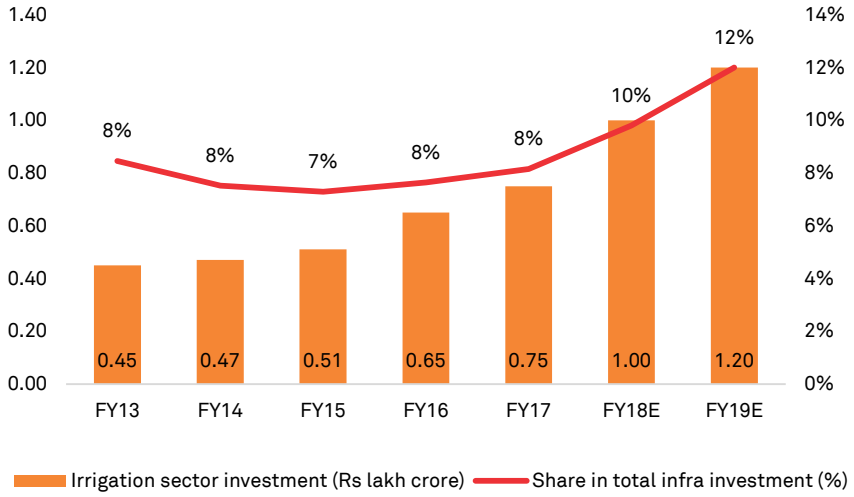
Historical investments

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)

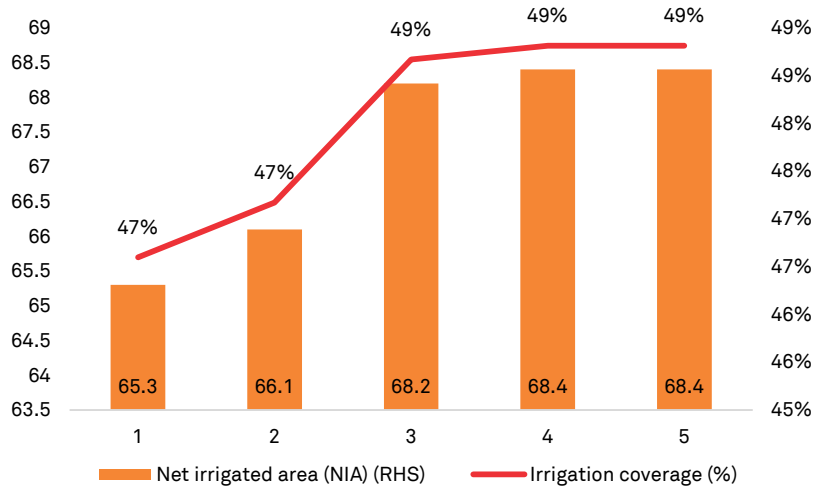
Investments in irrigation are mainly driven by respective state governments. The share of the centre and private sector is negligible in the irrigation sector as it is a state subject.

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, %)

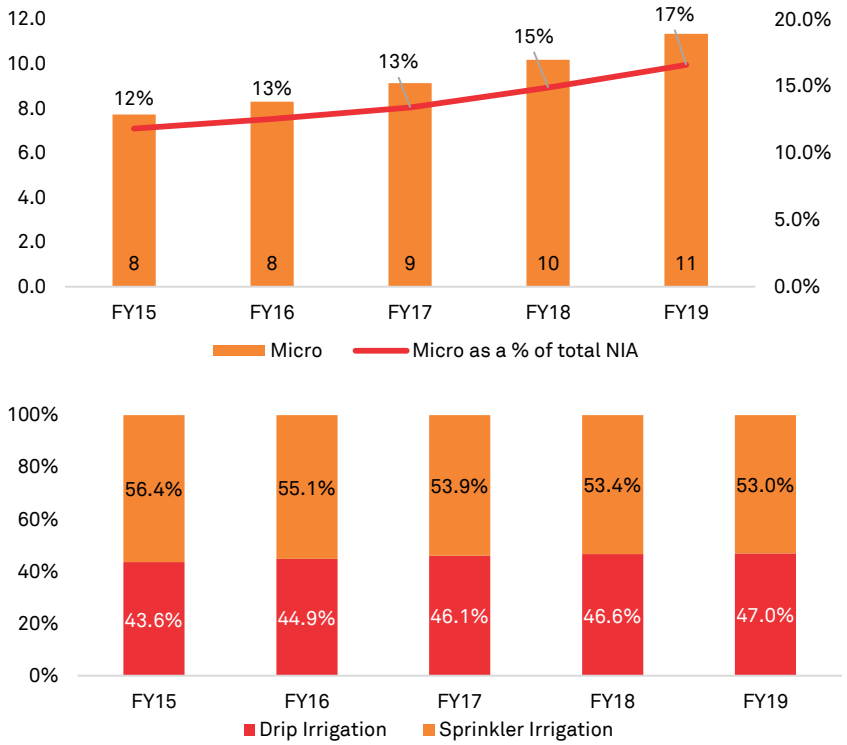


Source: Ministry of Agriculture Annual Reports

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.

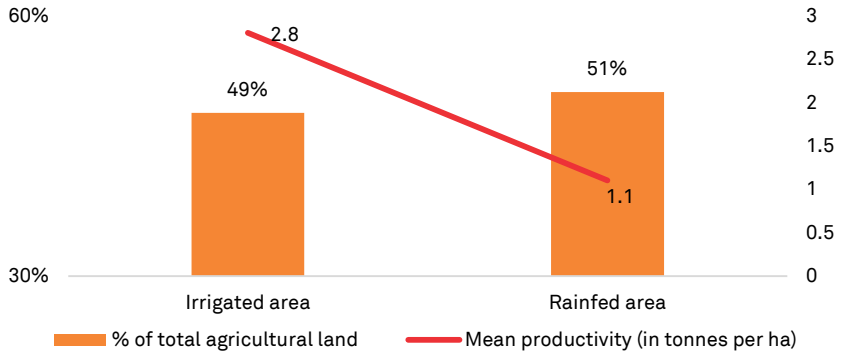
Further, under NPP, four priority links (of 30 identified links) have been identified – Ken-Betwa link project (KBLP) Phase I and II, Damanganga – Pinjal link project, Par – Tapi – Narmada link project and Godavari - Cauvery link project. The detailed project reports (DPRs) of Ken-Betwa, Damanganga-Pinjal, 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

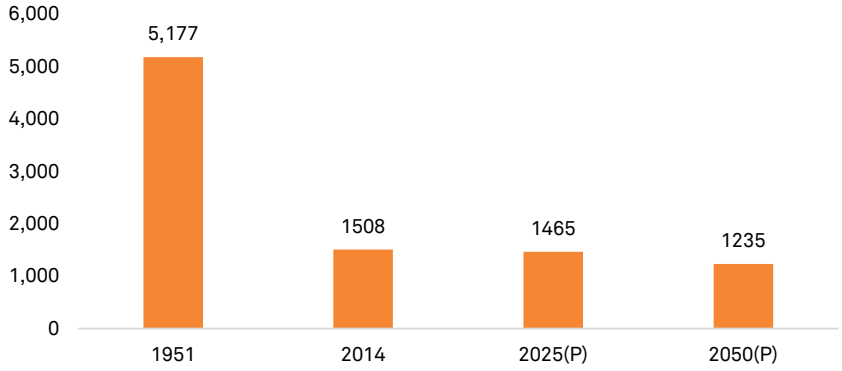
Rain-fed agriculture dominates, irrigation efficiency low, concerns of water scarcity

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
Irrigation coverage	• 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
Efficient methods of irrigation	• 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
Interlinking of rivers	• 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
Efficient use of water for irrigation	• 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.

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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

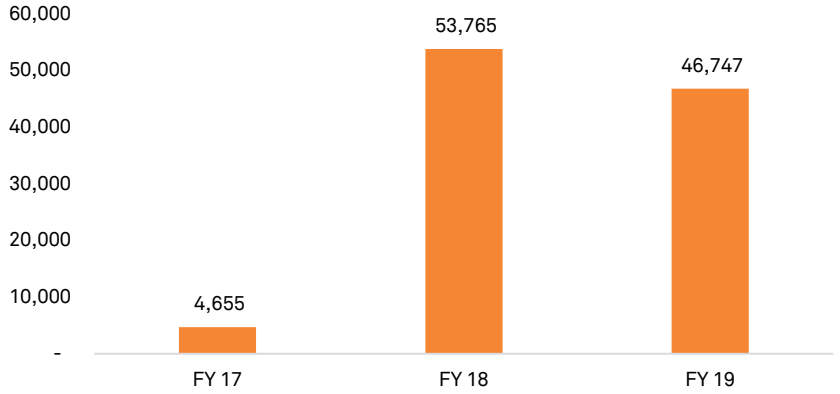
Infrastructure plays a critical role in economic growth of any region. At present, a majority (65%) of India's population resides in rural areas; thus, rural infrastructure needs to be developed to provide at least basic amenities such as civic services and housing to the rural population to improve 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.

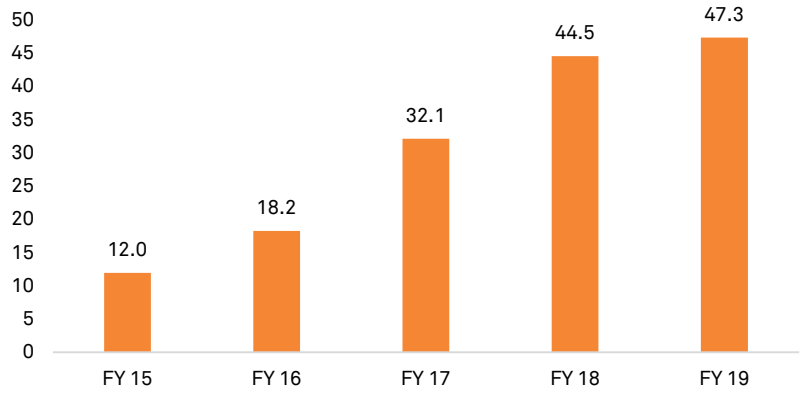
Figure 61 Investment under PMAY Gramin (Rs crore)



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)



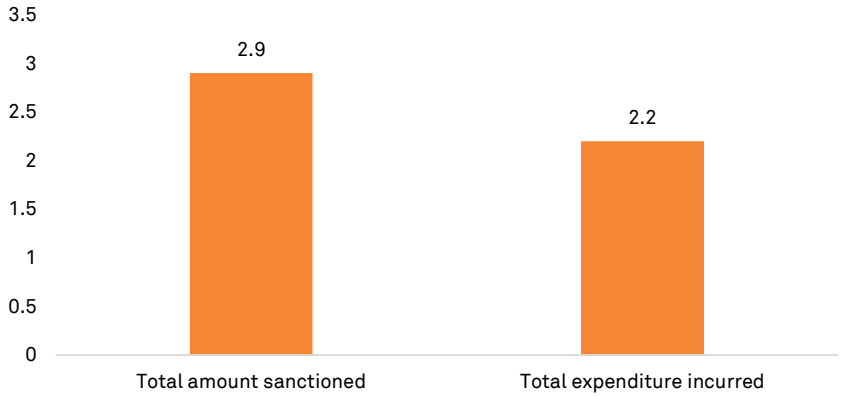
Source: Ministry of Rural Development (MoRD)

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.

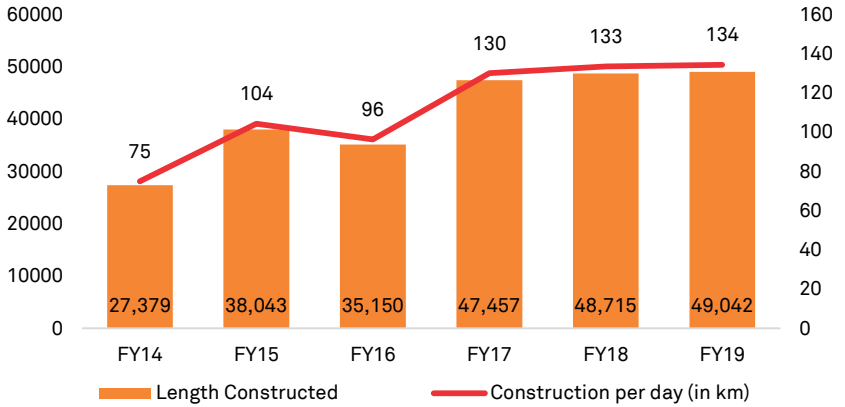
Figure 63 Capital expenditure under PMGSY (Rs lakh crore)



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

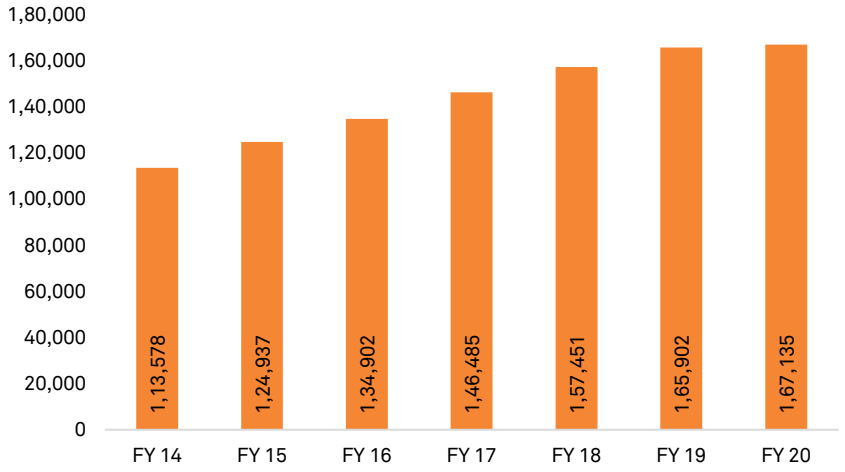
Since inception till December 31, 2019, 6.10 lakh km of rural roads have been constructed under PMGSY. The road construction under PMGSY in fiscal 2020 till December 31, 2019, has been 11,374 km.

Figure 64 Road construction under PMGSY



Source: Ministry of Rural Development

Figure 65 Habitations connected (cumulative) under PMGSY



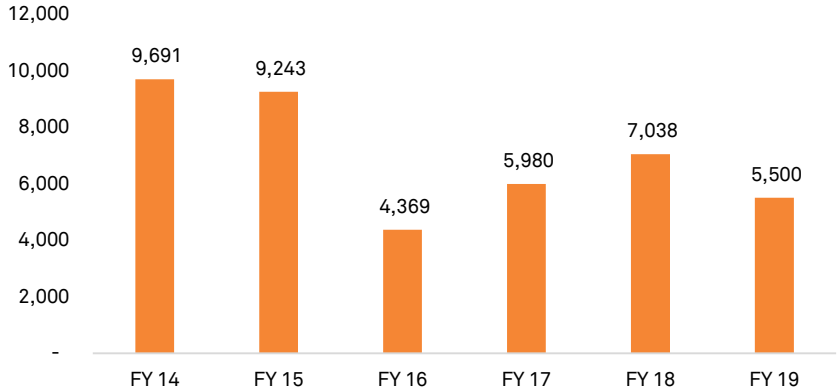
Source: Ministry of Rural Development (data till December 31, 2019)

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.

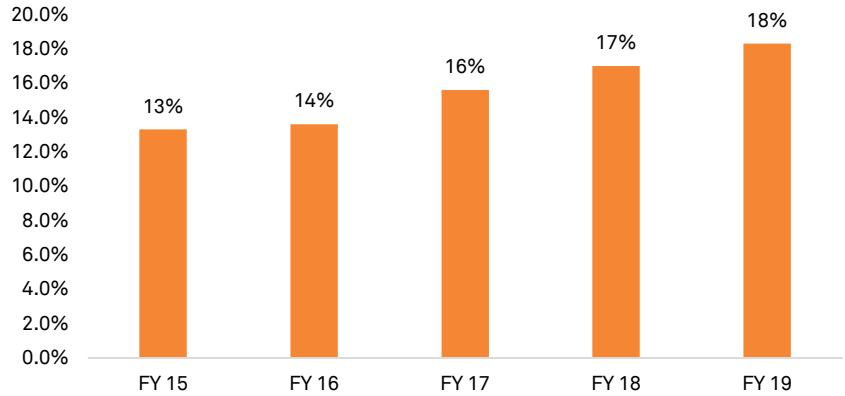
Figure 66 Expenditure under NRDWP (Rs crore)



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 (%)



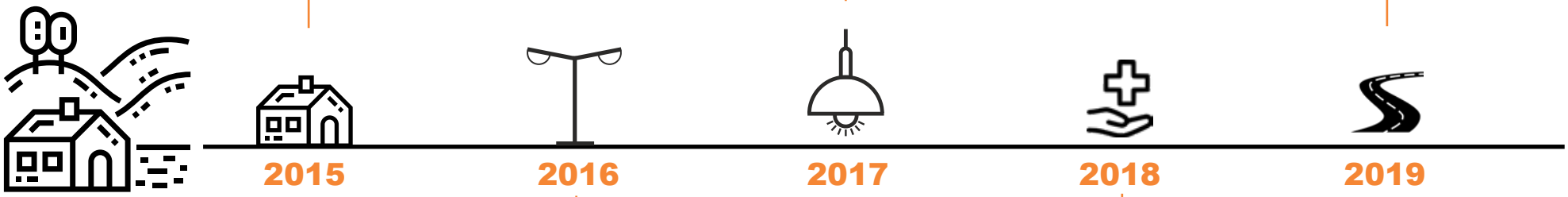
Source: NRDWP website, as of July 7, 2019

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

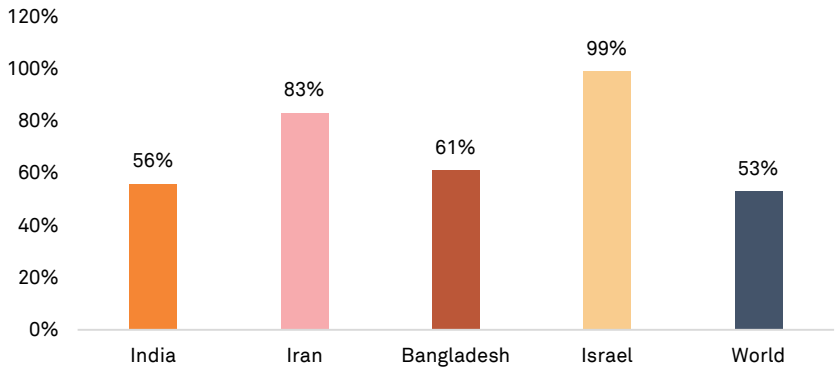
2019

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

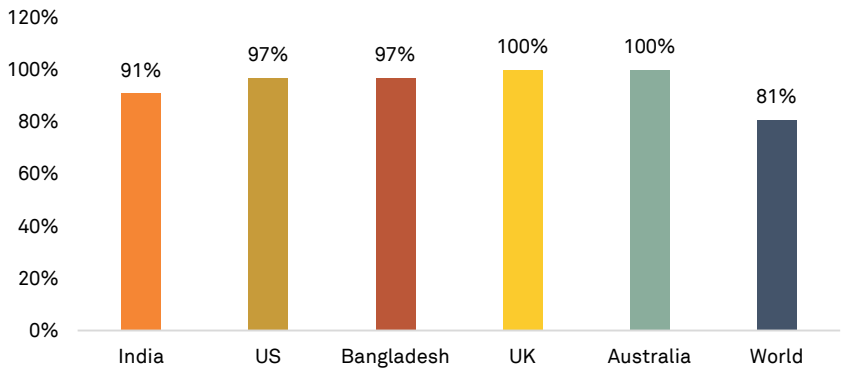
Infrastructure deficit in rural infrastructure

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



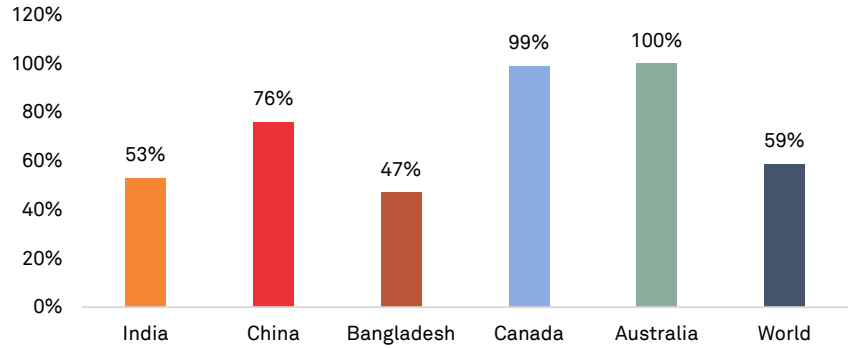
Source: World Bank Data (2017)

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



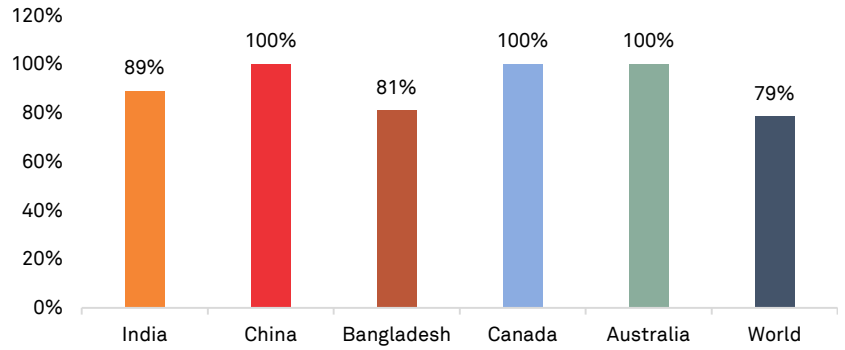
Source: World Bank Data (2017)

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

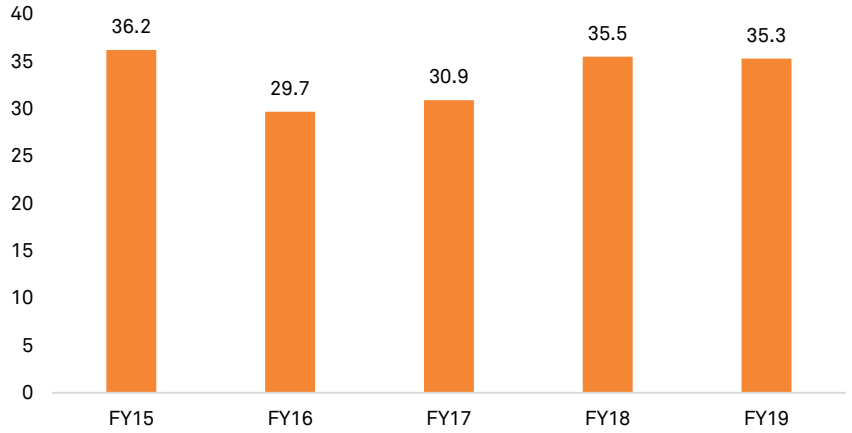
Agriculture plays a vital role in India's economy as ~56% of the total workforce is engaged in agriculture and allied activities. It accounted for ~16% of the country's Gross Value Added for fiscal 2019 at current prices. A well-developed food processing sector with higher level of processing helps in 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.

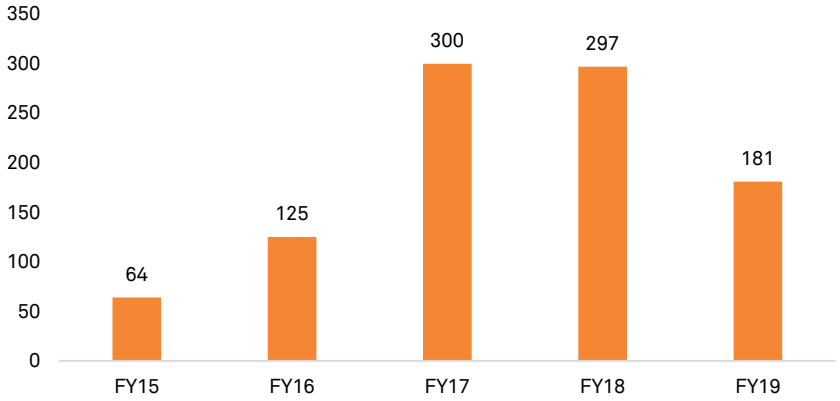
Figure 72 Year-wise export of processed food products ($ billion)



Source: MoFPI Annual Report 2018-19

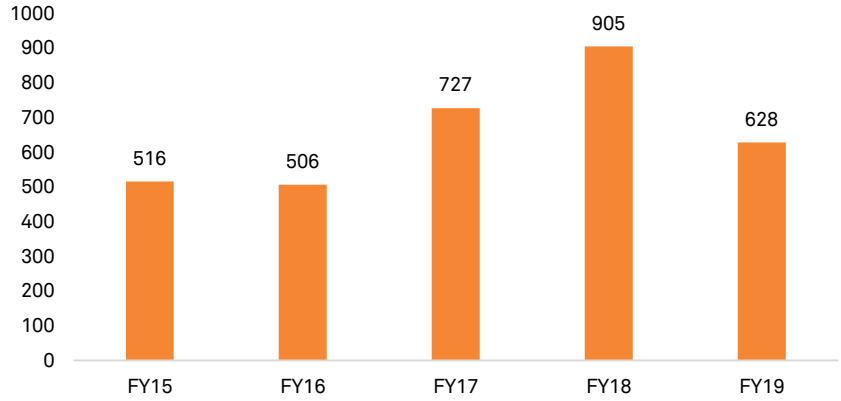
Food processing sector has been identified as one of the priority sectors under Make in India initiative. To attract investments in the sector, MoFPI has been implementing various schemes for development of Mega Food Parks with common facilities like roads, electricity, water supply, sewage facility 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)



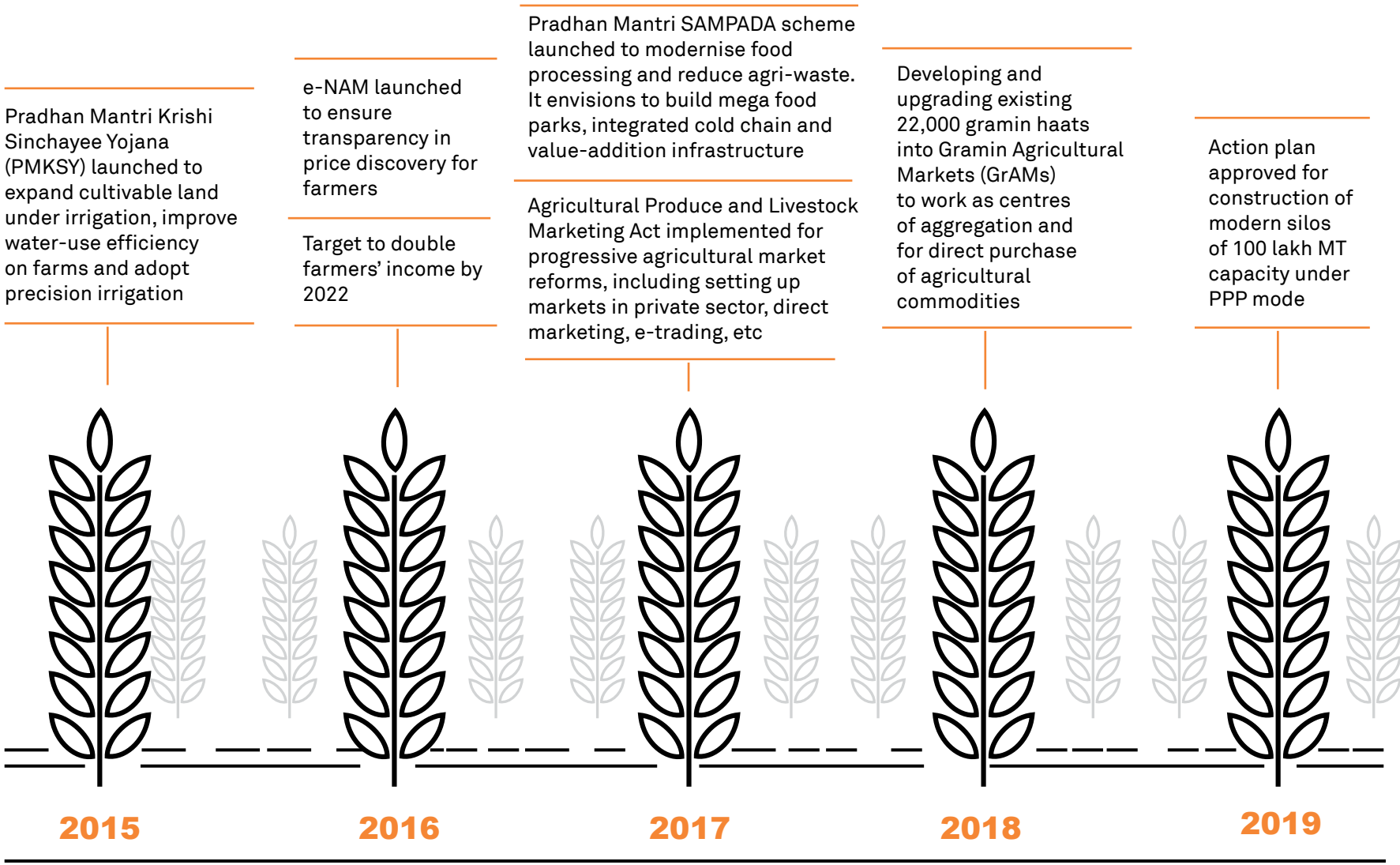
Source: MoFPI Annual Report 2018-19

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.

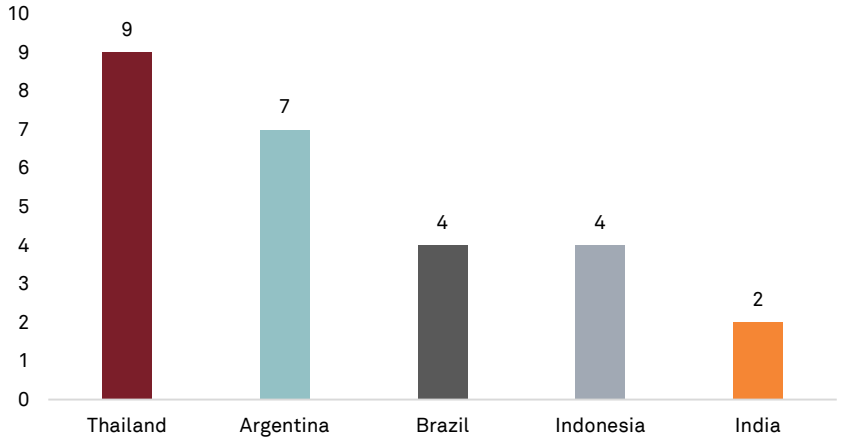
Table 2 Production and post-harvest losses in major agricultural sub-sectors

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**

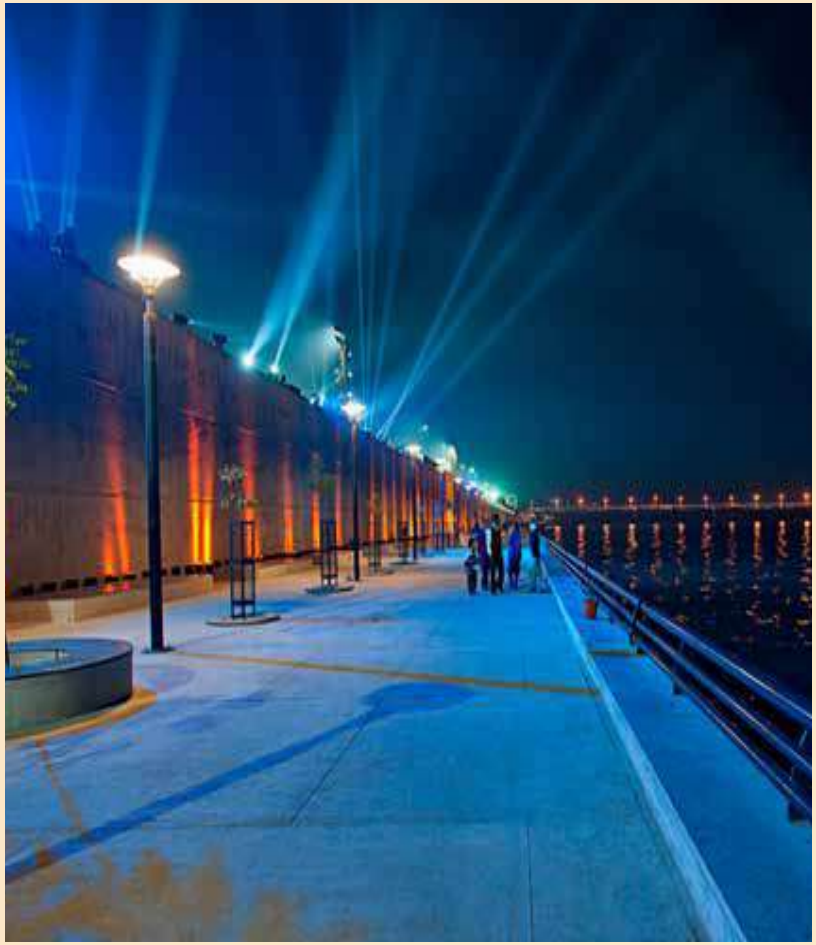
[55]States/UTs include Uttar Pradesh, Maharashtra, Gujarat, Telangana, Jharkhand, Tamil Nadu, Andhra Pradesh, Madhya Pradesh, Karnataka, Haryana, Punjab, Delhi, Kerala, Odisha, Chhattisgarh, West Bengal, Sikkim, Mizoram, Andaman & Nicobar, Chandigarh and Puducherry. For some projects, year wise phasing 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.

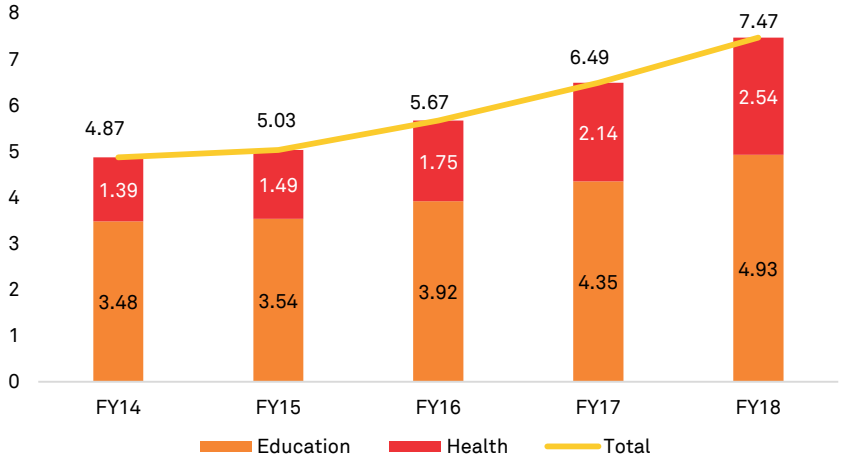
Investment in human capital is a pre-requisite for a healthy and productive population. As India is poised to grow into one of the leading knowledge economies, education, skill development and health will remain priorities for the government.

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.

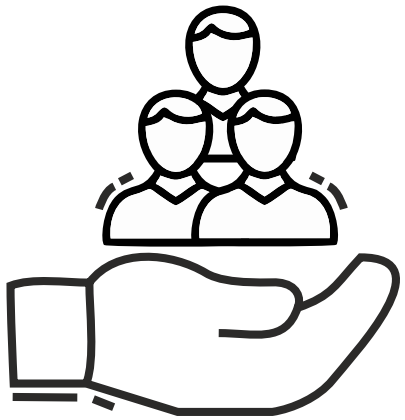
To improve higher education in India, the Rashtriya Uchchatar Shiksha Abhiyan (RUSA) was launched by the Department of Higher Education, MHRD, with the aim to provide strategic central funding to state higher education departments and institutions and achieve the broad objectives of access, equity and 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

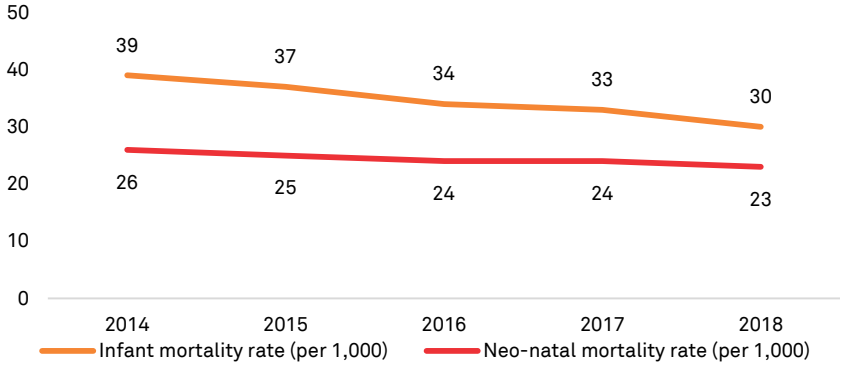
2019

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

Infrastructure deficit in social sector

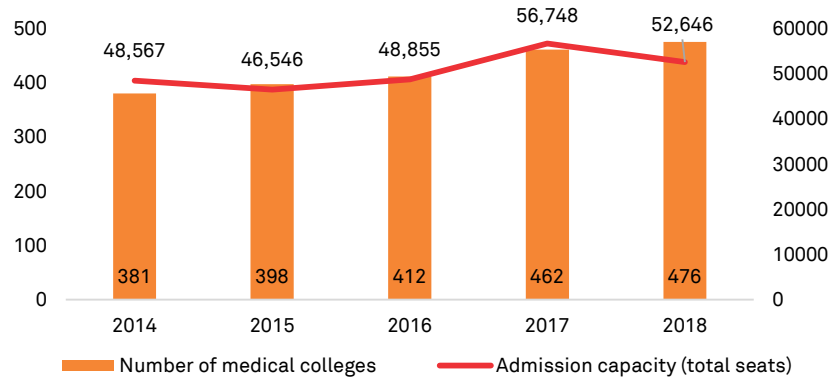
No universal access to quality healthcare, sub-optimal infrastructure, low per capita spend on health

Figure 77 Health indicator – IMR and NNMR



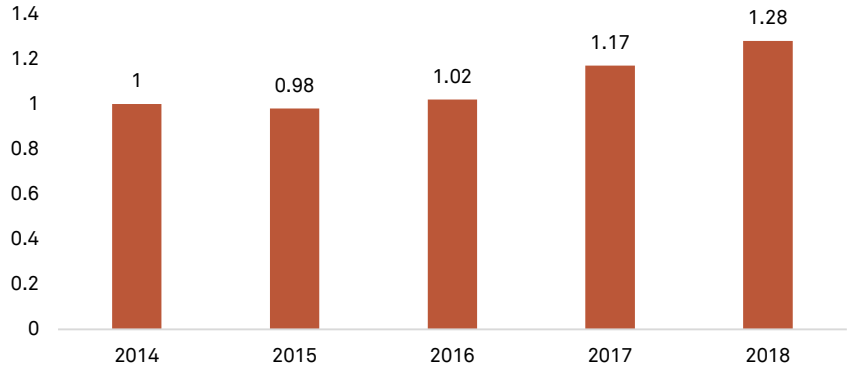
Source: National Health Profile 2018

Figure 78 Medical college infrastructure



Source: Medical Council of India

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

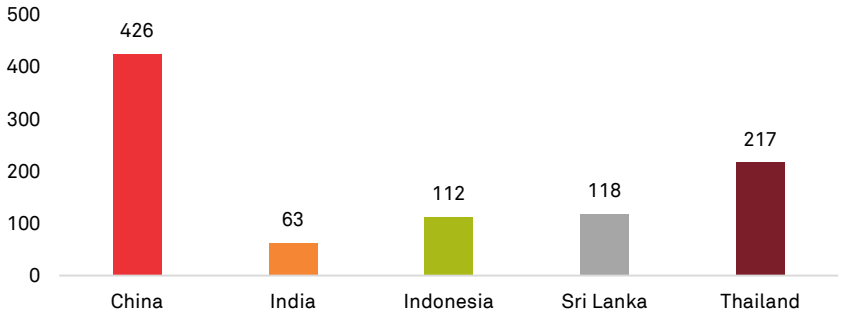


Source: National Health Profile 2018

- 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)

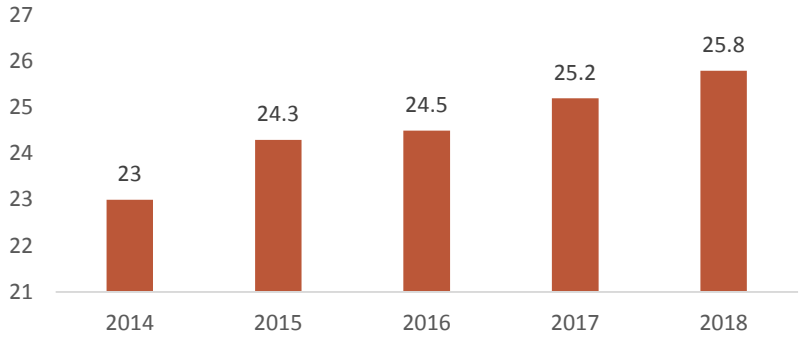
Figure 80 Per capita spend on health in 2018 ($)



Source: WHO - World Health Statistics Report

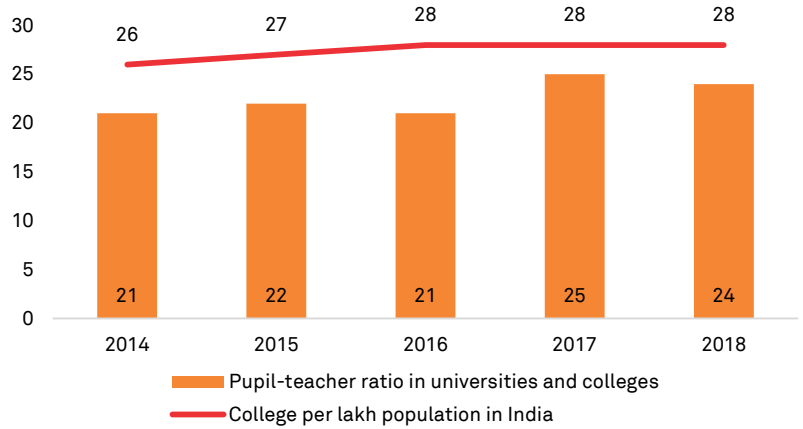
Education: Inadequate higher education infrastructure

Figure 81 Gross enrolment ratio in higher education



Source: MHRD AISHE Report 2018-19

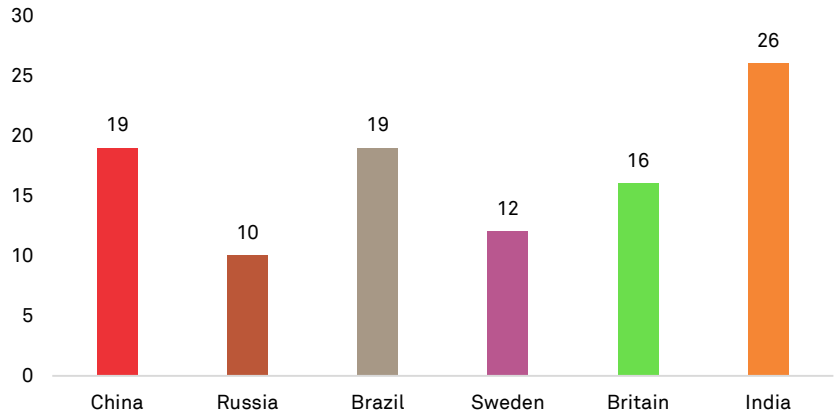
Figure 82 Higher education infrastructure



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.

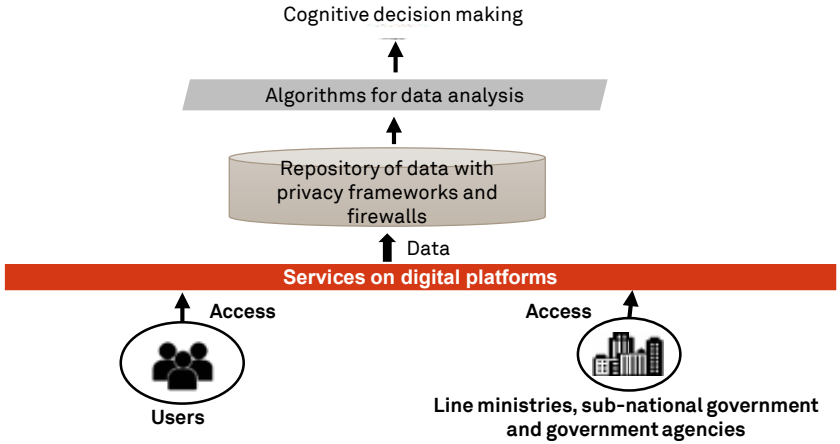
Creating public data sources with adequate data privacy frameworks – To foster an environment of informed decision making, there is a need to create and administer public data sources for use both by public and private organisations. At present, a majority of the services provided by the public and private 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.

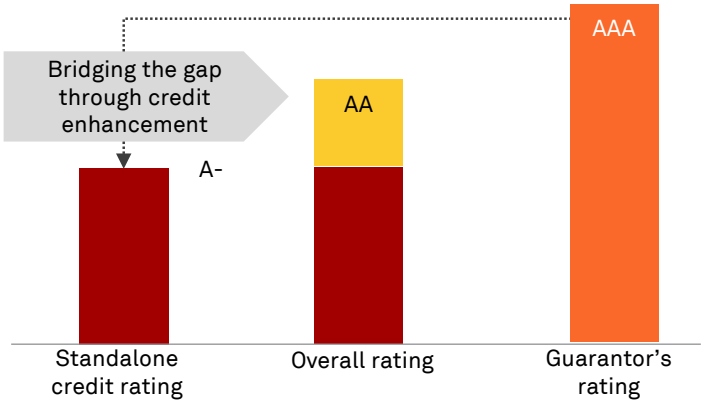
To create a demand for bonds from infrastructure companies, liberalisation of investment patterns along with change in investment behavior is required. Furthermore, it is noted that most investments under the existing limits for infrastructure companies have been towards infrastructure finance and housing 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