	45	8
Manipur				
Meghalaya				
Mizoram				
Nagaland	13000		1	
Odisha	194310		18	
Punjab	641143		25	
Rajasthan	282034		31	
Sikkim				
Tamil Nadu	361688	1	26	6
Tripura	14000		2	
Uttar Pradesh	680503		48	7
Uttarakhand	61127		6	
West Bengal	164160	1	37	2
A & N Islands	0		1	
Chandigarh	6200		1	
D & N Haveli				
Daman & Diu				
Delhi	0		10	1
Lakshadweep				
Puducherry	5339		1	
Total	**5264854**	**4**	**467**	**37**

Source: Material Supplied by Central Warehousing Corporation

@: Andhra Pradesh includes the present state of Telangana.