



SECTORS COVERED

Power

Transportation

Telecom

Ports

SECTOR REPORT VOL. II NO. I

SECTOR – INFRASTRUCTURE

BUSINESS ANALYSIS GROUP

RELIANCE INDUSTRIES LTD



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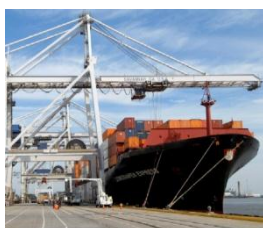
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INTRODUCTION

Reinforcing infrastructure – Key to achieving growth target – stressed the latest Economic Survey 2012-13. “Without growth there will be neither development nor inclusiveness”, the finance minister rightly acknowledged it in his Budget speech by stating that Foreign Direct Investment is not a matter of choice, it’s an imperative. Inclusive growth and sustainable development may sound like economic terms meant for intense, intellectual debates and discussions, but they impact the lives of more than 1.2 billion citizens of this country.

In the current fiscal year, our economy is estimated to grow at 5-6%. We are still the third fastest growing economy in the world, next only to China and Indonesia. This clearly indicates how tough the global economic environment is. There is no reason to be pessimistic but at the same time there is no ground for being complacent.

Growth in the Indian economy has been largely driven by a concerted effort in the services sector which unlocked the potential of millions of people. However the recent slowdown reveals that growth through domestic consumption-driven factors cannot be sustained for long. It has to be equally driven by investment-driven engines of growth.

A continued focus on infrastructure is a welcome step indeed. “While every sector can absorb new investment, it is the infrastructure sector that needs large volumes of investment,” finance minister said emphasizing on the need to create “new and innovative instruments to mobilize funds” for meeting infra investments targets of Rs 51.46 lakh crore in 12th Plan.

Financing for infra projects would be eased through enhanced liquidity from IDF (infra debt funds), India Infrastructure Finance Corporation Ltd(IIFCL) and housing loan deduction as the banks are constrained and unable to increase their exposure to infrastructure projects. Infrastructure companies reeling under huge debts have a reason to cheer post budget.

The decision to announce 3000 km of new road projects in next 6 months, the proposal to build 2 new ports (in West Bengal and Andhra Pradesh), 1 harbor in Tamil Nadu, dredging of national waterways, proposal to create a grid (combining ports, inland waterways and roadways) augur well for the infrastructure sector. There are several other positives for the infrastructure sector.

Enhanced corpus for Rural Infrastructure Development Fund (RIDF) along with increased funds for NABARD so that refinancing can be extended to projects pertaining to warehousing, cold storage, etc. will go a long way in addressing the supply bottlenecks that have been fuelling food inflation.

Extending the timeline of 31 March 2013 by one year to 31 March 2014 for infrastructure sector (power companies) to commence generation of electricity to enable them to claim tax holiday under Section 80IA is a positive and a very welcome proposal given the dire need of power in the country and considering huge private sector investment that this sector needs.

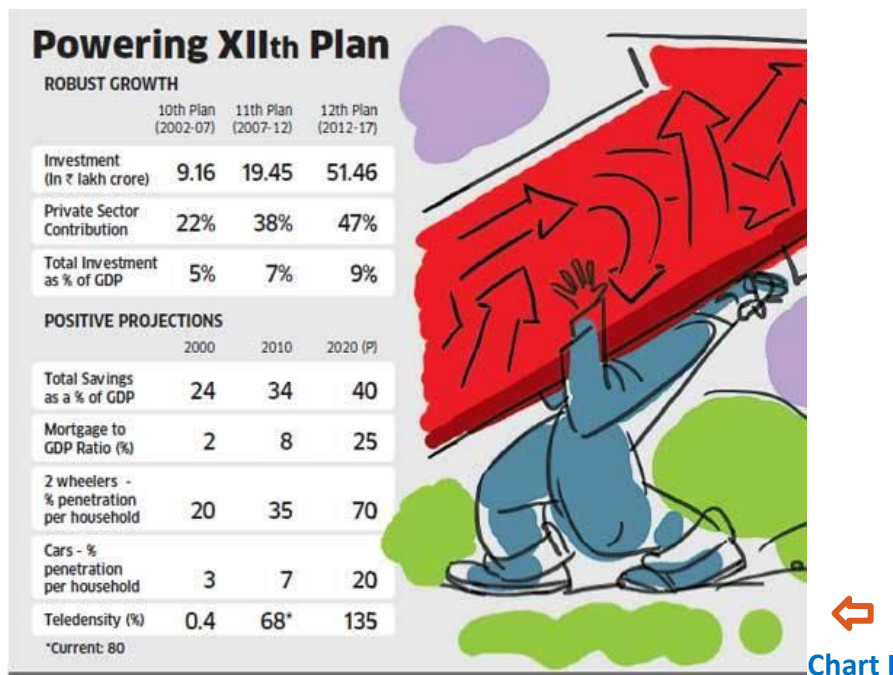
India ranked 84th in basic infrastructure (overall ranked 59th in the report) as per Global Competition Report 2012-13 indicating relatively slower developments as compare to other countries of the world. However, India’s growing economy holds a huge potential for critical infrastructure developments consisting of transportation, power and telecommunication.

Government initiatives, including major injections of investment capital into infrastructure projects such as water management and rural infrastructure, will generate significant demand in the polymer sector.



EXECUTIVE SUMMARY

Infrastructure will drive India's Growth Story



Source: The Economic Times

Infrastructure investment is a key towards achieving double digit growth rate and as the government finances are constrained, PPP is the way forward. However, due to a slew of reasons, private sector enthusiasm has waned in recent years. There is an urgent need to create the enabling environment

Our industries suffer from chronic power cuts. Exports are delayed because of poor roads & congested ports. Flights often circle in the air as there is a big queue of aircrafts waiting to land. Our office goers spend forever in the traffic. Villagers get power for mere 6 to 8 hours only.

Economists, estimate that 2% is lost in economic growth, as an outcome of poor infrastructure leads to serious supply constraints.

Accelerated Infrastructure investments, will not only de-bottleneck the system but will also create its own demand. Of the projected Rs 51.46 lakh crore investments during the 12th Plan period, about Rs.29 lakh crore is likely to be invested by the government and the rest by the private sector.

Infrastructure— What is happening?

Realizing the importance of nation building, our planners & policy makers are targeting a whopping Rs. 51.46 lakh crore of infrastructure investments during the XII Plan period.

With the combined Central & State deficit at over 11% of GDP, and national debt at close to 90% of GDP, Government finances are severely constrained. Realizing its constraints, government has actively encouraged private participation in infrastructure development since the early 2000.

In recent times, driven by government initiatives & private sector's enthusiasm, investment in infrastructure has made significant strides from a mere 5% of GDP a decade ago, to a projected 9% level during the XII plan period. During the same period, private component (in total infrastructure spend) has moved up from 25% to 50% range (XII plan estimates).



The key to global competitiveness of the Indian economy lies in building world class infrastructure and service delivery at competitive rates. Private-sector participation in financing of infrastructure has also generated optimism that public funding need not necessarily be the exclusive route for infrastructure investment. A conducive environment for private sector participation with a transparent and credible regulatory mechanism, therefore, could reduce the pressure on public-sector funding.

Energy sector

One of the foremost challenges in the coming years is to meet the energy requirement. The 12th Plan projections made by the Planning Commission indicate that for a GDP growth rate of 9% per year, energy supply has to grow at around 6.5% per year. The ability to meet the energy requirement would depend upon our ability to expand domestic production in the critical sub-sectors such as petroleum, natural gas, and coal, and meeting the balance requirement through imports. Reforms are necessary in the energy-pricing policy.

Power generation

India recorded an unprecedented 46.5% growth in new power capacity in the first quarter ended Mar'13. However, acute shortage of power is still being faced by many regions and industries across the country, which calls for huge investments in this sector.

CCI has recently approved 13 power projects worth Rs. 33000 crore. These 13 projects include 10 transmission, one hydro and two thermal projects.

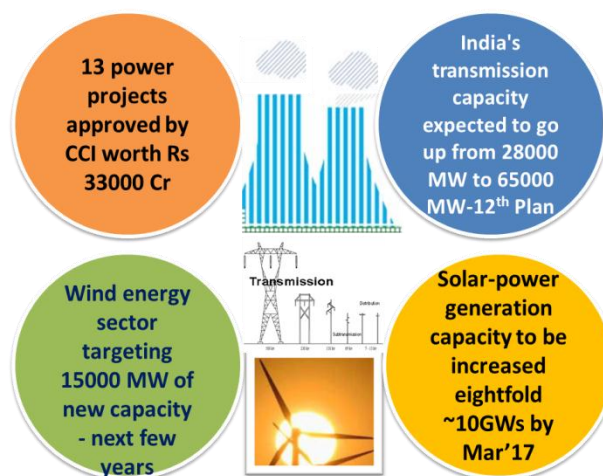
There would be a huge boost to the polymer sector with planned investments in transmission network across the country.

The govt. has recently planned to call for global contracts for laying power transmission lines worth over Rs. 6900 crores with focus on strengthening network connecting power generation projects in states like Bihar, Rajasthan, Tamil Nadu, Karnataka and Himachal Pradesh. Govt. also plans to construct a transmission link from Srinagar to Leh at an investment of Rs. 1840 crores. India's transmission capacity during the 12th Plan is expected to go up from 28,000 MW to 65,000 MW.

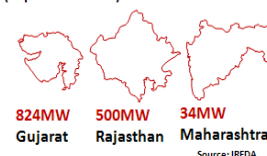
The renewable energy sector in India, led by the wind energy segment, is seeing a rebound in investment with around five deals worth approx. Rs. 3000 crore being sealed in 2013.

- Planned projects in the wind energy are expected to boost carbon fibre demand and are pegged as a key growth driver to the polymer sector with a target of 15000MW of new capacity.
- India is moving forward with plans to increase solar-power generation capacity nearly eightfold to more than 10 GWs by Mar'17, with the govt. prepared to spend up to Rs. 6000 crores in subsidies to reach the target.
- Solar power projects can boost demand in the polymer sector as PV solar cells that use conductive organic polymers for light absorption and conversion have shown great potential.
- A slew of investments in this sector like 'Roof top solar projects', 'Rural ATMs', 'Solar Parks' and innovative concept of 'roof over roads' to tap solar power and cover the Narmada canal with solar panels will boost demand for PV solar cells apart from the various solar projects planned by private companies
- As per GBI research, growth in Asia-Pacific and North American solar panel sectors will drive demand for EVA. EVA is used to encapsulate solar cells in the manufacture of solar panels

Chart 2 ↓



Examples of Solar States in India (Capacities in MW)



Roads sector

Road development is recognized as essential to sustain India's economic growth. Road development is a priority sector and the ongoing focus on the highway infrastructure development is targeted to projected annual growth of 12-15% for passenger traffic and 15-18% for cargo traffic-opportunity for geotextiles.

A slew of road projects have been announced by the government this year and decks have been cleared for highway projects worth Rs. 27000 crore for 20 projects spanning 2700 kms. Further, about 8270 kms of National Highways are to be improved along-with construction/rehabilitation of 100 nos. of bridges. Planning commission has provided an annual outlay of Rs. 37500 crore for 2013-14 for the development in roads and roads transport sector. **Chart 3** ↓

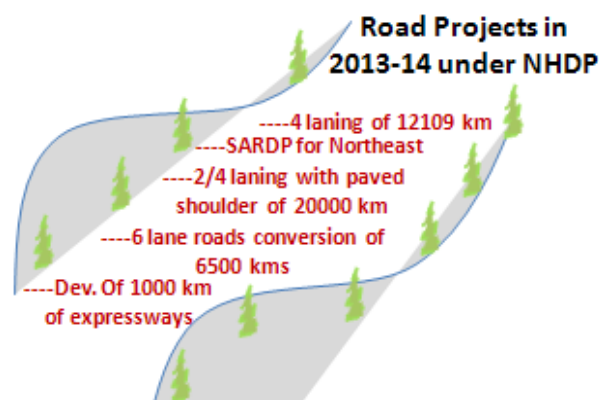


Chart 4 ↓



Under the PMGSY, an allocation of Rs. 21700 crore has been made for rural areas. Special Accelerated Road Development Programme in North East (SARDP-NE) covering construction/improvement/DPR preparation of 10141 km road stretches, approved by CCEA. For 2013-14, the internal target has been fixed at 9000 km of National Highways so as to ensure award of atleast 7300 km during the year.

Further the updates of DMIC projects have been covered in this report. Buoyed by the rapid progress of the DMIC project, two more industrial corridors have been announced which are Bengaluru and Chennai and Bengaluru and Mumbai. These will cover expressways and massive investments in the region in terms of townships, special investment zones, business hubs and Port development.

The report also covers the Geotextiles in road construction. Global geotextiles market is estimated to be worth \$6.3 bn (~Rs 34650 crores) by 2017, with growth expected to come from emerging in Asia. In India, FICCI projects a 20% increase in the geotextile sector based on boom in infrastructure projects in coming years and for this year 2013 it expects the demand to grow 10-12%.

Railways sector

Railways have entered the one billion plus club in freight loading, with the loading target exceeding 1007 Million Tonnes (MT) by the end of Mar'13. An investment of upto Rs. 9000 crore is expected under state government and private sector projects including Rs. 3800 crore for port connectivity projects, Rs 4000 crore for coal mine connectivity and Rs 800 crore for iron ore mines connectivity improvements.



There are positive development for the polymer sector as railways would be doubling its spend on electrification to Rs. 2000 crore in 2013-14, around 1800 route kilometre.

Furthermore, the ambitious 3300 km dedicated freight corridor (DFC) being constructed will also be 100% electrified. Among the other focus areas identified are elevated rail corridor and redevelopment of stations, power generation and freight terminals.

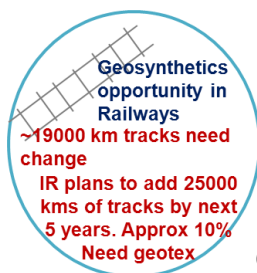


Railway Energy Management company would be setup to harness the solar and wind energy too. Solar powered railway gate signals -Kerala (384 level crossing gates). Capacity to generate 1KW power would be installed across the country approx. 1000 level crossing gates, giving a boost to PV solar technology.

Apart from the planned expansion for Metro across the country (Chandigarh, Indore, Kanpur, Ludhiana, Nagpur and Pune) there lies opportunity in for rapid transit trains being deployed across several major cities in India like Gurgaon, Jaipur, Hyderabad, Navi Mumbai, Kochi and Chennai.



The above projects will boost the cement demand apart from the cabling systems required giving a boost to the polymer industry. There are also monorails and elevated rail projects on anvil in Mumbai which would also further help boost the demand in this sector.



There also lies huge opportunity for geo-synthetics in Indian railways as about 19000 km track is on weak formation and would need rehabilitation and strengthening by use of geosynthetics. Indian Railways have drawn up a draft plan for operating semi-high-speed services along parts of the Golden corridor linking some of the main cities in the country. Apart from high-speed corridors, high-speed rail lines connecting Thiruvananthapuram and Kasaragod, Chennai & Bengaluru, Delhi and Chennai are planned by High-Speed Rail Corporation.



Telecom sector

Indian government, in order to cater to increasing infrastructure demands, is becoming one of the largest consumers of information technology related products and services, aiming to spend nearly \$6.9 billion on technology products and services in 2013 of which, telecommunications and networking equipment, will reach \$ 2.2 billion (~Rs. 12100 crores)

With mobile subscribers growing at a rapid space, the telecom sector is likely to witness huge investments to the tune of Rs 5 lakh crore in the next five years plans (2012-2017). There is a significant potential for data usage industry in India as penetration is lower at 11-12% compared to other Asian countries, like South Korea and Japan have data usage penetration levels at upto 50% -COAI.

India is presently witnessing an upsurge in mobile broadband and data services due to growing smartphone adoption. In order to accommodate high-speed data services, mobile operators need to upgrade their network infrastructure by deploying optical fiber cables (OFC). The OFC market in India is expected to be a \$290.8 Mn (~Rs. 1599.4 crores) market by 2018 (Frost Sullivan). The overall market is expected to grow at a CAGR of 12.5% between 2011-2018. There is a huge opportunity in solar power (PV cells market) as currently India has close to 500,000 mobile network towers in India which can use solar photovoltaic back power system instead of diesel generators currently being used.

Ports sector

The Shipping Ministry is hoping to award 30 port projects that entail an investment of Rs 24000 crore this fiscal. The Union shipping ministry has awarded 14 PPP port projects, which will bring in an additional capacity of 80 Mtpa at an investment of Rs 5600 crore. Overall, 26 port projects have been awarded, bringing in a capacity augmentation of 114 Mtpa. The target for shipping ministry for FY13 involved a total investment of Rs 35000 crore and a capacity addition of 244 MT. For FY14, the shipping ministry plans to add a capacity of 250 MT through public and private investment. There are hidden opportunities to cap on like providing mega ships to berth at Indian ports, opportunity in chemical infrastructure at ports and creating storage terminals for the growing chemical trade at Indian ports. Going ahead, 'chemicals' will be among the key cargo types in terms of attractiveness and ports must align their capabilities to leverage this opportunity. Hence key infrastructure projects in roads, ports, power and transportation are essential to achieve the crucial economic growth and key to boost demand for polymer sector.



SECTORS TO FOCUS ON



Power - Projected Growth and Investment Requirements

Size of the Initiative

An Inter-Regional transmission capacity of 37,800 MW has been planned for the 12th Plan. Transmission line additions of about 100000 ckt. kms, HVDC terminal capacity of 13,000 MW and AC transformation capacity of 270000 MVA has been planned for the 12th Plan. Data compiled by the Electric Power Survey Committee (EPSC) estimates that total electric energy requirement (EER) for the 13 Indian mega cities by the end of 12th Plan (2016-17) will be about 168 billion units and by end of 13th Plan the requirement would be 233 billion units.

Opportunity

The exponentially growing population of the country is creating more pressures on the power sector. Wherein countries like the United States and China, the per capita consumption of power stands at 11,919 Bn kWh and 3493 Bn kWh respectively, in India, with a population of 900 Mn (1.2 Bn minus 300 Mn without power), the per capita consumption currently stands at 600 billion kWh. As the Indian power sector is embarking on increasing the generation and transmission capacities, plastic consumption in this sector holds a significant role. The target would be to take the generation capacity further to 315 GW by the end of the 12th Plan period ending in fiscal 2016-17, estimating an investment of about Rs. 5 lakh crore.

Outlook

Table 1

2

and 3



Govt. plan for 12th plan - Power Sector		Out of 88 GW Planned to be added in 12th Plan period		Estimated Investment by 2017	
Conventional Power	88537 MW	Breakup		Thermal	Rs 5 crore per MW
Thermal Power plants	72339.6 MW	Thermal	67 GW	Hydro	Rs 8.5 crore per MW
Capacity Addition in		Hydro	10 GW	Nuclear	Rs 11 Crore per MW
Central Sector	14877.6 MW	Nuclear	5-6 GW	Total Investment	~Rs 5 lakh crore
State Sector	13922 MW				
Private Sector	43540 MW				

Potential

Hydro Projects

- India has an estimated (SHP) Small Hydro Power potential of about 15,000MW of which only 20% has been tapped. Proposed to install 2000MW additional power generation capacity in 12th Plan

Captive Power

- A number of projects lined up for commission by cement (UltraTech), Steel (SEIL, Visakhapatnam Steel Plant) and Fertilizer (KPR) companies etc. in next few years

Government plans to bring further 5000 MW into mainstream.

- "Open Access" and "Group Captive" allowed under recent policy initiatives.

Ultra Mega Power Projects

- The Power Ministry has identified 12 sites to set up UMPPs in different states: 9 projects with an individual capacity of 4000 MW, and 3 projects with an individual capacity of 3960 MW each have been identified.

National Grid Program

- India plans to connect all regional grids into a National Grid by 2014 to improve transmission of power across the country. The Rs.1.4-trillion plan to build the grid to increase country's inter-regional transmission capacity and enhance transfer of power from surplus regions to deficit areas is now afoot

Distribution: with respect to distribution, the following opportunities exist

- Rural Electrification

Renewables

- Propose to double the renewable energy capacity from 25000 MW in 2012 to 55000 MW by 2017

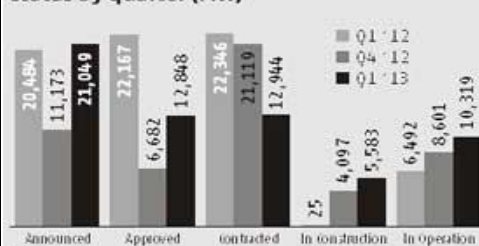


POWER SECTOR – Opportunities

India is the fifth largest producer and consumer of electricity in the world after US, China, Japan and Russia. Electricity production in India (excluding captive generation) stood at 835.3 Bn kWh in FY12, a growth of 8.1% over the previous fiscal. Over FY06-12, electricity production has expanded at a CAGR of 6%. India recorded an unprecedented 46.5% growth in new power capacity in the first quarter ended March this year, according to Platts. This comes at a time when power development activity in the Asian region tumbled 12% between Jan and Mar 2013 against the year-ago period. **Chart 5**

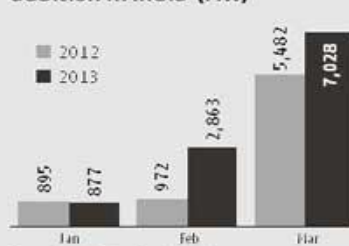
AHEAD OF THE PACK

Asia: Power generation projects changing status by quarter (Mw)



Source: Platts Power in Asia, compiled from company information

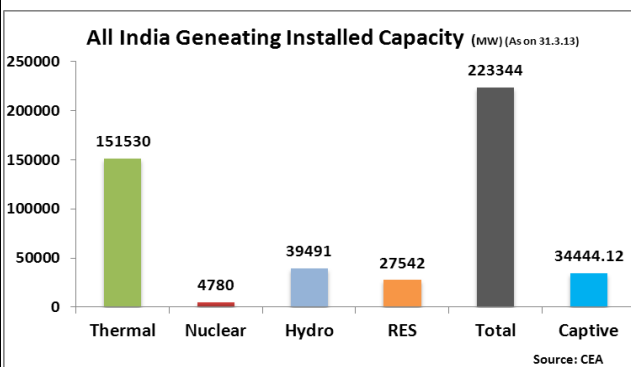
Growth in power capacity addition in India (Mw)



Source: Central Electricity Authority

Of the 23,467 mw of new capacity addition in FY13, thermal sector contributed 19,927 mw supported by 18,199 mw of coal-fired projects, followed by renewable energy sector at 3,039 mw and hydro power projects contributing 501 mw.

The capacity increase after the first fortnight of March 17 was led by the private sector, which added 9,103MW. Central power PSUs added 4,397MW, while those under the various State Governments chipped in 2,907MW. The private sector achieved 125% of the set target of 7250MW, which was possible, thanks to the commissioning of the Tata Group's four Mundra UMPP units of 800MW units each commissioned during the fiscal. **Chart 6 Table 4**



Source: CEA

All India Annual per capita consumption of Electricity

Year	Per capita consumption (kWh)#
2005-06	631.4
2006-07	671.9
2007-08	717.1
2008-09	733.5
2009-10	778.6
2010-11	818.8
2011-12	879.22
#(Gross Gen.+Net Import)/Mid year population)	

Source: CEA March 2013 report

The total power installed capacity in the country stood at 223,344 MW from both conventional and renewable sources as of March'13. Besides, industries had a total captive generation capacity of 34,444 MW. **Chart 7**

and **Chart 8**

Rank Country

- 1 [China](#)
- 2 [United States](#)
- 3 [Japan](#)
- 4 [Russia](#)
- 5 [India](#)
- 6 [Canada](#)
- 7 [Germany](#)
- 8 [France](#)
- 9 [Brazil](#)
- 10 [Korea, South](#)

Source: CIA World Fact Book Jan 2012

Electricity - production (billion kWh)

1 China	4,604
2 United States	3,953
3 Japan	937.6
4 Russia	925.9
5 India	835.3
6 Canada	604.4
7 Germany	556.4
8 France	510
9 Brazil	509.2
10 Korea, South	459.5

Rank Country

1 China	4,693
2 United States	3,741
3 Japan	859.7
4 Russia	857.6
5 India	600.6
6 Canada	549.5
7 Germany	544.5
8 France	460.9
9 Brazil	455.7
10 Korea, South	455.1



Opportunity for investments due to power deficit in the country

The country faced a huge power deficit of over 12,000 MW during the peak hours in the last FY - CEA

- Against the peak demand of 135453 MW, total power availability was 123294 MW in the last fiscal, the data showed. During March the overall peak power deficit stood at 9,482 MW or 7.4%.
- Southern region saw demand for electricity overshoot by 6,052MW against availability of 31,586MW.
- J&K, H.P., Punjab and Bihar were the worst affected with a peak power deficit of over 20% in 2012-13.
- Western region (Gujarat, M.P., Maharashtra, Goa etc.) registered least peak power deficit of 589 MW
- Eastern region (Bihar, Jharkhand, West Bengal, Odisha, etc.) recorded a shortage of 7.4% or 1,240 MW
- Northern region suffered an overall shortage of 8.9% or over 4,000 MW during the period.
- North-eastern region (Assam, A.P., Manipur, Meghalaya, Mizoram, Nagaland, and Tripura) recorded a deficit of 6.7% or 134MW. In March the region witnessed a shortage of 10 %.

The peak power demand during the month of April stood at 130676 MW of which 121656 MW was met. As per the latest projections from CEA, the country is expected to experience energy shortage of 6.7% per cent and peak shortage of 2.3% despite very high shortages likely to be experienced by Southern Region. Moreover, with above 20% of power generated getting lost during transmission and distribution, need of the hour is efficient transmission infrastructure in the country for reliable and quality transfer of power

Investments in power projects

The investment climate is turning positive in the power sector. Recently, FDI up to 100% is permitted in the power sector, under the automatic route has been approved for:

1. Generation and transmission of electric energy produced in hydroelectric, coal/lignite based thermal, oil based thermal and gas based thermal power plants;
2. Non-Conventional Energy Generation and Distribution;
3. Distribution of electric energy to households, industrial, commercial and other users; and
4. Power Trading.

CCI has approved 13 power projects worth Rs 33,000 cr. These 13 projects include 10 transmission, one hydro and two thermal projects.

Increase in investment in Power Projects

- 45 projects having installed capacity of 10897 MW have been targeted for hydro power capacity addition during the 12th plan. 800 MW Tawang-II hydropower project in Arunachal approved
- In Himachal Pradesh with focus on small and micro-hydro projects and private parties coming up with self-identified projects, the power potential has increased to 23000MW. HP to harness 1918MW hydro power during 2013-14
- Andhra Pradesh is poised to add about 4,000 MW by Dec-March next
- Tamil Nadu govt. proposes to launch power generation projects worth around Rs 20000 crore, including an Rs 7000 crore underground hydel power station in Nilgiris
 - High Tension and Low Tension power transmission lines to the tune of 15,000 km will be established
- 1,320MW thermal power plant at Godda and one at Patratu put up by JSPL
- Green Infra (part of Piramal Enterprises) has a portfolio of 300 mw of wind IPPs spanning across different states. 600MW operating capacity by FY14.
- MMRDA plans to generate 30MW of power from its Rs 300-cr worth 'waste to energy' project
- North Eastern Electric Power Corp. plans to invest Rs. 2089 crore in various schemes in 2013-14



Huge investments in transmission lines

Electricity production which stood at a mere 1,370 MW at the time of independence has gone up to 2.10 lakh MW after 65 years. Power transmission through the power grid, which currently stands at 28,000 MW, is targeted to rise to 48,000 MW in the current plan period.

A total of Rs 12 lakh crore are proposed to be spent out of which Rs 7 lakh crore would be used on electricity production, Rs 3 lakh crore on transmission and Rs 2 lakh crore on distribution

At present, Power grid Corp is operating more than 96,216 ckt km of transmission lines along with 158 sub-stations with transformation capacity of about 1,51,303 MVA. The existing inter-regional power transmission capacity is about 28,000 mw. The company has planned Rs 100,000 crore capital expenditure in the next 5 years. **Table 5** ↓

Growth of Transmission lines (ckm) at the end of each plan					
At the end of	500 kV HVDC	765 kV	400 kV	200 kV	Grand Total
6th plan	0	0	6029	46005	52034
7th plan	0	0	19824	59631	79455
8th plan	1634	0	36124	79600	117358
9th plan	4738	1160	49378	96993	152269
10th plan	5872	2184	75722	114629	198407
11th plan	9432	5250	106819	135980	257481
12th plan upto Mar'13	9432	6459	118180	140517	274588

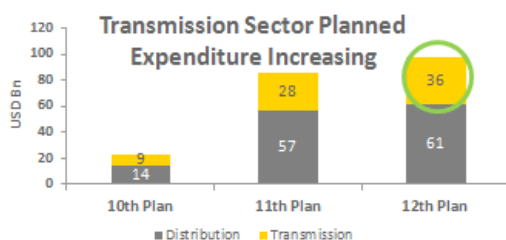
Source: CEA

According to estimates, 72,000km of transmission wire in Bihar state needs to be changed. There is an acute shortage of grids, not only causing difficulty in the distribution of power to the consumers but also huge transmission loss of around 40%.

Chart 9 ↓

High Growth Industry

Investment of USD 36 bn is expected in transmission sector over FY13-17



Planned Expenditure (FY 13 – 17)	Cost (USD bn)
Central Sector- Power Grid Corporation (PGCIL)	20.0
State Sector- Expected to be executed by State Funding	5.5
State Sector- Expected to be executed by Private Sector *	5.5
Private Sector	5.0
Sub Total Private Sector	10.5
Total	36.0

Source: CEA, Planning Commission Working Committee Report, Analyst Reports

Huge Investment planned in the Indian transmission space, very attractive growth opportunities

*Peak Deficit 1US\$= Rs.50

- India has huge power deficits with peak deficits in range of 10.6%* in FY2012
- An expenditure of around USD 247 bn has been planned for the Indian power sector in the 12th five year plan (2013-17)
- Of this, about USD 36 Bn Investments planned in the power transmission in 12th five year plan
- Open access and power trading will ensure need of greater investment
- Significant investment will come from private sector in this fiscal Rs. 85,578 crore

Govt. plans to award Rs. 6900 crore power transmission projects

Plans to call global tariff bids to award contracts for laying power transmission lines. The power ministry has asked state-run PFC and REC to invite bids for eight transmission lines worth Rs 3,000 cr. REC is also conducting bidding for another Rs. 3,900-cr transmission projects. The contracts include setting up

transmission lines and strengthening network connecting power generation projects in states like Bihar, Rajasthan TN, Karnataka and HP with national grid. Govt. would be constructing a transmission link from Srinagar to Leh in J&K at an investment of Rs. 1,840 cr.

The 12th Plan working group has estimated a huge requirement for additional new lines and substations under distribution. Corresponding with generation capacity addition plans, transmission and distribution have been also planned to facilitate power reaching the ultimate consumer.



Renewable energy sector

Table 6 (Source: - <http://data.gov.in>)

The renewable energy sector in India, led by the wind energy segment, is seeing a rebound in investment with around five deals worth approximately Rs. 3000 crore being sealed in 2013. India has an ambitious target of acquiring 15% of power needs, or 80000 MW, from renewable sources by 2020. An investment of around Rs. 40000 crore is required for strengthening the transmission system of green energy in India over the next 4 years. India has a total installed renewable energy capacity of 26,920 MW, which comprises mainly wind power of 19051MW. Wind energy is pegged as a key growth driver with the sector targeting 15,000 MW of new capacity in the next five years.

Estimated potential for renewable energy on 15th April 2013			
S.No.	Resource	Estimated Potential (MW)	Comments
1	Solar Power	1,00,000	30-50 MW/sq. km
2	Wind Power	1,00,000	At 80 m. height
3	Small Hydro Power (up to 25 MW)	20,000	
4 i)	Bio-Power: Agro-Residues	17,000	
4 ii)	Bio-Power: Cogeneration - Bagasse	5,000	
4 iii)	Waste to Energy: Municipal Solid Waste to Energy	2,600	
4 iv)	Waste to Energy: Industrial Waste to Energy	1,280	
TOTAL		2,45,880	

Wind Power

Wind power accounts for 11% of installed capacity and 6% of total generation in India. The govt. targets to increase the share of wind power to 15% by 2020 under its national action plan for climate change. Total wind power installed capacity as of 15th Apr'13 stands at 19051 MW in the country. **Table 7** <http://mnre.gov.in>

- The wind power potential in Andhra Pradesh is assessed to be at least 88,000 MW from wastelands. There is a potential of ~12,000 MW if 5% of state's agricultural lands were used.
- Karnataka has an estimated potential of 50000 MW from wastelands and an additional 20000 MW if 5% of the agricultural lands suitable for wind power were used.
- Nalco plans setting up 47.6 MW plant in Ludarva, Rajasthan
- Mytrah Energy setting up 100MW wind farm in TN and 40MW in Andhra Pradesh

Indian State Wise Wind Installed		
S. No.	State	Capacity in MW
1	Tamil Nadu	7162
2	Gujarat	3175
3	Maharashtra	3022
4	Rajasthan	2685
5	Karnataka	2135
6	Madhya Pradesh	386
7	Andhra Pradesh	448
8	Kerala	35
9	Others	4
Total		19051

Solar Power Projects



Present installed solar capacity of the country stands at 1686.44 MW as on 15th April'13 up from 1440 MW in March'13. India plans to increase solar-power generation capacity nearly eightfold to more than 10 GWs by Mar'17, with govt. prepared to spend up to Rs. 6000 crores in subsidies to reach the target. **Chart 10**

- Under JNNSM, 20,000MW solar power capacity addition is envisaged by 2022. As of 15th May'13- 1759 MW installed - JNNSM
- Rajasthan becomes second Indian state to cross 500 MW solar power capacities. Additionally, state plans to set up 600 MW of solar power capacity by 2017
- Punjab govt. planning to setup 300MW solar power projects
- Odisha govt. recently announced 25MW solar project
- Maharashtra plans 4 more solar plants of 200 MW by 2015
- TN Industrial Development Corp. plans solar parks with 1000MW capacity in '14
- Solar powered railway gate signals -Kerala (384 level crossing gates). Capacity to generate 1KW power

SOLAR POWER TO SURGE IN 2013

Solar power capacity is expected to leapfrog from the existing 1440 MW in 2012 and 2013 may well be a milestone year for the renewable energy sector



SOLAR PROJECT TENDERS IN 2013

Agency/State	Capacity*	Status
JNNSM II	750	Announced
JNNSM II	800	Announced
RPSPG	100	Announced
Andhra Pradesh	1,000	Bidding underway
Tamil Nadu	1,000	Bidding done
Karnataka	40	Announced
Rajasthan	200	Bidding done
Odisha	25	Bidding done
Kerala	10	Bidding underway
Uttar Pradesh	200	Bidding to start
Punjab	500	Bidding to start

4,615 MW
Total solar power capacity for which tenders have been called for under various schemes

* CAPACITY IN MW



Private Ventures in Solar Projects

- The Mahindra Group plans to develop 500MW of solar power projects within India & overseas
- Tata Power plans to set up a 28.8 MW solar plant near Satara, Maharashtra this fiscal.
 - Tata Power has set a target of generating 26,000 MW by 2020
- Welspun group plans to put up 500 MW of solar photovoltaic capacity by 2016-17
 - In addition the group intends to own 1,000 MW of wind power capacity

Roof over roads to tap solar power

- India's major roads may double up as solar highways, if an innovative proposal by GERMI scientists gets the government's approval
- PV roof cover over the four-lane 205-km-long Ahmedabad-Rajkot highway can generate 104MW of power while the Ahmedabad-Vadodara NH, 93-km-long, can generate 61MW of electricity.
- The same concept can be extended for use on the 52,584-km-long national and state highways in India with four lanes or more, -GERMI scientists
- The 4-lane 5,839-km-long Golden Quadrilateral Highway, for e.g., connecting Delhi, Mumbai, Chennai and Kolkata, can potentially generate 4,418mw of power while the North-South-East-West Corridor highway of 7,300 km connecting Srinagar, Kanyakumari, Porbandar and Silchar has 5,524 mw capacity of power generation

Roof top Solar Projects



- Kerala has a solar rooftop potential of 10,000 MW at the present efficiency level of 16.5%. This could increase to 20,000 MW as efficiency of module is improved.
- Andhra Pradesh to offer more sops for solar units and additional subsidy of 20% for rooftop units on behalf of state
- Gujarat has announced 5 more rooftop solar PV power projects in 5 cities, totaling 25 MW.

Gujarat Solar Park- The announcement of the 25 MW rooftop initiatives is significant because it sets a precedent for similar initiatives by other States. Today, there are 2 kinds of solar power projects. One is the large, 'utility scale' projects, like 5 , 10, 20 or 50 MW, coming up on large tracts of land, sometimes in a **dedicated solar park**, as in Gujarat. The other is distributed generation—small-sized plants that are put up on rooftops of commercial buildings and households, or in villages.

- Out of the total installed solar power plants in Gujarat i.e. 820 MW+ — the Gujarat Solar Park currently is home to 16 Solar Projects with 216 MW+ of installed solar plant capacity and has emerged to be a true testing ground & laboratory for various Solar PV module technologies
- Spread across about 2024 ha {1080 ha GoG, 944 ha Pvt.} area and with approx. capacity to house 500 MW, the Charanka solar park is developed mostly over the wasteland but with one of the best solar insolation / irradiation area identified in India. The park would save around 8MT of carbon dioxide from being released into the atmosphere and save around 9 lakh tonnes of natural gas per year.



Gujarat to cover Narmada canals with solar panels- Gujarat is set to potentially use the existing 19,000 km-long network of Narmada canals across the State for setting up solar panels to generate power.

- Assuming a utilization of only 10% of the existing canal network it is estimated that 2200MW of solar power generating capacity can be installed by covering the canals with solar panels.



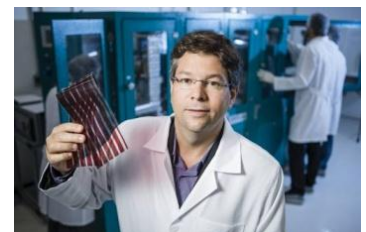
Smart ATMs: Need of the Hour

There is an attempt to fill the gap of ATM in rural area by providing solar powered ATMs in rural and semi-rural areas. From the first solar powered ATM in Cuddalore more than 5 years ago to 700 ATMs in various parts of the country, the latest solar ATMs are designed to cater to the needs of the rural populace. PNB, United Bank of India and Bank of India are some examples of banks who have taken up this initiative giving a boost to solar power use in rural areas in India and increase consumption of photo voltaic cells/panels.

Developments in polymer solar cells enhance performance in solar cell technologies

- In the effort to convert sunlight into electricity, photovoltaic (PV) solar cells that use conductive organic polymers for light absorption and conversion have shown great potential.
- Organic polymers can be produced in high volumes at low cost, resulting in photovoltaic devices that are cheap, lightweight and flexible. In the last few years, much work has been done to improve the efficiency with which these devices convert sunlight into power, including the development of new materials, device structures and processing techniques.
- The year 2012 has seen several developments enhancing performance in the spectrum of solar cell technologies: ***thin-film (including CIGS, CdTe, and other), c-Si, some unknown combination, and even some with some nanoscale assistance***, as per RenewableEnergyWorld.com.
- Another development has been organic (polymer/plastic) solar cells, approaching and exceeding 10% conversion efficiency.
 - This is an improvement from the high-teens of crystalline silicon or even low-teens for other thin-film options.
- Researchers at the UCLA Henry Samueli School of Engineering and Applied Science and CNSI report that they have significantly enhanced polymer solar cells' performance by building a device with a new "tandem" structure that combines multiple cells with different absorption bands.
- The device had a certified power-conversion efficiency of 8.62% and set a world record in July 2011.
- Europe has recently launched a four-year, Euro 14.2 Mn effort to develop advanced flexible plastic solar panels designed to be integrated into new consumer mobile applications and buildings.
- New Energy Technologies and the National Renewable Energy Laboratory (NREL) has created a working organic photovoltaic (OPV) module 170 sq. cm in size-14 times larger than previous NREL-made OPV devices - using the company's Solar Window technology that generates electricity on see-through glass.
- Brazilian scientists have developed plastic solar panels that could revolutionize power generation from this clean, renewable energy source.

What looks like a thin, flexible sheet of regular plastic is actually a solar panel printed with photovoltaic cells, which convert sunlight into electricity.

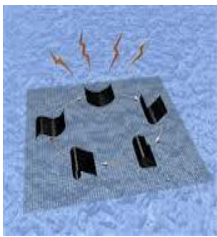


Growth in Asia-Pacific and North American solar panel sectors to drive demand for EVA

Although extensively used in the foams and films manufacturing industry, EVA can also be used in the construction of solar voltaic panels as an encapsulating material. EVA is used to encapsulate solar cells in the manufacture of solar panels. It prevents moisture from entering the panels and shorting out the solar cells. It also minimizes glass shattering and provides a buffer to prevent solar cells from cracking. The growing solar power industry is therefore predicted to play an important role in the future production of the co-polymer

Asia's impressive manufacturing industry will be largely responsible for a predicted worldwide EVA demand increase - from 2,286,193 tons in 2011 to 2,966,078 tons in 2017, climbing at a CAGR of 4.4% - GBI Research

Polymer film can generate electricity by harnessing the power of water vapor



A new polymer film that can generate electricity, or even serve as a motor itself, with nothing more than water as fuel has been developed by an engineering research team at the Massachusetts Institute of Technology. The new film is made from an interlocking network of two different polymers. One of the polymers, polypyrrole, forms a hard but flexible matrix that provides structural support. The other polymer, polyol-borate, is a soft gel that swells when it absorbs water.

MIT researchers believe the material can not only harvest energy from water vapor, but it can also generate electricity without any waste product like carbon dioxide. When coupling the polymer film with a device to convert mechanical energy to electricity (known as a piezoelectric material) it can generate an average charge of 5.6 nanowatts.

Geosynthetics in Renewable Energy Sources

The relatively recent renewables (wind, solar, biomass, biofuel and geothermal) represent a growing percentage of worldwide energy sources. Accompanying their construction and operations there are many geosynthetic applications which (on a site specific basis) appear to be as follows:

1. Local paved road widening and reconstruction using geotextiles and/or geogrid for access to these generally remote sites.
2. Unpaved road construction using geogrid and/or geotextiles leading from the paved roads to the actual construction site
3. Portable, and removable, temporary roadways leading from paved roads to the construction site.
4. High strength geotextiles and/or geogrid for foundation support and stabilization of concrete footings for wind and solar energy sources.
5. Mechanically stabilized earth (MSE) walls and slopes using geosynthetic reinforcement for creating level surfaces for wind and solar energy sources.
6. All types of geosynthetic erosion control and prevention systems since these recent renewables are invariably under strict public scrutiny.

Geosynthetics in Hydroelectric Power Production

Hydroelectricity provides power by virtue of the gravitational force of falling or flowing water. The various forms are conventional dams, pumped storage, run-of-the-river, tidal, and underground (waterfall or lake). Hydroelectricity power generation has been practiced for centuries. Bulletin No. 135 of the International Committee on Large Dams (ICOLD) shows that 250 dams have been constructed with geomembranes as waterproofing barriers.





(a) Earth fill dam



(b) Concrete dam



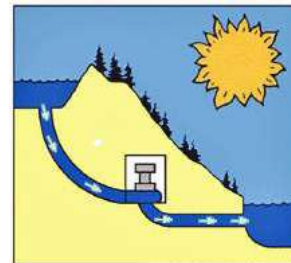
(c) Roller compacted concrete dam

The major geosynthetic applications with respect to hydroelectricity generation appear to be as follows:

1. Geomembranes and geosynthetic clay liners for upper and lower reservoir liners for pumped storage hydroelectricity.
2. Geomembranes waterproofing on the upstream face of earth fill, concrete and roller compacted dams.
3. Geonet, geocomposites and geotextile drainage materials between the dam and the waterproofing geomembranes.
4. Thick needle punched nonwoven geotextiles as geomembranes protection materials.
5. Geomembranes and/or geosynthetic clay liner waterproofing of the channels leading water to the generation station.
6. Tunnel waterproofing with geomembranes for discharge from the dam to the generating station.
7. Obviously, large amount of plastic pipe to convey water to the end user.



Concept and example of pumped-storage method of generating hydroelectricity



Daytime: Water flows downhill through turbines, producing electricity



Nighttime: Water pumped uphill to reservoir for tomorrow's use

Geosynthetics in Nuclear Power Generation

Within nuclear power generation plants there are limited geosynthetic opportunities (other than conventional geosynthetics used at all heavy construction sites). The major geosynthetic applications with respect to UMT and LLRW disposal appear to be as follows:

1. For new disposal situations complete double lined systems with leak detection are necessary. Thus, geomembranes, geosynthetic clay liners, drainage geocomposites, and geotextiles are all involved.
2. For both new and remediated disposal situations final covers are necessary; Included are geomembranes, geosynthetic clay liners, drainage geocomposites, geogrid reinforcement and geosynthetic erosion control systems.
3. Geomembranes as vertical cutoff walls for lateral confinement of contaminated groundwater seepage.
4. Geomembranes for lining of disposal boxes containing LLRW such as contaminated equipment, construction and demolition wastes.

Delhi Univ. students plan to generate Wind Power produced by turbines on Delhi Metro producing 4.8 kWh in a day. Delhi Metro presently has a network of 196 kms and plans to add upto 420 kms

TRANSPORT

ROADS SECTOR - Size of the Initiative

With an extensive road network of 3.38 million kilometers, India is the second largest in the world. Indian roads carry about 65% of the freight and 80% of the passenger traffic. All the highways and expressways together constitute about 79243 kilometers (only 1.7% of all roads), whereas they carry 40% of the road traffic.

Opportunity

Road development is recognized as essential to sustain India's economic growth. Road development is a priority sector and the ongoing focus on the highway infrastructure development is targeted to projected annual growth of 12-15% for passenger traffic and 15-18% for cargo traffic-opportunity for geotextiles.

Outlook

- Annual growth projected at 12-15% for passenger traffic, and 15-18% for cargo traffic
- Over \$50-60 billion investment is required over the next 5 years to improve road infrastructure

Potential

- The government is likely to set a stiff target for road transport and highways ministry to get at least 47% investment from the private sector during 12th Plan for construction of highways. This is 9% more than what the sector has got during the 11th Five Year Plan.
- Out of the projected Rs 1.9 lakh crore investments from private players in the next five years, a large chunk of it - Rs 1.8 lakh crore - will be used in National Highways Development Programme (NHDP).
- ***During the financial year 2013-14, about 8270 kms. of the National Highways are to be improved*** along with construction/rehabilitation of 100 nos. of bridges and 4 nos. of bypasses as standalone projects at an estimated cost of Rs.23300 crores.
- ***Planning Commission provided an annual outlay of Rs.37500 Crore for 2013-2014 (including the above Rs. 23300 crore) for development in roads and road transport sector.***
- 3,000 kms of road projects in *Gujarat, Madhya Pradesh, Maharashtra, Rajasthan and Uttar Pradesh* will be awarded in the first six months of 2013-14.
- For development of roads other than National Highways which are of economic importance or provide inter-state connectivity an out lay of Rs 262 crores has been made in the plan 2013-14.
- Under the PMGSY, an allocation of Rs 21,700 crore has been made for rural roads
 - Besides, an outlay of Rs. 3300 crores for SARDP-NE and 1800 crores for LWE scheme have been proposed for the year 2013-14.
- Special Accelerated Road Development Programme in North East (SARDP-NE) covering construction/improvement/DPR preparation of 10141 km road stretches, approved by CCEA
- Under the Arunachal Pradesh package for roads and highways, road stretches aggregating to 1543 km length have been approved for execution on Cash contract basis.
 - Out of these ~ 548km length has been sanctioned/awarded amounting to Rs 2699 cr. till date.
- For the FY 2013-14, the internal target has been fixed at 9000 km of National Highways so as to ensure award of at least 7300 km during the year.



ROADS SECTOR – Opportunities

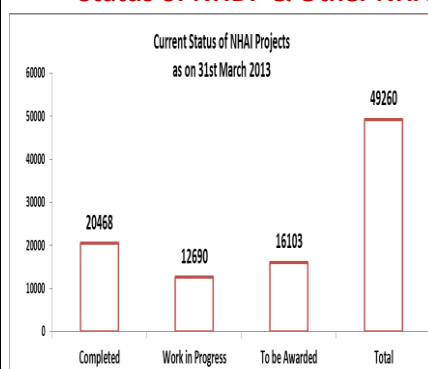
Snapshot

Road infrastructure has high importance for the growth of India's economy, since around 60% of freight and 85% of passenger traffic is carried by road. The country has a road network spanning 3.38 million kms and ranks among the largest in the world.

Although India has a large road network, in comparison with other countries (142), it stands at a low rank of 85 in terms of the quality of its roads. Only half the roads are paved, as compared to 67% in the US. The share of high-capacity roads is less, as compared to those in other countries. The National Highways only constitute around 1.7% of the road network, but carry 40% of the total road traffic. Yet only 24% of the National Highways are four-lane and meet international standards. For a country aspiring to grow at 8.0%, it needs extensive highways and expressways to prevent roads from becoming bottlenecks in its growth. Road development is recognized as essential to sustain India's economic growth and the ongoing focus on the highway infrastructure development is targeted to projected annual growth of 12-15% for passenger traffic and 15-18% for cargo traffic-opportunity for geotextiles. **Chart 11**

Table 8

Status of NHDP & Other NHAI Projects



Status of NHDP & Other NHAI Projects as on 31st March 2013												
	NHDP											
	GQ	NS - EW	NHDP Phase III	NHDP Phase IV	NHDP Phase V	NHDP Phase VII	NHDP Total	Port Connectivity	SARDP -NE	NH-34	Others	Total by NHAI
Total Length (Km.)	5,846	7,142	12,109	14,799	6,500	700	47,096	380	388	5.5	1,390	49,260
Already 4/6 Laned (Km.)	5,846	6,134	5,296	172	1,462	21	18,931	372	69	-	1,066	20,468
Under Implementation (Km.)	0	636	5,128	3,956	2,588	20	12,328	8	43	5.5	305	12,690
Contracts Under Implementation (No.)	7	56	89	29	28	2	211	2	2	1	4	220
Balance length for award (Km.)	-	372	1,685	10,671	2,420	659	15,807	0	276	-	20	16,103

Source: NHAI

Following projects, in addition to the completion of the ongoing works included under NHDP Phase-I and Phase-II, will be taken up during 2013-14 & beyond:-

- 4-laning of 12,109 km (NHDP Phase-III)
- Special Accelerated Road Development Programme for the North Eastern region.
- 2/4-laning with paved shoulder of 20,000 km of single lane NH under NHDP Phase-IV
- Conversion to six-lane roads comprising length of 6500 kms under NHDP Phase-V
- Development of 1,000 km. of expressways under NHDP Phase-VI
- Development of Ring roads, bypasses, grade separators, service roads etc. under (NHDP Phase-VII)
- Works on many of the stretches awarded last three years about 16000 km will be in full swing by next year and there will be visible progress in future.

Government Initiatives in road projects

- Decks have been cleared for highway projects worth Rs.27000cr for 20 projects spanning 2700 kms
- Govt. approved Rs. 7915 cr. road projects in U.P., Gujarat, Maharashtra and Haryana under NHDP
- CCEA approved 4 proposals to widen a total of 471km of highways, investment of Rs 4,618 crore.
 - Above projects are in Jabalpur-Bhopal, Demow-Bogibil, Jorhat-Demow, Numaligarh-Jorhat.
- Cabinet has given nod for two road projects covering 495 kms worth Rs 5000 cr. for Bihar & Odisha



- Govt. approved Rs 1229 crore road projects (4-laning of the Rewa to Sidhi section of NH-75E in M.P and 2-laning with paved shoulders of the Ladnu-Degana-Merta city section of NH-458, Rajasthan)
- 6-laning of Vadodara-Surat section on NH-8 under NHDP Phase V on DBFOT/BOT basis
- Rural road connectivity projects worth Rs 38500 cr. cleared by govt.
- Centre approved Rs 820 cr. under the flagship PMGSY project in Assam to build 689 km of roads
- Centre has recently sanctioned Rs 1135 cr. for PMGSY projects to Tamil Nadu
- Government approved to construct 27 roads along Sino-Indian borders at a cost of Rs. 1937 crores
- NHAI to expand highways in Vizag into six lanes
- Eco clearance for Udaipur-Ahmedabad 6 lane highway to widen section of NH79A, NH 79, NH8
- GoI and ADB have signed a \$252 Mn loan to construct 3461 kms of all-weather roads in five states – Assam, Chhattisgarh, Madhya Pradesh, Odisha and West Bengal.
- Proposed issuance of tax-free bonds to the extent of Rs.50000cr in 2013-14 would help the sector
- For the FY 2013-14, the internal target has been fixed at 9000 km of NH so as to ensure award of at least 7300 km during the year

State Government Initiatives in road projects

- TN Government to construct a 45-km elevated road to reduce traffic congestion along the IT Corridor. Other projects in Tamil Nadu include-
 - A Rs 168-crore project for six-laning the 22-km road linking Thiruninravur to Padi
 - New roads linking the Sipcot industrial estate at Bargur to the nearest NH at Rs 12 crore
 - A four-lane road linking up Thandalam-Perambakkam-Thakkolam, a distance of 39 km
 - A 14-km, 2nd phase of the bypass for Thanjavur
- Karnataka govt. has cleared Rs. 3658 crs of 5728 km roads rural road projects
- Bihar govt. has central govt. approval for construction of 9070 km of roads, cost of Rs. 3387 crs.
- Haryana's road project of four-laning of Rohtak-Hansi-Hisar (98.89km) got a central govt. approval
- 1817kms New National Highways will be developed thru PPP Model in the state of Andhra Pradesh
- 2 highway extn. projects in Rajasthan (investment Rs 713 cr.) with World Bank assistance approved
- Proposal for another 13.95 km Zojila Tunnel is under progress in J&K
- 4-laning with paved side shoulders of Ghoshpukur-Falakata-Salsalabari section of NH-31D in West Bengal approved
- The U.P. state government, allocated 1877 cr. for construction of link roads and small bridges
 - A six-lane 270 km expressway between Lucknow and Agra planned at Rs. 9155 crore
 - Rs.350 crore to be spent for construction of four lane link roads
 - The state highways, main district roads to be improved at a cost of Rs. 200 crore
 - U.P. government has approached the ADB for funds to the tune of Rs. 3000 crore. (1130 Km of roads are planned under this project)

Delhi Mumbai Industrial Corridor (DMIC) Project -

The \$90 billion Delhi Mumbai Industrial Corridor (DMIC) Project consists of various infrastructure projects for development of new industrial cities in the DMIC region. The projects are to be implemented at the State level in partnership with the State Governments. The process of land acquisition/ land procurement is in progress in the States of Haryana, Rajasthan, Madhya Pradesh, Gujarat and Maharashtra and master planning has started in Uttar Pradesh. Following industrial cities have been taken up for development in a phased manner:





Chart 12 ↑

S. No.	Name of the Node	State
1	Dadri-Noida-Ghaziabad Investment Region	Uttar Pradesh
2	Manesar-Bawal Investment Region	Haryana
3	Khushkera-Bhiwadi-Neemrana Investment Region	Rajasthan
4	Pithampur-Dhar-Mhow Investment Region	Madhya Pradesh
5	Ahmedabad-Dholera Investment Region	Gujarat
6	Shendra-Bidkin Industrial Park City near Aurangabad	Maharashtra
7	Dighi Port Industrial Area	Maharashtra

Table 9 ↑

As discussed in the last report following are the investment regions planned under DMIC project.

The government's ambitious USD 90 billion DMIC project has made rapid progress. Plans for seven new cities have been finalized and work on two new smart industrial cities at Dholera, Gujarat and Shendra Bidkin, Maharashtra will start during 2013-14.

Status on the work on DMIC Projects

- Perspective planning of the overall DMIC region completed
- The ToR clearance for the Shendra and Bidkin Industrial Park has been granted by MoEF.
- **Power Projects** - Power Projects Project development activities for 5 Gas Based Power Projects with capacity of 1000-1200 MW each have been taken up by DMICDC at the following sites:
 1. MIDC Ville Bhagad, Dist. Raigad in Maharashtra
 2. Chainpura Industrial Area, Distt. Guna, Madhya Pradesh
 3. MIDC Indapur in Dist. Pune in Maharashtra
 4. Vaghel, Distt. Patan, Gujarat
 5. Rajpur-Shahpur, Distt. Mehsana, Gujarat
- **Eco-Cities in DMIC region** – In addition to the studies conducted at the 4 sites of Dahej, Changodar, Shendra, Manesar, 2 more locations namely, Neemrana and Haryana SEZ at Jhajjar have last month taken up in discussion with METI, Japan.
 - The 19 short-listed projects under Japanese funding include Ahmedabad-Dholera rail line project, Dahej water supply, Delhi-Manesar-Bawal metro rail, power projects in Manesar and Neemrana Industrial Parks, conveyance system of Delhi's treated sewage water to Rajasthan and so on. Toshiba is interested in Light Rail Transit system in Pune
- **Model Solar Project in Neemrana, Rajasthan** – The planned project has following features
 - 5 MW Solar Power project feeding power to the commercial grid
 - 1 MW Solar Power Project and 2 MW Diesel Generator Integrated with Smart Micro Grid Feeding Power to Industrial Consumers in Neemrana Industrial Park

- **Pilot Projects in DMIC region**

- **Dahej Ecocity, Gujarat (Hitachi, Itochu, Hyflux Consortium)** - A SPV namely Swarnim Dahejspring Desalination Pvt. Ltd. has been formed by consortium members. Other emerging pilot projects being undertaken include solar roof top and waste management.
- **Sanand – Changodar Region, Gujarat (Mitsubishi consortium)** – The emerging projects include Water solutions system, Consolidated solar power, Dual Mode Transportation
- **Shendra Ecocity, Maharashtra (JGC Consortium)** - The various proposed pilot projects viz. Drinking Water Supply, Waste Water service, Water Recycle Service, Electric Vehicle and Photovoltaic cells.
- **Manesar-Bawal Ecocity, Haryana (Toshiba Consortium)** – Energy management system with high efficient gas cogeneration system is being evolved by Toshiba as a pilot project
- **Jhajjar-Manesar region, Haryana** – NEC Corporation and Mitsui are working on the Logistics Data Bank business plan. The project proposal for equity investment in the project has been posed for approval of DMIC Trust.
- **Neemrana Ecocity, Rajasthan** – Efficient and stable supply of high-quality electricity in an industrial park – Mitsui & Kansai. Ministry of P&NG has informed that as far as requirement of 2.8 mmscmd of RLNG for the Smart Community Projects in Rajasthan and Haryana is concerned, the same will be made at the price of RLNG applicable at the time of supply of gas in 2014
- **Road & Rail based Spur Connectivity to the new cities** – Proposals have been submitted by DMICDC to the concerned Central Ministries. Rigorous follow up is being done by DMICDC to prioritize their development.
- **Water availability to new cities** - MoWR has requested the state governments to arrange water supply to the proposed new industrial cities in DMIC and suggested that state governments may consider plans for the efficient use/management of water in irrigation sector where 80% of water resources are used.
- **Exhibition cum Convention Centre – Integrated Freight Complex at Dwarka, Delhi** – The project shall be an integrated complex comprising the ECC Centre, IFC/ACC (air Cargo Complex) with global facilities of 5 star hotels, shopping centre, commercial office space, multi-level parking, green open space etc. DDA has been directed to undertake necessary construction of Urban Extension Roads (UER-1 and UER-2) along with appropriate LRT (Light Rail Transit)/MRT (Mass Rapid Transit) connectivity, which form an integral component of the Master Plan on a fast track basis on a fast track basis so that transport and traffic congestion issues do not arise.

Buoyed by the rapid progress of the DMIC project, Finance Minister had announced in the 2013-14 Budget two more industrial corridors between Bangalore and Chennai and Bangalore and Mumbai.

Chennai-Bangalore Industrial Corridor

- Japan International Cooperation Agency (JICA) and the Indian government's department of industrial policy and promotion are preparing a plan for the industrial corridor. While the existing road connecting the two cities is 350 km, there is a proposal to cut the distance by 100 km with new roads.
 - Expressway will be 260-km drive covering Hoskote and Sriperambudur in just two hours
- More than 30% of the Japanese business base in India is located in south India.



- The southern region accounts for more than 50% of India's automobile exports and hence the Japanese are stressing on better infrastructure links for a regional production network spanning India and its East Asian neighbours.
- Five important business hubs have been identified in the corridor. Hoskote and Bangarpet in Karnataka; Palamaner and Chittoor in AP and Sriperambudur in TN.
 - Steel, cement, food processing, IT/BT, automobile zone, readymade garment zones, petroleum, chemicals and petrochemicals complex are some of the sector specific zones that are expected to in the business hub.
- To harness the region's potential; infrastructure projects in the Chennai-Bangalore region would include expansion of Ennore port and outer ring road in Chennai.
- About 60% of Japanese FDI in Tamil Nadu is in the automotive sector where the state has a core competence.
 - Several manufacturing units would find it easier to move goods.
 - Along the route are consumer electronics manufacturers in Sriperambudur, leather industry in Ranipet, granite in Bargur, IT companies & commercial vehicle makers in Hosur.
- Since the highway will pass through the Rayalaseema region, the districts of Chittoor and Anantapur, besides Nellore, are expected to see an industrial boom.
 - As planned Krishnapatnam Port in Nellore will be included in phase-I of the Corridor
 - It would be developed as an alternative port for Chennai and Ennore ports which are burdened by traffic congestion.
 - In phase-II, the districts of Chittoor and Anantapur have been included along with Nellore for development of industrial clusters.
 - The thrust will be on sectors like manufacturing including automobile and machine tools, but others like non-pollutant industries and the IT sector would also be developed.
 - Various border towns and cities like Tirupati, Pileru, Nayudupeta, Gudur and Hindupur in the districts will have an opportunity to benefit from the industrial corridor

Mumbai-Bangalore Industrial Corridor

- The corridor is expected to be part of the Peninsular Regional Industrial Development Corridor (PRIDe), which passes through Tamil Nadu, Karnataka, Andhra Pradesh and Maharashtra.
- The Dabhol-Bangalore gas pipeline project will double the potential in this corridor
- In the first phase, the corridor will be developed till Chitradurga.
- As it passes through Tumkur, a national investment and manufacturing zone (NIMZ) has been planned. It will be an integrated industrial township spread over 5,000 hectares.
- NIMZ will have state-of-the-art infrastructure, planned land use, energy-efficient technology, social infrastructure, skill development facilities. The zone will be managed by a special purpose vehicle and the cabinet has already cleared the project.
- Similar to NIMZ, govt. has plans to develop Dharwad as a special investment region on 5,000 acres.
- The region will also provide a platform for captive development which may be required for specific industry types with large footprints.
- In Karnataka, the corridor includes a road length of 550 km (23%) and rail length of 330 km (41%)
Industrial areas to be covered: Vasanth Narasapura (Tumkur), Bharamasagara (Chitradurga), Shimoga, Savanur (Hubli), Haveri, Kushtagi-Gadag, Yelburga (Gadag), Belur (Dharwad), Hukkeri (Belgaum), Navanagara (Bagalkot)



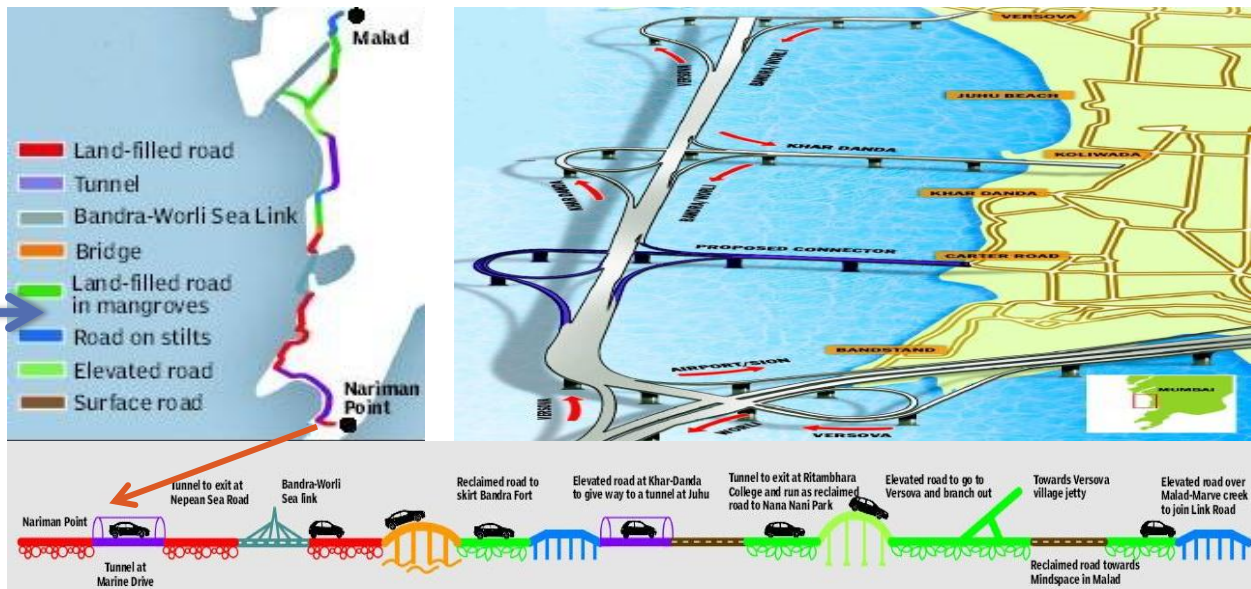
New Road projects in Mumbai

Major infrastructure project is the upcoming Santacruz-Chembur Link Road (SCLR) which is expected to be completed by 2014-end. Besides the mega-projects, another 20.6 km long new road would be added to Mumbai's existing road network and help ease traffic congestion across different sectors.

- Development of road network in Wadala TT area
- Underpass at Kalanagar junction
- BKC-Eastern Express Highway elevated road
- Flyover at Kherwadi junction on WEH
- Development of Andheri-Ghatkopar Link Road
- Decks have been cleared for Rs 9630 cr. **Mumbai Trans Harbour Link project** - The 22-km sea bridge – from the sea front at Sewri to Chirle, connecting NH-4B.
 - Besides decongesting the island city of Mumbai the link will provide connectivity to MBPT and JNPT ports and afford quicker access to Navi Mumbai International Airport. It will not only provide connectivity to commuters traveling towards Thane-Nashik, Navi Mumbai, Panvel-Pune and further to southern India. Expected to boost economic growth of Raigad district.
- MMRDA has also undertaken a few additional corridors to facilitate anticipated traffic dispersal.
- The 4.25 km Sewri-Worli (East-West) elevated connector running from Sewri Railway station to Dr. Annie Besant Road (Worli) will provide east connectivity at the Sewri Interchange of the MTHL.
- Third major connector for traffic dispersal is the Chirle-NH17-Mumba-Pune Expressway Connector.



Mumbai's Western Freeway- Mumbai's Rs. 8000-crore coastal 35.6-km freeway project would connect the west coast of the city from Nariman Point to Malad-Kandivli and replace the plan to link the coast entirely through sea links. Along the way it would comprise tunnels, sea links, reclaimed roads and elevated roads.



Bandra-Versova sea link: - Chart 13, 14, and 15



The 10 km link has got clearance with a rider that there won't be any reclamation of land along the coast. The sea link will be built 900 metres from the coast and have 4+4 lanes with traffic dispersal at Otter's Club in Bandra and at Juhu Koliwada. The project, estimated to cost Rs. 4045 crore, is being implemented by the Maharashtra State Road Development Corporation (MSRDC), the nodal agency.



Geotextiles in road construction

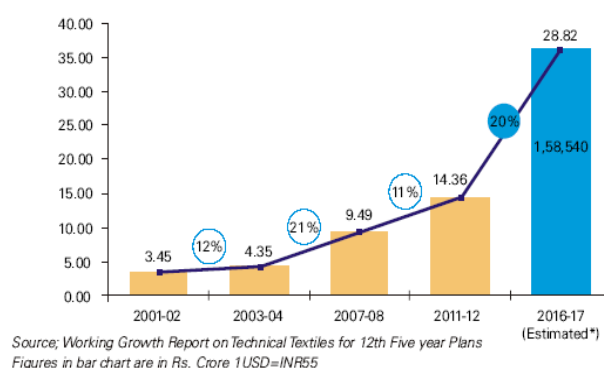
Geotextiles are permeable textile materials which are designed for use in civil engineering applications such as erosion control, soil stabilization, reinforcement, separation and drainage.

Global Geotextile market - The world geotextile market is enjoying strong growth but it is also highly competitive. In order to succeed, geotextile manufacturers have to develop cost effective, innovative products and processes. Furthermore, to increase their competitiveness in the global geotextile market, they must identify market requirements and introduce advanced products which are specific to customers' requirements

The global geotextiles market is estimated to be worth \$6.3 billion by 2017, with growth expected to come from emerging economies in Asia--markets & markets

Geotextiles are gaining importance on account of large scale infrastructural development going on at a global level. Geotextiles performs several functions which include separation, filtration, reinforcement, protection, and draining. Road industry is the dominating applications segment within geotextiles market. More than 50% of the market demand is expected to come from this segment.

Chart 16 ➡



Indian Geotextile market - It is estimated that over the next five years, road industry will govern the geotextiles market share as far as applications are concerned. Some other major applications within geotextiles market include erosion control, waste containment, and pavement repair. Economic growth in India has boosted demand for more roads, railways, highways, bridges, canals and dams, and the **FICCI projects a 20% increase in the geotextile sector based on the boom**. Geotextiles enhance design, durability, cost-effectiveness and aesthetics of infrastructure projects, and **demand is expected to grow 10-12% through 2013**. The continued impetus to infrastructure development in India has meant that the demand for geosynthetics is expected to rise quite significantly in the near future.

Examples of Geotextile usage in Indian context

Various sections of roads in Manipur have been identified where the Geotextiles project would be implemented. The GoI has already released Rs. 500 crores to the Ministry of Textiles for the commencement of pilot Geotextiles project. The sector has recorded 11-12% growth in the last five years and with domestic demand growing at a robust pace it should touch 18 to 20% in the 12th plan period.

For the 12th FYP, five new Schemes have been proposed by the Ministry with focus as under:

- I. Scheme for Usage of Geotextiles in North Eastern Region (Fund allocation-US\$90.91mn (Rs.500 Crs))
- II. Scheme for usage of agro textiles in North Eastern Region (Fund allocation – Rs. 55 Crs)
- III. Scheme for strengthening of database & standards for technical textiles (Fund allocation-Rs.10 Crs)
- IV. Special Incentive Package Scheme for speciality fibres (Estimated fund requirement – Rs.200 Crs)



State Government/Pvt. companies boost technical textiles projects

- Govt. of Tamil Nadu approved establishment of Rs. 117 crs. technical textile park in Pallavada, which is expected to commence production in 2013.
- Karnataka state will also promote technical textiles as a focus sector in its new industry-friendly textiles sector, which was expected to be launched in April 2013 for a period of 5 years till 2018.
- Jindal Group, plans to establish technical textile unit an investment of Rs. 1497 crores in Nashik

Examples of Geotextiles usage in various projects in India (Table 10)

Year	Projects	Application
2004	National Highway - 6	Trench drains
2005	ROB in Delhi	Filtration
2005	(Four-laning work on NH-6, Dankuni to Kolaghat, Km 17 to 72, West Bengal)	Geosynthetics in Black Topped Pavement
2006	Tuticorin Port	Coastal Protection
2006	Haladia Hazardous waste fill	Geomembrane Protection
2007	Kakinada Port Breakwater Construction	Coastal Protection
2008	Kolkata Airport Runway extension	Separator
2008	Chakdah Bongaon West Bengal SH-1	Asphalt Overlay Paving Fabric
2008	Dronagiri – JNPT -Mumbai	High Strength Polyester Grid with Non Woven Backing
2008	Construction Of 8 Lane Expressway Phase - II Pedda Amberpet (Km 95) To Bongulur (Km 108)	Reinforced soil walls using Geogrid – using discrete panels
2008	Construction of Flyover At NanaVarchha on Varchha Road in Surat.	Reinforced soil walls using Geogrid – using segmental panels
2008	Construction of DND – Mayur Vihar Link Road Phase I & II	Reinforced soil walls using Geogrid – using welded wire mesh
2008	Four Laning of Nagpur-Hyderabad Section of NH-7	Reinforced soil walls using segmental panels
2008	Meerut-Muzaffarnagar, Section Of NH 58 in the state of U.P.	Reinforced soil walls using segmental panels
2008	Four Lanning Of Lucknow-Muzaffarpur Section on NH-28	Reinforced soil walls using segmental panels
2008	Reinforced soil walls with segmental panels facia system for ROB's Jadcherala-Kotakatta	Reinforced soil walls using segmental panels
2008	Strengthening & Widening of Road at Palanpur-Swaroopgunj Package on NH-14	Reinforced soil walls using segmental panels
2008	Six Laning of Vadodara – Bharuch Section of NH-8	Reinforced soil walls using segmental panels
2008	Flyovers & ROB's of NH-76, EW-II (RJ-III), Udaipur (Rajasthan)	Reinforced soil walls using with discrete panels facia system
2008	Vallarpadam, Cochin Project	Geotextile (non woven) as separation/filtration layer- Qty used 4,30,260 sq m
2008	JNPT Package II (SH-54 & Aamra Marg)	Woven geotextile below embankment-Qty used 64,600 sq m
2011	AP- 19/20 Near Rajhmundry, (wrap around approach) built for 5 bridge approaches	Reinforced soil walls using Geogrid – using discrete panels
2011	Kundli - Mansear Highway	Geocells on embankment slope
2011	GRIL NH - 24, Expressway Project	Geocells on embankment slope
2012	Rehabilitation of State Highway 30, Karnataka	Geocells for road construction
2012	Rehabilitation of SH-84, Maharashtra	Geocells for road construction



Opportunity for Use of Geotextiles in Concrete roads in India

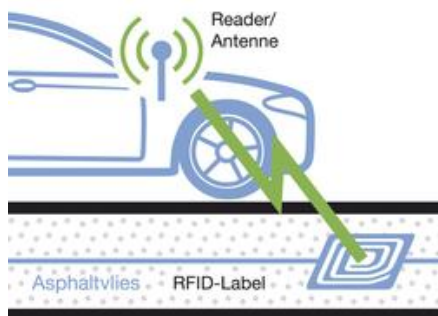
Geotextiles' position is dependent on its versatility, which allows these products to be used in a wide range of applications. Favorable gains in geotextiles demand will benefit from their dominant position in the transportation infrastructure and construction markets. Further promoting gains is the fact that engineers continue to realize the benefit of using these materials in road and other construction activities. Nonwoven geotextiles, for example, are finding expanded use in concrete road rehabilitation applications as an alternative to hot-mix asphalt in unbounded concrete overlays.

- **Concrete Road Project in Kochi** - An experimental white-top concrete road for Kochi is proposed to consist of a mix of fly ash, polymeric fibre, cement and sand. Cement Manufacturer's Association has offered to lay 25 km free of cost in any part of the State to kick off concretization. The association has promised a guaranteed life of 25 years for this stretch against 10 of conventional roads. Concrete pavements also bring down vehicle running costs by 10-15%-E. Sreedharan(principal adviser to DMRC)

With the 12th Plan Period envisaging an investment of US\$1 trillion for infrastructure development, the next few years could herald a new era of rapid growth for the geosynthetics industry.

New applications in Geosynthetics

Example from Germany



German company Schreiner LogiData together with Polyfilld has developed an efficient and cost-saving solution for which the geosynthetics are equipped with RFID labels. RFID chips serve to store information about the strengths and structures of the various road layers and materials plus road construction data and additional quality characteristics. To read and edit the data, vehicles are equipped with write/read units allowing the information to be read, changed and stored again onboard the moving vehicle.

Opportunities in Geosynthetics Applications in other infra projects

Geosynthetics in Oil production, Transportation and Storage

Oil, of course, consists of a well drilling and pumping operations which (when recovered) must then be transported, converted and stored or directly used as an energy source. The major geosynthetics applications with respect to oil operations appear to be as follows:

- Paved and unpaved road construction using geotextiles and/or geogrid to access the well site and storage locations.
- Geomembrane liners at the well site to control surface contamination.
- Geomembranes as secondary liners for storage tanks and tank farms.
- Plastic pipes at almost every stage of the operation.
- The uniqueness of oil sands represents opportunities for final covers of the spoil as well as control of numerous environmental contamination situations.

Geosynthetics in Coal mining, transportation, storage and waste disposal

Coal, the classic energy source, is either mined at depth or strip mined from the surface. The major geosynthetics applications with respect to coal operations appear to be as follows:

- Paved and unpaved roads using geotextiles and/or geogrid to access the mining operation and for transportation to the shipping site.
- Numerous environmental contamination controls such as erosion control materials, silt fences and sedimentation pond liners.
- Mine safety applications using various geosynthetic materials.
- Mechanically stabilized earth stabilization berms and final cover for coal spoil tips.
- Mechanical stabilized earth (MSE) walls and slopes for coal combustion residuals (CCR's) such as fly ash, bottom ash, flue gas desulfurization materials, and boiler slag. This applies to both dry disposal as well as slurried disposal.

Geosynthetics in Natural gas production and transportation

The major geosynthetic applications with respect to natural gas operations, **particularly shale gas plays**, appear to be as follows:-

- Geomembranes liners for fresh water storage and use.
- Double-lined geomembranes systems for frac water & production water storage, sedimentation & reuse. Double lined geomembranes systems for disposal of vertical and horizontal well cuttings.
- Geomembranes contamination prevention liner mats in the immediate well drilling vicinity.
- Local paved road widening and reconstruction using geotextiles and/or geogrid for access to these remote sites.
- Unpaved road construction using geogrid and/or geotextiles leading from the local paved roads to the well pad and its related operations.
- Mechanically stabilized earth (MSE) walls and slopes using geosynthetic reinforcement to provide level surfaces for operations and materials storage.
- Erosion control materials (of all types) to control slope and channel erosion from occurring.
- HDPE/ PVC pipe for fresh water, frac/production water as well as the final gas product transmission.

We have an outstanding chance to exchange knowledge and experiences of successful utilization of geosynthetics throughout every segment of the energy source landscape.

Table 11 ↓

Major Geosynthetic Application Areas for various Energy Sources						
Geosynthetic Application	Oil	Coal	Nat. Gas	Hydro	Nuclear	Renewals
Pond Liners			✓	✓		
Waterproofing liners	✓			✓		
Contamination barriers	✓		✓			
Landfill liners			✓		✓	
Final covers	✓				✓	
Paved roads	✓	✓	✓	✓	✓	✓
Unpaved roads	✓	✓	✓	✓	✓	✓
Temporary roads	✓		✓	✓		✓
Foundation support						✓
MSE walls and slopes		✓	✓			✓
Safety systems	✓	✓				
Drainage materials			✓		✓	
Protection materials		✓	✓			
Erosion control		✓	✓		✓	✓
Plastic pipe	✓	✓	✓			

Source: -Geosynthetic Institute 2012



TRANSPORT

Railways - Projected Growth and Investment Requirements

Size of the Initiative

Railways have entered the one billion plus club in freight loading - With the loading target exceeding 1007 MT by the end of March, Railways today entered the select group of billion plus club in freight movement with China, Russia and USA. The Railways budget 2013-14 earmarks an outlay of Rs. 63363 crore, the highest ever so far. 1047 MT freight targeted in 2013-14 - expected earnings Rs. 93554 crores

1. Dedicated Freight Corridor - significantly high allocation of Rs. 71bn as compared to Rs. 15bn spent in FY13
2. 500 km new lines, 750 km doubling, 450 km gauge conversion targeted in 2013-14
3. The budget has proposed that Rs 1 lakh crore of Rs 5.2 lakh crore of investments would be mobilized through the PPP route in the 12th Five Year Plan ending 2017. PPP to the tune of Rs 1 lakh crore will open the doors for privatization in the railways
4. Private sector is expected to grab a host of projects like the dedicated freight corridor (DFC), redevelopment of railway stations, power generation, energy-saving projects, freight terminal operations, setting up of wagon and locomotive units, gauge conversion and network expansion
5. It is planned that all Indian cities having population more than 20 lakhs will have metro rail system. Currently, rapid transit systems is being deployed in Chennai (2013), Gurgaon (2013), Hyderabad (2017), Jaipur (2013), Mumbai (2013), Navi Mumbai (2014) and Kochi (2016) these cities and more are under construction or in planning in several major cities of India
6. Other cities where metro is being planned are Chandigarh (2018), Indore (2019), Kanpur (2017), Ludhiana (2017-18), Pune (2018)
7. Pre-feasibility studies for one high-speed stretch have been completed and survey work on three other corridors is nearing completion.
8. Indian Railways has drawn up a draft plan for operating semi-high-speed services along parts of the so-called Golden Rail Corridor linking some of India's main cities
9. Apart from the high speed corridors, high-speed rail lines connecting Thiruvananthapuram and Kasaragod, Chennai and Bangalore, Delhi and Chennai are planned by the High Speed Rail Corporation

Opportunity

The number of passengers is expected to increase from 8.9 billion in 2012-13 to 11.7 billion by 2016-17. The annual growth in passenger-km is expected to be around 10.8%, rising from 1195 billion in 2012-13 to 1760.4 billion by 2016-17. Constructing high-speed lines could be a way to relieve congestion on the conventional network which is becoming increasingly clogged. Only around 11,000 km of new lines were built during the last 65 years, while 3000 new trains have been added to the timetable in the past three decades. There are plans to purchase 30,000 coaches in the 12th Plan

Outlook

It is estimated that by the year 2020 around Rs 1,400,000 crores would be spent on augmentation of capacity, upgradation and modernization of Railways, high speed corridors, expansion and management of extensive network on optical fibre cables, and big projects like new lines and dedicated freight corridors.

Potential

The railways plan to invest Rs 5 lakh crore in capacity addition during the 12 Plan. The railways have planned an estimated investment of Rs 632.12 bn for developing new tracks and bridges and signaling and telecom works has been estimated to be Rs 391.10 billion during 2012-17. India's 12th plan projections (2012-13 to 2016-17) encapsulate the goal of executing work on at least two high-speed rail corridors.

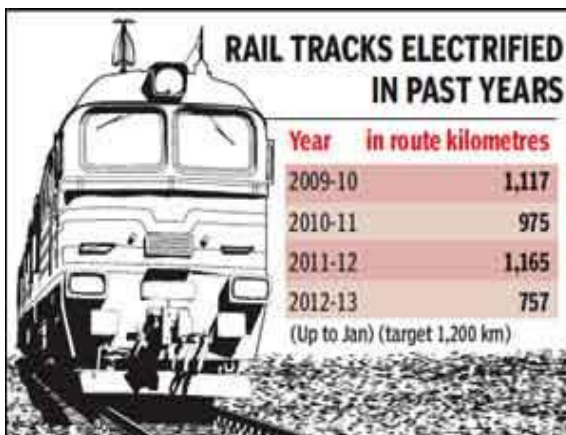


RAILWAYS SECTOR – Opportunities

Railways the next growth driver - The rail budget for 2013-2014 has provided a major boost for the growth of infrastructure sectors. The budget has provisions for speeding execution of projects in key industries, including power, coal, mining, ports and urban transport. Additionally, the renewed focus by the rail ministry on the much delayed Dedicated Freight Corridor (DFCC) project will help capture the freight traffic currently locked up in these sectors.

The rail ministry will rope in the private sector and state governments concerned in order to complete the ambitious projects on time. An investment of up to Rs 9,000 crore is expected under these projects including Rs 3,800 crore for port connectivity projects, Rs 4,000 crore for coal mine connectivity and Rs 800 crore for iron ore mines connectivity improvements.

Under the new policy for participative models in rail connectivity and capacity augmentation projects notified by the railway ministry, 100% FDI has been permitted under the approval (FIPB) route for the development of first- and last-mile connectivity projects at either end of the rail transportation chain providing connectivity to ports, large mines, logistics parks.



The railways, with this move, expect encouraging response from the foreign and domestic players. The railway need to invest, estimated by the Sam Pitroda committee on modernization, Rs 735,000 crore in the next five years to match the growth rate of the Indian economy.

Opportunities in Electrification Programme – Railways to spend double on track electrification

Indian railways have turned its attention on the neglected track electrification programme, increasing the target by around 50% for the next fiscal 2013-14.

The Railways would be doubling its spend on electrification to Rs. 2000 crore in 2013-14. This would be the railways biggest electrification drive as the target is expected to be around 1800 route kilometre. For 2012-13, the electrification target was 1200 route kilometre, of which only 757 km has been achieved till January 2013.

At present, only 31% of the 64000 kilometre railways network is electrified.

“Putting electrification target on fast track remains imminent for the railways as in 2012-13, the overall bulk diesel cost went up by over Rs. 15 litre, an increase of over 33%.

At present, the total fuel bill of railways is around Rs. 20000 crore (Rs. 12,500 crore for diesel and Rs. 7,500 crore for electricity). Thanks to the increase in diesel prices, the fuel bill will increase by at least 15%. All new rail track projects are expected to be electrified.

The ambitious 3,300-km dedicated freight corridor project is also going to be 100% electrified.

Government Initiatives



- Planned investment of Rs 63,363 crore for 2013-14, including Rs 600 crore from PPP route
- 12th Plan railway size to be Rs 5.19 lakh crore, with gross budgetary support of Rs 1.94 lakh crore
- Ministry plans to mobilize investment worth over a lakh crore through the PPP mode in the 12th Plan
- Among the focus areas identified are elevated rail corridor, DFCC, redevelopment of stations, power generation and freight terminals
 - Allocation of Rs 1,000 crore each made for railway land and station development authority
 - Rs. 9000 crore investments expected including Rs. 3,800 crore in port connectivity and Rs. 800 crore in iron ore mines connectivity
 - Railway Energy Management Company to be set up to harness solar and wind energy
 - Identification of 104 stations for upgradation with more than 1 Mn popn. and religious significance

Potential for Geotex in Indian Railways

- Geo-synthetics can find its use in railway application for track bed stabilization, track drainage, erosion control, interface protection, construction over soft soil, steep slope construction, mud pumping, etc.
- IR is upgrading infrastructure to meet future demand of higher axle load traffic. About 19000 km track (of routes A, B, C and D special) is on weak formation which causes of ballast penetration, higher fuel consumption, passenger discomfort, extra maintenance cost to track and rolling stock.
- Rehabilitation / strengthening of such track can help to eliminate speed restrictions. With dedicated freight corridors and high speed corridors being planned, these will entail heavy axle loads/ high speed railway tracks require stable track formation which can be provided by use of geo synthetics.
- Further 11,250 bridges on A, B and D special routes will require strengthening
- Indian Railways has plans to construct 25,000 kms of railway tracks by next 5 years, and about 10% of the new tracks (i.e. 2500 kms) will require Geotex. Every year Railway Ministry constructs close to 400 road-over bridges, and Geotex requirement comes from there as well.
- Examples of recent usage in railways- Biaxial geogrid has been used in South Central Railway, Northern Railway (PP– strength 30 kN/m with aperture size of 61mm x 61mm) for formation rehabilitation. Field observations indicate improvement in overall track performance after the application of geogrid

Massive Investments in coming up Rail Projects

- Union Cabinet has sanctioned a proposal to lay three new railway lines – 300 kms in Chattisgarh
- JNPT to spend Rs 1k crore on rail and road infrastructure
- Hyderabad Metro Rail, a 40-mile, 66-station elevated MRTS to be completed by 2017
- Maharashtra government approved elevated Nagpur Metro Rail project estimated cost at Rs. 7,350 cr.
- Construction of Churchgate-Virar elevated rail corridor in Mumbai costing Rs. 21000 crore to start this year
- Third Metro line (35 kms) in Mumbai to be constructed underground between Colaba-Bandra-Andheri SEEPZ at a cost of Rs. 21000 crore
- Under the Mumbai Urban Transport Project (MUTP) III, the Railways is keen to start work on the CST-Panvel elevated fast air-conditioned rail corridor, a third and fourth line on the Virar-Dahanu stretch and a Vasai-Virar-Panvel suburban corridor.
- Rs. 356 crore allocated towards the Mumbai Metro-Railway (the Versova-Andheri-Ghatkopar route) and Rs. 1500 cr. for the 8.80 km long monorail between Chembur-Wadala
- Mumbai Rail Vikas Corporation has drawn up an ambitious plan for direct suburban rail-connectivity between Navi Mumbai and Kalyan and beyond via the trans-harbour network
- Metrolink Express for Gandhinagar and Ahmedabad (MEGA) estimated at Rs18000 cr.
- Noida-Greater Noida, City Centre to Sector 62 Metro Projects gets nod - total length of the Metro project is 29.70 kms with 22 stations planned

Length 63km		Underground 16.54km	Track Broad gauge
Estimated speed 100km/hr		Operation 5am to midnight	
Capacity 90,000 passengers during peak hrs		Coaches Air-conditioned	
Tentative fare Min ₹20 for 3-4km			
Estimated cost of the rail corridor ₹21,000cr			



Telecom - Projected Growth and Investment Requirements

Size of the Initiative

With mobile subscribers growing at the pace of over 15 million every month, the telecom sector is likely to witness huge investments to the tune of Rs 5 lakh crore in the next five years plans (2012-2017).

There is a significant potential for data usage industry in India as penetration is lower at 11-12% compared to other Asian countries, like South Korea and Japan have data usage penetration levels at upto 50% -Cellular Operators Association of India.

India is presently witnessing an upsurge in mobile broadband and data services due to growing smartphone adoption. In order to accommodate high-speed data services, mobile operators need to upgrade their network infrastructure by deploying optical fiber cables (OFC).

Opportunity

The total number of telecom subscribers is projected to grow from the present 861 million to 1,200 million during the 12th Plan. Subscribers per MHz of spectrum per operator are about 10-15 million for Indian telco's compared with 5-6 million for Chinese, Philippine and Indonesian telco's, which also indicates that Indian telco's may need to invest more to decongest their networks. About 25% (roughly 300 million) would be 3G/4G subscribers, which would require scaling up the infrastructure.

The Optic Fibre Cables (OFC) market in India is expected to be a \$290.8 Mn (~Rs. 1599.4 crores) market by 2018 (Frost Sullivan). The overall market is expected to grow at a CAGR of 12.5% between 2011-2018

There is a huge opportunity in solar power (PV cells market) as currently India has close to 500,000 mobile network towers in India which can be converted to use solar photovoltaic back power system instead of diesel generators currently being used. Last year, TRAI directed all tower companies to reduce their dependence on diesel and cut carbon emissions by running at least 50% of all rural towers and 20% of urban towers on hybrid power by 2015.



Outlook

Indian government is aiming to spend nearly \$6.9 billion on technology products and services in 2013 of which, telecommunications and networking equipment, will reach \$ 2.2 billion. (~Rs. 12100 crores)

Potential

Private players in the telecom sector would make investments of nearly Rs 9 lakh crore during the Twelfth Five Year Plan, projects Infrastructure Division of the Planning Commission.

India has proposed to set up three funds with a combined corpus of Rs.17,500 crore to boost local research and manufacturing of telecom products as it seeks to cut dependence on imports at a time when the current-account deficit has widened to a record and also to reduce security concerns posed by such imports, particularly from China.

The govt. will initially allot Rs. 5000 crore to the Telecom Research and Development Fund, Rs.2,500 crore to the Telecom Entrepreneurship Promotion Fund and Rs. 10,000 crore to the Telecom Manufacturing Promotion Fund during the 12th Five-year Plan ending March 2017



TELECOM SECTOR – Opportunities

Industry

While explosion in data traffic has provided a new ray of hope for the Indian telecom industry, accumulation of additional capital to facilitate massive investment in capacity and backhaul to tap the unexplored potential in data services, has been a major concern for the industry.

The amendment in the meaning of the term 'process' under royalty definition by Finance Act, 2012 to include transmission by satellite, cable, optic fibre or similar technology, has had a far reaching impact on the industry.

The mobile telecom market is presently about 861.6 million users. This has led to an incredible amount of bandwidth demand as more people using these devices require internet connectivity. With more than 137 Mn users, India is the third largest internet user base in the world. **Table 11**

Highlights on Telecom Subscription Data as on 28th February 2013

Particulars	Wireless	Wireline	Total Wireless + Wireline
Total Subscribers (Millions)	861.66	30.36	892.02
Total Net Monthly Addition (Millions)	-0.96	-0.16	-1.12
Monthly Growth (%)	-0.11%	-0.52%	-0.13%
Urban Subscribers (Millions)	521.29	23.58	544.86
Urban Subscribers Net Monthly Addition (Millions)	-7.60	-0.09	-7.69
Monthly Growth (%)	-1.44%	-0.38%	-1.39%
Rural Subscribers (Millions)	340.38	6.79	347.16
Rural Subscribers Net Monthly Addition (Millions)	6.64	-0.07	6.56
Monthly Growth (%)	1.99%	-1.03%	1.93%
Overall Teledensity*	70.42	2.48	72.90
Urban Teledensity*	139.83	6.32	146.15
Rural Teledensity*	40.01	0.80	40.81
Share of Urban Subscribers	60.50%	77.65%	61.08%
Share of Rural Subscribers	39.50%	22.35%	38.92%



McKinsey research also estimates that India will add more users than any other country in the world, reaching 330 – 370 Mn by 2015.

And it's not just mobile usage that is driving the demand for increased bandwidth; emerging sectors like e-commerce, online travel services, and online retailing and banking are also growing at a frenetic pace, placing additional demands on existing infrastructure.

As these companies expand, they are beginning to move from saturated urban markets to semi-urban and rural areas to drive new business growth. A large part of India's future growth will therefore come from these Tier 2 and Tier 3 markets, driving demand for new network infrastructure.

In parallel, the Indian government, in order to cater to increasing infrastructure demands, is becoming one of the largest consumers of information technology related products and services, aiming to spend nearly \$6.9 billion (Rs 37950 crores) on technology products and services in 2013 of which, telecommunications and networking equipment, will reach \$ 2.2 billion. (Rs. 12100 crores approx.)



The government's goal is to ensure improved connectivity not just for commerce, but for better governance and service delivery across the country. One of the most significant government initiatives is the National Optic Fiber Network (NOFN), which aims to connect 250,000 small towns and villages in the country to optic fiber based broadband. The vision is to transform citizen service delivery and support local innovation capacity through rural broadband. With over 72% of India's population living in rural areas, this initiative will enable truly inclusive growth by offering critical banking, governance, and health services online.

Fiber-optic cabling market

Fiber-optic is the dominant type of cable for connecting separate buildings on campuses and connecting floors distributors to building distributors & data centers. If the cost of a fiber port on the active equipment is compared to that of Gigabit copper port on the active equipment, the fiber is almost 6 times higher. Within DC segment fiber-connected device ports already exceed copper-connected ports in every major global market; within India the ratio is almost 54% of fiber where as 46% of copper. It has been predicted that by 2014 over 85% of the connections made in the data center will be over fiber.

In the fiber segment, vendors have a focus on FTTH where infrastructure sector is likely to drive demand, as this form factor allows a single service provider to deliver voice, data and video content. This trend is likely to see a further increase as FTTH and FTTP both find increasing acceptance and deployment in India. The NOFN projects and the forthcoming LTE rollouts are expected both drive the adoption of fiber optic cabling. The fiber-optic cabling market is expected to see higher than average growth. Data center consolidation would further drive demand for fiber based solutions. HD video, high-quality voice, and data services, remote access of applications is likely to gain impetus in 2013 and consequently drive the demand for fiber cabling solutions. New investments would be coming in from tier-II and tier-III cities on account of Govt. spending, and infrastructure development.

Greener Pastures for Telecom Sector

- I. **3G** - Momentum is building but contribution to remain marginal 3G in India is still miles away from the mainstream 2G telephony as the adoption of the former is mere 2% of total wireless subscribers. On the brighter side, 3G traffic has grown more than 200% in the last year, predominantly, after the massive tariff cuts of 70-80% in May 2012. Also, the data usage for 3G stands at around 400 MB per user per month which is around 4 times that of a 2G data user. CARE Research believes that 3G adoption in India will pick up gradually over next 2-3 years growing at a CAGR of more than 40% as the base is small.
- II. **4G- The Great Indian Broadband Dream** - As the world awakes to the rising data needs, Long Term Evolution (LTE), one of the most prominent 4G technologies is getting adopted in 125 countries by 412 operators. As the data traffic grew by astounding 70% in 2012, 4G accounted for 14% of mobile data traffic though it contributed meager 0.9% of total connections. Biggest challenge for 4G globally remains to be lack of coherent ecosystem as the 4G is offered across various spectrum bands like 700 MHz in U.S., 1800 MHz in Europe, 2300 MHz in India etc. limiting mass production of devices for global markets. On the brighter side, worldwide 666 LTE enabled devices (including smartphones, routers, dongles, tablets etc.) have been announced as of Jan-2013 as compared to 269 devices in Jan 2012. India began its tryst with 4G after successful auctions of the spectrum in 2010 though the roll-out so far had been a non-starter with just one player starting services in few large cities.



Unlike our global peers where data usage accounts 20-30% of total revenue, India is still a voice-centric telecom markets that contributes nearly 90%. Though 4G offers a great promise in terms of taking the world to next level of data usage, lack of voice offering is a major lacuna in the Indian market. In spite of Voice-over-LTE being recently allowed by the Indian government, the technology is still in nascent stage globally. Nevertheless, 4G remains the as the hope to bring the data revolution in the country.

III. **4G - Addressable Market** -Though primitive at this stage, 4G can cater to a gigantic addressable market comprising 730 Mn TV viewers (with its Video-On-Demand offering), 137 Mn internet users, 40 Mn smartphone users, 25 Mn SME units (combined with cloud based services) and so on. Despite its challenges, 4G offers a great value proposition in India with a good mix affordable device, reasonable tariff and suitable content.

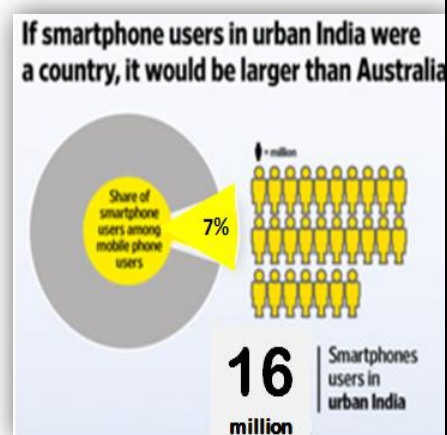
Smartphones driving polycarbonate demand

Plastic has clear benefits that aluminum and glass cannot best. It's light. Any polycarbonate device is lighter than the same device made out of aluminum, or glass.

- One of HTC's main reasons for using polycarbonate in the One X was weight.
- Nokia prefers polycarbonate in the Lumia line because of the way it retains colors.

Not all plastic is created equal. Every manufacturer has their version of it. Here are some quotes on plastic/polycarbonate and why it's the material of choice for some manufacturers. **Chart 17** ↓

- ❖ **Nokia's Nicola Ralston on polycarbonate:** *"We chose polycarbonate because of the colour approach we wanted to take – the ingredients that make up polycarbonate allow us to get the best intensity of colour. "When I first got my Nokia Lumia 800, I told all my friends about how natural it feels in my hand. Again, this is largely down to the polycarbonate."*
- ❖ *"The polycarbonate gives us a human touch – that is the best way to describe it," says Nicola.*
- ❖ **Samsung's Mobile Business Executive V.P. YH Lee on plastic:** *"Since we are shipping really large units, we always have to think how efficiently we can manage the manufacturability and also durability."*



- Samsung India will soon start manufacturing its flagship high-end smartphone GalaxyS4 in India
- **Overall mobile phone market in India reached about 221.6 Mn in 2012, growing 16% y-o-y- IDC**



- Of this, 16 Mn were smartphones, but the category saw a growth of about 48%.
- Samsung was the leader in the quadcore and 5-inch plus screen size models, IDC added.
- The demand for smartphones is expected to be around 34-36 Mn units in 2013-14.
- Panasonic has launched its first smartphone in India marking its re-entry in segment

Go Green: Green Solutions

Renewable energy technologies (RET) solutions like solar photovoltaic, wind power, biomass and fuel cells are the technologies of choice for alternative solutions at telecom towers today. Hybrid solutions that combine diesel generators with RETs and batteries are being customized. Fuel cells are being installed as a

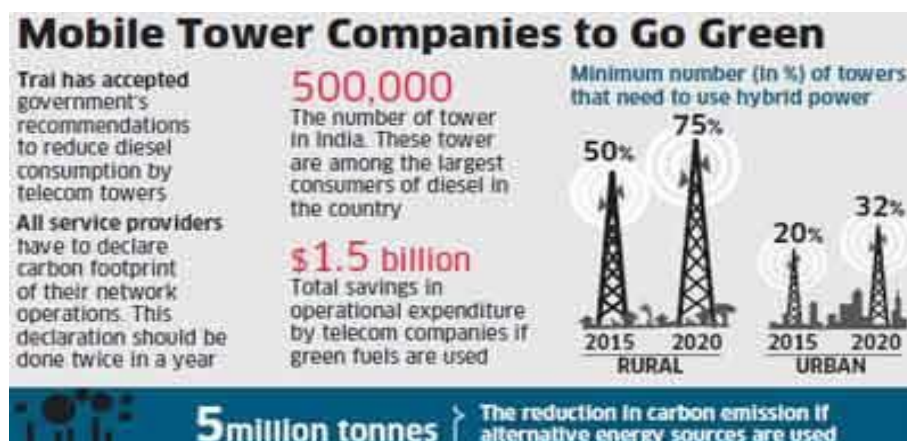


standalone solution replacing the existing diesel generator. In a limited number of cases where electrical grid availability is close to 20 hours a day or more, the diesel generator at the tower site has been replaced completely by enhancing the existing battery capacity leading to improvement in economics and reduction of carbon emissions at site.

- The govt. has passed directions to all telecom service providers to the effect that at least 50% of all their towers in rural areas and 20% of all their towers in urban areas run on hybrid power sources, which includes RET and grid power by 2015.
- Further, 75% of the towers in rural areas and 33% of the towers in urban areas are to be powered by hybrid power by 2020.



Chart 18 ➡



Gearing Up for a New Phase

The next couple of years will see intense network planning, optimization, and innovation as operators are looking for ways to manage scarce network resources to deliver better quality at low cost. Even as contribution of the telecom sector to GDP stands at 6.9%, high debt and stagnating revenues are leading to decline in operators' investments, delay in network expansion, and high tariffs, making telecom services unaffordable to potential users.

- For operators to get back on track, a cumulative CapEx of Rs. 250000 cr. is required for the 7 year period from 2013-20.
- This spend will increase rural teledensity, promote indigenous manufacturing, and achieve 600 Mn broadband connections by 2020.
- 2013 is likely to see the emergence of smarter telecom pipes with the addition of greater value to the content.
- Smarter networks are expected to benefit end-users, content providers, application providers, technology providers, mobile operators, and their vendors. This is the long-term strategic growth avenue for network operators.
- 2013 is also anticipated to witness structural changes around UID and related government-to-citizen (G2C) services.
- A few enablers of G2C initiative that need to be encouraged are investment in last-mile FTTH connectivity, cloud infrastructure, digitization of records, and content and data security.
- 2013 may witness the beginning of a coherent structure for G2C services in India, with some private sector investments and fledgling start-up activities that would establish the ecosystem.



Ports - Projected Growth and Investment Requirements

Size of the Initiative

The Indian port sector has witnessed strong growth in the last decade. The traffic handled at Indian ports had more than doubled to 912 million tonnes by FY12 from 384 million tonnes in FY02. The growth has been led primarily by non-major ports which have witnessed an increase in traffic handled at a CAGR of 15% compared to 5% at major ports. This has been due to capacity constraints at major ports which have been at 85% in FY11 and 80% in FY12. The share of non-major ports in maritime traffic handled has gradually increased from 25.1% in FY02 to 39% in FY12. In fact, major ports witnessed a decline of 1.7% y-o-y in traffic handled in FY12 against a 12% growth witnessed by non-major ports.

The overall port capacity in the country is expected to grow at a CAGR of 13.3% from 1,020 MT in FY11 to 3,130 MT in FY20. The capacity at non-major ports is projected to expand at a faster CAGR of 18% during FY11–20 from 375 MT to 1,670 MT. As compared to this, the capacity at major ports is expected to grow at a CAGR of 9.5% during this period, from 645 MT to 1,460 MT. The share of non-major ports in port capacity is anticipated to increase from 36.8% in FY11 to 53.4% by 2020.

Opportunity

In the 12th Five Year Plan the GoI has proposed to invest Rs.1606 bn for development of various projects in ports and inland waterways. According to the Interim Report of the High Level Committee on Financing of Infrastructure, of the total investment, Rs 171 bn is projected to come from the Centre while the states will bring in Rs 46 bn. **About 86% or Rs 1,389 bn is expected to be invested by the private sector.** In major ports, investment by public sector is expected to grow 12% per annum while private investment will flow at the rate of 48% per annum. In minor ports, public investment is expected to grow 12% a year while private sector investment will grow by 29% a year. **Private sector is expected to pump in larger monies in inland waterways, as the Plan expects investment to grow 115% per annum from this sector.** The shipping ministry's decision to allow major ports to fix their own tariffs based on prevailing market prices is likely to encourage more private firms to participate in projects under the PPP model to augment port capacity.

Outlook

As per 12th Five year plan the capacity of Major Ports would be increased to 1229.24 MT per annum by the end of March, 2017.

Potential

A target had been set for the MoS for award of projects for creating 244 MT of capacity during 2012-13 spread across 42 projects at an estimated cost of Rs 14,500 cr. (US\$ 2.66 bn). The ministry has recently awarded establishment two new major ports - one in A.P. another in W. Bengal. India has announced a combined US\$ 110 billion package to develop its ports and shipbuilding industry by 2020. The ten-year plan is known as Maritime Agenda 2010-2020, which intends to develop the Indian Ports Capacity to 3200 MT by 2020.

It has been decided that India will provide funding for minor ports under the jurisdiction of provincial govts./states. For each project, the Indian government will provide 50% of the funding, with a maximum contribution of Rs 500 million (\$9.3M). For local plans to develop facilities for inland waterways, the federal help will be capped at Rs 250 million (\$4.6M).



PORTS SECTOR – Opportunities

The Indian Shipping segment, with 187 minor ports and 13 major ports spread across nine maritime states, is poised to mark exponential growth in the years to come. The Government of India is geared to attract foreign investors in India by embarking on public-private partnership (PPP) route for modernization and expansion of the Indian ports. The total capacity of the port sector is envisaged to be 2,301.63 MT, to meet the overall projected traffic of 1,758.26 MT by 2016-17, as per the 12th Five Year Plan (2012-17) document. “The traffic forecast by the end of the 12th Plan would be 943.06 MT and 815.20 MT for the major and non-major ports respectively, with corresponding port capacities of 1,241.83 MT and 1,059.80 MT respectively,” it added.

To achieve the desired results, Ministry of Shipping is making all possible efforts and providing funding. **The Shipping Ministry is hoping to award 30 port projects that entail an investment of Rs 24,000 crore this fiscal.** The total investment in ports and inland waterways is now envisaged at Rs 1,606 billion during the 12th Five Year Plan as against Rs 495 billion invested during the 11th Five Year Plan period.

Recently a slew of incentives have been taken by government like upto 100% FDI under the automatic route is allowed for Port development projects apart from the income tax incentives.

Capacity addition

Some of the capacity addition projects include Rs 293-crore project for deepening of channel to create an additional 5 MTPA capacity and construction of a deep draught iron ore berth and coal berth on BOT basis at a cost of Rs 1,070 crore, to add 20 MTPA capacity. Some of the major projects in the future include construction of western dock system at an estimated cost of Rs 2,822 cr which is envisaged to create a capacity of 75 MTPA, mechanization of east quay at an estimated cost of Rs 917 cr, leading to a capacity addition of 14 MTPA

PPP project award process picks up pace

The Union shipping ministry has awarded 14 PPP port projects, which will bring in an additional capacity of 80 mtpa at an investment of Rs 5,600 crore. Overall, 26 port projects have been awarded, bringing in a capacity augmentation of 114 mtpa. In addition, the government has awarded an Rs 785-crore project for development of a ship repair facility at Cochin port. The target given by Finance Minister P Chidambaram to the shipping ministry for FY13 involved a total investment of Rs 35,000 crore and a capacity addition of 244 MT. The shipping ministry has managed to achieve 18% of the targeted investment.

For FY14, the shipping ministry plans to add a capacity of 250 MT through public and private investment.

Addition of New ports

- To augment port sector, two new ports will be established in Sagar, West Bengal and in Andhra Pradesh to add 100 MT of capacity.
- In addition, a new outer harbour will be developed in the VOC port at Thoothukkudi, Tamil Nadu, through PPP at an estimated cost of Rs. 7500 crore to add 42 MT of capacity.

These moves are aimed at catering to increased import of coal and oil and container volumes in the years to come. On the water front, in addition to the five inland waterways, a bill has been introduced in the Parliament to declare the Lakhimpur-Bhanga stretch of river Barak in Assam as the sixth water way.



Vizag port is set to take up 3 development projects worth Rs 1,800 crore. Visakhapatnam Port Trust (VPT) will be spending Rs 13,940 crore on the several ongoing projects to take the capacity to 149 MT by 2019-20. **Recently, CCEA has approved the project related to extension of the existing container terminal at Visakhapatnam port on DBFOT basis for a period of 30 years at an estimated cost of Rs. 633.11 crore which will enhance the container handling capacity of Vizag port from 0.4 Mn TEUs to 1 Mn TEUs.**

CCEA has recently approved the development of multi-purpose berths and mechanized berths with allied facilities on DBFOT basis at Haldia Dock II (North) for a period of 30 years at an estimated cost of Rs. 821.4 crore and at Haldia Dock II (South) for a period of 30 years at an estimated cost of Rs. 886.10 crore. The projects will enable Kolkata Port Trust to enhance its capacity by 23.4 MTPA and meet the demand for coal and other bulk cargo in the hinterland of Kolkata Port. In addition of the above, shipping ministry has plans to develop a harbour channel at Tuticorin Port at a cost of Rs. 7500 crore (which will enhance the port capacity from 33.5 MT a year to 85 MT in 2 years' time), a plan signalling an offensive approach from the shipping ministry, to increase the capacity of the ports. **Table 12**

SMOOTH SAILING
Port projects awarded during 2012-13

Port	Project	Capacity (MTPA)	Investment (in ₹cr)
JNPT	Container handling facility with quay length of 330 mtrs	10.0	600
Tuticorin	NCB-IV for handling coal and copper	7.28	355
Cochin Port	International bunkering terminal	4.1	206
Kolkata	Barge Handling Jetty	0.8	98
New Mangalore	Bulk Cement handling facility for Ambuja Cement	1.0	95

* Figures as on March 19, 2013
Source: Shipping ministry



Private Investments in ports - It is estimated that infrastructure investment of \$20bn is needed to increase India's container capacity to a level sufficient to accommodate the country's economic growth. Private sector involvement will be crucial to achieving such a high level of investment. Fortunately, Indian regulation encourages private sector involvement by allowing 100% FDI in the port sector. India is, therefore, currently dominated by three global terminal operators: DP World, PSA International and APM Terminals. Both DP World and PSA International operate neighbouring terminals and ports across the coast, while APM Terminals' presence is strong in the north west of the country. DP World has recently won a bid for a new facility at JN port. This will be the second terminal to be run by DP World at JN Port adding to the much-needed capacity at JN Port. **Chart 19**

JNPT: Layout plan



The total handling capacity of the current three container terminals is 4.3m TEUs per annum. Deepening of the port will increase the annual port capacity by about 10m TEU.

Investment from sources beyond the three major global terminal operators is expected to increase in the coming years. For example, in Feb'12 the European Port of Antwerp (Europe's 2nd largest port by cargo tonnage) signed a MoU with the Association of Multimodal Transport Operators in India. Presumably, this alliance will create an important Indo-European trade link between Indian ports and the Belgian port, which will enable Indian carriers and shippers to forward goods more easily to and from Europe.

Another example of investment from Europe includes the investment of Erdene Capital in the Ennore Container Terminal. As reported by Lloyd's List on 2 April 2012, Erdene Capital, a London-based Indian ports and logistics infrastructure investor, will work with a consortium led by Spanish port operator, Grup Maritim TCB, to build and run a new container terminal in the port of Ennore. **It is expected that the project will be one of India's largest single-operator container terminals and will enable Ennore port to serve as the industrial heart of the southern Indian state of Tamil Nadu.**

Recently, Essar Ports announced to invest Rs 10,000 crore in Gujarat over the next 10 years in Hazira and Salaya ports to expand its overall capacity by about 150 MT. The company will build five berths at Salaya to handle liquid, solid bulk and container traffic and increase the water front at Hazira by 3 km as part of the agreement. The company, which inaugurated a 16-mt terminal at Orissa's Paradip last month to take the total capacity to 104 MT, is on course to achieve the 158 mtpa target by 2015. Dighi Port is also looking to set up container terminals by 2014. It has recently announced to spend Rs. 1 lakh crore on new berth, rail and road infra.

Need to reduce the turnaround time and improve margins for Ports- As capacity constraints have a direct bearing on efficiency, it also impacts the transaction cost of shipping lines. For the major 12 ports, the average turnaround time is 4.6 days; for Singapore port, it is less than a day. "Each day delay adds 0.5% to the cost of carrying cargo. In commodities, the margins are 2% or 3% and in such a scenario, exporters are major sufferers." – Federation of Indian Export Organizations

Hidden Opportunities

- I. **Mega ships, Mega Investments in Ports** – The most significant development in shipping has been the increase in size of the vessels. The recent additions to the world mercantile fleet and the ships under construction consist mostly of very large vessels. Very Large Crude Carriers (VLCCs) carry most of the crude oil. Since they cannot call at the Indian ports due to inadequate draft, they discharge oil at Single Point Moorings (SPMs) set up by the ports and oil companies several nautical miles out in the sea.

Of the several advantages provided by the large ships, the most important is the benefits of the economies of scale available to the consumers. There are huge savings in the operating costs per ton of cargo. Further, port congestion gets reduced and cargo evacuation is faster. The new 18,000 TEU vessels belong to the Triple E Class — providing economies of scale, energy efficiency and environmental improvement.

Unfortunately, the benefit of using these vessels will not be available for India because of infrastructural constraints at the ports. The 18,000 TEU ship has a length of 400 ms, while the typical berth at Indian ports is below 300 ms long. The width is 59 ms; cranes with adequate span will be required. The most critical gap is in the draft. The Indian economy is losing out on the benefits which ports with adequate draft can provide. It is in this context that the Government should assess its priorities. Considering the status of port development, the highest priority should perhaps be given to having at least one big major port on each coast, which can serve as a hub port, primarily for container movement.



II. Opportunity in Chemical infrastructure at Ports - Of the over 70 operational ports in India, the 13 major ports handle over 50% of the country's trade by volume. Utilization rate of these major ports has been hovering between 80 to 90% over the past 3 years. When compared to international average of 70% utilization, these rates indicate potential overburdening of existing infrastructure at India's major ports. There is a need for capacity ramp-up, especially for chemical commodities, which are largely neglected in favour of bulk commodities such as iron ore and coal. **Table 13** ↓

Comparison on Tankfarms ¹ at different ports			
Parameters	Antwerp	Kandla	JNPT
Tank Capacity @ sample terminal in KL (Chemicals)	480,015	140,000	157,795
No of Tanks ¹	100+	44	38
No of Jetties ¹	12	1	2 (Shared with other Tankfarms)
Pipelines ¹	Most tanks have dedicated product lines with connections to the jetties	Common pipelines for multiple products 1 x 12" 1 x 16"	Common pipelines for multiple products 1 X 08" (CS) ² 1 X 10" (SS) ² 1 X 12" (CS) ² 1 X 16" (CS) ²
Distance from Waterfront ¹	Less than 1 km	3+ km	5+ km
Overall chemical handling capacity and throughput at different ports			
Tankage capacity at port (Lakh KL - Chemicals)	30	8.4	7.4
Total throughput at port (Lakh Tonnes - Non POL ³)	116	56	6.9

Notes : 1) Illustrative example of a sample terminal at the respective ports. 2) Carbon Steel
3) Stainless Steel 4) Petroleum, Oil & Lubricants

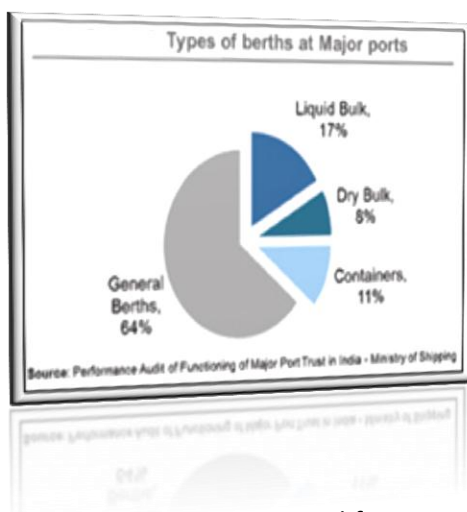
Source: Secondary research, Analysis by Tata Strategic

Ports with major liquid chemical traffic such as JNPT (6.9 lakh tonnes) and Kandla (56 lakh tonnes) have liquid chemical storage capacities of 7.4 lakh and 8.4 lakh KL, respectively. A comparison of number of pipelines, type of tanks, distance of tanks from water-front etc. for chemical terminals at these ports with terminals at some of the leading international ports like Antwerp, sharply brings out the inadequacy and lack of planning behind chemical infrastructure at Indian ports

Inadequate number of tanks and pipelines restrict the different types of products that can be handled by the tank farms.

Furthermore, limited number of pipelines from the water-front to the tank farm, directly impact the turnaround time of vessels and duration of port stay, thereby increasing costs.

III. Need to create storage terminals - Turnaround time also increases with distance between storage tanks and the water-front. Though the Coastal Regulation Zones (CRZ) notification by the Ministry of Environment and Forests (MoEF) allows for construction of storage terminals for several petroleum products in CRZ-II zones, it does not accommodate chemicals and petrochemicals. This means that liquid chemical storage terminals have to be built outside CRZ zones, which are far away from the water-front.

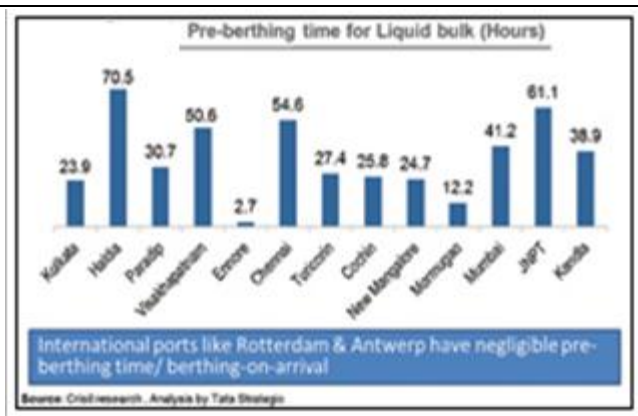


As chemical trade increases, the nature of cargo to be handled will become more specialized and will have specialized handling requirements. However, 64% of berths at major Indian ports are general cargo berths. (See Chart 19).

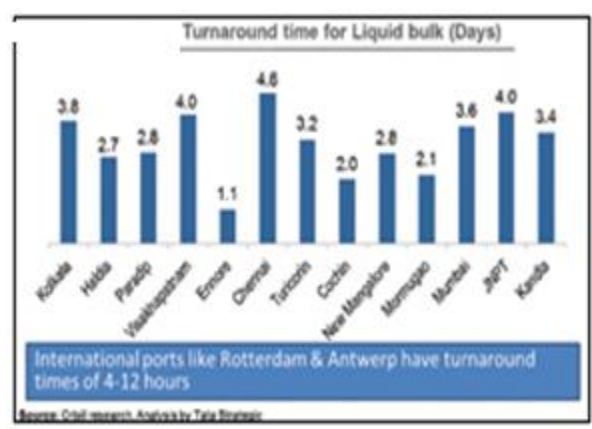
Waiting time (pre-berthing time) for bulk liquid vessels (which include POL and liquid chemicals) is long, and goes as high as 70 hours at Haldia and 60 hours at JNPT. (See Chart 20). This is abysmal compared to other advanced ports such as Rotterdam which do not have a concept of waiting time.

Turnaround time for liquid bulk vessels at major Indian ports ranged from 1.1 days in Ennore to 4.6 days in Chennai in 2012 (see Chart 21). This, again, is very high when compared to turnaround times of 4-12 hours at Rotterdam and Antwerp.





New generation chemical parcel tankers can carry upwards of 50 different cargoes in a fully segregated manner and are equipped to load or discharge up to 14 cargoes simultaneously. While some international ports are equipped to match this capability, Indian ports lag far behind.



IV. Ports must create high capacity berths with specialized handling equipment and infrastructure for chemical products

As Indian ports gear up for handling the increased chemical volumes expected in the future, there is a need for a focused effort on better planning, infrastructure up-gradation, policy reforms.

In view of future volumes and advanced parcel tankers, ports handling large liquid bulk chemical volumes, must invest in setting up high quality, dedicated pipelines which allow multi-product discharge and faster discharge rates for unloading & loading of chemical cargo. Pipeline networks should be well planned and layouts optimized based on unloading and storage locations at port. High volume chemicals such as Phosphoric Acid, Ammonia, Xylenes (PX, OX, and MX), Methanol and MEG should be included into the permitted products list, to allow storage tanks to be built closer to the water-front.

This would mean shorter pipelines, reduced capital investment, ability to lay larger number of pipelines, reduction in loss of time for product change over, faster discharge and quicker turnaround of ships.

Going ahead, 'chemicals' will be among the key cargo types in terms of attractiveness and ports must align their capabilities to leverage this opportunity.

The outlook

There are positive signs of progress in India's ports sector and the potential for growth and development is enormous. India is well-positioned as the world's second fastest growing major economy, and the country has emerged from the global economic crisis relatively unscathed.

Private sector investment and expertise is keen to play its part. India must continue to address the capacity constraints facing its port industry and look at creating infrastructure to cater to larger vessels.

Further investment in and development of the ports infrastructure, along with investor-friendly changes to the regulatory regime, will be key to improving the overall performance of India's ports.



Conclusion

Higher infrastructure spend, crucial to economic growth

As India's economic growth picks up momentum and makes rapid strides on the global canvas, the need for addressing deficiencies in infrastructure sectors for long term sustainable economic growth is being realized.

The immediate challenge is to further strengthen the economy by creating the conditions for industries to flourish. The main objective of any infrastructure investment programme is to rebalance the economy and give industries the right conditions to grow.

Key infrastructure projects related to energy, water, transport, healthcare, communication networks among other important projects are essential to achieve this. However, ensuring that this entire network is integrated is another key factor that will help the economy to grow further.

Huge spend is expected from infrastructure and the reforms that will be unleashed in the coming years will certainly drive the economic development of India.



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