सत्यमेव जयते

National Infrastructure Pipeline

Report of the Task Force
Department of Economic Affairs
Ministry of Finance
Government of India

Volume II

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Abbreviations and Acronyms

AAI	Airports Authority of India
ACS	Average cost of supply
ADB	Asian Development Bank
AI	Artificial intelligence
ACI	Airport Council International
AERA	Airports Economic Regulatory Authority
AFD	Agence Francaise De Developpement
AGR	Adjusted gross revenue
AIIMS	All India Institute of Medical Sciences
AISHE	All India Survey on Higher Education
ALM	Asset-liability mismatch
AM	Asset monetisation
AMRUT	Atal Mission for Rejuvenation and Urban Transformation
APDRP	Accelerated Power Development and Reforms Programme
APLM	Agricultural Produce and Livestock Marketing
APMC	Agricultural Produce Marketing Committee
APMIP	Andhra Pradesh Micro Irrigation Project
ARPU	Average revenue per user
ARR	Average revenue realised
AT&C	Aggregate technical and commerical
ATF	Aviation turbine fuel
AUM	Assets under management
BGF	Bond guarantee fund
BIS	Bureau of Indian Standards
BLT	Build, lease and transfer
BOLT	Build, own, lease and transfer

BOO	Build, own and operate
BOOT	Build, own, operate and transfer
BOT	Build, operate and transfer
BRPL	BSES Rajdhani Power Limited
BRTS	Bus rapid transport system
BSNL	Bharat Sanchar Nigam Limited
BTKM	Billion tonne kilometre
BTS	Base transmitter station
BU	Billion unit
BYPL	BSES Yamuna Power Limited
CAGR	Compound annual growth rate
CAA	Constitutional Amendment Act
CADWM	Command Area Development and Water Management
CCEA	Cabinet Committee on Economic Affairs
CCI	Competition Commission of India
CCTV	Closed circuit television
CDRI	Coalition for Disaster Resilient Infrastructure
CEA	Central Electricity Authority
CEF	Credit enhancement fund
CERC	Central Energy Regulatory Commission
CFS	Container freight station
CGD	City gas distribution
CGWA	Central Ground Water Authority
CGWB	Central Groundwater Board
CIDCO	City and Industrial Development Corporation
CNG	Compressed natural gas
COAI	Cellular Operators Association of India
COD	Commercial operations date
CPCB	Central Pollution Control Board

CPHC	Comprehensive primary health care
CPSE	Central public sector enterprise
CRIF	Central Road and Infrastructure Fund
CRIS	CRISIL Risk and Infrastructure Solutions Limited
CRZ	Coastal regulation zone
CSC	Common service centre
CSR	Corporate social responsibility
CWC	Central Water Commission
DBFOT	Design, build, finance, operate and transfer
DBT	Direct benefit transfer
DCI	Dredging Corporation of India
DDUGJY	Deen Dayal Upadhyaya Gram Jyoti Yojana
DEA	Department of Economic Affairs
DFC	Dedicated freight corridor
DFCCIL	Dedicated Freight Corridor Corporation of India Limited
DFI	Development finance institution
DFS	Department of Financial Services
DIPAM	Department of Investment and Public Asset Management
DISCOM	Distribution company
DMRC	Delhi Metro Rail Corporation
DOLA	Department of Legal Affairs
DPD	Direct port delivery
DPE	Department of Public Enterprises
DPIIT	Department for Promotion of Industry and Internal Trade
DPR	Detailed project report
DRC	Development rights certificate
DVC	Damodar Valley Corporation
ECA	Essential Commodities Act
EDFC	Eastern Dedicated Freight Corridor
EHS	Environment health and safety

ELRS	Expected loss rating scale
EODB	Ease of doing business
EPC	Engineering, procurement and construction
EPFO	Employee Provident Fund Organisation
EQUIP	Education Quality Upgradation and Inclusion Programme
ESG	Environmental, social and corporate governance
ETP	Effluent treatment plant
FAME	Faster Adoption and Manufacturing of Electric Vehicles
FAR	Floor area ratio
FCI	Food Corporation of India
FCNR	Foreign currency non resident account
FDI	Foreign direct investment
FEMA	Foreign Exchange Management Act
FHTC	Functional household tap connection
FIDIC	International Federation of Consulting Engineers
FOB	Free on board
FPI	Foreign portfolio investment
FRBM	Fiscal Responsibility and Budget Management
FSI	Floor space index
FY	Fiscal year
GAIL	Gas Authority of India Limited
GBPS	Giga bytes per second
GCA	Government contracting authorities
GDP	Gross domestic product
GER	Gross enrolment ratio
GGRC	Gujarat Green Revolution Company
GOI	Government of India
GPF	Global pension fund
GPS	Global positioning system
GST	Goods and Services Tax

GW	Giga watt
HAM	Hybrid annuity model
HEFA	Higher Education Funding Agency
HMIS	Health Management Information System
HPC	High powered committee
HRIDAY	Heritage City Development and Augmentation Yojana
HSR	High-speed rail
HUDCO	Housing and Urban Development Corporation Limited
IAP	Integrated Action Plan
IBC	Insolvency and Bankruptcy Code
ICAR	Indian Council of Agricultural Research
ICT	Information communication technology
IDF	Infrastructure Debt Fund
IEA	International Energy Agency
IEBR	Internal and extra budgetary resources
IECV	Initial estimated concession value
IFCI	Industrial Finance Corporation of India
IFSC	International Financial Services Centre
IGR	Investment grade rating
IIFCL	India Infrastructure Finance Company Limited
ILO	International Labour Organization
IMG	Inter-Ministerial Group
IMT	Irrigation management transfer
IMSC	Inter-Ministerial Steering Committee
INR	Indian national rupee
INVIT	Infrastructure investment trust
IOT	Internet of Things
IPDS	Integrated Power Development Scheme
IRC	Indian Road Congress
IRDAI	Insurance Regulatory and Development Authority of India

IREDA	Indian Renewable Energy Development Agency Limited
IRFC	Indian Railway Finance Corporation
IWT	Inland water transport
JICA	Japan International Cooperation Agency
JNPT	Jawaharlal Nehru Port Trust
JV	Joint venture
KRCL	Konkan Railway Corporation Limited
KUIDFC	Karnataka Urban Infrastructure Development and Finance Corporation
KWH	Kilo-watt hour
LAF	Liquidity adjustment facility
LAP	Local area plan
LBFT	Land based fiscal tools
LCC	Life cycle cost
LC	Letter of credit
LGBR	Load Generation Balance Report
LHB	Linke Hofmann Busch
LIDAR	Laser imaging detection and ranging
LNG	Liquefied natural gas
LPI	Logistics Performance Index
MCA	Model concession agreement
MHRD	Ministry of Human Resources Development
MMSCMD	Million metric standard cubic metre per day
MMTPA	Million metric tonne per annum
MoA	Ministry of Agriculture
MoCA	Ministry of Civil Aviation
MoEFCC	Ministry of Environment, Forest and Climate Change
MoRTH	Ministry of Road Transport and Highways
MoR	Ministry of Railways
MoSPI	Ministry of Statistics and Program Implementation
MoUD	Ministry of Urban Development

MRO	Maintenance, repair and overhaul
MRTS	Mass rapid transit system
MSP	Minimum support price
MSRDC	Maharashtra State Road Development Corporation
MTM	Mark to market
MTPA	Million tonne per annum
MVA	Megavolt amperes
MW	Mega watt
NABARD	National Bank for Agriculture and Rural Development
NAAC	National Assessment and Accreditation Council
NAM	National Agriculture Market
NBFC	Non-banking financial company
NDCP	National Digital Communication Policy
NEMMP	National Electric Mobility Mission Plan
NEP	National Energy Policy, 2019
NH	National Highway
NHAI	National Highways Authority of India
NHB	National Housing Bank
NHDP	National Highways Development Programme
NHSRCL	National High Speed Rail Corporation Limited
NIP	National Infrastructure Pipeline
NMCG	National Mission for Clean Ganga
NPA	Non performing asset
NPP	National Perspective Plan
NRI	Non-resident indian
NSE	National Stock Exchange
NWDA	National Water Development Agency
O&M	Operations and maintenance
ODF	Open defecation free
OMT	Operate-maintain-transfer

OTT	Over-the-top
OUIDF	Odisha Urban Infrastructure Development Fund
PCEC	Per capita electricity consumption
PE	Private equity
PFC	Power Finance Corporation Limited
PFRDA	Pension Fund Regulatory and Development Authority
PGCIL	Power Grid Corporation of India Limited
PIB	Press Information Bureau
PLF	Plant load factor
PMAY	Pradhan Mantri Awas Yojana
PMGSY	Pradhan Mantri Gram Sadak Yojana
PMKSY	Pradhan Mantri Krishi Sinchai Yojana
PNG	Petroleum and natural gas
PNGRB	Petroleum and Natural Gas Regulatory Board, India
PPP	Public-private partnership
PPPAC	Public Private Partnership Appraisal Committee
PRI	Principles for responsible investment
PSU	Public sector undertaking
PTR	Pupil-teacher ratio
RAPDRP	Restructured Accelerated Power Development and Reforms Programme
RBI	Reserve Bank of India
RCS	Regional Connectivity Scheme
RDA	Railway Development Authority
REIT	Real estate investment trust
RES	Renewable energy sources
RFCTLARR	Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013
RFID	Radio frequency identification
RLDA	Railway Land Development Authority
ROB	Road over bridge
RUB	Road under bridge
SAUBHAGYA	Pradhan Mantri Sahaj Bijli Har Ghar Yojana

SLR	Statutory liquidity ratio
SME	Small and medium enterprises
SPM	Single point mooring
SPR	Strategic Petroleum Reserves
SPV	Special purpose vehicle
SRRDA	State Rural Road Development Agency
SWF	Sovereign wealth funds
SWM	Solid waste management
TAMP	Tariff Authority for Major Ports
TAT	Turnaround time
TDR	Transfer of development rights
TEG	Technical expert group
TEU	Twenty-foot equivalent unit
TOT	Toll, operate, transfer
UDAN	Ude Desh ka Aam Nagrik
UDAY	Ujwal Discom Assurance Yojana
ULB	Urban local body
UMTA	Urban Metro Transit Authority
USD	United States dollar
USO	Universal service obligation
VCF	Value capture finance
VGF	Viability-gap funding
WDFC	Western Dedicated Freight Corridor
WHO	World Health Organization

Conversion Factors

Rs 10 lakh	Rs 1 million
Rs 1 crore	Rs 10 million
Rs 100 crore	Rs 1 billion
Rs 1 lakh crore	Rs 1 trillion
$ 1	~ Rs 71

Infrastructure Progress

This chapter highlights infrastructure trends in India since fiscal 2013. It focuses on capital expenditure, improvements in sector-specific parameters, shortfalls compared with standard benchmarks, steps taken for improvement, and challenges that remain.

Global trends in infrastructure

According to the Global Infrastructure Outlook 2017 (Oxford Economics), global requirement of investment in infrastructure between calendar years 2016 and 2040 is expected to reach $ 94 trillion. An additional $ 3.5 trillion is required to meet Sustainable Development Goals (SDG) in water and electricity. Of this, 50% of the investment needs are in Asia. Electricity and roads sectors will constitute over two-thirds of this, followed by telecom, rail and water sectors.

The study also indicates that global spend on infrastructure is ~$ 2.3 trillion (2015). Going by the needs projected above, the annual spend would have to double. The report states that in a business-as-usual scenario, if the current investment trends continue, there would be an investment gap of $ 14 trillion by 2040. Thus there is a strong case for sharp increases in infrastructure spending. The report projects that over half the annual global spend would be contributed by just four countries – China, the United States (US), India and Japan. It is estimated that India would need to spend $ 4.5 trillion[1] on infrastructure by 2030 to realise the vision of a $ 5 trillion by 2025, and to continue on an escalated trajectory until 2030.

Recent Trends in Infrastructure Investments

This section highlights the trends in overall infrastructure investment in India between fiscals 2013 and 2019, as well as in the shares of the Centre, states, and private sector. It analyses sector-wise investments in this period and captures shifts among various sub-sectors.

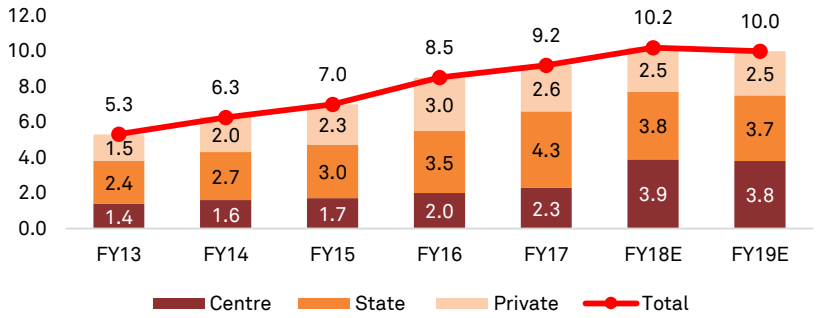
Investment and sector-wise shares

Infrastructure investment in India between fiscals 2013 and 2017 was estimated at Rs 57 lakh crore ($ 1.1 trillion at different annual exchange rates). The infrastructure investment was Rs ~36 lakh crore (at current prices) during fiscals 2013-17 or ~5.8% of gross domestic product (GDP). As per estimates, the total infrastructure spend in fiscals 2018 and 2019 was Rs 10.2 lakh crore and Rs 10 lakh crore, respectively.

The year-wise infrastructure investments since fiscal 2013 is shown in Figure 1. It also gives a split of this investment between the Centre, the states and the private sector.

[1] *CRIS estimates*

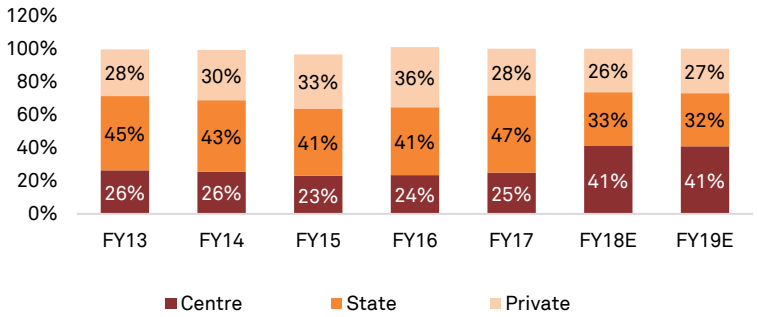
Figure 1 Year-wise investment trend in infrastructure (Rs lakh crore, FY13-17, FY18E and FY19E)



Source: Appraisal documents for five-year plans, CRIS estimates (investments mentioned are at current prices)

In terms of shares, infrastructure investments between fiscals 2013 and 2019 were predominantly made by the public sector, i.e., Centre and state governments (~70%), while the share of private sector has been ~30%. This split between the public and private sector is in sync with the rest of the world.

Figure 2 Share of infrastructure investment by the Centre, states and private sector



Source: Appraisal documents for five-year plans, CRIS estimates

Power, roads and bridges, telecommunications, railways, irrigation and urban accounted for ~95% of the infrastructure investment in this period. Centre and states were the major funding sources for power and roads, with a moderate participation from the private sector. Telecommunication investments were largely driven by private sector, while investments in irrigation sector were predominantly made by the states.

Table 1 Sectoral share of overall infrastructure investment (Rs lakh crore)

Sector	FY13	FY14	FY15	FY16	FY17	FY18E	FY19E	Total
Power	2.3	2.5	2.5	2.7	3.2	2.6	1.9	**17.7**
Roads and bridges	1.0	1.1	1.2	1.4	1.8	1.9	1.9	**10.3**
Urban	0.7	0.9	1.1	1.2	1.3	1.7	1.8	**8.7**
Telecommunication	0.4	0.7	1.1	1.6	1.1	1	1	**6.9**
Railways	0.4	0.4	0.4	0.8	0.9	1.3	1.4	**5.6**
Irrigation	0.5	0.5	0.5	0.7	0.8	1	1.2	**5.2**
Airports	0.0	0.1	0.1	0.1	0.1	0.1	0.1	**0.6**
Ports	0.1	0.1	0.1	0.1	0.1	0.1	0.1	**0.7**
Others	0.1	0.1	0.0	0.1	0.1	0.5	0.5	**1.4**
Total infra investments (A)	**5.3**	**6.3**	**7.0**	**8.5**	**9.2**	**10.2**	**10.0**	**56.7**
Nominal GDP (B)	99.4	112.3	124.7	137.6	153.6	171	190.1	**988.7**
% Infra investment of nominal GDP (A / B)	5.5%	5.6%	5.6%	6.2%	6.0%	6.0%	5.3%	**5.7%**

Source: Appraisal documents for five-year plans, CRIS estimates (investments and GDP values mentioned above are at current prices)

Energy

Sector Progress, Deficits and Challenges, Vision and Reforms

PPP in Power Distribution in Delhi

Project details

- Delhi power distribution segment was privatised in July 2002 by carving the city into three zones and privatising these by giving majority shareholding (51%) to the two largest private power sector players in India at that time: Tata Power (north and north-west Delhi) and BSES (BSES Rajdhani Power Ltd or BRPL - south and west Delhi and BSES Yamuna Power Ltd or BYPL - central and east Delhi)
- The transmission of power is still in the public sector while distribution has been transferred to the private sector
- The scope of concessionaires involved rehabilitation, development and operation and maintenance (O&M) of the brownfield assets. Concessionaires were responsible for funding, implementation plans and achievement of timelines

Salient features

- The subsidy for power distribution paid by the Delhi Government has come down drastically. Aggregate technical and commercial (AT&C) losses have come down to about 13% currently from over 50% at the point of privatisation in 2002
- During 1991-2002 (Delhi Vidyut Board period), the power tariffs increased at ~15% per annum while during PPP period from 2003-2012, rise in power tariffs was lower, only ~6.3% per annum
- Significant improvement in customer related parameters: Mean time to repair faults, meter replacement and bill complaint resolution. All concessionaires have set up call centres for addressing queries of consumers and for recording and responding to complaints. Websites have also been set up, which offer consumer-centric facilities

Energy sector includes conventional power, renewable energy (RE) and petroleum and natural gas. The power sector accounts for the largest share of investments in infrastructure. The energy use is projected to grow rapidly to fuel economic development, urbanisation and improved electricity access. Yet, India's per capita consumption of energy remains low even vis-à-vis developing countries. This calls for huge investments in the sector for installation of new capacities and upgradation of existing ones.

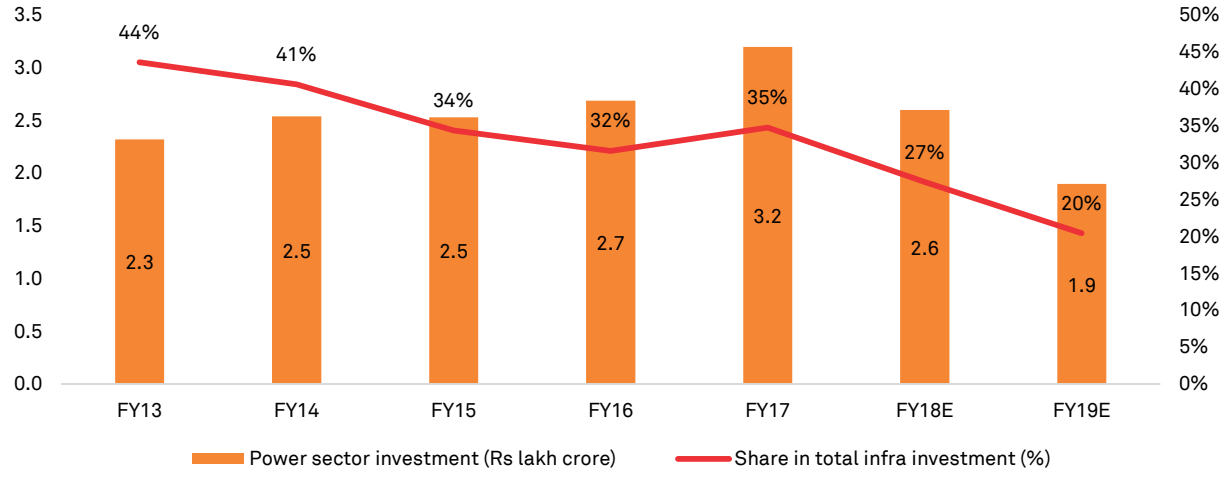
Power sector

Historical investment

Between fiscals 2013 and 2017, the share of power sector investment in overall infrastructure investment was ~37% rising at ~8% compound annual growth rate (CAGR).

For the 12th Five-Year-Plan, share of various segments in power sector investment was: generation (61%), transmission (20%) and distribution (19%).

Figure 3 Power sector investment (Rs lakh crore) and share in total infrastructure investment (%)



Source: Appraisal documents for five-year plans, CRIS estimates (investments mentioned are at current prices)

During the plan period, private sector investment declined mainly due to cancellation of allocated coal blocks, financial stress in distribution companies (discoms), leading to stressed assets and non-performing loans. It is critical to address these challenges to facilitate continued private sector contribution to power sector.

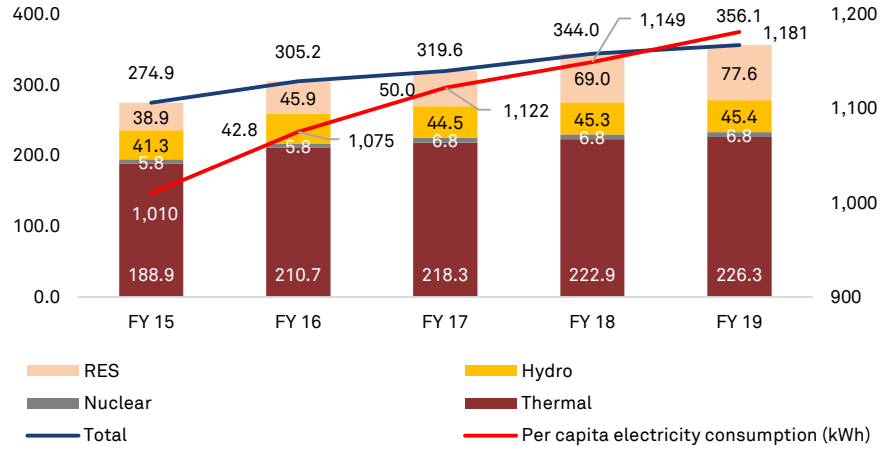
Power sector trends

Generation capacity

As of March 31, 2019, the generation capacity in India was 356 GW, with the Centre having 24% share, states 30%, and private sector 46%. The fuel mix continues to be dominated by thermal power (64%), followed by RE sources (22%), hydro (13%), and nuclear (1%).

The substantial increase in capacity of renewable energy can be attributed to strong government support, favourable policies and incentives, as well as falling cost of generation, particularly for the wind and solar power (refer to Figure 4).

Figure 4 Trends in power generation capacity (GW) and per capita electricity consumption in India (kWh)



Source: Central Electricity Authority (CEA)

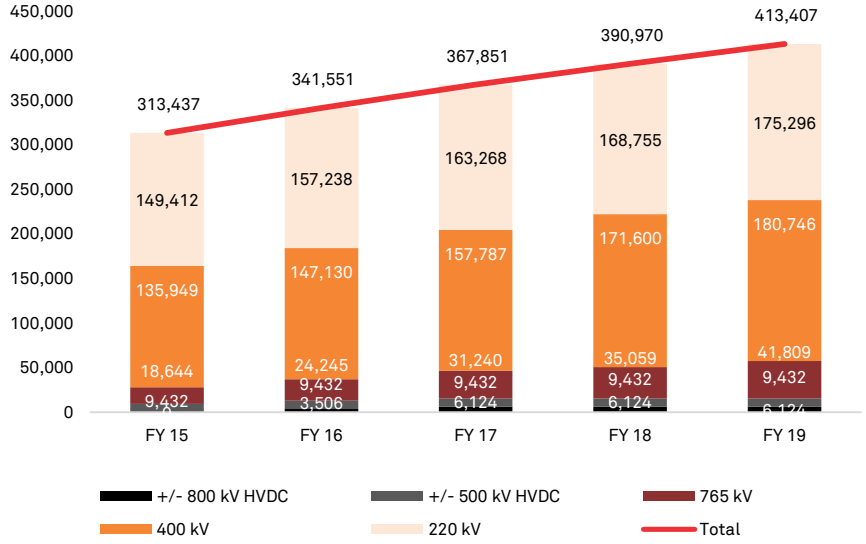
Per capita electricity consumption in India

India's annual per capita electricity consumption at 1,181 kWh has grown in recent years but remains far below the global average, which is estimated to be more than 3,200 kWh per capita as of March 31, 2018.

Transmission

As of March 31, 2019, the transmission lines in India aggregated to a total length of 413,407 circuit kilometre (ckm), growing at a healthy CAGR of 7% since 2015. The shares of the Centre, states and private sector in the overall length of the transmission lines were 38%, 54%, and 8%, respectively.

Figure 5 Trend in power transmission lines in India (ckm)



Source: CEA

Distribution

Distribution is the most critical link in the entire value chain of the power sector. Most of the distribution network is still managed by state distribution companies with little participation from the private sector. The distribution sector has seen many reforms in recent times, resulting in improved operational efficiency and power accessibility for the masses. However, more reforms are needed to strengthen this critical link and attract further investor interest in the sector.

AT&C losses

AT&C losses of utilities providing power directly to consumers marginally declined to 22.2% in fiscal 2020[2] from 22.6%[3] in fiscal 2014, highlighting the issues faced by the distribution sector. For fiscal 2018, states like Andhra Pradesh, Delhi, Goa, Gujarat and Himachal Pradesh achieved AT&C losses of less than 15% while Arunachal Pradesh, Bihar, Jammu and Kashmir, Jharkhand, Meghalaya, Nagaland, Sikkim, Tripura and Uttar Pradesh still had high AT&C losses (more than 30%).

Gap between average cost of supply (ACS) and average revenue realised (ARR)

ACS-ARR gap is an important indicator of the financial health of discoms. As of October 2019, the ACS-ARR gap was Rs 0.40/ kWh. This has been positive in the past because of high AT&C losses and inadequate tariff hikes. ACS-ARR gap remains a concern as it impacts the whole power sector value chain. However, it has narrowed in recent years.

Saubhagya scheme

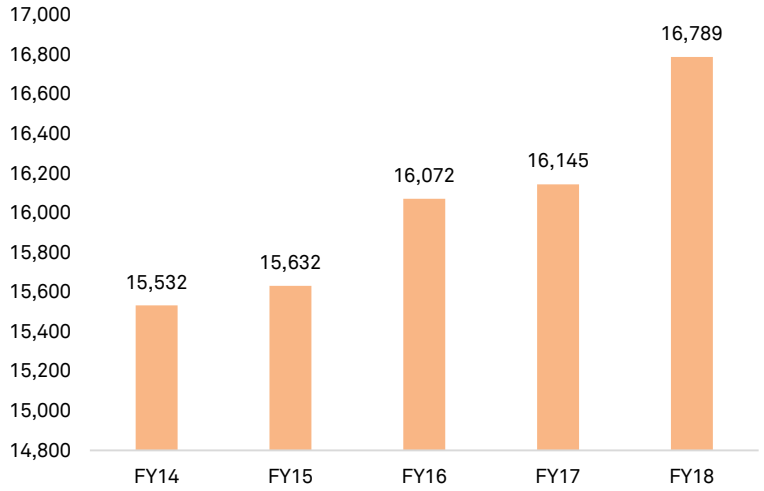
The Government of India launched the Pradhan Mantri Sahaj Bijli Har Ghar Yojana (Saubhagya scheme) in September 2017 with a total outlay of Rs 16,320 crore to provide last mile connectivity and electricity connection to the remaining un-electrified households in the country. The scheme has been a big success and all states have reported electrification of all households, except few households in naxal-affected Bastar region of Chhattisgarh. More than 2.63 crore[4] households have been provided electricity connections between October 2017 and March 2019. The scheme has helped in providing access of electricity to un-electrified households thereby increasing the consumption of electricity and enhanced utilization of generation assets. It is also helping the country meet the climate change mitigation commitments by promoting uses of electricity in daily household chores including lighting and fan, heating, cooking and other household appliances.

Gas transmission and distribution

At present, about 16,789 km long gas pipeline network is under operation. In recent years there has been huge impetus on increasing the mix of natural gas as source of energy with government envisaging a National Gas Grid to remove regional imbalance and provide access of natural gas to both domestic as well as industrial users throughout the country. About 14,700 km long additional gas pipeline has been approved and is at various stages of development to complete the grid. The most notable project is the 3,384 km Urja Ganga Pipeline having capacity of 16 million metric standard cubic metre per day (MMSCMD) which would connect the eastern states of Bihar, Jharkhand, West Bengal and Odisha to the national gas grid.

[2]UDAY (data as of October 1, 2019) – does not include Nagaland, Andaman and Nicobar Islands, Lakshadweep
[3]PFC Report – Performance of State Power Utilities
[4]Saubhagya dashboard (data as of March 31, 2019)

Figure 6 Length of natural gas pipeline in India (in km)

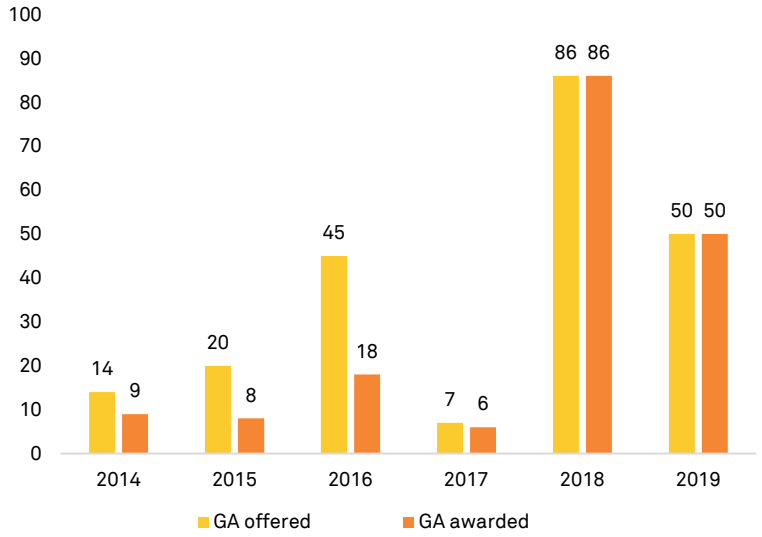


Source: Ministry of Petroleum and Natural Gas (MoPNG)

City gas distribution (CGD)

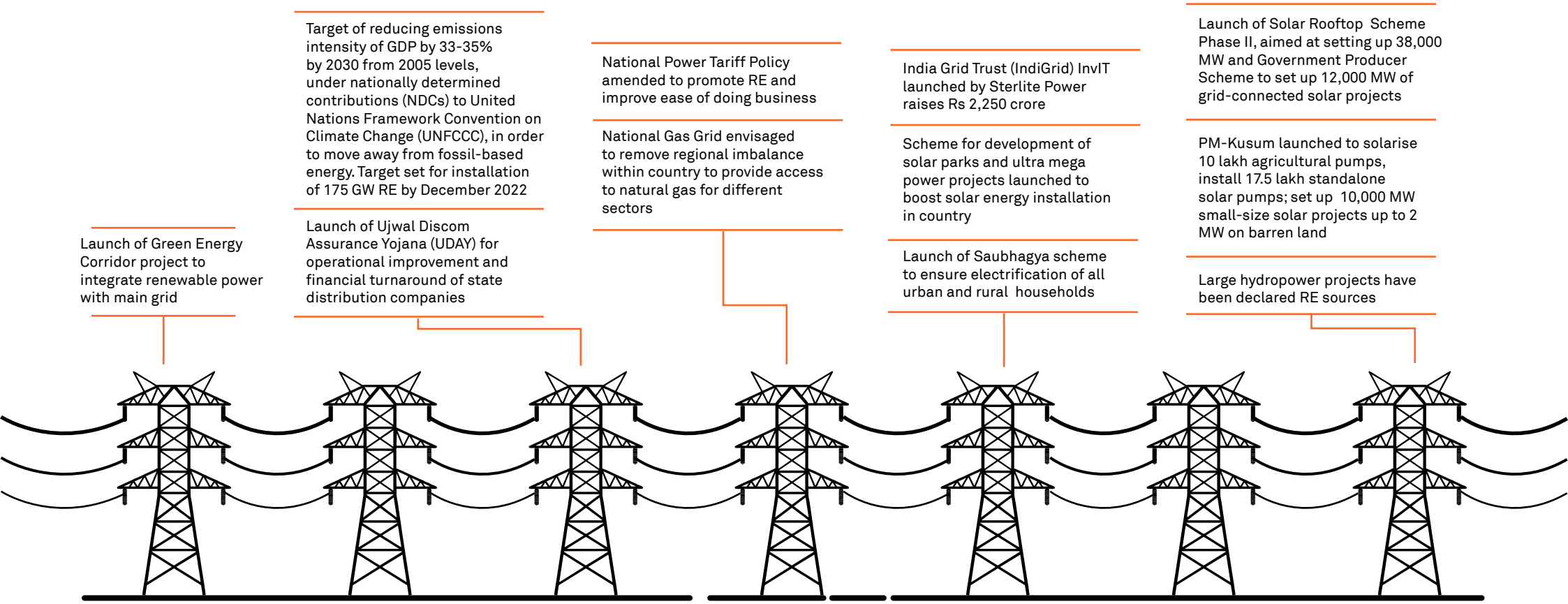
In order to make natural gas available to public at large, the government has emphasised on expansion of CGD network coverage across the country. CGD network ensures the supply of cleaner fuel (i.e., petroleum natural gas) to households, industrial and commercial units as well as transportation fuel (i.e., compressed natural gas) to vehicles. Till 2017, only 19% of the country's population spread over 11% of its area was covered by CGD in 96 geographical areas (GAs). To boost the CGD sector, 9th CGD bidding round was launched in April 2018 for 86 GAs covering 174 districts in 22 states / union territories of the country. 38 entities (public and private) have participated in this round and submitted total 406 bids. In the 10th round of bidding, 50 GAs covering 124 districts in 14 states and union territories were awarded in 2019. Post this ~ 70% of India's population and ~ 53% of its geographical area has been covered for the development of CGD network.

Figure 7 CGD bidding rounds snapshot



Source: Petroleum and Natural Gas Regulatory Board (PNGRB)

Energy sector reforms timeline



2013

Launch of Green Energy Corridor project to integrate renewable power with main grid

2014

Target of reducing emissions intensity of GDP by 33-35% by 2030 from 2005 levels, under nationally determined contributions (NDCs) to United Nations Framework Convention on Climate Change (UNFCCC), in order to move away from fossil-based energy. Target set for installation of 175 GW RE by December 2022

Launch of Ujwal Discom Assurance Yojana (UDAY) for operational improvement and financial turnaround of state distribution companies

2015

National Power Tariff Policy amended to promote RE and improve ease of doing business

National Gas Grid envisaged to remove regional imbalance within country to provide access to natural gas for different sectors

2016

India Grid Trust (IndiGrid) InvIT launched by Sterlite Power raises Rs 2,250 crore

Scheme for development of solar parks and ultra mega power projects launched to boost solar energy installation in country

Launch of Saubhagya scheme to ensure electrification of all urban and rural households

2017

Launch of Solar Rooftop Scheme Phase II, aimed at setting up 38,000 MW and Government Producer Scheme to set up 12,000 MW of grid-connected solar projects

PM-Kusum launched to solarise 10 lakh agricultural pumps, install 17.5 lakh standalone solar pumps; set up 10,000 MW small-size solar projects up to 2 MW on barren land

Large hydropower projects have been declared RE sources

2018

2019

Per capita electricity consumption (in kWh)	957	1,010	1,075	1,122	1,149	1,181

Launch of Deen Dayal Upadhyaya Gram Jyoti Yojana (DDUGJY) and Integrated Power Development Scheme (IPDS) for strengthening and augmentation of sub-transmission and distribution network in rural and urban areas

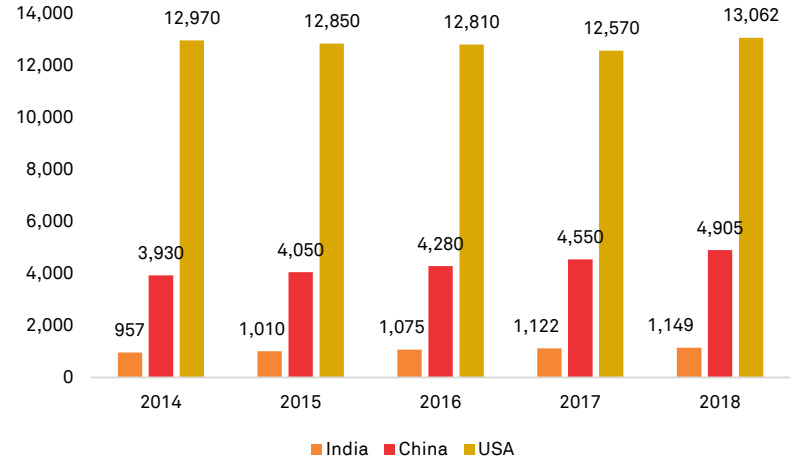
Launch of Ujjwala Yojana to provide liquefied petroleum gas (LPG) connection to every below poverty line (BPL) household

Launch of Pradhan Mantri Urja Ganga Project to ensure piped natural gas in eastern part of India

Phase II of Strategic Petroleum Reserves (SPR) programme for creating additional 6.5 million metric tonne (MMT) storage facilities launched

Infrastructure deficit in energy sector

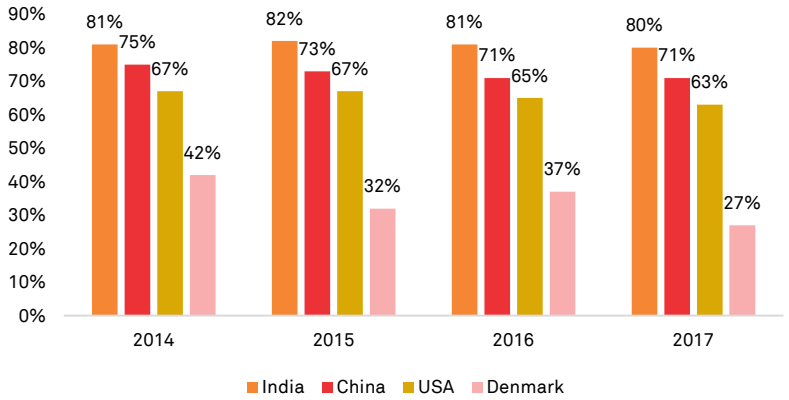
Figure 8 Per capita consumption (kWh/ person)



Source: International Energy Agency (IEA), CEIC - China, Energy Information Administration -USA, CEA - India

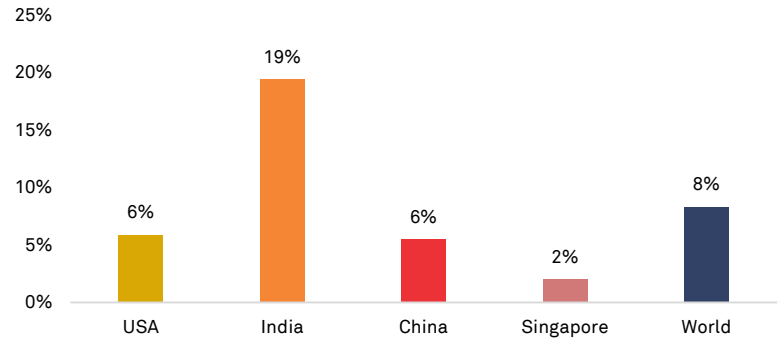
- Access to electricity in India is lower than its peers, owing to lower rural penetration. But, this is changing with all villages getting electrified recently under Saubhagya scheme and all households in these villages being connected to the grid progressively
- While the reported energy supply position makes India almost balanced (minimal deficit), current demand reporting does not capture unmet demand factors such as planned and unplanned load shedding, and large-scale back-up captive generation in many pockets
- Per capita consumption, while on the rise, is significantly lower than that of other comparable economies, and way below the world average

Figure 9 Share of fossil fuel in electricity generation (%)



Source: World Development Indicators; Global Energy Statistical Yearbook – ENER data

Figure 10 Electricity distribution losses (%)



Source: IEA Energy Atlas (2018)

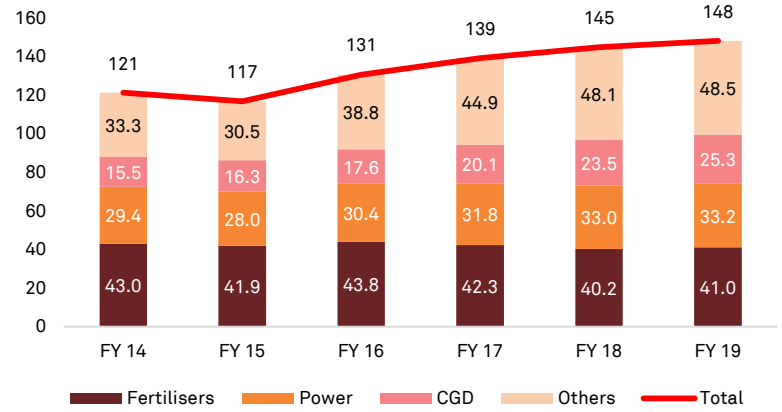
- Going forward, the energy mix should be designed taking into account India's intended NDC under its UNFCCC obligations. The country has pledged to reduce the emissions intensity of its GDP by 33-35% by 2030 from 2005 levels. It has also pledged to increase the share of non-fossil fuel-based electricity to 40%

- India's emissions intensity targets are similar to those of China. Its RE capacity stands at 86 GW as of December 2019, against a target of 175 GW installed capacity by December 2022 and 450 GW by 2030

- India's AT&C losses remain high compared to global peers

- The ARR-ACS gap, a key indicator of the financial health of distribution companies, has been consistently negative (though improving) during the past five years due to high AT&C losses and inadequate tariff hikes

Figure 11 Gas consumption by different sectors (in MMSCMD)



Source: MoPNG

- At present, natural gas accounts for ~6% in the country's primary energy mix against world average of ~24%. Among the available fossil fuels, natural gas, being an environment friendly clean fuel, has the potential to play a significant role in providing solutions to the environmental challenges. Power is one of the potential sectors which can facilitate an increase in the gas share in energy mix subject to improved affordability of power produced from gas. In order to move towards gas economy by increasing the share of natural gas to 15% in primary energy mix, India needs to focus on development of requisite gas infrastructure including National Gas Grid, CGD networks and re-gasified liquefied natural gas (R-LNG) terminals so as to improve the availability and accessibility of natural gas to public at large

Challenges in the energy sector

Power offtake and domestic fuel availability

Sluggish demand growth in the industrial and commercial sectors, and lack of capacity contracting by discoms have rendered a significant quantum of thermal capacity surplus, and without power purchase agreements (PPAs). Given this – along with financial distress and technical constraints – discoms have resorted to load shedding, resulting in suppressed demand and lower capacity offtake. Domestic coal supply has also been an area of concern owing to slow growth in production by Coal India Ltd, de-allocation of captive coal blocks and coal evacuation issues owing to constrained rail capacity.

Honouring of PPAs

Investors have become wary of state government utilities not honouring PPAs signed earlier. Some state governments have identified higher

tariff of wind and solar power PPAs as responsible for financial woes of state discoms and attempted to re-negotiate PPAs. Sanctity of contracts and timely dispute resolution are the key to retain and attract private sector participation besides protecting investments already made in these projects.

However, honouring PPAs should also be applicable to the private sector. Some thermal power projects recently managed to renegotiate PPAs. Given the country's low ranking on enforceability of contracts (163), sanctity of contracts should be upheld both by the public and the private sectors.

Management of discoms

UDAY was launched with the objective of revival and financial turnaround of power discoms. Many discoms have missed the targets set under UDAY, both in terms of tariff hikes and AT&C loss reduction. Slippages in the UDAY targets have resulted in significant cash losses for discoms, making working capital financing a challenge. Increase in tariff and making it cost reflective, as prescribed under UDAY, is proving to be a major challenge. Takeover of liabilities under UDAY has been a key reason for high fiscal deficits for state governments.

Inadequate gas pipeline infrastructure

Pipeline infrastructure and demand continue to face the 'chicken and egg' catch. The main obstacles to creating gas demand and boosting gas consumption are: domestic production difficulties, issues in the pricing and allocation of gas, and inadequate infrastructure. It is understood that creating adequate infrastructure is a pre-requisite to boost demand creation. Many pipeline projects have failed to move forward because of lack of demand or unfavourable economics. Another major issue has been under-utilisation of gas pipelines which is affecting risk-return profile for the existing owners - both public and private. The right of way issue also needs to be resolved among stakeholders to ensure timely completion of projects.

Vision 2025 for the energy sector

Current status

- Total capacity: 356 GW (as of March 31, 2019)[5]
- Thermal: 64%, renewable: 22%, hydro: 13%, nuclear: 1% as of 2019
- Low per-capita electricity consumption: 1,181 kWh (provisional as on March 31, 2019)
- RE share in consumption: ~10 %

- Load shedding: Discoms under huge debt burden and resort to unscheduled load-shedding
- High AT&C losses of discoms: currently at 8% to 41% (except J&K)

- Smart metering: <5% of meters as on June 30, 2018
- Level of digitisation: Services such as new connections, security deposits and reconnections, except bill payments and lodging of complaints, are not digitalised

- Low e-vehicle (EV) sales penetration: 2-3% for three-wheelers, but negligible for private and commercial cars, two-wheelers and buses

- Pipeline: Total length of operational gas pipeline is ~16,788 km with huge regional imbalance
- Installed capacity: 5.33 MMT for storing crude oil is available under SPR programme which can supply ~10 days of India's crude requirement

[5]*Source: CEA*

Vision 2025

- 24x7 clean and affordable power to be available to all households, industry, commercial businesses, agriculture in all states and union territories
- Total capacity: 583 GW[6]
- Thermal: 50%, renewable: 39%, hydro: 9%, nuclear: 2%
- RE share in generation capacity to increase, thermal to decline
- Substantial increase in per-capita electricity consumption to 1,616 kWh
- RE share in consumption to increase to ~20%
- Grid energy storage and offshore wind energy to be promoted

- Reformed discoms
  - Open access in power distribution
  - More cost reflective tariffs
  - Extensive metering
  - Payment to PPP operators through letter of credit (LC) mechanism
  - Subsidies to be switched to direct benefit transfer from government, allowing full commercial operation of discoms
  - Incentivise roof-top solar energy production

- Smart metering for all categories of customers, including prepaid meters
- Services such as new connections, security deposits, bill payments, lodging of complaints and reconnections through 100% digital platforms

- Public charging infrastructure within 3 km and in all commercial and multi storeyed buildings in urban areas leading to higher EV penetration using policies, such as NEMMP and FAME[7]: Private cars: ~5%[8], buses: ~11%, commercial cars: ~25%, two-wheelers: ~32% and three-wheelers: ~48%
- Highway charging infrastructure on all national highways every 25 km, including e-highway infrastructure in select corridors (overhead electric traction for heavy commercial vehicles)

- Under National Gas Grid project, there exists a need to add an additional ~14,700 km[9] to link each state to gas pipeline to ensure access to clean and green energy for all households and industries.
- In order to augment India's energy security, additional capacity of 6.5 MMT[10] crude oil storage needs to be added to provide buffer for overall ~22 days

[6] *Per capita electricity consumption to grow based on actual 10 year CAGR (FY08 - FY18) of ~5% and corresponding installed capacity addition based on government announced plans. NEP (Jan 2018) estimates installed capacity to be 583 GW at the end of FY25*
[7] *NEMMP - National Electric Mobility Mission Plan; FAME - Faster Adoption and Manufacturing of Electric Vehicles in India*
[8] *Source: Rocky Mountain Institute (RMI NITI Aayog) report titled India's Electric Mobility Transformation dated April 2019*
[9] *PIB National Gas Grid*
[10] *Implemented under Phase II of Strategic Petroleum Reserves*

Reform imperatives in energy sector

India's mission to become a $ 5 trillion economy hinges on rapid growth in the energy sector. Energy consumption in the country has almost doubled since 2000 and is set to grow further. This calls for huge investments over the next few years. It also entails segment-specific reforms in power generation, transmission and distribution and storage, to ensure uninterrupted power supply to urban and rural areas and meet the massive infrastructure needs of what may soon become the world's most populous country.

Conventional power

- **Improving the financial health of discoms:** Thermal assets of private power generation companies have come under increasing stress due to non-availability of long-term PPAs, dearth of credit provided by banks in the absence of long term PPAs and inadequate tariffs. It is important to improve the health of discoms so that they can procure power from power generation companies and pay their dues on time. Measures which have been introduced, such as letter of credit (LC) and other legal measures need to be enforced, to ensure honouring of power purchase and payment obligations. Bringing down AT&C losses along with achieving a commercial orientation in their functioning is the key to improving financial health of discoms

- **Ensuring adequate fuel supply:** There is an urgent need to address the concerns emanating from poor quality and erratic supply of coal as well as the stricter emission norms to be followed by thermal power plants. The recent policy change allowing 100% foreign direct investment (FDI) in coal mining is expected to provide a big thrust to foreign mining companies to enter India, bringing in their superior mining technology and increasing competition in the domestic market. This would bring in more efficiency and help reduce coal shortage in the power sector. It would also help reduce dependence on imported coal, and thereby lower the import bill. Similar issues have impacted gas-based power plants in India, where non-availability of domestic gas and high cost of imported gas have affected the financial viability of many gas assets

- **Resolving stressed and stranded thermal assets:** This is critical to unlocking bank exposure to infrastructure and releasing the same for re-investments. Recommendations of the High Level Empowered Committee set up for this purpose, may need to be fully implemented and monitored to ensure speedy resolution. Instead of setting up new thermal plants, resolving and putting to use stalled projects may be given the top priority

- **Planning for technology retrofits:** This is also required in our existing conventional power plants to enhance responsiveness to deal with steep ramp rates and shorter peaks in order to account for greater share of fluctuating renewable generation in our energy mix. Ministry of Power may enable an assessment by state and central utilities and plan for such retrofits

Renewable energy

- **Honouring PPAs:** Investors have become wary of state government utilities not honouring PPAs. Some state governments have identified higher tariff of wind and solar power PPAs as responsible for financial woes of state discoms and attempted to re-negotiate PPAs. Sanctity of contracts and timely dispute resolution are the key to retain and attract private sector participation. However, both public and private sector have to uphold sanctity of contracts

- **Improving scheduling and forecasting:** State regulations on scheduling and forecasting in line with the Central Electricity Regulatory Commission (CERC) framework will help to overcome the challenges of demand-supply mismatch and grid instability by ensuring better scheduling and forecasting mechanism

- **Providing bill discounting facility:** Many renewable and conventional power developers are selling power generated from their projects to state discoms. However, there have been significant delays in receipt of payments from the utilities leading to stress in the sector. The advent of a bill discounting facility will provide the much needed liquidity respite to developers as they will be able to raise upfront cash against receivables from discoms. Successful implementation of such a bill discounting facility will significantly reduce ongoing stress for renewable and conventional power developers

- **Boosting solar photovoltaic (PV) modules manufacturing:** While large scale investments are planned in this sector, India currently imports around 85% solar PV modules and cells from countries like China, Taiwan, Vietnam and Malaysia as they are cheaper. Huge investments are required in solar manufacturing to reduce imports. To make the domestic manufacturing competitive, targeted policy support should also be provided

Transmission and distribution

Despite implementation of several reforms in the sector by both Centre and states, state-run discoms remain the weakest link and have continued to make huge financial losses. The business sustainability of discoms remains a major concern for the sector's and economy's growth.

- **Asset monetisation**: Monetisation of seasoned transmission assets could help finance new transmission infrastructure, by bringing in much-needed capital

- **Introducing medium-term PPAs**: The present environment with sufficient installed power generation capacity, lower RE prices, and increased competition in the market would make medium-term PPAs (3 – 5 years) more attractive than long-term ones. As the tariffs especially of RE plants is falling, discoms are not willing to commit to long-term PPAs

- **Upgrading technology and infrastructure:** In order to reduce AT&C losses, discoms must invest in adoption of smart metering, which would monitor, control and disconnect consumers remotely, paving way for improving billing and collection efficiency

- **Introducing 'time of the day' pricing:** Discoms could also introduce "time-of-the-day" pricing in the commercial sector, in order to bring in efficiency. Under this, different rates would be applicable at different time slots in a day. This could substantially improve financial health of the utilities and smoothen the load curve

- **Improving subsidy policies of states**: Untargeted subsidies are one of the major causes of poor health of discoms. The discoms have been selling electricity to agricultural consumers and certain sections of domestic power consumers at highly subsidised prices, even lower than cost. In order to reduce this leakage, subsidies can be targeted through the direct benefit transfer mechanism, enabling discoms to become full commercial entities which is critical in reviving the investment cycle in the power sector. There is also a pressing need to further rationalize the subsidies to make the discoms more financially viable

- **Timely revision of tariff by discoms**: Delays in tariff revisions have resulted in deteriorating financial health of discoms. Tariffs should be cost reflective and in order to ensure that tariffs are revised from time to time, independent and autonomous functioning of the regulator is a must

- **Improving quality of baseline data before privatising discoms:** Efforts need to be made to build quality baseline data before embarking on a franchisee/ PPP model in power distribution. This must include data such as existing level of losses, network status,

consumer mix and sales, metering and billing. This is essential to provide confidence to prospective bidders, ensure they quote realistic bids, and increase accountability of the licensee as well as of the successful bidder for post-franchisee/ PPP performance

Power storage infrastructure

- **Pumped storage power plants and hydroplants with pondage** – These may be promoted to enable smoothening of the fluctuating output of intermittent renewable energy sources while also balancing base-load power plants, as the share of renewable energy grows. Immediate action to inventorise and assess potential for pumped storage may be carried out

- **Reducing construction delays of hydro plants** – Large hydro power projects commonly get embroiled in social and political issues mostly related to loss of significant areas of agricultural flood plains and forest lands and forced relocation without just compensation for affected rural communities. Interstate disputes over water rights can also often delay projects. In order to ensure more investments in hydro power projects and pumped hydro storage systems, it is important to address these concerns at the detailed project report (DPR) stage

- **Incentivising private investments in battery storage** – It has been estimated that over 70 GW and 200 GWh of energy storage would be required in India by 2022 and therefore we need to plan to strengthen our battery storage to meet this demand. Battery storage may be included in the harmonised master list of infrastructure to give it infrastructure status. To attract private participation in battery storage, it is important to incentivise setting up of such projects. They may be set up in existing solar parks, making them eligible for benefits associated with "infrastructure" status

- **Creating an enabling policy environment** – There can be a policy on comprehensive grid-connected storage, for viability gap funding, bringing in clarity for businesses to invest and develop a vibrant battery storage segment. This will also ensure that India takes the lead in creating storage manufacturing industry

Petroleum and natural gas

In order to expedite the execution of gas projects and to realise the desired socio-economic benefits from a gas economy, there is need for continuous efforts to create an enabling policy/regulatory framework.

- **Unbundling gas transmission and distribution segments** – To boost India's gas sector and make it more competitive, gas transmission and distribution segments need to be unbundled. This will enable non-discriminatory access to transmission network and improve the environment for improved usage of gas

- **Establishing a free gas market through trading hub/exchanges** – If India is to take meaningful strides to increase the share of gas in the energy mix, it is imperative to ramp up domestic gas output. For this, remunerative, market-linked price should be used prospectively, to encourage private investments. A gas trading platform will go a long way in enhancing trade transparency, boosting consumer confidence, and increasing market opportunities for suppliers. It will enable all stakeholders in the gas sector to have access to gas through a common platform, which would facilitate local gas price discovery in a fair and transparent manner

- **Creation of gas transport system operator (TSO)** - To enable uninterrupted gas flow from any gas source (domestic and imported) to any gas consuming market, setting up a TSO, without any conflict of interest, is necessary. It will facilitate in catalysing the creation of new gas markets along with interlinking regional networks to develop a single gas market in the country

- **Rationalisation of tax structure for natural gas:** The present tax structure for sale of natural gas (not under GST regime) increases input cost for the end-consumer. Further, varied VAT structure of states on natural gas is distorting the competitiveness of natural gas as against alternate fuels viz. LPG, furnace oil, petcoke which have already been covered under GST. There is a need to harmonise the tax structure for natural gas by bringing it under the GST regime. Tax reforms for gas will facilitate in attracting investment in gas infrastructure, which would lead to additional GST revenue. GST for gas will also displace polluting fossil fuels which would result in generating health and environmental dividend on account of reduced pollution

- **Expediting the process of granting permissions** – In order to set up City Gas Distribution (CGD) network, multiple clearances and permissions are required from many agencies — various departments of municipalities, railway authorities, the National Highways Authority of India, Public Works Department, traffic police, state road transport departments and other local authorities. These procedural delays tend to impact the pace of development of the CGD network. Providing single window clearances for the CGD network – at both state and district levels - is a key factor for their expeditious implementation. The option of acquiring such clearances before award may also be considered

- **Improving capacity utilisation of LNG terminals** – Currently, most LNG terminals in India are running well below their capacity, owing to several constraints related to laying of pipelines for delivering gas upstream to different regions. There is a need to provide adequate connectivity to ports and to expedite clearances and grant right of way for faster construction and operationalisation of pipelines

- **Improving oil production technologies** – Production from domestic fields has declined in recent years. As major oil fields are reaching their maturity stage, investment in enhanced oil recovery technologies is required to boost and maintain production

NIP project summaries and marquee projects

Power sector

In the power sector, an estimated total capital expenditure of Rs 1,410,428 crore by both the Centre and states would be incurred over fiscals 2020 to 2025. For the identified projects to be executed by central PSUs and private players, the break-up of total estimated expenditure of Rs 953,895 crore is as follows: an amount of Rs 326,811 crore will be expended on electricity generation projects, Rs 323,034 crore will be expended on electricity distribution projects, while an amount of Rs 304,050 crore will be expended on electricity transmission projects. The summary of the projects is highlighted in the table below:

Category	Capex over FY20–FY25 (Rs crore)
Generation	326,811
NTPC	119,991
NHPC	44,049
THDC	10,385
SJVN	10,334
DVC	2,848
State (Hydro)	75,375
Private (Hydro)	63,829
Distribution	323,034
DDUGJY, IPDS, Proposed New Scheme	323,034
Transmission	304,050
PGCIL	65,500
DVC	549
State	190,001
Private	48,000
Total	**953,895**
States	456,533
Overall total	**1,410,428**

- In generation, projects include greenfield/expansion of super thermal power projects such as Lara super thermal power station, Barh super thermal power station, etc; Hydropower plants undertaken by NHPC such as Dibang, Tawang – I&II, Teesta – IV, etc, and the solar PV plants undertaken by THDC

- In transmission, PGCIL is undertaking major projects such as HVDC Bipole Link between western and southern regions, interstate Green Energy Corridor Transmission Link and construction of substations

- In the distribution segment, many projects are being executed under the Integrated Power Development Scheme (IPDS) and Deen Dayal Upadhyaya Gram Jyoti Yojana (DDUGJY) to strengthen the distribution network in urban and rural areas in order to provide continuous power supply

Capital expenditure over FY20 to FY25

Rs crore	FY20	FY21	FY22	FY23	FY24	FY25	Total
Generation	30,056	53,819	63,789	63,474	64,982	50,690	**326,811**
Distribution	21,127	42,000	44,207	60,000	70,000	85,700	**323,034**
Transmission	54,875	53,897	50,712	51,522	51,522	41,522	**304,050**
Total	**106,058**	**149,716**	**158,708**	**174,996**	**186,504**	**177,912**	**953,895**
States[11]	58,081	75,834	63,027	48,491	38,732	33,090	**456,533**
Overall total[12]	**164,140**	**225,551**	**221,734**	**223,487**	**225,236**	**211,002**	**1,410,428**

[11]States/UTs include Uttar Pradesh, Maharashtra, Gujarat, Telangana, Jharkhand, Tamil Nadu, Andhra Pradesh, Madhya Pradesh, Karnataka, Haryana, Punjab, Delhi, Kerala, Odisha, Chhattisgarh, West Bengal Sikkim, Mizoram, Andaman & Nicobar, Chandigarh and Puducherry. For some projects, year-wise phasing has not been provided, so capital outlay for FY20 to FY25 will not add up to total capital outlay.
[12]Includes projects where yearly capex phasing has not been provided.

Marquee project

Dibang Hydel Power Project

- National Hydro Power Corporation (NHPC) would be implementing the 2,880 MW Dibang Hydel Power Project from October 2020 and the project is expected to be completed by the end of September 2029
- The project is estimated to be built at a total project cost of Rs 28,007 crore. This project will be built over Brahmaputra river in Arunachal Pradesh and is envisaged as a storage-based hydroelectric project with flood moderation as the key objective
- An estimated capital expenditure of Rs 15,150 crore will be incurred on this project between fiscals 2020 and 2025

High Voltage Direct Current (HVDC) Bipole Link Project

- Power Grid Corporation of India Limited (PGCIL) is implementing the HVDC Bipole Link between the western region (Raigarh, Chhattisgarh) and southern region (Pugalur, Tamil Nadu) at an estimated cost of Rs 14,733 crore
- The project objective is to improve the import capability of the southern region which is facing a huge power deficit due to delay in many anticipated generation projects. Therefore, to facilitate the import of power into the southern region and considering the long distance, it has been proposed that power be transferred over HVDC system ±800 KV 6000 MW HVDC link with terminals at Raigarh and Pugalur along with VSC-based 2000 MW HVDC link between Pugalur and north Trichur (Kerala)

Atomic energy

About seven generation projects have been identified to be implemented during 2020-25 with an estimated capital expenditure of Rs 155,503 crore over fiscals 2020 to 2025. These projects will be implemented by the central agency – Nuclear Power Corporation of India (NPCIL) through the EPC route. The summary of the projects is highlighted in the table below:

Category	No. of projects	Mode of implementation	Capex over FY20–FY25 (Rs crore)
Generation			
NPCIL	7	EPC	155,503
Total	**7**		**155,503**

- The projects include commissioning of new nuclear reactors such as Kundankulam Nuclear Project Units 3&4 and Units 5&6 - each 1,000 MWe reactor, commissioning a prototype 500 MWe fast breeder reactor, etc

Capital expenditure over FY20 to FY25

Rs crore	FY20	FY21	FY22	FY23	FY24	FY25	Total
Capital expenditure	11,635	21,462	28,324	33,124	32,674	28,284	**155,503**

Marquee project

Kudankulam Nuclear Power Project

- Kudankulam Nuclear Power Project Units 3&4 and Units 5&6 are being built at an estimated total project cost of Rs 89,470 crore and are expected to be completed by December 2025

Renewable energy

The category of projects included are solar, wind, small hydro and bio power. The capital expenditure for these projects is estimated at Rs 929,500 crore. The summary of the projects is highlighted in the table below:

Category	Target by Dec 25 (in GW)	Actual achievement till Oct 19 (in GW)	Capacity to be added by FY25 (in GW)	Capex over FY20–FY25 (Rs crore)
Solar power	149.7	31.7	118	472,000
Wind power	96.99	37.09	59.90	419,300
Small hydro power	7	4.65	2.35	23,500
Bio power	12.04	9.94	2.10	14,700
Total	**265.73**	**83.38**	**182.35**	**929,500**

Capital expenditure over FY20 to FY25

Rs crore	FY20	FY21	FY22	FY23	FY24	FY25	Total
Capital expenditure	30,500	151,000	144,000	170,000	217,000	217,000	**929,500**

Petroleum and natural gas (PNG)

An overall total capital expenditure of Rs 194,572 crore by both the Centre and states would be made over fiscals 2020 to 2025. About 163 projects have been identified to be implemented in 2020-25. The capital expenditure to be incurred by the Centre for these projects over fiscals 2020 – 2025 is estimated at Rs 193,126 crore. Out of the above 163 projects are to be executed by the Centre, 136 projects (~Rs 154,089 crore) are to be implemented through the EPC mode, two projects worth Rs 10,751 crore are to be implemented through PPP mode and 25 projects worth Rs 28,286 crore are to be implemented as joint ventures. The summary of the projects is highlighted in the table below:

Category	No. of projects	Mode of implementation	Capex over FY20–FY25 (Rs crore)
Gas pipelines	17	EPC	51,860
Oil pipelines	35	EPC	52,278
Oil/ Gas/ LNG storage facilities			
	40	EPC	19,692
	2	PPP	10,751
Others			
	44	EPC	30,260
	25	JV	28,285
Total	**163**		**193,126**

- The projects include various natural gas pipelines such as between Haridwar-Dehradun, Jagdispur-Haldia, and Bokaro – Dhamra, etc; city gas distribution network in different cities and LNG terminals in Gopalpur, Krishnapatnam, etc

Capital expenditure over FY20 to FY25

Rs crore	FY20	FY21	FY22	FY23	FY24	FY25	Total
Centre	27,006	43,056	48,147	41,524	22,858	10,535	**193,126**
States[13]	326	454	167				**1,446**
Overall total[14]	**27,332**	**43,510**	**48,314**	**41,523**	**22,858**	**10,535**	**194,572**

[13]States/UTs include Uttar Pradesh, Maharashtra, Gujarat, Telangana, Jharkhand, Tamil Nadu, Andhra Pradesh, Madhya Pradesh, Karnataka, Haryana, Punjab, Delhi, Kerala, Odisha, Chhattisgarh, West Bengal, Sikkim, Mizoram, Andaman & Nicobar, Chandigarh and Puducherry. For some projects, year-wise capex phasing has not been provided, so capital outlay for FY20 to FY25 will not add up to total capital outlay.
[14]Includes projects where yearly capex phasing has not been provided.

Marquee project

Strategic Petroleum Reserve (Phase II) at Chandikhol and Padur

- Indian Strategic Petroleum Reserve Limited (ISPRL) would be constructing strategic petroleum reserve of 6.5 million metric tonne at Chandikhol in Odisha and Padur in Karnataka
- Strategic petroleum reserves will be implemented under PPP mode, whereas the SPM and pipelines are proposed to be built by the public sector
- The project will augment India's energy security and will serve as a cushion during any supply disruption

Jagdishpur–Haldia /Bokaro–Dhamra Natural Gas Pipeline and Barauni–Guwahati Pipeline (JHBDPL & BGPL)

- GAIL (India) Ltd is implementing the Jagdishpur–Haldia/ Bokaro–Dhamra Natural Gas Pipeline and Barauni-Guwahati Natural Gas Pipeline at an estimated cost of Rs 15,520 crore to be completed by December 2021
- The JHBDPL and BGPL project is a 3,384 km-long gas pipeline system being developed in the states of Uttar Pradesh, Bihar, Odisha, Jharkhand, West Bengal and Assam and is intended to connect the eastern and northeastern part of the country with the National Gas Grid
- The project will ensure widespread supply of natural gas for the domestic, industrial and transport sectors

Total energy sector capital expenditure to be incurred from FY20 to FY25

Rs crore	FY20	FY21	FY22	FY23	FY24	FY25	Total
Power	164,140	225,551	221,734	223,487	225,236	211,002	**1,410,428**
Renewable energy	30,500	151,000	144,000	170,000	217,000	217,000	**929,500**
Atomic energy	11,635	21,462	28,324	33,124	32,674	28,284	**155,503**
PNG	27,332	43,510	48,314	41,523	22,858	10,535	**194,572**
Total[15]	**233,607**	**441,522**	**442,372**	**468,134**	**497,768**	**466,821**	**2,690,003**

[15]*Includes projects where yearly phasing has not been provided.*

Roads

Sector Progress, Deficits and Challenges, Vision and Reforms

Eastern Peripheral Expressway and Western Peripheral Expressway

Project details

- Both peripheral expressways are six-lane access-controlled expressways built with the objective of diverting heavy traffic passing through Delhi which are bound for other parts of the country, thereby decongesting road traffic and reducing pollution in Delhi
- The Eastern Peripheral Expressway (EPE) begins at Kundli and passes through Sonipat, Baghpat, Ghaziabad, Noida and Faridabad districts. It joins the Western Peripheral Expressway (WPE) near Palwal which also starts at Kundli, but passes through Manesar to reach Palwal. The expressways have a combined length of 270 km
- The WPE is constructed at a total cost of around Rs 6,400 crore and EPE is constructed at a total cost of around Rs 11,000 crore. The WPE passes through major cities of Sonipat, Bahadurgarh, Jhajjar, Manesar, Sohna, Hathin and Palwal

Salient features

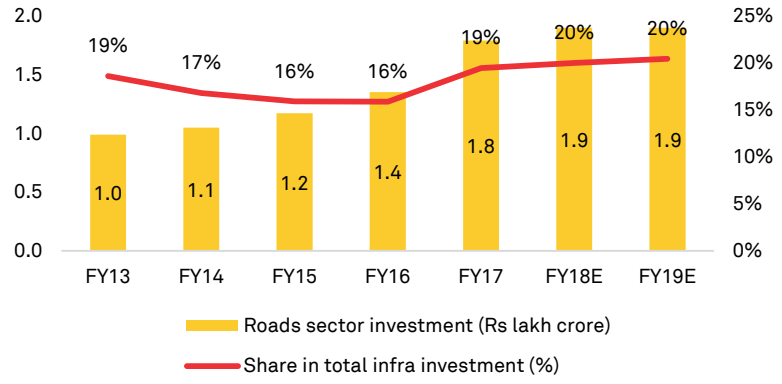
- The expressways aim to provide a high-speed link between the northern and southern districts of Haryana and provide an uninterrupted high-speed link for commercial traffic from Haryana to its neighbouring states
- The expressway is equipped with the latest, world-class smart technology and road safety features such as intelligent highway traffic management system, video incident detection system and a closed tolling system, where toll will be charged on the distance travelled
- The expressway is the country's first green highway with landscaping, plantation of nearly 2.5 lakh trees and fully lit by solar energy

The roads sector has attracted significant investment over the past 10 years. The sector has pioneered several innovative public-private partnership (PPP) models besides having a strong contractual framework compared with other sectors. These factors have led to significant investments from private players in the sector. There is a need to further boost connectivity as national and state highways constitute only 4.7% of the surfaced roads in India. This makes it imperative to strengthen hinterland connectivity with ports and other key locations including consumption centres, metros, Tier-2 cities and places of strategic importance so that people and goods can move at a faster pace.

Historical investments

The share of roads sector investment in the overall infrastructure investment was ~17% between fiscals 2013 and 2017, rising at ~16% CAGR (refer to Figure 12).

Figure 12 Roads sector infrastructure investment (Rs lakh crore) and share in total infrastructure investment (%)



Source: Appraisal documents for five-year plans, CRIS estimates (Investments mentioned are at current prices)

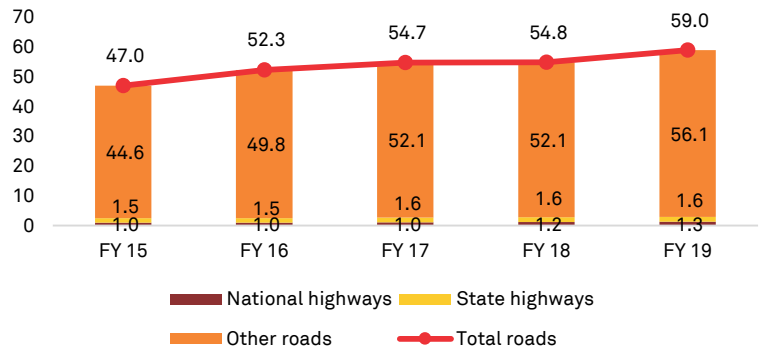
Private sector participation in the roads sector declined towards the end of the Twelfth Five Year Plan owing to land acquisition and utility clearance hurdles, inadequate dispute resolution mechanism, poor project preparation resulting in frequent change of scope and aggressive bidding by developers. In the light of falling private sector participation, the allocation of central government funds to the roads and bridges sector has increased considerably, as models such as Engineering, Procurement, and Construction (EPC) and hybrid annuity model (HAM) have been preferred in recent times.

Trend in roads sector

India has the second-largest road network globally. Roads can be classified into: national highways, expressways, state highways, major district roads and rural roads.

The total road network in India was 59 lakh km as of March 31, 2019. Of this, national highways and expressways comprised 132,500 km and state highways 156,694 km. Major district roads and rural roads accounted for the remaining 56 lakh km.

Figure 13 Trend in road network in India (lakh km)

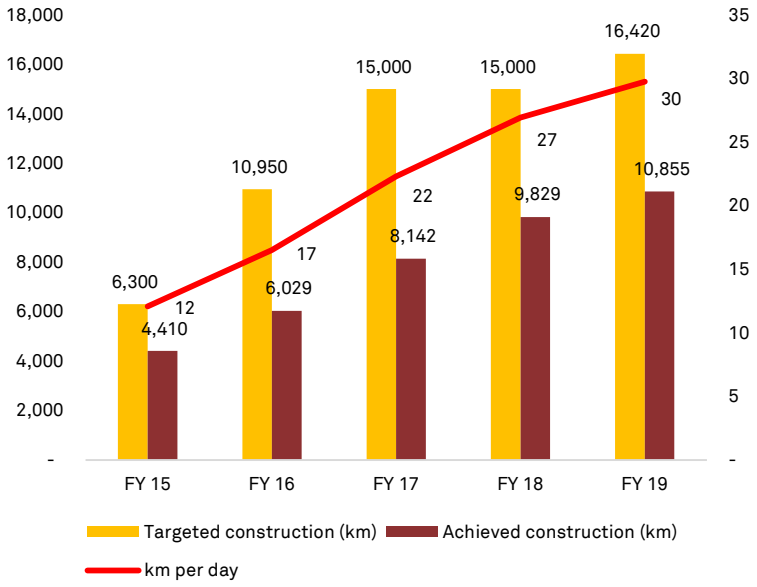


Source: MoRTH annual reports

Trends in project award and project completion

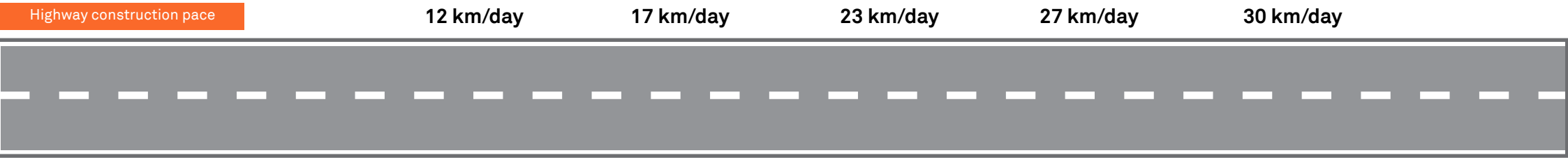
Ministry of Road Transport and Highways (MoRTH) constructed 10,855 km of national highways against the targeted 16,420 km in fiscal 2019 with an average daily construction rate of about 30 km. The rate of construction of national highways has more than doubled since fiscal 2015. The increase in the average daily construction rate of national highways can be attributed to the introduction of comparatively de-risked models (for the private sector) such as EPC and HAM, besides policy reforms such as the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, for facilitating land acquisition, etc.

Figure 14 Achievement targets set by MoRTH



Source: MoRTH annual reports

Roads sector reforms timeline



2013

First electronic tolling collection system launched for near non-stop toll collection and traffic monitoring

Facilitating harmonious substitution of concessionaire in case of both ongoing and completed projects

Infrastructure Debt Fund (IDF) set up to enhance flow of long-term infrastructure debt

2014

2015

2016

HAM launched to boost private sector participation in road projects

Setu Bharatam launched to make all national highways free of railway crossings

IDF set up to enhance flow of long-term infrastructure debt

2017

Bharatmala Pariyojana launched to improve economic corridor connectivity

IRB garners Rs 50.50 billion from public issue of India's first Infrastructure Investment Trust (InvIT)

2018

The NHAI raises Rs 96.81 billion by monetising road assets through toll-operate-transfer (TOT) model

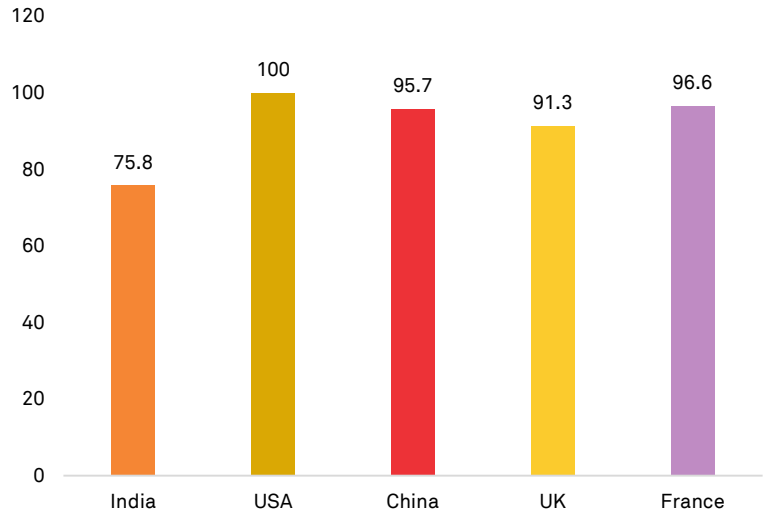
2019

Cube Highways emerges as winner for TOT Bundle 3 with price bid of Rs 50.11 billion

Infrastructure deficit in roads

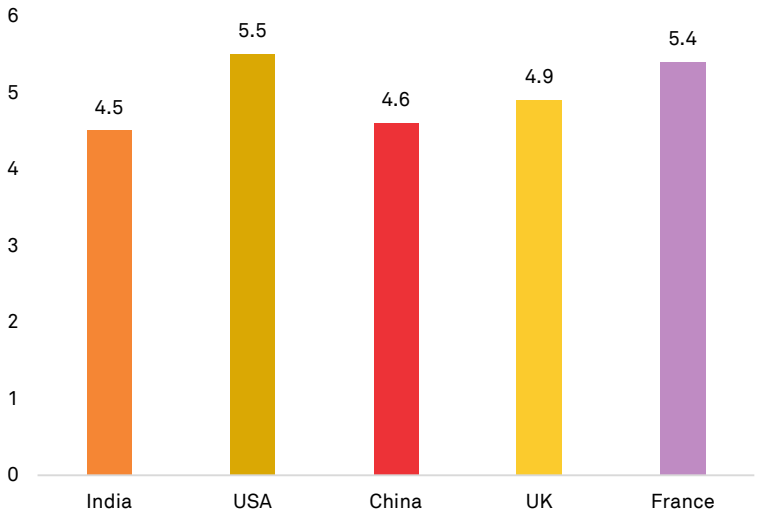
Dominant modal share in passenger and freight transport; road quality, connectivity and safety remain issues

Figure 15 Road connectivity (Score: 1 - 100)[16]



Source: WEF Global Competitiveness Report, Transport Competitiveness Report

Figure 16 Quality of road infrastructure (Score: 1 – 7)[17]



Source: WEF Global Competitiveness Report, Transport Competitiveness Report

[16]Score on the Road Connectivity Index, which measures average speed and straightness of a driving itinerary connecting the 10 or more largest cities that together account for at least 15% of the economy's total population. The scale ranges from 0 to 100 (excellent). This Index, developed by the World Economic Forum, comprises two elements: (1) a measure of the average speed of a driving itinerary connecting the 10 or more largest cities in an economy accounting for at least 15% of the economy's total population; and (2) a measure of road straightness.
[17]Response to the survey question "In your country, what is the quality (extensiveness and condition) of road infrastructure?" [1 = extremely poor—among the worst in the world; 7 = extremely good—among the best in the world] |Source: World Economic Forum, Executive Opinion Survey

- The modal share of roads for both passenger and freight traffic remains high at 85% and 59% in 2018. As roads account for the bulk of the passenger and freight movements, quality and end-to-end connectivity is essential

- India scores only a moderate 76% on the World Economic Forum's Road Connectivity Index that measures the average speed and straightness of roads connecting the country's 15 major cities

- There is a need to improve the quality of rural and border roads and make them all-weather to boost connectivity and economic activity in remote areas

- With a fatality rate of 17 per hour, road safety remains a concern

Challenges in the roads sector

Delays in achieving financial closure of new projects

Banks are becoming conservative in lending to private players in the roads and highways sector. The problem is especially acute for mid-sized players which have recently won projects from the National Highways Authority of India (NHAI).

Delayed award of contracts owing to delays in approvals and clearances

The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act (RFCTLARR), 2013, has made land acquisition more expensive. The land acquisition cost has tripled from around Rs 80 lakh per hectare to around Rs 2.38 crore per hectare. To avoid project delays, the NHAI only issues tenders for projects that have achieved 80% land acquisition. Non-provision of contiguous stretches of land causes slowdown and increases costs for contractors. The lengthy land acquisition process has led to a slowdown in project awards as limited tenders are getting issued. However, it is an international best practice to launch well-prepared projects, including 80% land acquisition. Delays in fixing appointed dates after award

due to non-fulfilment of conditions precedent affect the bidding capacity of contractors. Hence, NHAI may consider procuring all approvals and at least 90% contiguous land in advance before award of contracts.

Issues related to sanctity of contracts and delayed dispute resolution

Enhancing the enforceability of contracts and striving for predictability in execution is critical to attract and sustain private capital for funding infrastructure in key sectors such as roads. Another challenge is delayed resolution of disputes. Delays in resolution as well as execution of awards causes liquidity crunch for contractors. In order to ensure sustained private sector participation, all arbitration claims have to be expeditiously settled in an unbiased, user-friendly and cost-effective manner. The recent Cabinet decision on enforcing payment of 75% of awards has been of help. It has also been noticed that contracting agencies invariably appeal against arbitration awards and most of them result in confirmation of awards by courts, but with huge delays that are fatal to expeditious resolution of disputes.

Need for rapid asset monetisation

The NHAI has a huge backlog of projects. However, it also has a number of completed roads that can be monetised by ToT, InvIT, or asset securitisation models, to take up more greenfield project funding without increasing debt levels. This brownfield asset monetisation strategy for funding more greenfield projects should be increasingly used. The NHAI has proposed to monetise 12 more bundles of roads covering 6,000 km. This needs to be expedited to enable it to raise more funds for new roads.

Need for IT-based infrastructure maintenance and accident monitoring

State and national highways account for 63% of all fatalities related to road accidents. One of the reasons for these fatalities is ill-maintained roads and vehicles. Extreme weather also leads to a deterioration in the condition of roads. In addition, the absence of emergency medical facilities around the highway network system leads to significant treatment delays. Hence, casualty rates in case of any accident on highways remain high.

Vision 2025 for the Roads sector

Current status

- National Highways (NH) total length ~1.32 lakh km[18] ; including expressways of ~1,600 km
- Low private sector participation in NH - 15% (~17,150km)
- Poor connectivity of remote areas with trunk routes and metros

- Key component in Bharatmala Pariyojana is to improve the existing low quality and low connectivity of existing border and international connectivity roads

- Nascent stage for utilisation of asset monetisation options, such as InvIT and ToT, for good quality operating road assets
- Asset ownership mainly with public authorities and Indian developers, with limited participation from private equity players

- Higher share of cash collection resulting in revenue leakages and congestion at toll plazas

- Tolling mainly involves charging users a flat-rate toll for a particular stretch, irrespective of the actual distance travelled

- Limited use of advanced technology in traffic management, safety and security

[18] *As of March 31, 2019*
Source: NHAI, MORTH

- Last-mile connectivity – improved access to all remote areas after the completion of Bharatmala Phase-1
- Improved connectivity to key airports, ports, railway stations, military, other strategic installations, rail, intercity bus, metro, ferry terminals
- Development of overall 60,000 km of national highways including 2,500 km of expressways, 9,000 km of economic corridors, 2,000 km of coastal and port connectivity, bypasses for 45 towns and enhanced connectivity for 100 tourist destinations by 2024
- Reduce fatalities by 25%
- Significantly higher share of private sector in national highways

- Improved connectivity for border areas and international connectivity roads of high quality - all-weather, motorable and well-maintained roads

- Higher penetration of asset monetisation options, such as InvITs, ToT, securitisation of portfolio
- Asset ownership to tilt in favour of asset aggregators/private equity players
- Improved PPP models and agreements with more balanced risk-reward sharing

- Rs 1 lakh crore through asset monetisation by 2024
- Increased used of Fastag and RFID devices to shorten waiting time at toll plazas and plug revenue leakages

- Long-term financing through credit-enhanced project bonds
- Innovative models of financing – NIIF-led project development
- Value capture financing
- Tolling mainly based on 'pay as per use' concept, resulting in lower transportation cost
- Green highways or plantation-surrounding roads to result in lesser pollution

- Higher penetration of advanced technology in traffic management, safety and security
  - Use of LIDAR[19] guns and drones
  - Speed regulators on roads
  - Digital message signs on roads
  - Automated traffic control devices specifying alternate lanes/ roads in case of congestion
  - Extensive investment in automated road condition monitoring system
  - Intelligent geo-referenced traffic monitoring systems integrated with police databases for accident monitoring

Vision 2025

[19] *LIDAR – Laser Imaging Detection and Ranging*

Reform imperatives in roads

Approximately 18% of the Rs 111 lakh crore investment targeted over fiscals 2020-25 is expected to be made in the roads sector – the bulk of it in augmenting road length and safety features. Given the ambitious target, increased private sector participation is critical. The following reform measures could attract more private investment in the sector.

Increased investment in technology

Investing in technology is essential to improving and enforcing safety conditions. Technology can also be a revenue enabler. Better safety conditions and road design will increase traffic throughput and, eventually, toll revenue.

- Adoption of cashless modes of payment such as electronic toll collection, FASTag and RFID-related technologies at more lanes of toll plazas reduces waiting time and cash leakages. This has a two-fold effect of improving consumer experience and augmenting revenue
- Technology can be leveraged to improve road safety. There are advanced technologies such as Intelligent Traffic Management Systems, LIDAR gun, speed regulators, limiting the maximum speed permitted for commercial vehicles, variable digital message signs, traffic control devices specifying alternative lanes/roads in case of congestion, centralised incident management system, etc

Emphasis on improving road safety

Many road accidents are the result of faulty road design, poor engineering and deplorable road conditions.

- In order to improve the quality and safety aspect of roads, it is paramount to benchmark Indian roads against quality roads in developed countries and adopt international quality standards for parameters such as Surface Roughness Index, safety norms, etc. The large-scale use of automated road condition monitoring systems may be deployed on national highways which will ensure better transparency and service levels in road maintenance
- With a view to improve road safety and reduce number of accidents, real-time geo-tagged Road Accident Data Management Systems integrated with police databases should be launched all over the country which would help bring international best practices in collating, managing, analysing and using data on road accidents in India. This repository can help develop required solutions for the problem

Prioritisation of projects for development and key reforms to attract private sector

Attracting private investments throughout the lifecycle of the project will require a host of reforms. The risk appetite of private companies varies. For instance, banks and finance institutions with dedicated project finance units can finance greenfield projects. Pension funds and insurance companies with access to long-term funds and a low risk-return preference would be interested in investing at the post-construction, operational stage. This is when operational assets with an established track record of financial viability are refinanced. The suggested reform options are:

- At the construction stage of important projects, the focus should be on strong project preparation, upfront procurement of key approvals /clearances, and availability of required land. This is to streamline existing processes and thus develop a healthy project pipeline. Such steps will reduce the probability of time and cost overruns during implementation

- Key measures to improve private participation in the roads sector include ensuring better contract enforceability and robust dispute resolution mechanism

- The suggested reforms will help achieve the ambitious project construction targets of Vision 2025. Once completed, such a shelf of operational projects will also create a pipeline of investment-worthy road assets with high demand from long-term investors such as pension funds and insurance companies through the TOT and InvIT routes. This will ensure a virtuous cycle of asset creation and unlocking of growth capital through monetisation of mature assets. Such monetisation proceeds, in turn, can be used to finance more greenfield assets. The need is also to downplay HAM as it has adversely impacted BOT (Toll) concessioning and financial health of the NHAI

Project clearances - Enhancing the 'ease-of-doing-infrastructure'

Time and cost overruns in highways projects have been a serious concern. In the flash report for projects costing over Rs 150 crore, MoSPI has indicated that out of 1,623 projects, 552 are delayed (34%). Project delays and consequent disputes have been amongst the major causes that have taken a toll on developer finances and led to insolvencies. Enabling shorter project cycles and ease-of-doing-infrastructure are amongst the reform goals that need to be put in place.

- **Conditions precedent:** 90% of contiguous land needs to be acquired along with project clearances before awarding projects. Project SPVs need to procure these clearances, which may be made conditions-precedent (CP). This will ensure that contractors or developers are not affected by delays on this count

- **Railway clearances:** Road over bridge (ROB) or crossings often delay projects. Hence, a system by which such clearances can be fast-tracked through standardised design documents may be considered

Asset recycling for improving efficiency and mobilising resources

There is a need to increase use of financing options introduced in the last few years such as InvITs and TOT.

InvITs

- InvITs help developers/NHAI recycle invested capital in mature assets. These can attract and on-board the right investors, or patient capital, such as sovereign wealth funds, strategic investors and other long-term investors. These include pension funds, which have their return expectations in-line with the long-term cashflow profile of the underlying assets. This will help finance infrastructure without asset-liability mismatch usually associated with bank financing of infrastructure

Key reforms that may improve investor participation in InvITs are:

- InvITs suit the investment objectives of insurance companies and pension funds. The Insurance Regulatory and Development Authority of India (IRDAI) should revisit the prescribed cap of 5% for insurance companies' investment in a single InvIT, in line with the limit prescribed by the Securities and Exchange Board of India for mutual funds and its own cap for insurance companies while investing in listed equities

- IRDAI should come out with clear guidelines allowing insurance companies to invest in debt securities issued by InvITs, in line with traditional companies. This will help issuers significantly. Similarly, the Pension Fund Regulatory and Development Authority mandates a minimum credit rating of AA for the sponsor of an InvIT in order

to allow participation of pension funds. As InvITs are independent of their sponsors, the rating threshold should be made applicable only to InvITs and not the sponsors

Toll Operate Transfer (TOT)

- This has evolved from the operate-maintain-transfer (OMT) model, wherein the concessioning authority securitises the toll receivables by collecting upfront concession fee or initial estimated concession value (IECV). The major revenue source is toll collection and given the established revenue streams in operational assets there is low revenue risk for the concessionaire. Further, minimal construction risk attracts patient capital

- The key success factors of the TOT model include operational asset mix (underlying assets with established cashflows), well-defined contractual framework, and good growth potential

- The TOT model allows monetisation of a portfolio of operational road assets at one go

- A reform that could improve investor participation in the model is flexibility in the concession period of the underlying assets. This may encourage more companies to participate in such bids

Enabling NHAI to raise long-term money

- It is critical for NHAI to meet its financing needs from a wider investor base at competitive rates and for longer tenures compared with the predominant share of public sources of financing and conventional bank borrowings. Central Road and Infrastructure Fund (CRIF) provides capital through excise duty in diesel and motor spirit. In Budget Estimate 2020-21, Rs 1.26 lakh crore is to be collected. CRIF should be largely allotted to entities such as NHAI that are able to leverage it from the market using these funds, rather than ministries which use CRIF as grants for EPC projects. This will boost the multiplier effect on government allocations

- While NHAI has indeed raised taxable bonds with tenures of 25 to 30 years under its long-term borrowing programme, these currently constitute a smaller proportion of its total outstanding debt. Hence, it is imperative for NHAI to explore mechanisms to raise more low-cost funds at tenures matching the long life of its road projects, possibly through tax-free bonds

- NHAI can consider raising long-term funds through securitisation of toll proceeds of its operational highways and also seek participation from Life Insurance Corporation of India and Employees' Provident Fund Organisation to invest patient capital in part-financing its investment needs. Having an escrow arrangement for servicing such financing along with NHAI tapping into tools for monetisation of highways through the InvIT, TOT route, etc, will also help attract more long-term funds to refinance its existing short-to-medium-term debt

NIP project summaries and marquee projects

In the roads sector, total capital expenditure of Rs 2,033,823 crore by both the Centre and states would be made between fiscals 2020 and 2025. About 1,820 projects have been identified to be implemented in 2020-25. The total capital expenditure for these projects by the Centre is estimated at Rs 13.8 lakh crore over fiscals 2020 to 2025.

The summary of the projects is highlighted in the table below:

Category	No. of projects	Length (km)	Capex over FY20 – FY25 (Rs lakh crore)
National highways	1,815	87,162	1,280,638
Expressways	5	2,142	101,742
Total	**1,820**	**89,304**	**1,382,380**

- The projects include construction of new expressways such as Delhi–Mumbai Expressway, Bengaluru–Chennai Expressway, etc. Several projects being implemented include four laning/ two laning or widening of existing highways
- In order to improve the safety of highways, many projects include upgrading or re-construction of existing roads, bridges and construction of ROBs at level crossings

Capital expenditure to be incurred over FY20 to FY25

Rs crore	FY20	FY21	FY22	FY23	FY24	FY25	Total
Centre	247,838	259,714	251,695	172,484	170,238	280,411	**1,382,380**
States[20]	84,721	123,569	105,271	80,296	70,523	52,249	**651,444**
Total[21]	**332,559**	**383,283**	**356,966**	**252,780**	**240,761**	**332,659**	**2,033,823**

Marquee project

Delhi-Mumbai Expressway

- The Delhi-Mumbai Expressway is a 1,320 km greenfield expressway project which will be built at an estimated total project cost of Rs 90,000 crore
- The construction of the expressway will be undertaken in 40 packages under the EPC model and till October 31, 2019, 19 packages have been awarded by NHAI amounting to Rs 24,097 crore
- The project is estimated to be completed by the end of March 2023. The expressway would provide seamless connectivity between Delhi and Mumbai and further ease traffic congestion on this trunk national corridor

Chennai–Bengaluru Expressway

- The Chennai–Bengaluru Expressway is a 262 km project which would be built at an estimated total project cost of Rs 20,000 crore. The project will be built under HAM model and is estimated to be completed by the end of fiscal 2024
- The expressway would have six-lane divided carriageway with design speed of 120 mph
- The project's main aim is to boost commerce and trade between cities across south India

[20]States/UTs include Uttar Pradesh, Maharashtra, Gujarat, Telangana, Jharkhand, Tamil Nadu, Andhra Pradesh, Madhya Pradesh, Karnataka, Haryana, Punjab, Delhi, Kerala, Odisha, Chhattisgarh, West Bengal, Sikkim, Mizoram, Andaman & Nicobar, Chandigarh and Puducherry. For some projects year-wise phasing has not been provided, so capital outlay for FY20 to FY25 will not add up to total capital outlay.
[21]Includes projects where yearly phasing has not been provided.

Railways

Sector Progress, Deficits and Challenges, Vision and Reforms

Bogibeel Bridge

Project details

- The 4.94 km-long double-decker Bogibeel bridge connects the south bank of the Brahmaputra river in Assam's Dibrugarh to Silapathar in Dhemaji bordering Arunachal Pradesh
- The bridge has a two-line railway track on the lower deck and a three-lane road on the top deck
- The project was constructed at an actual total project cost of Rs 5,900 crore and was built under the EPC mode. Work started in April 2002 and the project was inaugurated in May 2017, post completion of construction

Salient features

- This bridge is Asia's second-longest rail-cum-road bridge and is expected to boost India's defence logistics along the China border and reduce travel time for rail passengers and road users
- This bridge has cut down the train-travel time between Tinsukia in Assam to Naharlagun town of Arunachal Pradesh by more than 10 hours
- This project has immensely benefitted the people of Dhemaji as major hospitals, medical colleges and the airport are in Dibrugarh, the third-largest city in the Northeast

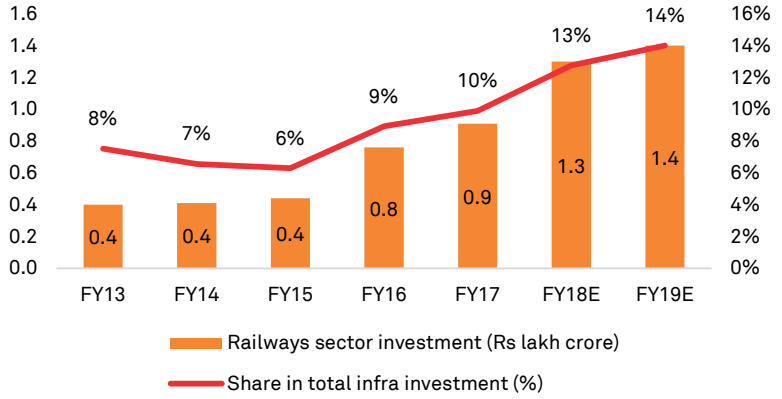
The Indian Railways has been investing significantly to enhance safety, augment the speed of trains, improve freight efficiency, enhance passenger amenities, and ensure better connectivity. To remain competitive vis-à-vis other transportation modes, there is an urgent need to upgrade and expand the railway infrastructure. It is thus important to engage the private sector to bring more funds and efficiency, thereby enhancing railway infrastructure.

Historical investments

Investments in the railways have remained subdued in comparison with the power and road sectors, though it picked up pace since 2016. The key focus areas have been decongestion of over utilised rail network, construction of new lines, doubling, tripling, quadrupling of rail lines and purchase of rolling stock such as wagons, locomotives, coaches, etc.

Between fiscals 2013 and 2017, the share of the railways sector investment in the overall infrastructure investment was ~8%, rising at a CAGR of ~23% (refer to Figure 17).

Figure 17 Railways infrastructure investment (Rs lakh crore) and share in total infrastructure investment (%)



Source: Appraisal documents for five-year plans, CRIS estimates (Investments mentioned are at current prices)

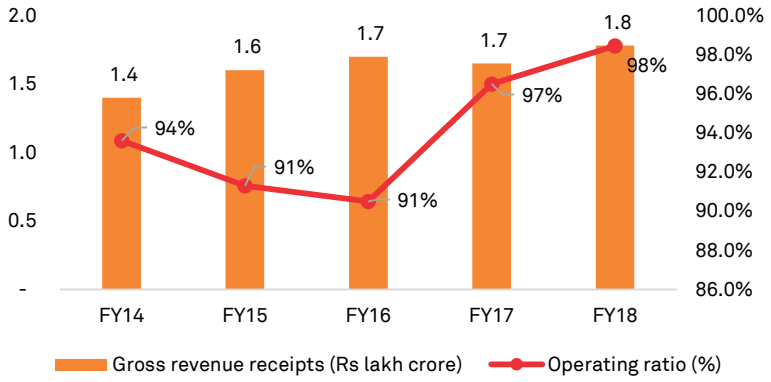
Historically, capital investment in railways has been mainly from the government, with little private sector investment. Private sector involvement is limited to allied activities such as track laying and maintenance, maintenance of coaches and wagons, construction of bridges, stations, signaling, and telecommunication works.

Trend in railways

Revenue and operating ratio

For fiscal 2018, the gross revenue receipts of the Indian Railways was Rs 1.78 lakh crore, growing at ~6% CAGR between fiscals 2014 and 2018. Traditionally, the operating ratio of the Indian Railways has been high, with the highest in fiscal 2018 at 98%. The alarming increase in operating expenses vis-à-vis revenue receipts can be attributed to implementation of the Sixth and Seventh Pay Commission awards, sticky passenger fares, and declining market share in freight traffic. Higher operating ratio in the Railways curtails its ability to make fresh investments through internal accruals.

Figure 18 Gross revenues and operating ratio (Rs lakh crore, %)

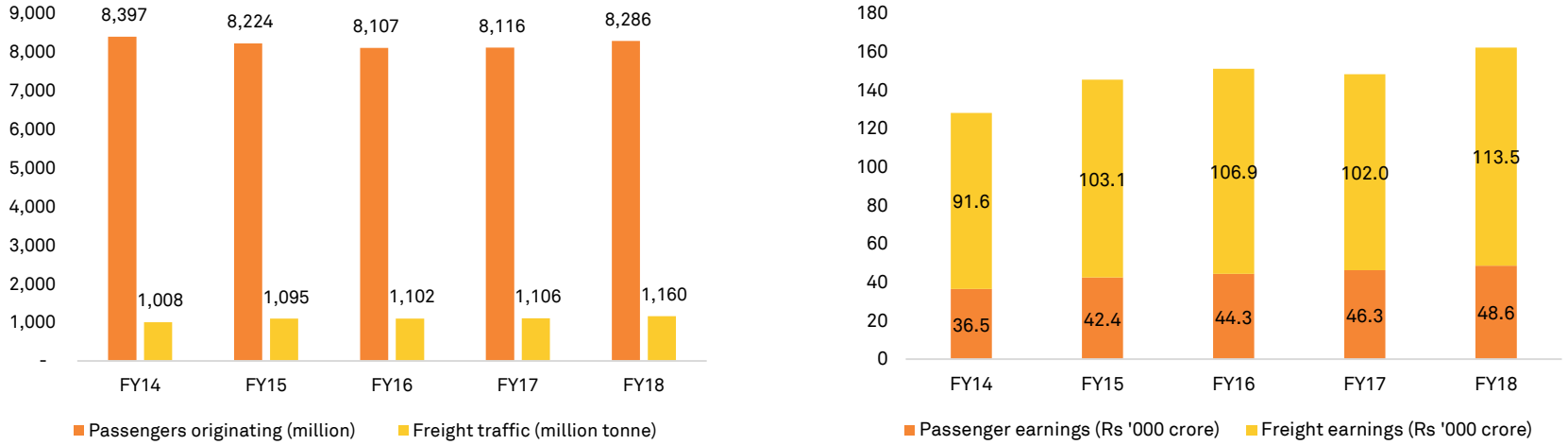


Source: Indian Railways Statistical Summary

Passenger and freight traffic and earnings

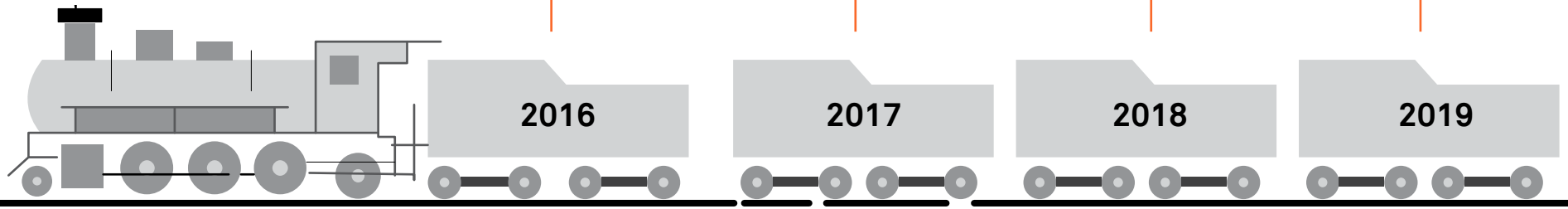
In fiscal 2018, the Indian Railways served 8.3 billion passenger trips and transported 1.2 billion tonne of freight. Freight traffic growth has been impacted by high freight rates, a decline in coal traffic for thermal power plants, slowdown in container traffic, and low volumes of cement traffic (together comprising 60-65% of rail freight). Freight revenue was the major contributor to the Indian Railways' revenue with 64% share, vis-à-vis 27% share of passenger revenue, and the rest coming from non-fare revenue and indirect earnings.

Figure 19 Trend in passenger and freight traffic and earnings



Source: Indian Railways Statistical Summary

Railways sector reforms timeline

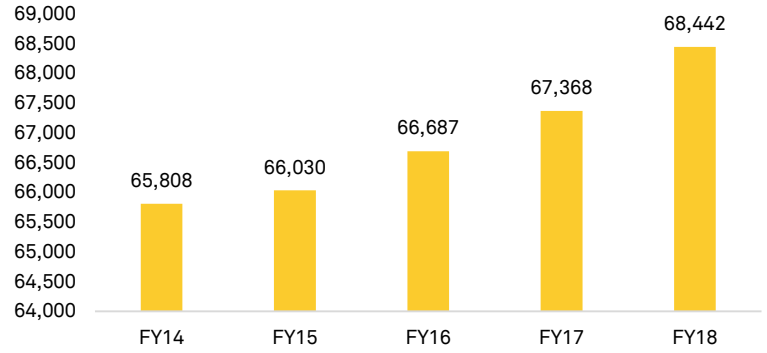


	2016	2017	2018	2019
	National High Speed Rail Corporation Limited formed to implement Mumbai – Ahmedabad high-speed bullet train project	Railway modernisation plans, fast-track electrification and doubling of tracks to enhance capacity and increase capex spend	Approval for formation of Rail Development Authority as an independent regulator for railways	First private train operation given to IRCTC, which will have full control over determining fare and services offered to passengers
		Implementation of dedicated freight corridors (DFCs) sanctioned to improve freight capacity and reduce freight costs	Station redevelopment scheme launched to modernise infrastructure at major stations	Launch of first indigenously manufactured semi high-speed train, Vande Bharat Express
			First railway project under PPP annuity transferred to a private player to construct a section of Eastern DFC	
Freight carried (in million tonne)	1,102	1,106	1,160	1,221

Infrastructure deficit in railways

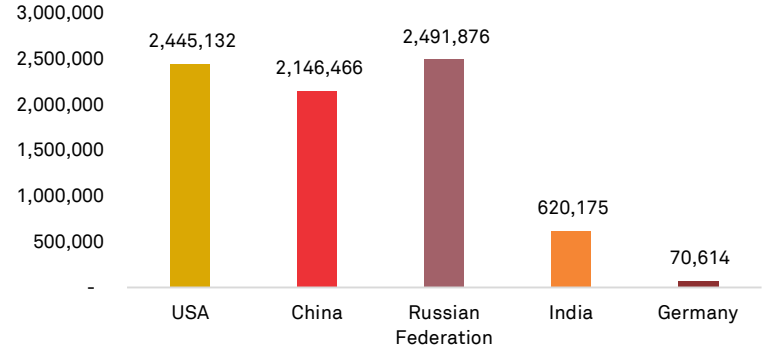
Route km nearly stagnant, freight throughput lags passenger throughput

Figure 20 Rail lines (total route-km)



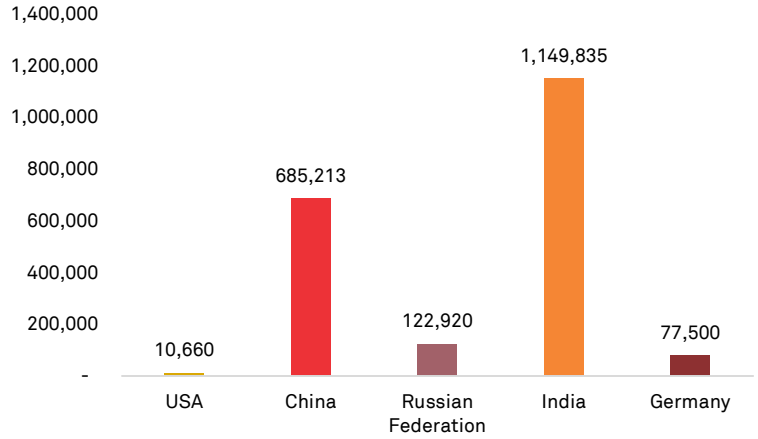
Source: Indian Railways Statistical Summary

Figure 21 Indian Railways – Peer comparison for goods transported in 2017 (million tonne – km)



Source: World Development Indicators-World Bank, IR Yearbook 2018

Figure 22 Indian Railways – Peer comparison for passengers transported in 2017 (million passenger-km)



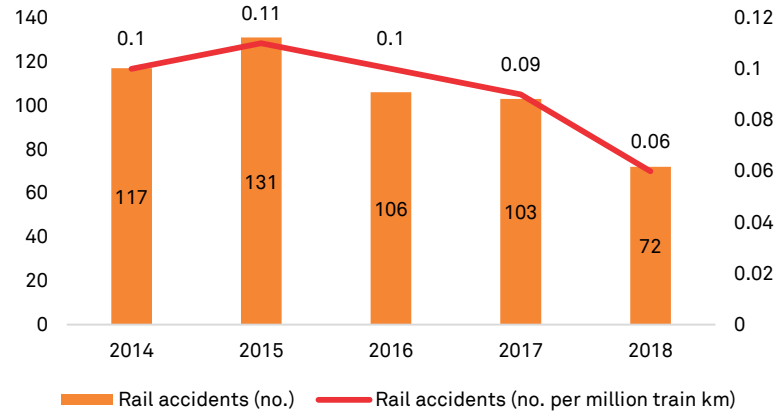
Source: World Development Indicators- World Bank, IR Yearbook 2018

- Over 1954-2016, freight loading grew 1,344% and passenger kilometres 1,642%, but route kilometres rose only 23%. Of 247 sections, 161 (or 65%) are running at 100% or above line capacity on high density network (HDN) routes^
- Due to low fares, passenger traffic uses two-thirds of capacity, but generates only one-third of revenue. High freight tariff is getting out-priced in the market
- As a result, railway finances with over 98% operating ratio (operating cost/ operating revenue) leave no surplus for capital investment. Persistent time and cost overruns for projects lead to low expenditure efficiency

Source: PIB, ^HDN are Delhi-Howrah, Delhi-Mumbai, Mumbai-Howrah, Howrah-Chennai, Mumbai-Chennai, Delhi-Guwahati and Delhi-Chennai

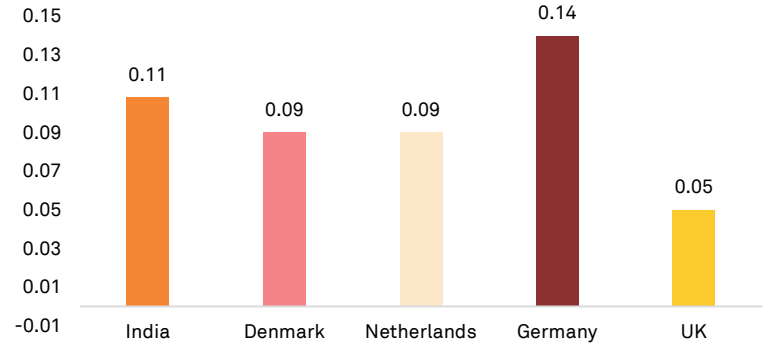
Need for improving rail safety

Figure 23 Rail safety: Accidents in Indian Railways



Source: IR Yearbook 2018, Lok Sabha Secretariat; 2018 data excludes KRCL

Figure 24 Rail accidents (in numbers per million train km, 2012-16)



Source: IR Yearbook 2018, EU Transport Scorecard, Standing Committee on Railway Safety

- Most casualties happen due to derailments caused by defects in the track or rolling stock. Of the total track length, 5,000 km is due for renewal this year. However, only 2,700 km has been targeted for renewal

- Further, increased congestion and saturated usage of line capacity reduce the headway — the interval between two consecutive trains running on the same route — thus increasing the chances of collisions on very busy stretches. So, congestion needs to be reduced

Challenges in the railways sector

Lack of investment for capacity augmentation

More than 100% utilisation of many routes has led to gradual wear and tear of tracks and decline in average speed of trains, necessitating large investments in network expansion and decongestion projects. Demand, too, has increased exponentially, with the supply-side struggling to keep pace. This has created a significant investment gap for capacity expansion, given the high operating ratio. Indian Railways has also been marred by ever-mounting debt. The debt-servicing costs are set to rise at a much faster rate as the repayment obligations related to DFC and High Speed Rail (HSR) network will kick in. High debt servicing cost would put further strain on railway finances.

Lack of rake availability for cargo movement

This is a major issue for freight transportation by rail. It is further aggravated in the case of unregulated sectors such as steel and cement. In these sectors, rail transport is a major component of the supply chain for sourcing raw materials and placing finished products in the market. In the existing scenario, end-users switch to other modes of transport, leading to a sub-optimal modal share of railways.

Loss of passenger share to airlines

The development of airports and thrust of airlines in Tier-2 and-3 cities has led to railways losing out on passenger traffic. Traditionally, railways has had an edge over air travel on pricing. However, the emergence of numerous budget airlines now operating in many cities has led to more passengers shifting to air travel.

Passenger traffic crowding out freight traffic

Freight trains have to run at half the speed of passenger trains, as the latter get priority in railways' scheduling. In addition, freight rates have risen 91% over the past decade compared with a 28% increase in passenger rates. Due to this, railways has been steadily losing freight market share to road transport. This, coupled with an estimated increase in permitted axle load of commercial vehicles by 25%, may lead to further reduction in modal share of railways in freight transport.

Independent regulation of passenger and freight fares

There is a need for autonomous regulation of passenger fares and freight rates. The government had approved setting up of Railway Development Authority (RDA) in this regard. However, the RDA has not become operational yet. Operationalisation will ensure that regulation of pricing and services is shifted from the Ministry of Railways to an independent regulator. Such regulation is expected to be one of the key reforms for improving private sector participation.

However, the delay in setting up of RDA also opens up avenues for other options like setting up a multi-sectoral regulator by allocating railway regulatory functions to an existing transport sector regulator such as Airports Economic Regulatory Authority (AERA) because the objectives of independent regulation are similar across sectors -- the need for conserving skills, and for preventing regulatory capture.

Urgent need for station redevelopment

An ambitious programme of station redevelopment has been announced but there has been little headway. There is a need to monetise non-core assets such as surplus land parcels available with the Indian Railways by providing them on long-term lease to fund the station re-development programme.

Lack of safety-related infrastructure

Track renewals are imperative to ensure safety. Therefore, backlog in track renewals has to be cleared rapidly. Out of 68,000 km of track, over 7,000 km is more than 30 years old and needs immediate replacement.

Slow progress in improving operating ratio

The poor operating ratio of the Indian Railways has constrained effective operations besides restricting investments in capacity augmentation and modernisation. The major reason for poor operating ratio is that the Railways have been priced out in the freight segment and passenger fares are highly subsidised.

Vision 2025 for the Railways sector

	Current status	Vision 2025
	• Low modal share of Indian Railways in freight traffic at 33%[22] • Two DFCs of total length ~3,360 km under implementation • High-speed railway network - NIL • Two stations being developed on PPP basis - Gandhinagar and Habibganj, others under development	• Increased modal share of Indian Railways in freight traffic at > 40% • EDFC and WDFC[23] fully operational with commencement of construction of other planned DFCs such as East-West DFC, North-South DFC, East-Coast DFC and Southern DFC • Mumbai-Ahmedabad HSR to be operational and other identified HSR projects at implementation stage • Higher private participation: 30% of net cargo volumes and 500 passenger trains privatised; 30% of 750 stations privatised; rolling stock from private sector
	• 46% of the existing railway network has been electrified as of March 31, 2018 • High network congestion: 50% of the 227 sections on the high-density routes are operating at a capacity utilisation of above120%	• 100% of the existing railway network electrified • Optimum utilisation of existing rail network – Less train delays, due to doubling/ tripling/ quadrupling of sections on high density corridors – completing multiple tracking works of 14,100 km on high density network and highly utilised network
	• Limited focus on safety and security aspects • Customer experience needs to be improved given lack of basic amenities and frequent delays • Average accidents per year: ~113 for 2015-17	• Focus on safer travel: Railway accidents to reduce drastically • Improved customer experience with high-quality amenities with modern stations and high-quality catering • Smart coaches with on-board infotainment, Wi-Fi, CCTV, fire and smoke detection facilities, tea and coffee-vending machines. • Increasing average speed of freight trains to 40 km/hr by 2024 – Due to investment in better wagons, ROB, RUB, flyover/bypasses, track upgrades, upgradation to high-power locomotives

[22] *Source: Indian Railways Annual Reports and Accounts, Bureau of Transportation & Statistics*
[23] *EDFC – Eastern Dedicated Freight Corridor, WDFC – Western Dedicated Freight Corridor*

Reform imperatives in railways

Indian Railways faces stiff competition from roads in freight transportation and airlines in passenger transportation. While growth in passenger rail traffic has held steady, airline and road traffic have seen impressive growth in recent years. To remain competitive vis-à-vis other transportation modes and provide optimum service to passengers/freight, there is an urgent need to upgrade and expand the current railway infrastructure. This calls for greater private sector engagement in this sector by creating a conducive policy and regulatory environment.

Autonomous regulation of tariffs and services

- For enhanced private participation in railways, it is important to shift the regulatory responsibility of tariff fixation, consumer protection. from the government to an independent regulator for railways – probably Rail Development Authority (RDA). However, sectoral regulators are also in place in several countries and therefore, regulatory responsibilities in Railways may also be transferred to an existing transport sector regulator, such as AERA

- The Regulator should provide a level-playing field for private players in the sector by making informed decisions on pricing of services, consumer interests, generating revenue and competition. This will help attract more investments and improve services in railways

Easing organisational rigidity by introducing structural reforms

- Having initiated private participation in railway stations and passenger trains, the next step is to corporatise the existing manufacturing and production units. It will bring in greater accountability and faster decision-making. It will also help production units look for state-of-the-art technologies, cut costs and explore overseas markets. Indian Railways should also implement accrual-based corporate accounting in all zones

- To enhance performance and efficiency, the proposal to open up the ownership/operations of locomotives and rolling stock to the private sector under a transparent and fair regulatory mechanism should be expedited

Augmenting capacity in railways

Railway infrastructure and technology have suffered owing to insufficient investments. They need to be upgraded. Timely completion of the Dedicated Freight Corridor (DFC) and semi-high speed rail initiatives would be game changers in freight and passenger segments.

- About 65% of routes operate at over 100% capacity utilisation, which has led to reduction in the average speed and service delivery of passenger and freight trains. Over-utilisation of the existing network has also raised concerns on safety. There is also a need for anti-collision technology and advanced signalling systems to improve passenger safety

Ensure greater private sector participation

Faced with staggering investment requirements for expanding and upgrading India's railway infrastructure, greater private sector involvement is required in areas, such as station redevelopment, passenger movement Initial steps in this direction have been taken with proposals for some railway stations and passenger routes being submitted for development through PPPs.

- The best practices in PPPs from other sectors, such as highways and airports, need to be followed, including favourable exit and substitution clauses, equitable risk sharing, and well-defined

obligations of the concessioning/contracting authority and concessionaire

- It would be necessary to ascertain the usage cost of track and other related infrastructure provided by the railways. For this, the railways needs to segregate its financial accounts under (a) track and related infrastructure development and maintenance, and (b) fleet management and regular operations. Cost allocation should be worked out in a manner so as not to discriminate against private operators

- Commissioning of DFC is also expected to open up opportunities for the private sector in areas, such as development of private freight terminals, rail-based logistics park and private rail sidings. This can also create a market for private rolling-stock operating companies. Hence, a conducive policy environment should be created to foster private sector participation and monetise the DFC assets once completed

Focusing on core activities

Indian Railways should focus on core activities, such as running of passenger and freight trains to efficiently compete with the private sector. It should distance itself from non-remunerative non-core activities, such as running a police force, schools and hospitals. These functions should be outsourced to private entities.

Addressing challenges pertaining to station redevelopment

- **Surrounding infrastructure plug-in** – Seamless entry and exit of freight, passengers and vehicles is essential for efficient performance of railway stations. The problem is that the area around a railway station comes under the jurisdiction of state government/urban local body and coordinating between different agencies can be a challenge. Also having a joint venture (JV) with state governments can be a good option

- **Approval glitches** - The system of approvals for real estate projects is a cause for delay. Construction permits that may be procured prior to award by Indian Railway Station Redevelopment Corporation (IRSDC) / Indian Railways in order to enable speedy completion of projects by the private partner

- **Market viability** – A project's financial viability can be adversely affected by delays in monetisation of real estate associated with station redevelopment and can consequently jeopardise finances of the private player involved. In case of tough market conditions, the spiral of delays and cost overruns can have an adverse impact on the project's financial viability. One of the mitigants could be equitable risk sharing between private players and Rail Land Development Authority. This will ensure that the private player has greater confidence in the project

NIP project summaries and marquee projects

Total capital expenditure of Rs 1,367,563 crore by both Centre and States would be made between FY20 to FY25. About 724 identified projects will be implemented in the period 2020-25. Out of the 724 projects, 697 projects worth Rs 11.97 lakh crore will be implemented through EPC mode, while 27 projects worth Rs 1.61 lakh crore will be implemented through PPP mode. A summary of the projects is highlighted in the table below:

Category	No. of projects	Capex over FY20–FY25 (Rs crore)
New lines/gauge conversion	259	440,072
Capacity augmentation	266	247,985
Dedicated Freight Corridor	7	166,171
Rolling stock	31	275,539
High-speed rail	2	110,647
Others	159	118,406
Total	**724**	**1,358,820**

Around 259 projects with ~33% of the estimated capital expenditure are towards constructing new lines are gauge conversion, 266 projects with ~18% of the estimated capital expenditure are in capacity augmentation, 7 projects with ~ 12 % of the estimated capital expenditure are in constructing DFC, 31 projects with ~20% of the estimated capital expenditure are in production of locomotives, rolling stocks, 2 projects with ~8% of the estimated capital expenditure in development of high-speed network, 159 projects with ~ 9% of the estimated capital expenditure are in coach and freight terminals and maintenance sheds.

Capital expenditure over FY20 to FY25 is shown below:

Rs crore	FY20	FY21	FY22	FY23	FY24	FY25	Total
Centre	132,463	260,811	307,466	272,024	219,747	166,309	**1,358,820**
State governments[24]	924	1,655	1,334	1,808	1,462	1,560	**8,743**
Total	133,387	262,465	308,800	273,831	221,209	167,870	**1,367,563**

[24]States/UTs include Uttar Pradesh, Maharashtra, Gujarat, Telangana, Jharkhand, Tamil Nadu, Andhra Pradesh, Madhya Pradesh, Karnataka, Haryana, Punjab, Delhi, Kerala, Odisha, Chhattisgarh, West Bengal, Sikkim, Mizoram, Andaman & Nicobar, Chandigarh and Puducherry. For some projects, year-wise phasing has not been provided, so capital outlay for FY20 to FY25 will not add up to total capital outlay.

Ports

Sector Progress, Deficits and Challenges, Vision and Reforms

Fourth Container Terminal at JNPT

Project details

- Jawaharlal Nehru Port Trust (JNPT), a major port in India, has successfully completed Phase I of the project titled 'Development of Fourth Container Terminal (FCT) on a Design, Build, Finance, Operate and Transfer (DBFOT) basis' for a concession period of 30 years
- The project is a part of JNPT's initiative on modernisation and capacity addition programme. It was awarded to Bharat Mumbai Container Terminals Pvt. Ltd. (a subsidiary of Port of Singapore Authority) with a revenue share of 35.79% through a concession agreement signed on May 6, 2014
- The development of fourth container terminal at JNPT is a part of the modernisation of ports component of the Sagarmala programme. It is India's largest FDI project in the port sector
- The cost of Phase I of the above project is Rs 4,719 crore and the cost of the Phase II development is Rs 3,196 crore (total Rs 7,915 crore). The project was awarded in May 2014 and its scheduled completion date was December 22, 2017 (Phase I).
- Phase I was completed as per schedule and is in operation since December 22, 2017

Salient features

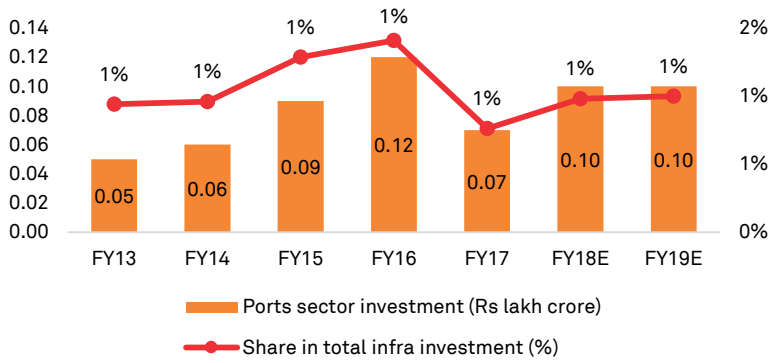
- The implementation of Phase I has enhanced the container handling capacity at JNPT by 2.4 million TEUs
- The storage facility with rail/road connectivity is also developed after reclamation of 90 ha of water area. Under Phase I, the fourth container terminal has augmented its container-handling capacity to provide reefer plugs to 1,630 containers. The facility will be beneficial for the large-scale export of agri-products from Maharashtra
- On completion of Phase-II, the capacity of container handling at JNPT will reach ~10 million TEUs. This will make JNPT, one of the top 20 container handling ports in the world

Most of India's international trade makes its way through ports, making the quality of ports a key factor in enhancing the competitiveness of our merchandise trade. The port sector has seen investments, both from the public and private sector to enhance port capacity, modernise existing ports and boost port connectivity. Even though port efficiency and productivity have improved significantly in the past 4-5 years, there still exists a need to further improve operational efficiency and productivity for cargo handling at Indian ports to bring them at par with well-managed ports globally.

Historical investments

The port sector is critical to India as ~95% of the trade activity by volume is carried out through the maritime route. Overall, India has 12 major ports and more than 200 minor ports. During 2013 to 2017, the share of the ports sector investment in the overall infrastructure investment was ~ 1%, and clocked a CAGR of ~9%. Investments during the 12th Five-Year Plan have largely focused on capacity addition and modernisation of existing ports, creation of additional berths, mechanisation and development of port connectivity projects (refer Figure 25).

Figure 25 Ports sector investment (Rs lakh crore) and share in total infrastructure investment (%)



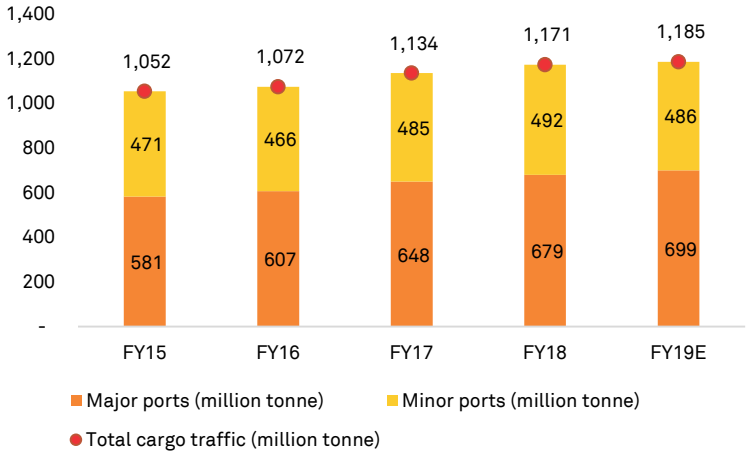
Source: Appraisal documents for five-year plans, CRIS estimates (Investments mentioned are at Current prices)

Port sector trends

Growth in cargo traffic in ports

Cargo traffic handled by ports increased at a CAGR of ~5% between fiscals 2015 and 2019. During this period, the share of major ports in overall cargo traffic handled remained same at 55%.

Figure 26 Cargo traffic at ports (mn tonne)

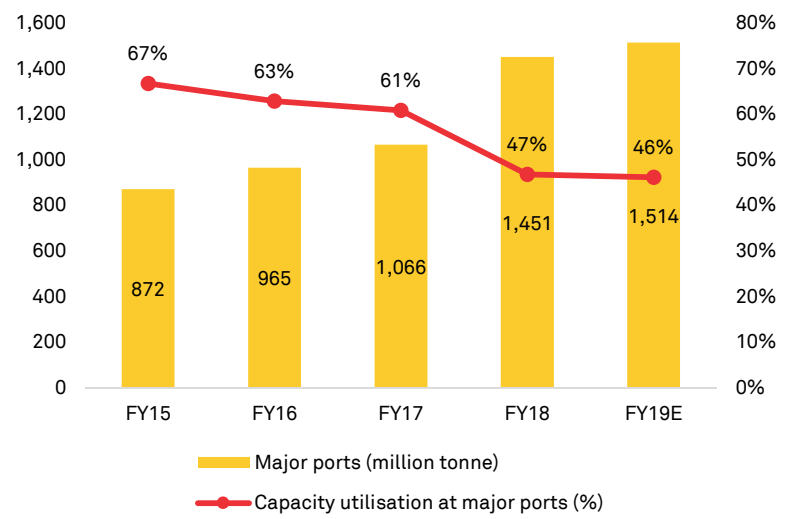


Source: Ministry of Shipping, India Ports Association

Growth in capacity and capacity utilisation for major ports

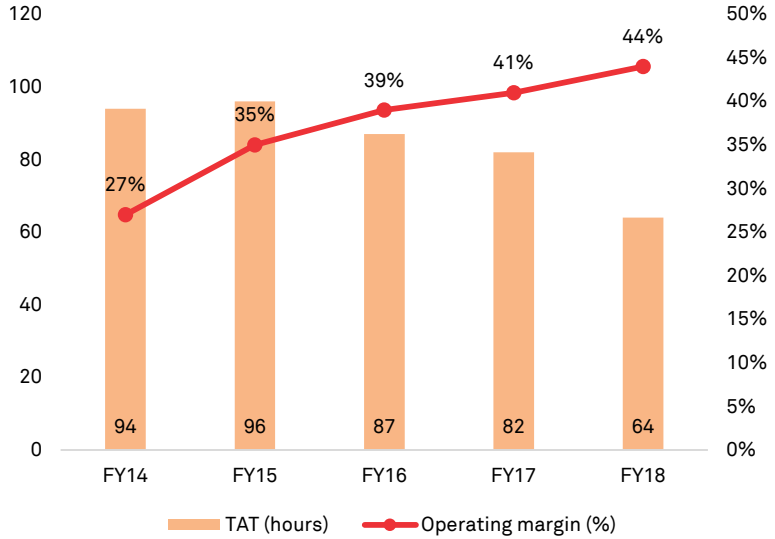
Capacity of major ports increased at a CAGR of ~15%, but utilisation declined, as there was no commensurate increase in cargo traffic.

Figure 27 Capacity and capacity utilisation of major ports (mn tonne)



Source: Ministry of Shipping, India Ports Association
Note: optimum usable capacity is 70% for Ports sector

Figure 28 TAT (hours) and operating margin (%)



Source: Ministry of Shipping, India Ports Association

Operating margin and turnaround time (TAT) of ships at major ports

The average turnaround time of ships at major ports has improved from 94 hours in fiscal 2014 to 59 hours in fiscal 2019. Various initiatives have contributed in improving the overall TAT, including improving connectivity of ports, direct port delivery, direct port entry, issuance of e-delivery order and RFID-based gate-automation. These have helped major ports to improve their operating margins over years (refer Figure 28).

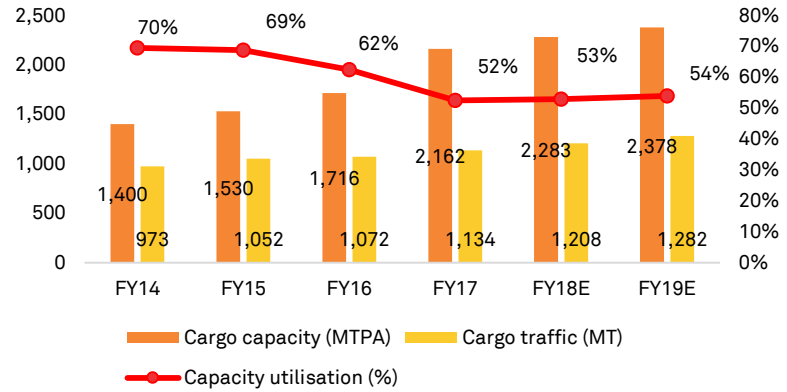
Ports sector reforms timeline

2014	2015	2016	2017	2018	2019
100% FDI allowed for port development projects under the automatic route	Sagarmala scheme launched to promote port-led development and enhance port infrastructure	Major Port Authorities Bill introduced to allow private players to fix tariffs based on market conditions		Relaxing of cabotage rules to allow foreign ship operators to transport containers between domestic ports New model concession agreement to make it more investor-friendly Relaxing of cabotage rules to allow foreign ship operators to transport containers between domestic ports	Strategic disinvestment of 100% Government of India shares in Dredging Corporation of India Ltd
Total cargo traffic at major ports (in million tonne)	556	581	607	648	679	699

Infrastructure deficit at ports

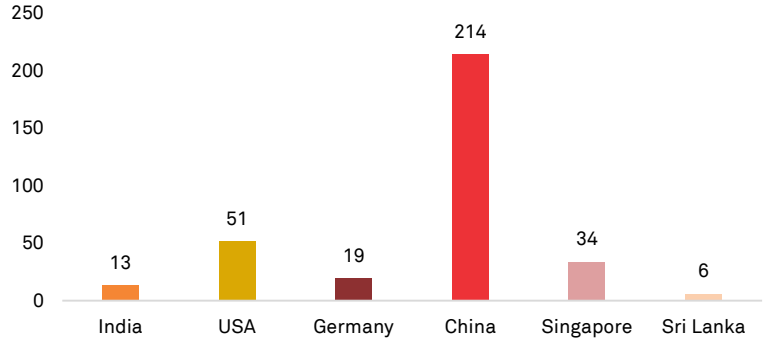
Subdued capacity utilisation at ports

Figure 29 Capacity utilisation at Indian ports



Note: Major ports capacity re-rated by the ministry based on Berthing Policy as per international norms. Total re-rated capacity during FY17 was 1,359 MTPA.

Figure 30 Container port traffic (million TEUs) in 2017

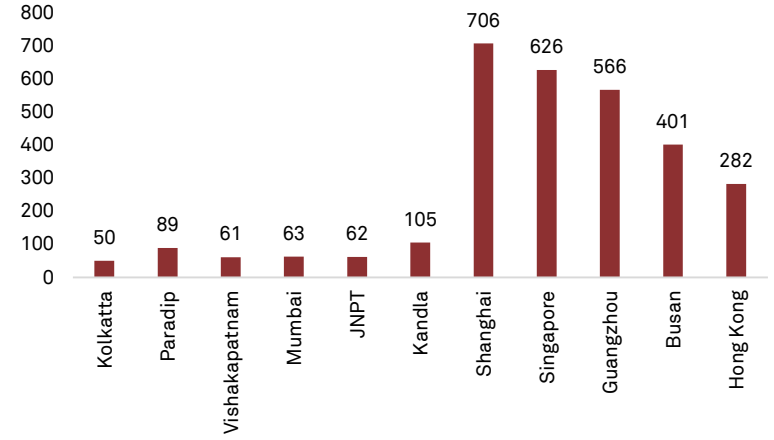


Source: UNCTAD, World Development Indicators- World Bank

- In the past five years, India's total port traffic registered a meagre ~5% CAGR, while its port-cargo capacity clocked an 11% CAGR. This has resulted in a significant drop in capacity utilisation in certain ports to below 50%
- The total container throughput is close to 13 million TEUs, but capacity is about 21 million TEUs, resulting in a ~62% capacity utilisation
- The container port traffic considerably lags that of global majors, such as China, Singapore and the US

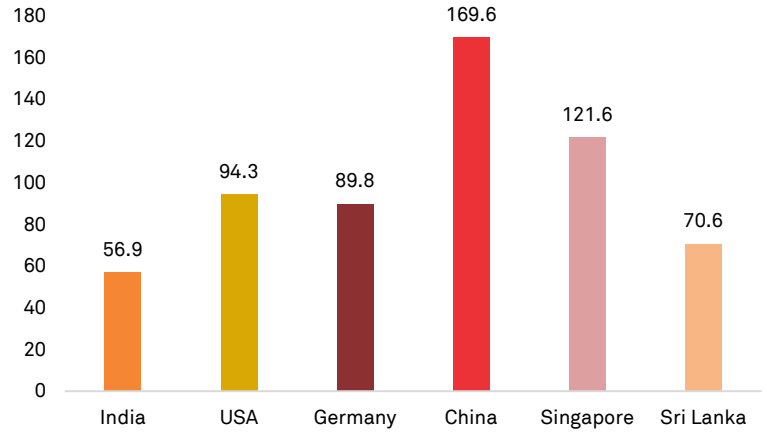
Cargo throughput at major Indian ports lags a few Asian peers significantly.

Figure 31 Cargo throughput (million tonne) in 2017



Source: UNCTAD Review of Maritime Transport, Indian Ports Association

Figure 32 Liner Shipping Connectivity Index for 2018



Source: UNCTAD, World Development Indicators- World Bank

- India also has low Liner Shipping Connectivity Index score. The index captures how well countries are connected to global shipping networks: parameters include number of ships, their container-carrying capacity, maximum vessel size, number of services, and number of companies that deploy container ships in a country's ports

Challenges in the port sector

Overcapacity has hurt capacity utilisation

Owing to the challenging global trade scenario, in the past five years, India's total port traffic has increased at a meagre ~5% CAGR. However, India's port-cargo capacity clocked an 11% CAGR. This has resulted in a significant drop in capacity utilisation, from 71% in fiscal 2012 to 54% (major and minor ports) in fiscal 2019. In certain ports, capacity utilisation is below 50%.

Need for level-playing field between major and minor ports

The Tariff Authority of Major Ports (TAMP) regulatory regime has prevented price parity between major and minor ports, as TAMP regulations are applicable only to the former. Due to this disparity, minor ports enjoy the distinctive advantage of fixing their own tariffs.

Lack of multimodal connectivity

In terms of hinterland connectivity of ports, the approach has been unimodal. Indian ports need to implement efficient and modern multimodal systems, not just at the policy level but also on the ground. On the rail front, the DFCs need to be commissioned on a timely basis. The railway network also needs to be ramped up considerably. Currently, rake availability is a problem even when connectivity exists. On the road front, the NHAI has given an impetus to port connectivity, but many crucial projects suffer from implementation delays. As for other means of intermodal transport, coastal shipping and inland waterways transport need to be key focus areas as cargo evacuation by water is cheaper and cleaner, reduces cost and port congestion, and brings in efficiency.

Vision 2025 for the Port Sector

	Current status	Vision 2025
	• India has 12 major ports and ~200 minor ports • Overall capacity utilisation of Indian ports ~54% of total capacity of ~2.4 billion tonne[25]	• Under Sagarmala, new major and minor ports will be constructed, along with existing port modernisation and capacity expansion • Overall capacity utilisation of Indian ports to be more than 65% of total capacity
	• Higher logistics cost, turnaround time and low output per ship berth due to issues in hinterland connectivity and lack of use of advanced technologies • Passenger and freight movement through inland waterways at very nascent stage – reforms, policies and projects under consideration/development	• Improved hinterland connectivity, port modernisation and computerisation to reduce logistics cost, shorten turnaround time, improve output per ship berth • Use of robots for packing, delivering and inspection as well as data analytics to monitor logistics flow to improve operational efficiency and turnaround time • Higher share of inland waterways in both freight and passenger traffic
	• Maritime trade contributes ~95% of the trade by volume and ~70% by value	• Increased share of ports by volume and by value to the overall trade in India

[25] *Source: Indian Ports Association*

Reform imperatives at ports

Just about 72 ports (out of more than 200 ports) account for around 95% of India's foreign trade by volume. However, poor infrastructure and weak connectivity have prevented these ports from realising their full potential. Given this, a revival in the sector's fortunes hinges on supportive reforms and private investment in infrastructure.

Regulatory reforms are need of the hour

- **Opening up the dredging market –** Efforts should be made so that bigger ships can ply while creating economies of scale and reduction in cost of port handling, including provisions for early environmental clearances to all major ports to create draft range between 15 metres and 20 metres. It is necessary to attract foreign players with superior dredging capabilities and technology. This would go a long way in creating hub ports. A roadmap can be prepared to develop major Indian ports as trans shipment hubs

- **Operationalising the Major Ports Authority Act –** The Major Port Trust Act, 1963, is "an Act to make provision for the constitution of port authorities for certain major ports in India and to vest the administration, control and management of such ports in such authorities and for matters connected therewith". Realising the complexities in the existing Act and the need to develop ports on the landlord model, it is suggested to replace the Act with the Major Port Authority Act (2019), which will be a simplified legislation and would envisage the abolition of TAMP. This Bill needs to be enacted, as it envisages more operational autonomy to major ports. Also, to address the issue of port capacity utilisation at major and minor ports, they may be corporatised for efficient management

- **Industrialise hinterland and enhance last-mile connectivity to ports–** At present, the ministries of shipping, road and railways are individually responsible for their respective sectors. To enhance connectivity and improve the turnaround time, there needs to be a more coordinated approach to handle traffic and evacuation, especially hinterland connectivity. Specific SPVs may be set up by state governments for planned industrial development, establishment of logistics hubs, improvement of connectivity around ports and monetisation of development for re-investment into infrastructure

Increased investment in modernisation to boost operational efficiency of ports

Indian ports lag international peers on many performance parameters such as container dwell time, throughput handled, and capacity utilisation. Benchmarking Indian ports against Chinese and US counterparts shows that India lags in port infrastructure and turnaround time of vessels. This pushes up the cost of trade, which renders Indian ports less competitive.

- **Smart ports and blockchain logistics -** Investments are needed to enhance port infrastructure in areas, such as modernising equipment to handle large volumes, navigational aids and IT systems and developing blockchain for logistics. This involves several agencies and inter-departmental co-ordinations
  - Creation of smart ports - A smart port is an automated port that uses advanced technologies, such as big data, Internet of Things (IoT), blockchain solutions and other smart-technology based methods to improve performance and economic competitiveness. A smart port is more efficient, effective and secure, making it environmentally sustainable, economically efficient; it also has higher capability to handle port traffic
  - Port digitisation and IT: Various initiatives towards port digitisation have also been undertaken by Indian ports. All major ports are equipped to receive e-delivery orders from incoming ships. Manual forms, Form 13 and Form 11, have been eliminated at JNPT and a software for Web-based e-Form 13 has been developed, wherein

the customs authorisation/endorsement is obtained online, while accepting containers. Direct port delivery and direct port entry haves been facilitated at major ports to reduce the dwell time and cost

- Major ports are in the process of installing large container scanners to obviate the need for manual examination of individual containers. Radio Frequency Identification (RFID) system is implemented at all major ports
- Introduction of IT and automation needs to be fast-tracked at all major ports of India. Real-time decision-making and IT/automation adoption across processes with manual oversight need to be ensured to increase efficiency and reduce dwell time and logistic costs

- Cruise tourism - To promote cruise tourism along the Indian coast, the government has revised standard operating procedures (SOPs), such as e-visa facility at five sea ports (Mumbai, Goa, Mangalore, Cochin and Chennai) and the construction of new cruise terminals at five major ports in the country. Existing major ports such as Kolkata and Mumbai, which have been engulfed by cities, need to be converted into cruise tourism hubs

Prioritisation of projects under Sagarmala to boost exports

- It is important to speed up the completion of various projects under Sagarmala, especially those aimed at improving port connectivity and establishing new ports

- Setting up of a single-window facility for cargo clearance and putting in place fully mechanised cargo-handling infrastructure is critical to increase the throughput

Investment opportunities in bunkering

As the current capacity of ports is underutilised, it is imperative to bring in more reforms and greater involvement of private players in bunkering infrastructure. Appropriate bunkering facilities should be provided at internationally competitive prices.

- Emphasis should be on opening a bunkering facility close to a refinery and near a busy port to leverage the trade route to maximise volumes and minimise diversion for ships

- A national standard code of practice for bunkering based on global best practices should be set up to provide a clear and standardised operational framework for private players to operate in this area

Policy interventions to promote inland waterways

- **Navigable route development –** For greater private sector participation in inland waterways, the government and Inland Waterways Authority of India need to take full responsibility of route navigability and ensuring adequate depth of rivers

- **Enhancing last-mile connectivity –** Inland water transport (IWT) should be integrated with multimodal/intermodal connectivity. This will enable efficient use of inland terminals having proper road and/or rail connectivity for seamless transfer of goods that will provide an efficient logistics supply chain

- **Development of industrial corridors -** There is a need to promote green industrial corridors and logistics hubs alongside waterway terminals and foster waterways that run parallel to transportation corridors and urban centres

- **Promoting passenger transportation –** Ferry services operating on national waterways are mostly unorganised country boats. Both Central and state governments can collaborate to promote river tourism in a big way by investing in passenger terminal development and improving safety of ferries. Private players should be encouraged for developing river tourism

- **Ensuring adequate air clearance –** On many sections of some waterways there are multiple bridges with low vertical clearance, which obstructs the passage of bigger vessels. The Centre can work closely with state governments to ensure sufficient vertical clearance for smooth passage of bigger vessels

- **Shortage of MRO facilities –** There is severe shortage of maintenance, repair and overhaul (MRO) facilities for IWT vessels. This hinders private players from investing in IWT and needs to be addressed

NIP project summaries and marquee projects

The total estimated capital expenditure by both Centre and State governments in the port sector between FY20 and FY25 is Rs 121,194 crore. For projects executed by the Centre, about 58 identified projects are planned for implementation in the period 2020-25. The capital expenditure for these projects is estimated at Rs 49,950 crore.

Out of the above 58 projects, 47 projects worth Rs 39,949 crore are to be implemented by major port trusts, while 11 projects worth Rs 10,001 crore are to be implemented by Cochin Shipyard Limited, Inland Waterways Authority India and private sector players. A summary of the projects is highlighted in the table below:

Particulars	No. of projects	Capex over FY20–FY25 (Rs crore)
Major port trusts - expansion	47	39,949
Inland Waterways Authority of India	2	4,151
Cochin Shipyard Limited, Kochi	2	2,197
Others	7	3,653
Total	**58**	**49,950**

- The projects include construction of a new port at Vadhavan (a proposed new port 140 km north of Mumbai and near Dahanu, Palghar district, Maharashtra), building dry port at Nashik, Wardha and Jalna, enhancing evacuation capacity at major ports through building roads and rail connectivity and mechanisation of berths

Capital expenditure over FY 20 to FY 25 is shown below:

Rs crore	FY20	FY21	FY22	FY23	FY24	FY25	Total
Centre	8,724	10,793	12,442	8,123	2,935	6,933	**49,950**
State governments[26]	4,633	7,311	8,207	7,740	4,789	3,069	**71,244**
Total[27]	**13,357**	**18,104**	**20,649**	**15,863**	**7,724**	**10,002**	**121,194**

[26]States/UTs include Uttar Pradesh, Maharashtra, Gujarat, Telangana, Jharkhand, Tamil Nadu, Andhra Pradesh, Madhya Pradesh, Karnataka, Haryana, Punjab, Delhi, Kerala, Odisha, Chhattisgarh, West Bengal, Sikkim, Mizoram, Andaman & Nicobar, Chandigarh and Puducherry. For some projects, year wise phasing has not been provided, so capital outlay for FY20 to FY25 may not add up to total capital outlay.
[27]Includes projects where yearly phasing has not been provided.

Marquee project

Vadhavan Port

- Vadhavan Port will be developed by JNPT at an estimated cost of Rs 51,140 crore, out of which Rs 16,140 crore would be incurred by JNPT and Rs 35,000 crore will be invested through the PPP mode. The construction is expected to commence from June 2020 and the project would be completed by December 2025
- The project is designed to ease growing pressure on JNPT, India's busiest container handler, which is operating at its full capacity and has had to deal with major delays, mainly due to landside infrastructure bottlenecks. The port has potential to attract large ocean carriers, given the deep water depth at the site and the close proximity to major industrial locations in the western region

Airports

Sector Progress, Deficits and Challenges, Vision and Reforms

Indira Gandhi International Airport, Delhi

Project details

- In January 2006, following an International competitive bidding process, the concession to operate, manage and develop the Indira Gandhi International (IGI) Airport was awarded to the Delhi International Airport Limited (DIAL) consortium. The bid parameter was a revenue share of 45.99% of annual gross revenue, payable to the AAI for the entire concession period of 30 years
- The winning consortium was a joint venture of GMR (54%), Airports Authority of India (AAI) (26%) and Fraport AG Frankfurt Airport Services Worldwide (10%) and Malaysia Airports Holding Berhad (MAHB) (10%). In 2015, MAHB exited from the consortium by selling its entire stake to GMR thereby increasing its share to 64%
- Delhi airport completed its first phase of modernisation, i.e., construction of Terminal 3 by 2010 at a cost of about Rs 12,700 crore. The first phase of the airport design was capable of handling 60 million passengers per annum

Salient features

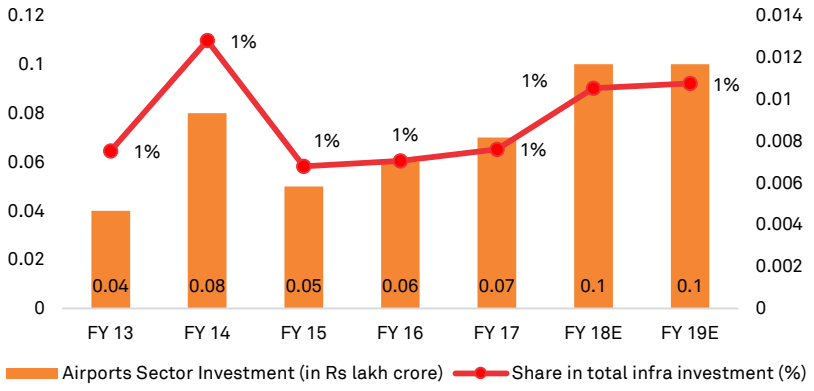
- Indira Gandhi International Airport, Delhi is the busiest airport in the country, as it handled 70 million passengers and more than 8.57 lakh tonnes of cargo fiscal 2018
- Delhi International Airport was ranked #1 in the highest category of over 40 million passengers per annum of Airport Service Quality Awards, 2018

India has seen massive growth in the airport sector with investments from both the government and private sector. The country has become the third-largest domestic civil aviation market in the world and has immense potential to grow further. This calls for higher investment to build new airports and augment the existing airport infrastructure to support future growth.

Historical investments

During the fiscals 2013 to 2017, the share of airports sector investment in the overall infrastructure investment has been ~1% and has increased at a CAGR of ~16%. Investments in airports sector declined in the 12th Five-Year Plan, compared to the 11th Five-Year Plan, as some of the major airport sector projects, such as modernisation and expansion of Kolkata and Chennai were undertaken during the 11th Five-Year Plan (refer Figure 33).

Figure 33 Airport sector investment (Rs lakh crore) and share in total infrastructure investment (%)

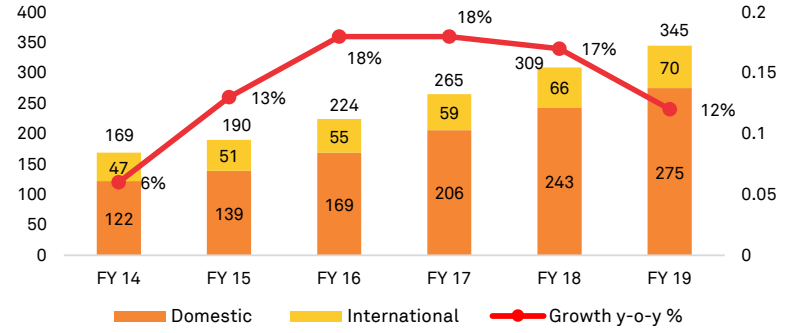


Source: Appraisal documents for five-year plans, CRIS estimates (Investments are at current prices)

Airport sector trends

Growth in passenger and air cargo traffic

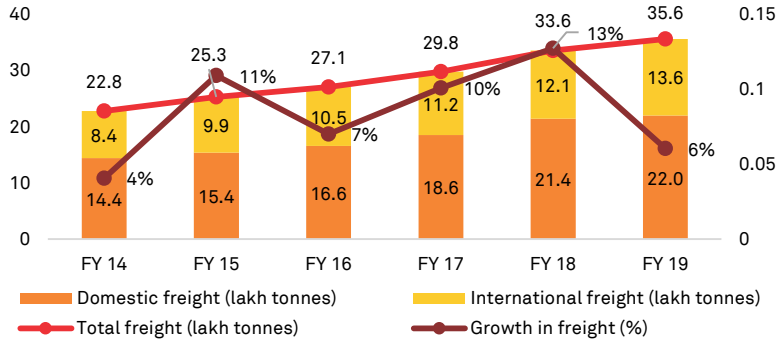
Figure 34 Domestic and international passenger traffic (million)



Source: Airports Authority of India

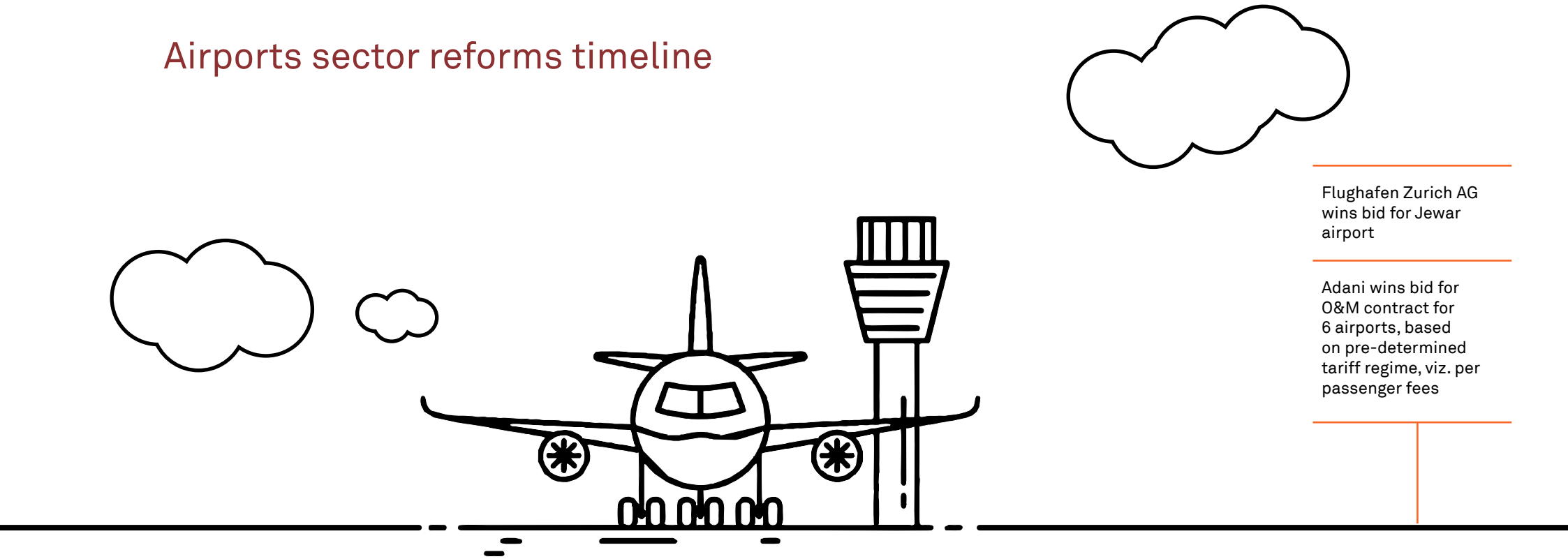
For fiscals 2014 to 2019, international and domestic cargo grew at a CAGR of 9% and 10%, respectively.

Figure 35 Domestic and international air cargo traffic (lakh tonne)



Source: Airports Authority of India

Airports sector reforms timeline



Total passenger traffic

2016

224 million

Ude Desh ka Aam Nagrik (UDAN) scheme launched to boost regional connectivity at underserved and unserved airports

2017

265 million

Second round of bidding for UDAN scheme launched after successful bidding in the first round that covered 29 airports

2018

309 million

Six airports of Airports Authority of India (AAI) viz., Guwahati, Lucknow, Jaipur, Ahmedabad, Mangalore and Trivandrum identified for leasing out under PPP

2019

345 million

Digi Yatra platform operationalised to enable biometrics-based digital processing of passengers at airports

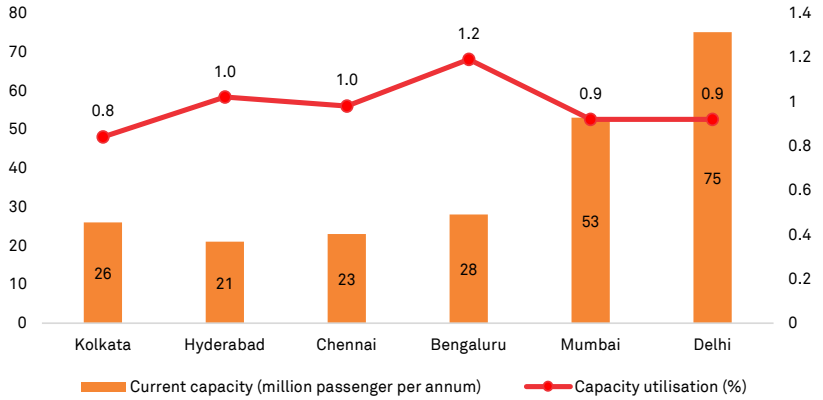
Flughafen Zurich AG wins bid for Jewar airport

Adani wins bid for O&M contract for 6 airports, based on pre-determined tariff regime, viz. per passenger fees

Infrastructure deficit at airports

High capacity utilisation rates at some major airports

Figure 36 Capacity utilisation at major airports

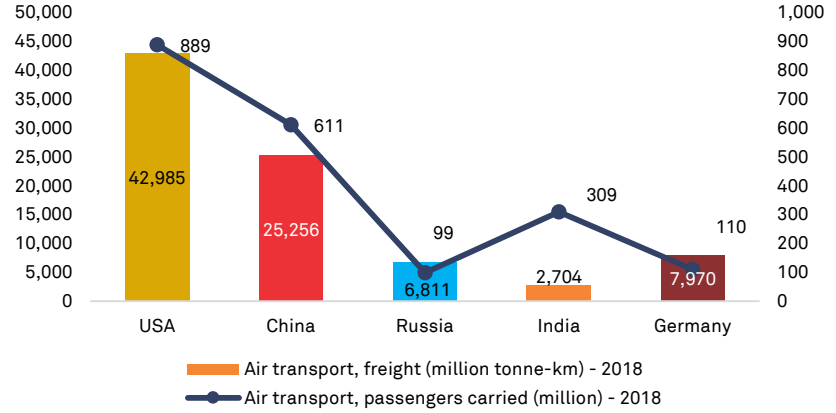


Source: Airports Authority of India

- Capacity utilisation across the six key airports remained high. In fiscal 2019, capacity utilisation at Hyderabad and Bengaluru airports was more than 100% while for Chennai, Kolkata, Delhi and Mumbai airports, capacity utilisation was ranging between 84% and 98%

- To address the capacity constraints, two steps have been taken to upgrade the airports by adding new runways and new terminal buildings at Delhi, Bengaluru and Hyderabad. The airport capacity at Delhi is expected to increase passenger capacity as follows: 110 million by 2023, 56 million at Bengaluru by 2022 and 36 million at Hyderabad by 2024. In addition, Jewar will come up as second airport in Delhi and Navi Mumbai Airport will be commissioned by 2023

Figure 37 Freight (million tonne-km) and passenger (million) traffic through air transport



Source: World Development Indicators

- Indian airports' utilisation remained high despite a relatively smaller passenger throughput compared with global peers. This is in view of the country clocking double-digit growth rates in passenger traffic over the last five years

- Further, air travel is concentrated in a few routes, leading to utilisation saturation in these routes. Ten city-pair routes[28] have high passenger volumes, and rank in the top 100 globally

- In addition, usage of air transport for ferrying cargo remained low. A pick-up in this segment is essential to drive growth in high-value-added agricultural produce

[28] *10 City Pair Routes are: Mumbai-Delhi, Bangalore-Delhi, Bangalore-Mumbai, Kolkata-Delhi, Delhi-Pune, Delhi- Hyderabad, Delhi-Chennai, Mumbai-Goa, Mumbai-Chennai, and Delhi-Goa*

Challenges for the airport sector

Capacity enhancement lagging demand

Large airports such as Delhi and Mumbai cater to the lion's share of traffic and operate at near/more than 100% capacity utilisation, indicating the need to expand and/or develop a second airport in metros. Mumbai International Airport recently held the record of handling maximum number of flights in a 24-hour cycle, at around 974 on a single runway. This highlights high capacity utilisation and infrastructure constraints at Indian airports.

PPPs at more airports

From being the worst airports in the world before being given over as PPPs, Delhi and Mumbai airports are today among the best airports in the world. In addition, Delhi and Mumbai airports have produced healthy returns for Airports Authority of India (AAI). Since a few major airports would be saturated over the next five years, due to exponential demand growth, it is imperative that these airports are developed and upgraded on PPP basis.

Challenges in creating an MRO hub

The aviation maintenance, repair and overhaul (MRO) industry has not been able to flourish in India, partly due to high taxes being levied on the sector. This has resulted in making servicing costlier in India than abroad.

Vision 2025 for the airport sector

Current status	Vision 2025
• India is the third largest domestic aviation market in the world • ~345 million[29] passengers handled at airports in 2019 • Insufficient capacity: Major airports such as Delhi, Mumbai, Bengaluru and Hyderabad are operating at high capacity utilisation • Six airports – Lucknow, Jaipur, Ahmedabad, Guwahati, Mangalore and Thiruvananthapuram, owned by the Airports Authority of India (AAI), are being developed as PPPs	• India to be in the top three world's largest aviation markets • Make flying affordable for the masses • Enable 500 million domestic ticketing by 2027 and 200 million international ticketing by 2027 • Cargo volumes should increase to 10 million tonne by 2027[30] • All major airports will run at optimum capacity utilisation attributed to addition of new international/domestic airports and capacity expansion in existing airports • Airports owned by the AAI will be developed as PPPs
• Regional connectivity scheme UDAN is expected to make air travel affordable and connect many under-served areas • Absence of in-house MRO facility - India is dependent on foreign countries such as Sri Lanka, South-east Asian countries or Middle-east or European countries for MRO of their planes • After aviation turbine fuel (ATF) costs, MRO forms the next major component of operating costs of an airline	• All tier-II and most tier-III cities will be well-connected with fully functional airports – with affordable fares and world-class facilities • Development of high-quality in-house MRO facilities will substantially reduce the operating costs of carriers, thus making air travel more affordable
• Manual safety and security checks at the airports have led to long queues and delays in boarding at busy airports such as Delhi, Mumbai, Bengaluru and Hyderabad	• Digi Yatra Biometric Boarding System to be made operational at international and domestic airports to enhance passenger throughput • Installation of smart cameras and use of robots for checking-in and transferring luggage bags of passengers

[29] *Source: Traffic Summary, AAI fiscal 2019*
[30] *National Civil Aviation Policy 2016 – http://www.civilaviation.gov.in › files › Final_NCAP_2016_15-06-2016-2_1*

Reforms imperative at airports

According to Airport Council International (ACI), the Indian aviation sector has already become the third-largest domestic aviation market in the world during 2018. Over the past few years, the government has announced several new initiatives and reforms to support this sector and spur growth. The civil aviation industry is vulnerable to several intrinsic and extraneous risks, such as volatility in oil prices and exchange rates. Therefore, to sustain growth momentum, it is imperative that the reform momentum continues to provide a conducive environment for private players to compete and contribute.

Bringing in policy reforms

Some of the changes that can help the aviation sector to realise its true potential and unleash growth momentum – which until now was untapped – include:

- Aerotropolis approach – Policies need to be aligned to ensure that new airports are developed as a part of a holistically planned 'aerotropolis' than a mere plot of land, where aircrafts land and take off. While framing the policy, a cue can be taken from important hubs, such as Beijing and Hong Kong. These hubs obtain a significant part of their revenue from cities situated in their catchment areas, as they are complemented by multi-modal transport infrastructure, which allow ease of access for passengers and cargo. This approach can be used for developing Jewar Airport near Delhi, where an integrated transport hub could be developed

- Hub-development policy – A hub-development policy, which will provide fiscal, monetary and procedural benefits to all Indian carriers that venture into international routes, needs to be considered. A hub-and-spoke model would be useful

- Transshipment reform – Cumbersome customs, safety and security procedures for transshipment cargo have prevented its full exploitation until now. This needs to be addressed on priority to enable seamless transfer of transshipment cargo, followed by greater engagement with logistics companies

Developing India as an MRO hub

- India has long been viewed with interest by global maintenance, repair and overhaul (MRO) operators seeking a valuable gateway between the Middle East and the Asia Pacific. Growth in the segment is boosted by the expansion and development of new airports, a liberal foreign direct investment policy, rising adoption of new technology and focus on regional connectivity

- Despite a rising fleet, the domestic MRO segment continues to struggle. The biggest challenge is the severe tax anomaly with foreign jurisdictions. Due to the sub-optimal tax structure, most Indian carriers carry out MRO operations in Sri Lanka, South East Asia, Middle East or Europe. This entails additional cost of empty ferry flights, additional logistics costs and payments in foreign exchange. There is also a need to focus on engine and component repairs, where nearly 60% of all MRO spending is done

Refinements/ improvements in the UDAN scheme

The cornerstone of National Civil Aviation Policy was the Regional Connectivity Scheme (RCS), popularly known as Ude Desh ka Aam Naagarik (UDAN). It has received significant interest from leading domestic carriers and start-up airlines, due to the various monetary incentives and the three-year exclusivity rights to operate on the allotted RCS routes.

- To ensure that traffic growth momentum due to better regional connectivity is maintained, it is imperative to address challenges, for example, limited slots for UDAN flights in congested airports, such as Delhi and Mumbai, and restricted leasing options for

small-fleet owners. The state government should also provide funds to attract more private players in their tier-2 and tier-3 cities

- Promoting international connectivity from non-metro cities under the international UDAN scheme, by bringing more airports under the purview, could be the next phase. Here, the onus is on state governments to nominate their cities under this scheme to enhance tourism potential, economic growth and job creation

Reforms to enhance private investments

- The PPP mechanism created world-class airports in India and generated large financial resources for the government with better operational efficiency and risk management

- Further, options to be considered include providing viability-gap funding (VGF) or grants for PPPs in smaller cities, where revenue and traffic risk could potentially be higher to improve private sector participation

Increased investment in technology

- The Digi Yatra Biometric Boarding System, which aims to enhance passenger movement at airports through facial recognition after proper validations, should be operationalised at every major airport in India to promote paperless and hassle-free air travel

- Deploying smart cameras and re-positioning of security apparatus at all airports to end the practice of stamping hand-baggage tags during security checks

- It is also paramount to use latest air traffic management systems and benchmark airport handling capacity and productivity to international standards

NIP project summaries and marquee projects

Overall, total capital expenditure of Rs 143,448 crore is estimated to be incurred by both Centre and State governments between FY20 and FY25. For projects to be executed by the Centre, about 58 identified projects will be implemented in the period. The capital expenditure for these projects is estimated at Rs 89,167 crore. Out the above 58 projects, 52 projects worth Rs 37,188 crore are to be implemented through EPC mode and 6 projects worth Rs 51,980 crore are to be implemented through PPP mode. A summary of the projects is highlighted in the table below:

Particulars	No. of projects	Capex over FY20–FY25 (Rs crore)
Completely greenfield projects	8	36,147
Expansion and modernisation of existing airports	50	53,020
Total	**58**	**89,167**

- The completely greenfield projects include construction of new airports at Navi Mumbai, MOPA (Goa), Jewar, Itanagar, Bhogapuram, Dholera (Gujarat), Agatti and Rajkot
- In order to improve passenger ammenities, upgradation and modernization work is being carried out at several existing airports such as Chennai, Trichy; expansion work being taken up at Delhi International Airport and Banglore International Airport

Capital expenditure over FY20 to FY25 is shown below:

Rs crore	FY20	FY21	FY22	FY23	FY24	FY25	Total
Centre	15,460	18,200	18,459	15,043	18,487	3,519	**89,167**
State governments[31]	3,207	3,455	6,361	6,291	6,899	1,622	**54,281**
Total[32]	**18,667**	**21,655**	**24,820**	**21,334**	**25,386**	**5,141**	**143,448**

Marquee project

Navi Mumbai Airport

The airport is being developed under PPP mode by the GVK group along with CIDCO. Recently, NIIF completed the acquisition of a majority shareholding in the project along with a few global pension funds. The project is being built at an estimated cost of Rs 16,704 crore and is expected to be completed by FY23. The much-needed new airport is expected to ease a lot of pressure from Mumbai's Chhatrapati Shivaji International Airport.

[31]States/UTs include Uttar Pradesh, Maharashtra, Gujarat, Telangana, Jharkhand, Tamil Nadu, Andhra Pradesh, Madhya Pradesh, Karnataka, Haryana, Punjab, Delhi, Kerala, Odisha, Chhattisgarh, West Bengal, Sikkim, Mizoram, Andaman & Nicobar, Chandigarh and Puducherry. For some projects, year wise phasing has not been provided, so capital outlay for FY 20 to FY 25 will not add up to total capital outlay.
[32]Includes projects where yearly phasing has not been provided.

Urban Infrastructure

Sector Progress, Deficits and Challenges, Vision and Reforms

Delhi Metro Rail Project

Project details

- Delhi Metro Rail Corporation, the implementing agency for Delhi Metro Rail Project, was formed in May 1995 as a joint venture between Central government and Delhi state government to provide a rail-based transport system that would alleviate Delhi's ever-growing transport congestion and vehicular pollution
- The project, constructed in three phases, is built at an estimated cost of Rs 85,700 crore and caters to ~ 3 million passengers per day
- Currently, the Delhi Metro network comprises about 389 km with 285 stations (including Noida–Greater Noida Metro and Rapid Metro Gurugram which are being operated by DMRC), connecting different parts of Delhi and extending to Ghaziabad and Noida in Uttar Pradesh and Gurgaon, Faridabad and Bahadurgarh in Haryana

Salient features

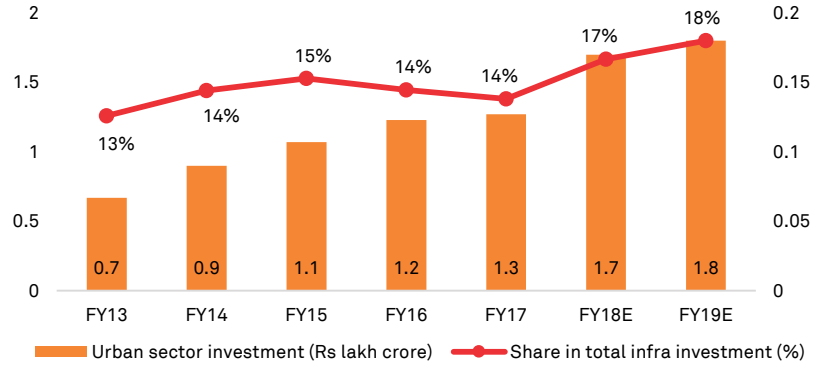
- The Airport Express link between the Indira Gandhi International Airport and New Delhi has propelled Delhi to the league of global cities with high -speed rail connectivity between the city and the airport
- The Delhi Metro has contributed tremendously on the environment front by becoming the first-ever railway project in the world to claim carbon credits for regenerative braking. DMRC has also been certified by the United Nations (UN) as the first metro rail and rail based system in the world to get carbon credits for reducing greenhouse gas emissions, as it has helped to reduce pollution in the city by 6.3 lakh tons every year, thus helping in reducing global warming

In recent years, the importance of urban infrastructure has grown owing to its link with economic growth, poverty reduction, and quality of life. As urban local bodies generally suffer from a dearth of funds, new financing mechanisms, such as land leasing, value capture finance and monetisation of assets, are being evaluated to source more funds to enhance urban infrastructure. India needs to invest significantly to improve urban services, such as water supply, solid waste management, sewerage, storm water drains, urban mobility, and public spaces.

Historical investments

India has close to one-third of its population residing in urban areas and this could increase to 50% in the next two decades. Historically, investments in the urban sector have been close to 1% of GDP. While the urban population in India increased rapidly, there was no commensurate supply of quality basic urban services. Between 2013 and 2017, the share of urban sector investment in overall infrastructure investment was ~14%.

Figure 38 Urban sector infrastructure investment (Rs lakh crore) and share in total infrastructure investment (%)[33]



Source: Appraisal documents for five-year plans, CRIS estimates (Investments mentioned are at Current prices)

[33]Refer to Annexure 1 for methodology used to estimate ULB FY14 to FY19 capex

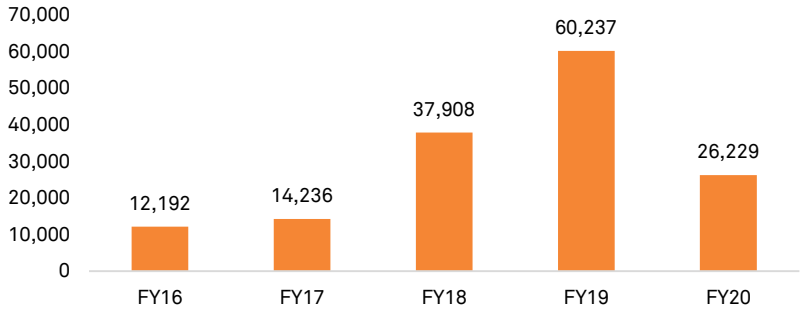
Investments in the urban sector have traditionally been undertaken by public sector entities through budgetary allocations until recently, when some projects were also undertaken through the private sector route. There has been a steep rise in state investments from fiscal 2013, due to the launch of flagship schemes such as Smart Cities, Atal Mission for Rejuvenation and Urban Transformation (AMRUT), Heritage City Development and Augmentation Yojana (HRIDAY), and Swachh Bharat Mission.

Pradhan Mantri Awas Yojana (PMAY) – Urban

In recent years, the importance of housing infrastructure has grown, due to its link with economic growth, poverty reduction, and quality of life. To achieve the long-term goal of Housing for All by 2022, the Government of India in June 2015 launched Pradhan Mantri Awas Yojana (PMAY) to construct around 1.12 crore affordable houses in the urban areas and about 1.95 crore affordable houses in the rural areas.

During fiscals 2016 to 2020 (till December 2019), a cumulative investment of Rs 150,802 crore has been made under Pradhan Mantri Awas Yojana (Urban). As of December 12, 2019, around 93.19 lakh houses are sanctioned under PMAY (urban) out of which 28.60 lakh houses have been completed.

Figure 39 Investment made under PMAY Urban (Rs crore)



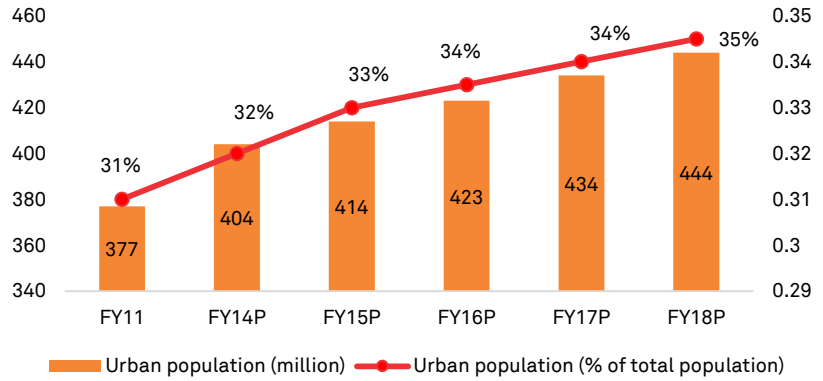
Source: Ministry of Urban and Housing Affairs (FY 20 till Dec 19)

Urban sector trends

Urbanisation in India

India's urban population is estimated to have increased from 377 million as per Census 2011 to 444.4 million in 2018[34], at a CAGR of 3%, with an urbanisation level of ~34%. As per Census 2011, Maharashtra, Uttar Pradesh, Tamil Nadu, West Bengal and Andhra Pradesh (including Telangana) were the top five states in terms of urban population.

Figure 40 Urbanisation trend in India



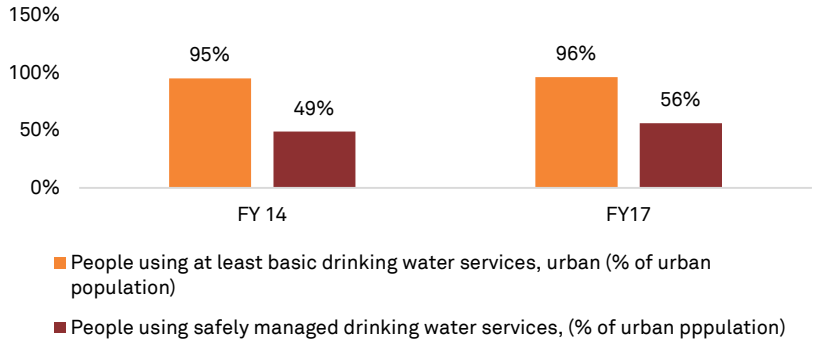
Source: Census of India 2011, CRIS Estimates, World Bank Urban Growth Estimates, 2018 P - Projections

Drinking-water services

As of March 31, 2017, 96% of the urban population in India had access to basic drinking-water services, while 56% of the urban population had access to safely managed drinking-water services.

[34]*United Nations Population Division's World Urbanisation Prospects 2018*

Figure 41 Access of urban population to drinking water-services

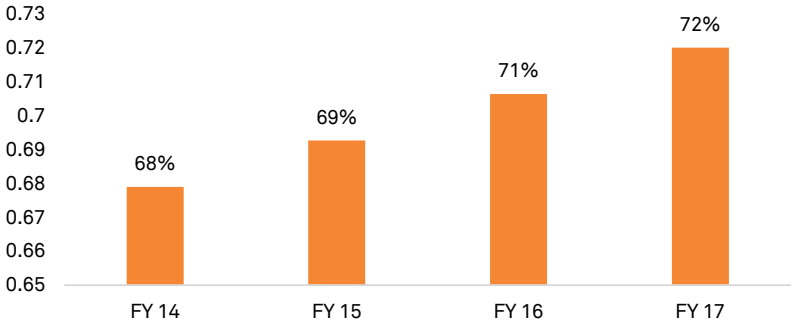


Source: World Bank

Access to sanitation services

As of March 31, 2017, 72% of the urban population in India had access to basic sanitation services.

Figure 42 Access of urban population to sanitation services

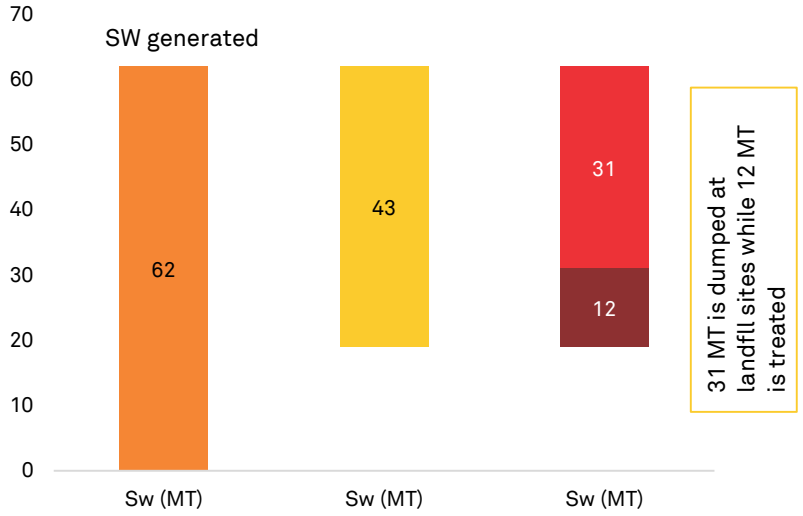


Source: World Bank

Solid waste management (SWM) in India

As of March 31, 2019, India generated 62 million tonne of municipal solid waste annually, of which, 43 million tonne (~70%) was collected. Of this collected waste, 12 million tonne (28%) was scientifically treated, while the rest was dumped at landfills without any processing and treatment.

Figure 43 SWM in India – 2019 (million tonne (MT) per annum)



Source: CRIS Analysis

Urban sector reforms timeline

2014

Swachh Bharat Mission launched to eliminate open defecation, improve municipal solid waste management

2015

Smart City Mission launched to implement area-based development and technology-driven city solutions

AMRUT launched to ensure adequate water supply and sewerage network in cities

PMAY launched with the aim of 'Housing for All' by 2022

HRIDAY launched to rejuvenate India's rich cultural heritage

2017

94 Indian municipalities get credit ratings, of which 55 received investment grade ratings

Pune Municipal Corporation issued a 10-year municipal bond to raise money for its Smart City Mission

City liveability index launched to measure quality of life in 116 major cities

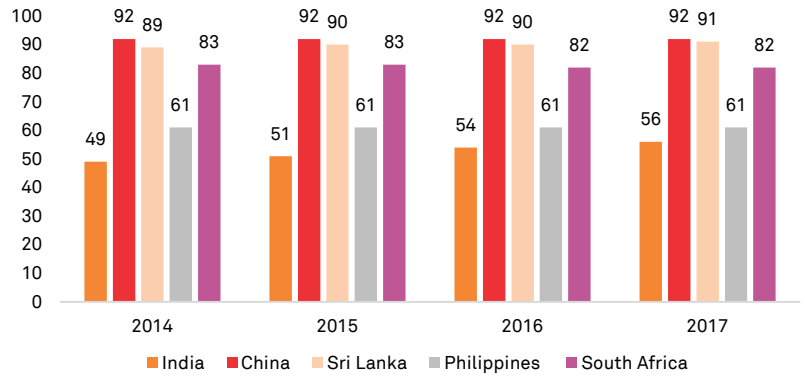
2019

Over 2.8 million houses completed, of which nearly 2.4 million houses delivered to beneficiaries under PMAY

Infrastructure deficit in urban areas

Significant gap in solid waste management and waste water management infrastructure and access to potable drinking water

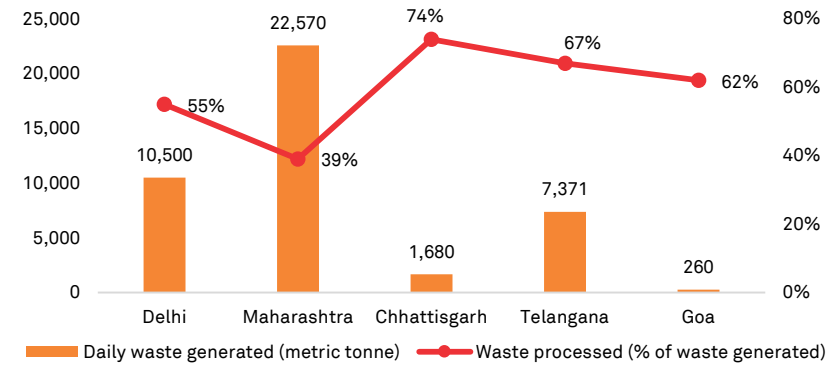
Figure 44 People using safely managed drinking water services – peer comparison for period 2014 to 2017 (% of population in that year)



Source: World Bank

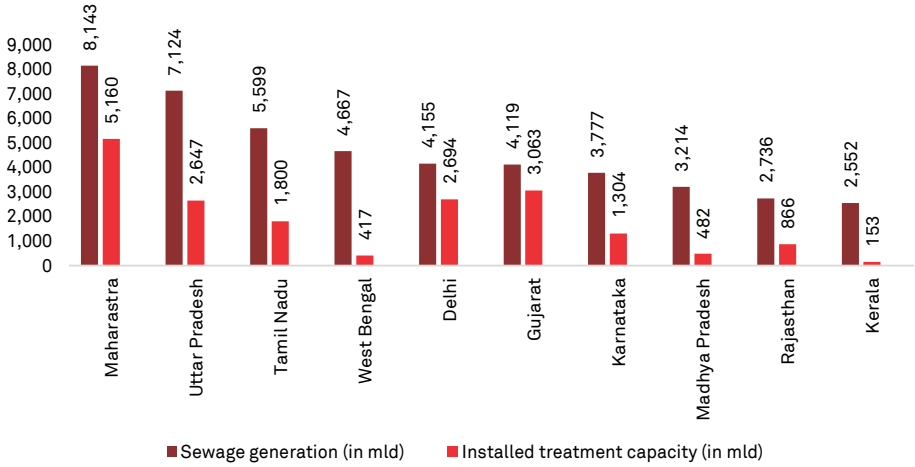
- In order to ensure that sanitation, sewage treatment and potable drinking water services are improved, urban local bodies need to build their capacity and learn from the best examples being used within the country and in South East Asian countries. For example, the Hybrid Annuity Model is being used for wastewater treatment in the Namami Gange Project; Manila has a highly successful water supply project being implemented by the Manila Water Company

Figure 45 Solid waste management in select states 2018 (metric tonnes)



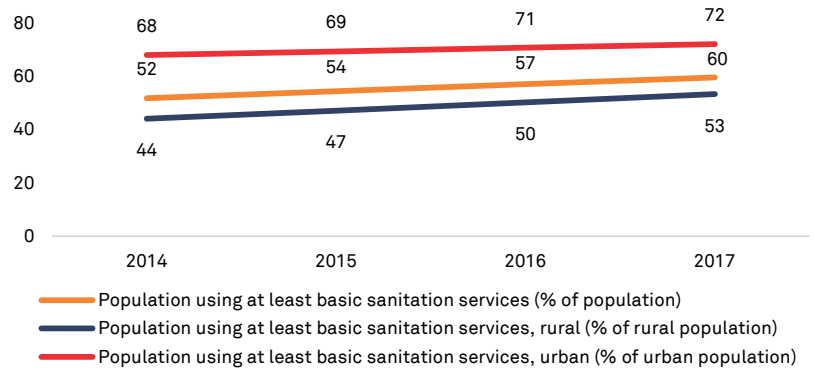
Source: MoHUA

Figure 46 Sewage generation and installed capacity in selected states in 2018



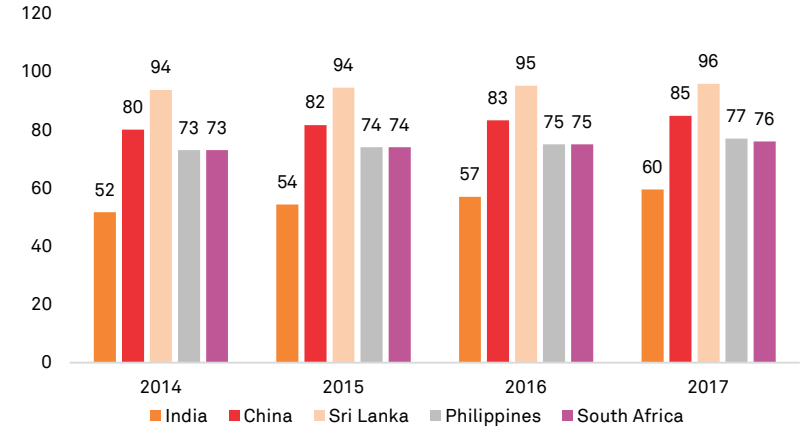
Source: Ministry of Environment, Forest and Climate Change (MoEFCC), mld – million litres per day

Figure 47 Percentage of population using sanitation services



Source: World Bank

Figure 48 People using at least basic sanitation services (% of population)



Source: World Bank (2017)

- Solid waste management has been a big issue in India. Even the best-managed states are able to process only around 75% of the waste generated daily

- Waste water and sewage management are inadequate owing to lack of sewage treatment plants and proper sewerage lines. The need is to ensure that urban local bodies adopt a scientific process of solid waste and sewage management

- Water resources are under tremendous pressure in most Indian cities and large sections of the population do not have access to piped potable water

Challenges in the urban sector

Rapid growth has exacerbated service delivery gaps

Demand for urban services grows with cities. In the absence of adequate institutional and financial capacity to cope with growth, glaring service gaps become visible. In water supply, while 'access' figures look reasonably healthy at 96%, the 'quality of access' and duration of supply are below par. Losses in distribution, high non-revenue water and inadequate cost recovery continue to plague urban water supply systems across the country. Less than 30% of urban domestic wastewater is treated, which has adverse consequences for health and environment. Also, the share of public transport is low and declining. Moreover, the slum population in urban areas was estimated at 26% of the population in 2010.

Inefficiencies of urban local bodies

The sharp increases in budgetary outlays for state and central government schemes have not been backed with commensurate improvements in institutional and financial capacity at the level of

cities to equip them to deliver services effectively. Many urban local bodies (ULBs) are institutionally and financially incapacitated, leading to limitations in investment spending and delays in implementation. Even though a multi-fold increase in investment is needed to bridge infrastructure and service delivery gaps, capacity weaknesses constrain implementation and absorption of even available grants in many cities. The low absorption levels on several of the flagship schemes reflect this constraint. Also the 74th Constitutional Amendment Act, made with the aim to strengthen decentralisation and ensure that ULBs assume responsibility of urban planning, has not been operationalised completely since it did not lay down the revenue base for ULBs. This power continues to rest with the states. This has ensured that ULBs often do not have sufficient funds to perform their functions properly.

Slower adoption of innovative financing mechanisms

ULBs have been slow to leverage innovative financing mechanisms as an alternate source of revenue. It is important to adopt innovative financing mechanisms such as value capture finance (VCF) to raise financing for urban transit projects such as Metro and Bus Rapid Transit System (BRTS). Also, more ULBs should raise capital by issuing municipal bonds to reduce their financial dependence on states.

Land availability and finance constraints in housing

Land availability: There is a continuous tussle for land for industries, commercial/ retails spaces and for housing in urban areas. Therefore, land mass is under severe constraint to meet the housing requirement of the country's rapidly growing urban population. This implies that the vision of affordable housing for all will require acquisition/supply of large land parcels on a regular basis.

Inadequate finance: In urban areas where land and houses prices are high, finance is one of the biggest concerns for developers as well as home buyers particularly for the low-cost or affordable housing category.

Vision 2025 for the urban sector in India

	Current status	Vision 2025
	• ~56% of urban households have drinking water on their premises • ~16% of rural households are connected to piped-water supply • 70% of water is contaminated – India ranks 120th among 122 countries in the water quality index • Limited waste water is treated • ~19% of the municipal solid waste generated is treated scientifically • High proportion of population living in slums in India	• ~100% of urban and rural households connected to piped-water supply • Significant improvement and use of advanced techniques in maintaining the quality of water • Most waste water to be treated and re-used in urban and rural areas • ~100% of the municipal solid waste generated to be collected and treated with advanced scientific techniques • Slum population rehabilitated with implementation of the PMAY[35] • Decongestion of urban spaces through urban planning • National standards on urban infrastructure adopted by all cities
	• Limited number of parks and green spaces for children and elderly population • Total of 18 cities in India have an operational metro rail-transit system whereas it is operational/under construction in 27 cities • Low quality and poor connectivity of public transport - ~7% of daily trips catered to by public transport	• Number of parks and green spaces to increase significantly • Walkability of city neighbourhoods significantly improved and focus on river front development • Mass rapid transit system to be available in more than 50 cities in India by 2025 • Improved quality and connectivity of public and mass-transport system • Significant increase in the proportion of daily trips catered to by public transport including electric buses • Availability of public charging infrastructure within 3 km in all cities, within commercial buildings and housing apartments
	• Low awareness and penetration of electric vehicles • High dependence on privately owned vehicles with internal combustion engines • Advanced public transport technologies such as Hyperloop and Transit X are at conception stage	• Higher penetration of electric vehicles due to policy focus and increasing awareness about hazards of internal combustion engine vehicles • Higher dependence on public transport to reduce the proportion of privately owned vehicles plying on roads • Implementation of urban mobility solutions such as bicycles and e-bikes

[35]*Source: PMAY*

Reform imperatives in the urban sector

Reforms needed to boost slum redevelopment and land pooling

The central government's vision of 'Housing for All' by 2022 is beingimplemented under the PMAY. It provides assistance to states/ union territories to address the housing requirement of people from economically weaker sections and the lower income and middle income groups. Though the government's efforts have been commendable in the past few years, a slum-free urban centre appears to be a difficult target.

- In India, housing has become unaffordable owing to skyrocketing land and construction costs which is an outcome of scarce land and skewed spatial development. The problem can partly be resolved by releasing unused government land for affordable housing projects

- The policy reforms that will enable the urban sector to realise its true potential and unleash the growth momentum are as follows:

  - Promote rental housing – A new model tenancy law needs to be introduced as the current rental laws are archaic and do not address the lessor-lessee relationship in an equitable manner. This has curtailed new investment in the rental housing segment

  - Using land pooling – The concept of land pooling should be encouraged and the associated legal framework needs to be fine-tuned so that it can be a true alternative to land acquisition in India. Authorities must lay down guidelines on compensation, resettlement and rehabilitation. Also, states must mandate documented land ownership records for land pooling

Reforms to improve urban waste management

Solid waste management

In India, segregation and storage of waste at source is lacking, and decomposable and non-decomposable waste is often disposed of at a common open site. There is no storage area to place the segregated waste in a scientifically safe manner. Street sweeping and drain cleaning activities are irregular and waste is dumped in the open. Scientific treatment methodologies are conspicuous by their absence.

- Creating the right environment for more private participation – Financial sustainability of ULBs has been the biggest bottleneck to upgrading the solid waste management system in the country. The annual budget for the present waste management system is insufficient to meet the challenges of daily collection, transportation, treatment, and disposal of waste. Therefore, it is important to bring in private investment and expertise through PPPs. Key success factors for increased private sector participation involve the presence of an experienced, accountable and independent management; conducive regulatory environment for contract enforceability; and availability of financial information and improved disclosure standards of ULBs. Balanced contracts and payment mechanisms through letters of credit or escrow account mechanism by local bodies will be critical for attracting high quality private investments. Further, MoHUA can also develop a model concession agreement for SWM. It may also be useful to have integrated SWM PPP concessioning (collection, transportation, processing, etc.) to avoid co-ordination issues

- Need to change the process of waste management – There are no proper systems to segregate waste – biodegradable and non-biodegradable – generated at source. ULBs lack proper tools and the knowhow, which results in primary collection of waste from source via street sweeping. The vehicles used for transportation of

waste from source to the common collection area often transport waste directly to the processing facility, which hinders effective waste management. There needs to be a well-defined process for proper door-to-door garbage collection to efficiently tackle waste in cities and towns

- Creating e-waste recycling facilities - Electronic waste (e-waste) consists of many hazardous heavy metals, acids, toxic chemicals and non-biodegradable plastics. Currently about 95% of India's e-waste is recycled in the informal sector in a crude and unscientific manner which is detrimental to the environment. At the same time, e-waste consists of high-grade metals such as gold, silver, copper, and palladium which could be extracted and used again. So there is a need for well-designed and well-regulated e-waste recovery facilities which will generate jobs as well as wealth

Indore solid waste management case study

Indore today generates over 1,115 MT of garbage a day and all of it is collected from the source, whether it is a household or commercial establishments. The households and residential complexes are covered by the door-to-door collection system while the semi-bulk and bulk generators are covered by the bulk collection system. Indore ensures 100% coverage of its 85 wards through its door-to-door collection system.

Implementation of door-to-door collection system – In order to implement a successful door-to-door collection system, an identification study was carried out to figure the amount of waste generated at each ward and the population of each ward. On that basis, a detailed route plan was prepared to cover all wards to meet the waste collection demand of each ward. The door-to-door collection is done through the use of partitioned vehicles. There are three separate collection bins for wet, dry and domestic hazardous waste in each tipper. All vehicles used in the collection and transportation system are monitored by a GPS-enabled tracking system. The waste is then transported to the garbage transfer stations (GTS) for secondary collection.

Processing of waste - At the GTS, the tippers unload the wet waste and dry waste into dedicated compactors which compress and load the waste on dedicated hook loaders. The details of all the incoming waste collection vehicles are logged in the log books at the GTS. The bulk collection vehicles do not travel to the GTS but head straight to the processing plant after completing their respective collection routes. Domestic hazardous waste is sent straight from the GTS to the Central Domestic Hazardous Waste Treatment Facility to be incinerated. The wet waste is processed into compost and the dry waste is segregated into different components such as metal, rubber, board, plastic, etc.

Waste water and sewage management

In urban areas, water resources are under significant pressure owing to high water demand and complex consumption patterns within small densely populated areas. Currently, demands of most cities are met by exploiting ground water. This is not only inefficient but also energy-intensive. Practices such as reuse of treated wastewater would be of immense significance in achieving water security.

- Using a decentralised system for waste water management – Developing a decentralised system is the best way for India for waste water treatment as against a centralised treatment system

Bengaluru can be used as a model given its stringent laws and partial on-ground implementation. Combining a decentralised system with increased water tariffs and strict enforcement would result in better waste water management in Indian cities

- Recycle water accreditation – Introducing recycled water accreditation will make water recycling and reuse mandatory across various user groups, such as domestic, commercial and agricultural users, by setting up a water conservation or recycling target (as a percentage of actual water consumption). If the recycling targets are achieved by the user group, they would be awarded a tradable recycled water certificate. This certificate would be a proof that the user has fulfilled its obligation of recycling the given amount of water. This mechanism is likely to help reduce water footprint, create and support recycled water market, and promote the company's commitment to recycle and reuse water. However, there must be a penalty mechanism for non-compliance

- Technology intervention – There is a pressing need for enhancing operational efficiency through digitisation, particularly in utilities and urban environments. Technology for leakage detection and intervention will allow for quick repair of leakages and reduce wastage

- Using a well-established PPP structure – On the lines of the sewage treatment plant installed under Namami Gange, the HAM can be replicated in the waste water sector. This will ensure greater private participation, limit the revenue risk for private players and give them complete freedom to choose the design and technology to deliver the desired performance. Also, the ticket size of HAM projects can be increased and/ or multiple small projects bundled together to make them attractive to established players

- Appropriate pricing of fresh and recycled water – For a market to develop, fresh water and waste water needs to be priced at the right level. If fresh water is available for free, market for waste water cannot develop

Bamroli sewage treatment plant (Surat) case study

Surat, in order to meet its huge water requirement, has installed several sewage treatment plants to cater to the needs of its industrial sector by efficiently recycling and reusing water. The idea is to ensure tertiary treatment of secondary treated sewage and using it to generate industrial grade water for supply to Pandesara Industrial Estate. The plant uses Ultra Filtration Reverse Osmosis (UFRO) technology to treat water. This has ensured that precious potable water is not diverted for non-potable purposes and the process also generates assured revenues for Surat Municipal Corporation. This initiative has resulted in reducing pollution, conserving natural resources and has ensured continued water supply for industry along with generating revenue for the corporation.

Improving the storm water drainage system

An efficient drainage system is extremely important for discharging storm water within minimum time, controlling floods, maintaining the drainage networks, and improving the environment in and around drainage networks. However, analysis shows that the drainage network in Indian cities is mired with problems related to design, maintenance, and encroachment and dumping of solid waste.

- **Need a holistic approach for designing the drainage system –** A holistic approach is needed to plan and design the drainage system of a city in an integrated manner based on the catchment area, its topography, slope, rainfall intensity and future expansion of the urban areas

- **Creating an enabling environment for the private sector to work with municipalities** – As municipalities often lack the necessary technical and management skills, it is important to bring in private players for their expertise in designing and planning and superior management skills to improve operations and maintenance of the drainage system. As the capital expenditure is very high, state governments should use the viability gap funding and the availability-based payment mechanisms (HAM model) to boost private investments

Reforms to improve supply of drinking water

Water is a crucial sector in need of urgent reforms. Uninterrupted supply of basic drinking water to all remains a distant goal even as overexploitation and mismanagement have aggravated the water crisis in the country. However, such substantial amounts cannot be summoned from the public sector alone. Increased private sector participation is hence critical to meet the massive investment outlay required for efficient management of water. This section details further reforms needed to attract investments in water resources.

Developing PPP models for water infrastructure projects

As water is a merit good, there remains a high revenue risk for private players on account of low tariffs, high capital costs, lack of central level regulation for the sector, and lack of support and capacity of local stakeholders. This requires the government to share substantial responsibilities in order to avoid market failures and attract private participation. Taking a cue from the success achieved in other sectors, such as roads, for a conducive environment in which the private sector can invest, the HAM needs to be adopted.

- **PPP in water needs a sector-specific thrust:** PPPs have not been adopted as a sector strategy and specific enablers such as model concession agreement have not been created. A aodel concession agreement needs to be developed with balanced risks and returns framework for the private and public sectors

- **HAM option:** An important option is to adopt HAM in the water sector. Under this model, 40% of the capital cost could be paid by the government and the balance by private players during the construction stage. For bearing the 60% capital cost, the private player must be compensated by the concessioning authority through inflation-indexed annuity payments, along with annual operation and maintenance (O&M) costs. All payments must be linked to performance standards. This will ensure limited revenue risk for the private player. The company will also enjoy complete freedom in choosing the design and technology required for delivering the desired performance level. Some sewage treatment plants (STPs) installed under the Namami Gange programme have been funded through the HAM route. There have been significant improvements in the overall contractual framework of projects under this programme. These changes have been well-received by lenders and investors. Hence, replicating this contractual framework for water infrastructure PPP projects too must be considered. Increasing ticket sizes of such HAM projects and/

or bundling multiple small projects together to make the bundle attractive to established players that look for a minimum ticket size of investment can be considered

- **Strengthening capacities of ULBs:** There is a need to develop capacity for ULBs and state governments to monitor and implement PPPs. The central government can play a key role in developing a Model Concession Agreement for the water supply sector

Using innovative financing mechanisms at the local level

- **Impact investing:** Innovative financial instruments such as impact investing directed towards setting up sustainable water infrastructure are gaining traction, with instruments such as social impact bonds, development bonds, and green bonds hitting the market. Under AMRUT Mission, credit rating work has been completed in 469 cities, of which 163 cities have received Investment Grade Rating (IGR), including 36 cities with credit rating of A- or above. These cities are part of the AMRUT scheme, in which water and sanitation are key focus areas

- **Blue bonds:** Another instrument for financing water sector projects is blue bonds. These could be used for water-related infrastructure, taking into account climate change mitigation, adaption and resilience opportunities. The government, municipalities, banks, and corporates can issue them. Globally, blue bonds worth over $ 10 billion have been issued already. A reference point is the success of San Francisco's public utilities, which issued a climate-certified water bond of $ 350 million to fund storm water management and wastewater projects

- **User charges** – In order to improve the urban infrastructure and services, it is paramount that the user is charged for the service provided and these charges should be cost-reflective. There is also need for property tax reforms so that charges reflect the growing cost of land and level of services provided in the locality

Reforms to improve urban mobility

A number of regulatory challenges prevent Indian cities from having sustainable mobility services. Different aspects of urban mobility are governed by different agencies at the centre, state and city levels. The absence of an overarching framework, along with multiple institutions with overlapping jurisdictions and lacking coordination, leads to distortions in service provision, financing, implementation, and pricing of mobility.

- **Setting up a central urban mobility standards authority** – A central urban mobility standards authority can be set up under a central act to conduct research, provide technical guidance and provide statutory standards that are mandatory for states to follow. The MoHUA has a number of such institutions and one of them may be given this responsibility. This would be on the lines of The Indian Road Congress that focuses on planning, design and construction of roads and highways

- **Non-fare revenue segment** – Focus should be on the non-fare revenue segment to reduce revenue and traffic risk. In order to have more private investments in metro rail and Bus Rapid Transport, emphasis should be on non-fare revenue by ensuring better land value capture and advertisement. Private vehicles may be disincentivised by increasing parking fees and fuel surcharge

- **Mass rapid transit systems:** While every city wants a metro rail system, it must be realized that metro rail is the most expensive form of mass transit at an average cost of over Rs 300 crore/ km. Whenever a metro rail system is desired, the aim should be to at least recover operational costs from user charges. There are other

cheaper options such as Bus Rapid Transit System, which may also be explored

Improving the condition of urban roads, walkways and public spaces

- **Adhering to the Indian Road Congress (IRC) codes –** IRC codes or those laid down by the National Urban Standards Authority or other similar institution should be mandatorily adhered to for urban road development. Municipalities fail to enforce these standards on the contractors as these are voluntary. The IRC is the nodal agency that sets design guidelines and technical standards for construction of roads and bridges, primarily for intercity roads but also for urban roads. These standards are voluntarily followed by all road construction agencies, including public works departments of cities

- **Improving walkways and pedestrian infrastructure –** India has poorly developed pedestrian infrastructure such as sidewalks, signage, signals and proper zebra crossings, which makes pedestrians prone to danger while crossing the road. ULBs must make considerable investments to improve this. Attention should also be given to aesthetics of the structure; people typically do not mind paying for better amenities

- **Riverfront development –** The urban space can be revitalised by rejuvenating water bodies and thereafter leveraging it to promote densification with public transit and necessary urban amenities such as , drainage, sewerage, affordable housing, schools, green spaces, and work spaces. In many cities of India, the water bodies have been undergoing eutrophication, due to the sewage entering the rivers, lakes and ponds. This has led to the filling up of the waterbodies with organic and inorganic waste leading to urban flooding, even with normal rainfall intensity. Encroachment of water bodies has led to the reduction in the capacity of the water bodies to hold water. Some cities such as Ahmedabad have taken up projects for riverfront and lake front development. The steps involved are –

  – Identification of the waterfront area to be developed/ redeveloped;

  – Survey of the area and listing all the stakeholders of the area;

  – Preparing a master plan for waterfront development;

  – Diverting sewage through a closed pipeline network and a sewage treatment plant and releasing clean water into the system;

  – Demarcating the project area and preparing the list of activities;

  – Detailed Project Report;

  – Preparing the budget and funding. These projects are funded by the local body and state government in some states;

  – Apart from finances, the land of the water body needs to be transferred to the project executing agency, city government or a special purpose vehicle or a parastatal as the case may be. In Gujarat, the land was transferred to the SPV specifically formed for riverfront development with an arrangement where part of the land would be auctioned with clear bye-laws and the proceeds realized would be used for funding the project while also partly sharing with the state government. The land to be sold was only 13 percent of the total reclaimed land and

rest of the 87% was for public purpose, such as parks, gardens and urban forest. This has created a win-win situation for all stakeholders

– Apart from the sale of land, due to positive transformation of urban waterfront, the land value appreciates significantly around the waterfront. This land value capture can be done through releasing higher Floor Space Index (FSI) around this area, where a part of higher FSI is sold at 40% of the land price of the area, and the revenue realised is used to retrofit the infrastructure needs of the higher floor space index released. To ensure proper planning of the area provided with higher FSI for redevelopment, a local area plan (LAP) has to be prepared where the public spaces are contiguous and usable as the redevelopment takes place

The waterfront development projects can be taken up in many cities, as the economic and environmental gains are very high in addition to positive rate of return. Central government funds could be provided as an incentive to take up waterfront development with land value capture and increasing blue and green balance of the city. To start with 36 such projects in 36 states/union territories can be planned with a mobilising incentive for each state to achieve the following objectives :

- Capacity building to take up waterfront development projects;
- Protection of fresh water sources ensuring water security;
- World-class public space creation and good amenities;
- Mixed development for reducing travel time;
- Land value capture where the gains outweigh the funds required;
- Integration with urban planning- The LAP to revitalise the central areas of the cities.

Reforms for boosting urban affordable housing

The government recognises the need for affordable housing and has actioned the PMAY to ensure 'Housing for All' by 2022. The scheme also aims to trigger economic growth and create millions of jobs for both skilled and unskilled labour. However, for the affordable housing initiative to succeed, it is important to address the following concerns.

- **Efficient land usage –** Unused land and non-core assets of sick/loss-making public sector undertakings (PSUs) of the central/state governments can be monetised and utilised effectively to resolve the issue of land availability for affordable housing projects under 'Housing for All'
- **Easy access to financing –** The Government has already included affordable housing up to 60 sq m carpet area in the Harmonised Master List of Infrastructure which provides easier access and terms of funding to this segment
- **Setting up an affordable housing fund in the National Housing Bank (NHB) –** This can be funded from the priority sector lending shortfall. It will enable the NHB to mobilise larger funds for housing projects and help achieve greater synergies among different agencies that are implementing the government housing schemes
- **Use of designs that optimise space –** The success of the East Kidwai Nagar redevelopment project in Delhi can be replicated wherever possible. The key feature of the project was replacement of old-style public housing, which suffered from gross inefficient use of land with a modern housing design, thus optimising space There is also a need to explore the possibility of replicating good practices of all agencies working in housing sector (rural, urban, armed forces, railways) by incorporating the latest cost-effective green technologies such as use of recycled and sustainable material, using rooftop solar system and rain water harvesting

- **Innovative financing mechanisms –** Financial engineering, such as 'rental-cum-ownership housing', can be used in which houses will initially be offered on rent and ownership will be transferred to the tenant once the cost of the unit is recovered. This will especially help people from the low income group who do not have access to formal financing and hence cannot afford to pay large sums of money upfront. The success of the Bhindi Bazaar Redevelopment Project may also be replicated

Reforming regulations governing the rental housing sector

Rental housing is of paramount importance in rapidly urbanising India. Millions of migrants are moving to towns from villages to seek better opportunities. Buying and owning a home in towns is not a viable option for poor migrants, especially if they already own one in the village. So, it is important to focus on reforming the rental housing sector in our cities.

- **Need for regulatory reform –** Introducing a new model tenancy law in place of the current rental law can be a game-changer. The existing law, Model Rent Act, 1948, doesn't fairly address lessor-lessee relationships. Little investment is coming in the rental housing space owing to the unfavourable regulatory environment. Hence, supply has always been way behind demand. There is need to expedite the adoption of the Model Tenancy Law developed by MoHUA. The aim of the new law should, inter – alia, be to bring millions of vacant unsold houses into the rental market

NIP project summaries and marquee projects

Overall capital expenditure of Rs 1,919,267 crore is estimated to be incurred by both the Centre and states from fiscals 2020-25 in the urban sector. For projects to be executed by the Centre, about 1,362 identified projects will be implemented in the period 2020-25. The capital expenditure for these projects is estimated at Rs 1,572,410 crore. The summary of the projects is highlighted in the table below:

Category	No of projects	Capex over FY20-25 (Rs cr)
Affordable Housing	98	540,711
Urban Transport / MRTS*	50	573,366
Street Lighting / Solid Waste Management (Smart City Mission)	809	131,460
Water Supply and Sanitation / Green Parks / Sewage Treatment Plant (AMRUT)	405	47,382
Water supply, rejuvenation of water bodies, waste water collection and treatment (Jal Jeevan Mission)	-	279,492
Total	**1,362**	**1,572,410**

** Mass Rapid Transit System*

The capital expenditure over FY20-25 is shown below:

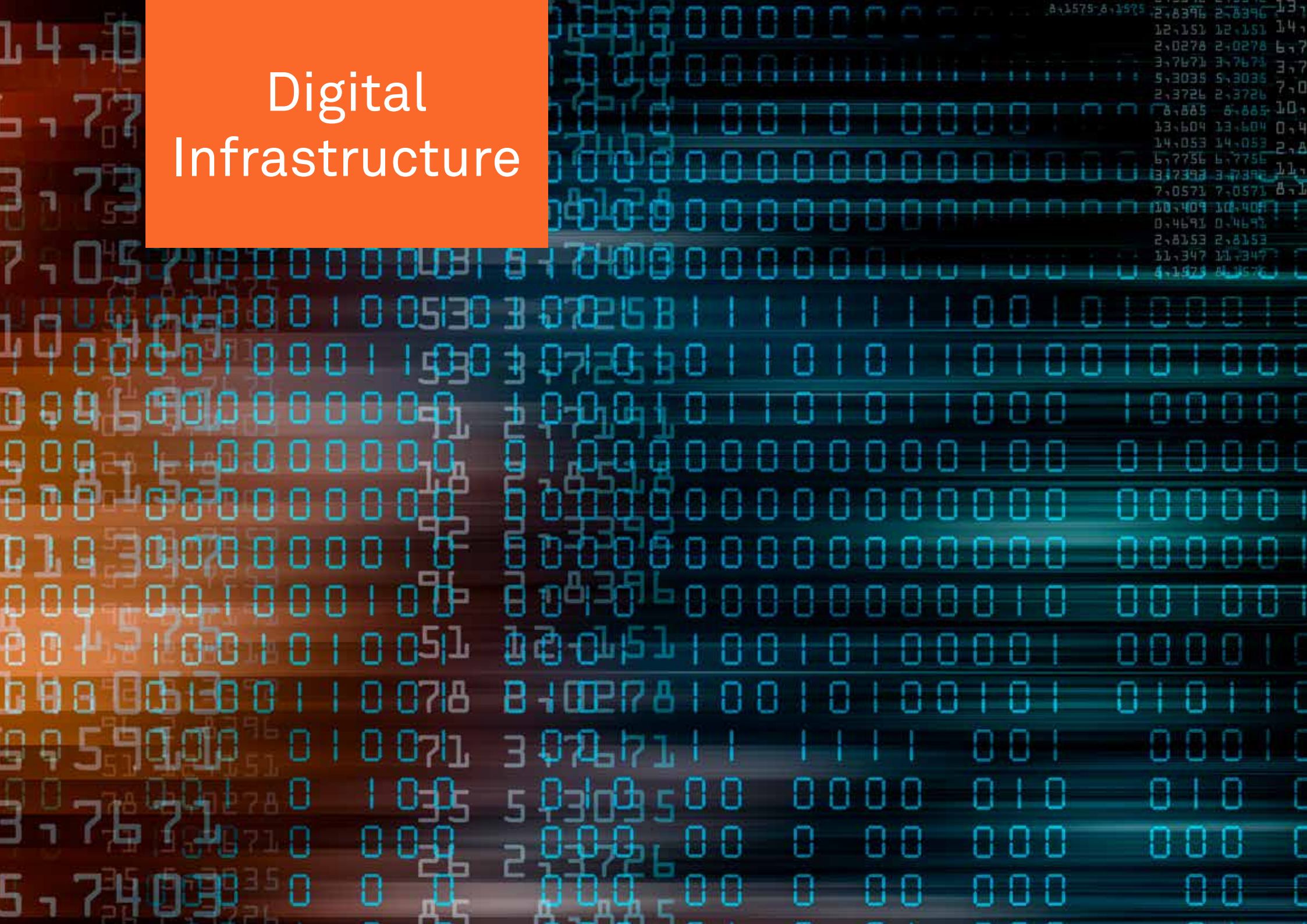
Rs crore	FY20	FY21	FY22	FY23	FY24	FY25	Total
Centre	271,698	421,412	362,144	194,608	183,773	138,776	**1,572,411**
States[36]	26,475	40,796	41,990	40,251	33,391	21,086	**346,856**
Overall Total[37]	**298,174**	**462,208**	**404,134**	**234,858**	**217,164**	**159,862**	**1,919,267**

Marquee project

Surat metro rail project

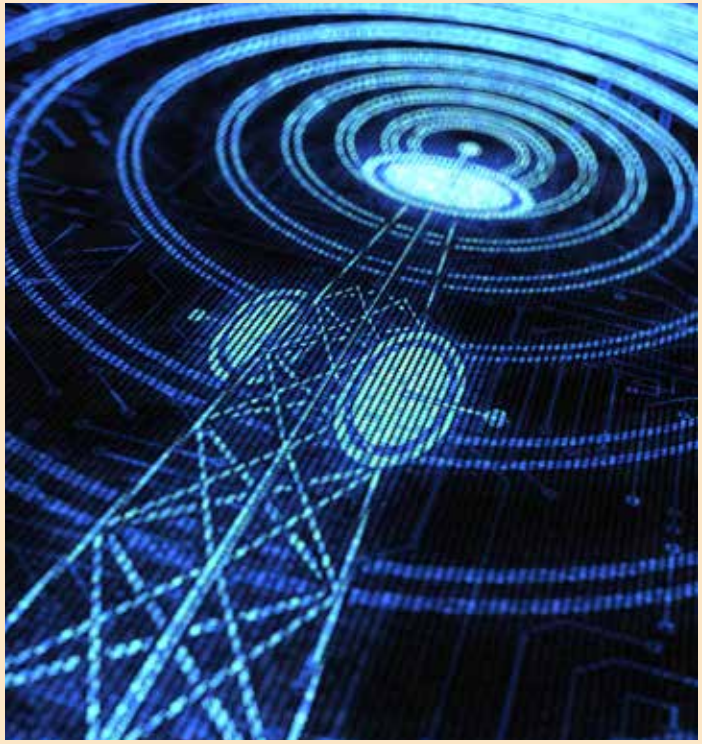
The Surat metro rail project is being implemented by Gujarat Metro Rail Corporation Limited and is estimated to be built at an at a cost of Rs 12,020 crore. The project will initially have two metro rail corridors with a combined length of 40.35 km. The project is estimated to be completed by end of April 2024. The proposed corridor will have multimodal integration and will have a feeder network of bus, intermediate public transport and non- motorized transport. The project aims to provide affordable, reliable, safe, secure and seamless transport system in the city. This will reduce travel time, pollution, and accidents as well as regulate urban expansion and provide sustainable and eco-friendly transport to commuters and residents.

[36]States/UTs include Uttar Pradesh, Maharashtra, Gujarat, Telangana, Jharkhand, Tamil Nadu, Andhra Pradesh, Madhya Pradesh, Karnataka, Haryana, Punjab, Delhi, Kerala, Odisha, Chhattisgarh, West Bengal, Sikkim, Mizoram, Andaman & Nicobar, Chandigarh and Puducherry. For some projects, year wise phasing has not been provided, so capital outlay for FY 20 to FY 25 will not add up to total capital outlay.
[37] Includes projects where yearly phasing has not been provided.


Digital
Infrastructure

Sector Progress, Deficits and Challenges, Vision and Reforms

BharatNet



Project details

- BharatNet, also known as Bharat Broadband Network Limited, is a telecom infrastructure project being implemented by the Department of Telecommunications, Government of India, for establishment, management, and operation of the National Optical Fibre Network
- The objective is to provide a minimum of 100 Mbps broadband connectivity to all 250,000 gram panchayats (GPs or village councils) in the country, covering nearly 625,000 villages, to improve telecommunications
- BharatNet Phase-I, connecting 100,000 village councils covering 300,000 villages, was completed in December 2017 at a cost of Rs 11,000 crore funded entirely by the central government
- Additional work of connecting 26,264 GPs is under progress
- The project is being implemented through CPSUs: BSNL, RailTel and PGCIL. Existing fibre of BSNL is used to lay and the connect new optic fibre cable (OFC) under the project
- CSC e-Governance Services India Limited is responsible for operation and maintenance of BharatNet infrastructure
- BharatNet Phase-II will be implemented under PPP model (with viability gap funding) and will involve lifetime maintenance of the network by the PPP provider

Salient features

- As of November 30, 2019, the status was as follows:
  - Length of OFC laid: 388,838 km
  - No of GPs where OFC laid: 142,678
  - No of GPs made service-ready (On fibre & satellite) 130,371

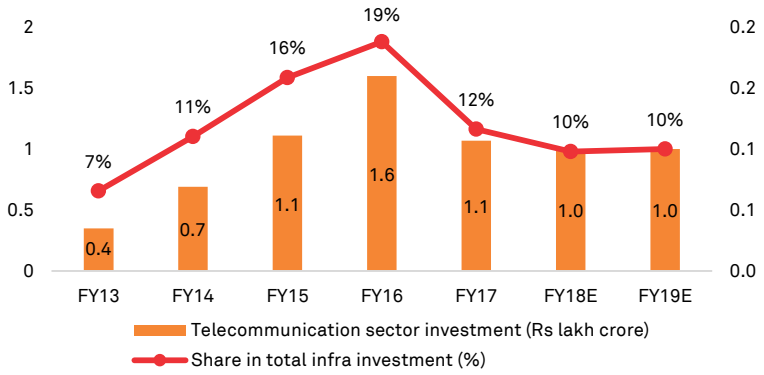
Telecom has attracted large foreign direct investment inflows between fiscals 2015 and 2019, amounting to $ 18.7 billion. Most of the investment has come from private players and the sector has seen a lot of mergers and consolidation in the past two years. India is the second-largest telecom market in the world; yet, large investments are still needed to improve data speeds and service quality.

Historical investments

In the past decade and a half, telecommunications has been the fastest-growing sector in the infrastructure space. With advancements in technology and increasing affordability of smartphones, the subscriber base has been increasing steadily, thus encouraging investments in this sector.

Over fiscals 2013 to 2017, the share of telecommunications sector investment in the overall infrastructure investment has been ~13%, clocking a CAGR of ~32%. But, lately the sector has seen little investments. (refer Figure 49)

Figure 49 Telecommunications sector investment (Rs lakh crore) and share in total infrastructure investment (%)



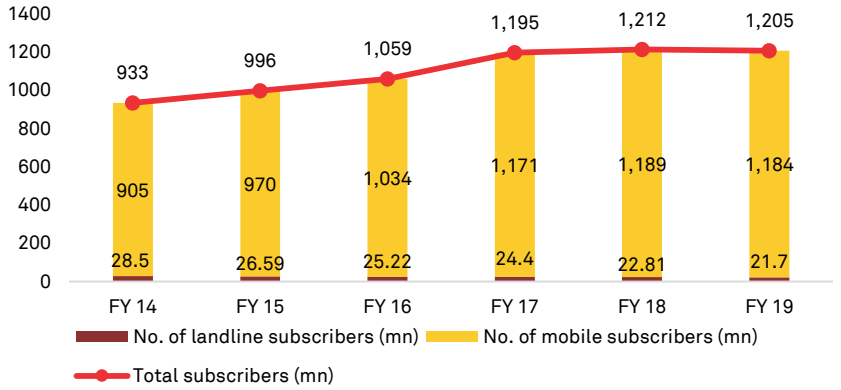
Source: Appraisal documents for five-year plans, CRIS estimates (Investments mentioned are at Current prices)

Telecommunication sector trends

Telephone and mobile subscribers in India

Between 2014 and 2019, the overall subscribers in India increased to 1,205 million (with 98% mobile subscription), increasing at 5% CAGR. The number of landline subscribers declined at 5.3% annually, while mobile subscribers increased at 5.5% CAGR. As of September 30, 2019, the overall teledensity is 91%. The strong growth in mobile subscription can be attributed to fall in prices of smart mobile handsets and internet data packs (refer Figure 50).

Figure 50 Trend in telephone and mobile subscribers in India



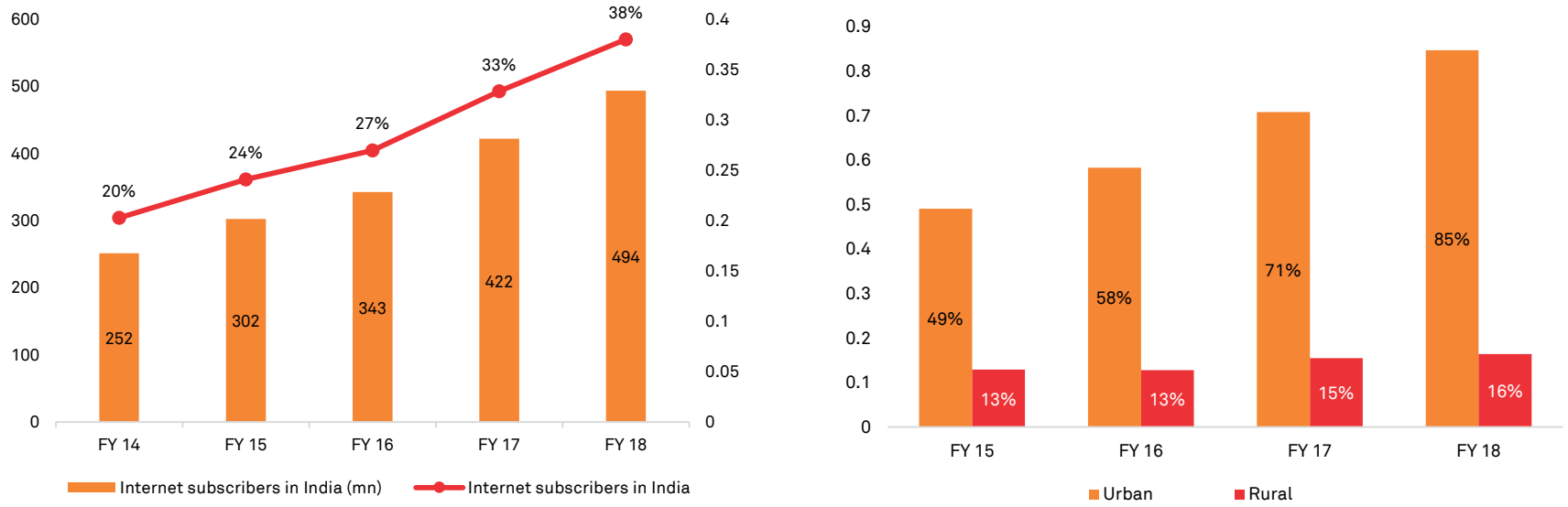
Source: Telecom Statistics India, Department of Telecommunications

Internet subscribers in India

Internet subscribers in India grew at a healthy 18% CAGR between 2014 and 2018 to reach 494 million and internet penetration increased from 20.3% in fiscal 2014 to 38% in fiscal 2018. Internet penetration

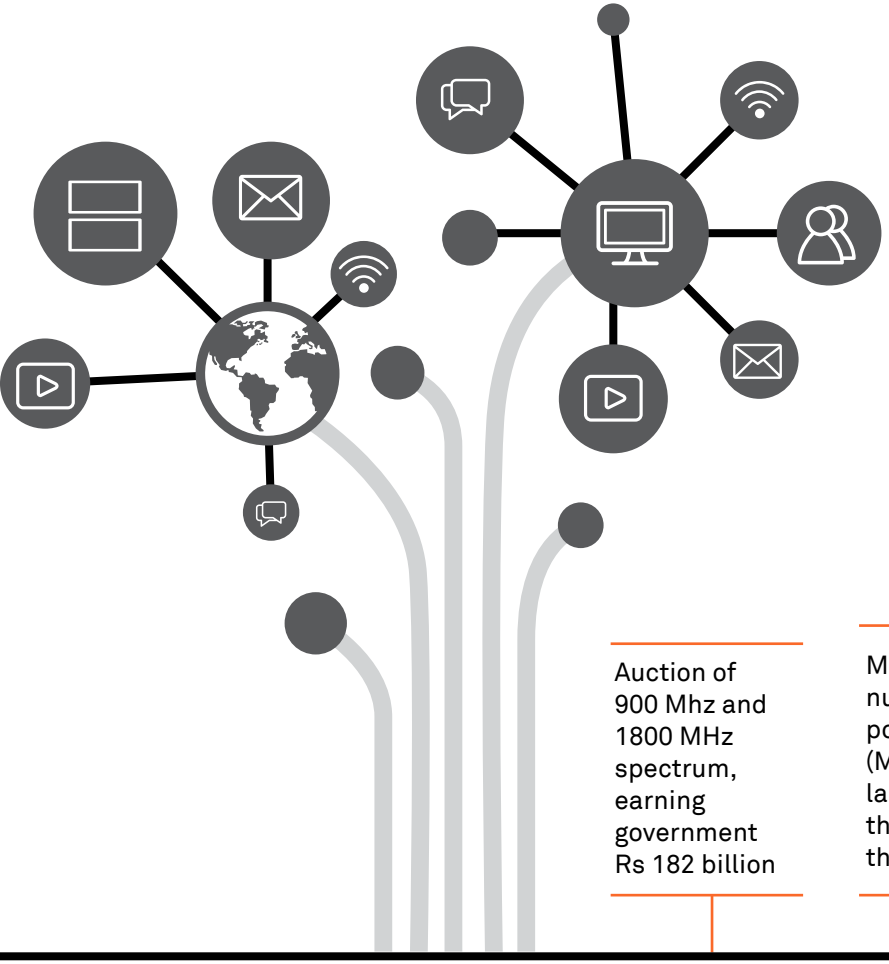
was higher in the urban areas than in rural areas. As of March 31, 2018, 85% of the urban population was connected to the internet vis-à-vis 16% of the rural population.

Figure 51 Trend in internet penetration in India



Source: Telecom Statistics India, Department of Telecommunications

Digital infrastructure reforms timeline

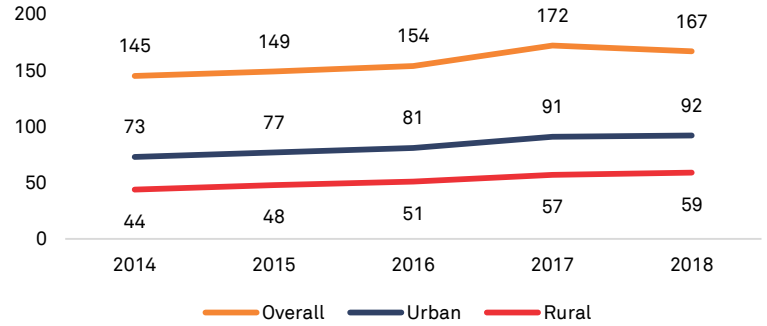


2014	2015	2016	2017	2018	2019
Auction of 900 Mhz and 1800 MHz spectrum, earning government Rs 182 billion	Mobile number portability (MNP) launched throughout the country	Auction of 4G airwaves for 700 Mhz band, earning government Rs 324 billion	Consolidation of Indian telecom market, from 14 operators in 2011 to 3 large private players (Bharti Airtel, Reliance Jio and Vodafone Idea) and 1 public player (BSNL)	New digital communication policy approved to create a flourishing digital economy	National Broadband Mission to bridge the digital divide and provide universal access of broadband to all
Teledensity in India (per 100)					
73	**77**	**81**	**91**	**92**	**89**

Infrastructure deficit in digital sector

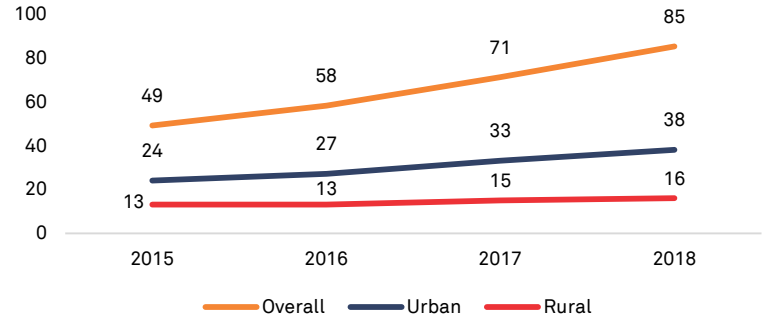
Lower penetration in rural areas, and low data speeds have restricted leveraging full potential of digital technologies such as Internet of things (IoT), cloud, artificial intelligence (AI)

Figure 52 Mobile teledensity in India per 100



Source: TRAI

Figure 53 Internet subscribers per 100

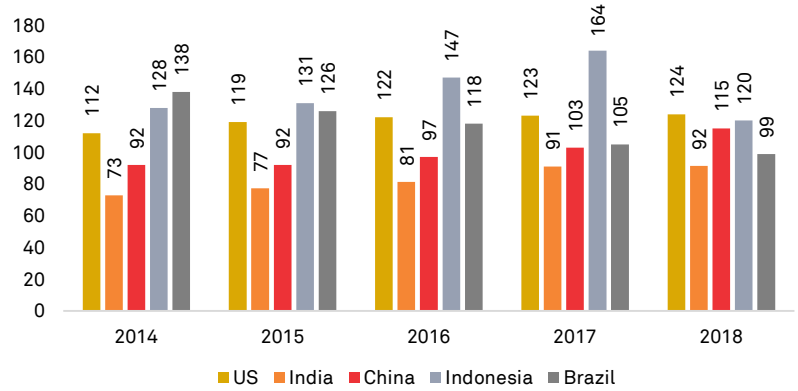


Source: TRAI

- Telecom and network connectivity are critical enablers of a nation's socio-economic growth. Though urban India is reaping the benefits of the telecom revolution, rural teledensity is still low

- There is still huge potential to ramp up Internet and broadband penetration in rural areas. Also providing optimal data speeds and quality of service has remained a challenge for industry players in both urban and rural India

Figure 54 Mobile cellular subscriptions (per 100 people)

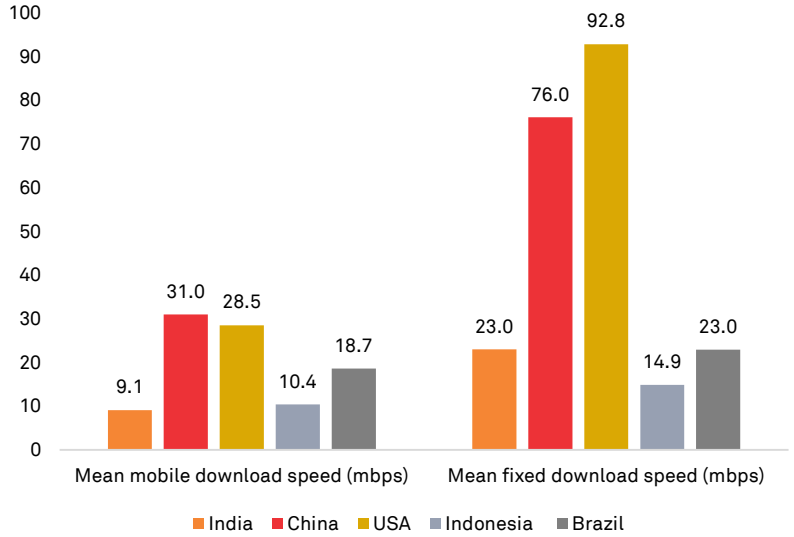


Source: World Bank

- Several initiatives have been taken by the Department of Telecommunications to enhance the country's digital ecosystem and to expand digital infrastructure to bridge the urban-rural digital literacy divide

- The corpus from the Universal Service Obligation (USO) Fund can be efficiently utilised to further enhance the country's digital ecosystem

Figure 55 Data speed comparison 2018



Challenges in the digital infrastructure sector

Broadband connectivity

There is an urgent need to fast track the progress, necessitating fundamental changes in the way we operate, specifically with respect to creation of digital communications infrastructure, which faces several hurdles. This will enable us to reach a stage where digital communications is able to fulfill its potential of becoming a universal platform for equitable and inclusive growth across the country. Several challenges delay the roll out of broadband services to the unserved, underserved, rural and remote regions of India. Investments in infrastructure need to be enhanced and universal last-mile connectivity needs to be promoted.

Right-of-way issue

Creation of the digital communications infrastructure requires coordination and alignment of the work of multiple stakeholders and agencies - the central ministries and departments, state governments, local/municipal authorities, industry and user communities to achieve the intended objectives. One of the major challenges is implementation of Indian Telegraph Right of Way Rules, 2016. The cost of fibre rollouts remains high in India due to complicated and uncertain right-of-way (RoW) policies across the country.

With continued increase in demand for data, additional telecom towers need to be installed to increase coverage in rural or non-metros and to increase capacity in metros. Currently, India has ~5.5 lakh towers and the industry believes the country will require additional ~1 lakh towers per year over the next 2-3 years to meet the estimated demand. Further, only ~25-30% of telecom towers are fiberized. India will need to fiberise over 50%-60% of its towers (ideally) before launching 5G. This requires quick approval by state authorities for laying fibre, especially in metros and Tier 1 cities. This issue has resulted in continuing delays for operators in setting up the needed infrastructure.

Stress in the telecom services sector

In recent years there has been an overall decline in gross revenue (GR), adjusted gross revenue (AGR), profit after tax (PAT), average revenue per user (ARPU) of the telecom service providers (TSPs). The debt exposure of the TSPs has been estimated to be Rs 7.7 lakh crore by the Inter-Ministerial Group (IMG) on Financial Stress in Telecom Sector in its report dated August 31, 2017. As of November 30, 2019, the component of deferred payment liability of spectrum auction of the three major private TSPs amounts to about Rs 2.9 lakh crore. Financial leverage ratios have been further impacted by the Hon'ble Supreme Court AGR judgement of October 24, 2019 consequent to

which approximately Rs 135,000 crore towards prior period (2006-07 onwards) licence fee and spectrum usage charges, and interest, penalty and interest on penalty thereon are payable by the TSPs. These dues generally pertain to assessments up till fiscal 2016. Incremental amount since then would also have to be added. Many of the affected TSPs are now no longer in business. The liability of some of the TSPs is significant, thereby placing these companies in a precarious position, considering that a huge amount is required to meet this liability in a very short time – that too when the financials of these TSPs are already stretched. There are serious concerns about the capability and capacity of some of the companies to meet their contractual commitments.

Vision 2025 for the digital infrastructure sector in India

	Current status	Vision 2025
	• India ranks 2nd in terms of mobile phones – 119 crore[38] total mobile subscribers • Internet penetration is 38%[39] in India	• India to rank 1st in terms of mobile phones – 100% of the population connected to internet • Internet penetration of more than 80% • India to have a strong foothold in ICT[40] development by providing high speed connection to gram panchayats and development institutions • Propelling India to the top 25 nations in the ICT Development Index of ITU from 134 in 2017
	• > 100,000 gram panchayats have been connected under BharatNet project • Utilisation of BharatNet infrastructure and last-mile connectivity needs to be enhanced	• Universal access of broadband by 2022 • Provide seamless connectivity of rural and remote areas, bridging the digital divide • Availability of government services in real time on mobile • Greater financial inclusion and access to quality education and healthcare facilities to remote areas through mobile • Improved utilisation of Bharat Net infrastructure and last- mile connectivity through public private partnership
	• 4G technology has enabled India to move towards a digital economy by providing faster internet connectivity at affordable prices • Limited penetration of data centres due to stringent regulations and complex processes	• 5G technology will fuel industry growth and innovation, harnessing the power of emerging digital technologies, such as IoT, cloud, AI and big data • Increased penetration of data centres due to better regulatory environment • India to emerge as a data centre hub fuelling growth of Fintech, Payment Gateways, e-commerce, over the top (OTT) sector

[38]as of August 31, 2019, Source: Department of Telecom
[39]Internet Penetration as of March 31, 2018
[40]ICT - Information and Communication Technology

Reform imperatives in the digital infrastructure sector

Improving the performance of BharatNet

The BharatNet project is being implemented in a phased manner to provide broadband connectivity to all the Gram Panchayats (~ 250,000) in the country. The project is under implementation and the infrastructure being created is a national asset, accessible on a non-discriminatory manner for provision of services. The project envisages providing affordable broadband services in rural and remote areas to help realise the vision of Digital India. To overcome the challenges in implementation of BharatNet project, the recommendations of the High Powered Committee may be followed, which has suggested an implementation approach across the BharatNet to assign the work of creating, maintaining and utilising the network to a single entity in the Public Partnership (PPP) Model through Private Sector Partner (PSPs).

Reforms to improve the health of the digital infrastructure sector

The government has come out with a National Digital Communication Policy (NDCP) 2018 for telecom, a sector with high technology churn and increased capital costs of operations. The key objectives of the policy include providing broadband to all, achieving digital empowerment and improving the well-being of the people. This is in line with the government initiatives such as Digital India. A healthy and vibrant telecom sector is extremely important for the success of these schemes. However, the industry is reeling under a debt of Rs 7 lakh crore, which is reflective of the players' financial stress. Recently the government has provided a moratorium of two years in payment of spectrum charges by the private sector to improve their financial health.

Pricing of spectrum

- For the upcoming auction of 5G airwaves, the Department of Telecom (DoT) has suggested a base price of Rs 492 crore per MHz. This is very high compared with the base price in countries where 5G is already deployed. The high price comes at a time when the demand for spectrum is likely to be subdued as consolidation has reduced the number of players in the sector to effectively only four. However, providing inclusive and affordable 5G services to all sections of the population in the country is important to achieve the NDCP goals. For this, participation of the private players in the 5G auction should be robust. In order to enable this, the authorities should rationalise all elements of spectrum pricing for the auction, including base price, period of payment of charges and interest rates

Creation of collaborative institutional mechanism between the Centre, states and local bodies for common right of way (RoW), standardisation of costs and timelines

- With continued increase in demand for data, additional telecom towers need to be installed so as to increase coverage in rural and non-metro cities and to expand capacity in metros. Additional towers take time to be installed mainly due to delay in getting permission from local authorities and other procedural issues. As per industry estimates, an additional 10 lakh towers need to be established and an 30 lakh km of optical fibre cable (OFC) need to be laid by 2025. Typically, about Rs 50 lakh is the required investment for setting up a tower. Around 30% of the telecom towers in India are fiberized. In order to quicken the process of giving RoW permissions, adoption of India Telegraph RoW Rules 2016 by state/ union territory government and central agencies is required. There is an imminent need to develop innovative implementation models for RoW and to work with states/UTs for having consistent policies pertaining to expansion of digital infrastructure

- The sizeable corpus of the Universal Service Obligations (USO) Fund can be utilised more efficiently. The excess funds can

be redeployed to boost schemes such as BharatNet which will facilitate sectoral growth and increase the penetration of broadband connectivity in the country

Enabling environment for developing data centre infrastructure

- Growth of the data centre services market is hindered by regulations and complex processes at present. A number of permissions and clearances are required from multiple government departments and agencies which delays setting up of a centre

- Tax incentives or exemptions on select equipment may be provided to help increase investments in data centres. At present there are one-time and recurring taxes that have a significant impact on costs and viability. The data centres are capital-intensive and attract relatively high sales taxes and property taxes. Further, electricity tariff, import duties on equipment sourced from outside India and multi-jurisdiction tax implications impact data centre costs

Setting up super computer Infrastructure

Investment in supercomputing is needed if India truly wants to become a knowledge-driven, $ 5 trillion dollar economy in the next five years that can support cutting-edge science and consequently benefit its economy and the businesses.

- High-performance computing is important if India wants to make significant progress in areas such as weather forecasting, drug discovery, astrophysics and bioinformatics. India can learn from China where a number of supercomputers are already deployed to carry out a range of tasks

- As setting up of super computer involves many stakeholders, it should be promoted as a nationally coordinated collaborative programme involving developers and users of supercomputing systems and academic and research institutions

NIP project summaries and marquee projects

Overall capital expenditure of Rs 309,672 crore would be incurred by both the Centre and states from fiscals 2020-25. For the projects executed by the Centre, about 14 identified projects will be implemented in the period 2020-25. The capital expenditure for these projects is estimated at Rs 304,692 crore. The summary of the projects is highlighted in the table below:

Category	No of projects	Capex over FY20–25 (Rs crore)
4G Project of BSNL and MTNL	2	37,284
Network for Spectrum	1	14,768
BharatNet	1	13,000
Private Player Capex	2	228,000
Others	8	11,640
Total	**14**	**304,692**

- The projects include capex done by BSNL and MTNL to start 4G services, expenditure incurred towards spectrum on a pan-India basis, private players capex, connecting gram panchayats through BharatNet and providing telecom and internet connectivity in border and remote areas.

The capital expenditure over FY20-25 is shown below:

Rs crore	FY20	FY21	FY22	FY23	FY24	FY25	Total
Centre	76,694	60,676	53,322	38,000	38,000	38,000	**304,692**
States[41]	1,662	1,171	1,216	719	119	93	**4,980**
Overall total[42]	**78,356**	**61,847**	**54,538**	**38,719**	**38,119**	**38,093**	**309,672**

Marquee project

BharatNet

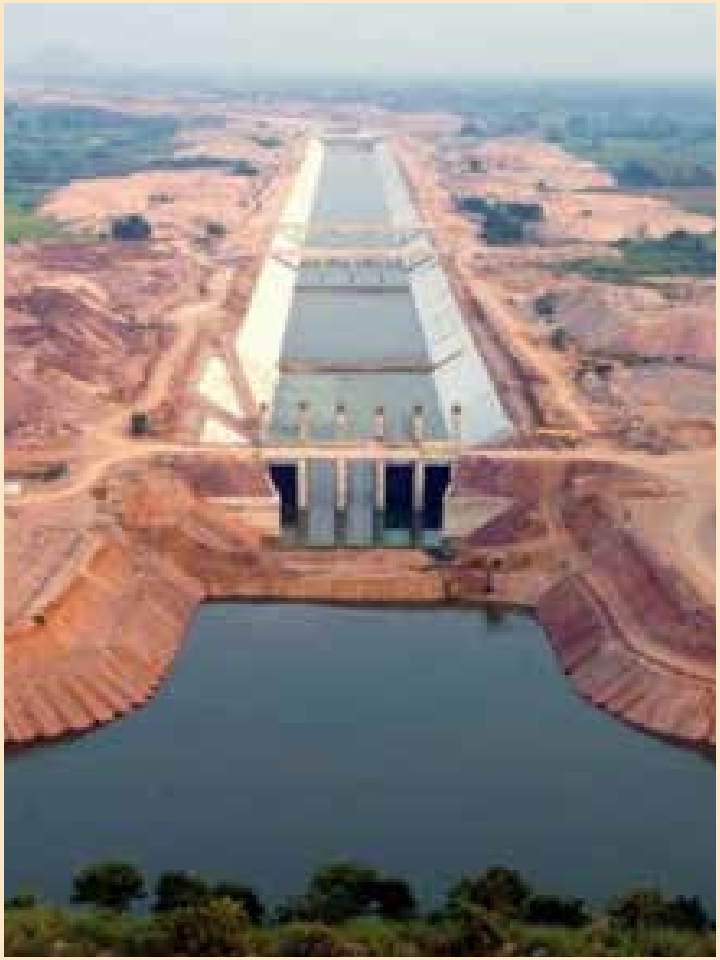
Bharat Broadband Network Limited is currently implementing the BharatNet Project which aims to connect 250,000 gram panchayats in India through broadband using optimal mix of underground fibre, fibre over power lines, radio and satellite media network and provide 100 Mbps of speed to all gram panchayats. The project is being done at a cost of Rs 17,145 crore and is estimated to be completed by fiscal 2022. Capital expenditure of Rs 13,000 crore would be incurred over fiscals 2020-2022 on this project.

[41]States/UTs include Uttar Pradesh, Maharashtra, Gujarat, Telangana, Jharkhand, Tamil Nadu, Andhra Pradesh, Madhya Pradesh, Karnataka, Haryana, Punjab, Delhi, Kerala, Odisha, Chhattisgarh, West Bengal, Sikkim, Mizoram, Andaman & Nicobar, Chandigarh and Puducherry. For some projects, year wise phasing has not been provided, so capital outlay for FY 20 to FY 25 will not add up to total capital outlay.
[42]Includes projects where yearly phasing has not been provided.

Irrigation

Sector Progress, Deficits and Challenges, Vision and Reforms

Kaleshwaram Lift Irrigation



Project details

- The Kaleshwaram Lift Irrigation Project is aimed at making Telangana drought-proof by harnessing the flood waters of the Godavari. The project will divert 180 thousand million cubic feet (TMC) of Godavari flood water, first to Sripada Sagar Yellampalli barrage and then to Mallanna Sagar from the Pranahita confluence point
- The project is being built at a cost of Rs 80,190 crore and is the world's largest multi-stage, multi-purpose lift irrigation project. The waters of the Godavari will be tapped by reverse pumping and storage, thereby facilitating agriculture over 38 lakh acres, including the creation of about 18 lakh acres of new area
- The project would help in rejuvenating thousands of tanks, providing water for industries and supplying drinking water to a number of cities, including Hyderabad and Secunderabad, by creating a series of storage tanks and a network of pipelines

Salient features

- Water is stored in the Godavari via the construction of barrages and reservoirs. This has saved the government from the hassles of land acquisition and resettlement of people
- The world's largest pumping station has been set up underground, with an 81 km tunnel running between Yellampalli barrage and Mallanna Sagar reservoir. The tunnel can carry 2 TMC of water continuously

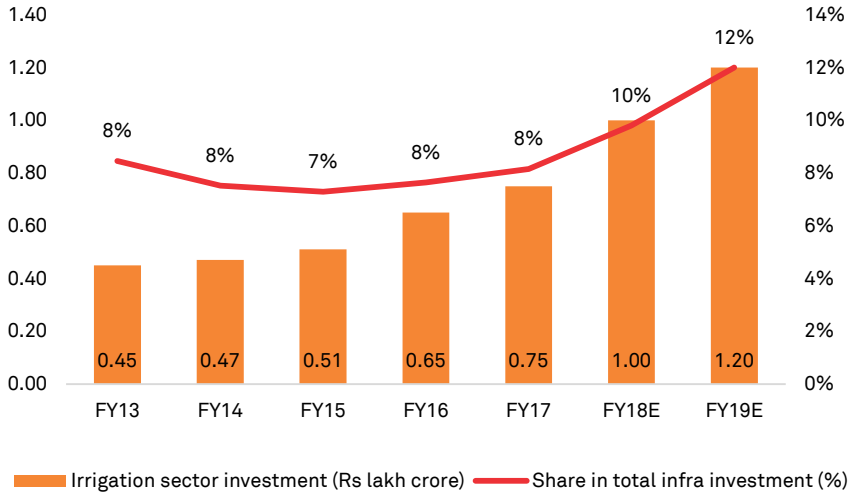
Irrigation is critical to food security and economic growth of India. The performance of irrigation systems is of vital importance to farmers who rely on them for crops and livelihood. India has been grappling with water scarcity which calls for investment in efficient water management technologies such as micro-irrigation. There is also a need for private sector participation, for resource augmentation and efficiency.

Historical investments

Investment in the irrigation sector is critical as it directly impacts agriculture and the rural economy in India. As the livelihood of a major proportion of India's population depends on agriculture and allied activities, it is important to minimise the uncertainty owing to dependence of agriculture on rains.

During fiscals 2013 to 2017, the share of irrigation sector investment in overall infrastructure investment was ~9%, having clocked ~5% compound annual growth rate (CAGR) (refer Figure 56).

Figure 56 Irrigation sector investment (Rs lakh crore) and share in total infrastructure investment (%)



Source: Appraisal documents for five-year plans, CRIS estimates (Investments mentioned are at Current prices)

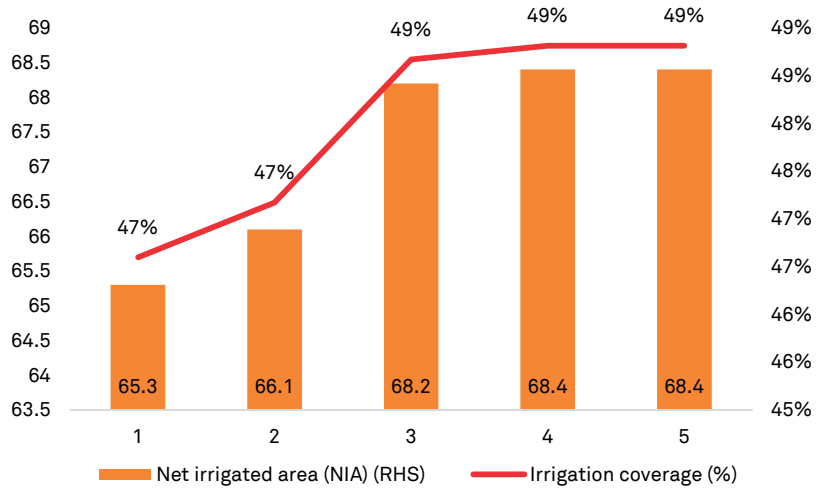
Investments in irrigation are mainly driven by respective state governments. The share of the centre and private sector is negligible in the irrigation sector as it is a state subject.

Irrigation sector trend

Net irrigated area

The overall net irrigated area (NIA) in India increased at a CAGR of ~2% between fiscals 2015 and 2019, and has remained almost stagnant over the last four years from 47% in fiscal 2015 to 49% in fiscal 2019 (refer Figure 57).

Figure 57 NIA trend in India (mn Ha, %)

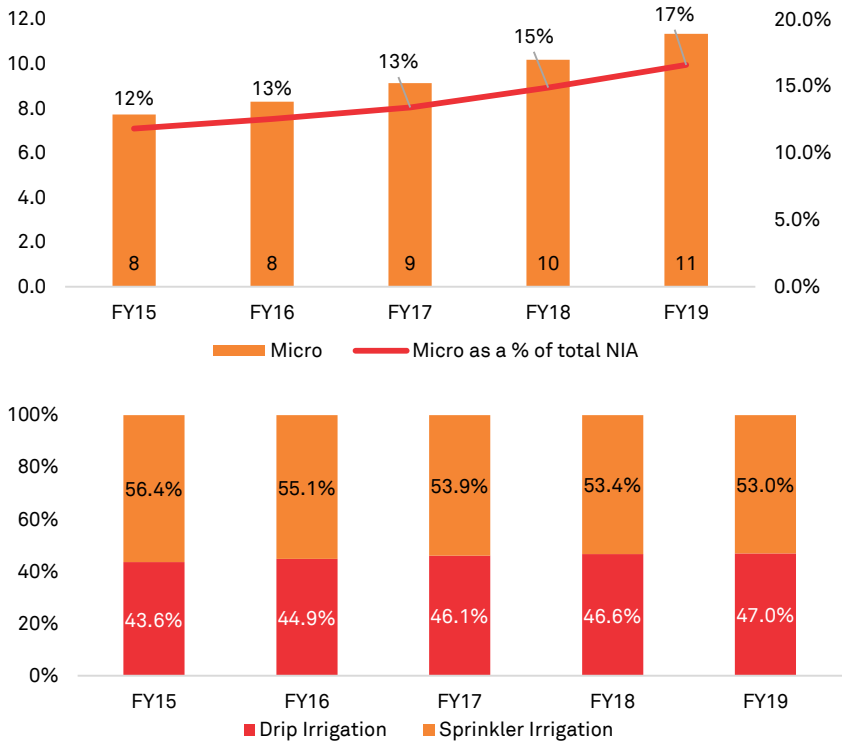


Source: Ministry of Agriculture Annual Reports

Penetration of micro-irrigation in India

The area under micro-irrigation in India clocked 10% CAGR between fiscals 2015 and 2019, owing to continued focus of the government in the form of targeted, centrally-sponsored schemes and initiatives. The share of sprinkler irrigation declined marginally from 56% in fiscal 2015 to 53% in fiscal 2019, with a commensurate increase in the share of drip irrigation. The penetration of micro-irrigation increased from ~12% in fiscal 2015 to ~17% in fiscal 2019 (refer Figure 58).

Figure 58 Micro-irrigation in India (mn Ha)



Source: Pradhan Mantri Krishi Sinchai Yojana (PMKSY)

Interlinking of rivers (ILR) programme

The National Perspective Plan (NPP) prepared by the Ministry of Water Resources, River Development and Ganja Rejuvenation (MoWR, RD, and GR) envisages development through inter-basin transfer of water from water-surplus basins to water-deficit basins. As part of the NPP, the National Water Development Agency (NWDA) has identified 30 links that are currently under various phases of project preparation.

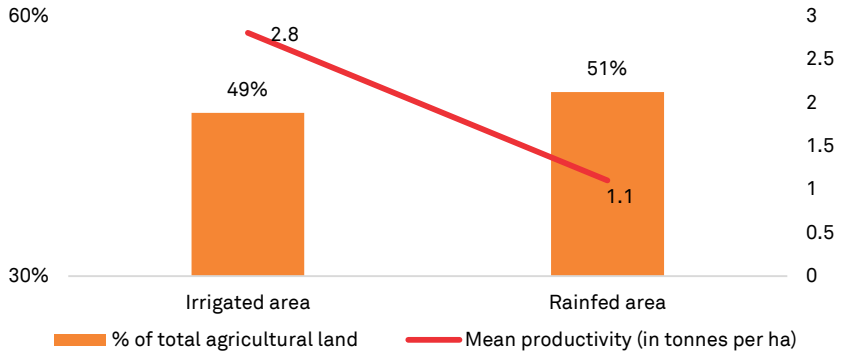
Further, under NPP, four priority links (of 30 identified links) have been identified – Ken-Betwa link project (KBLP) Phase I and II, Damanganga – Pinjal link project, Par – Tapi – Narmada link project and Godavari - Cauvery link project. The detailed project reports (DPRs) of Ken-Betwa, Damanganga-Pinjal, Par-Tapi-Narmada link projects have been completed. All statutory clearances have been accorded for Phase-I components and most of the clearances for projects under Phase-II of Ken-Betwa link project have also been obtained. The clearances for the Damanganga-Pinjal and Par-Tapi-Narmada link projects are being obtained from concerned ministries/departments. The draft DPR of Godavari-Cauvery link project has also been completed and sent to party states for concurrence.

The completion of the identified 30 links will result in an increase in overall area under irrigation by 35 MHa, the supply of industrial and domestic water will increase by 14,000 million cubic metre (mcm) and these will also be used for hydropower generation of ~34 GW.

Infrastructure deficit in irrigation

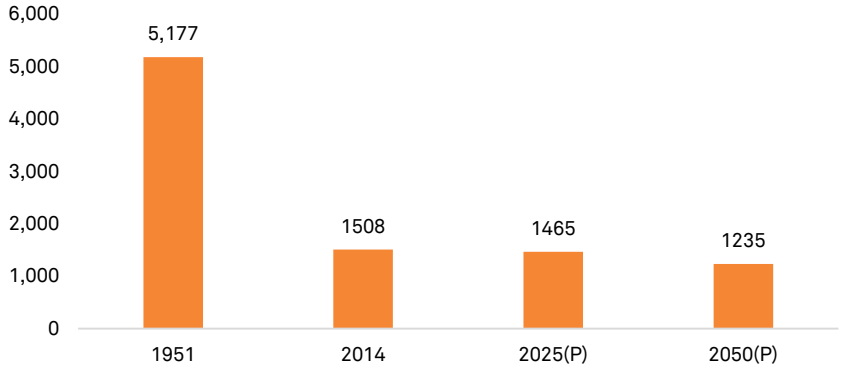
Rain-fed agriculture dominates, irrigation efficiency low, concerns of water scarcity

Figure 59 Rain-fed agriculture dominates



Source: ICAR, PIB

Figure 60 Per capita annual water availability (in cu m)



Source: ICAR, PIB

Agriculture accounts for 80% of the current water consumption. Of the 140 million ha of net sown area in the country, net irrigated area is about 68 million ha and remaining 72 million ha is rain-fed. Of the net irrigated area, about 40% is irrigated through canal systems and 60% through groundwater. Groundwater is being overexploited in large areas of the country. With declining per capita water availability, overexploitation and inefficiencies are a cause for alarm.

Challenges that remain in irrigation

Delay in the completion of major irrigation projects

A number of major multi-purpose river valley projects that were expected to give a boost to the irrigation potential in the economy are yet to be completed. This is due to a number of problems faced by the projects, mainly in land acquisition, rehabilitation and resettlement of affected people, inadequate state budgets, etc. As irrigation projects have a long construction period, this has resulted in changes in the size and nature of projects after starting work, which adds to delays.

Underutilisation of irrigation potential

The problem of underutilisation of irrigation potential has been a serious concern. The primary reason has been lack of coordination between the departments of agriculture and irrigation at the project formulation stage. Improper operations and maintenance have resulted in failure to minimise conveyance losses and associated problems of water logging and soil salinity. There have been many structural inadequacies with the main system, and the consequent inability to deliver the right quantity of water at the right time at the irrigation outlets. There have been challenges related to the absence of a field distribution system, water control structures and farm drainage facilities. There is also a lack of farmer organisations and proper extension services.

Vision 2025 for the irrigation sector in India

	Current status	Vision 2025
	• Low irrigation coverage – The area under irrigation is ~68 million Ha[43] (~49% of total[44]) with the balance being unirrigated and dependent mostly on monsoon	• Higher irrigation coverage[45] • Total irrigated land to be ~85 million Ha (~61% of total). Reduced dependence on monsoons to increase farmers' incomes and consumption levels
	• Low focus on efficient methods of irrigation • Land irrigated under micro-irrigation (considered the most efficient method of irrigation): ~17% of total net irrigated area	• Emphasis on efficient methods of irrigation – Micro irrigation cover to reach 28% of total net irrigated area, leading to efficient use of scarce water resources • Switchover from traditional methods such as tank and canal irrigation to efficient methods such as drip and sprinkler irrigation
	• No interlinkage of rivers – three priority links identified under National Perspective Plan (NPP) • 30 interlink projects have been identified which are under various stages of project preparation	• Interlinking of rivers – Priority links identified as per NPP to be taken up • Interlinking of various rivers to increase the overall area under irrigation, domestic and industrial water supply and hydropower generation
	• Limited focus on efficient use of water for irrigation • Pricing method based on irrigated land -area-based fees	• Judicious and efficient use of water for irrigation – Pricing method based on water quantity-volumetric pricing – Robust IT and automated systems to track efficient use of water

[43] *Source: Ministry of Agriculture – Annual Report for 2018-2019*

[44] *India's ultimate irrigation potential remains at ~140 mn Ha (Maximum area that can be irrigated by optimal utilisation of available water resources)*

[45] *Historical CAGR for increase in irrigation potential observed during fiscals 2014 to 2017 is used to project the net area under irrigation in fiscal 2025*

Reform imperatives in irrigation

Of a net sown area of 140 million hectare (ha) in India, about 72 million ha (51%) is unirrigated and rainfall-dependent.

The most severe problems afflicting the Indian irrigation system are: rising costs of new schemes, huge backlog of incomplete schemes, and increasing neglect of existing systems. Large-scale canal irrigation systems, in particular, are in poor condition. Maintenance is lacking, operations are inadequate, water supplies do not reach the end point of the systems, and water supply timings are unreliable. The wide gap between actual and desirable performance threatens the sustainability of irrigated agriculture. Greater participation of private players is important to bring in efficiencies in irrigation system management. The following reforms could greatly help improve the current situation:

Regulatory reforms

- **Irrigation management transfer (IMT):** Sharper focus is required on better managing existing irrigation infrastructure than putting more money into building new infrastructure
  - States must only concentrate on technically and financially complex structures, such as main systems, up to secondary canals and structures at that level
  - Tertiary-level canals and below, minor structures, and field channels may be handed over to water users' associations of farmers. The objective is decentralisation and democratisation of management by transferring some functions to water users' associations
  - The IMT has been the basis for the substantial improvement in irrigated area in Gujarat and Madhya Pradesh, as it leads to sustainable operations and maintenance (O&M) of the irrigation systems and improves equitable access to water for all farmers
- Participatory irrigation management (PIM): Reforming the irrigation agencies alone is not likely to improve the system's efficiency. The government agencies and water users must manage the system jointly. Farmers could form a cooperative, membership of which must be mandatorily through purchase of shares
  - With no burden of bureaucracy and regulations, users organisations can use their local knowledge to efficiently carry out critical O&M tasks. Farmers are more likely to carry out organised activities at sites where a canal serves their village
  - Legal changes must be brought about in order to empower user groups. If PIM programmes are to make a major difference, user organisations must have the authority to levy water fees, carry out maintenance tasks, and represent farmers' interests in front of government agencies. Without this authority, members or other organisations will not take user groups seriously

More private investment in micro-irrigation

Of India's irrigated area of 68 million ha, only 11.3 million ha (as on March 31, 2019) is under micro-irrigation, such as drip and sprinkler irrigation. Increasing the micro-irrigation coverage will go a long way in solving the country's water crisis. With the budget allocation for the PMKSY at Rs 3,500 crore for fiscal 2020, the government aims to bring 0.5 million ha more under micro-irrigation this year. This makes private investment imperative in micro-irrigation projects, which are relatively less risky.

- **Replicating best practices:** In order to build an enabling environment for micro-irrigation, states can take a cue from the success of Gujarat Green Revolution Company (GGRC) and Andhra Pradesh Micro Irrigation Project (APMIP). The common thread here is the presence of a dedicated team to promote micro-irrigation and information technology (IT)-backed operations

- **According priority sector status to micro-irrigation:** This will facilitate greater flow of bank credit to farmers to buy equipment. The farmers must also be provided interest subvention and access to credit guarantee fund. According priority sector status can hence be a step towards reducing the dependence on subsidies over time

Pricing reforms and technology adoption

- Pricing water for irrigation requires an appropriate method. The pricing method must move from area-based fees - which do not incentivise judicious use of water - to quantity-based fees, which would charge the farmer on the basis of actual quantity used. This would facilitate efficient, equitable, and sustainable use of water resources
- **Water could be subsidised up to a threshold level,** considering the cropping season. Once the threshold level is breached, the farmer could be charged the actual fee. This would encourage efficient use of water resources
- **Robust IT and automated systems** must be used to track efficient use of water resources. This would ensure careful assessment and accounting of the performance levels across sources
- **Supervisory control and data acquisition,** or SCADA systems could be used to control systems and processes, to bring about economically sustainable water management that focuses on improving overall productivity and delivery
- **Intelligent systems aided by information and communication technology** have proven to be highly effective in water management. Internet of Things devices such as smart meters could be used to achieve acceptable benchmarks of non-revenue water. Urban local bodies (ULBs) could also use these systems to publish service levels for coverage of water supply

NIP project summary and marquee projects

Overall capital expenditure of Rs 894,473 crore would be made by both centre and states between fiscals 2020 and 2025. About 95 identified centrally-funded projects (to be handled by Department of Water Resources, RD & GR) will be implemented between fiscals 2020 and 2025. The capital expenditure for these projects is estimated at Rs 249,215 crore. Of the above 95 projects, 16 projects worth Rs 2,808 crore for National Mission for Clean Ganga and National River Conservation Directorate will be implemented through PPP mode while the other 79 projects worth Rs 246,407 crore will be implemented through the engineering, procurement and construction (EPC) route. The summary of the projects is highlighted in the table below:

Category	No of projects	Capex over FY20-FY25 (Rs crore)
SPR, ISBIG, CADWM	47	126,434
NWDA	4	102,664
NMCG, NRCD	44	20,117
Total	**95**	**249,215**

Note: SPR – State Projects, ISBIG – Incentivisation Scheme for Bridging Irrigation Gap, CADWM – Command Area Development and Water Management, NWDA – National Water Development Authority, NMCG – National Mission for Clean Ganga, NRCD – National River Conservation Directorate

- Various projects are being undertaken to augment water suply in water deficit areas, through irrigation and reservoir projects such as Sardar Sarovar project, Subernarekha mutipurpose project in Jharkhand, etc
- Many sewage treatment plants STPs and effluent treatment plants ETPs are being commissioned under the NMCG programme
- The NWDA has plans to undertake river interlinking projects to connect Ken- Betwa, Par Tapi Narmada and Godavari – Cauvery rivers

The capital expenditure over FY 20 to FY 25 is shown below:

Rs crore	FY20	FY21	FY22	FY23	FY24	FY25	Total
Line ministry	39,830	61,799	54,103	45,413	28,398	19,671	**249,215**
States (information provided by DoWR, RD and GR)	14,836	19,186	12,027	4,523	4,353	878	**55,802**
States[46]	57,293	119,456	109,845	88,413	83,122	50,715	**589,457**
Overall total[47]	**114,463**	**200,615**	**175,669**	**137,358**	**115,281**	**70,474**	**894,473**

Marquee project

Godavari – Cauvery River Interlinking

The NWDA will will undertake the implementation of Godavari – Cauvery River Interlinking project at an estimated cost of Rs 60,361 crore. The idea is to make use of 1,100 TMC of Godavari water that currently drains in the sea and resolve water issues in southern states. The project is estimated to start by fiscal 2021 and end by fiscal 2025.

46 States/UTs include Uttar Pradesh, Maharashtra, Gujarat, Telangana, Jharkhand, Tamil Nadu, Andhra Pradesh, Madhya Pradesh, Karnataka, Haryana, Punjab, Delhi, Kerala, Odisha, Chhattisgarh, West Bengal, Sikkim, Mizoram, Andaman & Nicobar, Chandigarh and Puducherry. For some projects, year wise phasing has not been provided, so capital outlay for FY 20 to FY 25 will not add up to total capital outlay.

47 Includes projects where yearly phasing has not been provided.

Rural Infrastructure

Sector Progress, Deficits and Challenges, Vision and Reforms

Mission Bhagiratha

Project details

- The project is envisaged to ensure safe and sustainable piped drinking water supply from surface water sources to 20 lakh urban households and 60 lakh people in rural Telangana
- The planned project outlay of Rs 45,028 crore involves laying a pipeline network of 1.46 lakh km to serve a population of 2.72 crore in Telangana
- Telangana Drinking Water Supply Corporation (TDWSCL) was established by the government to implement Mission Bhagiratha

Salient features

- As of date, the project is 95% complete
- The project completion is expected to induce a substantial qualitative change in the lives of the rural population of Telangana and offers huge scope for replication on a pan-India basis

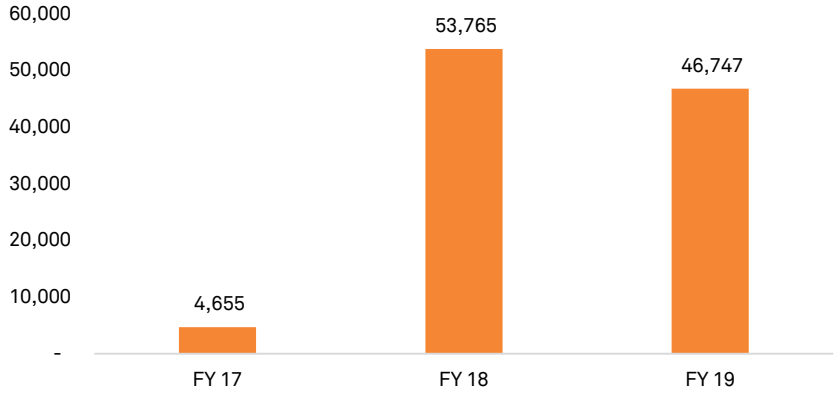
Infrastructure plays a critical role in economic growth of any region. At present, a majority (65%) of India's population resides in rural areas; thus, rural infrastructure needs to be developed to provide at least basic amenities such as civic services and housing to the rural population to improve their quality of life. Further, from the point of view of agriculture, agro-based industries, poverty alleviation and better access to markets and job opportunities in rural regions, rural infrastructure is important.

In view of the above, the Government of India (GoI) has initiated critical schemes such as Pradhan Mantri Awas Yojana (PMAY - Gramin) to provide housing in the rural areas, Pradhan Mantri Gram Sadak Yojana (PMGSY) to develop and improve the quality of rural roads and Jal Jeevan Mission - Rural to provide tap water to all rural households.

Rural housing: Pradhan Mantri Awas Yojana (PMAY) – Gramin

In order to improve the quality of life of rural population and in keeping with the importance of housing infrastructure on account of its link with economic growth and poverty reduction, the GoI initiated PMAY Gramin (PMAY-G), a centrally-sponsored scheme, with a long-term objective of providing Housing for All by 2022. PMAY-G aims to provide pucca (permanent) houses and other basic civic amenities such as piped drinking water, power supply and liquefied petroleum gas (LPG) connection in convergence.

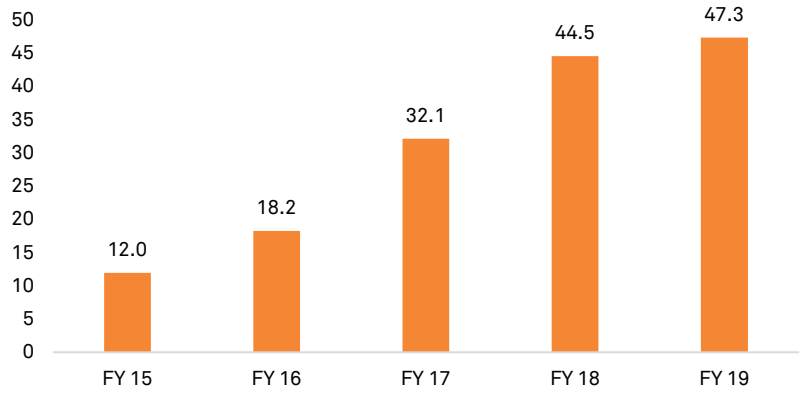
Figure 61 Investment under PMAY Gramin (Rs crore)



Source: PMAY (Gramin) website

Between fiscals 2016 and 2019, a total of 154 lakh housing units were built under the rural housing scheme.

Figure 62 Houses built under PMAY – Gramin (in lakh units)



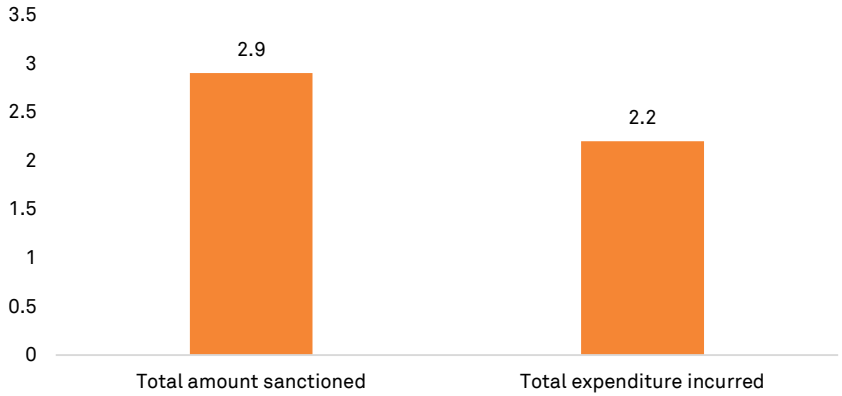
Source: Ministry of Rural Development (MoRD)

PMGSY – Rural roads

PMGSY is a centrally-sponsored scheme initiated to improve rural connectivity, by providing all-weather roads to connect eligible habitations in rural areas. Under PMGSY, all eligible habitations with a population of 500 persons and above in Plain areas and more than 250 persons in Special Category States, Desert Areas (as identified in the Desert Development Programme), Tribal (Schedule V) areas and Selected Tribal and Backward Districts (as identified by the Ministry of Home Affairs and Planning Commission) are to be connected by all-weather roads. For most intensive Integrated Action Plan (IAP) blocks as identified by Ministry of Home Affairs, the unconnected habitations with population 100 and above (as per 2001 Census) are eligible to be covered under PMGSY.

As on December 31, 2019, road length worth Rs 2.9 lakh crore had been sanctioned and expenditure of Rs 2.17 lakh crore incurred.

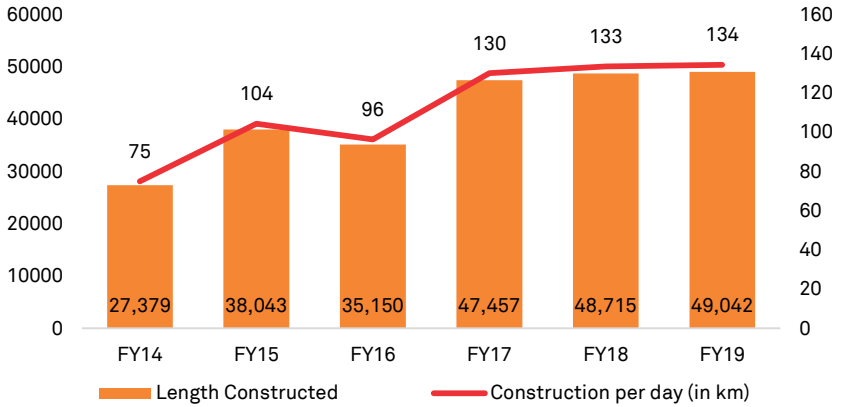
Figure 63 Capital expenditure under PMGSY (Rs lakh crore)



Source: Ministry of Rural Development website, as on December 4, 2019

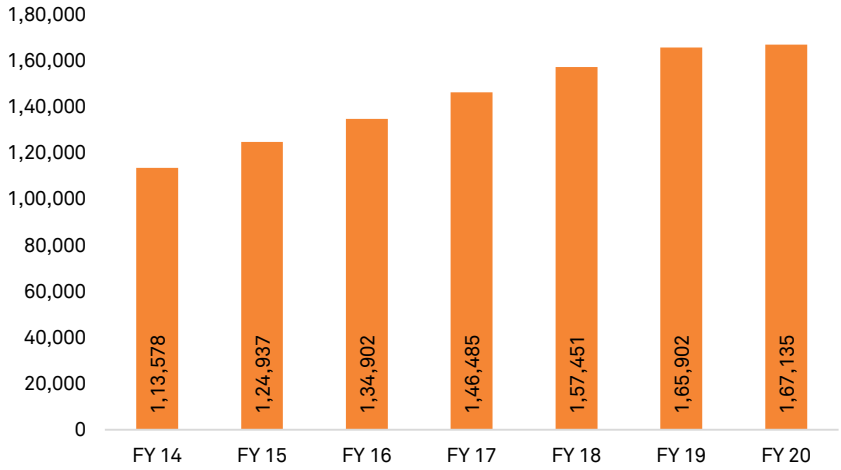
Since inception till December 31, 2019, 6.10 lakh km of rural roads have been constructed under PMGSY. The road construction under PMGSY in fiscal 2020 till December 31, 2019, has been 11,374 km.

Figure 64 Road construction under PMGSY



Source: Ministry of Rural Development

Figure 65 Habitations connected (cumulative) under PMGSY



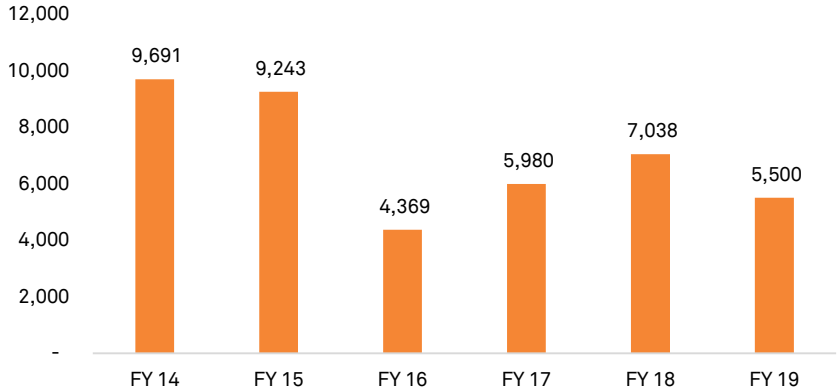
Source: Ministry of Rural Development (data till December 31, 2019)

Drinking water – National Rural Drinking Water Programme (NRDWP) and Jal Jeevan Mission Rural

NRDWP

NRDWP was initiated with an objective of assisting states in providing adequate and safe drinking water to the rural population of India. The centre-state fund sharing pattern within the scheme for components such as coverage of habitations, quality of water provided and O&M of projects, etc., was 50:50 for all states and 90:10 for the northeast Himalayan states.

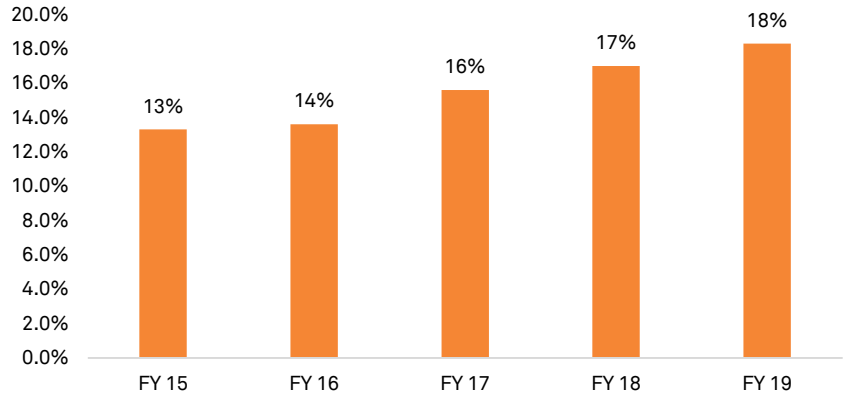
Figure 66 Expenditure under NRDWP (Rs crore)



Source: NRDWP website

As on July 31, 2019, a total of 1,387,480 habitations (81%) were fully covered and a total of 269,465 habitations (16%) were partially covered under the NRDWP programme. Hence, around 97% of the rural households have access to basic drinking water under NRDWP. As on July 31, 2019, only 18% of the households had access to piped water supply, and the coverage of piped water supply in NRDWP remained low.

Figure 67 Households with piped-water supply in rural areas (%)



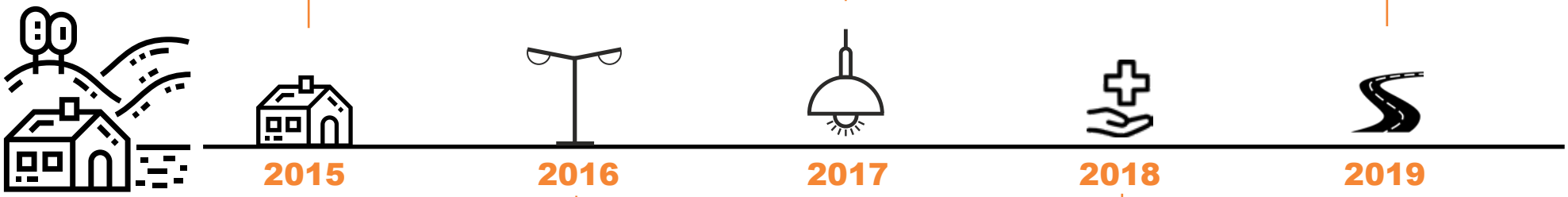
Source: NRDWP website, as of July 7, 2019

Jal Jeevan Mission – Rural

In 2019, the GoI restructured the ongoing National Rural Drinking Water Programme (NRDWP) which was subsumed into the Jal Jeevan Mission (JJM) to provide functional household tap connection (FHTC) to every rural household i.e. Har Ghar Nal Se Jal by 2024. The estimated project cost for the mission is Rs 3.6 lakh crore, through which around 14.6 crore rural households will be provided with FHTCs. The funding pattern for the JJM scheme between centre and state is 90:10 for Himalayan and northeastern, 100:0 for Union Territories and 50:50 for the rest of the states.

JJM is aimed at improving the quality of life of rural population and assisting in ensuring open defecation free (ODF)-sustainability. In the rural areas, in order to develop in-village water supply infrastructure, water resource management, source augmentation, grey water management, treatment plants, distribution network, etc., there will be requirement of human resources and procurement of various materials. This will help generate rural employment and boost the economy.

Rural infrastructure reforms timeline



2015

Deen Dayal Upadhyaya Gramin Kaushalya Yojana (DDU-GJY) launched to add diversity to the incomes of rural poor families and cater to career aspirations of rural youth

Swachh Bharat Mission - Gramin launched to accelerate efforts to achieve universal sanitation coverage, improve cleanliness, and eliminate open defecation in rural areas of India

PMAY - Gramin launched to provide 'Housing for All' in rural areas with basic civic amenities such as piped water supply, power supply, access to toilets, etc.

2016

Shyama Prasad Mukherji Rurban Mission (SPMRM) designed to deliver catalytic interventions to rural areas that are on the threshold of growth. Major plans focused on provision of basic and economic amenities

2017

Pradhan Mantri Sahaj Bijli Har Ghar Yojana launched to provide electricity to rural as well as urban households in India

2018

Mission Antyodaya, a convergence and accountability framework, launched to achieve optimum use and management of resources allocated by ministries/ departments of GoI

Ayushman Bharat Yojana or Pradhan Mantri Jan Arogya Yojana (PMJAY) launched to provide basic healthcare services to poor and deprived rural families

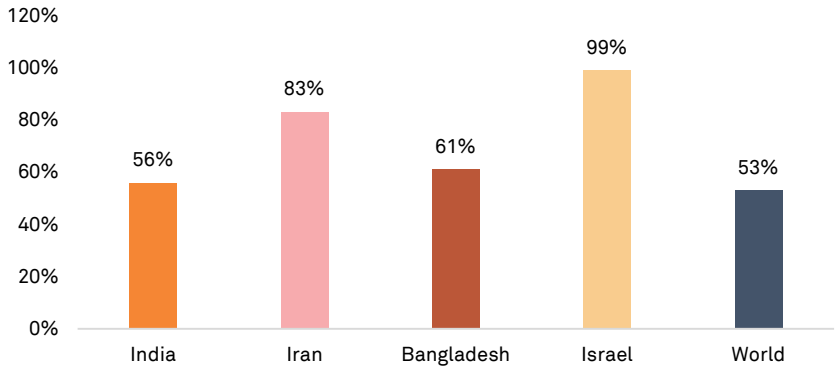
2019

Jal Jeevan Mission (Rural) launched to have 100% coverage of piped water supply to rural households

Pradhan Mantri Gram Sadak Yojana - III (PMGSY III) launched to provide all-weather roads, improve the quality of roads and connectivity in rural areas

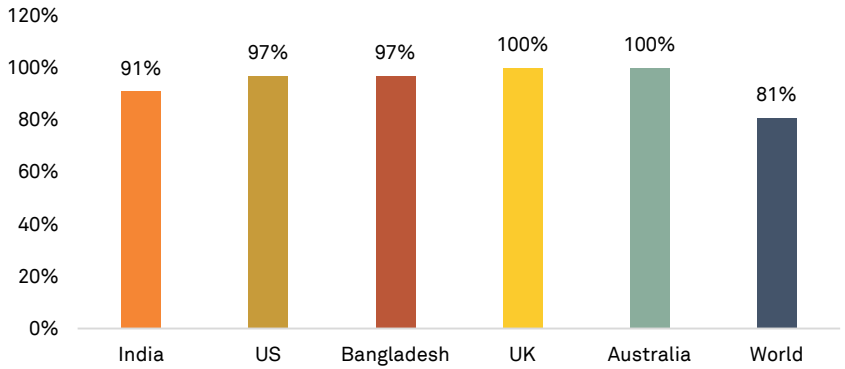
Infrastructure deficit in rural infrastructure

Figure 68 Access to safely managed drinking water (as a % of rural population)



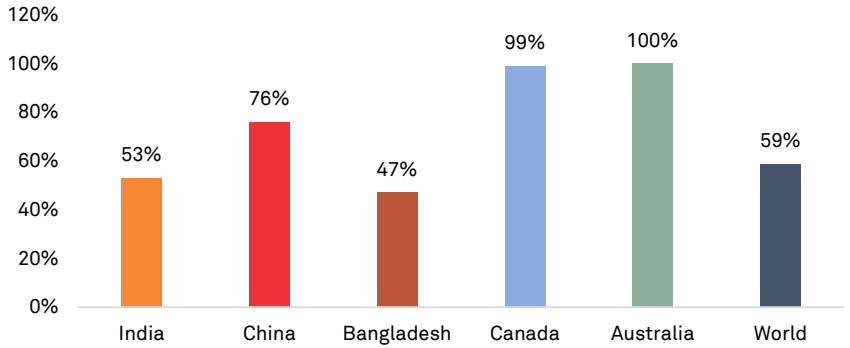
Source: World Bank Data (2017)

Figure 69 Access to basic drinking water (as a % of rural population)



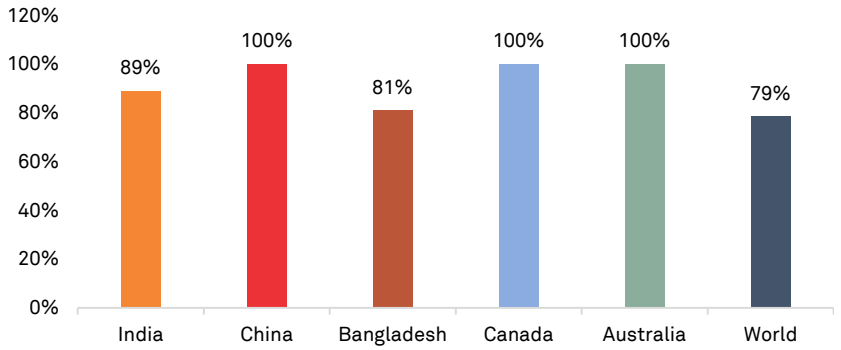
Source: World Bank Data (2017)

Figure 70 Access to basic sanitation services (as a % of rural population)



Source: World Bank Data (2017)

Figure 71 Access to power supply (as a % of rural population)



Source: World Bank Data (2017)

- Rural population of India has good coverage of basic water supply and power supply services
- Rural population of India has low coverage of advanced civic services such as safely managed drinking water supply and basic sanitation services

Challenges that remain in rural infrastructure

Issues with land availability, finance and legal constraints for housing

Land availability: There is a continuous tussle for land for agriculture, agro-based industries and housing in the rural areas, which is a severe constraint to meet the housing demands of the rural population. This implies that the vision of 'Housing for All' will require acquisition/ supply of large land parcels on a regular basis.

Inadequate financing: Inadequate access to formal sources of finance for the rural population has been an issue in the rural housing sector. Though affordable housing is considered under priority sector lending, lack of proper documentation/ steady source of income for rural population has been a hindrance in securing formal finance.

Legal constraints: A crucial factor behind this issue is the barrier for major players in real estate in tapping the vast land potential in rural areas reinforced by poor enforcement of laws against encroachment of public lands. Besides, there is absence of clear titles to private lands causing an artificial scarcity of land in rural areas. Another major issue is absence of large-scale digitisation of land records and easy access to such records for checking land holding titles.

Poor condition of rural road network

India has one of the largest and densest rural networks around the world. However, a major proportion of it, ~2.7 million km of rural road network is in poor condition. At present, a majority of the rural roads are not all-weather roads, and lack connectivity to remote areas. Rural roads comprise the tertiary road network in India that connect the rural population with the market and basic amenities such as health, education, employment opportunities, etc. They become a critical component in the socio-economic development of the rural population. It is considered that as rural road connectivity increases, rural population will have increased opportunities to earn or improve their livelihood their livelihood, thus reducing poverty levels in rural areas.

A major constraint in improving rural road network and connectivity has been lack of funds with the state government to improve and develop the rural road network coupled with inadequate maintenance of rural roads by the local governments. Further, lack of capacity in the local government to undertake rural road works as per specified standards has resulted in poor quality of roads.

Challenges in providing basic civic services such as water supply and sanitation

Limited accountability and lack of institutional capacity: The Gram Panchayats (GPs) lack institutional strength and capacity and are not properly supported by the state government in developing, undertaking and implementing infrastructure projects at the rural level. Further, lack of accountability at the GP level has led to degradation in the quality of civic services provided in the rural areas.

Lack of funds for improving rural infrastructure in India: Improving the quality of life and services to the urban population has been given a higher priority over improving the provision and coverage of basic civic services in the rural areas. As the demand-supply gap of civic services required at the urban level is constantly increasing with an increase in the urban population, a majority of the funds at the state government level are diverted to address this gap. As a result, limited funds are available for improving rural infrastructure.

Low project viability due to limited paying capacity of the rural population: Further, the rural population lacks capacity to pay required user charges/ fees for availing quality civic services such as piped water supply, sanitation, etc. As a result, it becomes difficult to undertake and implement required projects in the rural areas, due to lack of capacity or willingness of the rural population to pay for the services availed, thus, affecting the project viability. This also results in the local authorities not being able to even recover their administrative and O&M costs required to provide these services.

Vision 2025 for Rural infrastructure

Current status	Vision 2025
• Majority of the rural population **does not have access to pucca houses** made up of bricks, cement, etc. • **Lack of access to basic civic amenities** such as piped drinking water and LPG connection	• **100% of the rural population** to have **access to pucca houses** with **basic civic amenities** such as piped drinking water, power supply and LPG connection • Provision of urban facilities in rural areas under Rurban Mission
• **PMGSY** under implementation to improve existing rural roads	• Good quality and well-maintained rural roads facilitating **improved connectivity, safer and efficient access** to livelihood and socio-economic opportunities for rural communities
• AS per NRDWP, **97% of village habitations** have access to **basic drinking water** – 81% are fully covered while 16% are partially covered • Only **18% of rural households** have access to piped water supply	• **100% of the rural habitations** to have **full access to safe drinking water** • Under Jal Jeevan Mission, **100% of rural households** to have functional household tap connections by 2024
• As per Swachh Bharat Mission (Gramin), **99.4% of rural households have access to toilets** (Individual Household Latrines) • As per Swachh Bharat Mission (Gramin), **90% of villages** have been declared open defecation free **(ODF)**	• **100% of rural households** to have access to toilets (Individual Household Latrines) • **100% of villages** to be ODF

Reform Imperatives in Rural infrastructure

Boosting rural affordable housing

To ensure 'Housing for All by 2022' for rural population, the government has set up the PMAY-Gramin scheme. This also aims at triggering economic growth and creating millions of jobs for both skilled and unskilled labour. However, for the affordable housing initiative to succeed, it is important to address some concerns first.

Efficient land usage – Unused land and non-core real estate assets owned by various sick/loss-making public sector undertakings (PSUs) of the central/state governments can be monetised and utilised effectively to resolve the issue of land availability for affordable housing projects under 'Housing for All'.

Easy access to finance and innovative financing mechanism: As the bulk of low-income households working in the informal sector does not possess reliable documentation of income, banks and non-banking financial companies (NBFCs) can associate with FinTechs to devise innovative credit appraisal techniques for population in the informal sector. For low-income group households, perusing the Income Tax returns, where available, filed for previous years, CIBIL score, monthly expense statements, etc., can serve as useful pointers to take a call on creditworthiness.

Setting up an affordable housing fund in the National Housing Bank (NHB) – It can be funded from the priority sector lending shortfall. It will enable the NHB to mobilise more funds for housing projects and help achieve greater synergies among different agencies that are implementing the government housing schemes.

Improving condition of roads under PMGSY

- To address the issue of funds for repair and maintenance of roads constructed under PMGSY, the suggestion made by the Ministry of Rural Development to the 15th Finance Commission may be considered, for inclusion of asset maintenance and management by the states in their awards
- All PMGSY roads are covered by five-year maintenance contracts, to be entered into along with the construction contract with the same contractor in accordance with standard bidding document (SBD). Maintenance funds to service the contract is to be budgeted by the state government and placed at the disposal of the State Rural Road Development Agency (SRRDA) in a separate maintenance account. On expiry of five-year post-construction maintenance period, these roads are to be placed under zonal maintenance contracts consisting of five-year maintenance including renewal as per cycle
- National Rural Infrastructure Development Agency in collaboration with International Labour Organization (ILO) had prepared a Policy Framework for the development of rural roads maintenance policy. The policy framework, along with a guidance note for the states, had been shared with the states. This Rural Roads Maintenance Policy needs to get adopted and notified at state level. The policy and guidance note would be helpful for the road agencies of the States to have a clear understanding about expectations for rural road maintenance and intentions of states to sustain the created network of rural roads
- To boost road connectivity under PMGSY and ensure greater fund availability to states, an appropriate payment method can be used. Also, feedback obtained through Meri Sadak App can be used to improve quality of PMGSY roads
- Improving the capacity of local governments' public works department (PWD) to implement rural road projects through institutional strengthening and training
- Further, the next phase of PMGSY should focus on improving the last mile connectivity in rural areas. A concept note in this regard for providing connectivity to habitations with population above 250 people based on Census 2011 has been already prepared

Improving coverage of basic civic amenities

- Accountability of GPs – India needs to adopt a decentralised service delivery model, wherein the GPs and local communities will play a key role in providing access to basic water supply and sanitation services to the rural population. These authorities will be supported by the Panchayati Raj, state governments and local private sector entities for improved planning, facilitating, monitoring and providing a range of basic civic services
- Improving the capacity of local government - The capacity of the local PWD team needs to be augmented to undertake and implement quality infrastructure projects in the rural areas. This can be done through institutional strengthening and training from the Panchayati Raj Ministry, state governments and the local private sector entities
- Creating awareness among the rural population regarding user charges/ fees for quality services/ amenities: There needs to be sufficient awareness created among the rural masses about the necessity of paying for the civic services to maintain their quality and sustainability. This can be done by the local authorities undertaking activities like roadshows. Further, in order to help the local authorities recover at least their administrative and O&M expenses, the Panchayati Raj Ministry and the state government can provide direct subsidies (DBT) to the rural masses availing these services. Further, community models (improve participation from the communities) can be explored in creating awareness and providing these basic services

Improving supply of drinking water

Water is a crucial sector in need of urgent reforms. Uninterrupted supply of safe drinking water to all remains a distant goal even as overexploitation and mismanagement have aggravated the water crisis in the country. With India's water crisis nearing a tipping point, the government announced the Jal Jeevan Mission (or National Rural Drinking Water Mission) to provide potable water to every rural household by 2024. The scheme is in-line with the government's larger thrust on water conservation and aims to provide safe drinking water to all. To realize the objective of this scheme, large investments and policy reforms are required. The following reform measures will help augment investment and assist in meeting these objectives:

- Bringing structural changes in regulatory environment: At present, water is being managed under two separate heads - surface and ground water. Surface water is managed by the Central Water Commission (CWC) and groundwater, by the Central Groundwater Board (CGWB). From a hydrological standpoint, however, the two disciplines are not mutually exclusive. Therefore, a shift is needed in the institutional framework of the CWC and the CGWB in order to make water management more holistic and multidisciplinary
- Position NWC as a lead institution: Going forward, a logical step would be restructuring and unifying the CWC and CGWB to form a new National Water Commission (NWC). The NWC would be responsible for water policy, data and governance in the country and also fill the various gaps left unaddressed by the two agencies. It would build, institutionalise and appropriately manage an architecture of partnerships with knowledge institutions and practitioners in the water space, especially in areas where in-house expertise may be lacking
- Make model laws for states: A model law on water resource regulatory mechanisms may be drafted for adoption by each state government. There is also a need to bring a law stipulating legal provisions for reuse and recycling of water

NIP summary

Overall estimated total capital expenditure of Rs 773,915 crore would be made by both centre and states between fiscals 2020 and 2025. Department of Drinking Water and Sanitation will be implementing the Jal Jeevan Mission to provide functional household tap connection to every rural household i.e. "Har Ghar Nal se Jal" by 2024. The program will be implemented at an estimated total capex of Rs 360,000 crore shared between states and centre as follows:

Financial year	GoI share	State share	Total (Rs crore)
FY20	20,798	15,202	**36,000**
FY21	34,753	25,247	**60,000**
FY22	58,011	41,989	**100,000**
FY23	48,708	35,292	**84,000**
FY24	46,382	33,618	**80,000**
Total	**208,652**	**151,348**	**360,000**

Rs 248,626 crore would be invested in rural housing under PMAY Gramin and about Rs 162,329 crore would be invested to improve rural roads under PMGSY.

Category	Capex over FY20-FY25 (Rs crore)
Rural Housing	248,626
Rural Roads	162,329
Total	**410,955**

The capital expenditure over fiscal 2020 to 2025 is shown below:

Rs crore	FY20	FY21	FY22	FY23	FY24	FY25	Total
Rural housing	76,500	89,251	82,875				**248,626**
Rural roads	27,055	27,055	27,055	27,055	27,055	27,055	**162,329**
Drinking water	36,000	60,000	100,000	84,000	80,000		**360,000**
States[48]	758	497	881	824			**2,960**
Overall total[49]	**140,313**	**176,803**	**210,811**	**111,877**	**107,057**	**27,055**	**773,915**

[48] *States/UTs include Uttar Pradesh, Maharashtra, Gujarat, Telangana, Jharkhand, Tamil Nadu, Andhra Pradesh, Madhya Pradesh, Karnataka, Haryana, Punjab, Delhi, Kerala, Odisha, Chhattisgarh, West Bengal, Sikkim, Mizoram, Andaman & Nicobar, Chandigarh and Puducherry. For some projects, year-wise phasing has not been provided so capital outlay for FY20 to FY25 will not add up to total capital outlay*

[49] *Includes projects where yearly phasing has not been provided*

Agriculture and food processing infrastructure

Sector Progress, Deficits and Challenges, Vision and Reforms

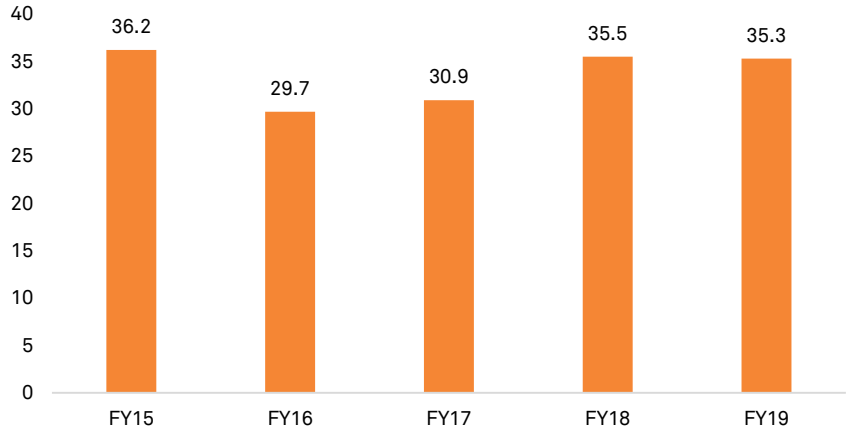
Agriculture plays a vital role in India's economy as ~56% of the total workforce is engaged in agriculture and allied activities. It accounted for ~16% of the country's Gross Value Added for fiscal 2019 at current prices. A well-developed food processing sector with higher level of processing helps in the reduction of wastage, improves value addition, promotes crop diversification, and ensures better returns for farmers as well as increases export earnings. The sector is also capable of addressing critical issues of food security, food inflation and providing wholesome, nutritious food to the masses. Over the years, agricultural production in India has consistently recorded higher output and this abundant supply of raw material has immense potential for food processing industry.

Trends in agriculture and food processing sector

Development of agriculture and food processing infrastructure has been accorded high priority by the Government of India in recent years. To modernise the infrastructure in this sector, the government launched the Pradhan Mantri Kisan SAMPADA Yojana to develop various agro – processing clusters. The scheme envisages creation of mega food parks, agro processing infrastructure, integrated cold chain infrastructure and expansion of food processing capacity in the country. The main objective of the scheme is to reduce wastage of perishable produce, create gainful employment and also ensure food security of growing population. The 39 mega food parks (located in 24 states), sanctioned by the Ministry of Food Processing Industry, are currently at different stages of implementation. The government has approved 297 cold chain projects out of which 183 projects have been completed.

To develop agricultural marketing infrastructure, including storage infrastructure, Ministry of Agriculture & Farmers Welfare is implementing Integrated Scheme for Agricultural Marketing (ISAM) to effectively handle and manage marketable surpluses of agricultural and allied produce including horticulture, livestock, poultry, fishery, bamboo, minor forest produce and others such produce to enhance farmers' income. The objective is also to promote innovative and latest technologies in post-harvest and agriculture marketing infrastructure. Government is also working towards developing and upgrading of Gramin Haats (open-air local market place) as GrAMs (Gramin Agricultural Markets) for better farmer-consumer market linkages and also to assist in integration of GrAMs with e-NAM portal so as to improve transparency in trading and better price discovery.

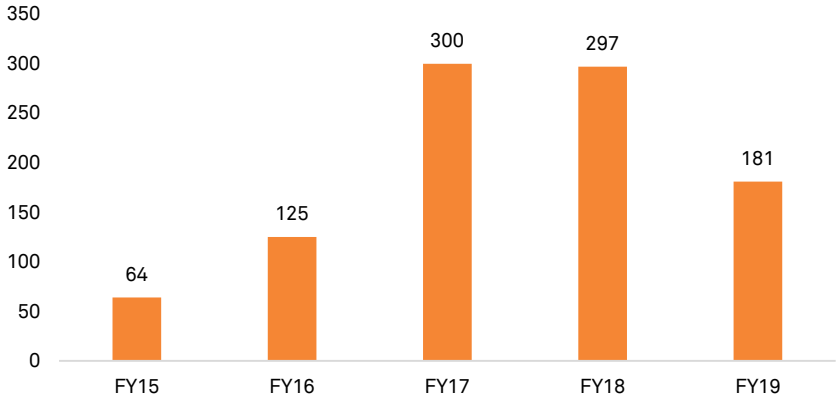
Figure 72 Year-wise export of processed food products ($ billion)



Source: MoFPI Annual Report 2018-19

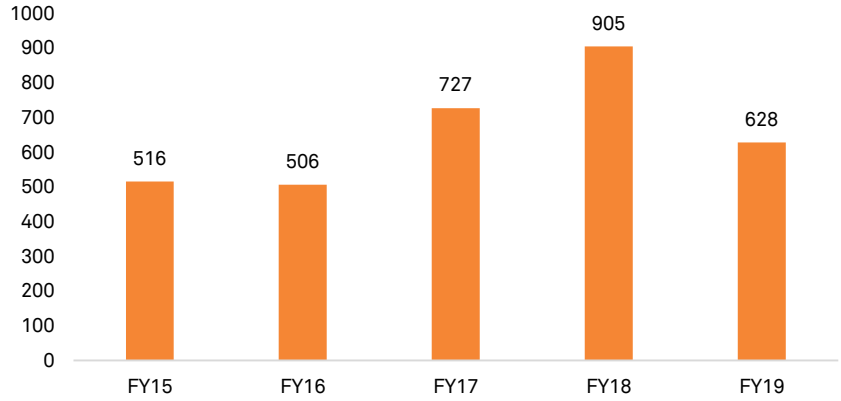
Food processing sector has been identified as one of the priority sectors under Make in India initiative. To attract investments in the sector, MoFPI has been implementing various schemes for development of Mega Food Parks with common facilities like roads, electricity, water supply, sewage facility and common processing facility such as pulping, packaging, cold storage, dry storage and logistics being promoted in areas with strong agricultural resource base. A cumulative 3,282 million has been invested in India's food processing industry through FDI route between fiscals 2015 and 2019.

Figure 73 Year-wise investments in mega food parks (Rs crore)



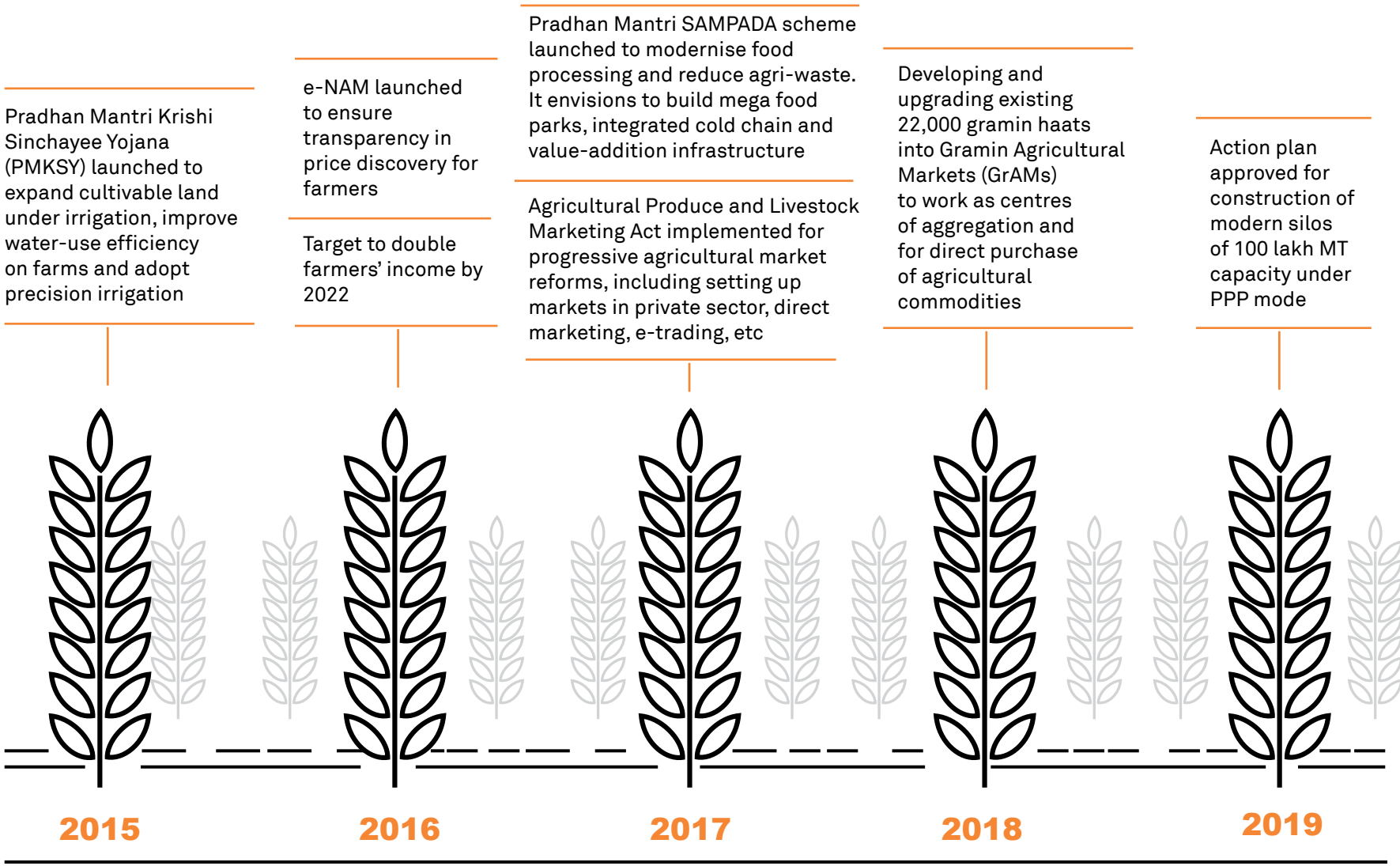
Source: MoFPI Annual Report 2018-19

Figure 74 Year-wise FDI inflows in food processing industry ($ million)



Source: Department for Promotion of Industry and Internal Trade

Agriculture & food processing reforms timeline



Infrastructure deficit in agriculture and food processing

Despite the huge improvement in production, India's post production wastage levels are high, leading to a loss of Rs 44,000 crore[50] annually. This is primarily due to the fact that India's overall processing level of perishables is 8% only.

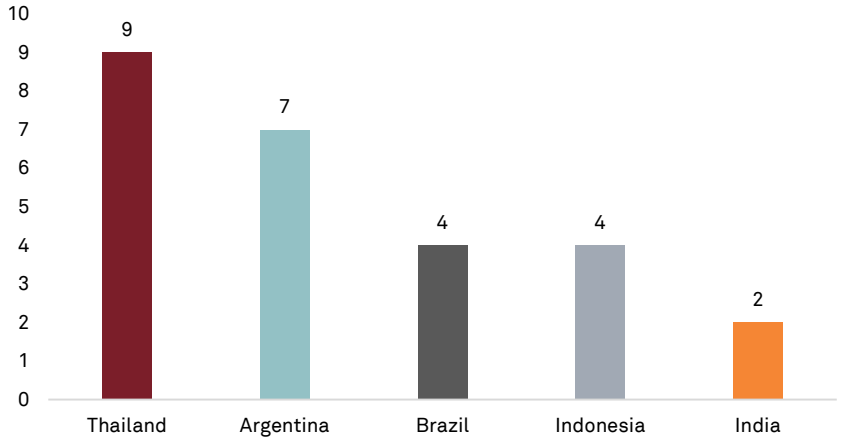
Table 2 Production and post-harvest losses in major agricultural sub-sectors

Category	Production	Level of Processing	Total (Rs crore)
Food Grains	275 MT	NA	**4.6 - 5.9**
Fruits & Vegetables	287 MT	2.2	**Fruits - 6.7 - 15.9** **Vegetables - 4.6 - 12.4**
Milk	165 MT	35	**0.9**
Meat	7.4 MT	21	**2.7**
Poultry	Chicken - 3.5 MT Egg - 88.1 billion no.	6	**Chicken - 6.7** **Egg - 7.2**
Fish	11.4 MT	8	**Marine - 10.5** **Inland - 5.2**

Source: Department of Agriculture Cooperation and Farmer Welfare (2017-18)

At present, India's agricultural exports predominantly consist of raw materials which are processed further in other countries. Most processing in India can be classified as primary processing, which has lower value-addition compared with secondary processing. There is a need to move up the value chain in processed food products (value-added products) to boost farmer incomes. This is also the prime reason why despite being one of the largest producers of agricultural commodities in world, agricultural exports as share of GDP is fairly low for India relative to rest of the world.

Figure 75 Agricultural exports as % of GDP for comparable countries (2016)



Source: Trade Promotion Council of India

[50] *NABARD Sectoral Paper on Food Processing (2018)*

The lack of an adequate and efficient cold chain infrastructure leads to massive post-harvest losses. One of the biggest challenges is India's inefficient cold storage supply chain. Most existing cold storages are single commodity storages, resulting in their capacities lying idle for up to six months a year. The cold chain infrastructure is also unevenly distributed among states.

Table 3 Gaps in cold chain development

Type	All India requirement 2015[51]	As on Dec 31, 2017
Pack house (nos.)	69,831	20,864
Cold storage	34.16 MT	35.88 MT
Reefer vehicle (nos.)	52,826	1,047
Ripening chamber (nos.)	8,319	443

Source: NITI Aayog

Challenges in the agriculture and food processing industry

Insufficient market infrastructure

The infrastructure required to handle the quantity and quality of agricultural produce is neither sufficient nor suitable to boost efficiency and productivity in the agriculture sector. Storage space is inadequate which leads to post-harvest losses. This has also ensured that farmers are forced to sell even if prices realised are low. The quality of storage facilities also needs to be improved.

Ineffective cold chain management

It is important to increase investment in modernising cold storage and making cold chain management more efficient. Large proportion of horticulture produce is wasted due to lack of cold storage facilities and refrigerated transport vehicles. Of the available cold storages in the country, a huge proportion is used only for potato.

Insufficient grading and certification infrastructure

The present day grading or sorting in Agricultural Produce Market Committees (APMCs) is restricted to sieving and fanning to remove foreign material. Most of the processes used in these facilities is manual and unscientific. In order to ensure high quality stock appropriate grading, quality assessment and certification should be encouraged. Also poor adoption of quality standards by the food processing industry has led to lower perceived brand value of Indian processed food in international market.

Insufficient processing of agricultural produce

Value addition in agricultural commodities can help raise the price that commodity earns, thus helping farmers. Even primary value addition such as cleaning and grading of grains; and cutting, dicing and packaging of fruits and vegetables can help raise farmers' income.

[51] *Based on study done by National Centre for Cold Chain Development (2015)*

Vision 2025 for Agriculture and food processing sector in India

Current status	Vision 2025
• Implementation challenges and infrastructure bottlenecks have prevented wide adoption of e-NAM • APMC regulations have prevented effective functioning of e-NAM and help in fair price discovery for farmers	• Doubling of farm incomes by upgrading of 22,000 rural haats into Gramin Agricultural Markets (GrAM) • GrAMs are exempt from APMC regulations and linked to e-NAM to develop the agricultural marketing infrastructure and bring markets closer to farm gate
• Existing yield levels of a majority of crops remain much lower than the world average • Use of low quality seeds and low adoption of technology have been major challenges	• Increased adoption of hybrid and improved seeds to further improve crop productivity • Strengthening research and seed testing facilities and higher adoption of latest farm machinery
• 60%[52] of the cold storage facilities are located in Uttar Pradesh, Punjab, Gujarat and West Bengal and the rest are unevenly distributed throughout the country • Sub-optimal storage & cold chain infrastructure has resulted in high post-harvest wastage	• Uniform distribution of cold storage facilities throughout the country to help improve India's agricultural export quality • Addressing gaps in cold storage infrastructure by building packaging & processing units near farms and using refrigerated transportation to reduce wastage
• FCI currently has an installed modern silos capacity of 7.25 lakh tonne [53]	• Modernising the storage infrastructure by adding modern silos of 100 lakh tonne[54] capacity in order to improve shelf life of food grains for the Public Distribution System

[52] *Source: MoFPI, PIB*

[53] *Ministry of Consumer Affairs, Food and Public Distribution, PIB*

[54] *Source: State of the art food godowns, PIB*

Reforms imperative in agriculture infrastructure

Agricultural reforms are required broadly in three areas – e-market infrastructure, storage and processing, and research and development (R&D).

Reforms to improve e-market infrastructure

The electronic National Agriculture Market (e-NAM) was launched in the country to fetch better prices for farmers and lower agri-produce prices for consumers, thereby creating a win-win at both ends of the agri-value chain. But implementation challenges and infrastructural bottlenecks have prevented wide adoption of e-NAM. Some of the urgent reforms needed in this context are:

- **Expediting adoption of model Agricultural Produce and Livestock Marketing (APLM) Act –** Many of the constraints in marketing can be addressed by adopting the APLM Act, 2017, which provides for progressive agricultural marketing reforms, including the setting up of markets in the private sector, allowing direct sales to exporters/processors and customers, farmer-consumer markets, e-trading, single point levy of market fee, unified single trading licence in a state, declaring warehouses/ silos/cold storage as market subyards, and the launching of eNAM. Provisions of the APLM Act must be adopted by all states with urgency
- **Greater coordination between Centre and states –** eNAM, which was envisioned as a unified national electronic agriculture market, faces multiple hurdles. For its implementation, each state has to first amend its Agricultural Produce Marketing Committee (APMC) Act. The amendments are required to make a provision for electronic auction as a mode of price discovery, allow a single licence across the state, and levy of market fees at a single point. Most states have, until now, not amended the APMC Act
- **Ensuring better price discovery mechanism –** As per the Department of Agriculture Cooperation and Farmers' Welfare, most of the reported transactions on e-NAM are intra-mandi. Inter-mandi and inter-state trading on the platform are minimal. This essentially means that states on e-NAM have not been able to provide farmers with better price discovery in other mandis of the same state or across states. This has ensured that no competitive bidding happens, and hence, monopoly of APMCs continues unabated
- **Investing in infrastructure/ equipment –** Owing to lack of required equipment or quality testing machines, no scientific sorting/grading facilities takes place at most mandis. Lack of internet connectivity is another hindrance. These challenges give rise to issues in fair auctioning and transparency in bidding. E-payment facilities are also missing at most mandis
- **Undertaking capacity and confidence-building measures –** State agricultural departments have been finding it difficult to convince all stakeholders — farmers, traders and commission agents — to move to the online platform. While traders fear the taxman, farmers fear lower prices if the produce is of inferior quality. This calls for efforts by both state and central governments to allay concerns of different stakeholders
- **Leveraging farmer producer organisations –** There is a need to create an end-to-end agriculture value chain to help double farmers' income. For this, farmers can be organised into farmer producer organisations (FPOs), which can provide assistance to farmers in activities like more-efficient farm practices, shared transportation to reduce logistics' cost, linkage with markets and better price realisation. FPOs can easily link with commodity producer boards to ensure marketing of small farmers' produce

Reforms in storage and processing infrastructure

Despite having a strong agricultural production base, India sees colossal wastage of food each year due to inadequate infrastructure such as packaging facilities, storage, transportation, cold chain, and low levels of processing. On this front, it is important to:

- **Remove infrastructure bottlenecks –** Cold storages require steady power supply. Frequent power cuts are a major cause of concern in India, owing to which companies have to invest separately in power back-ups, which increases the required capital investment. It is vital to improve the health of state distribution companies, or discoms, to create robust power distribution infrastructure
- **Improve supply chain linkages –** India's agriculture market has a long and fragmented supply chain that results in high wastage and costs, especially due to seasonality, perishability, and variability of produce. The rise of online fruits and vegetables segment in e-commerce will enable much needed investments in supply chain management, provided the government creates a conducive regulatory environment for players to invest
- **Improve adherence to quality standards –** India lacks basic standardisation and certification infrastructure. Given the size of the food processing industry, there is a huge gap in the availability of laboratories, trained manpower and certification agencies. There is need to modernise the Food Safety and Standards Authority of India standards and procedures and benchmark them to international standards to enhance export opportunities
- **Enhance storage capacity by building silos –** The Food Corporation of India (FCI) needs to invest more in building modern storage infrastructure. This will help reduce carrying cost of grain and storage losses. As public resources are scarce, it is important to bring in more private players through public-private partnerships (PPPs) and build enabling infrastructure such as railway sidings. Land acquisition has been a serious challenge, and private sector participation would be feasible only when all the required land is acquired, as it will ensure that private parties do not have to bear this risk. The excess land available with FCI may also be used for the purpose

Building of world class agriculture universities and R&D facilities

The total R&D expenditure in India as a percentage of gross domestic product (GDP) has been stagnant at 0.6-0.7% in the past two decades — much lower than the US (2.8%), China (2.1%), South Korea (4.3%), or Israel (4.2%). Research expenditure on agriculture acquires special significance, given millions of Indians depend on this sector. Hence, it is important to create an enabling environment which promotes participation of multiple stakeholders in provision of R&D services. This could be done by:

- **Focusing on precision agriculture:** It is essential to support research on energy friendly irrigation pumps, micro irrigation, climate smart technologies, Internet of Things (IoT), and use of technology in animal husbandry to monitor animal behaviour, health, and production to prepare for future challenges
- **Creating a knowledge hub to disseminate best practices:** New technologies have to be adopted at the farm level. The performance of Krishi Vigyan Kendras (KVKs) must be regularly reviewed by external agencies and well performing KVKs strengthened to disseminate best practices at the field level
- **Developing models of integrated farming:** Research so far has focused on practices for individual crops or enterprises. The Indian Council of Agricultural Research and state agriculture universities must focus on providing recommendations across the farming value chain, covering production, post-production, processing, and other value addition activities. More research also needs to be done in using precision technology to boost agriculture production. Drones can be used for predicting crop yield, estimating crop damage for insurance purpose, seeding and crop surveillance
- **Developing export-oriented institutions:** In order to ensure greater returns, for farmers there is a need to develop a hierarchy of institutions across regions, with a specific focus on marketing both domestically and for exports. For this, multiple hubs or agri-export zones can be added for agricultural produce such as tea, coffee and horticulture. Similarly, a supply chain for marketing produce like ginger/turmeric from North East and other parts of the country also needs to be built

NIP project summaries and marquee projects

Agriculture

About 20 identified projects will be implemented over fiscals 2020-2025. The capital expenditure for these projects is estimated at Rs 134,820 crore. The summary of the projects is highlighted in the table below:

Category	No of projects	Capex over FY20–FY25 (Rs crore)
Gramin Agricultural Markets (GrAM)	1	5,000
Agri-market infrastructure	6	78,660
Testing/quality infrastructure	5	8,585
Cold chain infrastructure	4	4,000
Modernisation of agri infrastructure	2	26,000
Modernisation of agri institutes	2	12,575
Total	**20**	**134,820**

- The major projects to be undertaken include conversion of rural haats (open-air local markets) into GrAM, agri-market infrastructure (terminal markets for fruits/vegetables, computerisation of primary agricultural credit societies, etc.), testing facilities and creation of cold chain facilities

About 15 identified projects will be implemented by the Centre over Fiscals 2020-2025. The capital expenditure for these projects by the Centre is estimated at Rs 1,255 crore. The summary of the projects is highlighted in the table below:

Category	No of projects	Capex over FY20–FY25 (Rs crore)
Mega food parks	15	1,255
Total	**15**	**1,255**

Marquee project

Gramin Agricultural Market (GrAM)

The GrAM scheme is to improve the infrastructure and civic facilities in gramin haats across the country. There is price risk asociated with agricultural markets and sometimes delay in arrival at mandis leads to fall in prices below MSP for some crops. To overcome this, the government is facilitating construction of godowns/warehouses where farmers can deposit their produce and obtain a warehouse depository receipt and wait for the opportunity for higher price. Keeping this in mind, the plan is to develop and upgrade existing rural haats into GrAM for which an estimated Rs 5,000 crore capex would be incurred over fiscals 2020-2025.

Agriculture and food processing – summary of investments

Rs crore	FY20	FY21	FY22	FY23	FY24	FY25	Total
Agriculture							**134,820**
Food processing	461	519	203	73			**1,255**
Food and public distribution							**5,000**
States[55]	3,109	3,376	3,423	1,850	1,176	649	**27,652**
Overall total[56]	**3,570**	**3,895**	**3,626**	**1,923**	**1,176**	**649**	**168,727**

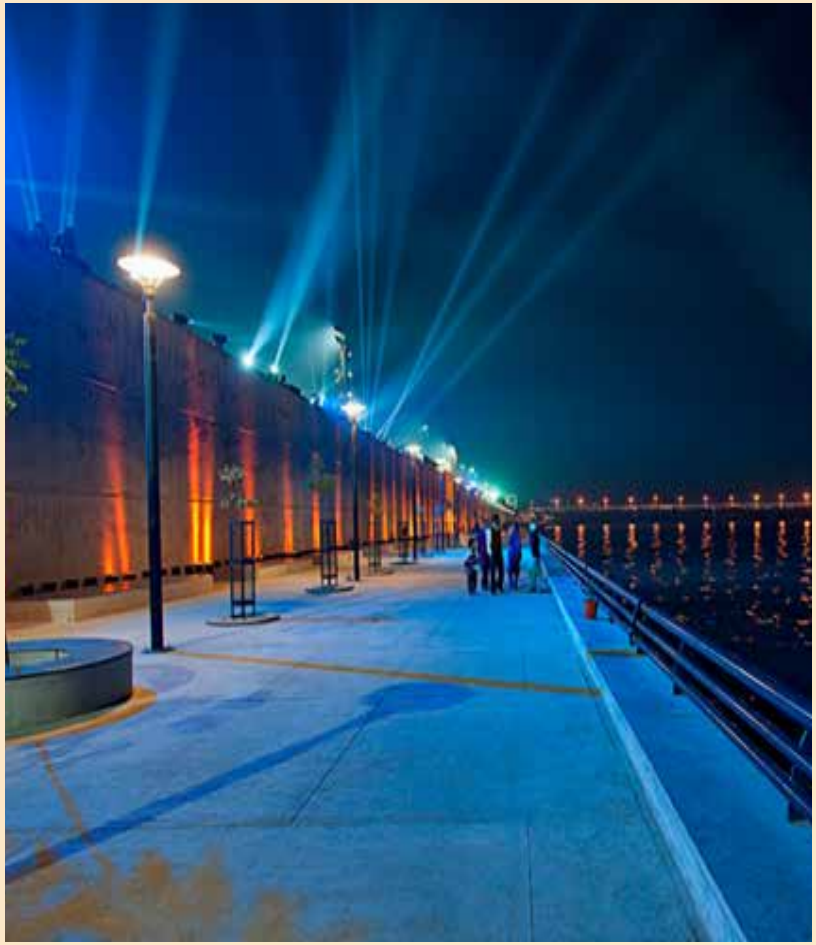
[55]States/UTs include Uttar Pradesh, Maharashtra, Gujarat, Telangana, Jharkhand, Tamil Nadu, Andhra Pradesh, Madhya Pradesh, Karnataka, Haryana, Punjab, Delhi, Kerala, Odisha, Chhattisgarh, West Bengal, Sikkim, Mizoram, Andaman & Nicobar, Chandigarh and Puducherry. For some projects, year wise phasing has not been provided, so capital outlay for FY 20 to FY 25 will not add up to total capital outlay.

[56] Includes projects where yearly phasing has not been provided.

Social Infrastructure

Sector Progress, Deficits and Challenges, Vision and Reforms

Sabarmati Riverfront Development



Project details

- Sabarmati Riverfront is developed on the banks of river Sabarmati in Ahmedabad, Gujarat
- The riverfront is developed by Sabarmati Riverfront Development Corporation Ltd covering an area of ~205 hectares, or 11 km of riverfront on both sides of the river, at a total project cost of Rs 1,152 crore
- The construction of the project started in 2005, the waterfront was opened to public in 2012, and various new facilities are still actively under construction

Salient features

- The key objectives of the project are:
  - Environmental improvement: Reduction in erosion and flood, sewage diversion to clean the river, water retention
  - Social infrastructure: Rehabilitation and resettlement of slum dwellers near the riverbed, creation of parks and public spaces, provision of socio-cultural amenities for the city
  - Sustainable development: Generation of resources, revitalisation of neighborhoods
- The riverfront houses a continuous promenade on both sides of the river, cultural and educational institutions, leisure activities, large public parks, markets and plazas and a few commercial and retail development facilities.

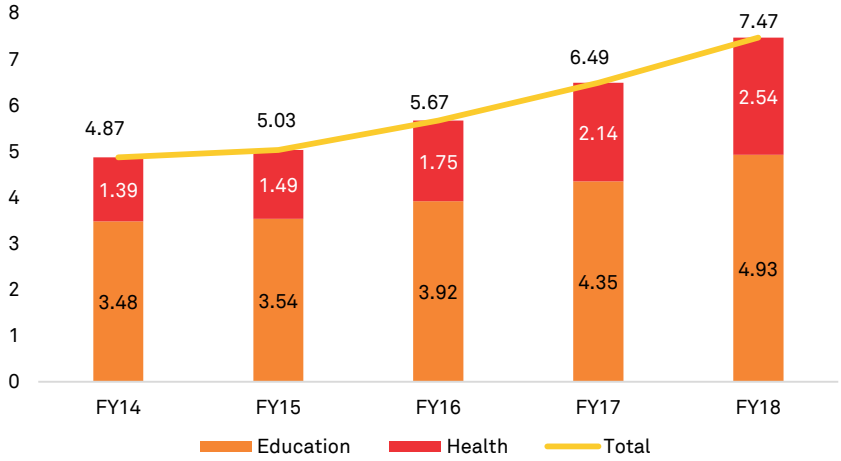
Investment in human capital is a pre-requisite for a healthy and productive population. As India is poised to grow into one of the leading knowledge economies, education, skill development and health will remain priorities for the government.

Trends in social infrastructure sector

To improve healthcare facilities, Upgradation of Medical Colleges programme which envisages improving tertiary health infrastructure through construction of super specialty blocks/trauma care center and procurement of medical equipment for existing as well as new facilities has been taken up under the Pradhan Mantri Swasthya Suraksha Yojana (PMSSY). PMSSY aims to correct imbalances in the availability of affordable healthcare facilities in different parts of the country in general, and augmenting facilities for quality medical education. For improving the quality of medical education and augmenting the tertiary healthcare infrastructure, setting of 22 new All India Institute of Medical Sciences (AIIMS) have been announced. Besides, 157 new government medical colleges are being added in different phases under the scheme for upgradation of district/ referral hospitals to medical colleges.

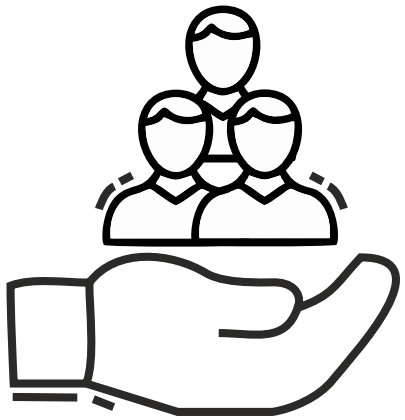
To improve higher education in India, the Rashtriya Uchchatar Shiksha Abhiyan (RUSA) was launched by the Department of Higher Education, MHRD, with the aim to provide strategic central funding to state higher education departments and institutions and achieve the broad objectives of access, equity and excellence. The scheme envisages creation of universities by way of upgradation of existing autonomous colleges, and by way of conversion of colleges in a cluster by bringing together three-five colleges which have required academic excellence and administrative autonomy. Also universities with valid accreditation from National Assessment and Accreditation Council (NAAC) of over 2.5 out of 4 are eligible for infrastructure grants and are given additional resources to strengthen infrastructure facilities for new construction, renovation and purchase of equipment and improving research, innovation and quality improvements.

Figure 76 Expenditure in education and health sector by the Centre and states (Rs lakh crore)



Source: Economic Survey 2018-19

Social infrastructure reforms timeline



2013

RUSA launched to improve quality of higher education

2014

- The Ministry of Skill Development and Entrepreneurship set up to implement the National Skill Development Mission
- The National AYUSH Mission launched to promote cost-effective AYUSH healthcare

2017

- Mission Indradhanush launched to improve immunisation coverage
- NAAC makes accreditation of higher institutions mandatory
- The Higher Education Funding Agency (HEFA) set up as a non-profit NBFC to mobilise extra-budgetary resources to build crucial education infrastructure

2018

Ayushman Bharat Pradhan Mantri Jan Aarogya Yojana launched to provide universal health cover to make quality healthcare service accessible and affordable

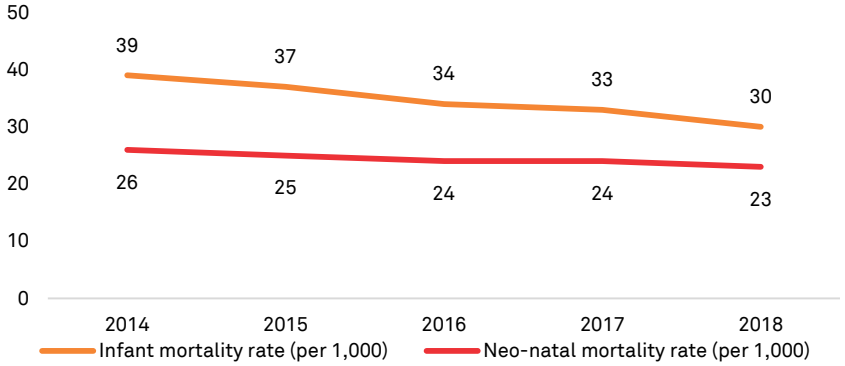
2019

Five-year vision plan -- Education Quality Upgradation and Inclusion Programme (EQUIP) - released by the Ministry of HRD

Infrastructure deficit in social sector

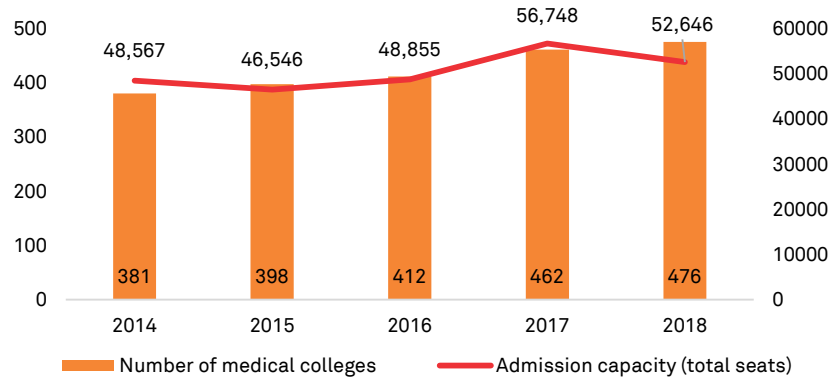
No universal access to quality healthcare, sub-optimal infrastructure, low per capita spend on health

Figure 77 Health indicator – IMR and NNMR



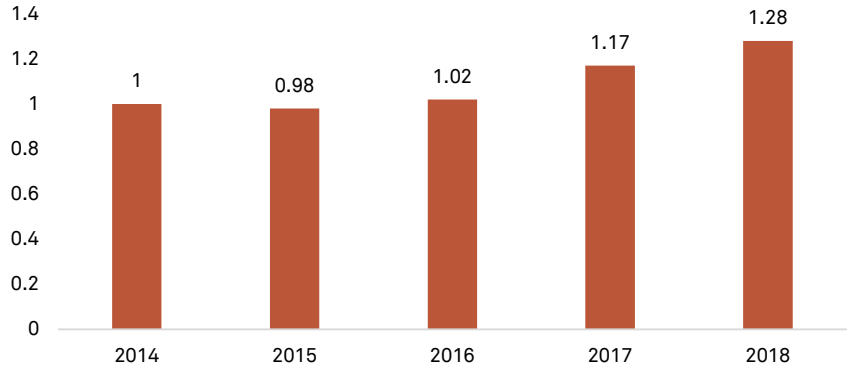
Source: National Health Profile 2018

Figure 78 Medical college infrastructure



Source: Medical Council of India

Figure 79 Public expenditure on health in India as a % of GDP

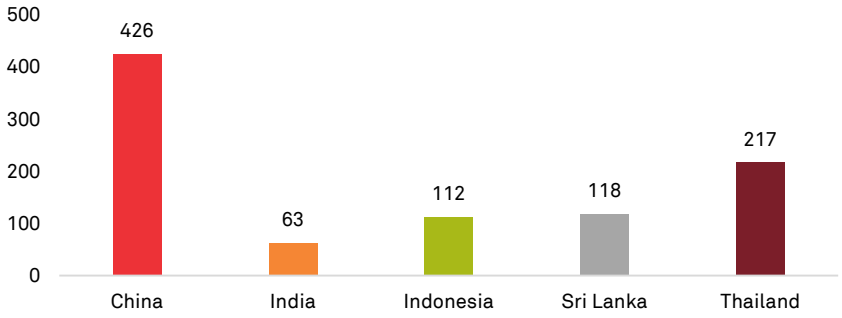


Source: National Health Profile 2018

- In India, access to quality healthcare facilities is sub-optimal partly due to lower per capita spend on health. The way forward is to increase the public expenditure on health to at least 2.5% of GDP, which is nearly double of the current rate of health spending
- It will help upgrade the existing government healthcare facilities by adding more beds and diagnostic facilities. There is also need to ramp up medical colleges in order to address shortage of well qualified medical professionals. To address this issue, PPP in medical education needs to be explored
- To holistically address health (covering prevention, promotion and ambulatory care), at primary, secondary and tertiary level, the government has launched the Ayushman Bharat scheme. Ayushman Bharat has two components
- The first component pertains to creation of 150,000 Health and Wellness Centres (AB-HWCs) by upgrading the Sub-health Centres (SHCs) and rural and urban primary health centres (PHCs) for provision of comprehensive primary health care (CPHC) closer to the community

- The second component is the Pradhan Mantri Jan Arogya Yojana (PM-JAY) which provides health coverage of up to Rs 5 lakh per family per year to around 10.74 crore poor and vulnerable families identified as per Socio Economic Caste Census (SECC)

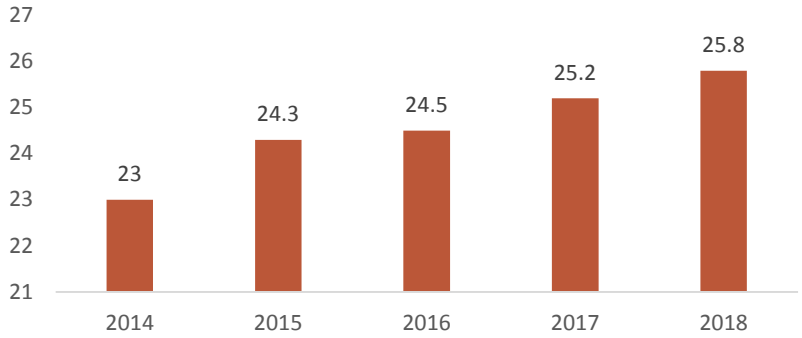
Figure 80 Per capita spend on health in 2018 ($)



Source: WHO - World Health Statistics Report

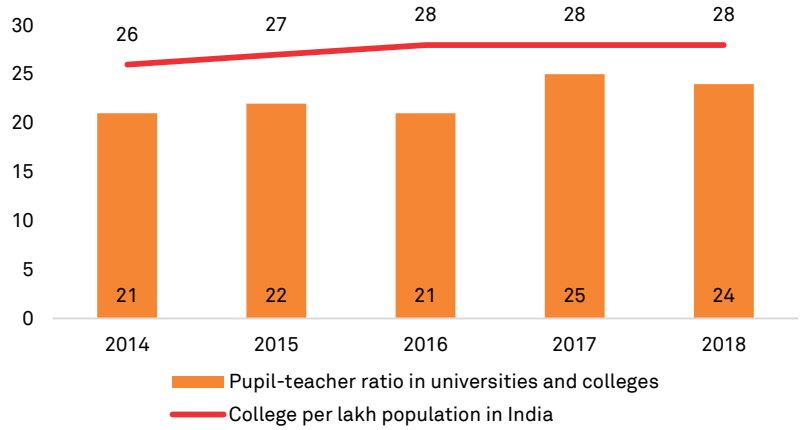
Education: Inadequate higher education infrastructure

Figure 81 Gross enrolment ratio in higher education



Source: MHRD AISHE Report 2018-19

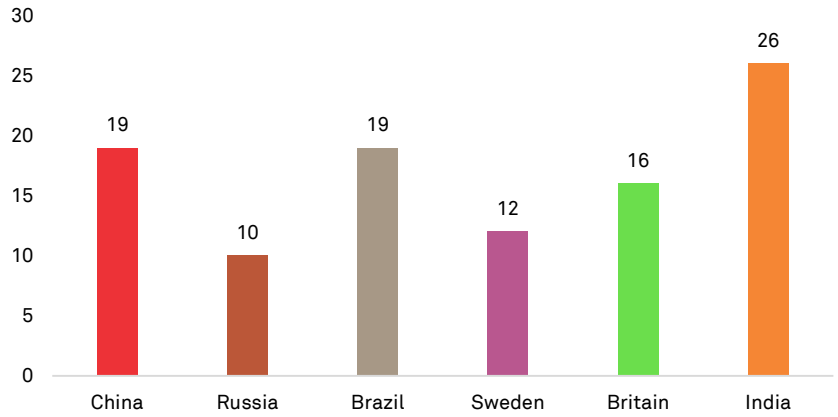
Figure 82 Higher education infrastructure



Source: MHRD AISHE Report 2018-19

- Gross enrolment ratio in higher education has seen an upward trend, but still needs to improve considerably
- Higher education lacks quality due to inadequate infrastructure and research facilities. The way forward is to increase the public expenditure on education and develop more institutes of eminence that can match the teaching and research standards of world-class academic institutions

Figure 83 Pupil-teacher ratio benchmark (2018)



Source: MHRD AISHE Report 2018-19

Vision 2025 for social infrastructure in India

Current status

- Out of the total 39,931 colleges, only 2.5% (~998) offer PhD and 34.9% (~13,936) offer postgraduate programmes
- Infrastructure bottlenecks have restricted quality higher education which significantly lags global standards

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- Gross enrolment ratio (GER) in higher education, which is calculated for 18-23 years age group, is 25.8%
- The pupil-teacher ratio (PTR) is currently 24, which has resulted in sub-optimal learning outcomes

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- India's GDP spend on healthcare has been 1.28% of GDP which reflects on the infrastructure, bed density and service quality of healthcare system
- Immunisation levels have been sub-optimal which has made it challenging to tackle vaccine preventable diseases. Only 62% children between ages 12 and 23 months are fully immunised. As per HMIS 2018-19 (administrative coverage), full immunisation coverage is 91.63%

- Healthcare and diagnostic are facilities quite expensive in India due to excessive dependence on imported medical devices and diagnostic equipment
- Shortage of well qualified doctors and support healthcare staff owing to insufficient medical colleges in the country

Vision 2025

- With a focus on better research quality, at least 50[57] new institutes dedicated to quality research to be set up
- World-class education institutes that will provide state-of-the-art technology driven learning in line with global peers will be set up

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- Overall GER needs to improve to at least 40%[58] with reduced interstate disparity
- To tackle high PTR, new educational institutes to be set up

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- India to spend higher amounts on healthcare at about 2.5%[60] of GDP to revamp the existing health care system and improve hospital bed density
- Mission Indradhanush objectives to be attained. This mission has been undertaken to rapidly improve full immunisation coverage

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- Need to scale up India's medical devices and diagnostic equipment manufacturing under "Make in India" initiative
- Use of tele-consultation which will link tertiary care institutions to district and sub-district hospitals which provide secondary care facilities.
- New medical colleges on PPP basis

[57] *New Education Policy 2019 aims to build 150-300 research institutes over next 10 years*
[58] *New Education Policy 2019 aims to improve GER to 50% by 2035*
[59] *Data as on 29th November 2019*
[60] *Based on the vision of National Health Policy 2017*

Reform imperatives in social infrastructure sector

Public investment in social infrastructure such as education and health is critical for the development of an economy. Despite enhanced government expenditure, a large section of the society continues to lack access to quality education, skill development and health services in India, mostly due to infrastructural bottlenecks. Hence the need for reforms in this area.

Improving healthcare infrastructure

Indian healthcare infrastructure has been unable to keep pace with the demands of a growing population. An increasing number of people are choosing private healthcare facilities over government ones due to the availability of better facilities, including specialist doctors, diagnostic equipment and drugs. However, this has meant increased expenditure on health services that many cannot afford.

Some recommendations to improve healthcare infrastructure are:

- Building more healthcare and wellness centres – Compared with the population and number of people requiring medical treatment, the available quantum of healthcare systems is sub-optimal. This has resulted in higher casualties due to preventable and curable diseases. There is an urgent need to upgrade existing government healthcare infrastructure by adding more beds, equipment, doctors and staff in government hospitals and primary healthcare clinics, especially in smaller towns and villages
- Incentivising the private sector to build primary healthcare facilities – There is a need for greater private participation through the public-private partnership (PPP) route to improve primary healthcare facilities at the district level. Under the PPP model state governments can induct a private partner for a period of 10-15 years to equip, hire human resources and manage a government facility, while the private partner recovers its investment via availability-based payments from the state government that addresses issues related to demand risk. Investment by the private sector in social infrastructure (health and education) may also be considered eligible under corporate social responsibility (CSR) obligations
- Increasing the number of medical colleges – The regulatory system National Medical Commission and Nursing Council of India has failed to ensure adequate availability and quality of health professionals. There is a dearth of quality medical and nursing colleges, resulting in a dire shortage of well-qualified doctors and support staff in the country. Ayushman Bharat has further triggered the need for more health professionals, which requires a strong improvement in governance of medical and allied education
- Scaling up devices equipment manufacturing – India's medical devices market has been largely dependent on imports, raising the cost of using quality healthcare facilities. There is a need to develop a holistic ecosystem to boost the indigenous medical devices industry under the "Make in India" initiative. This has been achieved in states like Tamil Nadu where proximity to R&D facilities and adequate ecosystem support (policy and tax incentives) have led to the formation of a manufacturing hub in Chennai

Improving education infrastructure

Education is one of the most powerful instruments to reduce poverty and inequality and is key to enhancing India's competitiveness in the global economy. Therefore, ensuring access to quality education for all, in particular for the poor and rural population, is central to the economic and social development of India.

Some recommendations to improve education infrastructure are:

- Improving school infrastructure – An analysis of the National

Achievement Survey 2017 shows that factors such as quality and availability of infrastructure in schools, including basic amenities such as drinking water and washrooms, have an impact on the learning outcomes and dropout rates of students. To provide children with a holistic learning environment, investments need to be made to ensure that schools have well-ventilated classrooms, libraries, playgrounds, and adequate furniture, apart from other basic amenities. There is a need for greater involvement of NGOs/ CSR funding to boost the infrastructure of schools and run them efficiently

- Improving governance system for better monitoring and accountability – State governments should develop and formulate robust mechanisms to enforce regulations regarding teacher qualifications, teacher absenteeism and learning outcomes. Learning outcomes should be regularly assessed by independent body, and emphasis should be on improving learning outcomes rather than just ramping up physical infrastructure
- Upgrading regulatory mechanism to allow the entry of foreign universities – In order to improve university education in India, there is a need to create an enabling framework to allow foreign universities of global repute to operate in India, in collaboration with Indian institutions, to offer joint degree programmes
- Developing more Institutes of Eminence – More colleges need to be selected to be developed as Institutes of Eminence to help them attain world-class standards of teaching and research. A graded mechanism to ensure additional funds flow to top public universities should be developed, based on the model adopted by Singapore and China to develop their top universities
- Performance-linked funding for central universities – Currently, only two of 47 central universities have NAAC scores of above 3.51 despite the generous funding available to them. An assessment may be undertaken to understand the challenges faced by these central universities, and they can be asked to develop strategic plans to enter the top 500 global universities rankings in the next 10 years
- Scaling reach using distance and online learning – Open and distance learning and massive open online courses (MOOCs) need to be used to reach out to more students who face financial challenges in accessing quality education. Universities with high accreditation scores may be permitted to offer online education programmes. In regular courses, technology could be leveraged to overcome faculty shortages
- The government has set up various schemes to mobilise funds from the market, as per the requirements of the centrally-funded higher educational institutions set up across all the states of the country. Funding is via agencies such as the Higher Education Funding Agency (HEFA). Also, the Department of Higher Education, Ministry of Human Resource Development, has finalised and released a five-year vision plan, namely the Education Quality Upgradation and Inclusion Programme (EQUIP)
- Another option worth debating may be to stop all subsidies for higher education and move them to primary education given the limited externalities generated by higher education vis-à-vis school and primary education

Reforming Higher Education Funding Agency (HEFA)

- HEFA needs to be restructured. As state universities are starved of capex funding and relaxation of HEFA windows is critical to reviving infrastructure in state-funded educational institutions. HEFA should, therefore, cover all state-funded institutions, as well as public/private institutions ranked among the top 100 (overall) in India. The management of these qualifying private institutes must bear responsibility for the servicing of the full principal and interest of loans so availed
- Government equity in HEFA needs to be substantially increased to meet the expected increase in funding for the projects

Education Quality Upgradation and Inclusion Programme (EQUIP)

- In a bid to transform the higher education sector in the country, the Ministry of Human Resource Development has embarked on a five-year vision plan. The vision plan, termed EQUIP, will be taken up Cabinet approval post inter-departmental consultations
- EQUIP aims to deliver on the principles of access, inclusion, quality, excellence, and enhanced employability in higher education, thereby transforming India's higher education system by implementing strategic interventions in the sector over five years (2019 – 2024)

NIP project summary and marquee project

Education

Overall an estimated capital expenditure of Rs 213,520 crore would be made by both central and states government over fiscals 2020-2025. The estimated capital expenditure by the Centre for higher education during the period is Rs 48,619 crore. All the projects identified (excluding projects where details for the mode of implementation are yet to be finalised) will be implemented through the EPC mode. The summary of the projects (higher education) is highlighted in the table below:

The capex for fiscals 2020-2025

Rs crore	FY20	FY21	FY22	FY23	FY24	FY25	Total
Higher education	5,287	5,499	11,943	13,043	12,848	-	**48,619**

Category	Project cost (Rs crore)
AIIMS and Medical education institutions	14,949
IITs	12,830
Central universities	6,368
NITs	5,141
IIMs	3,633
IISc, IISERs and other MHRD institutions	2,197
Total	**20**
Total by the Centre – higher education	**48,619**

The estimated capital expenditure by the Centre for school education over fiscals 2020-2025 is Rs 37,791 crore. The summary of the projects (school education) is highlighted in the table below:

Category	Capex over FY20 – FY25 (Rs crore)
School infrastructure	37,128
Regional Institute of Education	663
Total by the Centre for school education	**37,791**

Education - summary of total investments

Rs crore	FY20	FY21	FY22	FY23	FY24	FY25	Total
School education	5,053	7,132	7,077	6,398	6,569	5,562	**37,791**
Higher education	5,287	5,499	11,943	13,043	12,848		**48,619**
States[61]	15,125	22,423	22,627	16,524	14,558	12,285	**127,109**
Overall total[62]	**25,465**	**35,054**	**41,647**	**35,965**	**33,975**	**17,847**	**213,520**

Healthcare

Overall an estimated capital expenditure of Rs 151,019 crore would be made by both central and states governments over fiscals 2020-2025. About 52 identified projects will be implemented by the Centre during the period. The capital expenditure for these projects is estimated at Rs 94,697 crore. All the projects identified will be implemented through the EPC route. The summary of the projects is highlighted in the table below:

Category	No of projects	Capex over FY20 – FY25 (Rs crore)
Medical colleges and their upgradation	13	50,151
AIIMS	22	28,937
Construction and setting up of hostel blocks, OPDs, specialty blocks, etc.	14	15,609

- The major projects undertaken include construction of new AIIMS, upgradation of government medical colleges and setting up of special blocks at different government hospitals such as Post Graduate Institute of Medical Education & Research (PGIMER) etc.

Capital expenditure over fiscals 2020-2025

Rs Crore	FY20	FY21	FY22	FY23	FY24	FY25	Total
Centre	18,554	26,111	26,914	9,537	8,030	5,550	**94,697**
States[63]	10,165	14,021	13,000	6,559	1,726	993	**56,323**
Overall total[62]	**28,719**	**40,132**	**39,914**	**16,096**	**9,756**	**6,544**	**151,019**

[61]States/UTs include Uttar Pradesh, Maharashtra, Gujarat, Telangana, Jharkhand, Tamil Nadu, Andhra Pradesh, Madhya Pradesh, Karnataka, Haryana, Punjab, Delhi, Kerala, Odisha, Chhattisgarh, West Bengal, Sikkim, Mizoram, Andaman & Nicobar, Chandigarh and Puducherry. For some projects, year wise phasing has not been provided. So capital outlay for Fiscal2020-2025 will not add up to total capital outlay.
[62]Includes projects for which yearly phasing has not been provided.
[63]States/UTs include Uttar Pradesh, Maharashtra, Gujarat, Telangana, Jharkhand, Tamil Nadu, Andhra Pradesh, Madhya Pradesh, Karnataka, Haryana, Punjab, Delhi, Kerala, Odisha, Chhattisgarh, West Bengal, Sikkim, Mizoram, Andaman & Nicobar, Chandigarh and Puducherry. For some projects, year wise phasing has not been provided, so capital outlay for FY 20 to FY 25 will not add up to total capital outlay.
[64]Includes projects for which yearly phasing has not been provided.

Reform imperatives in other infrastructure sectors

Logistics

The government has an ambitious plan of making the country a manufacturing giant, for which it has launched many initiatives such as Make in India. A robust logistics sector will be an enabler in realising this vision.

The logistics sector has seen significant improvements due to increased government focus in recent years but still faces multiple challenges. The next logical step would be to formulate a comprehensive policy in order to build a more robust logistics network, with greater private involvement.

Implementing policy and regulatory reforms

- A comprehensive national logistics policy can pave the way for a larger and holistic improvement in the sector. It must incorporate key drivers for the sector, namely integrated logistics, information technology and right set of infrastructure. It should also place emphasis on skill development
- The logistics policies of South East Asian nations such as Malaysia and Indonesia follow international best practices, which have helped them improve their rankings on the World Bank's Logistics Performance Index (LPI). India should study their policies to prepare a blueprint of the national logistics policy, which will aid competitiveness of the Indian economy

Developing integrated end-to-end logistics

An integrated logistics system would allow seamless flow of cargo across the value chain, involving multiple stakeholders with varying business models. It would help bring better efficiency, thereby reducing the cost and time of cargo movement.

- Set up multi-modal logistics parks, which can improve the country's logistics sector by lowering overall freight costs, reducing vehicular pollution and congestion, and cutting warehousing costs. The Ministry of Road Transport and Highways (MoRTH) can assist the state governments for selecting potential locations, expediting land acquisition and creating right set of infrastructure for proper connectivity to these parks. This will also play a big role in reducing logistics cost, which is 14% of GDP in India compared with the international standards of around 9%

Regulatory reforms for cold storage

Every year, about 18% of the fruits and vegetables produced in India are wasted due to lack of post-harvest storage facilities. To address this issue, cold storage, needs to be developed, which are constrained by a number of regulatory roadblocks.

- Reforming the Agriculture Produce Market Committee (APMC) Act – The APMC is cited as a major impediment to the growth of cold storage of fruits and vegetables in India. The mandi system works as centralised markets and disincentivises private stakeholders who wish to set up separate cold storage facilities. The present APMC Act doesn't allow multiple market channels such as private market yards and direct marketing
- Reforming the Essential Commodities Act (ECA) – This law does not allow private traders to hold agri-stocks beyond a certain limit. The stock limit is revised from time to time which adds to challenges in creating economies of scale and efficient storage. The ECA can be amended to stabilise the regulatory policies of stock limits

Inland container depots

- It is important to develop a new regulatory framework for inland container depots (ICDs) in order to ease customs clearance mechanism and expedite cargo movement. The idea is to switch to direct entry and delivery model. This can easily be done on the lines of reforms made in direct port delivery (DPD) at the Jawaharlal Nehru Port Trust (JNPT) in Mumbai

Industrial Infrastructure

Robust industrial infrastructure is the foundation of a modern economy. It is important especially for emerging economies like India for boosting employment and economic growth. A holistic policy approach is required to build an enabling regulatory environment and to resolve infrastructure bottlenecks to boost industrial growth.

Reforming industrial parks and SEZs

It is important to develop a manufacturing and services ecosystem which is delinked from export performances. Policies governing industrial parks and special economic zones (SEZs) need not be solely export-oriented and focus should be on making them integrated hubs of economic activities that can generate employment opportunities. Putting in place quality infrastructure and boosting ease of doing business will attract more investments into them.

- Development of industrial park rating system – Developing an industrial park rating system will help increase competitiveness of industries and promote the manufacturing and services sectors. The system should assess industrial parks on parameters such as infrastructure, connectivity, safety management and business support services. This will ensure that industrial parks in the country match global standards
- Separate norms for manufacturing and services SEZs – There is a need to have separate rules and procedures for manufacturing and services SEZs. Also the focus of SEZs should shift from only enhancing exports to a more broad-based objective of employment generation and boosting economic growth
- Creating enabling environment and infrastructure – In order to attract more investments, it is critical to create a conducive ecosystem by promoting integrated industrial and urban development (for instance, walk-to-work zones). Competitiveness can be enhanced by creating high-speed multi modal connectivity, various business services and utility infrastructure
- Developing innovative financing mechanisms – Owing to challenges in raising budgetary resources, various innovative financing mechanisms can be thought of to raise long-term funds and bring in more private capital. Industrial parks should be promoted among investors so that it can attract more foreign direct investment inflows
- Reforming labour laws – The labour laws in the country are overly protective of the labour force in the formal sector. While labour protection and security is important, the flipside has been that it has discouraged entrepreneurs who have stayed away from labour-intensive sectors and opt for sectors with high capital or skilled-labour intensity

Reforming R&D, testing & certification centres

If India wants sustained high growth, it needs to have a robust research and development (R&D) ecosystem with increased investment from both the private sector and government.

- Greater private sector participation in R&D – A country of India's size should invest at least 2% of GDP in R&D. This cannot be achieved without the private sector enhancing its investments in technology development. This can be done by strengthening the public private partnership (PPP) model in knowledge parks and incubators, and by improving academia-industry linkages through developing entrepreneurship cells

- Development of R&D parks – In order to boost private sector investments, R&D parks should be created on the lines of SEZs, offering tax incentives to investors
- Greater international collaboration – Greater collaboration with different countries that have truly been trailblazers in R&D in specific sectors is required. This would give access to global best practices which can then be customised to suit the Indian context
- Increased investments in education – India should look to build its expertise in R&D through enhanced investment in research-based education. Both the government and private sector can invest in specialised universities and better research infrastructure
- Restructuring the ISI mark scheme – Promotion of Indian products overseas should be backed with a visible and credible made in India certification that gives assurance of quality and sustainable practices. The ISI mark scheme of the Bureau of Indian Standards (BIS) is time tested and can be the best for international certification labelling. However, in its present form its certification is legally restricted to Indian standards. So it is essential to come up with a new legislation for notifying standards, technical regulations and certification assessment procedures in accordance with global good regulatory practices

Reforming skill development centres

For harnessing the demographic advantage that India enjoys, the country needs to build the capacity and infrastructure for skilling/reskilling/upskilling of the existing labour force and its new entrants. With most of the developed world having an aging population, India has the opportunity to supply skilled labour globally and become the world's skill capital. However, the demographic advantage might turn into a liability if the skill sets do not match industry requirements.

- Creating a demand-driven skill development ecosystem – Skill development strategies and plans should be made on the basis of sector and geography, mapping the availability of infrastructure and assessing skill requirements at state levels. Regular labour market studies should be done to capture changes in skills required in different industries
- Improving training quality – Infrastructure and capacity of training institutes need to be upgraded. Availability of qualified trainers and industry experts can be ensured through industry-institute linkages. Each training should be followed by an independent assessment of the trainee to measure efficacy of the training intervention
- Setting up vocational training centres in secondary schools – In order to introduce various skills to the children and to make them more employable, vocational education can be started from the eighth grade in schools. This will ensure that children are acquainted with formal vocational courses and apprenticeship training
- Enhancing employment opportunities – There is a need to ensure that students skilled under various programmes are getting enough employment opportunities. This will increase participation in skill development schemes. The government can also look at setting up an overseas employment promotion agency under the Ministry of External Affairs which could closely work with the Ministry of Skill Development and Entrepreneurship to train and certify Indian workers keen on overseas employment in line with international standards
- Enhancing focus on unorganised sector – In order to meet the requirement of skilled workers in the unorganised sectors, it is necessary to scale up Recognising of Prior Learning (RPL) under the Pradhan Mantri Kaushal Vikas Yojana, using apprenticeship, work-based learning and advanced courses

Reforming tourism infrastructure

As a highly labour-intensive sector, tourism has the capacity to generate large-scale, good quality employment. In order to unlock the sector's potential, there is a need to solve the issues of infrastructure and inadequate connectivity that it currently experiences. This will create an enabling environment for greater private sector participation.

- Financing through innovative models in PPP – To attract greater private investment into the sector, it is important that the private sector bidder gets all clearances and licences upfront before awarding bids to construct a project. This will reduce development risk for the bidder and ensure timely completion of the project
- Developing iconic sites – More iconic tourist sites can be developed by pooling funds from the Centre, states and the private sector. The objective should be to develop the sites in a holistic manner by involving various stakeholders, including the local people, while addressing the issues related to connectivity, facilities and customer experience
- Improving connectivity to tourist destinations – This can be achieved by improving flight connectivity to tourist destinations through the Ministry of Civil Aviation's Regional Connectivity Scheme – UDAN (RCS-UDAN)
- Building tourist circuits – It is important to promote more tourist circuits such as the Golden Triangle (Delhi-Agra-Jaipur)
- Greater private sector participation in ropeways and cable cars – It is necessary to attract and involve private sector investors through PPP mode which is financially viable for developing ropeways and cable-car facilities. Ropeways and cable cars would also decongest the major tourist destinations. This will increase the attractiveness of tourist destinations and boost domestic and foreign tourist arrivals

NIP project summaries and marquee projects

Industrial infrastructure NIP summary

Overall an estimated capital expenditure of Rs 306,732 crore would be made by both central and states government over fiscals 2020-2025. There are 25 projects identified to be implemented by the Centre during the period. The estimated capital expenditure for this period is Rs 69,750 crore. Most of the projects identified will be implemented through the EPC mode (except for a few multimodal transport and logistics hub projects).

Project	No of projects	Mode of implementation	Capital outlay (Rs crore)
Trunk infrastructure for industries and its components	16	EPC	41,975
Multimodal transport and logistics hub	3	EPC/ PPP	10,788
Global industrial finance and trade city	1	EPC	1,382
Others	5	EPC	15,604
Total	25		69,750
Convention & expo centre	1	EPC	6,446
Total	**1**		**6,446**

DPIIT (Convention and expo centre) has identified one project to be implemented over fiscals 2020-2025. The estimated capital expenditure for this project is Rs 6,446 crore and it will be implemented through the EPC mode.

Industrial infrastructure – summary of investments

Rs crore	FY20	FY21	FY22	FY23	FY24	FY25	Total
Centre	5,075	19,396	20,676	16,383	10,565	4,100	76,195
States[65]	12,336	21,281	21,882	17,146	12,166	6,420	230,537
Overall Total[66]	**17,412**	**40,676**	**42,558**	**33,529**	**22,731**	**10,520**	**306,732**

Ministry of Steel NIP summary

The Ministry of Steel has identified **4 slurry pipeline projects** to be implemented over fiscals 2020-2025. The total capital expenditure for these identified projects is estimated at **Rs 8,225 crore.** Three projects worth Rs 5,441 crore are to be implemented through the PPP route while one project worth Rs 2,784 crore is to be implemented through EPC mode. The summary of the projects is highlighted in the table below:

Rs crore	No of projects	Mode of implementation	Cost (Rs crore)
Slurry pipelines			
Private sector	3	PPP	5,441
Central PSU	1	EPC	2,784
Total	**4**		**8,225**

Tourism - summary of state[67] investments

Rs crore	FY20	FY21	FY22	FY23	FY24	FY25	Total
Capital expenditure[68]	1,104	1,581	2,059	1,863	1,196	715	**19,777**

Sports infrastructure - summary of investments

Rs crore	FY20	FY21	FY22	FY23	FY24	FY25	Total
Centre	60	300	300	300	340		**1,300**
States[69]	1,260	1,247	1,124	1,089	880	840	**7,769**
Overall total[70]	**1,320**	**1,547**	**1,424**	**1,389**	**1,220**	**840**	**9,069**

[65]States/UTs include Uttar Pradesh, Maharashtra, Gujarat, Telangana, Jharkhand, Tamil Nadu, Andhra Pradesh, Madhya Pradesh, Karnataka, Haryana, Punjab, Delhi, Kerala, Odisha, Chhattisgarh, West Bengal, Sikkim, Mizoram, Andaman & Nicobar, Chandigarh and Puducherry. For some projects, year wise phasing has not been provided. So capital outlay for Fiscals 2020-2025 will not add up to total capital outlay.
[66]Includes projects for which yearly phasing has not been provided.
[67]States/UTs include Uttar Pradesh, Maharashtra, Gujarat, Telangana, Jharkhand, Tamil Nadu, Andhra Pradesh, Madhya Pradesh, Karnataka, Haryana, Punjab, Delhi, Kerala, Odisha, Chhattisgarh, West Bengal, Sikkim, Mizoram, Andaman & Nicobar, Chandigarh and Puducherry. For some projects, year wise phasing has not been provided. So capital outlay for Fiscals 2020-2025 will not add up to total capital outlay.
[68]Includes projects for which yearly phasing has not been provided.
[69]States/UTs include Uttar Pradesh, Maharashtra, Gujarat, Telangana, Jharkhand, Tamil Nadu, Andhra Pradesh, Madhya Pradesh, Karnataka, Haryana, Punjab, Delhi, Kerala, Odisha, Chhattisgarh, West Bengal, Sikkim, Mizoram, Andaman & Nicobar, Chandigarh and Puducherry. For some projects, year wise phasing has not been provided. So capital outlay for Fiscals 2020-2025 will not add up to total capital outlay.
[70]Includes projects for which yearly phasing has not been provided.

General Reforms

1. Project preparation

Project preparation is a critical step in efficient implementation and creation of bankable infrastructure projects. It involves activities such as need-identification/conceptualisation, feasibility study, finalising the project structure and mode of implementation and bid procurement. Inadequate project preparation may lead to time and cost overruns during the implementation of the project and it may also lead to the project getting scrapped prior to its implementation. Despite there being an increased focus on project preparation in India, it has been unable to translate its infrastructure requirements into a robust, prioritised and well-defined project pipeline. The following section highlights the critical elements required to have a robust project preparation framework.

- Transparent policy: It is important for the government to set long-term goals and aspirations that it needs to achieve in a given period. In alignment with the above strategic direction, it is necessary to have a long-term infrastructure plan and policies in place. Each of the government departments/ contracting agencies should focus on preparing multi-year plans and be accountable for implementation of the same. The accountability and focus on implementation of these multi-year plans will translate into improvement in the project preparation capacities of the Government Contracting Authorities (GCAs). The NIP is a step in that direction
- Presence of an overarching, capable and empowered public institution for infrastructure planning: As the long-term infrastructure plans are complex and spread across various sectors, the responsibility of preparing, updating and reviewing these multi-year plans needs to be undertaken by capable and empowered public institutions. A majority of countries have mandated the responsibility of preparing infrastructure plans with a central planning authority. This translates into the requirement of an infrastructure institution affiliated to the Ministry of Finance which may be given this responsibility
- Presence of guidelines, standards, model documents and processes: To translate well-defined policies into action and improve implementation of infrastructure projects, it is critical that these policies are backed by guidelines, standards, model documents and processes for actual implementation of projects. Further, it is important that the sub-national governments that are also responsible for infrastructure development within their jurisdiction are aligned with the national level policies, guidelines, standards and processes, in order to have robust project preparation at the sub-national level
- Improving private sector participation: Transparent and well-defined PPP policies are important for provision of a robust institutional framework for developing, procuring and implementing infrastructure projects via PPP route. These well-defined PPP policies should identify the competent authority responsible to undertake project preparation and implementation, along with guidance on methods and procedures to be followed for competitive procurement. India already has a PPP Appraisal Committee seated in the Department of Economic Affairs, Ministry of Finance, which is the institutional mechanism for appraisal of PPP projects. It is inter–disciplinary in nature with members from NITI Aayog, Department of Expenditure and Department of Legal Affairs
- Improving project concept and pre-feasibility stage of project preparation: It is necessary to strengthen the ability and planning processes followed by GCAs to create the project pipeline with high-priority projects. There should be improved coordination and cooperation between the central agencies responsible for preparing and reviewing the project pipeline and various departments in the national or sub-national governments. For facilitating improved early stage screening and project identification, structured processes and guidelines such as the project identification route-map implemented by the United Kingdom should be put in place. These route maps consist of detailed checklists to be used during the initial assessment of projects, guidance on performing the gap analysis and guidance on necessary steps for enhanced project

environment. Further for quality assurance of pre-feasibility reports, it is necessary that these reports are reviewed or evaluated by third party or independent agencies

- Improving feasibility stage of project preparation: To have preparation of comprehensive and high quality project feasibility reports, it is necessary to have frameworks and standardised guidelines in place. Given the complexity of undertaking feasibility studies, use of standardised guidelines, frameworks and procedures is crucial. These guidelines should define the approach to be followed and the parameters to be evaluated for all aspects of feasibility study – alignment with strategic direction/ national long-term vision, financial assessment, environmental assessment, legal assessment, economic assessment, affordability, etc. In case of PPP mode of implementation, it is important to have standardised processes and model bid documents in place to have smooth and efficient procurement.
- Well-defined workflows, multi-stage reviews, audits and approvals result in improved project quality and quality assurance: A standard platform needs to be developed for independent appraisal of projects, by reducing the conflict of interest of the entities involved in project preparation and appraising and approving the projects. The independent entity/ platform performs detailed appraisal and also checks the correctness of the steps undertaken. The Gateway Review Process in the United Kingdom has instituted a robust and compulsory peer review process at key stages of the project's lifecycle in order to improve the quality of project preparation. Further, these review exercises should involve multiple stakeholders so that all critical issues and challenges in a project are properly addressed. PIMAC in Korea and MIRT Framework in the Netherlands are independent agencies responsible for review of project preparation documents, involving a wider set of stakeholders in the review throughout the project preparation lifecycle. The Indian PPP Appraisal Committee seated in the Ministry of Finance may need to be strengthened on similar lines.

2. Enhancing execution capacity of private sector participants

A key pre-requisite for robust private sector participation is to have an adequately deep pool of developers with required experience, competence and execution capacity. In many of the infrastructure sectors today, only a handful of private sector participants are available. Limited availability of participants reduces the pace of infrastructure build-out via PPP, as the execution capability and ability to attract finance, both turn into limiting factors and the concentration risk increases. Also, the project execution scenario in India hasn't been very encouraging in view of the ongoing liquidity crunch and persistent twin balance sheet stress issue. Hence, efforts of all stakeholders are required to reach a stage where projects are executed in an efficient manner.

To alleviate the above scenario of lack of eligible private sector participants, a multi-pronged approach is required. First, an effective enabling environment is necessary, that makes the infrastructure sector attractive for private sector participation. Sanctity of contracts and speedy dispute resolution processes are critical in this regard. Secondly, capacity development of the private sector is required, so as to enable correct project appraisal, evaluation, bidding, financing and execution. This ought to prevent over-aggressive and ill-conceived bids that ultimately result in delays or failure in project delivery.

Part 1: Enabling environment

An effective enabling environment comprises two key ingredients: A robust policy framework and well developed public institutional capacity; while the policy frameworks should articulate the broad principles governing private sector participation, building public institutional capacity catalyses project preparation.

A robust policy framework facilitates clarity, consistency and stability of government actions, while providing for the agility to adapt and manage changes in the wider infrastructure ecosystem. It signals government commitment to infrastructure development. These frameworks ought to be followed-up with guidelines, standards and processes which are key to make policy actionable. Also, importantly for a federal structure like India, an aligned cascading of policies across the national and subnational levels is essential to ensure policy coherence, stability and visibility to private sector investors.

The policy framework and regulatory ecosystem should invite private participation through well framed contractual agreements with optimal and equitable risk allocation. Contracts, so entered into, should be honoured, in letter and spirit. Any deviation, from the contract should be swiftly adjudicated through dedicated institutions for dispute resolutions in a timely manner. A brief synopsis of these elements of an enabling environment is given below.

Risk sharing

- Optimal and equitable risk allocation between public and private sectors – PPP contracts should ensure optimal and equitable risk allocation across stakeholders such that the risk is allocated to the entity that is best suited to manage it. In this regard FIDIC contracts can be opted for India. Second Report of the Chaturvedi Committee on the faster implementation of NHDP also puts emphasis on adoption of the FIDIC model in all forms of contract. NITI may be entrusted with the task of getting views of industry and ministries and recommending alignment of current contract clauses with international best practices, including standardisation of contract clauses across ministries and CPSEs within a period of three months
- Model Concession Agreement should be developed across sectors – The adoption of Model Concession Agreement has substantially reduced the transaction cost. However, Model Concession Agreements (MCAs) have been developed only for roads and port sectors in India. There is a need to develop MCAs across infrastructure sectors like station redevelopment, airports, etc
- Upfront clearances – Project delay has been one of the most common reasons for stalling of many projects, resulting in losses for private players. Hence, a new mechanism can be set up to ensure all key clearances and licences that may impact project viability are obtained upfront before bidding of the project. This will substantially reduce project completion risk for private players and ensure timely completion of projects

Form of contract

- Sanctity of contracts – In order to boost the confidence of investors, it is absolutely important that the sanctity of a contract is maintained. The provisions should be legally enforceable, such that once parties duly enter into a contract, they must honour their obligations under that contract and, in case they don't honour, there should be adequate safeguards for other stakeholders. This should be applicable to both public and private sectors. All ministries should work closely with CPSEs,

state governments and developers/contractors to build a culture of honouring contracts. NITI Aayog may sensitise state governments and local bodies on this crucial issue through the Governing Council. In case of inability, contracts should have adequate safeguards built in the form of clearly quantified termination payments under various possible scenarios

- Capacity building of state governments – In order to ensure strong contractual enforcement, it is necessary to build capacity of state government employees in understanding the risk matrix and their responsibilities as per the contract. This is important so that state governments and local authorities can provide administrative support in enforcing contracts at grassroot levels
- Standardisation of contracts – In order to ensure clarity in the roles and responsibilities of the main parties, as well as the allocation and management of risk, International Federation of Consulting Engineers (FIDIC) contracts can be adapted with project level flexibility
- Safe exit for parties – In case of a project getting stuck due to some reason beyond the control of the concessionaire, the terms of the contract should be framed in such a manner that they allow the party/concessionaire to exit the contract easily with reasonable consequences

Dispute resolution

- Mediation and conciliation: The capacity of all stakeholders, including regulators, authorities, consultants and financing agencies, needs to be built up in order to efficiently resolve disputes related to PPP projects. Certain infrastructure agencies like NHAI have put in place conciliation mechanisms. Ministry-level committee may be set up to resolve complex contractual disputes as mediation mechanisms that can settle disputes out of court. FIDIC provides for a Dispute Resolution Board acting as conciliation mechanism as part of the contract structure review. This will help in ensuring early identification of the growing disagreement between government functionaries and the private party to facilitate quick dialogue
- Improving arbitration framework – The current issues relate to both enforcement of awards as well as trustworthiness of the arbitration process
    i. Challenging arbitration awards should be made very selective and the approved policy of paying 75% of the challenged arbitration awards needs to be enforced. NITI may continue to monitor the same
    ii. Clear guidelines may be laid down as to when a ministry or authority may challenge an arbitration award under Section 34 of the A&C Act. NITI may be requested to come out with draft guidelines
    iii. The New Delhi International Arbitration (NDIA) Centre Act 2019 has been enacted. The NDIA Centre should be established with global standards immediately. Government contracts should also provide for institutional arbitration in such accredited seats
- Designating special courts for resolving infrastructure disputes – Under Specific Relief (Amendment) Act, 2018, there is a provision for designating civil courts for infrastructure disputes. Under the said provision, 17 states and 3 UTs have designated courts for infrastructure disputes. The balance states/UTs are being requested to do so in an expeditious manner. In order that this delivers sound results in enabling speedy resolution in the next few years, Department of Economic Affairs (DEA) and Department of Legal Affairs (DOLA) may jointly ensure effective functioning of special courts under Section 20B of the Act

Development of public institutional capacity is essential, with well-governed public institutions having a clear role, mandate, and commensurate capacity to operationalise policy into effective project preparation and smooth implementation.

The capacity of public institutions to plan, prepare and deliver infrastructure projects is central to effective infrastructure development. Even where infrastructure projects are executed with private sector participation through PPP arrangements, the role of the public sector institutions is crucial. Such an institutional mechanism exists in the form of PPP Appraisal Committee (PPPAC) in India.

An enabling environment makes infrastructure sector attractive for private sector participation and reduces the barrier to entry for new participants.

Part 2: Capacity development of participants

The capacity development of participants to ensure proper project management and timely execution is critical. Timely execution of a project is dependent on a variety of factors such as proper project evaluation, preparation of realistic detailed project reports with realistic project cost estimates, correct design elements, accurate pre-qualification criteria for the selection of the contractor, and proper construction supervision and contractual management.

Project evaluation should satisfactorily cover the areas of design, quantification, costing, and contractual engagement. Evaluation should begin with pre-planning and site investigation to reduce uncertainty during execution and enhance reliability on project budget and schedule. Pre-planning work should include required topographical surveys of infrastructure sites, preparation of plans of survey work - for compiling benchmark information and description of features, geotechnical tests, material testing and estimation of the quantity and quality of material needed to comply with the relevant codes, amongst other measures. For PPP projects, care should be taken that specifications are in the form of outputs and outcomes rather than inputs.

Further, the construction supervision and contractual management is also important. The contractors' organisational arrangements, key personnel, construction programs, plant and equipment should be satisfactorily drawn up. Here one should aim for productivity improvement - Construction is largely an unorganised sector in India and poor productivity, low utilisation of resources, and site inefficiencies are natural offshoots. This coupled with scarcity of skilled resources impacts work, eventually leading to reworks, errors, quality issues and delays. To overcome this, lean construction structuring can be used for large projects to improve work flows.

Finally, monitoring the progress of works against programmed targets, inspection and approval of proposed contract variations and additional works, preparation of quality standards and codes and quality audit are essential.

A summary of techniques in building project management capability is given below:

Project management capability

- National Project Management Framework - There is a need for greater involvement of the Department of Economic Affairs (DEA), NITI and Ministry of Statistics and Programme Implementation (MoSPI) in programme implementation. It is recommended that a National Project Management Framework be drafted putting in place systems for effective project management. Tested frameworks like the Project Management Book of Knowledge (PMBOK) of Project Management Institute - PMI (of USA), PRINCE2 (UK), etc., could be used. Project management standards need to be reviewed and upgraded keeping in mind large time and cost overruns faced in projects. NITI Aayog in the report of the Task Force on Project and Program Management has made a number of recommendations which are endorsed by this Task Force as well for immediate implementation

  i. NITI may review implementation of the recommendations of the above Task Force by all infrastructure ministries

  ii. Committee on Project/ Program Management (CPM) may be created by NITI to develop a National Project/ Program Management Policy Framework (NPMPF)

  iii. CEO, NITI may be requested to write to all states to set up a State Committee of Secretaries (SCoS) / High Powered Committee (HPC)/ Empowered Committee (EC) for projects above Rs 500 crore to avoid cost and time overruns

  iv. A single national project monitoring platform may be created integrating PMO (PRAGATI), PMG (e-Suvidha), MoSPI (OCMS) and ministries for effective tracking and monitoring of key public projects as recommended by the NITI Task Force

- Establishing a robust project governance structure – As a large project (such as Nal se Jal) will involve multiple stakeholders, a national level multi-tiered Project Management Unit can be formed with an aim to enhance collaboration between the Centre and the states. This will ensure quick resolution and decision making to ensure timely project implementation
- Use of agile planning – A more collaborative approach, involving contractors/ subcontractors and key stakeholders (various departments, local communities, etc.) can be used instead of the prevailing command and control planning practice that will ensure setting-up of more realistic targets from early project stage
- Improving procurement process and strengthening contract management – Many large projects are often delayed by inefficient procurement process and improperly structured contracts. As infrastructure projects run for multiple years, it is paramount to have strong contract between implementation agency and the contractor for project success
- Strengthening people management processes – Lack of structured project communication and slow decision making are two critical issues that lead to time and cost overruns. For improving this, the decision makers need to be motivated, well-trained, completely informed, and adequately empowered. There needs to be a clear responsibility charter, with delegation of decision making authority and greater adoption of technology to increase project implementation visibility at each stage

3. Enhancing ease of doing infrastructure projects

Time and cost overruns in infrastructure projects have been a major concern in India. As per a report released by Ministry of Statistics and Programme Implementation (MoSPI), which monitors infrastructure projects worth Rs 150 crore and above, as of July 2019 ongoing infrastructure projects have shown cost overruns to the tune of Rs 3.88 lakh crore owing to delays and other reasons. Of the 1,623 projects, 355 have reported cost overruns and 552 have reported time overruns. The major reasons stated for time overruns include delays in land acquisition, forest clearance, Right of Way (RoW)/ Right of Use (RoU) issue, contractual issues and supply of equipment.

- Single window approval – As the planning and prioritisation of infrastructure projects typically involve both central and the state government, a lot of time is required to get necessary approvals from the concerned authority both at the Centre and state level. In order to expedite this process there is dire need for a "single window" for providing all approvals and clearances and minimize bureaucratic procedures
- Conditions precedent – In order to make ease of doing infrastructure a reality, there need to be certain conditions that should be fulfilled before awarding contracts. As land acquisition has been a major bottleneck which often leads to delay in projects, the Task Force recommends that 90% of contiguous land should be available with the authority before bidding. In addition, all applicable clearances may be procured by the project authority and provided upfront before award. This will ensure that contractors and developers will not be affected by delays caused by land acquisition and clearances
- Ensuring sanctity of contracts - Litigation resulting from retrospective changes in contracts that have been signed years back seriously affect the capacity of the infrastructure sector to attract the required capital. It is important to resolve issues around contract enforcement such as power purchase agreements (PPAs) to attract private players and global developers in the infrastructure sector. Sanctity of contracts needs to be ensured by both public and private sectors

4. Technology, data and design innovations

Advanced technologies such as data analytics, artificial intelligence, virtual reality, cloud, etc. are transforming the world at a rapid pace - with introduction of new, innovative and unique disruptive ideas in each and every field of our lives. Innovation has now become a critical element to be focused on by countries to grow at a fast pace. Innovative countries are investing in data development and are embracing collaborative practices, such as encouraging open data and knowledge exchange that support the innovation ecosystem.

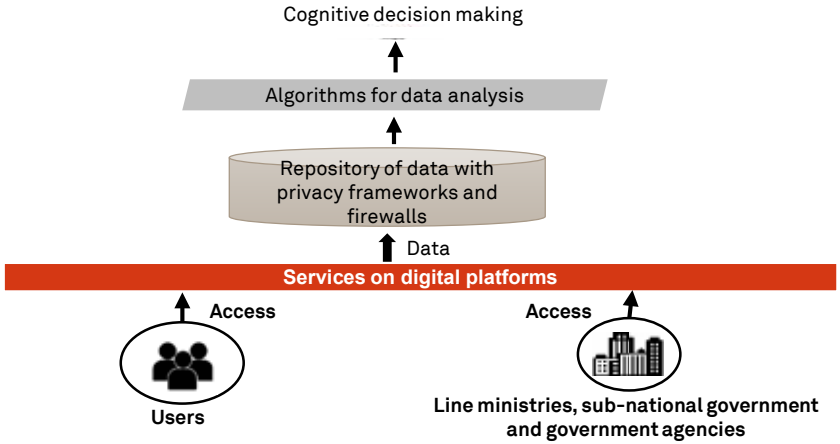
Creating public data sources with adequate data privacy frameworks – To foster an environment of informed decision making, there is a need to create and administer public data sources for use both by public and private organisations. At present, a majority of the services provided by the public and private sectors are available on digital platforms along with access to various social networking platforms. An increase in access to such digital platforms, leaves a lot of data behind, which can be captured in these public data sources and can be analysed in order to identify the need/ issue and undertaking necessary steps/ cognitive actions to resolve the issue or provide for the need. The government launched Open Government Data Platform India in 2012 for data sets published by various ministries and departments; however, more needs to be done for better data accessibility.

Data-based policy decisions - To improve the quality of services and livability of cities, it has become imperative to scale citizen services through digitisation, improvement of work process and development of new standards and protocols. To achieve all of this, it is important to develop the knowledge infrastructure and steer way for future where

the massive amount of data that is constantly being generated will result in invaluable insights. The real-time user data and the data from various government agencies, departments, that is captured in the public data sources can be analysed to take cognitive policy decisions and infrastructure development.

Smart infrastructure – The quest for more efficient infrastructure associated with the rise of information technology has led to the concept of smart infrastructure. This would require creating an ecosystem where enabling technologies such as connected sensors and big data analytics are connected with the physical infrastructure to achieve real time monitoring and enhanced service delivery. The potential benefits of smart infrastructure include decreased maintenance costs, reduced down time and increased quality of service. The concept of smart infrastructure can be applied in many sectors including electricity distribution, water management, intelligent transport systems, emergency services and monitoring critical infrastructure such as tunnels, bridges and dams.

Figure 84 Services on digital platforms



Foster a regulatory environment that is supportive of digital technology adoption – Emerging technologies such as artificial intelligence (AI), machine learning, big data analytics, distributed ledger technology, and the Internet of Things (IoT) are creating new ways for consumers to interact – and disrupting traditional business models. This has resulted in key challenges for regulators on how to best protect citizens and ensure fair markets while allowing new technologies to flourish. This regulatory uncertainty along with the complexity in using these advanced technologies is affecting the full adoption of technology in many sectors. It is necessary that the line departments/ ministries are made responsible for regulating and adopting these advanced technologies in their respective sectors. At present, adoption of advanced technologies in core infrastructure sectors in India is at a very nascent stage. In the power sector, smart metering has been introduced to reduce the losses of Discoms, further basic services such as payment of electricity bills, application for new connections, etc. are available on digital platforms. In the roads sector, usage of FasTags for tolling has helped reduce wait time at toll plazas. Advanced technologies can be used in providing traffic management, surveillance, speed regulation, etc. Introduction of IoT and other advanced services in providing urban infrastructure has been undertaken as a part of the Smart City Mission.

Capacity building - Although most of these advanced technologies are complex in nature, their adoption in efficiently delivering services is hardly complex. To capture the full potential of emerging technologies, it is important that the line ministries/ departments responsible for adopting these technologies augment their internal capacities regarding the available technologies. An environment needs to be created where these technologies flourish by adopting appropriate regulations that protect the rights of citizens and help foster an environment of innovation.

5. Infrastructure quality

Good quality infrastructure is the most critical physical requirement

for attaining faster growth in a competitive world. It is also essential for ensuring improved human development index (a measure of a country's achievement in ensuring the health, education, and standard of living of its citizens) and broad-based participation in development involving equitable distribution of benefits and sustainable economic development.

The G20 has also highlighted the importance of the quality of infrastructure investment, including in the Leaders' Communiqué at the 2016 Hangzhou Summit, and in the Roadmap. In infrastructure, quantity and quality can be complementary. A renewed emphasis on quality infrastructure investment will build on the past G20 presidencies' efforts to mobilise financing from various sources, particularly the private sector and institutional sources including multilateral development banks, thereby contribute to closing the infrastructure gap, develop infrastructure as an asset class, and maximising the positive impacts of infrastructure investment according to country conditions. Under the Japanese presidency the G20 Principles for Promoting Quality Infrastructure Investment, a document that sets out a set of voluntary, non-binding principles that reflect our common strategic direction and aspiration for quality infrastructure investment. India can adopt many of these general measures as part of the NIP that is in keeping with national priorities and country circumstances. The six principles are as follows :

a) Maximising the positive impact of infrastructure to achieve sustainable growth and development
b) Raising economic efficiency in view of lifecycle cost
c) Integrating environmental considerations in infrastructure investments
d) Building resilience against natural disasters and other risks
e) Integrating social considerations in infrastructure investment
f) Strengthening infrastructure governance

Uniform regulation - Developing infrastructure in India is the responsibility of authorities. As a result, certain types of infrastructure that are the responsibility of the central government may be developed with consistent capacity across the country. However, where sub-national authorities are responsible, infrastructure provision may vary depending on state capacity, even if the same standards are adopted. Therefore, it is paramount that uniform regulations and output-based sector-specific performance standards are adopted across different levels of governance to build standard quality infrastructure. For example, in case of the roads sector, the Model Concession Agreement has evolved over a period of time wherein the Concessionaire has to comply with clearly defined levels of output based parameters like surface roughness of the road instead of merely mentioning re-carpeting to be done at specified time intervals irrespective of the actual wear and tear of the road project. This encourages construction of quality roads besides avoiding unnecessary periodic maintenance and, thus, inconveniencing users.

Developing consistent process for setting standards - The process for developing infrastructure standards is not consistent across the multiple sector-specific standard setting bodies in India. As a result, quality assurance and appropriateness of the standards are suspect. In order to bring in consistencies, uniform standard setting processes need to be adopted. For example, India can take a cue from USA and Canada where accreditation of Standards Development Organizations (SDO) processes is used to streamline the way standards are developed across various bodies

Alignment with development strategy - The infrastructure project must be aligned with the medium and long-term development strategies of central and state governments. This will ensure that projects would be integrated with future developments to substantially enhance the ease of living for citizens.

Alignment with social and environmental sustainability - Social and

environmental standards applied to infrastructure projects must be determined using objective and quantifiable indicators. These targets can be reviewed continuously throughout the project life to ensure sustainability for future generations. It is imperative to reduce or mitigate the negative social and environmental impacts through application of reliable safeguard procedures and standards which not only comply with international practices but also are consistent with local laws and conditions. This would result in developing environmental friendly infrastructure to realise the vision of a low-carbon society which is needed to address global warming and climate change.

Strengthening infrastructure governance: Sound infrastructure governance over the life cycle of the project is a key factor to ensure long-term cost-effectiveness, accountability, transparency, and integrity of infrastructure investment. Countries should put in place clear rules, robust institutions, and good governance in the public and the private sector, reflecting countries' relevant international commitments, which will mitigate various risks related to investment decision-making, thus encouraging private-sector participation. Coordination across different levels of governments is needed. Capacity building is also key in ensuring informed decision-making and effectiveness of anti-corruption efforts. In addition, improved governance can be supported by good private sector practices, including responsible business conduct practices. In specific the following measures may be needed:

a) Openness and transparency of procurement should be secured to ensure that infrastructure projects are value for money, safe and effective and so that investment is not diverted from its intended use.

b) Well-designed and well-functioning governance institutions should be in place to assess financial sustainability of individual projects and prioritise among potential infrastructure projects subject to available overall financing.

c) Anti-corruption efforts combined with enhanced transparency should continue to safeguard the integrity of infrastructure investments.

d) Access to adequate information and data is an enabling factor to support investment decision-making, project management and evaluation.

6. Disaster resilience and environment sustainability

Infrastructure needs to be resilient to domestic and global risks and transition India to a more sustainable economy. Sustainability and resilience should not be seen as fringe concepts in infrastructure debates, but as good economic practice. Infrastructure that is sustainable and resilient can support growth and a higher standard of living. Sustainability aims for the right balance of economic, environmental and societal outcomes to meet our needs without compromising our future. It should be a guiding principle for decision makers across the public and private sectors in achieving the best outcomes from scarce resources.

- Coalition for Disaster Resilient Infrastructure (CDRI), which has been developed through consultations with more than 35 countries, envisions enabling measurable reduction in infrastructure losses from disasters, including extreme climate events. CDRI thus aims to enable the achievement of objectives of expanding universal access to basic services and enabling prosperity as enshrined in the Sustainable Development Goals, while also working at the intersection of the Sendai Framework for Disaster Risk Reduction and the Paris Climate Agreement
- CDRI can emerge as a platform for generating and exchanging knowledge and providing member countries technical support, training and advocacy in building resilient infrastructure systems. In its formative stage, CDRI will focus on developing resilience in ecological infrastructure, social infrastructure with a concerted

emphasis on health and education, and economic infrastructure with special attention to transportation, telecommunications, energy, and water

- CDRI aims to look at how the present infrastructure in countries where natural or man-made disasters have an impact, is equipped to face current as well as future risks. It also aims to develop standards that can meet these challenges and train people to design and build infrastructure such as rail, roads, airports or bridges that would have a reduced impact in the wake of a calamity
- Within 2 - 3 years, the coalition aims to have a three-fold impact of achieving considerable changes in member countries' policy frameworks, future infrastructure investments and high reduction in economic losses from climate-related events and natural disasters across sectors
- Policy measures need to be taken to develop clear supportive policy, regulatory frameworks and enabling environments to ensure that sustainability and resilience become embedded in planning and investment criteria - both for public spending and as a signal for private investment. The sustainability criteria also needs to be included in procurement processes
- Carbon pricing needs to be adopted to stimulate low carbon investment in energy, transport and other infrastructure in the requisite scale. A well-defined policy and appropriate regulatory environment needs to be developed to ensure that private sector invests in low carbon technology to build future proof infrastructure

7. Competition

The reforms initiated since 1991 recognised the need for removing fetters on trade and industry with the view to unleash the competitive energies. It was noted that the Indian industry could scarcely be competitive with the rest of the world if it had to operate within an over regulated environment. This agenda of reforms aims to enhance competition in the domestic markets and to promote a culture of competition in the country.

- Speeding anti-trust resolution mechanism - In order to speed up the resolution of anti-trust cases, companies facing penal action by the Competition Commission of India (CCI) for anti-competitive actions or practices can be allowed to reach a settlement by committing themselves to taking corrective action. Settling such cases would enable companies to lower the uncertainty of prolonged trials and the risk of adverse CCI rulings
- Greater collaboration between CCI and sector regulators - Consultation between sector regulators and competition authority could be made mandatory. This will apply to regulators seeking CCI's advice on competition matters as well as the CCI seeking regulators' advice on issues that have implications for the regulated industry There is a need to establish a consensus between the CCI and sectoral regulators, so that there is better coordination amongst them to ensure that competition concerns are addressed properly
- Operationalising the National Competition Policy - The National Competition Policy needs to be operationalised in order to promote coherence in the reforms and establish uniform competition principles across different sectors. This will also ensure that the perspective of competition is considered while formulating various policies and consistency is maintained across sectors

8. Role of legislation and regulation in providing a conducive environment for private sector participation

In order to meet the infrastructure funding gap and create an enabling environment for improved private sector participation, the Government can consider several measures including changes in existing regulations and dispute resolution mechanisms to ensure optimal and

equitable risk allocation across all stakeholders. The following points can be considered:

1. Ensuring equitable allocation of risks in PPPs to respective stakeholders and upholding sanctity of contracts is expected to improve private sector participation in infrastructure.

    a. Standardisation of contracts is an international best practice. This clarifies the risk-return framework for the private sector, as well as dealing with issues related to force majeure, incentives and penalties, tariff and its indexation and termination payments. India has developed Model Concession Agreements (MCAs) for the road and port sector. It is necessary to develop MCAs for more sectors, especially for emerging sectors like railway station development and passenger train operations.

    b. The risk allocation to respective parties should be based on their ability to bear the same in an efficient manner.

2. Autonomous regulation in all infra sectors that are going in for PPP mode of implementation.

    a. Currently a few sectors like airports and power have their respective independent regulators which provide investors recourse on matters such as dispute resolution, performance standards, consumer protection and competition. Similar measures can be considered for other infra sub-sectors especially the key ones.

    b. However, it needs to be borne in mind that independent sectoral regulators are just one option for autonomous regulation. There are other options like regulation by contract practised in the road sector, where India has more than 400 contracts. The option of multi–sectoral regulators economizes on costs and skills while deterring regulatory capture.

Legislative protection for infrastructure investors

The government can consider instituting a legislation for facilitating Infrastructure under **Infrastructure Facilitation Act.** The Act may contain clauses for investor protection by prescribing timelines for provision of clearances, breach of which may be prevented using sanctions through specific defined penalties that would be specified. Transparency in time-bound issuance of clearances and deemed clearances beyond specified time frames, would greatly aid prevention of time overruns. It may offer protection for action taken in good faith to promote expeditious decision making. Further, the financial security for maintenance of the project can be ensured by following the best practices in terms of creation of escrow and reserve accounts.

Financial sector reforms

FDI policy

FDI policies should promote the use of low-cost capital from foreign investors to fund assets in India, especially in crucial infrastructure sectors. Liberalised and simplified FDI policies accompanied with reforms for enabling ease of doing business can result in increase in FDI inflows. Measures such as developing Model Investment Agreements in line with international standards and best practices, consistent, fair and unambiguous enforcement of investment terms through efficient investment protection and neutral investor arbitration claims mechanism and creation of non-ambiguous tax and repatriation frameworks and systematic framing of FDI-linked performance condition will aid in improving the FDI inflows in India.

Attracting foreign and private capital into infrastructure

Using expected loss rating scale (ELRS)

Leading credit rating agencies in India have developed ELRS specifically for infrastructure projects. The scale is based on expected loss methodology and will complement conventional credit ratings that convey opinions on the basis of probability of default (PD). The scale is unique for infra projects as the credit profile of infra projects improves when project stabilises. Operational infrastructure projects, which are fundamentally viable, may face short-term liquidity mismatches, constraining credit ratings on the conventional PD rating scale. The EL rating system fills this gap as it focuses on recovery of dues to investors and lenders over the life cycle of an infrastructure project. For this, it takes into account the possibility of refinance/restructuring, residual economic life and the presence of embedded safeguards typically present in infrastructure projects. The Task Force recommends that regulations should facilitate use of ELRS as it will help attract long-term capital market investors to invest in infrastructure projects.

Revising investment guidelines and incentivising investors

Given the long-term nature of the infrastructure projects, long-term patient capital is more suited for funding them. Investment guidelines for patient capital, i.e. insurance and pension funds, are not aligned to meet this requirement. Strict regulatory requirements require these funds to invest only in highly safe government and public sector bonds, even at the cost of earning lower returns. Further, while most infrastructure firms are set up as SPVs and are private limited companies, the current guidelines of insurance firms and pension funds prevent their participation in funding such companies. Also, net worth norms stipulated are not in sync with the reality of the structure of SPV and hence prevent participation of this sector in infrastructure growth in India. The investment guidelines of IRDAI, EPFO and PFRDA need to be revamped to enable investment by pension and insurance funds in project bonds, municipal bonds and Infrastructure Investment Trusts (InvITs). the Task Force recommends that Department of Financial Services (DFS) may examine this with IRDAI, EPFO and PFRDA in enabling this. DFS may work out a strategy for growing the pool of pension and insurance assets through sector reforms including FDI reforms.

Encouraging green financing

The financing of green projects such as renewable energy; clean transportation (including mass/public transportation); sustainable water management and water recycling; waste to energy plants; energy efficient buildings can be funded from proceeds raised by issuing green debt securities. For issuing green securities, SEBI's regulations related to "Issue and Listing of Debt Securities" should be complied with in addition to providing environmental sustainability objectives of proposed green investment. More CPSE and private players must issue green bonds as per these the Securities and Exchange Board of India (SEBI) guidelines to raise green finance which will come cheaper as global funds will be interested in investing in environment and socially responsible projects backed by a sound corporate governance framework.

Revitalising the bond and credit markets

A credit enhancement fund (CEF) can be established specifically for the infrastructure sector. The fund will open up corporate bond market for funding the infrastructure projects. Institutional investors in the corporate bond market are ideal for financing infrastructure projects, however they have limited appetite for lower rated assets (below AA) and incidentally most of the infrastructure projects are rated below AA as they are set up on a project finance basis.

Recently regulators have taken multiple initiatives for deepening the bond markets and improving the secondary market liquidity. Some of the key measures taken are:

- Regulatory framework for credit enhancement has been defined by the RBI
- Large borrower framework (as mandated by the RBI and SEBI)
- Permitting corporate bonds in liquidity adjustment facility (LAF)
- Exchange-based corporate bond repos

These measures are expected to support growth in the bond markets; however, all of them are expected to bring in results only over a period of time.

Measures like reissuances, limiting number of International Securities Identification Number (ISINs) and trade repository initiatives will help in improving the liquidity of debt markets in the long run. The challenge is that large investors like banks, insurers and pension funds are 'hold to maturity' investors.

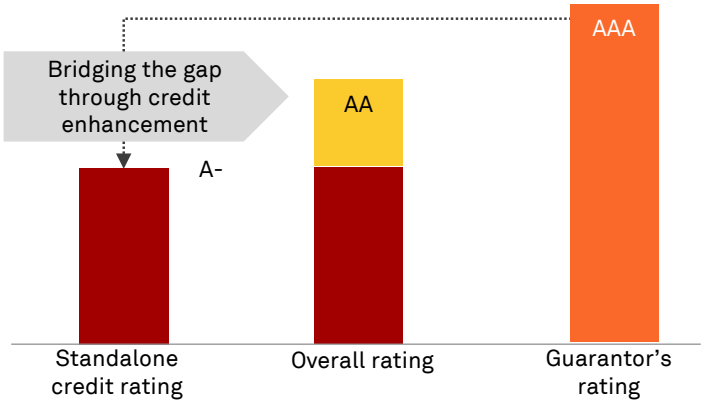
To create a demand for bonds from infrastructure companies, liberalisation of investment patterns along with change in investment behavior is required. Furthermore, it is noted that most investments under the existing limits for infrastructure companies have been towards infrastructure finance and housing finance companies.

Dedicated vehicles like InvITs can also help in channeling funds to operational projects. However, the funds launched in past few years have seen limited liquidity in secondary market highlighting limited appetite for such products. Timely resolution of cases referred under Insolvency and Bankruptcy Code (IBC) will further enhance investor confidence and can help deepen the bond markets for infrastructure funding. Additionally there exists an arbitrage between bank loans and bonds since bank loans are not valued on a mark-to-market (MTM) basis, making it as a preferred choice for funding. Removal of such arbitrage is critical to channel the funds through bond markets. Additionally, there is a need for MTM valuations like proposed for uniform valuations, to ensure all securities are priced appropriately on daily basis and proper risk monitoring can be done. All these measures can help in deepening of the bond markets. Many developing and middle income countries have bond market sizes in excess of 30% of the GDP. India's bond market size is about 17% of the GDP. The Department of Economic Affairs is working on measures to deepen bond markets with emphasis on greater number of public issues and liquidity. The Task Force recommends that an action plan to deepen bond markets be put in place with specific reference to support infrastructure projects.

Against this backdrop, it is necessary to enhance the credit rating to augment the access of institutional investors to the infrastructure sector through capital market instruments, such as bonds and derivatives. Although institutional investors are best placed to fund infrastructure assets due to long-term maturity of their liabilities, they are constrained by regulations, as well as internal mandates to avoid the construction risk inherent in infrastructure projects. Institutional investors in India are permitted to invest in infrastructure projects rated AA or above, but most of the ongoing infrastructure projects in India are rarely rated BBB or above, resulting in a significant mismatch

between the extent of institutional investor credit available and actual credit requirement for financing infrastructure sector in India. These challenges can be addressed by institutions, such as the Credit Guarantee Enhancement Corporation announced in Union Budget 2019-20. These credit-enhancement entities aid in augmenting the credit ratings of securities of certain above-investment grade operational infrastructure projects through well-defined and robust credit-enhancement structures, improving their attractiveness to institutional investors. There can be a gamut of credit-enhancement structures that could be implemented - the most prominent of them being partial or full credit guarantees. The Task Force recommends that the Credit Guarantee Fund be set up at the earliest to enable greater access to bond markets for infrastructure projects.

Figure 85 Illustration of credit enhancement through partial credit guarantee



Source: CRIS analysis

Revitalising asset monetisation

Asset monetisation (AM) is another method in which asset owners can reduce their debt burden or churn their asset portfolio for further investment. It will also help GOI reduce the debt burden and free up resources for better use. The direct benefit of monetisation is that it creates an enabling environment for participation of long term institutional investors and brings private sector efficiencies in the management of infra assets.

Different ways in which asset monetisation can be useful in Indian context are:

i. Sale of land and non-operational assets: Non-core assets of PSUs (real estate, etc.) could be monetised through long-term leases with significant upfront payment of lease. The Task Force recommends that land is a non-renewable asset and has future development value and hence large parcels of land must be preferably developed through various options like long-term concession, outright sale, etc.

ii. TOT: The TOT model, introduced by the Ministry of Road Transport and Highways (MoRTH) for monetisation of a portfolio of road assets to long-term investors, is inspired by the operate-maintain-transfer (OMT) model and involves leasing out of operational national highways constructed under the EPC model.

Under this model, the selected operational stretches of national highways constructed by the NHAI or a concessionaire are bundled and bid out to the private sector, which typically includes players with deep pockets, such as large private-equity funds, pension funds and sovereign wealth funds. The NHAI can securitise the toll receivables by collecting an upfront concession fee (initial estimated concession value, or IECV) from the selected bidder. The private sector bidder that quotes the highest upfront payment will be selected and gets to collect toll, as well as operate and maintain the underlying operational

road assets for 30 years from the date of financial closure.

The NHAI is expected to generate growth capital for construction of new roads and highways under the Bharatmala programme through monetisation of its operating road assets.

The key parameters of a TOT model are:

- Source of revenue: Toll collection undertaken by the concessionaire
- Bidding parameter: Highest upfront fee (IECV) payable to the government authority
- Concession period: 20-30 years, with 100% exit option after two years. The concession period may be increased or decreased based on the revenue generated at a predefined time period (year 10 and year 20 as per the current TOT model)
- Method of securitisation: The government authority calculates the IECV, which is free cash flow expected to be generated by the project discounted by the weighted-average cost of capital (WACC)
- Target investors: Minimal construction risk allows for investment by pension funds and sovereign wealth funds

In 2016, the Cabinet authorised the monetisation of 75 publicly-funded national highways with a cumulative length of ~6,400 km. In March 2018, the first ToT bundle, which comprised nine operational road assets, was bid out. These assets, six in Andhra Pradesh and three in Gujarat, totaled a length of 682 km. The IECV of the authority (NHAI) was Rs 6,258 crore. The consortium of MAIF Investments India Private Ltd and Ashoka Buildcon Ltd emerged as the highest bidder by bidding Rs 9,681 crore, i.e., ~1.5 times the IECV of NHAI. The financial closure of the bundle was achieved on August 29, 2018.

The success of this issue was mainly attributed to right asset mix, comprising assets with established cash flow, long concession period, and better risk allocation in the TOT Model Concession Agreement, addressing key issues in earlier PPP models.

Following this, state governments are also likely to consider asset monetisation through the TOT model for their portfolio of mature, operating road assets. For example, in Maharashtra, Maharashtra State Road Development Corporation (MSRDC) and the NHAI are expecting proceeds of at least Rs 8,000 crore from the securitisation of toll receivables for Mumbai-Pune Expressway through the TOT model. Other states can consider TOT as the preferred model for asset monetisation of respective trunk routes, linking key cities.

Bids for the second ToT bundle were issued on August 6, 2018, comprising eight operational road assets totaling ~586 km in Rajasthan, Gujarat, Bihar and West Bengal with 12 toll plazas. However, the bids received were less than the IECV of the authority and, hence, the second bundle was not awarded.

Recently, the NHAI has invited bids for the third TOT bundle, which comprises nine operational road assets totaling a length of 566 km in Uttar Pradesh, Bihar, Jharkhand and Tamil Nadu. This bundle has recently been awarded.

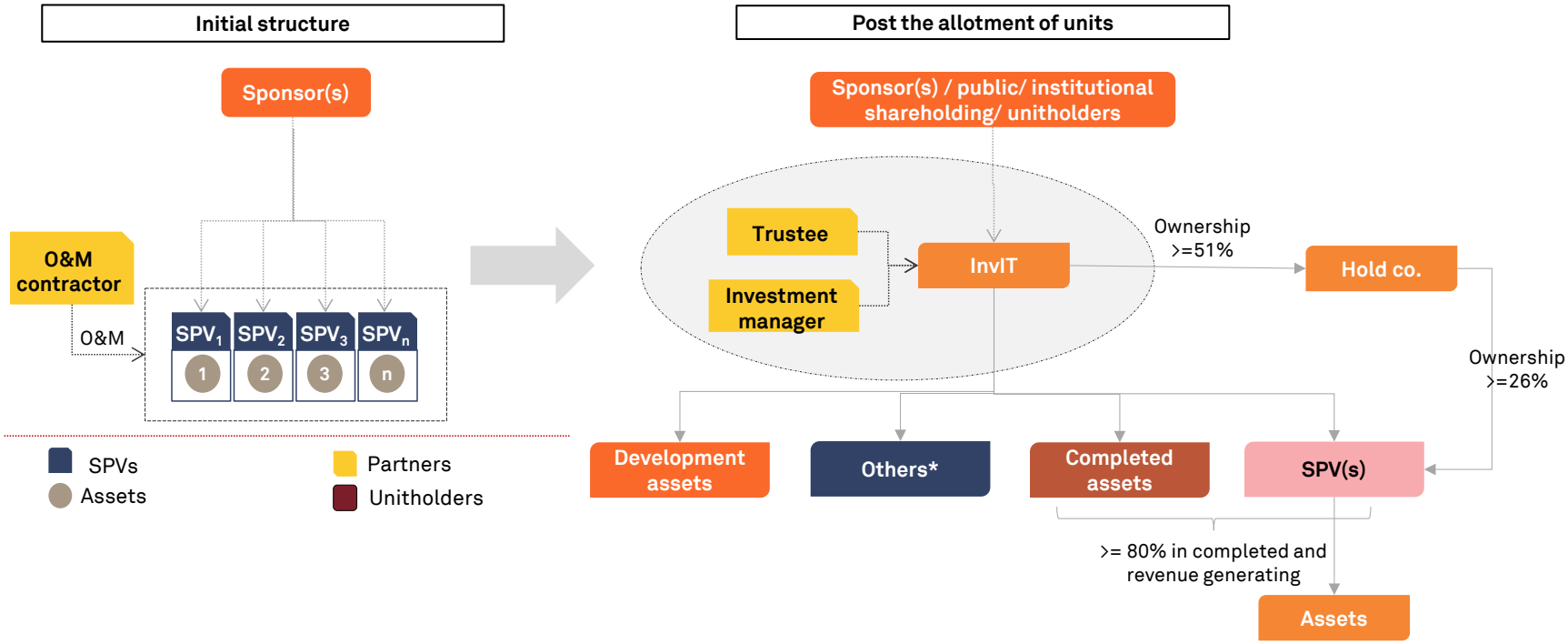
The recent successful bidding for NHAI TOT Bundle 3 provides a good baseline for reference for future TOT monetisation. In recent months, ports, airports, etc., have been proposed for asset monetisation on similar lines. The Task Force recommends that the TOT model must be configured by DEA and Niti Aayog for use by other infrastructure ministries to enable asset monetisation.

iii. InvITs and Real Estate Investment Trusts (REITs) : InvITs are trusts holding infrastructure assets, such as operational roads and transmission assets, which have long concession periods and stable cash flows.

InvITs are registered with the Sebi, and can raise funds by listing on the exchanges and issuing units to investors. The sponsors of the assets may retain operational control of the assets and divest a part of the holding over a period of time to realise the market value and raise significant capital.

InvITs help developers raise capital from a wider investor base, and also help sponsors time the market for stake dilution. These are hybrid instruments regulated by Sebi and are mandated to pay at least 90% of distributable cash flows to investors. Such distributions are to be mandatorily made at least on a half-yearly basis. Because of their pass-through status, InvIT units offer tax-efficient returns and are ideally suited for long-term institutional investors.

Figure 86 Typical structure of an InvIT



Source: CRIS analysis

The key features of InvITs are:

- They derive value only from the cash flows of underlying assets and have no operating income of their own
- InvITs primarily hold operating infrastructure assets with a specified investment limit for under-construction assets (private InvITs have a higher flexibility to invest in under-construction assets compared with public InvITs)
- They require prior approval from the regulator/concessioning authority for asset transfer or sale
- Upfront advantages for the sponsors (developers), investors (unit holders) and lenders are:
- Sponsors: Can monetise invested capital, prepay SPV bank debt through InvIT loans raised from fresh issue and/or unlock capital to bid for new projects (freeing-up of capital)
- Investors: Cash yields derived from dividends, interest on InvIT loans and buyback/capital appreciation of units mandated by the SEBI to distribute at least 90% of distributable cash flows at least once in every six months
- Lenders: After the SPV loan prepayment, banks would have higher headroom to lend to new projects

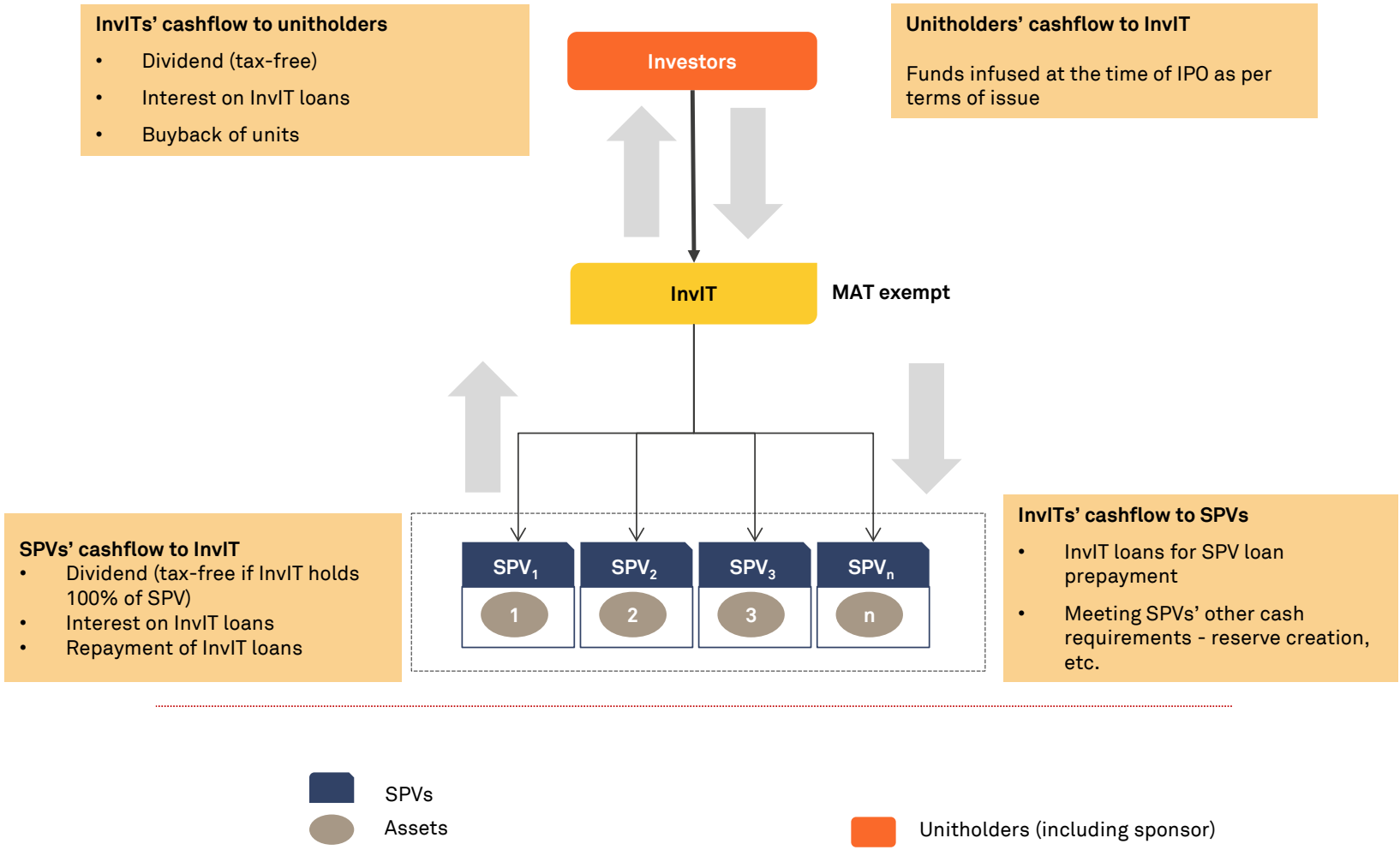
As per an RBI circular dated October 14, 2019 (RBI/2019-20/83, DBR. No.BP.BC.20/08.12.014/2019-20), the central bank has now issued guidelines on bank lending to InvITs. Such bank lending to InvITs would be subject to the following conditions:

- Banks are required to formulate a board-approved policy on exposure to InvITs covering processes, such as appraisals, loan sanctions, exposure limits, and mechanisms for monitoring
- Banks are required to undertake thorough assessment of sufficiency of cash flows at the InvIT level to ensure timely debt servicing
- The overall leverage of InvIT and the underlying SPVs together should be within the permissible limits prescribed in the board-approved policy of the bank
- Banks are required to monitor the performance of underlying SPVs, as the ability of an InvIT to meet debt obligation depends on the performance of the underlying SPVs
- Banks are required to lend to only those InvITs, where the underlying SPVs have existing debt and are not facing any financial difficulties
- Bank financing to InvITs for acquiring equity stake in other entities are subject to regulations, such as:
- Borrowing company should provide infrastructure facilities and should have satisfactory net worth
- Borrowing company or its directors/ promoters should not have defaulted on bank/FI loans
- Bank financing to be restricted to 50% of the finance required for acquiring the promoter's stake
- Tenor of bank loans should not be longer than seven years
- Bank financing acquisition of shares by promoters should be within the regulatory ceiling of 40% of their net worth as of March 31 of previous year
- Board should have approved the proposal for bank finance
- Compliance with statutory requirement as mentioned under Section 19(2) of the Banking Regulations Act, 1949

Returns and tax implications for InvITs

InvITs are a transparent, tax-efficient investment that provide stable income and diversification benefits to investors.

Figure 87 InvITs' cashflows to stakeholders

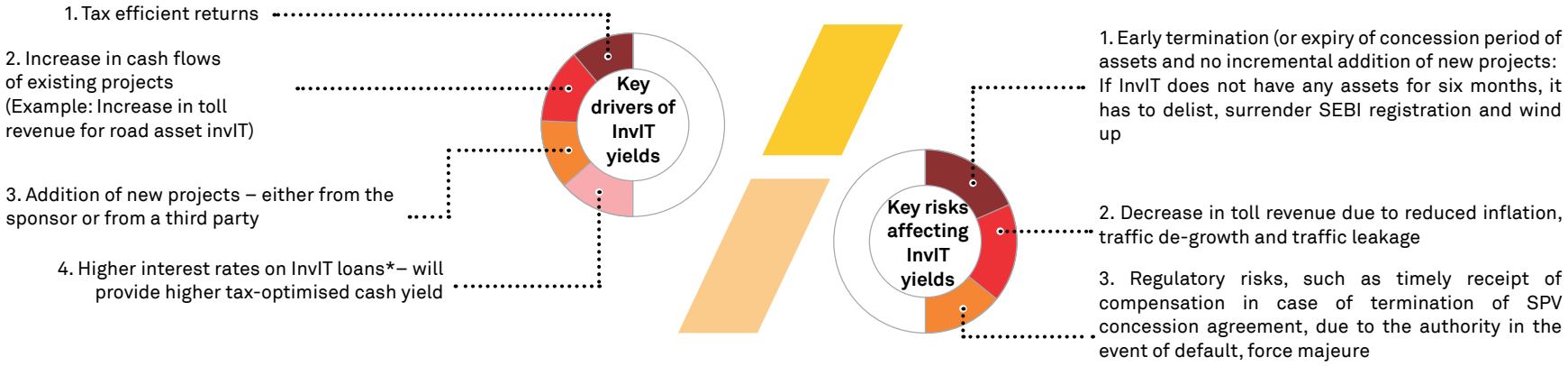


Source: CRIS analysis

Key drivers and risks for InvIT yields

The key drivers and risks for InvIT yields for an operating BOT-toll road project are highlighted in the following infograph.

Figure 88 Key drivers and risks for InvIT yields



*Note: * - InvIT loans are loans provided by the InvIT to downstream SPVs to prepay their external debt*
Source: CRIS analysis

Details of InvIT issuances done in India are summarised in the following table.

Table 4 InvITs issued till June 30, 2019

Sr No.	Name	Listing month	Issue size (Rs crore)	Category	Sector	Type of assets
1	IRB InvIT Fund – IRB Infrastructure Developers	May 2017	5,035	Publicly listed	Toll roads	7 operational BOT road projects
2	India Grid Trust of Sterlite Power	June 2017	2,250	Publicly listed	Transmission	5 operational transmission assets
3	IndInfravit Trust – L&T IDPL	June 2018	3,200	Privately placed	Roads	5 operational BOT road projects
4	India Infrastructure Trust – Brookfield	March 2019	12,950	Privately placed	Gas pipeline	1 operational natural gas pipeline project

Source: CRIS analysis

The Ministry of Power, the NHAI etc., have initiated action to monetise core operational assets using InvITs. It is necessary for these Ministries to ensure that the efficiency of revenue collection through these assets proposed for monetisation is toned up through various means (including plugging revenue leakages using O&M operators) so that the InvIT process fetches higher values. The Task Force also recommends that real estate assets of government and CPSEs should be monetised using REITs.

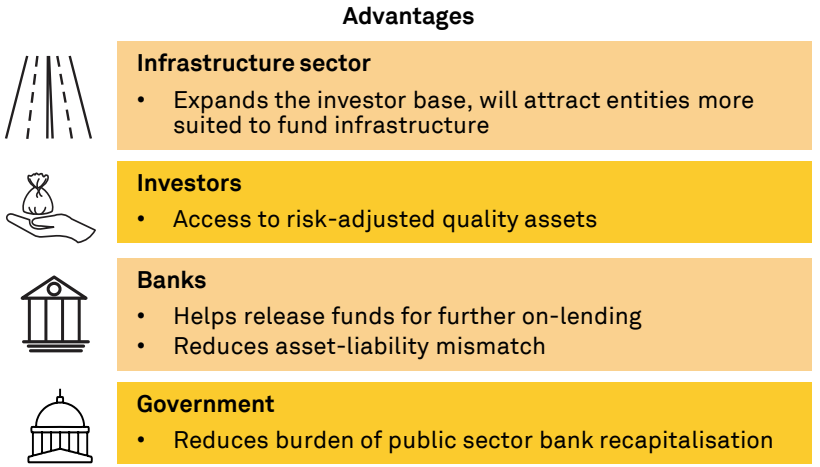
Sale of portfolio of assets to strategic/financial investors: Portfolio sale assists in unlocking capital and allows for participation of institutional investors. For instance, relaxation in exit clause by the NHAI enabled a precedent for portfolio buyouts in the roads sector. The Task Force recommends that the BOT/HAM/TOT contracts of all other infrastructure projects provide such a mechanism imparting higher liquidity to infrastructure investments.

Securitisation of infrastructure loan assets: Given the reluctance of institutional investors to bear the construction risk inherent in the infrastructure sector, securitised paper backed by the cash flows of the operating infrastructure assets provide another avenue for patient capital. Most infrastructure loan assets typically bear a rating of not more than 'BBB-' and with the absence of a market for lower-rated securitised paper, it is envisaged that the complete loan asset pool will require support to improve credit quality. Credit enhancements such as excess interest spread, cash collateral and guarantee can help improve the credit quality to meet investor expectations. The securitised paper can usher in capital market investors to the infrastructure asset class.

This could potentially help banks diversify their risks and alleviate larger risks from a single project, while recycling capital to finance critical infrastructure requirements. It also offers an opportunity for banks to improve their capital ratios by transferring loan assets from their balance sheets to securitisation trusts and SPVs.

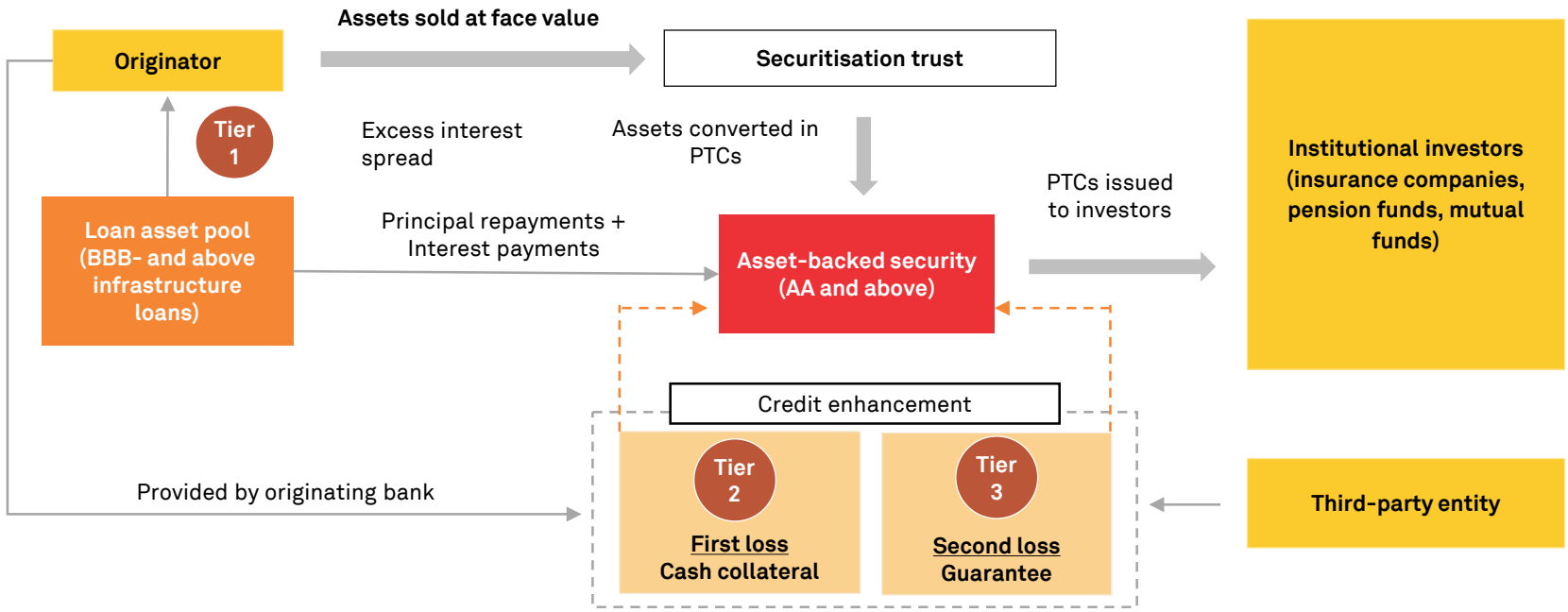
There are no prior instances of project-finance securitisation in India. Post-COD infrastructure projects, with credit enhancements at appropriate stages, if required, can be targeted for securitisation.

Figure 89 Advantages of loan-asset monetisation through securitisation



Source: CRIS analysis

Figure 90 Typical structure of loan asset monetisation through securitisation



Source: CRIS analysis

Infrastructure loan assets are amenable to securitisation. Post-COD infrastructure projects could be targeted for securitisation. Indian banks should be encouraged to securitise existing infrastructure loans through the bond market. This will create capacity for them to lend to fresh investment in infrastructure assets. The Task Force recommends that the proposed Inter Ministerial Steering Committee on Financing of Infrastructure deliberate on the subject to work out a positive regulatory environment to enable securitisation markets to take off in India.

The Task Force recommends that there is a need to replicate the success of models like InVITs, REITs and TOTs across infrastructure sectors like freight corridors, metro rails, oil pipelines, power transmission, ports, and renewable energy etc. to enable the large infrastructure deficit in the country. The following, therefore, may be considered –

i. NITI may get all other infrastructure ministries who are yet to identify monetisable assets to start working on asset monetisation. It is recommended that annual targets for each infrastructure

ministry for next three years may be laid out, including assets which are yet to be commissioned.

ii. NITI may circulate on Asset Monetisation (AM) Guidebook and get all state governments and local bodies also to use AM effectively to finance new assets.

iii. Land monetisation to be actively promoted by ministries as a means of financing. Example river front development of Sabarmati, marina re-development projects proposed by the Ministry of Shipping.

Revitalising land monetisation:

The Government of India departments, other than Railways and Defence, do not have a specialised organisation to handle commercial development of government lands. An alternate could have been entrusting the work to NBCC, which however is focused on construction and bogged down by large construction projects. There is need for a separate organisation / authority which can work with various departments to utilise these surplus and unutilised land assets of Government of India and CPSEs effectively. The objective is to set up an empowered organisation with competence to carry out commercial exploitation of land, manage land concessions, as well as raise funds for re-investment in CPSEs as well as for infrastructure construction in the country.

- Identification of surplus lands with government departments or CPSEs is the start of the process. "Surplus" land or property can be defined as property that is not needed, or not appropriate, for provision of the public service for which the agency owning the property is responsible. In the simplest case, "surplus" land is land which is vacant and not planned for future service use. In a more complex case, land may presently be in use, but planned to be vacated as part of improvements in service efficiency. Identifying "surplus" land may be thought of as a "supply-driven" approach to public land disposition. Once "surplus" land has been identified, market forces and perhaps other agents of government can focus on the surplus parcels and express demand for them
- Proposal for National Land Management Corporation - A systematic and specialised way of monetising land assets could unlock greater economic benefits for the government and also assuage the restricted supply of land. The Task Force recommends that a National Land Management Corporation, registered under the Companies Act, can be established to act as the facilitator for land monetisation and act as an asset manager for lands owned by government of India and CPSEs
- Concessioning principles - The first guiding principle of the SPV is to treat land as a non-renewable resource that needs to be preserved. Hence, the SPV would normally employ land lease or concessions as a primary mode of commercial exploitation. However, given the practical difficulties in existing concession, sale of land may also be a viable option
- Eminent domain - Legal cover will be provided for the SPV through an appropriate legislation. The SPV will focus on lands belonging to any central government ministry/department or CPSE. It will also consider development or co-development of land belonging to Defence or Railways if so required by these agencies. The SPV will also consider co-development of private land parcels adjoining government lands so as to maximise revenue
- Board composition - The SPV should be professional with representation from MoHUA, DEA, DOLA, DPE and DIPAM and strong independent directors from real estate and finance domains. A professional CEO will be hired from the market along with a sound technical team with high degree of competence with market rates of compensation

- SPV's functions - The SPV will provide the following full life-cycle services to ministries/departments/CPSEs:
    a. Establish and update the comprehensive inventory of Public lands
    b. Develop Model Concession Agreements for various kinds of land developments/sale of land
    c. Legal management of litigation/encumbrances relating to land
    d. Development planning, design and bid process management
    e. Concession/contract and revenue management
    f. Redevelopment of concessioned properties
    g. Raising capital from market backed by land assets

- Processes - The SPV would be a specialised organisation with a business approach undertaking the above-mentioned tasks. This agency should be staffed with real estate/legal/business development professionals with capabilities to
    a. Identify best use for excess land to be concessioned/sold
    b. Negotiate with the local authorities on changes to regulated land use as needed
    c. Resettlement and rehabilitation/eviction of occupiers
    d. Agree on local infrastructure improvements required as the land use changes
    e. Carry out project development plan in consultations with land owning agencies and government
    f. Carry out road shows to market offers
    g. Make timed decisions for concessioning / selling land to avoid disruption to local real estate markets
    h. Identify development partners through a competitive process

- Concessioning policy - This SPV would concession land following competitive and transparent processes by auctions or pre-qualified calls. This agency should be responsible for identifying real estate opportunities and optimising value for taxpayers. A land development and concessioning policy will be approved by the government. The policy will also need to dwell on delegation of powers to Board of Directors of the SPV or to an Empowered Committee, development models, bidding processes, land concession options, contract management, management fees for services rendered, revenue sharing, etc., to enable speedy decisions on individual projects. Sale of land would also be an option to be pursued

- Business model - All stakeholders, public and private, should receive fair compensation for the land that they make available, as an incentive to participate in the process. It is suggested that Land owning departments, including states or local bodies, will also get a share of the proceeds for its schemes, to incentivise release of valuable land for commercial development. The SPV will receive a management fee for various services rendered to land owning agencies. All these would form part of the Land Development & Concessioning Policy

Getting user charges right

It is vital to ensure correct pricing of infrastructure services as infrastructure assets often provide crucial services emanating from roads, electricity, water, etc. The price for access to the asset is an important factor as firstly the consumers must get access to essential services at a price that is fair so that it doesn't discourage the use of asset. Secondly, from the asset owner's perspective, it is essential that it earns risk-adjusted returns that justify the investment. While for a consumer, the lowest possible price is desirable, from a practical point of view, given the limited availability of government budgetary sources of funds for creating infrastructure assets, not all infrastructure can be provided at subsidised rates or for free.

Determining fair user charges is crucial to finance and grow infrastructure so that the end-user values the asset to ensure that it is efficiently used, and not squandered away. Free services can often be overused leading to dire consequences, especially for limited natural resources such as water. Fair value is also important as the need is to provide quality infrastructure to end users. User charge also ensures that sufficient funds are available for the upkeep and maintenance of the asset. By recovering the costs of infrastructure services, the government/private player could use resources for expanding or upgrading services thus helping in overall development of the economy. For example, in case of city metro, user charges alone do not lead to investment returns but still form a critical component of part-financing some of the operational investments required during the life of the asset. Even if the capital expenditure cost of social infrastructure cannot be recovered through user charges, at least recovery of the operation and maintenance (O&M) costs of infrastructure must be ensured.

User charges can also help in providing infrastructure services from a demand perspective. For example, civic authorities can respond to demand for expanding essential urban infrastructure by providing appropriate services with the cost being easily recovered. This would boost ease of living and provide residents with well-functional, quality infrastructure such as water and sewerage connections, paved roads, clean neighbourhood, etc. This model has been well established in highways in India where levying user charge has resulted in better quality roads with improved safety, reduction in travel time and better fuel efficiency for users.

A carefully defined user charge, therefore, will provide more clarity for investors, which in turn will ensure more investments. This has been done in India by including the provision about setting up of user charges in the contract (concession agreement) or leaving them to independent sectoral regulators.

The following may be considered –

i. Infrastructure ministries need to work out ways to recover costs of economic infrastructure services through rational user charges that are indexed to inflation.

ii. Subsidies should be passed on to consumers directly through DBT, leaving the infrastructure service to function commercially.

iii. Ministries may support and incentivise states to incorporate cost recovery policies while implementing central sector schemes.

iv. The Ministry of Finance may take up with Finance Commission to consider incentivisation of cost recovery via performance grants.

v. Social infrastructure services should consider recovery of at least the cost of operation and maintenance of infrastructure assets.

Strengthening the municipal bond markets in India

Grants from state and central government currently dominate the municipal financing landscape in India. These grants, which are devolved under state and centrally-sponsored schemes or directly through the Finance Commission, are substantially lower than the investment requirements of respective cities. This has affected the cities' capacity to provide quality services to its citizens. In an attempt to augment its funding sources, some cities have tapped into debt markets to raise long-term debt for part-financing their capital expenditure.

Although municipal bond issuances in India date back to mid-1990s, when Ahmedabad Municipal Corporation did the first municipal bond issue in India, the number and the value of issuances has been relatively small with only 8 cities accessing the bond markets in the earlier phase. The recent spurt in the bond issuances by ULBs have resulted from a policy push by the Government of India in the form of interest subsidy incentives to cities issuing municipal bonds. The Ministry of Housing and Urban Affairs (MoHUA) has targeted 50 cities to access the bond markets by 2024. If this has to materialise a variety of measures have to be initiated in order to improve the scale of funds raised through municipal bond issuances in India, as indicated below.

- Improving financial discipline and regular disclosure by local bodies – Although many steps and initiatives have been undertaken to improve the accounting quality and disclosure of financial information of local bodies, only a few local bodies have implemented these recommendations in letter and spirit. Further, delay in audit of financial statements compounds these issues. It is necessary for urban local bodies to have a robust municipal accounting system along with strong, credible and transparent disclosure of financial information to augment their access to municipal bond markets and improve investor interest. While reform initiatives under AMRUT have helped, the sustenance of the same continues to be a challenge. The Task Force recommends a nation-wide capacity building exercise to enhance the financial governance and accounting standards in local bodies to meet market requirements, including lateral entry of financial management talent into local body organisations
- Augmenting the revenue base and buoyancy of revenues of urban local bodies – A majority of the urban local bodies have inadequate revenue base and limited buoyancy of revenue. These issues, coupled with increasing establishment and administrative expenses have rendered many of the local bodies ineffective and unable to even meet their operating and maintenance expenditure from their own revenues. Effective implementation of reforms under AMRUT focusing on improvement, coverage and collection is needed in order to improve revenue from taxes and user charges. These initiatives should be complemented by introducing innovative ways for expanding revenue base for urban local bodies such as land-based revenue streams, value capture finance, advertisements, etc. This implementation can be coupled with incentives for the local bodies that successfully implement these reforms
- Addressing the gap in credit worthiness of local bodies through innovative credit enhancement structures – The bond market issuances in India with a credit rating of AA and above only are palatable to investors. However, only a few of the local bodies in India have a credit rating of AA and above. Hence, it is critical that the local bodies improve their credit worthiness for successful bond issuance. Given the issues of lower revenue base and buoyancy in own revenue for local bodies, it is important that the MoHUA, multilateral development banks (MDBs) and other financial institutions support the local bodies with innovative credit enhancement structures to improve investor confidence. Investor participation in bond issuances of urban local bodies can be augmented through effective waterfall repayment mechanism
- Encouraging pooled bond issuances – As only the financially strong

local bodies are able to access the debt markets with independent issuance, pooled bond issuances can serve as a bridge linking small and medium towns to debt markets. Pooled funding allows ULBs to aggregate their financing needs, diversify their credit risks and spread the transaction costs of a bond issuance. It opens up avenues for projects/entities such as ULBs that have inherent credit risks and might not attract funding on their own. Pooling arrangements at state or regional levels allow small and medium cities to aggregate their financing needs and diversify credit risk, which serve to attract investors as well as spread the transaction costs among a number of borrowers. With proper credit enhancement, pooled funding can also reduce the cost of debt for urban local bodies for their funding requirements for urban infrastructure projects. Pooled funds act as a pass-through facility that receive contributions from multiple financial partners and allocate resources in turn to multiple implementing entities.

- MoHUA may consider incentivising municipal bond financing through its schemes and request incentivisation by the Finance Commission, in place of subsidies (interest subvention)

Reforms pertaining to value capture financing (VCF)

Value capture financing refers to recovering a portion of increment in land or property valuation due to positive externalities from actions other than property owner's investments. This appreciation in the value can be attributed to regulatory changes, investments in public infrastructure, which increases the quality of housing, employment access, transportation or social benefits, and emergence of key commercial, residential, institutional or cultural development in the neighbourhood. Land-based fiscal tools (LBFTs) such as general taxes, benefit taxes, fees or user charges, and regulatory fees act as critical avenues for augmenting the financial resources for urban infrastructure financing. MoHUA has released a Value Capture Policy Framework (VCPF). The Task Force recommends that the VCPF may be adopted in expressways, railways, land pooling, ports or area development, etc. Concerned ministries may build this into the financing plan for NIP. State governments and local bodies should also be persuaded/incentivised to adopt this framework. A national capacity-building mission to facilitate VCF across sectors and levels of government must be launched jointly by NITI Aayog, DEA and MoHUA.

Identifying the key land-based value capture mechanism prevalent in India - It is critical to identify relevant LBFTs prevalent in major urban local bodies in India, and the reforms should focus on these LBFTs for improving their revenue potential. Certain LBFTs, such as property tax, development charges, and betterment charges are common in India, and the reforms required to improve these are highlighted below.

Property tax

- Linking the property tax assessment to the latest market value guidelines - At present, for majority of urban local bodies in India, property tax is assessed using old property guideline values/ is area-based and, thus, any increment in the land or property value is not captured, hence rendering the property tax base not buoyant. Therefore, reforms are required wherein the property tax is assessed using the latest market value guidelines, thus, capturing the current land/ property value due to infrastructure interventions. This will increase the buoyancy of revenue from property tax for urban local bodies
- Revision of rates applicable – For most of the urban local bodies in India, the applicable rates are not revised regularly. A revision of applicable rates for different categories of properties such as residential, commercial and vacant/ open land, along with its linking with market-value will aid in sustaining the buoyancy of revenue from property taxes
- 100% coverage and collection efficiency – As revenue from property tax is one of the major sources of own-revenue for urban local bodies, it is critical that they improve its coverage and collection efficiency

Development charges

- Transitioning from area-based assessment to value-based assessment – For a majority of urban local bodies, the existing rates are calculated based on area and, thus, are static. It is recommended that the development charges be linked to the market value that are revised annually, thus helping in capturing the buoyancy of the market
- Transfer of Development Rights (TDR) – TDR may be used as a mechanism to facilitate the speedy acquisition of land for developing infrastructure, such as city road development, satellite towns and metro rail. Under the TDR route, the government will acquire the land from land owners in exchange for development rights that are transferred to the land owner. The development rights issued as Development Rights Certificate (DRC) will empower the owner to go for extra floor area ratio (FAR) fixed by the government. The rights can also be traded with other developers, and can be utilised on any piece of land, depending on personal choice. The TDR can be designed for slum redevelopment, urban amenities, and low cost housing projects to name a few. Hence, the TDR may be used as an effective tool to address the extended and costly process of land acquisition, especially in urban areas

Betterment charges

- Transitioning from area-based betterment charges to value-based betterment charges – For a majority of urban local bodies, the existing betterment charges are calculated based on area and, thus, are static. It is recommended that these betterment charges be linked to the market-value that are revised annually, thus, aiding in capturing the buoyancy of the market
- Redefining the basis of levying betterment charges – Betterment charges are levied on land/ property owners that have benefitted due to development schemes/ town planning schemes to offset the cost of developing physical and social infrastructure. The betterment charges are linked to increment in the land value due to provision of infrastructure. Introducing development schemes/ town planning scheme (TPS) and capturing scheme-wise increment can be used as an instrument to develop new areas. Thus, financing infrastructure in town planning/ improvement schemes through betterment charges needs to be mainstreamed

Introducing innovative VCF tools

- Tax increment financing (TIF) – Under TIF, the incremental revenue from future increase in property tax or surcharge on the existing property tax rate is ring-fenced and utilised for financing new infrastructure investment in the area. The area under development is earmarked and the incremental property tax values are used for part financing of the projects in the identified area
- Project linked impact fee – At present, only a few urban local bodies levy impact fee to capture some portion of increment in land/ property within the impact area of the project. This can be complemented by identifying certain benefit zones which get directly affected by the implementation of the identified project. The impact fee will be directly levied on the land owner and will be charged when the land/ property is sold or developed
- Urban transport fund: Some states have set up a city level fund under the Urban Metro Transit Authority (UMTA) law. This has provisions for an urban transport fund to which betterment levies or TDRs or surcharges in betterment zones related to transportation projects, such as metro or BRTS, accrue for plough-back into urban transport infrastructure projects

Infrastructure Financing

This chapter explores traditional and innovative ways for financing infrastructure development in India, including fund raising through capital markets, traditional sources such as banks and development finance institutions (DFIs), external financing from multilateral and bilateral agencies, and foreign investments.

Capital Markets

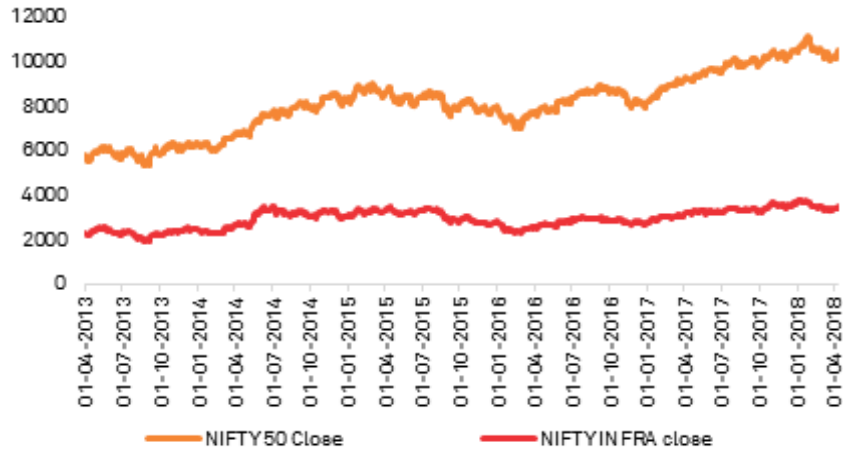
Equity and IPOs

As of March 31, 2018, the equity market for the infrastructure sector in India had a market capitalisation of about Rs 9 lakh crore, as against a total market capitalisation of Rs 150 lakh crore, constituting ~6%[71] of the total trades in the market.

This could be a direct consequence of a lower valuation accruing to the infrastructure sector, versus all the listed Indian companies, given the capital-intensive nature of the infrastructure-development business and the debt-laden balance sheet of developers. The average price-to-earnings (PE) ratio of stocks in the Nifty 50 index was ~26 for fiscal 2018, while that of stocks in the infrastructure sector was ~17.

The following figure highlights the sector benchmark's performance versus Nifty 50, reflecting the prevalent challenges of infrastructure development in India.

Figure 91 Nifty 50 versus Nifty Infra performance, FY13–FY18

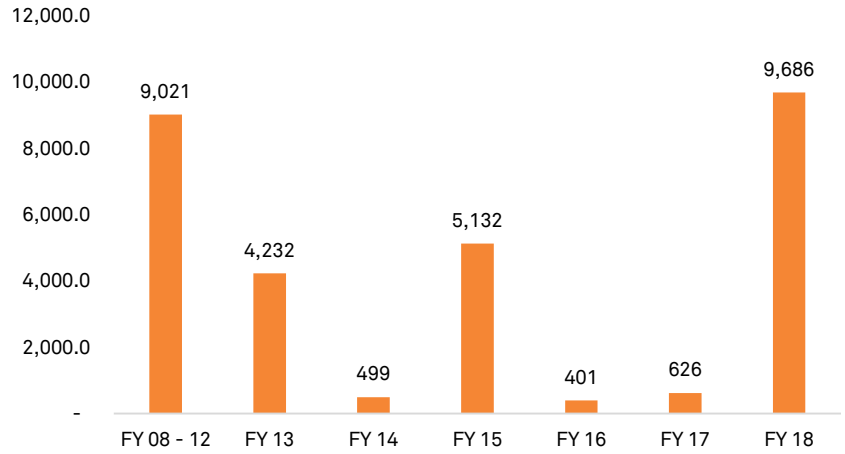


Source: NSE

Between fiscals 2008 and 2018, infrastructure corporates have raised an aggregate amount of ~Rs 30,000 crore through equity issuance in the capital markets, with total issuances in fiscal 2018 alone being ~33% of the total amount raised in the period.

[71] *As of April 11, 2018. Source: NSE, BSE, India Infoline*

Figure 92 Year-wise equity issuance by infrastructure companies (Rs crore)



Source: Bloomberg

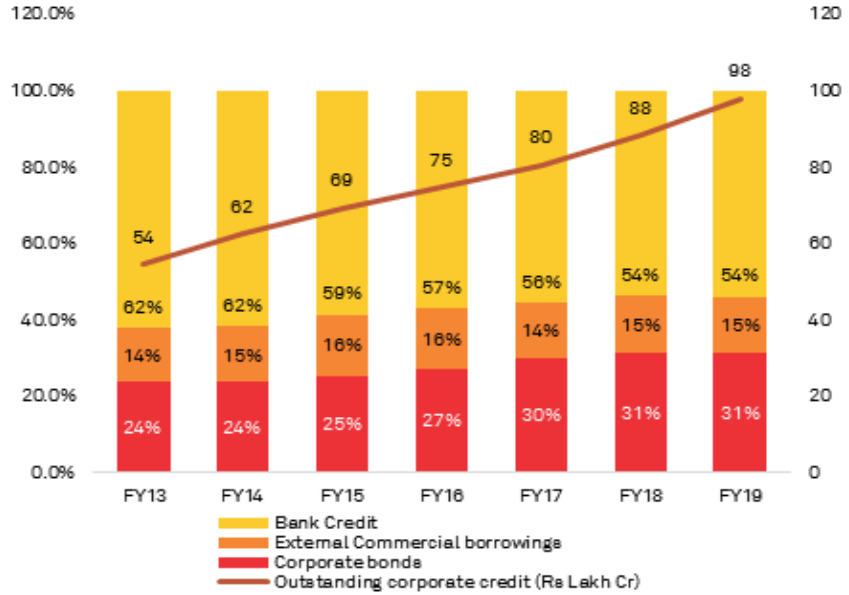
Bond markets

Indian bond markets are growing at a healthy pace. However, some of the structural issues continue to plague the growth of corporate debt bond markets.

The depth of capital markets in India is low – as of end fiscal 2018, the penetration of India's corporate debt market (outstanding value of corporate debt as a percentage of GDP) was ~17%, which was far smaller than countries such as the US, South Korea and Malaysia.

Bank loans are still the primary source of funding for corporates. While the pie of corporate bonds is increasing gradually, it still faces some structural issues.

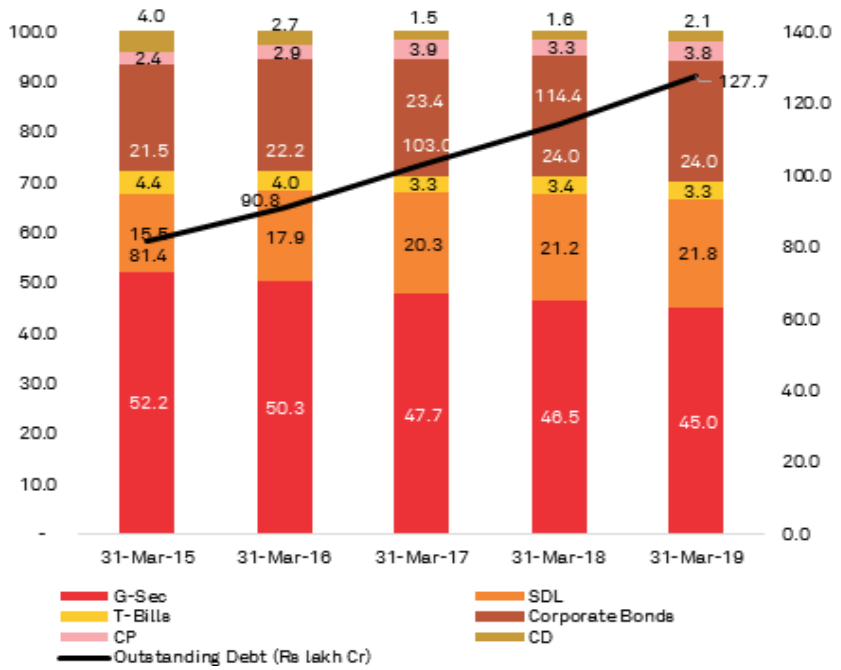
Figure 93 Details of outstanding corporate credit (Rs lakh crore)



Source: RBI, SEBI

Bond markets have grown substantially over the past five fiscals. However, debt markets remain skewed towards sovereign securities, which account for over 70% of the outstanding debt. Hence, the crowding out is high for corporate bonds.

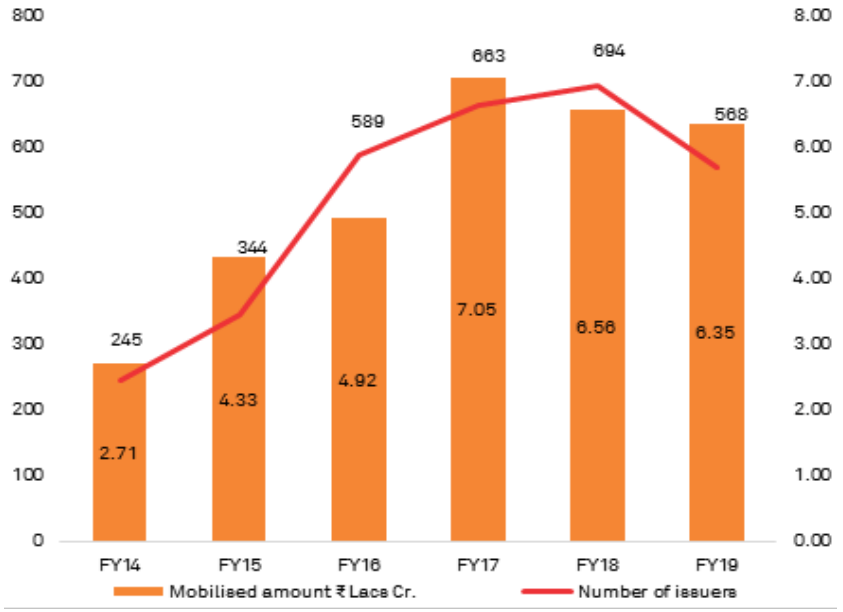
Figure 94 Details of outstanding debt (Rs lakh crore)



Source: RBI, SEBI

Corporate bond markets have also grown at a healthy pace over the years with some slowdown observed in last few years due to rising yields and credit events which reduced investor confidence and demand.

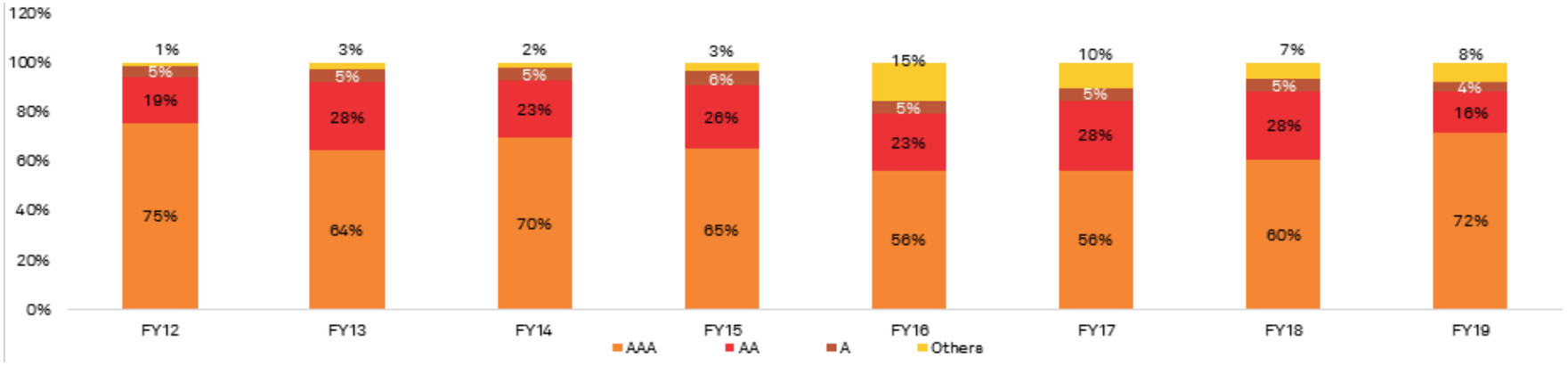
Figure 95 Trends in issuances of corporate bonds (Rs lakh crore)



Source: Prime Database

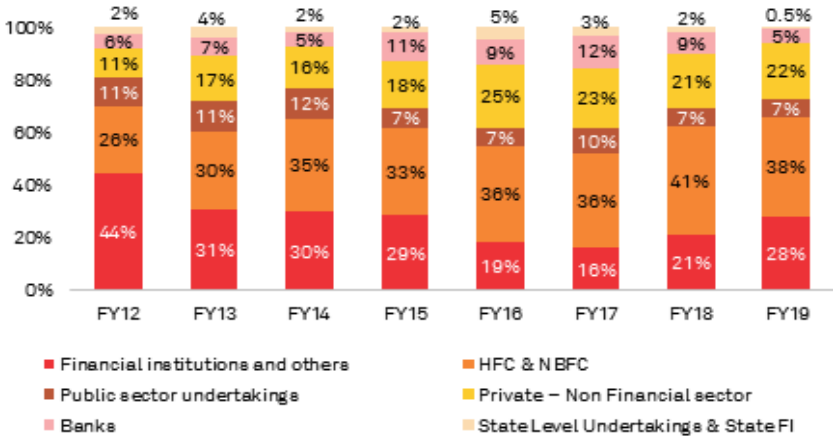
However, the markets are completely skewed towards top-rated and financial sector entities.

Figure 96 Proportion of corporate bond issuances in various rating categories



Source: Prime Database

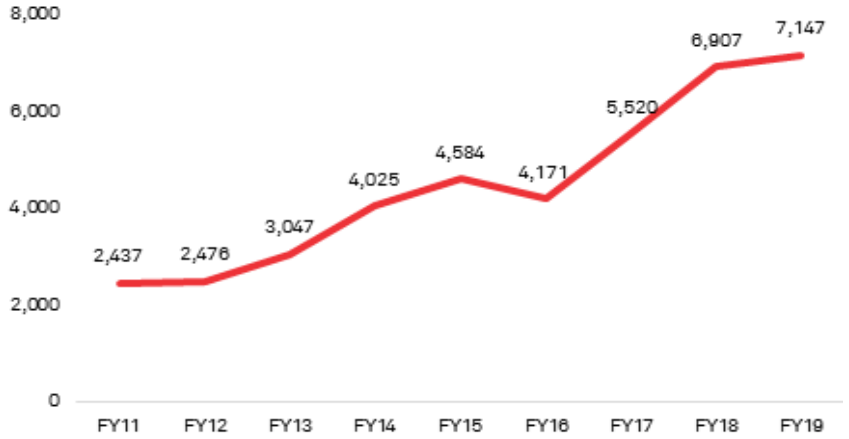
Figure 97 Proportion of corporate bond issuances in various sectors



Source: Prime Database

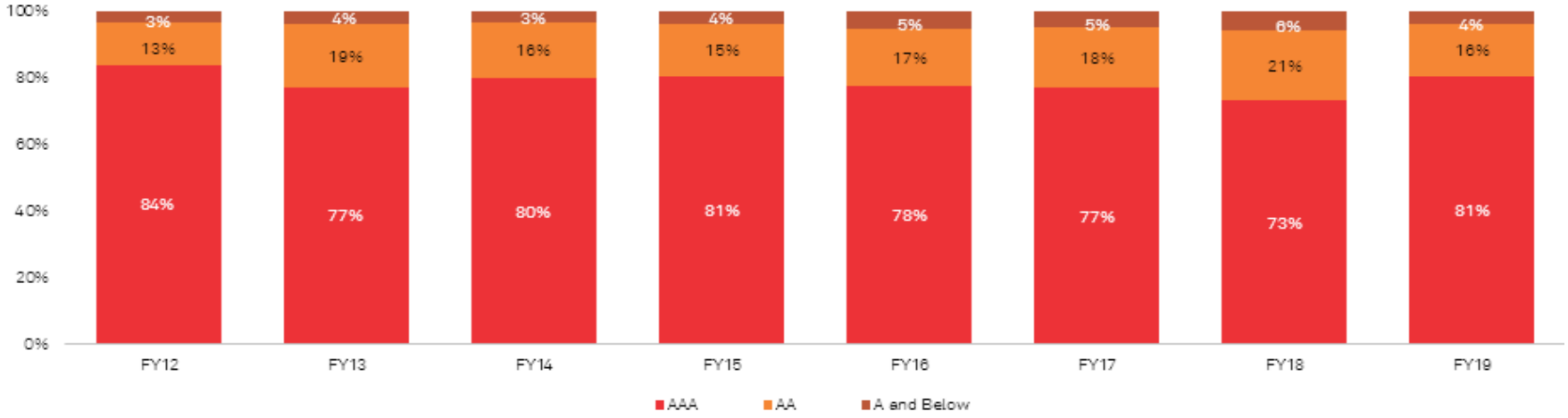
Secondary market also reflects similar trends, where again top-rated and financial sector entities top the charts.

Figure 98 Trend in average daily trading of corporate bonds



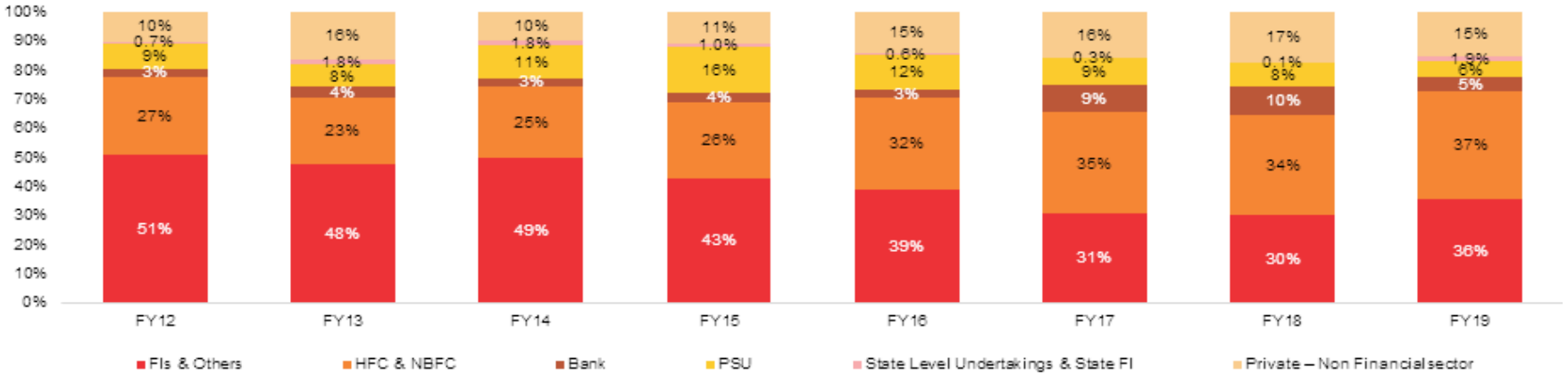
Source: FIMMDA, CRISIL Estimates

Figure 99 Trend in rating-wise break-up of traded corporate bonds



Source: Prime Database, CRISIL Estimates

Figure 100 Trend in sector-wise break-up of traded corporate bonds



Source: Prime Database, CRISIL Estimates

Additionally, most large investors, such as pension funds and insurers, have restrictive investment guidelines, limiting investments below AA-rated papers. It also has been observed that key investors like EPFO have lowered their floor for their corporate bond allocation owing to reasons such as low supply, etc. This leads to reduced demand and liquidity for such issuers, leading to higher yield demanded by investors, and making it more difficult for them to raise funds through the bond market.

This is one of the key reasons why resources raised through capital markets for infrastructure corporates are limited in India. Further, the presence of institutional investors, such as insurance companies and pension funds, which are the main source of infrastructure corporate debt with long tenures, is limited even though a separate limit is available for such investments. This can be also attributed to lower credit ratings of infrastructure projects.

The Task Force notes that the Department of Economic Affairs is working on a plan to deepen the bond market, based on announcements made in the 2019 and 2020 Union Budget speeches of the Finance Minister. While these measures may be expedited, the Task Force recommends that the government take suitable measures to make bond issuances by infrastructure companies attractive. The Task Force also recommends that the announcement proposing setting up of the Credit Enhancement Guarantee Corporation be expedited, as this is expected to support growth of the bond market for infrastructure projects.

Domestic pension and insurance funds

By 2050, the global population aged 65 years and older will have doubled, from 10% to 20%. Nearly 130 crore people – 80% of the elderly – will live in low income countries. Yet, only around one-third of the population in these countries have any sort of formal retirement income. Pension systems address this: by providing income in the event of old age, disability and premature death of the primary beneficiaries. In addition, pension systems contribute to promote long-term savings, which, in turn, stimulates economic growth. Pension funds are also an increasingly important source of infrastructure finance, sustainable finance, and leaders in greening our financial systems. But pension assets as a % of GDP remains low at ~10% in India as against 130% in Australia, 140% in the US, 105% in the UK, and 94% in Canada.

Similarly, insurance coverage in developing economies remain stubbornly low. Where insurance markets do exist, these need to be made more robust and inclusive: i) Insurance helps reduce or avoid poverty in the face of adversity, with paid insurance claims having a long-term benefit well beyond the immediate event (avoiding measures like selling income-generating assets or taking children out of school), and ii) insurance can reduce poverty beyond compensating losses through claims payments, and benefit also the uninsured and the overall economy through quantifying and reducing risk, enhancing access to credit, and enabling greater savings and investments – serving as an important source of long-term domestic capital. Furthermore, insurance offers the most effective risk management, especially for events of low frequency but high severity that are on the rise due to climate change.

Indian pension funds, including NPS (National Pension System), EPFO, etc, have assets under management (AUM) of over Rs 18 lakh crore ($ 250 billion). Similarly, insurance funds, including LIC, have AUM of nearly Rs 37 lakh crore. Thus, collectively, the pension and insurance AUM exceeds Rs 55 lakh crore ($ 760 billion). A large portion of the funds are invested in G-secs and other safe assets. LIC has been investing in infrastructure created by the Centre and state governments, with the infrastructure AUM for fiscal 2019 at Rs 3.84 lakh crore, or ~10.5% of the total AUM of Rs 36.65 lakh crore. EPFO, with an AUM of Rs 11 lakh crore, is permitted to invest up to 5% in asset-backed securities, units of REITs and InvITs, up to 40% in equities (which include infrastructure equities), and up to 40% in debt securities (which may include

infrastructure project debt securities).

The Task Force recommends that the government work with pension funds in enabling these to invest in brownfield and greenfield infrastructure projects. A working group may be set up under the IMSC on finance to document infrastructure investments, and suggest ways forward in enhancing infrastructure investments by domestic pension and insurance funds.

The Task Force also recommends that the Department of Financial Services take immediate measures to reform the pension and insurance systems so that pension savings and insurance coverage support quick growth of pension and insurance savings to at least 30% of GDP by 2025 and investments in infrastructure before India's demographic dividend disappears in 2050.

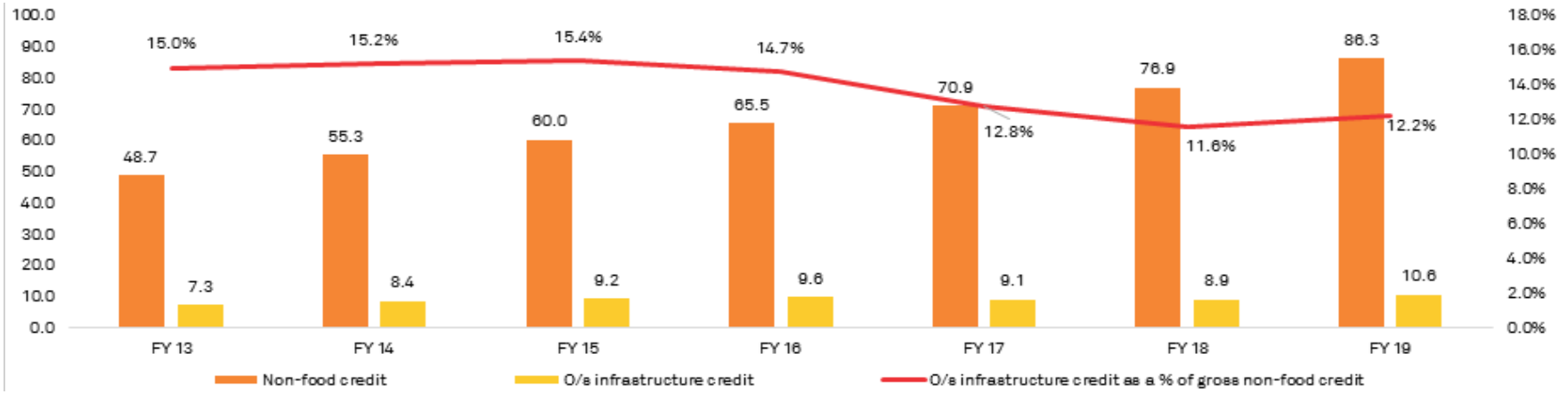
Banks

Bank lending to infrastructure

In India, the infrastructure financing landscape is dominated by bank lending, with the outstanding credit to infrastructure sector, as a percentage of gross non-food credit, by banks elevated at 15% until fiscal 2016. However, due to rising non-performing assets in the banking sector, driven by declining asset quality in infrastructure sector, this share declined to 12% in fiscal 2019.

The following figure highlights the trend in outstanding bank credit to the infrastructure sector in India between fiscals 2013 and 2019. Given the challenges faced by banks and FIs in recovering their dues from developers and contractors, the growth in outstanding credit to the infrastructure sector has been subdued during the review period.

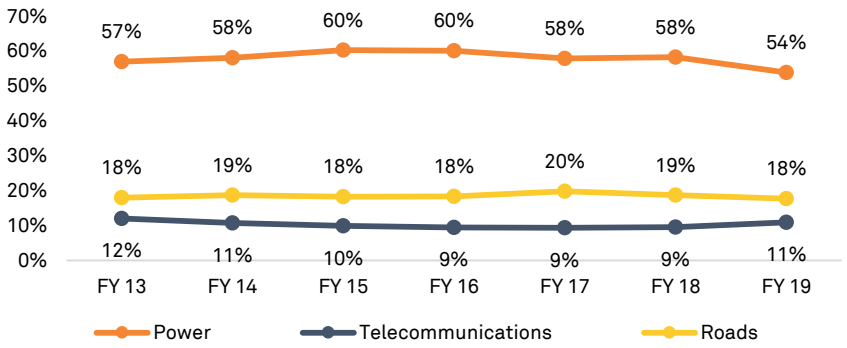
Figure 101 Outstanding bank credit to infrastructure sector, year-wise (Rs lakh crore)



Source: RBI

The following figure shows that the power and road sectors have the largest exposure in the banks' total exposure to the infrastructure sector, with both contributing ~72% of the outstanding infrastructure credit as on March 31, 2019.

Figure 102 Power, roads and telecommunications sectors dominate outstanding infrastructure credit (%)



Source: RBI

Infrastructure financing is generally done on project finance basis, characterised by non-recourse or limited-recourse lending, in which, the main security package consist of first charge on project cash flows through an escrow account, rights under the PPP agreement, and first charge on the project assets. Infrastructure projects in the under-construction stage are typically rated at BB or below, signifying the high risk in funding these projects.

Typically, interest rates for ~75% of all infrastructure loans are in the 9-13% range, which is typical of less-risky projects. This is because banks in India lend on relationship basis, where riskier projects are financed by banks because of the ongoing lending relations between the bank and the promoters. Relationship-based lending rarely factors in a risk-based approach to pricing, resulting in mispricing of the project risk by banks while financing the project during the construction period, which involves high construction risk.

Further, the need of the hour is to have sector-specific DFIs that have the domain expertise to appraise and lend to under-construction projects. This will free up banks' exposure limits to lend to operational assets and further recycle capital in the form of down-selling exposure to bond investors and patient capital, such as pension funds and insurance companies.

DFIs' lending to infrastructure

DFIs are specialised institutions promoted or assisted by the government to channel 'development finance' to important sectors, especially where commercial finance is not a viable proposition.

The challenges are acute in sectors such as industry, infrastructure, agriculture, and small and medium enterprises (SMEs; especially the lack of availability of long-term finance). The role of DFIs is to identify the gaps in financial markets in these sectors and act as a 'gap-filler'. The lack of viability for commercial finance may be due to one or more supply-demand mismatch factors, including sectoral risk, low returns, liability mismatch and unavailability of collateral.

DFIs bring in a balanced approach to lending towards critical projects, while leveraging on their policy/institutional strengths to mitigate risks, thus creating an efficient source of capital.

DFIs in infrastructure are sector-specific – national-level ones play an important role in railways, power and roads sectors, whereas state-level DFIs are largely in the urban sector.

A review of the DFIs in the infrastructure space reflects a high number of sector-specific DFIs housed within a specific line ministry. However, individual entities have tried to diversify their portfolios across specific sub-sectors.

For example, infra NBFCs such as Power Finance Corporation Ltd (PFC) and REC Ltd (acquired by PFC in 2019) have fairly diversified portfolios across the power sector value chain (generation, distribution and transmission), while Housing and Urban Development Corporation Ltd (HUDCO), by virtue of its urban infrastructure mandate (urban infrastructure includes multiple sectors, such as water supply, sewerage and housing), has a wide sectoral presence. Hence, the size and scale of this diversification is limited.

Entities such as PTC Financial Services Ltd have been attempting to look beyond opportunities in the power sector and create a pan-infrastructure portfolio with limited success.

At the state-level, the number of DFIs has been largely limited. Most of the infrastructure implementation is undertaken through grants. The extra-budgetary resources (including loans) are raised directly by the state (through state-development loans/bonds passed on as grants) or by the implementing agency (through bonds and term loans). However, there have been a few successful DFI initiatives, especially in the urban infrastructure space, such as: Tamil Nadu Urban Development Fund and Water and Sanitation Pooled Fund (Tamil Nadu), Karnataka Urban Infrastructure Development and Finance Corporation (KUIDFC), and Odisha Urban Infrastructure Development Fund (OUIDF).

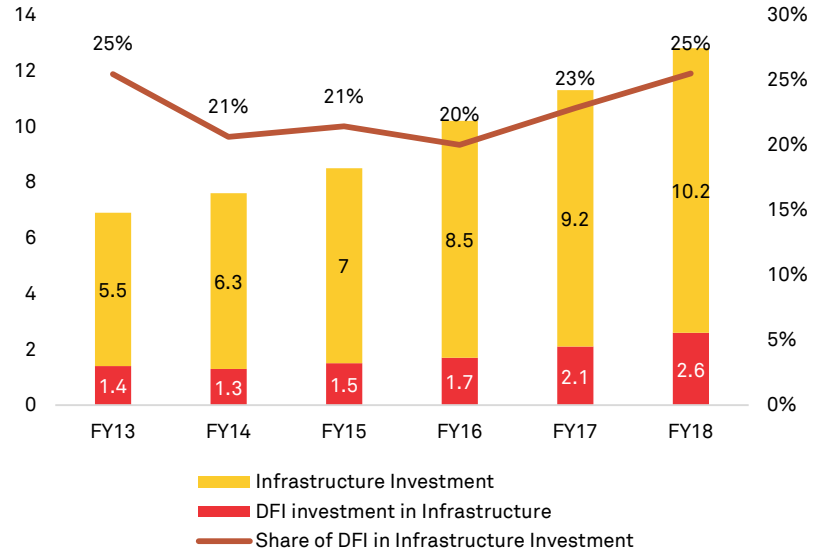
The DFI staff bring in a deep understanding of the sectoral issues and opportunities, helping them in appraising the projects/entities more effectively. They also leverage on the expertise of the line ministries in project selection and appraisal.

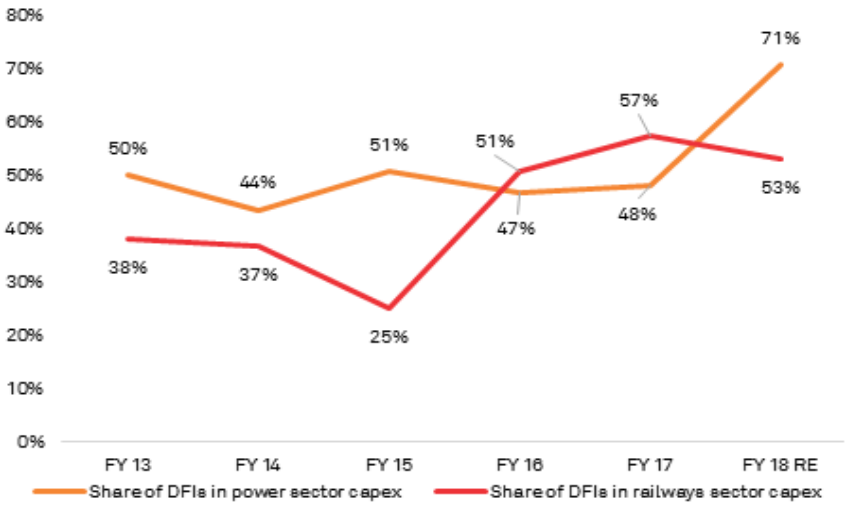
DFIs' share in investments in the infrastructure sector have been sizeable, predominantly in power and railways.

The total disbursement by DFIs was ~23% of the average annual infrastructure investment between fiscals 2013 and 2018. The total disbursement of national-level DFIs increased from Rs 1,36,083 crore to Rs 2,57,432 crore during the period, implying a healthy CAGR of ~14%. DFIs' investments are mainly focused on the power and railways sectors. The average share (~23%) is skewed by sectors, such as power and railways, which had a relatively high DFI share of ~50% and ~40% of the sectoral investment, respectively.

Figure 103 highlights the trend in annual infrastructure investment and compares DFIs' disbursements versus investments between fiscals 2013 and 2018.

Figure 103 Contribution of DFIs to infrastructure investments, FY13-18 (Rs lakh crore)





Note: Share of DFIs is based on the sum of disbursements by the entities, which also includes short-term loans/bridge loans, long-term loans towards refinancing and towards capex. As disaggregated information is not available, the above chart considers total disbursements to total annual capex comparison.

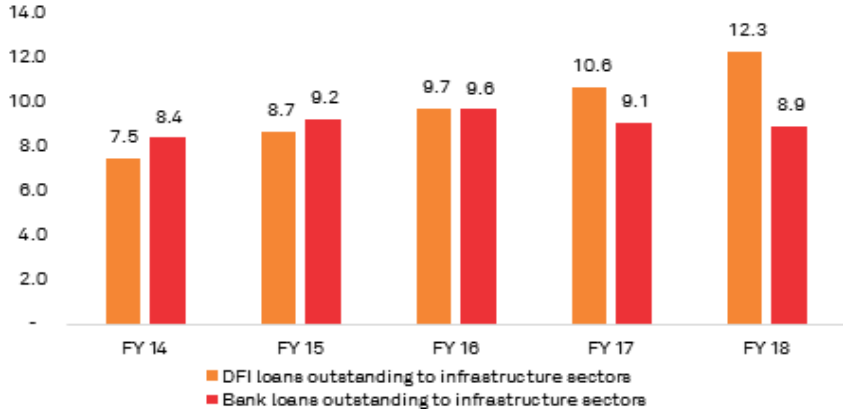
Source: Annual reports of DFIs, RBI; RE – revised estimates;

DFIs have shown higher growth in infrastructure loan assets versus commercial banks

Along with DFIs, lending from commercial banks, and borrowings from the capital markets and multilateral financial institutions form the major sources of financing infrastructure in India. The outstanding credit of DFIs logged a healthy CAGR of 14% between fiscals 2013 and 2018, from Rs 7.5 lakh crore to Rs 12.3 lakh crore, while that of scheduled commercial banks (SCBs) has seen a sluggish growth, increasing from Rs 8.4 lakh crore in fiscal 2014 to Rs 8.9 lakh crore in fiscal 2018, a CAGR of ~2%.

Of late, SCBs have taken a conservative approach in lending to the infrastructure sector, due to unfavourable investment environment in the infrastructure sector in India and further deterioration of asset quality. Given the mandate of infrastructure development for most of the DFIs, even during the tough times of increasing delinquencies in the infrastructure sector, they have increased their exposure considerably versus SCBs, and have overtaken SCBs in terms of overall exposure to the infrastructure sector in India. The following figure highlights the overall exposure of DFIs (national level) and SCBs to the infrastructure sector between fiscals 2014 and 2018.

Figure 104 Outstanding credit of DFIs and banks to the infrastructure sector in India (Rs lakh crore)



Source: RBI, Annual reports of DFIs

Challenges in long term financing of infrastructure

1) Banks face challenge of stressed assets

The infrastructure sector is facing key issues with respect to availability of capital for funding new projects. Banks and NBFCs,

which were traditional lenders to infrastructure, have high exposure to stressed assets in the infrastructure sector. These stressed assets have led to capital adequacy issues for several major banks/ lenders, and further restricted their ability to lend. Moreover, the traditional risks associated with long-term lending, such as asset-liability mismatch (ALM) issues, have also led to risk aversion among lenders. The Task Force recommends that the government take special steps to reduce the overhang of the telecom and thermal power sectors' stress on bank lending to the infrastructure sector.

2) NBFCs face liquidity crunch

In view of the modest bank credit disbursement to the infrastructure sector, NBFCs had stepped up lending in the last few years to fund infrastructure projects. The aggregate AUM of key infrastructure NBFCs such as L&T Infrastructure Finance, SREI Infrastructure Finance, Tata Cleantech Capital, IL&FS Financial Services, and PTC India Financial Services was about Rs 66,500 crore as of March 31, 2018. In 2018, one of the largest infrastructure NBFCs defaulted on loan payments mainly due to high leverage, ALM issues and high exposure to stressed infrastructure assets promoted by related parties. This led to a loss of investor confidence in NBFCs as a whole, and especially those with infrastructure lending as a focus, creating a liquidity crunch and ultimately increasing the cost of funds for most NBFCs. Greater regulatory supervision proposed by the RBI is expected to enable greater prudence in lending by NBFCs.

3) Infrastructure development funds (IDFs) to gain critical mass

IDFs are relatively recent entrants in the infrastructure financing landscape. IDFs were conceptualised to help take out banks' mature operating infrastructure assets, helping the lenders recycle capital and gain headroom for lending to greenfield projects. IDFs also help original lenders mitigate the ALM risk. However, IDFs have seen limited success mainly due to limited availability of operational infrastructure projects with a track record of satisfactory performance of one year. Besides, banks are unwilling to part with their good infrastructure assets to IDFs as their existing asset quality is under pressure amid moderation in overall banking system credit growth. These two factors have impacted IDFs' growth in loan book in recent past. With the sectoral and client concentration being much higher than that of conventional NBFCs, such as higher exposure to renewable assets where there is limited seasoning, the IDFs' ability to manage the higher concentration risk while profitably growing the business will be a key deciding factor for their asset quality and eventual loan book growth. The aggregate AUM of key IDFs such as L&T IDF, IDFC IDF, ICICI IDF and Kotak IDF was only about Rs 13,000 crore as of March 31, 2018. NHAI has been among the first government contracting authorities (GCAs) who has put in place a model tripartite agreement (MTA) among NHAI, the concessionaire and the IDFs to facilitate take-out financing by the IDFs in BOT projects. The Task Force recommends that the adoption of the MTA by all infrastructure GCAs implementing PPP projects should be facilitated by the DEA, imparting liquidity in loan assets of banks. Other facilitative measures, including permission for IDFs to lend to InvITs, may need to be considered by the RBI.

4) DFIs are now only sector-specific

The Industrial Finance Corporation of India (IFCI) was the first DFI set up in 1948, marking the beginning of the era of development banking in India. Subsequently, DFIs such as Industrial Credit and Investment Corporation of India (1955), Unit Trust of India (1963), Industrial Development Bank of India (1964), Export-Import Bank of India (1982), National Bank for Agriculture and Rural Development (1982), Small Industries Development Bank of India (1990), and various state financial corporations were set up to cater to the specific needs of various sectors.

Over the past few years, while some of the major DFIs have amalgamated with their banking outfits (such as ICICI and IDBI), some have been

reclassified as systemically important non-deposit taking NBFCs (such as IFCI). The remaining four all-India financial institutions – Exim Bank, National Bank for Agriculture and Rural Development (NABARD), National Housing Bank (NHB), and Small Industries Development Bank of India (SIDBI) – are primarily refinancing agencies, focused on non-infrastructure sectors. NABARD has played an important role in financing rural infrastructure, such as road networks, irrigation facilities, flood protection, storage to accelerate economic growth, and improve the quality of life in rural areas. HUDCO has played an important role in promoting, developing and financing housing and urban infrastructure related projects. It has been the nodal agency for promoting government's policy in priority sector of social housing under PMAY.

DFIs had demonstrated good credit appraisal skills in appraising and funding greenfield projects, ensuring the specific sector-related issues are adequately addressed/mitigated while financing these. During the early part of fiscals 2000-2010, DFIs such as ICICI, IDBI and IDFC were instrumental in providing long-term finance to industry and infrastructure. However, after achieving critical mass, these transformed into universal banks as these did not have the advantage of low-cost liabilities to de-risk their business models. Besides paucity of low-cost funds, factors such as withdrawal of government guarantee for bond issuance, and the resultant non-statutory liquidity ratio (SLR) status of their bonds, and high concentration risk led to financial stress for many DFIs. These developments further hampered DFIs' lending to greenfield projects. Also, many DFIs faced asset quality issues attributed to the ongoing stress in the infrastructure sector and high exposure to stressed sectors, such as power generation.

Recently, the government has indicated its intent to develop IIFCL into a DFI by increasing its equity capital by Rs 15,000 crore. IIFCL has had limited success in financing of infrastructure thus far. With increased equity capital, the idea is to create requisite headroom for borrowing such that IIFCL can finance big infrastructure projects.

As can be seen from the table below, while the outstanding loan assets of the aforesaid DFIs was Rs 11.1 lakh crore as of March 31, 2019, these institutions are focused on mainly lending to specific sectors and not to infrastructure as a whole.

Table 5 Development finance institutions

Name of the DFI	Role	Outstanding loan assets (March 31, 2019) (Rs lakh crore)
REC Ltd (erstwhile Rural Electrification Corporation Limited)*	Provides financial assistance to the power sector, mainly transmission and distribution segments	2.81
Power Finance Corporation Ltd (PFC)*	NBFC focussed on lending to the power sector. It mainly funds assets involved in power generation	3.15
Indian Renewable Energy Development Agency Ltd (IREDA)	NBFC engaged in extending financial assistance for setting up renewable energy projects	0.21
Indian Railway Finance Corporation (IRFC)	NBFC engaged in financing railway infrastructure in India	1.9
India Infrastructure Finance Company Ltd	Provides financial assistance to all infrastructure sectors	0.35
NABARD	Provides financial assistance to irrigation projects, flood protection and watershed management, agriculture storage and marketing infrastructure and food processing	1.95
HUDCO	NBFC engaged in financing housing and urban infrastructure projects	0.73
	Total*	**11.1**

Source: Respective company websites and annual report, CRIS analysis
**Except NABARD, all entities mentioned are NBFCs*

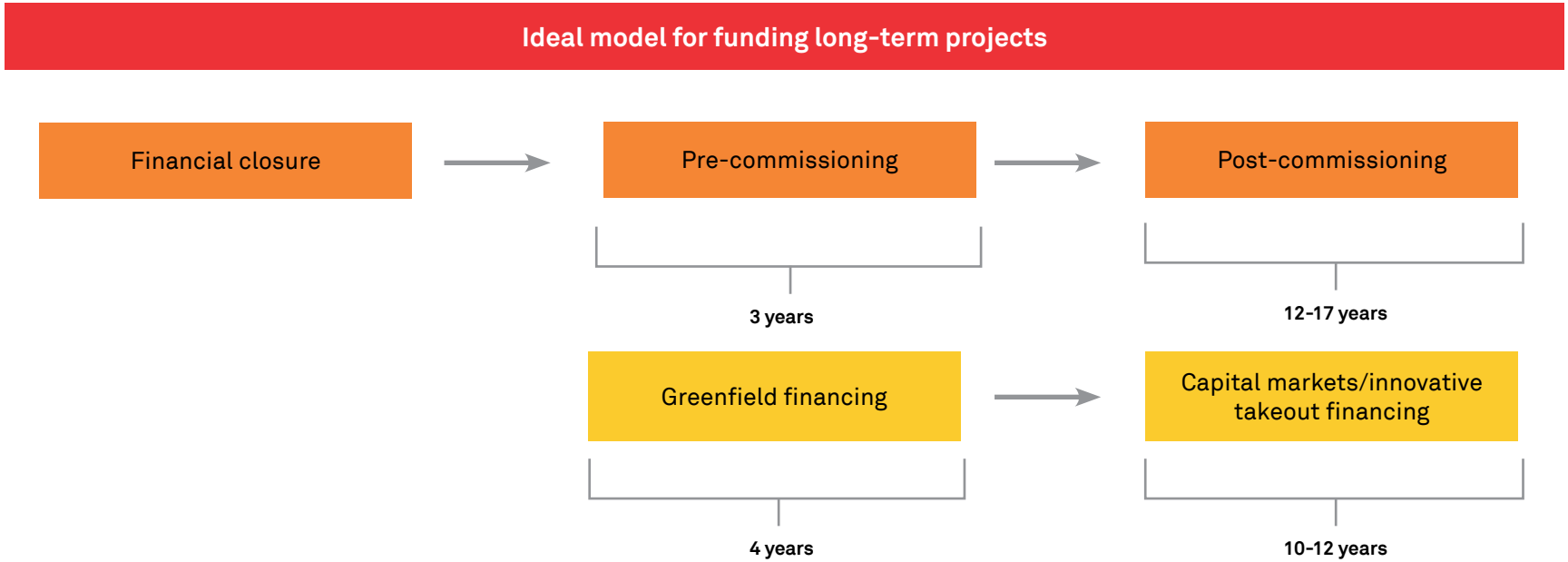
Recommendations to address the challenges

The capital available for long-term investment can be increased by inducting new sources of finance and freeing up capital of original lenders, thus facilitating a perpetual cycle of lending, refinancing, asset recycling and new lending. The recommendations to this end are as follows:

1) Funding long-term projects: Right institutions for the right stage in project finance

To bridge the funding gap, it is imperative to develop a new class of investors who can bring in patient capital from insurance companies, pension funds and provident funds. This capital has differentiated risk-return preferences compared with greenfield funding capital and is likely to come in only once the project is commissioned and has stabilised. This “patient capital” prefers assured, stable returns over long periods even if such returns are lower than those on construction phase financing.

Figure 105 Funding long-term infra projects

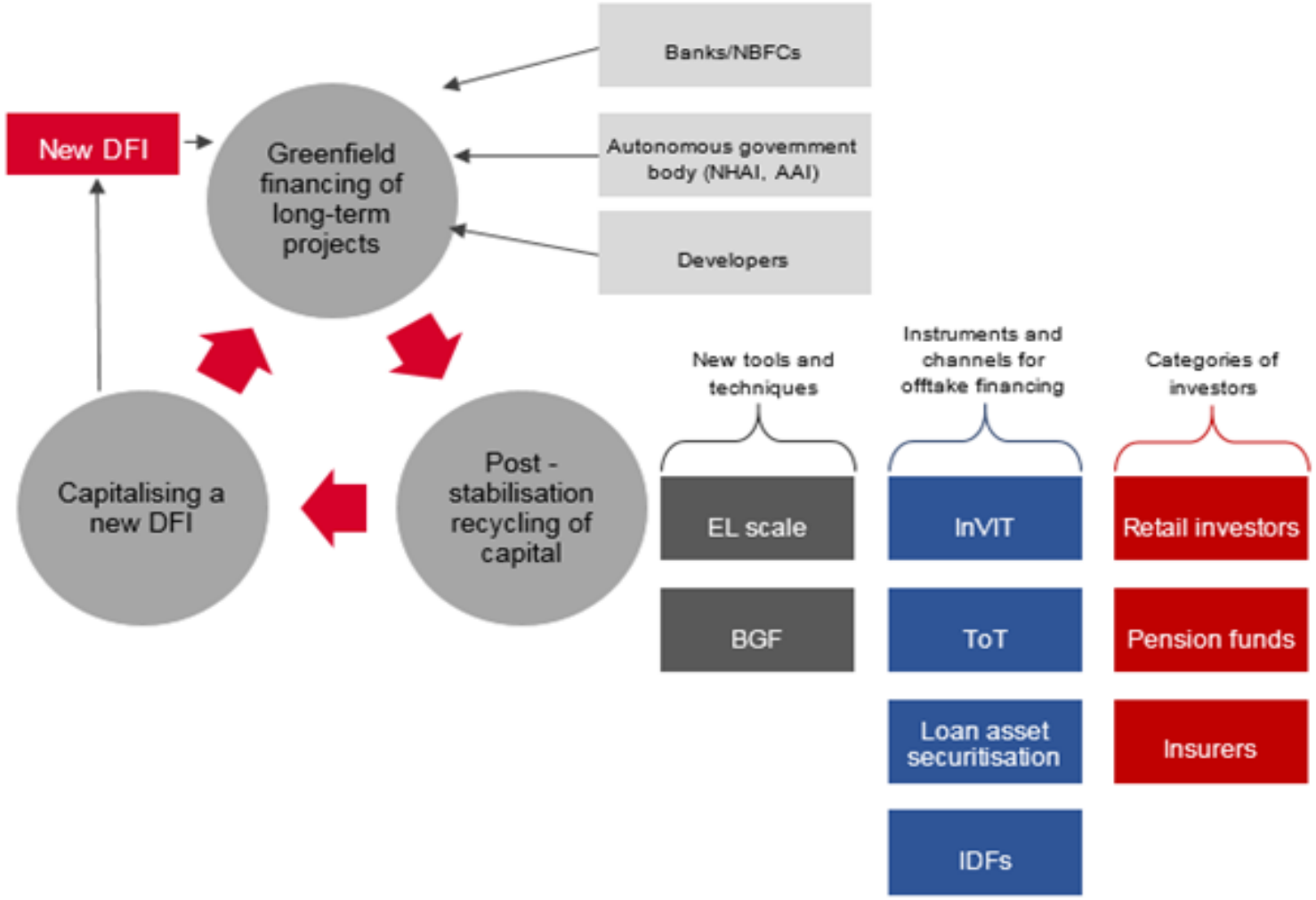


The ideal mode of financing long term projects is for banks/project financing institutions to focus on funding up to the pre-commissioning stage of projects.

After the project is commissioned and stable, the greenfield financing institutions must refinance the debt (through bonds) through long-term investors. Such refinancing will free up considerable funds for banks and enable their redeployment in new projects. While this financing model will allow banks to address their ALMs better, bond investors will also get good quality, long-term assets with stable cashflows. Besides, developers can benefit from reduced costs and fixed interest rates that can help offset the interest rate risks inherent in bank loans.

For this to happen, the banks will, however, need to adopt a stronger risk-based pricing model for project loans. It will also be critical to develop the ability to assess projects – a skill which seems to be in short supply after the demise of the DFIs. Banks can price their loans to reflect the evolving risk profile of projects.

Figure 106 Right ecosystem of funding infra projects at the appropriate stage



An ecosystem of enabling institutions, investors, and tools and techniques will be required to do this. In the greenfield stage, along with the existing set of banks/ NBFCs, there may be a need for an exclusive DFI that has solid project appraisal skills and is adequately capitalised with long-term financing sources.

In the post-commissioning stabilisation stage, there is a need to attract new sources of capital and investors. To do so, a significant scale up of recently introduced offtake finance initiatives, such as IDFs, InvITs, and ToT modes of monetisation is needed. Further, new modes such as loan asset securitisation and sale of non-core assets may also be explored.

Also, new techniques to measure credit risk (the expected loss rating scale) and credit enhancement of infrastructure loan assets (through partial or complete guarantees from a bond guarantee fund) are needed to suit the risk appetite of this new class of investors.

These measures are elaborated below.

2) DFIs with better credit appraisal skills

A strong DFI with competitive cost of funds and strong project appraisal and credit monitoring skills can offer superior risk-based pricing of long term project loans. Such an institution will be differentiated and have the following characteristics:

i. Domain expertise and project appraisal skills: It should have developed expertise in assessment of sector-specific project risks across multiple infrastructure sectors. It will also need to have a strong risk management framework for continuous credit monitoring. Availability of manpower and leadership skilled in project appraisal is a pre-requisite for success

ii. Well capitalised with access to long term sources of finance: It will need to have access to long term finance (most likely from long term bonds from capital markets) at competitive cost so that funding of long term and infrastructure projects could be done in an economically viable manner and without associated ALM mismatches. However, it must be noted that DFIs in the past had to convert into universal banks in view of the challenges they faced in securing long term financing, given the non-SLR status of their bonds. The Task Force recommends that some of the existing DFIs may be capitalised adequately with the help of MDBs, such as IFC, ADB, NDB, etc. DFIs should also actively seek equity investment from local and global pension funds. The Task Force also recommends that given that infra financing is a critical input for implementing the NIP, a positive tax free or low tax regime for long-term bonds be allowed for raising capital through the bond markets. This will also help deepen bond markets in India

iii. Diversified asset base with funded projects across sectors to prevent concentration risk: It is necessary that the DFIs have a diversified asset base across all sectors in order to protect against cyclical nature of the infrastructure/industrial sectors. This will also enable greater investor confidence. Hence, sector-specific DFIs may be encouraged to consider diversification into new infrastructure sectors that have potential for growth

3) Advisory think tank for risk-sharing partnership projects

There is a need to develop a cross sectoral project advisory think tank that would generate ideas and share global and domestic best practices in crafting well-balanced risk-sharing partnership frameworks. This body should also consider autonomous regulation in each sector which does not automatically translate into independent sectoral regulators; other regulatory options like regulation by contract and multi–sectoral

regulators may also be explored. It can also be responsible for capacity building of various stakeholders and counter parties in the ecosystem. Well balanced and nuanced frameworks tend to allocate both risk and returns more equitably between the public and private sectors, and can be helpful in enhancing private sector interest, while at the same time maximising efficiency in provisioning of infrastructure. A 3P institution was announced earlier. Given that most infrastructure is still implemented by the public sector, the mandate of the proposed institution may be expanded to cover all infrastructure (and not just PPPs). Also, rather than setting up a new institution, one of the existing national institutions could be considered for development into a national infrastructure centre.

DFIs can consider infrastructure as an investible asset class. First, this can increase availability of funds (liquidity) from both domestic and international providers of capital. Second, this can increase the scale of investment by bundling together individual projects and providing a portfolio of products in which such providers of capital can invest. Third, this can address the governance and capability gaps that often hinder private-sector investment.

The Task Force recommends that SBI, one of the largest lenders to the infrastructure sector, needs to strengthen the infrastructure vertical and take steps to enhance the liquidity of its exposure to the infrastructure sector. Efforts in collaborating with IDFs in take-out financing and developing the market for asset-backed securitisation needs special attention.

The Task Force also notes that a working group be set up to review the role and functioning of existing central public sector DFIs, such as PFC, IREDA, NHB, HUDCO, etc, and state DFIs. State governments may also be roped in with regulators.

The Task Force also recommends a differential licensing system with an enabling regulatory framework to encourage setting up DFIs in the infrastructure sector, with domestic or foreign capital. It is recommended that a working group may be set up by the RBI to consider this option.

The Task Force also recommends a differential licensing system with an enabling regulatory framework to encourage setting up DFIs in the Infrastructure sector with domestic or foreign capital. It is recommended that a working group may be set up by RBI to consider this option.

The Task Force recommends that the IIFCL, which has received sanction for additional infusion of Rs 15,000 crore as capital, needs to ramp up its role in infrastructure financing as well. The Task Force recommends that IIFCL needs to bring in top talent to build its capacity in infrastructure project appraisal and advisory.

The Task Force also welcomes the announcement in Union Budget 2020-21, sanctioning Rs 22,000 crore for capitalisation of IIFCL and infrastructure NBFC of NIIF.

External Aid – Multilateral and Bilateral

India's major development partners include ADB, AFD, the JICA, KfW, and World Bank. The Asian Infrastructure Investment Bank and the New Development Bank are new multilateral funding agencies. These development partners focus predominantly on infrastructure, including social infrastructure (health and education).

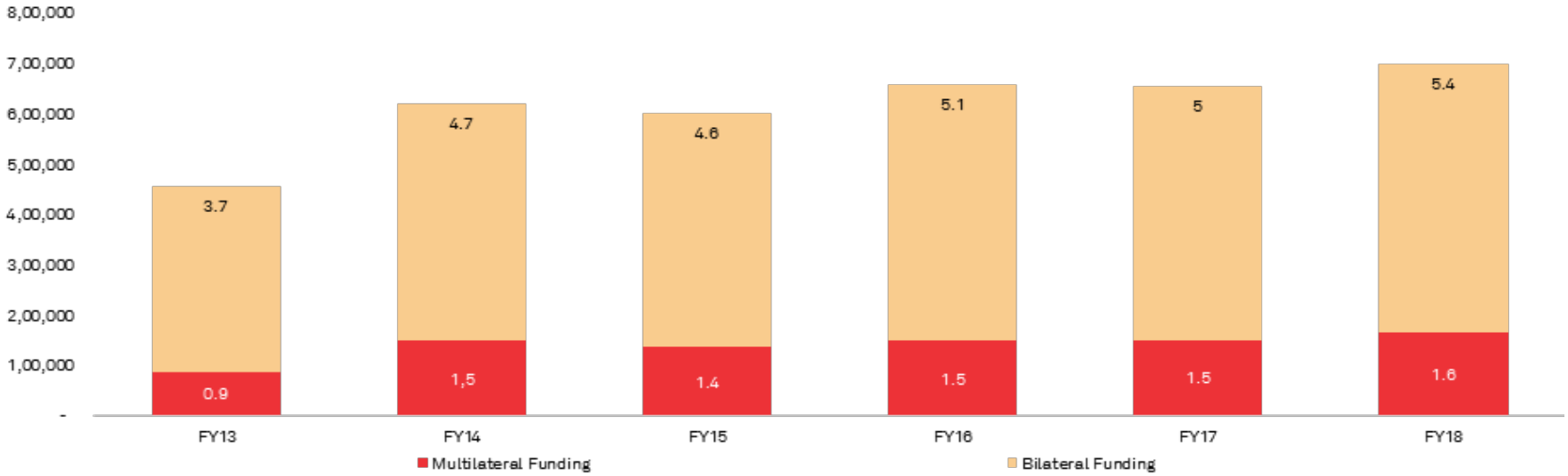
Further, United Nations agencies also provide support in social and environmental sectors. The Ministry of Finance is the government's nodal agency that coordinates and consults with India's development partners to ensure that effective and prioritised assistance is provided,

in sync with the country's development agenda and the priorities of the Centre and state governments, and sectors.

External aid from these development partners helps fund infrastructure, aiding finance projects with relatively lower commercial returns but large developmental effects, due to their lower cost of funding. This project finance supports select projects in the development stage that would otherwise not receive commercial funding. Using own funds, these provide both loans and equity finance to private sector projects that meet their internal appraisal criteria, but that cannot get financing from other sources on reasonable terms. These also offer quasi-equity and financial risk management products. In general, though, these lend on market terms, and do not compete with, but rather complement, private capital.

In many instances, by using credit-enhancement techniques, such as the issuance of partial-credit guarantees and first-loss guarantees, the development partners are able to crowd-in investment from the private sector that would otherwise not have participated in infrastructure lending. For instance, infrastructure projects in sectors as diverse as renewable energy (Porbandar Solar Private Ltd, backed by IIFCL guarantee and back-stopped by ADB guarantee) to urban water and sanitation sector (Tamil Nadu and Karnataka WASH SPVs, backed by USAID guarantees) have been able to tap the bond markets.

Figure 107 External-aid financing in India between fiscals 2013 and 2018 (Rs lakh crore)



Source: RBI, Ministry of Statistics and Programme Implementation

Foreign Investments

FDI inflows in the infrastructure sector in India

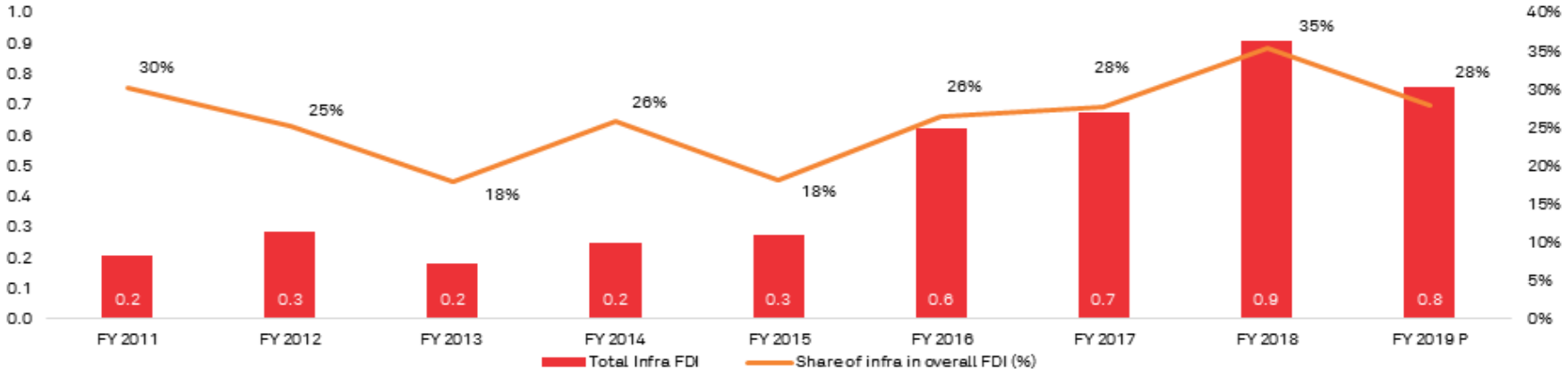
FDI in the infrastructure sector, or any other industry, brings in an alternative source of funds and also helps in bringing modern technologies, skills and knowledge, which assist in completing a project efficiently. FDI in the modern era is considered to be a critical vehicle for transfer of advanced technologies, resources and innovations from one nation to another. Further, there is a direct correlation among FDI inflows, infrastructure development and economic growth.

As infrastructure is considered a critical sector for aiding economic development, it requires large investments and liberal policies from the point of view of ease of doing business, thus augmenting foreign investments in this sector. As a positive step towards encouraging FDI inflows in infrastructure sector in India, the Government of India has brought in most of the key infrastructure sectors listed under the harmonised list of infrastructure sectors in India under eligible sectors that can have 100% FDI under the automatic route.

Figure 108 shows that FDI inflows in infrastructure sector have grown from Rs 0.2 lakh crore in fiscal 2011 to Rs 0.8 lakh crore in fiscal 2019, logging a healthy CAGR of ~19%. However, growth in FDI inflows in the infrastructure sector during fiscals 2011 to 2015 was almost flat, but picked up from fiscal 2016, which is a trend observed in overall FDI inflows in India.

This can be attributed to a number of reforms undertaken by the government, such as an increase in the investment caps for certain sectors, and non-sensitive activities placed under the automatic route. During this period, 21 sectors covering 87 areas of FDI policy have undergone major reforms resulting in higher FDI inflows.

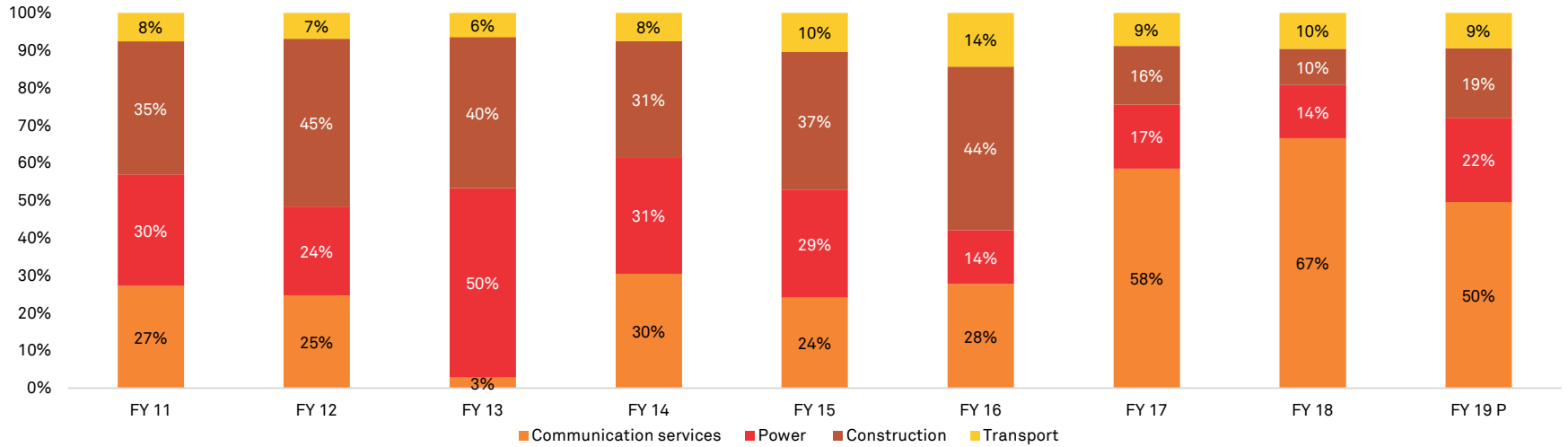
Figure 108 FDI inflows in infrastructure sectors in India between fiscals 2011 and 2019 (Rs lakh crore)



Source: RBI Annual Reports

The following figure shows that among the infrastructure sectors, FDI inflows to the infrastructure sector were mainly in communication services and power sectors.

Figure 109 FDI in various infrastructure sectors in India, FY11-19



Source: RBI Annual Reports

Investment by NRIs and NRI-held entities

More than 2.8 crore people, including NRIs, persons of Indian origin and overseas citizens of India (OCIs) stay overseas. For allowing these NRIs to participate in the Indian growth story and further the infrastructure development in India, FDI policies have been amended to facilitate investments by these NRIs.

NRIs in India can make investments in India under various schedules of the Foreign Exchange Management (FEMA) Regulations, 2000. Schedule 1 of these regulations permits 100% NRI investments under the automatic route in sectors, such as townships, housing, built-up infrastructure and construction development projects, only when the contribution is on a non-repatriation basis and investments are done as an inward remittance or out of NRE/FCNR (B)/NRO accounts. Further, investments made by NRIs under Schedule 4 of FEMA Regulations, 2000, on a non-repatriation basis is considered to be domestic investment at par with the investments made by the

residents. Special dispensation of NRIs is available to companies, trusts and partnership firms that are incorporated outside India and are owned and controlled by NRIs.

NRIs can also invest in shares/convertible debentures of any Indian company under FDI, subject to terms and conditions. An NRI can sell and purchase shares/convertible debentures of any Indian company on both repatriation and non-repatriation basis under the Portfolio Investment Scheme (PIS). The ceiling for investment for NRIs is 10% of the paid-up capital of an Indian company and 20% in case of public sector banks. This ceiling can be raised to 24% of the paid-up capital, subject to the approval of general body of the company.

Investments by global sovereign wealth funds and global pension funds

Sovereign wealth funds and global pension funds are characterised by interest in longer term returns, with focus on stable, predictable cash flows, especially on dividend flows. Sovereign wealth funds tend to invest in greenfield projects and in developing countries. These have managed risks through co-investment in partnership with domestic sovereign wealth funds and institutional investors. For the most part, sovereign wealth funds take minority positions and do not intervene in the management of the infrastructure project or company acquired abroad, leaving the oversight to expert partners. Sovereign wealth funds have long had a specific asset allocation to infrastructure in their portfolios, but the latest trend is also to set up sovereign funds dedicated to investing in domestic infrastructure in partnership with foreign institutional investors, notably other sovereign wealth funds. This is the case of the National Investment and Infrastructure Fund in India.

Government of India in its Union Budget 2020-21 has taken certain bold measures, which are likely to enthuse global pension and sovereign wealth funds' appetite for infrastructure investments. Elimination of dividend distribution tax and 100% tax exemption to their interest, dividend and capital gains income with respect to investment made in infrastructure and other notified sectors before March 31, 2024 and with a minimum lock-in period of three years. It is expected that these measures will provide significant change in the perception of sovereign wealth funds /global pension funds towards infrastructure investments in India and will lead to significant inflows.

The Task Force recommends that measures be also taken by ministries and regulators to simplify the procedural aspects of FDI investment in infrastructure by sovereign wealth funds /global pension funds, improving the ease of investing.

Environmental, social and corporate governance (ESG) considerations by foreign investors

Over their lifetime from development to construction to operation all the way through to the end of the economic life, infrastructure assets will face all kinds of ESG issues. These will vary depending on asset type, sector, size, geographic location and stage in the lifecycle. Some of these issues may originate outside the asset but have impact on its technical ability to operate or on its profitability (e.g. temperature rise, increased water scarcity, changing regulations, tariffs). Other issues may be caused by the asset itself and impact its surrounding environment and communities (e.g. water effluent, quality of life of the communities around it, labour conditions, etc.). In the latter case, we speak of externalities. These can and increasingly will impact the asset's financial performance via various feedback loops (e.g. protests

of the surrounding community). It is thus important to realise that both directions of impact (impact on the asset, and impact from the asset) may have financial consequences for the investors, particularly if they are “universal owners”.

Industry standards and guidelines are often the foundation for investors’ ESG management systems in infrastructure investing. The World Bank Group Environmental, Health and Safety (EHS) Guidelines & Industry Sector Guidelines, the IFC Performance Standards, Equator Principles, PRI Principles, CDC Toolkit and Infrastructure Sector Profile are commonly cited references. The technical expert group (TEG) advising the European Commission on sustainable finance has, in March 2020, published its final recommendations on the EU taxonomy, including “substantial new user guidance” to help investors and companies meet obligations for reporting against the framework. The taxonomy is a list of economic activities and corresponding performance criteria consistent with the EU’s commitment to reach net-zero carbon emissions by 2050.

The Task Force recommends greater understanding of global ESG standards by ministries and implementing agencies to enable them to assess the expected performance outcomes and document the same in DPRs and also lay down mechanisms to measure and disclose performance in line with India’s Nationally Determined Commitments for Climate Change. These will enable global investors to assess their interest in investing in such projects, besides enabling India to report the performance against NDC commitments. It is also suggested to set up a working group under the Ministry of Finance to recommend regulatory changes and other policy measures required to enhance the attractiveness of India to ESG focused funds.

Business Models

This chapter discusses the business models typically followed during the construction and operational phases of infrastructure projects in India.

The business models followed by infrastructure projects in India have taken on different structures depending on the roles of the entities involved, and ownership arrangements and allocation of risks among the parties involved. For instance, if a project is fully public-funded, it is typically implemented through the engineering, procurement and construction (EPC) model. However, if a private sector entity is involved in implementation and financing, it can be under any of a number of public-private partnership (PPP) models.

EPC

EPC projects involve infrastructure development contracts in which the responsibility of delivering the project at a guaranteed price within a fixed period and with quality and performance parameters as per predetermined standards is with the contractor.

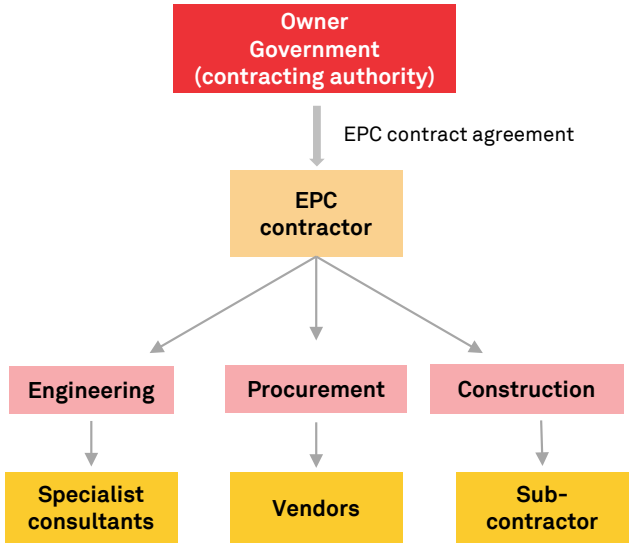
The contractor will undertake detailed engineering design of the project, procure all the equipment and raw materials, and construct the facility in return for a fixed payment from the government/ public sector entity.

The funds to be given to the contractor by the public sector entity (state or central) for delivery of the infrastructure project are provided through budgetary support or directly by internal and extra budgetary resources (IEBR) of state or central PSUs. These payments are linked to the achievement of certain construction milestones.

EPC projects are also known as 'turnkey projects' as the contractor delivers a complete facility/ infrastructure asset to a public sector entity that is ready to start operating the asset. The risks of cost and time overruns are both transferred to the private contractor.

In India, EPC projects are typically undertaken in sectors such as power transmission and distribution, metro rail, expressways and highways, railways, residential constructions, water supply and waste management.

Figure 110 Typical structure of an EPC project



There are five key differences between the EPC and PPP models. These are:

- **Allocation of risks –** In traditional procurement methods such as EPC, the public sector entity bears almost all the risks that can emerge in the operations phase of a project's life cycle. All the risks related to design and construction are borne by the EPC contractor. In case of PPP procurement, there is an optimum allocation of risks between the public entity and the private partner such that a particular risk is allocated to the party that is most capable of handling or mitigating it.
- **Management of the project –** Under the EPC model, the public sector entity is solely responsible for complete O&M of the project after the construction phase, while in case of PPP procurement, the responsibility of O&M of the project is primarily with the private partner for the duration of the concession period.
- **Objective –** In EPC, the objective of the public sector entity is to build an asset, while in case of PPP procurement, its objective is to buy services or ensure service delivery. The public sector entity owns the asset in both cases. The outputs/service-level agreements are explicitly mentioned in the bid documents which the private sector partner is expected to meet in a PPP.
- **Sources of financing –** EPC projects are financed by the public sector entity through its budgetary allocations/ resources. In case of PPP procurement, the private sector can bring in finances in the form of debt and equity and can be supported by the public sector entity through grants/ viability gap funding (VGF).
- **Payments –** The public sector entity is responsible for making frequent and short-term payments to the contractor of an EPC project. These payments are linked to certain construction milestones. In case of PPP procurement, there is a long-term agreement between the private and public entities and the payments are to be made on the basis of the terms and conditions mentioned in the concession agreement.

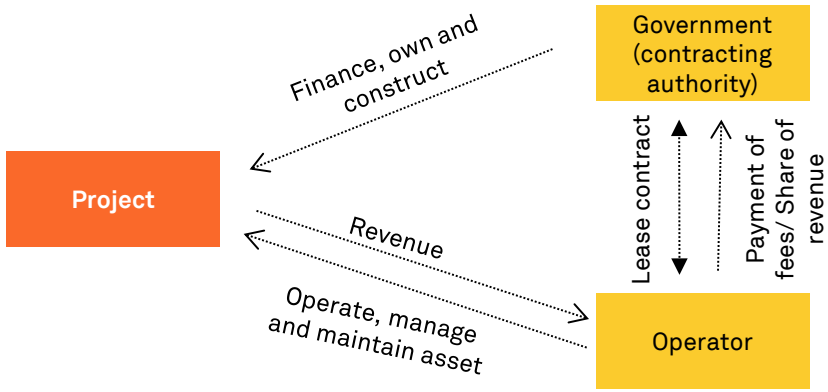
PPP

PPP models were devised in order to encourage the private sector to finance infrastructure development and related services. Various PPP models are in use, with varying parameters governing the ownership of the asset, responsibility for investment, allocation of risks and duration of the contract. In this section, we discuss in detail about these models.

Leasing

In lease contracts, the infrastructure asset owned by a public entity is leased out to a private partner. These contracts are typically for medium term, i.e. 10-15 years and may involve some capital investment by the private partner. The private partner, as per the contract, charges a user fee from consumers and does not receive any fixed fee from the public authority, as in the case of management contracts. A portion of the receipts of the user fee charged is provided to the public entity owning the asset as a lease fee and the balance retained by the private partner

Figure 111 Typical structure of a lease contract



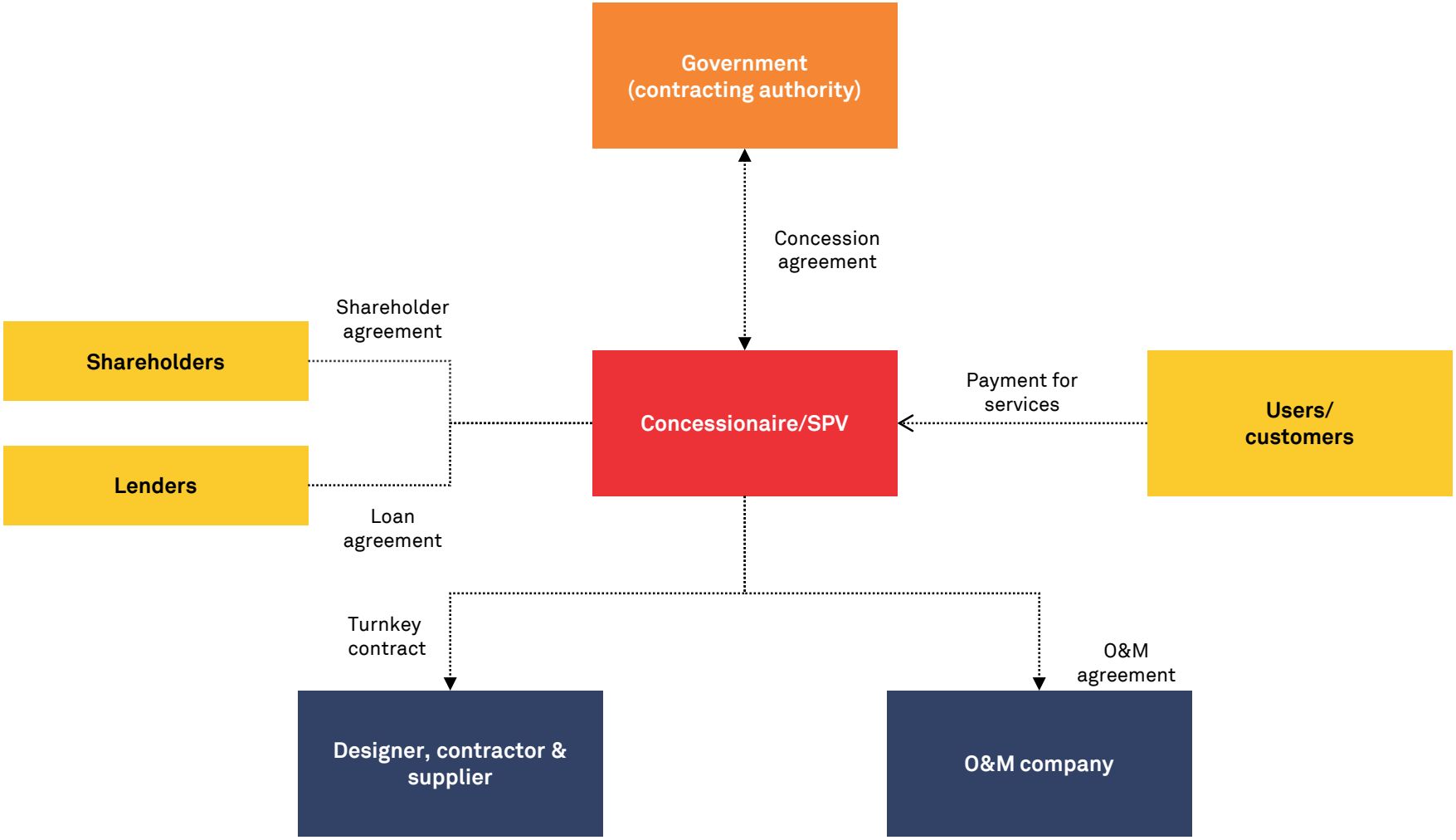
The model has several variants, including:

- Leasing involves the public sector entity leasing the asset it owns to a private sector partner for the purpose of O&M and management. Here, the revenue will be collected by the private sector partner and a part of it will be shared with the public sector entity. For instance, leasing of retail outlets at railway stations by the Indian Railways and sub-leasing of commercial real estate by a private airport operator to private players / mall operators / offices
- Build-lease-transfer (BLT) and build-own-lease-transfer (BOLT) involve the private sector building and owning a facility (in case of BOLT), leasing it to the public sector entity and transferring the facility to the public sector entity at the end of the lease period. In this variant, during the lease period, the public sector entity will make monthly or annual lease payments to the private sector entity for using the facility and as a means to repay the investment made. Here, the asset is owned by the private sector entity and then transferred to the public sector entity at the end of lease period
- Build-transfer-lease (BTL) involves the private sector partner building an asset, transferring it to the government and then leasing it back. In this variant, the private sector delivers the service, assumes demand / traffic risk and collects user charges from consumers. Such user charges can have an inflation-linked component to serve as a partial or full hedge against inflation. Here the asset is owned by the public sector entity. Rajiv Gandhi Container Terminal is an example

BOT

BOT model has a public sector entity, the contracting authority, defining and granting rights to a private sector partner to build and operate an infrastructure facility/ service for a fixed duration or concession period (typically a long period of 15-30 years). At the end of the fixed duration/ concession period, the asset and its operations are transferred to the contracting authority. The BOT model is generally applicable to development of greenfield assets and in some cases brownfield assets too, in which risk allocation to the private sector may be significant. In the BOT-toll model, the construction and demand risk is borne by the private sector partner, which collects the tariff revenue/ user charges from the consumers and may share a portion of it with the public sector entity. In the case of the BOT-annuity model, the construction risk is borne by the private sector partner, but the demand risk is borne by the public sector entity. Here, the private player mainly bears the counterparty risk with respect to timely annuity payments from the public sector subject to the former maintaining the asset as per predefined performance standards. In certain cases, in order to make the project commercially viable/ reduce the commercial risk taken by the private sector, the public sector entity may provide funds in the form of VGF, a type of grant, to the private sector partner. In some cases, there can also be an element of revenue share or negative grant / premium to be shared with the concessioning authority during the concession period – either upfront negative grant payable or premium to be shared on a monthly basis with the concessioning authority. This model is more prevalent in the transportation sector, especially in the roads and highways and ports sub-sector in India. Examples of BOT-toll projects are Nhava Sheva Container Terminal, Amritsar Interstate Bus Terminal, Delhi Gurgaon Expressway, Hyderabad Metro, etc. An example of BOT-annuity project is Tuni Anakapalli Road Project.

Figure 112 Typical structure of a BOT project



Design-build-finance-operate-transfer (DBFOT)

DBFOT is a variant of the BOT model with additional flexibility for the private partner with respect to undertaking detailed design of the project during the construction period, based on the output specifications defined upfront in the concession agreement. In case of DBFOT also, the private partner builds, finances and operates the facility for a fixed duration or concession period, and then, the asset is transferred to the public sector authority. Throughout the concession period, the asset is owned by the public sector entity and operated by the private sector partner. Examples of DBFOT model are four-laning of Goa/Karnataka border to Kundapur section of NH17 in Karnataka under the National Highways Development Project (NHDP) IV, six-laning of Vijayawada-Gundugolanu section of NH5 in Andhra Pradesh, a 104.7 km stretch on NH73 under NHDP III in Haryana, etc.

Rehabilitate-finance-operate-transfer (RFOT)

RFOT is similar to other BOT variants. Under this model, a public sector entity enters into a contractual arrangement with a private sector partner to refurbish an existing facility or infrastructure asset, finance, operate and maintain it for a defined period. On expiry of such period, the legal title of the asset is transferred back to the public sector entity. This model is only applicable for brownfield projects. Compared with a greenfield project, the demand/ revenue risk will be low as the facility/asset's demand history will be available and help understand the base-year cash flows. This model is applicable for facilities/ infrastructure assets that require significant capital investment for capacity expansion/ upgradation.

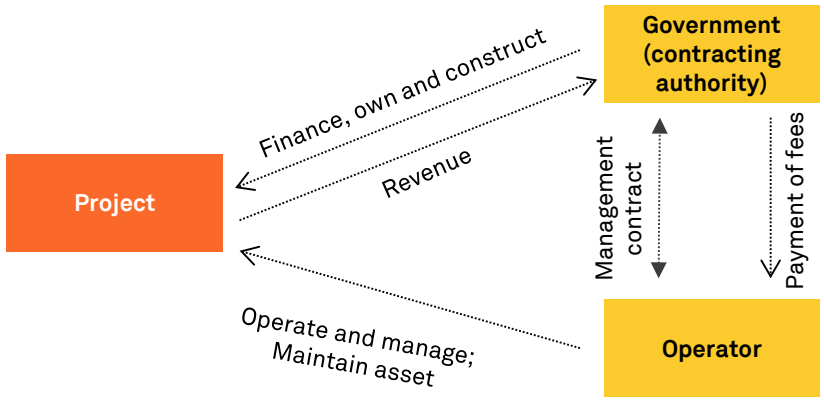
Build-own-operate (BOO)

BOO is also a variant of the BOT model and has a similar structure. Here, the private partner is responsible for construction and O&M of the asset. It also has the responsibility of providing the service/ facility to the users. The ownership of the asset is perpetually with the private partner. This model is mainly applicable for large-scale greenfield projects but is not common in India.

Management contracts

This is a contractual arrangement between a public sector unit and a private sector entity, where the public sector entity owns a particular infrastructure asset and the private sector entity is responsible for the O&M of a part or the whole of the asset/ facility or service. Under the management contracts, the obligation to provide service remains with the public authority, but the day-to-day management of the asset is vested with the private sector. The duration of the arrangement is typically 3-5 years.

Figure 113 Typical structure of a management contract



JV

Typically in PPPs, special purpose vehicles (SPVs) are set up by the private concessionaire, who contributes the long-term equity capital and leads the implementation of the project. In some cases, the public sector entity/ concessioning authority also contributes long-term equity capital in the SPV for a minority share. In such cases, the SPV is established as a JV company between the private and the public sector entity and also can be established between two PSUs, like in gas pipelines. This model is used in cases where the government/ public sector entity wants to have a continued interest in the management and operations of infrastructure assets of strategic importance or assets that require significant financial contribution from the government. The private sector entity will be responsible for financing, designing, constructing, and managing the operations of the project, while the public sector partner will contribute by providing fixed assets such as land, buildings or facilities/ shareholder capital. Examples of this model are international airports in Hyderabad and Bengaluru and some ports.

Public Private Partnership Appraisal Committee (PPPAC)

To streamline the appraisal process for PPP projects, the Cabinet Committee on Economic Affairs (CCEA) approved the procedure for appraisal and approval of PPP projects. The appraisal mechanism for PPP projects is streamlined to ensure speedy appraisal of projects, eliminate delays, adopt international best practices and have uniformity in appraisal mechanism and guidelines. The PPPAC, with Secretary (Economic Affairs) as the Chairman and CEO, NITI Aayog, Secretary (Expenditure), Secretary (Legal Affairs) and Secretary of the department sponsoring the project as members, has been set up with the objective to fast-track the appraisal and approval of PPP projects of all sectors, where the capital costs or the underlying value of the assets is Rs 250 crore or more (except ports and NHDP, where the delegation of powers has been amended). NHDP projects (with civil construction cost above Rs 1,000 crore) and port projects having cost of more than Rs 1,000 crore (under the PPP mode) would need PPPAC appraisal and CCEA approval.

VGF scheme

The scheme for financial support to PPPs in infrastructure (VGF) is administered by DEA, Ministry of Finance, and provides financial support in the form of grants, one-time or deferred, to infrastructure projects undertaken through PPPs with a view to make them commercially viable. The scheme provides VGF up to 20% of the total project cost (TPC). The government or statutory entity that owns the project may, if it so decides, provide additional grants out of its budget up to further 20% of the TPC. VGF under the scheme is normally in the form of a capital grant at the stage of project construction. The scheme requires the project authorities to seek 'in-principle' approval of the Empowered Institution/Empowered Committee prior to seeking bids and obtain the final approval after the selection of the bidder. The actual disbursement of VGF takes place once the private entity has expended its portion of the equity. VGF up to Rs 100 crore for each project may be sanctioned by the Empowered Institution, subject to the budgetary ceilings indicated by the finance ministry. The Empowered Committee is responsible for sanctioning VGF more than Rs 100 crore up to Rs 200 crore for each project, subject to the budgetary ceilings indicated by the finance ministry. Amounts exceeding Rs 200 crore may be sanctioned by the Empowered Committee with the approval of the Finance Minister.

Table 6 broadly captures the major differences between various models (traditional and PPP), though the features mentioned here are indicative and can have further variations depending on the strategic importance and complexity of the project.

Table 6: Comparison among various models available for implementing infrastructure projects in India

Model	Asset ownership during contract	Concession period	Capital investment focus & responsibility	Private partner revenue risk	Compensation for the private sector	Responsibility of the private sector	O&M responsibility	Key differentiating features
EPC	Public	Not applicable	Capital investment borne by the private player and this investment is compensated by the public sector	Variable (depending on the counterparty risk of the concessioning authority)	Payment from public sector/ concessioning authority depends on achievement of predetermined construction milestones	Construction of infra projects as per predefined specifications and performance standards to be met during defect liability period. Others include detailed design, procurement of equipment and raw materials, etc.	Public sector (can be outsourced to third-party contractor on a case-by-case basis)	• Private partner risk is limited to construction phase of the project lifecycle • Funded by public sector through budgetary allocations or directly through IEBR of state-owned PSUs or central PSUs • Used for greenfield (and in some cases brownfield) projects where there is significant demand/ revenue risk leading to viability issues • Construction risk (risk of time and cost overruns) is passed on to the EPC contractor if the EPC contract is on fixed cost basis with liquidated damages

Model	Asset ownership during contract	Concession period	Capital investment focus & responsibility	Private partner revenue risk	Compensation for the private sector	Responsibility of the private sector	O&M responsibility	Key differentiating features
Leasing (for assets which are already constructed and only O&M is to be under taken, except for some variants such as BOLT which are detailed below)	Public	Typically 10-15 years	Nil to low capital investment to be undertaken by the private sector entity (except for BOLT which is detailed below)	High	Revenue from operations/ fee charged to users	Managing, operating and maintaining the asset	Private partner	• Asset is leased out to private partner for O&M • Private partner typically shares a percentage of the annual / monthly revenue from operations with the public sector entity • Leasing contract can also be executed between two private entities • Applicable for brownfield projects

Model	Asset ownership during contract	Concession period	Capital investment focus & responsibility	Private partner revenue risk	Compensation for the private sector	Responsibility of the private sector	O&M responsibility	Key differentiating features
BOT	Right to operate and maintain the asset, besides the collection of user fee, vests with the private player in some sectors such as roads and airports; the public sector entity owns the asset	Varies with projects. Typically long term, 15-30 years, in order to ensure project viability from collection of user fee over a sufficiently long concession period	High capital investment to be undertaken by the private partner	High in case of BOT-toll or BOT-annuity, involves only counterparty risk to be borne by the private player	• Tariff revenue in case of BOT-toll for toll roads projects • Annuity revenue in case of BOT annuity for annuity projects • Revenues from development rights, e.g., non-aero revenues of privatised airports • Termination payment for pre-defined events of termination for various events of default and force majeure events	Financing, building and operating the asset	Private partner	• Advanced form of PPP; produces value for money for public sector if structured well • Private sector optimises life-cycle costs • Applicable for greenfield projects where the demand/ revenue risk is low to high

Model	Asset ownership during contract	Concession period	Capital investment focus & responsibility	Private partner revenue risk	Compensation for the private sector	Responsibility of the private sector	O&M responsibility	Key differentiating features
DBFOT	Similar to BOT	Similar to BOT	Similar to BOT	Similar to BOT	Similar to BOT	Designing, financing, building and operating the asset	Private partner	• Variant of the BOT model, with additional flexibility available to the private sector for asset construction / design based on output specifications defined upfront in the concession agreement • Applicable for greenfield projects where the demand/ revenue risk is low to high
RFOT	Similar to BOT	Similar to BOT	Medium to high capital investment to be undertaken by the private partner	Low as the demand history of the asset will be available	Revenue from operations/ fee charged to users	Refurbishing, financing, operating and maintaining the asset	Private partner	• Applicable for only those brownfield projects where there is need for major maintenance/ capacity expansion

Model	Asset ownership during contract	Concession period	Capital investment focus & responsibility	Private partner revenue risk	Compensation for the private sector	Responsibility of the private sector	O&M responsibility	Key differentiating features
BOO	Private	Perpetual	High investment to be undertaken by the private partner	High	Revenue from operations/ fee charged to users	Financing, building and operating the asset	Private partner	• Asset is perpetually owned by the private partner • Responsibility of providing service/ facility is with the private partner
Management contract	Public	Short to medium period, typically 3-10 years	Nil to low capital investment, to be undertaken by public or private entity	Nil to low	Predetermined fee with performance incentives, in case of normal management contracts	Managing, operating and maintaining the asset	Private partner	• Private partner is responsible for managing, operating and maintaining the asset • Public sector pays management fee to the private partner for managing the asset • Applicable only for brownfield projects

Model	Asset ownership during contract	Concession period	Capital investment focus & responsibility	Private partner revenue risk	Compensation for the private sector	Responsibility of the private sector	O&M responsibility	Key differentiating features
JV	Public and private	20-30 years	High, to be undertaken by the private partner	Medium to high	Revenue from operations/ fee charged to the users	Financing, building and operating the asset	Private partner	• Project company formed is a JV between private and public partners • Applicable for strategic, large-scale, politically sensitive projects • Applicable for greenfield/ brownfield projects

Financing the NIP

The NIP would be financed through sources as shown in Table 7. About 18-20% of the pipeline is expected to be financed through the Centre's budget; About 24-26% is expected to be financed through the state's budget; ~31% would be raised through debt from bond markets, banks and NBFCs; equity from private developers, external aid multilateral and bilateral agencies and internal accruals of PSUs would comprise 4–10%.

The existing sources would be able to finance 83–85% of the capital expenditure to be incurred between fiscals 2020 and 2025. Some proportion of the financing gap can be filled through establishing new DFIs and using asset monetisation as a tool to monetise operational assets at both central and state levels.

Table 7 Sources of funding for NIP projects

Rs crore	Assumptions to projections	Share of NIP being financed
Centre's budget	Centre's budgetary outlay on capital investments is expected to be around 1.25% of GDP	18-20%
State's budget	State's budgetary outlay on capital investments is expected to be around 1.7% of GDP	24-26%
Internal accruals - PSUs	Projected to suffice for the funding requirements of NIP	1-3%
Banks	Expected to grow at an average rate of 8%	8-10%
Infra NBFCs (PFC, REC, IRFC, IREDA, IIFCL and private sector NBFCs)	Expected to grow at an average rate of 12% for public sector NBFCs and 15% for private sector NBFCs	15-17%
Bond markets	Expected to grow at an average rate of 8%	6-8%
Equity	Expected to grow at an average rate of 15% due to NIIF stepping up pace of investments	2-4%
Multilaterals/bilaterals	**Expected to constitute half of the external aid flows**	**1-3%**
Others		**3-5%**
Total		**83-85%**

NIP required outlay – (A)		Rs 111 lakh crore
Total sources of financing– (B)		83-85%
Financing gap– (C) = A-B		15-17%
Bridging the gap -- (D)= (a)+(b)+(c)		6-8%
From new DFIs --(a)		2-3%
Asset monetisation-Centre --(b)		2-3%
Asset monetisation-States– (c)		1-2%
Shortfall-E= (C) –(D)		8-10%

Key assumptions and rationale used to finance the NIP

1. The Centre's budgetary outlay on capital investments is expected to grow at 10% in view of available fiscal space of government. It is growing at CAGR of 13.2%, during fiscal 2018 (A) to fiscal 2021 (BE). As a consequence, as a share of GDP, it is expected to be around 1.25% of GDP between fiscal 2020 and fiscal 2025

2. State's budgetary outlay on capital investments is expected is expected to grow at 10%, it has grown at CAGR 12%, during fiscal 2016 (A) to fiscal 2019 (RE). As a consequence, state's budgetary outlay on capital investments is expected to stay steady as share of GDP, at around 1.7%. Very few outlier states spend more than 2% of state GDP

3. Bank credit to infrastructure has is expected to grow at 8% (it has grown at 3.8%, on average, during fiscal 2016 to fiscal 2019, due to de-growth in fiscal 2017 and fiscal 2018, before rebounding in fiscal 2019)

4. Capital outlay by infra NBFCs (PFC, REC, IRFC, IREDA, IIFCL and private sector NBFCs) is expected to grow at 12% for NBFCs in public sector and 15% for NBFCs in private sector. While the credit stock of public sector infra NBFCs has grown at 12% from fiscal 2016 to fiscal 2018, the credit stock of private sector infra NBFCs has grown at 20% from fiscal 2016 to fiscal 2018, given lower base

5. Bond markets have supplied funds to the infra sector (corporates) at the rate of ~Rs 95,000 crore per annum over fiscals 2015-2018, with growth rates of 35% on average, though it has de-grown by 25% in fiscal 2018. We have assumed growth rate of 8% - given the de-growth in recent past, because these issuances are lumpy, and concentrated amongst few issuers and hence may vary from year to year, the pool of high credit rating issuers are limited and therefore incremental supply of credit through the bond markets may be tempered

6. Equity from FDI and step up in NIIF investments have been assumed to grow at 15%. At NIIF, a substantial increase in investment have been assumed, as it picks up pace. FDI flow of funds to the infra sector is ~Rs 9,500 crore per annum over fiscals 2016-18

The Task Force also notes that significant sums of money are spent on infrastructure through central sector schemes and finance commission grants. These are often provided to state governments/ UTs under the revenue heads of accounts. The Task Force recommends that the Budget division may develop a comprehensive method of mapping infrastructure grants and budgetary support on an annual basis and publish the same as part of budget documents.

The Task Force notes that an Inter-Ministerial Steering Committee on Financing the NIP has been set up in February 2020 with orders of the Finance Minister. The Task Force recommends that the Inter-Ministerial Steering Committee (IMSC) should be used effectively to enable and accelerate private investments in NIP. The Task Force recommends that government grants under the budget should be effectively used as equity multiplier to syndicate domestic equity sources and leverage debt in the market. This could be possible if the budgetary support is channelised through commercial bodies corporate like NHAI. This would make possible achieving the yearly financing target of Rs 20 lakh crore.

Given the massive fund requirements in various infrastructure sectors in the coming years, innovative ways of financing need to be explored. One potential avenue could be more efficient usage of the Central Road and Infrastructure Fund (CRIF), which is earmarked for various infrastructure sectors such as transport (road and bridges, ports, shipyards, inland waterways, airports, railways, urban public transport), energy, water and sanitation, communication and social and commercial infrastructure, as per the provisions of the CRIF Act, 2000, amended by the Finance Act, 2019. The funds for various infrastructure sectors are to be earmarked as per the provisions of the abovementioned Act. The CRIF received Rs 1.13 lakh crore in fiscal 2019 and Rs 1.2 lakh crore in fiscal 2020. The CRIF is a significant source of equity for infrastructure. Since the CRIF is singularly dependent on petroleum product surcharges on excise duty and taking into account the long-term negative outlook on oil consumption, a futuristic plan to strengthen and diversify sources of revenue for CRIF needs to be planned with a view to providing a robust long-term revenue stream for financing the NIP. Hence, the Task Force recommends setting up a Working Group headed by Joint Secretary-Budget (JS-Budget) to study various additional sources of revenue for the CRIF and make suitable recommendations.

Way Forward

Governance Structure and Monitoring

The NIP suggests a governance framework with escalation matrix where monitoring is to be based on threshold levels of TPC, delay in project completion, and delays in land acquisition, and receipt of key approvals/ clearances. This will help all stakeholders in monitoring the implementation of projects by comparing actual progress vis-a-vis initial estimates for each of the NIP projects, which will facilitate timely project implementation. In addition, PRAGATI platform has already been set up by the PMO to follow up implementation of key projects.

This section describes the monitoring and evaluation tool developed with an objective to help all stakeholders monitor the implementation and actual progress vis-à-vis the initial estimates of the NIP projects. The basic elements of the monitoring and evaluation framework are highlighted in Table 8 below.

A. Projects under implementation

a. Mobilisation of project manager, key management personnel and adequate manpower physical resources by developer/ contractor to enable timely completion

b. Projects that are under implementation can be monitored on the basis of actual year-wise capital expenditure incurred with respect to the scheduled annual capital expenditure and key potential issues stalling timely completion such as timely availability of environment and forest clearances, competent authority approval, land acquisition, etc.

c. Further, monitoring key potential issues stalling timely completion mentioned above, can help identify any delay that can happen in implementation of a project due to delay in obtaining any of the clearances/ approvals.

d. Key monitorables can also include the number of projects and expenditure for projects currently under implementation in the NIP. These can be undertaken by monitoring results, tracking against pre-defined milestones and reporting actual progress. Also, using this monitoring tool, key issues can be identified that may stall projects under implementation, the party responsible and the required plan of action

e. By comparing actual financial progress with scheduled financial progress, projects (number of projects and the value of project expenditure) can be categorised in to projects that are ahead of their schedule, projects that are on schedule and projects that are delayed

f. Check potential reasons for time overrun and subsequent cost overruns such as progress in land acquisition, especially progress in availability of unencumbered land and compliance of key conditions subsequent such as availability of forest, CRZ, rail over bridge, and rail under bridge clearances, affecting a particular section of the project

g. Highlight such key issues to concerned line ministries, regulators, etc., and in case key project areas continue to be affected by hindrances, non-availability of clearances, etc., then timely action to be taken by concerned regulators and stakeholders to de-scope the affected area of land from the project and ensure timely completion. This will minimise time and cost overruns

B. Projects achieved financial closure (FC), yet to drawdown funds

a. Such projects should involve monitoring of key conditions subsequent such as clearances obtained/ not obtained and other conditions such as pending land acquisition, for the

hindered area of the project, thus estimating the delay in proceeding to the implementation stage

b. The action plan for this category of projects to include establishing project teams and steering committees to drive smooth preparation and implementation of the project, creation of work-plan based milestones/ project design, robust governance structures and managing risk mitigation activities

c. Ensure timely fulfillment of conditions precedent (CP) and conditions subsequent

d. Completion of designs

e. Timely procurement decisions by GCA and developer/ contractors

C. Projects under development

a. Appointment of project chief executive and key management personnel

b. Projects that are under development can be monitored on the basis of completion of feasibility studies or DPRs, approval from competent authority, clearances obtained/ not obtained and other conditions fulfilled which form a part of the CPs, thus estimating the time required by individual projects for achieving FC

c. Monitor approval from the competent authority and other key clearances that can impact achievement of FC for the project

d. Monitor status of and actual progress in compliance of all CPs and key issues

e. Analysing designs and financing options

f. Maximising private investment through PPP

D. Projects at the conceptualisation stage

a. Projects at the conceptualisation stage can be monitored based on the annual number of projects and annual value of project expenditure for projects at the conceptualisation stage

b. Task Force to monitor progress of projects at the conceptualisation stage

c. The action plan for this category of projects should include tracking preparation of feasibility report and DPR, tracking the status of necessary clearances and approvals

d. Proper analysis of technology choices and cost-benefit analysis

e. Stakeholder and primary user consultations

Table 8 Elements of monitoring and evaluation framework

Category	Project category	Key monitorables	Action plan
I	Projects under implementation	• Monitor actual achievement of project milestone against planned milestone • Monitor financial progress – actual progress in disbursement of debt, grant and equity against stated milestones • Close monitoring of critical issues for timely project completion • Timely highlighting of issues to concerned line ministries and stakeholders	• Results monitoring, tracking against pre-defined milestones, reporting progress • Resolution of key issues stalling progress, required intervention and responsible party • Timely action to be taken by concerned stakeholders as per governance structure and escalation matrix provided in Table 9 • Plan for commissioning project - safety, service levels, staff training, etc. • O&M plan – ToT procurement or own operations
II (a)	Projects under development - Projects achieved FC, yet to drawdown funds	• Compliance of all conditions subsequent specific to relevant milestones and key issues stalling compliance • Monitor contractor/ developer resource mobilisation and staffing • Monitor detailed design finalisation	• Establishing the project monitoring tool – project milestones (cost and time) • Establish steering committee comprising representatives from stakeholders such as lenders and equity investors and assign responsibilities • Facilitate commencement of construction • Training for project team for project implementation • Public stakeholder management

Category	Project category	Key monitorables	Action plan
II (b)	Projects under development - Projects identified and DPR prepared, but yet to achieve FC	• Administrative approval of competent authority • Monitor land acquisition/ environment and forest clearance • Monitor compliance of all CP and key issues • Approval of phasing of financial allocations	• Set up Empowered Committee (in case of large projects) for clearances • Delegate powers to SPV • Negotiate with the government and financial institutions for financial allocations • Conduct detailed financial appraisal and risk management • Design of risk mitigation strategies • Execute procurement processes - EPC and PPP • Hire competent managers for SPV- depends on construction and O&M plan
III	Projects at the conceptualisation stage - Projects announced and approved recently but little visibility on project award, land acquisition, etc.	• Monitor progress in completion of feasibility studies/preparation of DPR • Organising and staffing the project SPV	• Project formulation stage • Map key clearances: environment, CRZ, forest clearance etc. • Monitor the status of land acquisition • Economic, environment and social appraisal • Procurement strategy- EPC/PPP etc • Risk and sensitivity analysis • Technology choice analysis – disaster resilience, inclusiveness • O&M philosophy – ToT, own maintenance • Stakeholder consultation

This section highlights review mechanism and escalation matrix required for various issues plaguing infrastructure projects forming part of the NIP.

Table 9 Suggested governance framework for elimination of cost and time overruns with escalation matrix

Sr. No.	Concerned authority	Focus	Total project cost per project (Rs crore)	Delay in project completion (revised vs original estimated COD)	Delay in pending land acquisition – vis-à-vis initial estimates	Delay in receipt of key approvals/ clearances
1	Cabinet Secretary/Committee of Secretaries	Time and cost overruns	Above 500	Above 6 months	Above 6 months	Above 6 months
2	Inter-Ministerial Steering Committee headed by Secretary of the line ministry	Time and cost overruns	All projects forming a part of the NIP	Any delay	Any delay	Any delay
3	Inter-Ministerial Steering Committee headed by Secretary, DEA, for financing NIP	Financing NIP projects	All NIP projects			

As per Table 9 above –

a) Projects with TPC above Rs 500 crore and having a delay in project completion, land acquisition, or key approvals of greater than six months may be monitored by the Cabinet Secretary headed the Committee of Secretaries

b) All projects forming a part of the NIP will be monitored by the Inter-Ministerial Committee headed by the Secretary of the concerned ministry

c) For infrastructure projects implemented by state governments (without central financial assistance) and the private sector, the same Inter-Ministerial Steering Committee headed by the Secretary of the concerned line ministry, will provide facilitation, essentially focusing on any central clearances and policy reforms required

d) An Inter-Ministerial Steering Committee on Infrastructure Financing has been set up with the Secretary, DEA, as the chair and participation of Secretaries of Financial Services, Expenditure, key line ministries such as MoRTH, Water Resources, Railways, and Chairman SEBI, DG RBI, Chairman SBI, CEO NIIF and market players in the financial sector as required to unlock access to finances for NIP from banks, financial markets and global investors.

Annexure

Annexure 1 – Details of ULB Expenditure

In view of limitation of data, given that most of the ULBs do not maintain books of account, the following methodology is used to estimate the ULB investments:

Table 10 Details of ULB expenditure

Particulars*	Source	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19
A: Growth in urban population (%)	World Bank		2.39%	2.36%	2.35%	2.34%	2.33%	2.32%	2.34%	2.34%
B: Urban population (crore)	12,336	21,281	21,882	17,146				12,166	6,420	230,537
B = Urban population in previous year*(1+A)	All India Census 2011	37.71	38.61	39.52	40.45	41.40	42.36	43.35	44.36	45.39
C: Annual average inflation (%)	RBI				9.4%	5.8%	4.9%	4.5%	3.6%	4.5%
D: Per Capita capita urban expenditure by ULBs (Rs)										
D = Per capita expenditure for previous year * (1+C)				1,130	1,236	1,308	1,372	1,434	1,485	1,552
E: Total capital expenditure by ULBs (Rs crore)										
E = D * B (For FY14 – FY19 and FY13 is actual number)	14th Finance Commission Study			34,188	50,007	54,145	58,122	62,146	65,888	70,435

Note: Red numbers are actuals/ data points, while the other values are derived estimates

Annexure 2 – Key Clearances and Approvals Required

Table 11 Details of key clearances and approvals

Sr no	Legislation/Regulation	Authority
1	Environment (Protection) Act, 1986	Ministry of Environment, Forest and Climate Change (MoEFCC)
2	Forest Conservation Act, 1980 (diversion of forest land for non-forestry purposes - forest clearance)	MoEFCC, state forest department
3	Water (Prevention and Control of Pollution) Act, 1974	Central Pollution Control Board of India (CPCB), state pollution control board (SPCB)
4	Noise Pollution (Regulation and Control) Rules, 2000	CPCB, SPCB
5	Air (Prevention and Control of Pollution) Act, 1981	CPCB, SPCB
6	Environmental Impact Assessment Notification, 2006	MoEFCC, state environment impact assessment authority (environment clearance)
7	Wildlife Protection Act, 1972	MoEFCC
8	Coastal Regulation Zone Notification, 2018	MoEFCC
9	Manufacture, Storage and Import of Hazardous Chemical Rules, 1994; Amendments, 2000	MoEFCC
10	Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016	CPCB, SPCB
11	Tree felling	State forest department
12	Guidelines/criteria for evaluation of proposals/request for ground water abstraction by Central Ground Water Authority	State ground water authority
13	Water (Prevention and Control) Act, 1974; Amendments, 1988 (consent to establish and consent to operate)	
14	Private land acquisition - Right to Fair Compensation and Transparency in Land Acquisition Resettlement and Rehabilitation Act, 2013 Guidelines/policies/rules/statutes for acquisition of land on consent basis by various state governments	Central and state governments

Sl. No.	Legislation/Regulation	Authority
15	License under Factories Act, 1948	Department of Factories, Boilers, Industrial Safety & Health
16	Contract Labour Regulation Act, 1971	Labour department
17	Child Labour (Prohibition and Regulation) Act, 1986 as amended in 2016	Labour department
18	Minimum Wages Act, 1948 and Rules 1980 Payment of Wages Act, 1936 Equal Remuneration Act, 1976	Labour department
19	Workers Compensation Act, 1923 Maternity Benefits Act, 1961 Public Provident Fund Act, 1968 Employees State Insurance Act, 1948	Labour department
20	Explosive and petroleum licences under explosives and petroleum Acts	Petroleum and Explosives Safety Organisation (PESO), Nagpur
21	Public Liability Insurance Act/Rules, 1992	MoEFCC