

# Getting back on track

## Indian Railways in makeover mode

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# Foreword from CRISIL



**Akshay Purkayastha**

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Indian Railways, called the ‘lifeline of the nation’, moves ~1.1 billion tonne of freight and ~8 billion passengers annually to the farthest corners of the country.

However, for the past several decades, the railways has been facing numerous challenges, primarily because of insufficient investment in infrastructure augmentation and lag in technological upgradation. Also, considerable improvement in road infrastructure and growth in aviation have chipped away the competitive positioning of the railways in both the freight and passenger segments.

Cognisant of the railways’ capability of being the economy’s growth engine, the Government of India has accelerated rail infrastructure programmes and launched new initiatives to transform the sector. While capital outlay between fiscals 2016 and 2020 has fallen short of the envisaged investment of Rs 8,560 billion as per the five-year investment plan, it has reasonably improved over the years. The government has been continuously increasing capital outlay – Rs 1,099 billion in fiscal 2017, Rs 1,200 billion in fiscal 2018, Rs 1,485 billion in fiscal 2019, and Rs 1,602 billion (planned) in

fiscal 2020. Notably, the increase in capital investment outlay in recent years is also accompanied by multipronged initiatives, including capacity augmentation, safety, technology and infrastructure upgradation, improvement in passenger experience, energy-efficiency projects, and research and development. Safety has received much-needed attention, with a jump of 138% in expenditure in fiscal 2019 vis-à-vis 2010.

Also, there have been several firsts in recent years, including the Station Redevelopment Programme, introduction of semi- and high-speed trains, scheme for private participation in general purpose wagons, and establishment of the National Rail & Transportation Institute.

In this report, we have highlighted key initiatives and projects undertaken by the Indian Railways, and their expected impact, challenges and key success factors. We believe successful implementation of many of these projects and initiatives will be instrumental in putting the sector on the track of transformation and setting the pace for future growth.

We hope you will find the report an interesting read.

# Foreword from Messe Frankfurt



**Kushal Sharma**

Head - Conference Division, Messe Frankfurt Trade Fairs India Pvt. Ltd.

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Mobility, Logistics and Infrastructure belong to the focus core competence areas of Messe Frankfurt with our wide portfolio of global trade fairs and conferences catering to these industries and bringing together various concerned stakeholder groups at the leadership level to network, exchange insights and explore synergies for future collaboration.

It is indeed our pleasure and privilege to have CRISIL as the “Knowledge Partner” for our Rail India Conference & Expo 2019 and I take this opportunity to heartily thank and congratulate Mr. Akshay Purkayastha and the entire team at CRISIL to have compiled this knowledge report being released at the 4<sup>th</sup> annual edition of this Conference.

The report offers a holistic, detailed and incisive overview and update on the various most concurrent and relevant facets of Indian railways today, offering a gamut of opportunities for investment and cutting edge technology solutions to play a vital role.

Backed by CRISIL’s expertise in the transport and logistics domain spanning over roadways and railways and its rich experience of having worked closely along with key nodal railway agencies in India, we are sure this comprehensive knowledge report shall certainly benefit Conference delegates with a good understanding of growth drivers in the Railway sector.

I wish you all an insightful reading!

# Abbreviation

<b>Acronym</b>	<b>Definition</b>
B&R	Bridge and Roof Co (India) Ltd
DEMU	Diesel electric multiple unit
DFC	Dedicated freight corridor
DFCCIL	Dedicated Freight Corridor Corporation of India Ltd.
EDFC	Eastern dedicated freight corridor
EPC	Engineering, procurement and construction
EPIL	Engineering Projects India Ltd
ERR	Economic rate of return
GPWIS	General Purpose Wagon Investment Scheme
HSR	High-speed rail
HSRC	High Speed Rail Corporation
ICD	Inland Container Depot
IPRCL	Indian Port Rail Corporation Ltd
IPRRCL	Indian Port Rail and Ropeway Corporation Ltd
IRFC	Indian Railway Finance Corporation
IRSDC	Indian Railway Stations Development Corporation
JICA	Japan International Cooperation Agency
LED	Light emitting diode
LTT	Lokmanya Tilak Terminus
MEMU	Mainline electric multiple unit
NHSRCL	National High Speed Rail Corporation
NPCC	National Projects Construction Corporation Ltd
PPP	Public-private partnership
RKM	Route kilometre
RLDA	Rail Land Development Authority
ROB	Road over bridge
RUB	Road under bridge
RVNL	Rail Vikas Nigam Limited
SIAM	Society of Indian Automobile Manufacturers
SPV	Special purpose vehicle
UDAN	Ude Desh Ka Aam Naagrik

# Executive summary

## Introduction

The Indian Railways operates more than 19,000 trains daily, carrying ~22 million passengers and ~3 million tonne of freight. Although it has been the primary passenger and freight transportation mode in the country, chronic underinvestment in infrastructure augmentation and technological upgradation have exposed it to numerous challenges, including fierce competition from roads in the freight segment and aviation in the passenger segment.

A network of ~67,000 route kilometre (rkm) and a workforce of ~1.3 million indicates the sheer size of this behemoth on tracks. Given its size and legacy issues, it has been a herculean task to undertake transformative initiatives and implement large-scale projects. However, the government's resolve to transform the sector is evident from the massive Rs 8.56 trillion five-year investment plan that was outlined for fiscals 2016-20. The plan promised a far-reaching impact through initiatives cutting across various aspects of the railways, including introduction of new technology trains, capacity augmentation through new lines, gauge conversion and doubling/tripling projects, electrification of fixed and movable infrastructure, construction of dedicated freight corridors (DFCs), and enhancement of non-fare revenue share through station redevelopment, among others.

However, the total capital outlay in the past five years has fallen short vis-à-vis the planned investments. Assuming the realisation of revised estimates and planned capital outlay, ~Rs 6,322 billion has been invested in the past five years, which is ~26% less than the planned investments under the five-year plan.

One of the major reasons for this shortfall has been limited realisation of public-private participation (PPP) and joint venture (JV) projects as envisaged under the five-year plan. As per the actual

investments over fiscals 2016-18 and revised estimates for fiscal 2019, the total investments through extra-budgetary resources have been ~Rs 2,426 billion, comprising only 34% from PPP projects amounting to ~Rs. 816 billion and the rest coming from institutional financing (28%) and market borrowings (38%), respectively.

Although the overall capital investment outlay has fallen short on the five-year plan, the sector has seen a significant uptick in capital investments at 14% compound annual growth from fiscals 2016-20 and a 1.7 times increase in budgetary support to ~Rs 661 billion.

With the considerable increase in available funds, the Indian Railways has formulated several projects and programmes targeting problem areas and potential opportunities. Certain projects have been merged to ease administration and implementation. Additionally, a large number of ongoing projects have been accelerated.

## Dedicated freight corridors (DFCs)

Among the projects for capacity augmentation, the long-awaited eastern and western DFCs are expected to be commissioned soon and are regarded as a game-changer for the sector. With improved design and operational parameters, the operating cost is expected to be substantially lower than the current figure on Indian Railways network.

The commissioning of DFCs may enhance profitability of the freight business of the railways and, hence, improve internal accrual that has been under stress for long. Further, they may also provide a leeway to the railways to pass on the benefit to freight customers, ameliorating its competitive position vis-à-vis other modes of transport. The DFCs are also expected to help enhance value proposition of railways to freight customers with better service provisions such as faster speeds and time reliability. This may help railways to bring back its lost traffic share from roads.

## Station Redevelopment Programme

The Station Redevelopment Programme is one of the largest infrastructure augmentation programmes in the country. To improve passenger experience at stations, the railways plans to redevelop 600 stations, enhancing efficiency and quality of services to passengers and enhance its non-fare-box revenue stream. After a lukewarm response from private players for the redevelopment projects in the first phase, various changes have been made in the project structure and implementation model. The Indian Railways Station Redevelopment Corporation has been made the nodal agency for the implementation and the lease period has also been extended to 99 years to attract private sector funding. To speed up the implementation of the programme, various public sector units (PSUs) have been entrusted with 44 stations to develop the master plan and other relevant project studies. The success of this programme is expected to have high impact in driving non-fare revenue for the railways, enhancing its revenue stream.

## High-speed rail (HSR)

The high-speed rail project is among the major initiatives launched by Indian Railways to modernise rail services in the country. The Japan International Cooperation Agency-funded (JICA) HSR project between Mumbai and Ahmedabad is a landmark one. The network, which will be able to achieve speeds of 250-300 km per hour (kmph), has the potential to change the face of the railways. With a high degree of comfort to boast, the HSR can conceivably rival airlines when it comes to targeting customers where the commuting time is 2-3 hours. Success of the project will pave the way for similar developments across high-density passenger traffic routes in the country.

## Mission Raftaar

In pursuance of its objective to increase the speed of trains on the Indian Railways network, the Ministry of Railways (MoR) announced Mission Raftaar in Railway Budget 2016-17. Mission Raftaar aims to double the average speed of freight trains and increase the average speed of all non-suburban passenger trains by 25 kmph, in five years. The principal routes for implementation of the project and major action points have been identified and the works are in progress. In February 2019, Vande Bharat Express / Train 18, India's fastest train, was launched. It runs on the Delhi-Varanasi route, via Kanpur and Allahabad, reducing travel time by 15%. At an operating speed of 160 kmph, it outpaces Shatabdi by 30 kmph. Six other routes on the Golden Quadrilateral and its diagonals, namely, Delhi-Mumbai, Delhi-Howrah, Howrah-Chennai, Chennai-Mumbai, Delhi-Chennai, and Howrah-Mumbai, have been identified for introduction of Vande Bharat Express/Train 18.

## Project Utkrisht and Project Swarn

To provide an enhanced travel experience to passengers, Project Swarn and Project Utkrisht were launched by the Indian Railways in November 2017 and October 2018, respectively. Project Utkrisht intends to develop 640 upgraded passenger rakes at a cost of Rs 4 billion. The upgraded coaches are equipped with several modern features and passenger friendly amenities to ensure cleanliness, hygiene and better on-board experience.

Project Swarn has been targeted to give an improved look to the passenger coaches. As many as 29 Rajdhani and Shatabdi Express trains have been identified under the project for upgradation. The objective is to significantly improve passenger experience across nine dimensions: coach interiors, toilets, on-board cleanliness, staff behaviour, catering, linen, punctuality, security, and on-board entertainment. Real-time feedback is also a part of the project.

## Port connectivity and JV with states

Port connectivity and evacuation infrastructure are critical for capturing export-import traffic for railways. Realising this, a special purpose vehicle (SPV), Indian Port Rail & Ropeway Corporation Ltd (IPRRCL), was formed with JVs between major ports and Rail Vikas Nigam Ltd (RVNL).

As many as 52 rail-to-port connectivity projects are under way, entailing an investment of Rs 446 billion. These projects are being undertaken by the IPRRCL and the MoR. IPRRCL has taken up 32 projects worth Rs 182.5 billion across nine major ports, of which eight projects totalling Rs 1.75 billion have been completed.

These projects are expected to enable the railways to corner a large portion of the freight traffic as it will be able to offer last-mile connectivity, essential for cost optimisation in case of rail transport.

Apart from port connectivity, the JV model with states for development of connectivity has also been operationalised.

The JV companies being established with various states have identified over 40 projects for implementation. The model is gaining pace and also attracting private participation in projects such as gauge conversion and new lines. The projects implemented by these JVs may help the railways augment its network with limited investments because of sharing of costs and possible ease in the land acquisition process owing to involvement of the state government.

## Mission Electrification

To tackle with the high operating costs, the Indian Railways is currently implementing the Mission Electrification project envisaging to electrify its entire track length. It is estimated the fuel bills alone account for more than 30%<sup>1</sup> of the operational cost for Indian Railways. Of this ~64% of the costs

can be attributed to diesel traction, making electrification a major focus area. The electrification of the rail network would help optimise the energy mix for Indian Railways as electricity can be sourced from non-conventional resources which is not the case in diesel traction.

To fasten the implementation, the works have also been entrusted to new agencies i.e. Indian Railways Construction Company, RITES, and Power Grid Corporation of India Ltd.

## Wagon investment schemes

Private investments in rolling stock have been sought for long by Indian Railways. To enhance private sector participation in rolling stock, various ongoing schemes have been modified to make them conducive for private investment. Further, the General Purpose Wagons Investment Scheme (GPWIS) was introduced in 2018 targeting private investments in general purpose wagons, which was not allowed till then. It is expected that GPWIS scheme may achieve high success due to high demand of such wagons by end-user industries such as power and mining.

## Way forward

Substantial efforts have been made by the MoR in the past few years to transform the railway sector in the country. However, for successful implementation of its initiatives, it may consider the following key elements:

Encourage Private Participation – Railways may focus on its core activities and disengage itself from ancillary activities. It should encourage private participation in various aspects of railways, including operations and maintenance. Notably, wages, pension and energy constitute more than 50% of the operating expenses of Indian Railways. Engaging the private sector may bring in greater efficiency and also enable railways to deploy

<sup>1</sup> [http://www.indianrailways.gov.in/Mission\\_41K.pdf](http://www.indianrailways.gov.in/Mission_41K.pdf)

financing on projects that are essential but cannot be funded through private sector financing.

Exploring targeted subsidy – As of now, the Indian Railways recovers only 53%<sup>2</sup> of the cost of passenger fare, incurring a loss of about Rs 330 billion every year<sup>3</sup> in subsidising passenger fares. But, there is a section of customers who may be happy to pay more for the services. Recently, the railways introduced the ‘Give it up’ scheme for concessional fare for senior citizens, in line with the campaign on cooking gas subsidy. In the past two years, almost 40 lakh senior citizen passengers have given up the subsidy voluntarily. This example corroborates there is a section of consumers who can afford to pay the right price provided the desired service levels such as reliability, comfort and safety are offered.

Therefore, to relieve itself from the burden of the social service obligation, railways may explore the option of providing targeted subsidy in line with the cooking gas subsidy. However, the mechanism of determining the level of subsidy and target populace for the same would need to be deliberated upon

Increasing non-fare revenues – Currently, the non-fare revenue of the Indian Railways forms a minuscule portion of its overall revenue. It has to be increased to at least 20% over a period of time, in line with global standards. Areas that can be targeted are advertising, rail information displays, FM radio etc. Notably, Delhi Metro, with daily ridership of 3 million, fetched an advertisement revenue of ~Rs 5 billion<sup>4</sup>. This indicates the value the Indian Railways can fetch with 22 million daily ridership. Focus on such revenue streams may be synergistic with the station redevelopment programme and can be instrumental in enhancing the railways’ non-fare box revenue pie.

Right pricing model – The pricing model of the Indian Railways is based on cross-subsidisation of passenger fares with freight fares. India has the lowest fare-to-freight ratio (the ratio of passenger fare and freight rates) of 0.24 compared with several other countries including Japan (1.9), Germany (1.5) and China (1.2)<sup>5</sup>. Hence, to relieve railways from the issue of skewed pricing, the Rail Development Authority which has been approved by the cabinet as an independent regulator to recommend passenger and freight fares should be institutionalised as soon as possible.

Focus on customer experience – Given the increasing competition from the aviation industry, providing superior customer experience in all interfaces, including ticketing, station touch points and on-board travel engagement (cleanliness, food and beverage, in-coach facilities, etc.), will be of utmost importance. Considering the consumer has many choices, the railways will have to offer differentiators by reinventing customer experience

National transport policy – A national transport policy should be formed, aiming at regional development and avoiding over investments in certain pockets of the country. The policy should include a road map for ensuring uniform connectivity to all parts of the country.

The policy should also envisage reaping in benefits from synergies emanating from integration of various modes of transport rather than competition amongst them. Further, it should also include short-term, medium-term and long-term plans, to involve private sector in building, operation and maintenance of railway infrastructure assets (covering both passenger as well as freight).

<sup>2</sup> <https://economictimes.indiatimes.com/industry/transportation/railways/railways-want-subsidy-to-go-on-train-tickets/articleshow/69889892.cms?from=mdr>

<sup>3</sup> <https://www.ndtv.com/india-news/railways-to-extend-give-it-up-scheme-to-all-categories-availing-fare-subsidy-1841224>

<sup>4</sup> <https://timesofindia.indiatimes.com/city/delhi/ads-earned-dmrc-rs-492cr-last-fiscal/articleshow/61167384.cms>

<sup>5</sup> *Indian Railways and Coal: An Unsustainable Interdependency*, by Brookings India

# Introduction



Transporting in excess of a billion tonne of freight and over eight billion passengers a year, the Indian Railways is the fourth-largest freight and the largest passenger railway system globally. But other modes of transport, primarily in the freight segment, are threatening its dominance. In fact, the modal share of the railways in the transportation of surface freight plunged from 86.2% in fiscal 1951 to 33% in fiscal 2015<sup>6</sup>.

One of the major reasons for this is chronic underinvestment in infrastructure augmentation and technological upgradation over the decades. The consequence: congestion on the rail network across freight and passenger segments, which has vastly impacted the efficiency of operations. The decrease in average speeds has affected freight traffic as well as the travel experience of passengers.

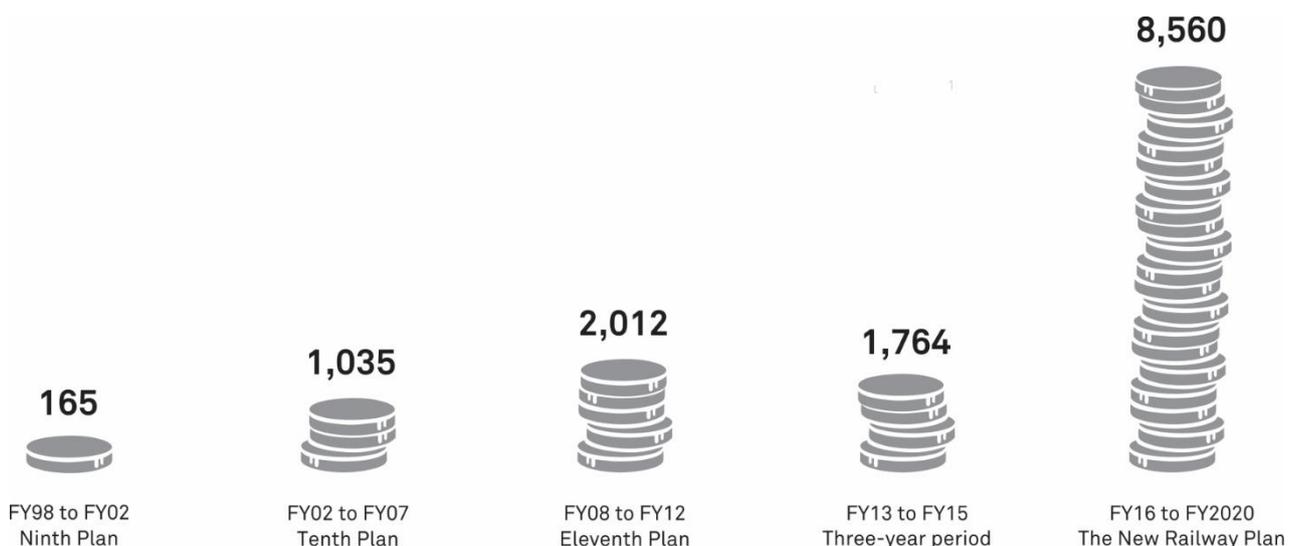
A measure of the high saturation and capacity over-utilisation on popular routes can be assessed from the fact that while the Golden Quadrilateral and its diagonals make up only 15% of the entire route of

the railways, they move 58% of the freight load<sup>7</sup> and 52% of the passenger traffic. Further, as freight and passenger trains move on the same track, the issue of over-utilisation of capacity gets amplified.

Why have things come to such a pass? There has been a huge delay with regard technological upgradation pertaining to electrification of rail lines, introduction of new coach designs/passenger vehicles, and deployment of safety equipment, among others. These have impacted the railways' capability to deliver high-quality services. Also hampering the competitive positioning of the railways is the development of road infrastructure and growth of the aviation industry.

Realising the importance of the railways in ensuring economic growth, the government embarked on a massive investment programme focussing on various aspects of railway sector in the country. This five-year plan, which runs from fiscals 2016 to 2020, had the maximum planned investment outlay in the railways' history.

## Railways' capital investment plan (Rs billion)



Source: Indian Railways

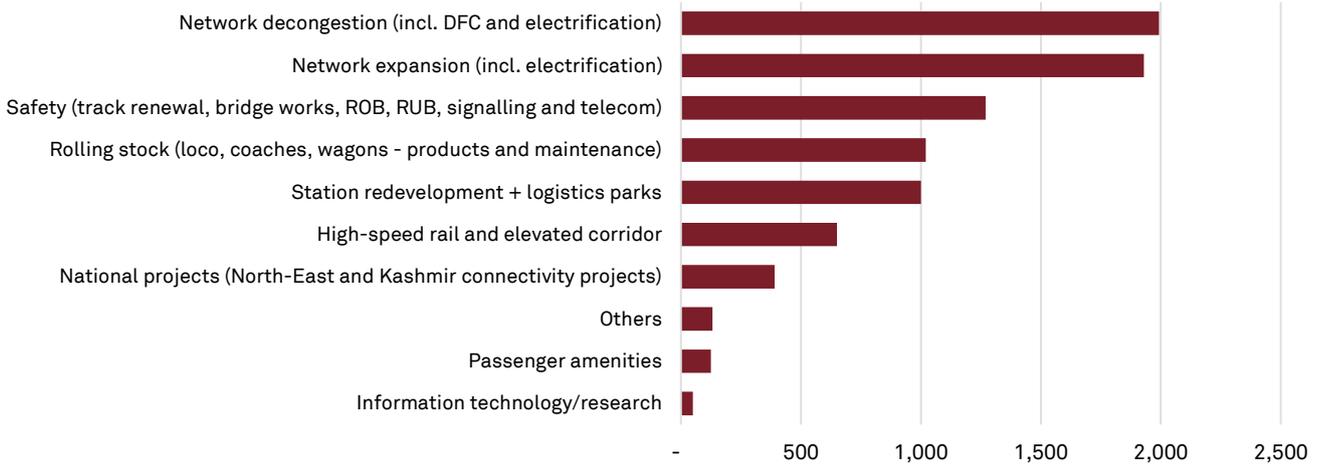
<sup>6</sup> Indian Railways: Lifeline of the Nation (a white paper), February 2015

<sup>7</sup> NITI Aayog – Strategy for New India

The five-year investment programme included network capacity augmentation (decongestion, expansion, national projects and rolling stock), safety, non-core infrastructure development

(station redevelopment and logistics parks), electrification, expanding passenger amenities, introduction of an HSR, and development of elevated corridors, among others.

### Railways' five-year investment plan - FY16-20 (Rs billion)

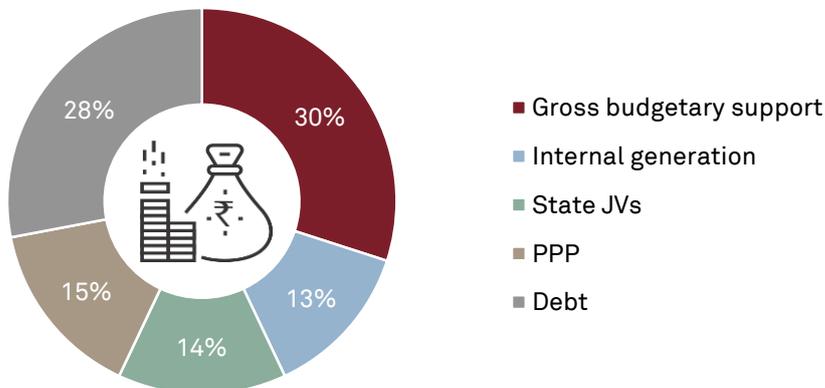


Source: MoR

The funding source for the five-year investment plan relied extensively on extra-budgetary resources, contributing ~57% of overall funding. JVs with states and PSUs, which comprised 14% to the overall funding plan and 25% of the total extra

budgetary resources, were towards implementation of new lines, mine connectivity and other critical projects. Additionally, institutional financing mechanisms targeted at leveraging pension and insurance funds were also part of the medium term financing plan<sup>8</sup>.

### Five-year investment break-up – FY16-20



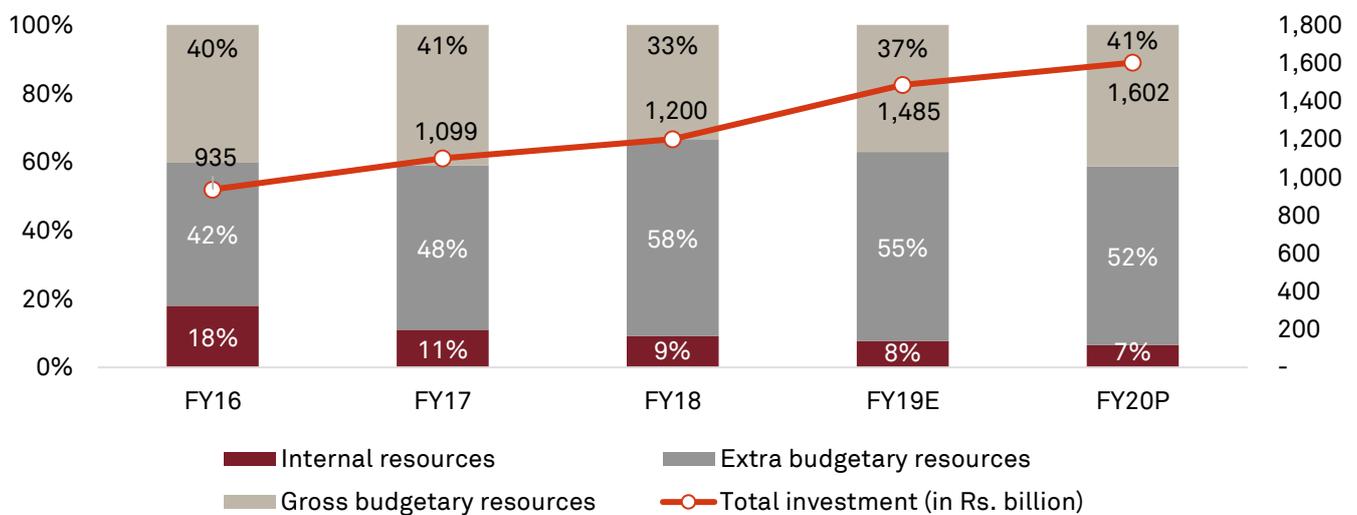
Source: MoR

<sup>8</sup> <http://www.indianrailways.gov.in/Presentation%20on%20Achievements%20&%20%20Plans%20of%20Indian%20Railways.pdf>

The government increased the annual capital outlay for the railways threefold over five years, from Rs 935 billion in fiscal 2016 to Rs 1,600 billion in fiscal 2020. This translates into a compound annual growth rate of ~14% in capital outlay. However, if

compared with the five-year plan, the investments have fallen short. Assuming the realisation of revised estimates and planned capital outlay, the investments made over fiscal 2016 to 2022 stand at ~Rs 6,322 billion, ~25% less than the investments planned under the five-year plan

## Railways' capital outlay in last five years



Source: MoR, Union Budget 2019-20, PRS Legislative Research

One of the major reasons for this shortfall has been limited realisation of PPP projects. As per the actual investments over fiscal 2016-18 and revised estimates for fiscal 2019, the total investments through extra-budgetary resources have been ~Rs 2,426 billion, comprising only 34% from PPP projects amounting to ~Rs 816 billion and the rest coming from institutional financing (28%) and market borrowings (38%), respectively.

Although the realisation has fallen short via-a-vis the investments planned in the five-year plan, many

of the identified projects are in various stages of implementation. Additionally, several ongoing projects have been accelerated for quicker implementation.

This paper provides a glimpse of the marquee initiatives, programmes and projects across freight and passenger segments that have the potential to transform the country's railway system in the near future.

# Dedicated freight corridors



## Game-changer for rail freight transportation in India

### Background

Rail has been one of the country's key modes for freight transportation, especially for long lead distances and bulk cargo. However, the share of rail in the freight transportation modal mix has been much lower than the potential. One of the major reasons for the sub-optimal share is congestion on the railway network, which translates into longer and unreliable transit times. As of 2017, the average speed of freight trains in India was as low as 24 km per hour (kmph)<sup>9</sup>.

One of the major reasons for high congestion on the network is the sharing of the network by freight and passengers – as per the Indian Railways' operating principles, passenger trains are given preference over freight trains. This is further aggravated on the Golden Quadrilateral that links the four key cities of India. The Golden Quadrilateral accounts for only 15% of track length, but carries 58%<sup>10</sup> of the freight. Among the

key routes on the Golden Quadrilateral, the Delhi-Mumbai rail route that links the northern manufacturing hubs to the ports of Gujarat and Maharashtra is one of the busiest, with a capacity utilisation of 115-150%<sup>11</sup>. Congestion on these routes leads to higher lead time for container and dry bulk movement. This has led to traffic shifting from rail to road.

Against this backdrop, considering the capacity constraints on the existing rail network and anticipating a quantum leap in freight transportation demand, the MoR embarked on a long-term plan to construct high-capacity and high-speed DFCs.

The idea of a DFC was conceptualised in 2006 with the incorporation of the Dedicated Freight Corridor Corporation of India (DFCCIL), an SPV set up under the administrative control of the MoR. It was to undertake planning and development, mobilisation of financial resources, and construction, maintenance and operations of the DFCs.

### DFCs under implementation

Sr. no.	DFC	Estimated cost	Origin-destination	States covered
1	Western DFC	Rs 303 billion	Dadri, Uttar Pradesh, to Jawaharlal Nehru Port, Maharashtra	Uttar Pradesh, Haryana, Rajasthan, Gujarat, Maharashtra
2	Eastern DFC	Rs 511 billion	Ludhiana, Punjab, to Dankuni, West Bengal	Punjab, Haryana, Uttar Pradesh, Bihar, Jharkhand, and West Bengal

Source: DFCCIL

<sup>9</sup> Indian Railways Annual Statistical Statements – 2016-17

<sup>10</sup> NiTI Aayog – Strategy for New India

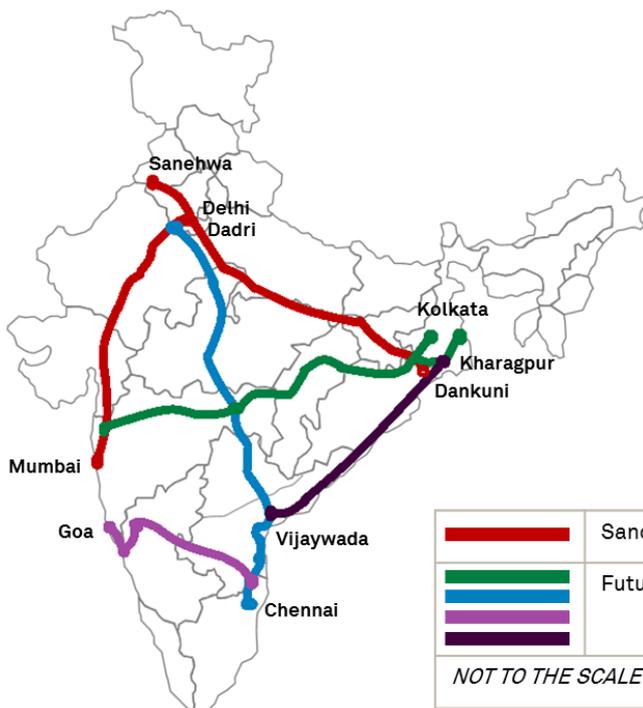
<sup>11</sup> Sagarmala National Perspective Plan, April 2016

Funding of the western and eastern DFCs is being done through a combination of debt from bilateral/multilateral agencies, equity from the MoR, and PPPs. The western corridor is being largely funded through loans from Japan International Cooperation Agency (JICA), whereas the eastern corridor is funded by a mix of a loan from the World Bank, equity from the MoR, and PPP (for the Sonnagar-Dankuni section).

Apart from the western and eastern DFCs, DFCCIL has proposed the development of four more corridors, largely spread across the Golden Quadrilateral.

Moving ahead, the MoR has sought Cabinet approval for the new DFCs- east-west corridor, north-south corridor and east coast corridor. These three proposed DFCs, with a length of 5,769 km, will require a whopping capital investment of ~Rs 3000 billion, compelling a concrete financing plan.

### Sanctioned and planned DFCs



Corridor	From – To	Distance
Eastern Corridor	Sanahwal to Dankuni	1,856 km
Western Corridor	Dadri to Mumbai	1,504 km
East – West Corridor	Kolkata to Mumbai	2,328 km
North – South Corridor	Delhi to Chennai	2,327 km
East Coast Corridor	Kharagpur to Vijaywada	1,114 km
Southern Corridor	Chennai - Goa	899 km

	Sanctioned Projects
	Future Projects
	
	
<i>NOT TO THE SCALE</i>	

Source: DFCCIL

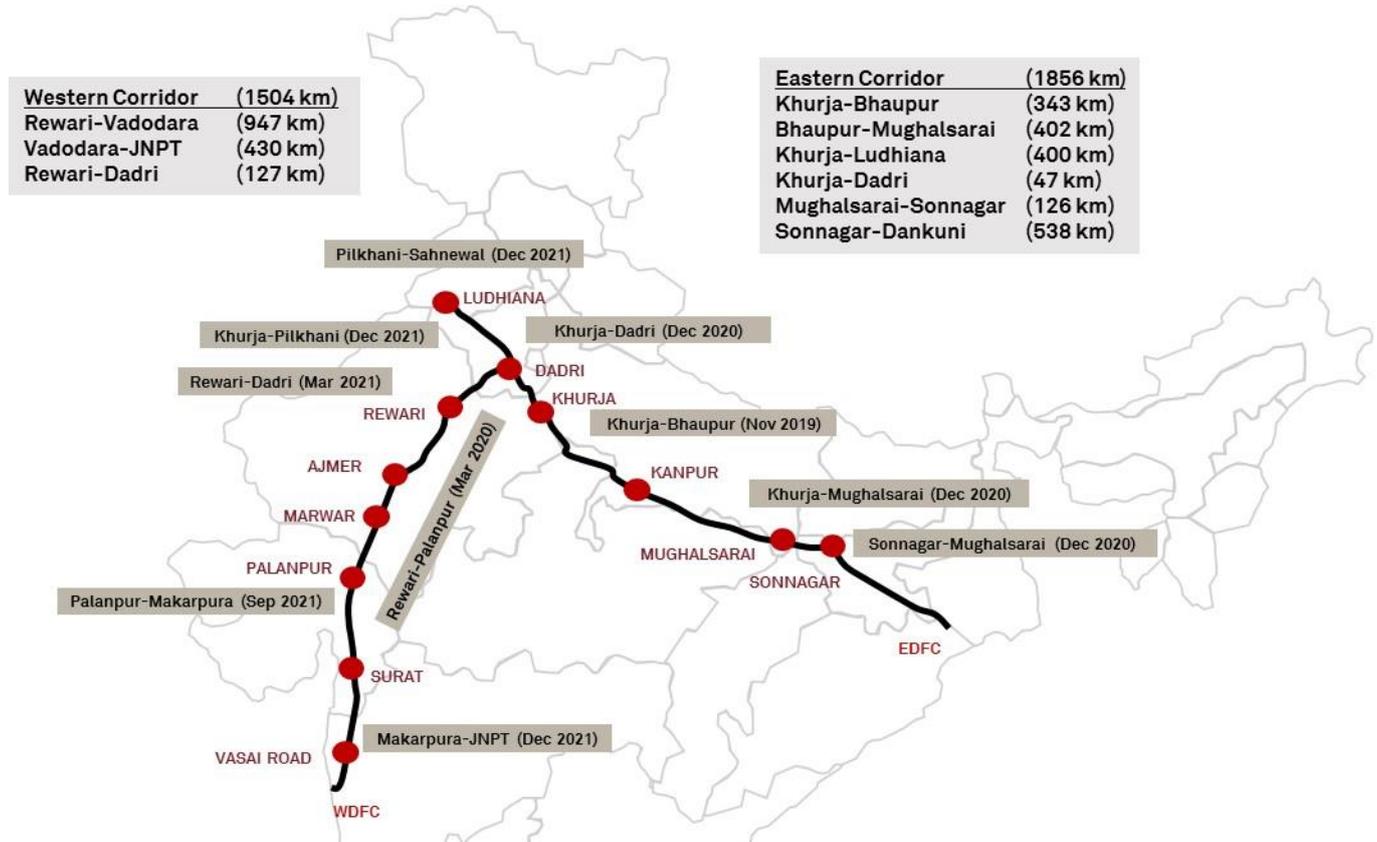
### Status of western and eastern DFCs and expected commissioning

DFCCIL is working on phase-wise commissioning of the project. As of December 2018, land acquisition for 99% of the western DFC and 97% for the eastern DFC (excluding Sonnagar-Dankuni section) was completed. Also, the Ateli-Phulera (192 km) and the Madar-Kishangarh-Balawas (306 km) sections on

the western DFC have been commissioned. The section between Rewari and Palanpur is expected to be completed by March 2020.

On the eastern DFC, the Khurja-Bhadan (194 km) section has been commissioned, with full completion of the project expected by December 2021, as per DFCCIL.

**Section-wise expected commissioning dates for eastern and western DFCs**



Source: DFCCIL

One of the major elements for the success of the DFCs is enabling the movement of cargo from the hinterland and ports. Realising this need, the

development of various feeder routes has been undertaken by the Indian Railways to connect ports and the hinterland to the DFC.

**Feeder connectivity to various ports in the DFC hinterland**

Sr. no.	Feeder route	Length
1	Pipavav-Surendranagar-Viramgam-Mehsana	395 km
2	Kandla-Gandhidham-Palanpur	312 km
3	Mundra-Gandhidham	66 km
4	Hazira-Surat	40 km
5	Mumbai-Wadala-Kurla-Diva	36 km
6	Panvel-Pen-Roha	75 km
7	Bharuch-Dahej	62 km
8	Dankuni-Damdam Junction-Ballygunje-Diamond Harbour-Budge Budge	101 km

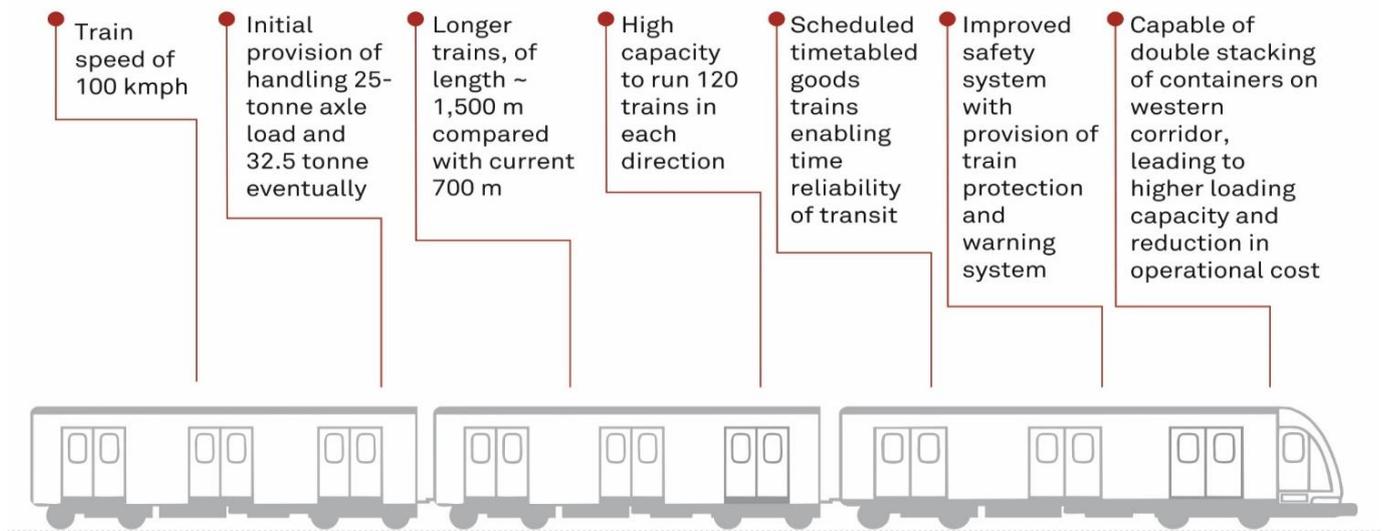
Source: DFCCIL

## Expected impact of the commissioning of the western and eastern DFCs

The DFCs are largely intended to enable the railways to regain lost freight share to road

transport. They offer several features that are expected to considerably reduce turnaround times and logistics costs, compelling industries to rejig their logistics strategies.

### Key features of the upcoming DFCs



The DFCs will help the railways gain a competitive edge over road for transportation of freight, especially in the case of bulk freight and containers. As per the Sagarmala National Perspective Plan, 2016, a 25% reduction in freight charges may enable lowering of viable distance for rail transportation of containers to 400-500 km from 1,000- 1,300 km, making rail attractive for the northern hinterland.

With increased time reliability, DFCs could attract sectors such as cold chain for transportation of perishable commodities and express distribution. As per DFCCIL, it is expected that the port and

Inland Container Depot (ICD) rail traffic share will rise from 25% to 31%. This is owing to increased container movement on the DFC because of double stack operations, assured transit time, and faster speeds.

It is also expected cement traffic by rail will improve from 30% to 38% on account of better service offerings by the DFCs and resolution of issues related to multiple handling. Overall, it is estimated that the eastern and western DFCs may increase the market share of rail in freight segment from ~30% to more than 50%<sup>12</sup>.

<sup>12</sup> Presentation by Director – Operations and Business Development, DFCCIL, July 9, 2019

**Projected traffic on DFCs**

Freight traffic (million metric tonne per annum)	C+2 years	C+5 years	C+10 years	C+30 years
Traffic due to IR	235	269	304	523
Additional traffic (non-IR)	163	284	515	1272
<b>Total traffic</b>	<b>398</b>	<b>553</b>	<b>819</b>	<b>1795</b>
Eastern DFC	141	193	366	995
Western DFC	257	360	453	800

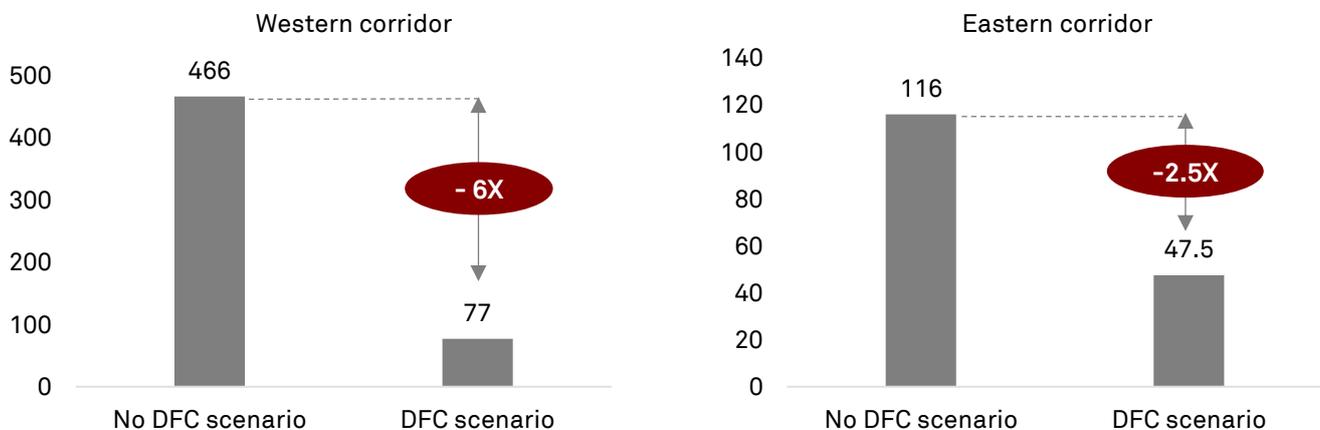
Source: DFCCIL

Note: 'C' represents the year of commencement

Apart from the increase in rail traffic, the DFCs are also likely to yield immense environmental benefits. It is expected that the commissioning of the DFCs

will help save 457 million tonne of carbon dioxide emissions over a five-year period, contributing in helping the country achieve its climate goals.

**Savings on greenhouse gas emissions over 30-year period due to DFCs (in million tonne)**



Source: Report on Greenhouse Gas Emission Reduction Analysis for Dedicated Freight Corridor, 2011

**Opportunities emanating from DFCs**

It is expected the commissioning of the DFCs will open up more opportunities for the private sector owing to the enhanced competitiveness of railways. These projects can be largely spread across development of private freight terminals, rail-based logistics parks, and private rail sidings, among others. This will create a win-win situation for both private players as well as the railways. The setting

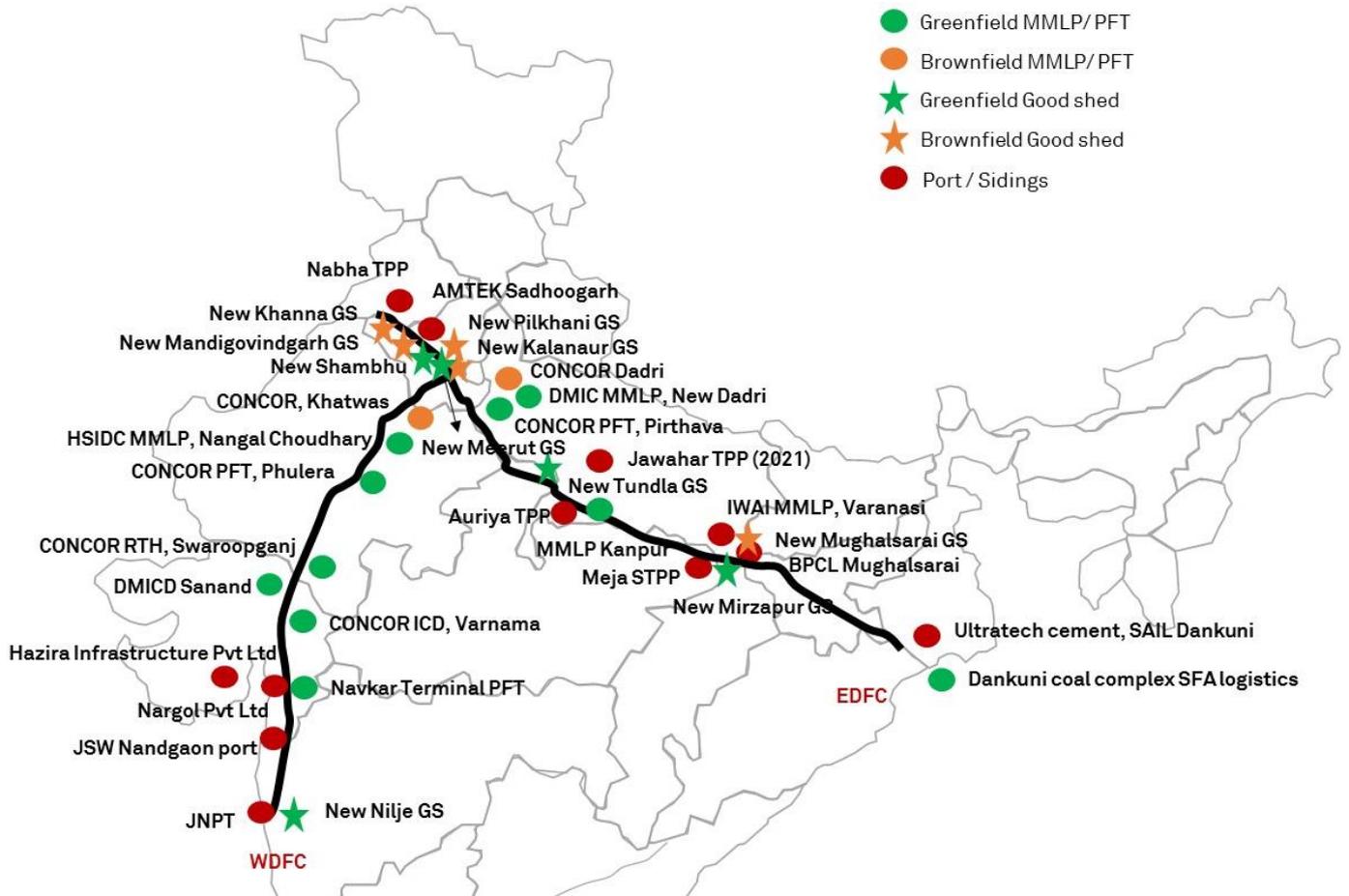
up of these facilities will enable consolidation and movement of cargo through the DFC from regions that are not directly connected with the corridors. The MoR has already finalised the following policies for the development of terminals and port connectivity on the DFC network:

- Private siding rail connectivity policy
- Private freight terminal policy
- Port rail terminal connectivity policy

Following the promulgation of these policies, the MoR has received nine proposals for private freight terminals and 13 for private sidings. Eight in the former category and eight in the latter have received in-principle approval<sup>13</sup>. The MoR has also received

four proposals for port rail connectivity, of which one has been given in-principle approval. Various greenfield and brownfield projects planned on the western and eastern DFCs are depicted in the schematic given below.

**Private freight terminals, railway sidings and port connectivity projects along DFCs**



Source: DFCCIL

The DFC project will be a potential game-changer for India’s logistics landscape. By segregating passenger and freight flows in the railway system, it will not only ensure faster movement of freight, but also aid the economy through decongestion of major highways. Further, its key features such as

high loading capacity, higher speed, least possible detention, and double stacking of containers will help the Indian Railways considerably reduce its operational cost and also provide it a leeway to pass on the benefit to freight customers through competitive pricing.

<sup>13</sup> Presentation by Director – Operations and Business Development, DFCCIL, July 9, 2019

## Challenges ahead

The western and eastern DFC projects received approval from the Union Cabinet in 2006 and works commenced in fiscal 2009. However, both projects are yet to be commissioned even after more than a decade. The projects have missed several deadlines owing to various reasons, primarily land acquisition.

As on December 31, 2018, progress on land acquisition has been 97.3% in the eastern DFC (without the Sonnagar-Dankuni section)<sup>14</sup>. In the Sonnagar-Dankuni section; even after many years, progress on land acquisition has been a paltry 67.8%<sup>1516</sup> indicating hurdles in implementation of the section.

Further, the railways intends to develop the 538 km-long Sonnagar-Dankuni section through PPP. Considering the project involves high investment and private participation in railways still is at a nascent stage, it may be a challenge to attract a private partner to develop a greenfield railway connectivity project. This scenario may compel the railways to reconsider its approach for the implementation of this section. A delay in executing this section may hamper traffic for the EDFC, especially coal, as mines are in proximity to this section.

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<sup>14</sup> Source: [http://dfccil.gov.in/dfccil\\_app/Project\\_Status](http://dfccil.gov.in/dfccil_app/Project_Status) accessed on 09.08.2019

<sup>15</sup> Source: [http://dfccil.gov.in/dfccil\\_app/Project\\_Status](http://dfccil.gov.in/dfccil_app/Project_Status) accessed on 09.08.2019

<sup>16</sup> Data on progress on land acquisition is based on stage 20F of land acquisition as per The Railways (Amendment) Act, 2008

# Station Redevelopment Programme



## Enabling superior passenger experience and non-fare box revenue for Indian Railways

### Background

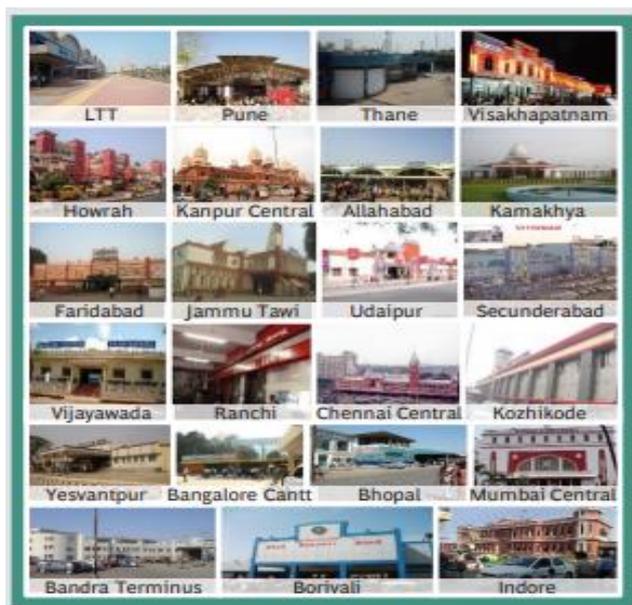
The Station Redevelopment Programme is one of the largest programmes undertaken by the Indian Railways in recent years. The programme focusses on two major areas: improving passenger experience at railway stations, and generating non-fare box revenue, thus enhancing revenue streams for the Indian Railways. The programme focusses on developing world-class infrastructure and amenities at railway stations including, but not limited to, segregating arriving and departure streams of passengers, surface or basement parking, seamless accessibility for the differently abled, swipe ticket entry machines, ATMs, CCTVs with integrated security systems, medical facilities or standby amenities, food and beverages and entertainment facilities, hotels, lounges, etc.

### Programme implementation

The Indian Railways has more than 8,000 stations, which are classified into seven categories as per their annual earnings from passenger traffic. In June 2015, the Union Cabinet approved the railways' proposal to redevelop A1 and A category stations<sup>17</sup> (about 400 stations) on 'as is where is' basis. Open bids were invited from interested parties with their designs and business ideas, duly providing for amenities and other requirements of the railways, including permitting commercial development of real estate by zonal railways<sup>18</sup>.

Accordingly, the Station Redevelopment Programme was launched in February 2017. In the first phase, 23 railway stations were selected for redevelopment by individual zonal railways and PSUs in collaboration with state governments, the Ministry of Defence, the Ministry of Urban Development and other ministries.

### 23 stations selected initially under Phase I of Station Redevelopment Programme



<sup>17</sup> A1 and A category stations witness high passenger earnings due to their location in metros, major cities or tourist destinations

<sup>18</sup> <http://pib.nic.in/newsite/erelease.aspx?relid=176123>

Further, the Indian Railway Stations Development Corporation Ltd (IRSDC), a JV of Ircon International and Rail Land Development Authority (RLDA), was entrusted with the redevelopment of 12 stations: Anand Vihar, Bijwasan, Chandigarh, Habibganj, Gandhinagar, Nagpur, Gwalior, Baiyappanahalli, Amritsar, Shivaji Nagar, Surat, and Gandhinagar (Jaipur).

On July 4, 2016, an agreement was signed between the IRSDC and the Bansal Group for the

redevelopment and modernisation of Habibganj railway station located in Bhopal, Madhya Pradesh. Habibganj is the first station to be redeveloped through PPP under the Station Redevelopment Programme. The total estimated cost of station redevelopment is Rs 1 billion and of commercial development is ~Rs 3.5 billion. As on December 31, 2018, 70% of the redevelopment work (civil works)<sup>19</sup> has been completed. The redeveloped station is expected to be ready by December 2019<sup>20</sup>.

### Envisaged 3D model of Habibganj railway station



Source: IRSDC

On January 3, 2017, the Gandhinagar station project was awarded on engineering, procurement and construction (EPC) basis to Kunal Structure India Pvt Ltd. As on December 31, 2018, 82% of the work (civil works)<sup>21</sup> was completed. The Rs 2.50 billion project is an SPV between IRSDC and the Gujarat government. The redeveloped station is expected to be ready by September 2019<sup>22</sup>.

Further, in October 2018, the Union Cabinet approved the redevelopment of 600 railway stations by the IRSDC as the nodal and main project development agency. The programme has been tweaked with simplification of procedures, adapting various business models and a longer lease tenure of up to 99 years with option of subleasing. Also, the Ministry of Finance has given approval for station redevelopment as an infrastructure project<sup>23</sup>, thus

<sup>19</sup> <https://irsdic.in/irsdic-has-completed-redevelopment-work-habibganj-railway-station-70-civil-works-and-gandhi-nagar>

<sup>20</sup> <https://www.financialexpress.com/infrastructure/railways/habibganj-railway-station-redevelopment-status-progress-image-indian-railways-irsdic/1649763/>

<sup>21</sup> <http://irsdic.in/sites/default/files/loagk.pdf>

<sup>22</sup> <https://timesofindia.indiatimes.com/city/ahmedabad/new-gandhinagar-station-to-be-ready-by-sept-2019/articleshow/66741925.cms>

<sup>23</sup> [http://www.iricen.gov.in/iricen/iricen\\_day/2017/11\\_STATION%20REDEVELOPMENT%20IRICEN.pdf](http://www.iricen.gov.in/iricen/iricen_day/2017/11_STATION%20REDEVELOPMENT%20IRICEN.pdf)

paving the way for enhancing private sector interest.

The IRSDC, being the nodal agency, will prepare the strategic and business plans for individual or a group of stations, ensuring cost-neutrality of the programme. Upon approval of business plans by the MoR, the IRSDC or other project development agencies will take up the work of redevelopment. The railways/RLDA/IRSDC will be the planning and

development authority for railway land in consultation with urban local bodies, to transfer land on free-hold basis to the railways. This would enable the MoR to accelerate the redevelopment of major stations on an overall cost-neutral basis.

The IRSDC has appointed five PSUs to undertake planning and project management consultancy work for 44 stations.

### Clustering of stations for redevelopment

Sr no	RITES	MECON	NPCC	EPIL	B&R
1	Dehradun	Lokmanya Tilak Terminus (LTT)	Jaipur	Secunderabad	Delhi Cantt
2	Gurgaon	Mumbai Central	Gandhinagar	Udaipur city	Faridabad
3	Pune	Ranchi	Bengaluru City	Adarsh Nagar Delhi	Kalyan
4	Aurangabad	Ajmer	Agra Cantt	Hyderabad	Abu Road
5	Indore	Bandra Terminus	Bengaluru Cantt	Wardha	Ahmedabad
6	Borivali	Chennai Egmore	Delhi Shahadra	Coimbatore Jn	Asansol
7	Bhusawal	Lonavala	Yesvantpur	Jalandhar Cantt	Kolkata
8	Bongaigaon	Andheri	Allahabad	Thiruvananthapuram Central	Ambala Cantt Jn
9	Shivaji Nagar	Bokaro Steel City	Dadar	Ludhiana	-

Source: IRSDC

The PSUs have appointed or are in the process of appointing agencies to prepare master and business plans, and financial and transaction advisory for individual stations. Indian Railways Finance Corporation has provided the IRSDC a line credit of Rs 26 billion to provide a fillip to the programme.

In January 2019, an agreement was signed with the French railway (SNCF) for a joint study on the renovation concept design of Ambala and Ludhiana stations. Also, Korean Railway has expressed interest in the redevelopment of New Delhi station.<sup>24</sup>

### Challenges ahead

The railway station redevelopment programme is one of the most ambitious initiatives of the railways given its impact on passenger experience and potential to generate non-fare revenues. However, the programme has multiple challenges.

Railway stations are an integral part of a city's ecosystem, underscoring the strong interdependence between city systems and rail property. The development of the station without a focus on its vicinity may not be the optimal structuring for such projects. In fact, adequate development in the vicinity of the railway stations in tandem with station redevelopment may increase

<sup>24</sup> <http://pib.nic.in/newsite/PrintRelease.aspx?relid=187185>

the project's prospects. Further, there is a dependency on local municipal authorities for redevelopment projects with respect to provision of water, sewerage, roads, and electricity. Also, in many cases, a change in the land use plan is required. All these activities require multiple approvals from local municipal authorities that often hamper the progress of project execution. For example, the redevelopment of Habibganj railway station got delayed as the Bhopal Municipal Corporation and Indian Railways disagreed on the floor area ratio, among other issues.

The dependency of success of station redevelopment projects on municipal authorities makes a case for enhanced coordination between the municipal authorities and Indian Railways. A solution to this could be making the municipal authority a party to the project. An example of this mechanism is the redevelopment of Surat station as

a multimodal hub with the participation of IRSDC, Gujarat State Road Transport Corporation, and Surat Municipal Corporation in a JV.

Further, apart from procedural problems and issues related to coordination with various authorities, the station redevelopment programme also faces difficulties pertaining to the real estate sector. Given that station redevelopment is essentially a real estate project, the success of the programme would be directly linked to the real estate industry. The real estate sector has been under stress for some time owing to multiple reasons, including the rollout of the Goods and Services Tax and the introduction of new real estate regulations. However, the decision for allowing longer-term lease tenure of 99 years and multiple sub-letting are positive steps that may attract private players to undertake station redevelopment projects.

# High-speed rail



# Enabling faster transit facilities on high-density passenger routes

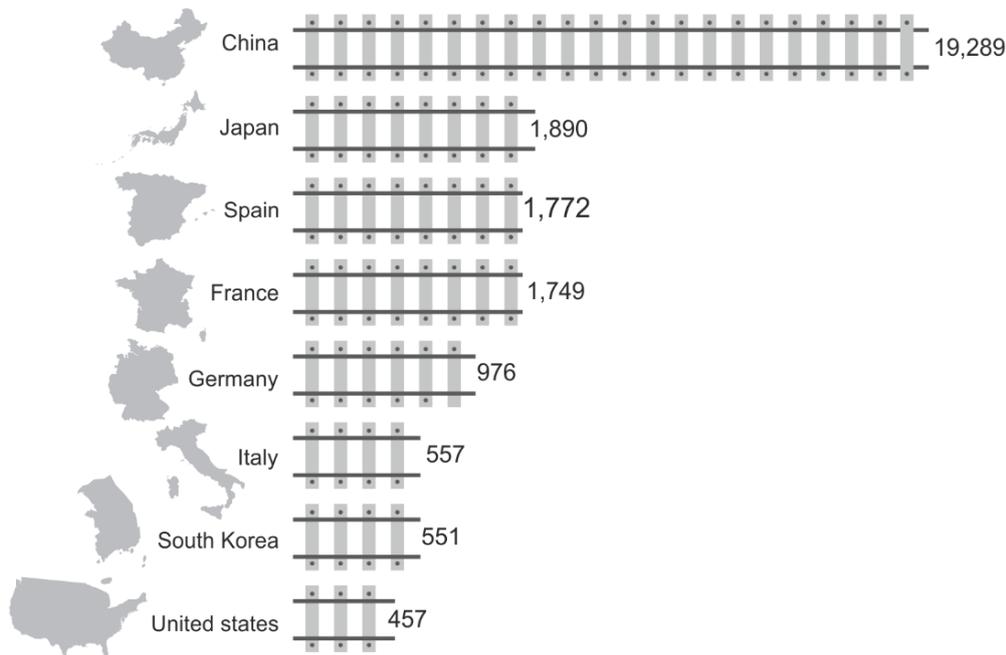
## Global context

Train lines having speed in excess of 250 kmph are generally considered HSR. Generally, HSRs are viable only on high-density passenger corridors. High-speed corridors have played a major role in the revitalisation of railways in Japan, China and Europe. With a high degree of comfort to boast, HSR can conceivably rival airlines when it comes to targeting customers with a commuting time of 2-3 hours. One such scenario has been observed in Spain, wherein commissioning of the Madrid-Seville high-speed line led to air traffic between the two cities declining from 40% to 13% between 1991 and 1994 along with an increase in passenger railway traffic from 16% to 51%<sup>25</sup>.

The first HSR system began operations in Japan in 1964, and is popularly known as the Shinkansen, or bullet train. Today, Japan has a network of nine HSR lines serving 22 of its major cities. It is the busiest HSR service in the world, carrying more than 420,000 passengers on a typical weekday. Its trains travel up to 320 kmph, and the railway boasts that, in over 50 years of operation, there have been no passenger fatalities or injuries owing to accidents.

Further, China began planning for HSR in the early 1990s and has made rapid progress in developing an HSR network over the past decades. It has the longest high-speed track length globally, accounting for about two-thirds all operational HSRs in commercial service.

## Country-wise HSR tracks in operation (miles)<sup>26</sup>



Source: UIC, International Union of Railways<sup>27</sup>

<sup>25</sup> Indian Railways: Re-birth of the Colossus, 2017, Edelweiss Research

<sup>26</sup> Note: Figures are as of January 2019

<sup>27</sup> <https://www.forbes.com/sites/niallmccarthy/2019/02/20/the-united-states-trails-the-rest-of-the-world-in-high-speed-rail-infographic/#2bfc71cf6c20>, accessed on 03.08.2019

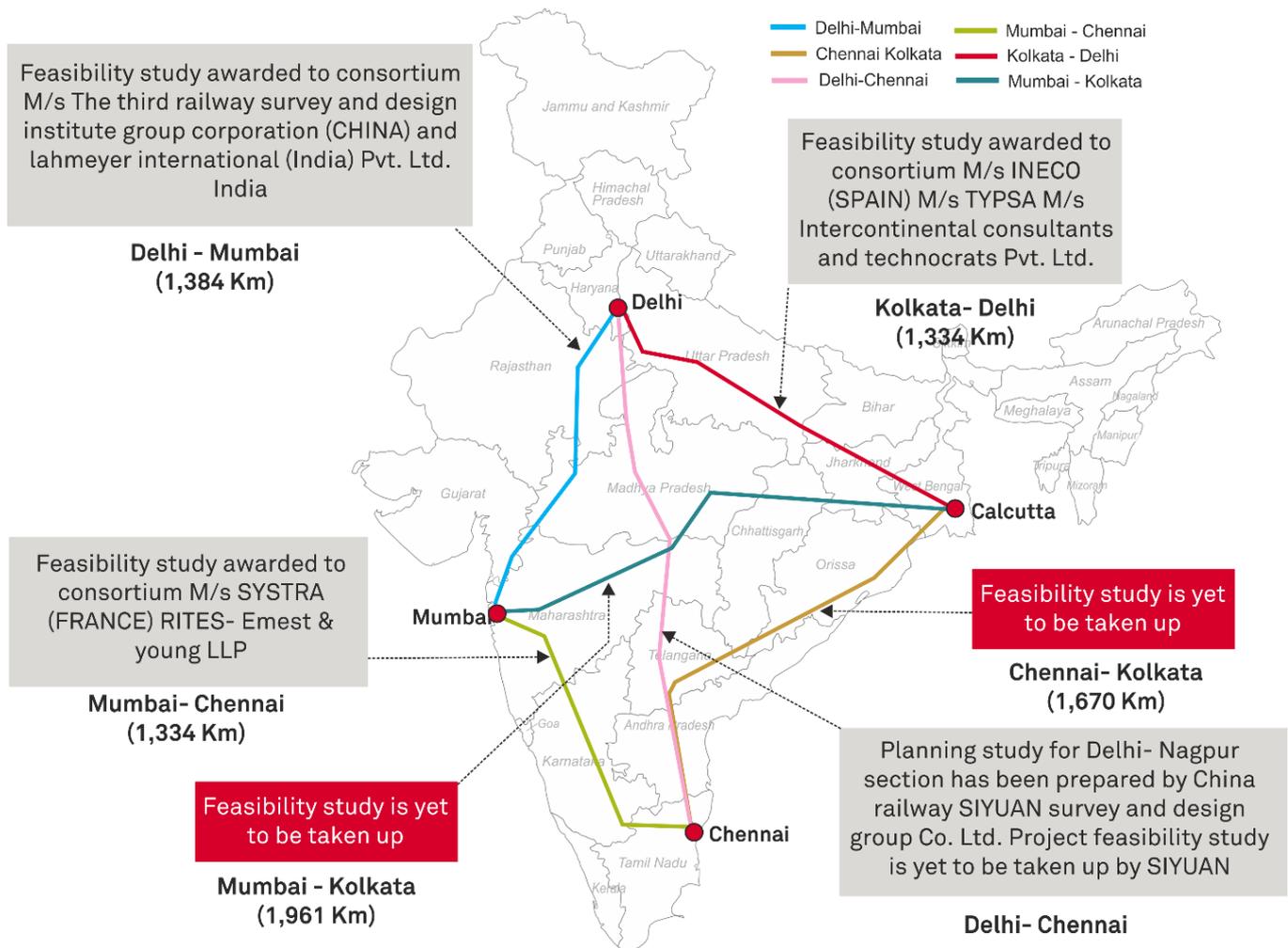
**Indian Railways' approach to HSR**

The MoR set up High Speed Rail Corporation of India Ltd (HSRC) in 2012 for the development and implementation of HSR projects. HSRC's approach is to identify a number of intercity routes, depending on viability, and build state-of-the-art high-speed corridors for speeds up to 350 kmph in partnership with state governments. Partnerships with state governments are crucial for HSR projects as real-estate development is a key element

determining the viability of these highly capital intensive projects.

In addition to the Mumbai-Ahmedabad high-speed corridor, six more corridors spanning over 10,000 km and covering portions of the Diamond Quadrilateral and semi-diagonals in the country are being explored, and consultants have been appointed to undertake feasibility studies for four corridors. These four corridors are Delhi-Mumbai, Mumbai-Chennai, Delhi-Kolkata, and Delhi-Chennai

**Planned HSR network in India other than Mumbai-Ahmedabad**



Source: HSRC, UITP (Union Internationale des Transports Publics)<sup>28</sup>, news articles<sup>29</sup>

<sup>28</sup> <https://india.uitp.org/articles/India-first-high-speed-rail>, accessed on 03.08.2019

<sup>29</sup> <https://swarajyamag.com/insta/bullet-train-in-other-parts-of-india-centre-assessing-feasibility-of-delhi-mumbai-delhi-kolkata-routes>

## **Mumbai-Ahmedabad HSR Project**

An Indo-Japan joint feasibility study for the corridor started in December 2013. The JICA submitted the final project report in July 2015. The project got official sanction in December 2015 with the signing of a memorandum of understanding between the two countries for project development during an official visit by Japanese Prime Minister Shinzo Abe.

In February 2016, the Government of India formed National High Speed Rail Corporation Ltd (NHSRCL), a JV between the Government of India, Government of Gujarat and Government of Maharashtra with equity participation in the ratio of 50:25:25.

## **Salient features of the project**

### **Overview of the project and operational details**

The Mumbai-Ahmedabad network will begin from Bandra Kurla Complex in Mumbai and end near Sabarmati railway station in Ahmedabad. The alignment of the project traverses through Gujarat, Dadra and Nagar Haveli, and Maharashtra. The corridor will have 12 stations: Mumbai, Thane, Virar, Boisar, Vapi, Bilimora, Surat, Bharuch, Vadodara, Anand, Ahmedabad, and Sabarmati. The corridor will be largely elevated, except a 21 km underground tunnel between Thane and Virar, of which 7 km will be under the sea. The maximum design speed for the corridor will be 350 kmph with an operating speed of 320 kmph.

Along with the development of the HSR system, the JICA is also providing assistance to establish a training institute in Vadodara, Gujarat. An agreement for providing a loan of ~Rs 6.4 billion has been signed between the JICA and the Government of India in this respect.

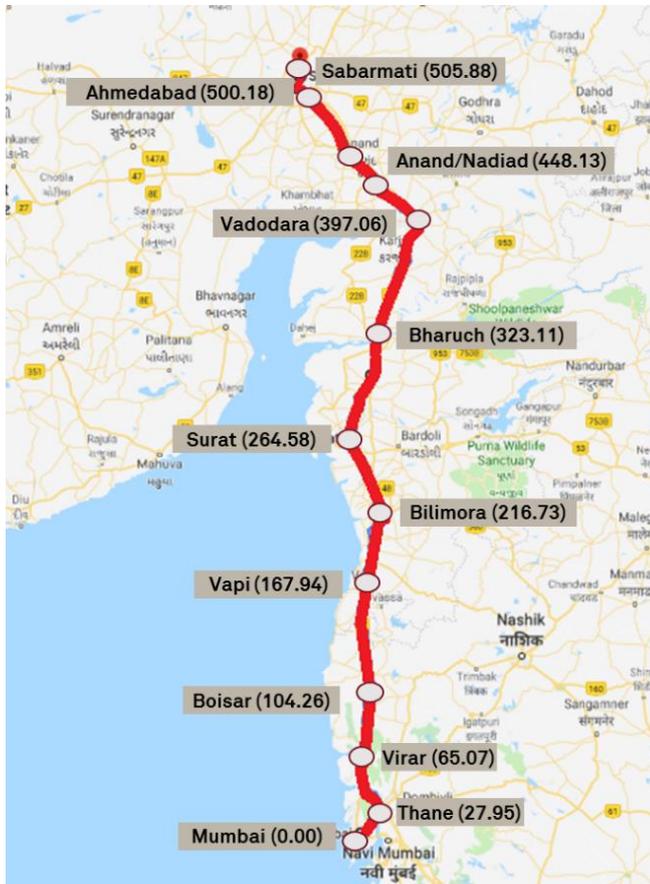
## **Project cost and funding structure**

The total completion cost of the proposed Mumbai-Ahmedabad HSR line is estimated to be ~Rs 1,080 billion (including price escalation, interest during construction, and import duties). The project is largely funded by the JICA, which will be providing ~81% of the total cost of the project as a loan with an interest rate of 0.1%, a repayment tenure of 50 years, and a 15-year moratorium. The balance will be contributed by the Indian Railways and the Maharashtra and Gujarat governments.

## **Implementation and expected commissioning**

The official target date for the completion of Mumbai-Ahmedabad HSR Project is December 2023. The entire project, including the High-Speed Rail Training Institute, has been divided into 26 contract packages. As per media reports, till June 2019, the NHSRCL had acquired 39% of the 1,380 hectares required for the project. The tenders for tunnelling work including testing and commissioning of the HSR between the Bandra Kurla Complex and Shilphata stations, in Maharashtra, have been floated. Also, tenders for the design and construction of civil and building works, including testing and commissioning of 237 km of rail line between Zaroli village at the border of the two states and Vadodara, have been floated. Further, tenders for the construction of Vapi, Bilimora, Surat and Bharuch stations have been floated, and the construction of Sabarmati hub in Ahmedabad has started.

**Mumbai–Ahmedabad HSR network**



It is expected the Mumbai–Ahmedabad HSR Project will pave the way for more such projects in the country. The HSR system will be able to capture a specific section of customers, primarily passengers travelling by air. However, ensuring on-time implementation of the project is of utmost importance to avoid cost overruns that might affect the project viability.

**Taming the ‘White Elephant’:**

The Mumbai–Ahmedabad HSR project is scheduled to be completed by 2023. The NHSRCL has already missed the December 2018 deadline for completion of land acquisition. As per media reports, the NHSRCL has been able to acquire only 537 hectares (~39%) of the 1380 hectares of land till date: 471 hectares of 940 hectares in Gujarat and 66 of 431 hectares in Maharashtra.<sup>30</sup> Though the agency is expecting to complete the land acquisition by December 2019, still, it would be a challenge to maintain the timeline. Any cost overrun, owing to delay in execution, can have an adverse impact on the financial feasibility of the project.

Further, in fiscal 2013–18, the passenger traffic has grown at a compound annual growth rate of 18% at the Ahmedabad airport. Considering traffic potential and near full capacity utilisation, last year, the government floated a tender to expand Ahmedabad international airport, for which Adani Group emerged as the successful bidder. With the envisaged expansion of the airport under a privatisation programme and penetration of furtherance of the air Regional Connectivity Scheme, it would be interesting to see the value proposition bullet train would offer ‘creamy’ customers.

<sup>30</sup> <https://economictimes.indiatimes.com/industry/transportation/railways/38-91-per-cent-land-acquisition-done-for-bullet-train-project-railway-minister-piyush-goyal/articleshow/70059279.cms>

# Mission Raftaar



## Faster transit for passengers and freight on conventional railway network

Mission Raftaar was announced in the rail budget for fiscal 2017 with the aim of doubling the average speed of all freight trains and increasing the average speed of non-suburban passenger trains by 25 kmph in five years. Under this, loco-hauled commuter trains will be replaced with mainline electric multiple unit (MEMU) or diesel electric multiple unit (DEMU) trains. Further, constraints in fixed infrastructure, movable infrastructure, operational practices, and institutional mechanisms have to be eliminated.

Principal routes identified for Mission Raftaar include those on the Golden Quadrilateral and its diagonals. These routes carry approximately 58% of freight and 52% of passenger traffic. To achieve the objectives, a cross-functional Mobility Directorate was created in the Railway Board, working under the direct supervision of the chairman of the Railway Board. Its objective is to undertake initiatives related to factors that affect train movement at enhanced speeds. Further, in May 2018, the following action points were outlined by the Ministry to achieve the mission objectives:

- Increasing maximum permissible speed of all types of freight stock to minimum 75 kmph and up to 100 kmph
- Elimination of unmanned level crossings (with a few exceptions) and completion of sanctioned railway over bridge (ROB) and road under bridge (RUB) on the Golden Quadrilateral and diagonal routes
- Development of a policy on upgrading the Golden Quadrilateral and diagonal routes for 160 kmph and rest for 130 kmph
- Development of bypasses and flyovers at busy junctions on high-density networks

- Improving the availability of additional electric locomotives for freight and passenger trains on the Golden Quadrilateral and diagonals
- Replacement of loco-hauled passenger trains by MEMU/DEMU trains with a maximum permissible speed of 130 kmph for MEMU and 90 kmph for DEMU
- Action on provision of twin-pipe braking system in freight stock to enable movement at higher speeds
- Review of the timetable for rationalisation of commercial halt, stoppage, duration per stoppage, etc.

Some key initiatives undertaken recently by the MoR to achieve these objectives include:

- Launch of the Vande Bharat Express or Train 18, India's fastest train, in February 2019, touching speed of 200-210 kmph<sup>31</sup> during its trial run. Currently, it runs on the Delhi-Varanasi route, via Kanpur and Allahabad, reducing travel time by 15%. At an operating speed of 160 kmph, it outpaces Shatabdi Express by 30 kmph<sup>32</sup>. The Indian Railways plans to run Train 18 on the Delhi-Katra route from late 2019<sup>33</sup>.
- Replacing 141 short-distance passenger trains, especially those having reversal en route, with DEMUs/MEMUs, thus improving overall mobility of the system
- Speeding up of 261 trains leading to a decrease of 110 minutes in travel time, across various railway zones
- Utilisation of idle rakes at various terminals for the introduction of ~40 new services, extension of 21 services, and increasing frequency of eight services

<sup>31</sup> <https://www.businesstoday.in/current/economy-politics/train-18-launch-live-updates-pm-modi-inaugurates-vande-bharat-express/story/318925.html>

<sup>32</sup> <https://www.mapsofindia.com/my-india/travel/vande-bharat-express#>

<sup>33</sup> <https://www.financialexpress.com/infrastructure/railways/new-vande-bharat-express-train-from-delhi-to-katra-second-train-18-awaits-this-crucial-nod/1661468/>

## Fast-tracking 'Mission Raftaar':

- Though the launch of semi-high speed trains such as Train 18 is a welcome step for 'Mission Raftaar'; it is important to augment the capacity of network tracks to handle trains running at 180 kmph. Only 0.3% of India's railway tracks spread over 60,000 km are fit to handle trains running at speeds of up to 160 km

per hour, according to an assessment made by the railways.<sup>34</sup> Hence, the operational speed of Train 18 has been capped at 130kmph on most of the sections in its route. The railways would need to focus on upgrading the track, in parallel with investing in such modern rakes to realise the mission.

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<sup>34</sup> <https://www.hindustantimes.com/india-news/just-0-3-of-railway-tracks-fit-for-trains-running-at-160km-hour/story-F5BhXi48ik6M5Ul63ZNRiM.html>

# Passenger comfort and amenities



## Providing superior travel experience to railway passengers

The Indian Railways aspires to meet the expectations of a large section of passengers as it faces competition from airlines and buses that often provide better passenger comfort and amenities. This lack of comfort and amenities for passengers who can afford higher fares, results in them shifting to other competing modes. Last year, the total passengers carried by airlines crossed the total number of AC class passengers in railways. Government support to the aviation sector through schemes such as UDAN (Ude Desh ka Aam Naagrik) is further expected to fuel airline passenger growth. This growth may be at the cost of AC class passengers of railways and can negatively impact the railways' competitive position in passenger space as well as its revenue. Notably, the AC three-tier class is the only profitable passenger segment, and losing these passengers to airlines may dent the Indian Railways' profitability significantly.

Taking cognisance of the importance of passengers' travel experience, two flagship schemes – Project Utkrisht and Project Swarn – were announced in October 2018 and November 2017, respectively, focused on passenger comfort and amenities. Further, the increase in allocation for rail passenger amenities in Union Budget 2020 to Rs 34 billion from Rs 17 billion in Union Budget 2016, is a testimony to the railways' enhanced focus on passengers' travel experience.

### Project Utkrisht

The Indian Railways intends to develop 640 Utkrisht rakes as part of upgradation of mail/express trains at a cost of Rs 4 billion. The upgraded coaches will be equipped with several modern features and passenger-friendly amenities to ensure cleanliness, hygiene and better on-board experience, such as:

- Swachh Rail Toilet, a hybrid design bio-toilet system
- Anti-skid floor tiling, which is easy to clean and maintain, for better aesthetics
- Aluminium composite panel wall and roof for better look and longer life
- Indigenously designed windows (louvre) for improved ventilation
- Anti-graffiti vinyl wrapping in the gangway and doorway areas as well as interiors
- Passenger information system, coach indication boards, single information posters, and train timetable
- Energy-efficient LED lights and Braille signage
- USB charging points, acrylic mobile holders, digital wall clock
- New colour scheme for the coach exterior
- Wi-fi hotspot facility with inbuilt 500 hours of content in 'Utkrisht plus' rakes

Some amenities being provided for passengers by the railways to enhance travel experience

### Perks on wheels

	Bio-toilet with improved hygiene		WiFi hotspot facility on 'Utkrisht Plus' rakes
	GPS-enabled trains with passenger information system		On-board infotainment system
	Automatic fire alarm system		USB charging point, acrylic mobile holder
	Dustbins in Swach Coaches to prevent choking		Plastic bottle crushing machines

### Project Swarn

Project Swarn has been started to upgrade the condition of Rajdhani and Shatabdi Express trains. This initiative is likely to give an improved look to the coaches. As many as 29 Rajdhani and Shatabdi Express trains have been identified under this scheme. The objective is to significantly improve passenger experience across nine dimensions: coach interiors, toilets, on-board cleanliness, staff behaviour, catering, linen, punctuality, security, and on-board entertainment. Real-time feedback is also a part of the project.

All Shatabdi Express trains have already been revamped under this 'gold standard' project. Upgradation of 15 rakes of Rajdhani Express, mostly belonging to Northern Railway and North-East Frontier Railway divisions, is pending. The project is expected to be completed in the next six months.

### Challenge

Although the provision of superior passenger amenities is a step in the right direction in the effort to improve travel experience, the punctuality of trains is a matter of concern. Given that punctuality is important to passengers, it needs to be improved. In fact, the railways has registered subdued performance in punctuality in recent years. While in fiscal 2016, it recorded 77.4% punctuality of trains; the subsequent years have seen a drop with 76.69% in fiscal 2017 and 71.39% in fiscal 2018<sup>35</sup>. The MoR took initiatives to improve the punctuality of trains by installing data loggers sensing the status of delays. Punctuality improved to ~80% in January 2019<sup>36</sup>. However, there is still a margin for improvement and it would be necessary to maintain the punctuality rate. Without punctual operations, it may be difficult for the railways to keep its passenger traffic from moving to other reliable modes of transport.

<sup>35</sup> <https://www.businesstoday.in/current/economy-politics/indian-railways-sees-worst-punctuality-performance-in-three-years-30-percent-trains-run-late-in-2017-18/story/276269.html>

<sup>36</sup> <https://www.financialexpress.com/infrastructure/railways/indian-railways-sees-improvement-in-train-punctuality-records-thanks-to-data-loggers-details-here/1451564/>

# Port-rail connectivity and JVs with states



## Enabling last-mile connectivity through railway infrastructure development

### Port-rail connectivity

Rail connectivity for ports is of utmost importance to enable efficient port infrastructure and reduction of overall logistics cost for exporters and importers, especially for bulk cargo. Further, it helps the railways capture a larger chunk of freight traffic and generate revenue. Realising the importance of rail connectivity for ports and the need for a focused approach, an SPV, IPRRCL,<sup>37</sup> was formed. It is a JV between 11 major ports under the Ministry of Shipping and RVNL, with the former holding 90% of the equity of the company and the latter 10%.

As of December 2018, 52 projects were in various stages of implementation by agencies including IPRRCL, MoR and other operators. IPRRCL has taken up 32 projects entailing a cost of Rs 182 billion across nine major ports. Of these, eight projects worth Rs 1.75 billion were completed in December 2018<sup>38</sup>.

In addition, 23 rail connectivity projects at a cost of Rs 248 billion identified under the Sagarmala

programme are being taken up by the MoR. Of these, seven projects worth ~Rs 25 billion were completed as of December 2018. Further, 15 rail connectivity projects entailing an investment of Rs 42 billion have been taken up through other agencies and operators, of which three (Rs 0.5 billion) were completed till December 2018.

### JVs with states

Railway projects, especially greenfield ones, are capital-intensive and generally entail large capital costs. Further, improved rail connectivity enhances the economic prospects of a geographic location through better access to an economic mode of transportation. Such a scenario builds a case for the participation of states in financing and development of railway projects. The JV model enables states to augment the rail infrastructure within their jurisdiction. Key features of the JV companies of states and the MoR are given below.

### Key features of JV companies of MoR with state governments

Sr. no.	Particulars	Features
1	Objectives of the JV	<ul style="list-style-type: none"> <li>Development, implementation and financing of mutually identified commercially viable railway projects</li> <li>Prioritisation of critical connectivity and capacity augmentation projects for various states</li> </ul>
2	Structure of the JV	<ul style="list-style-type: none"> <li>State JV company is a government company by the virtue of its shareholding, i.e., 49% equity shareholding by MoR and 51% by state government</li> </ul>
3	Activities to be undertaken by the JV companies	<ul style="list-style-type: none"> <li>Incorporation and equity funding of SPVs incorporated to undertake specific projects</li> <li>Undertaking railway projects after establishing project viability or viability gap funding to enable optimal utilisation of funds</li> </ul>
4	Enhancement of viability	<ul style="list-style-type: none"> <li>State government may provide land for the project free of cost, if necessary</li> </ul>

<sup>37</sup> Erstwhile IPRCL

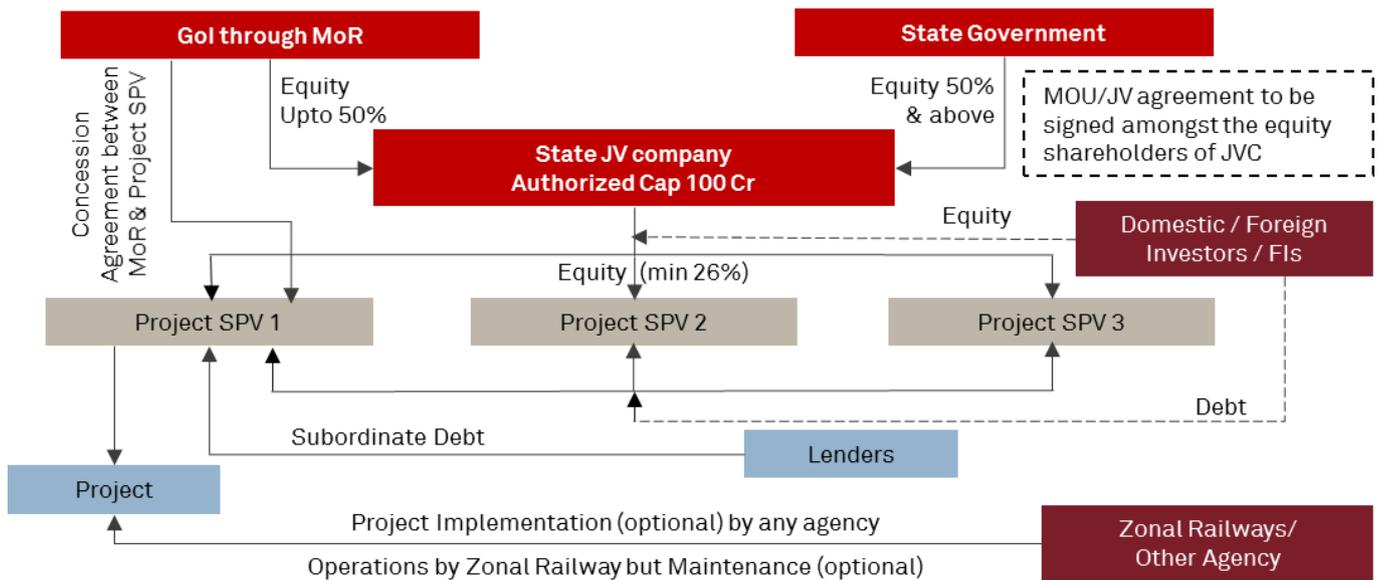
<sup>38</sup> <https://www.thehindu.com/business/Industry/projects-worth-446k-crore-underway-for-rail-connectivity-to-ports/article25756798.ece>

Sr. no.	Particulars	Features
		<ul style="list-style-type: none"> <li>Project scope may entail other non-railway revenue streams such as commercial exploitation of land for robust business model</li> </ul>
5	Applicability of investors other than MoR and state government	<ul style="list-style-type: none"> <li>Other investors may contribute a maximum of 74% equity and the MoR and state government will maintain at least 26% equity share in individual project SPVs</li> </ul>
6	Other funding sources	<ul style="list-style-type: none"> <li>Project SPV may avail debt from lenders/multilateral agencies</li> </ul>

Key projects that can be undertaken by JV companies include port connectivity, mine connectivity, new line, suburban railway, or other critical projects mutually identified by the MoR and state governments. The existing sanctioned

projects such as new line, doubling and gauge conversion may also be taken up by JV companies. The companies can take up numerous projects by incorporating multiple project SPVs. A schematic of the arrangement is depicted below.

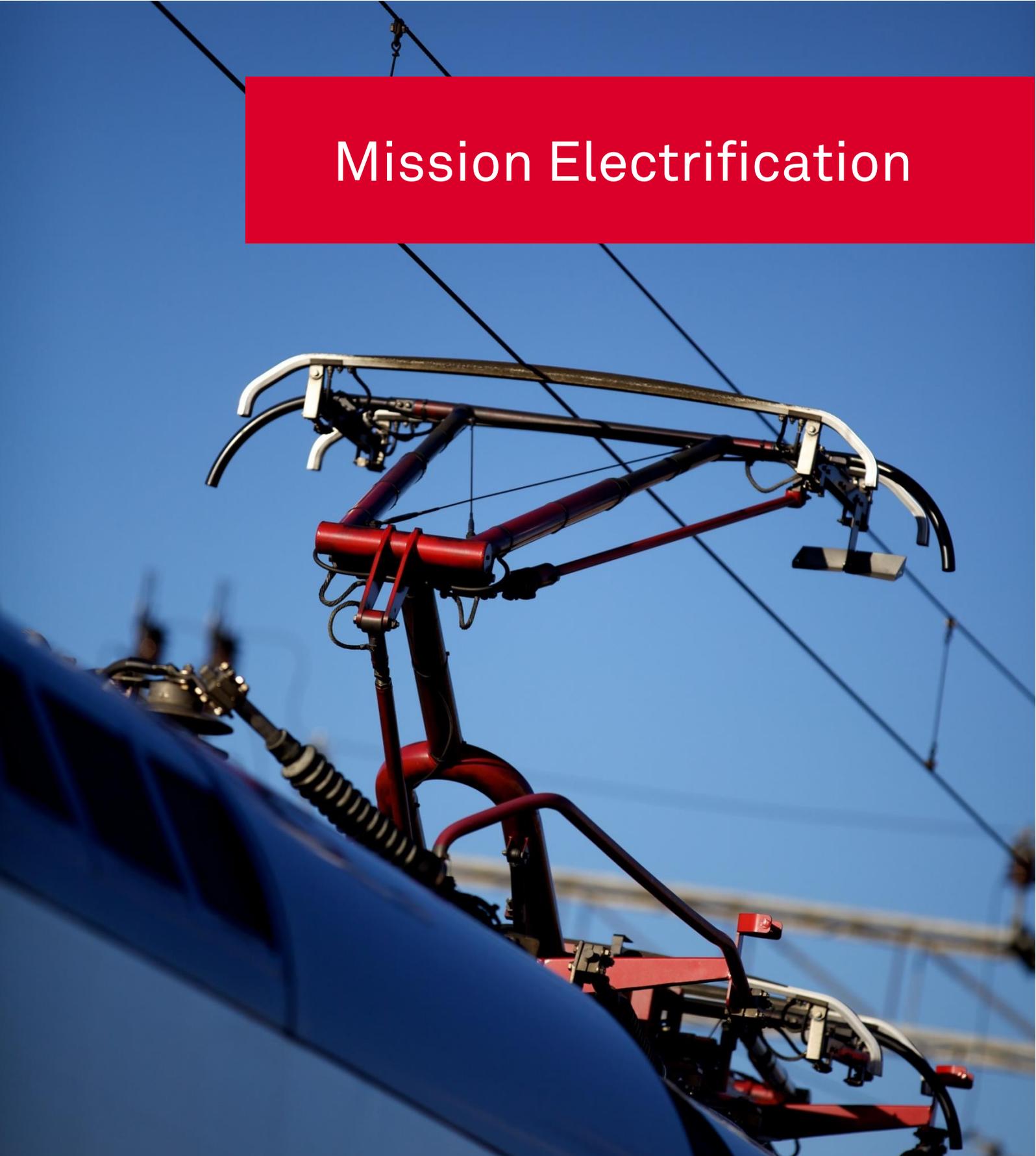
### General structure of a JV company funding multiple projects



Since its inception, around 20 states have signed up for the programme. Of these, Andhra Pradesh, Assam, Chhattisgarh, Gujarat, Haryana, Jharkhand, Kerala, Madhya Pradesh, Maharashtra, and Odisha have already formed JV companies with the Indian Railways. Until September 2018, around 42 projects were identified and studies were being undertaken to assess their feasibility. Apart from state governments, the programme is also drawing interest from several companies and private investors. Companies with manufacturing units located at distant places in the hinterland are

looking at rail connectivity for economic transportation. An example is automobile major Maruti, which requires broad gauge connectivity for movement of its vehicles produced in the Sanand manufacturing plant in Gujarat. The company is working with Gujarat Infrastructure Development Corporation and G-RIDE (a JV of Gujarat government and the MoR) on a ~Rs 5 billion project to convert the Kalol-Katosan-Chanasma-Ranuj line from meter to broad gauge. Similar projects have been identified in Chhattisgarh, which will benefit various coal and cement companies.

# Mission Electrification



## Reducing carbon footprint and operating costs, creating a win-win situation for the Indian Railways

High operating cost is one of the major challenges facing the Indian Railways, which has an operating ratio of more than 90%. It is estimated fuel bills alone account for 30%<sup>39</sup> of the operating costs for the railways. Further, most of the operations are confined to diesel traction, contributing to ~64% of the total energy bill. This scenario makes electrification a major focus area for the railways.

Electric traction has several advantages. First, it is substantially cheaper to operate trains on electric traction than on diesel traction. Various reports suggest running trains on electric traction is ~50% cheaper for coaching traffic and ~47% cheaper for goods traffic. Electric traction offers regenerative braking (where kinetic energy of train is converted into electrical energy) and reduces energy consumption by ~20% for locomotives and ~30% in EMUs<sup>40</sup>. In addition, electric traction improves throughput and section capacity by ~18% owing to higher average speed<sup>41</sup>. Also, electric traction is not dependent on a specific primary source of energy and therefore can be sourced from a range of energy forms taking into consideration price and other characteristics.

Keeping in mind the huge cost savings from electric traction and the objective of reducing carbon footprint, the Indian Railways has set the target of 100% electrification by fiscal 2022. It is expected that 100% electrification shall enable railways to save Rs 135.10 billion per year.

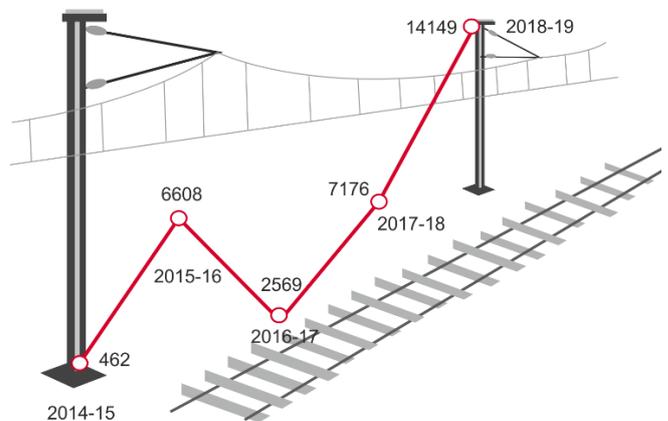
Historically, electrification works have been undertaken by the Central Organisation for Railway Electrification, RVNL and zonal railways. The Indian Railways has increased the number of agencies executing electrification projects from the three to six by entrusting works to new agencies, viz., Indian

Railway Construction Company, RITES, and Power Grid Corporation of India Ltd. This is likely to expedite the pace of electrification going ahead.

Significant emphasis has been given to railway electrification in the recent years to reduce the nation's dependence on imported petroleum-based energy and enhance energy security. During the past five years, 204 electrification projects consisting 30,964 rkm have been sanctioned by the Government of India keeping in mind the huge cost savings and considerable reduction in carbon footprint. Total 38,000 rkm has been identified for electrification of the broad gauge network by 2021.

### Trends of electrification works sanctioned (rkm)

*Significant uptick in works sanctioned for railway electrification*



*Source: Central Organisation for Railway Electrification*

<sup>39</sup> [http://www.indianrailways.gov.in/Mission\\_41K.pdf](http://www.indianrailways.gov.in/Mission_41K.pdf)

<sup>40</sup> *Indian Railways: Re-birth of the Colossus*, by Edelweiss

<sup>41</sup>

[https://core.indianrailways.gov.in/view\\_section.jsp?lang=0&id=0,294,302,532](https://core.indianrailways.gov.in/view_section.jsp?lang=0&id=0,294,302,532) accessed on 03.08.2019

Various reports suggest in the event of 100% electrification, 4,500 additional electric locomotives will be required. Currently, the railways manufactures electric locomotives at its Chittaranjan plant. To cater to the increasing demand, this plant's capacity is being expanded to 275 locomotives. Further, the Indian Railways has also awarded a contract to Alstom for setting up an electric locomotive factory at Madhepura, Bihar. Notably, the railways is also working on the conversion of diesel locomotives to electric, which is a first of kind project in the world. This conversion of locomotives is also enhancing the power from 2,600 horse power to 5,000 horse power.

## Challenges:

The electrification of 100% of track length of Indian Railways is expected to require huge investments. Assuming an expenditure of Rs 15 million per km<sup>42</sup>, electrification of the targeted 38,000 rkm will cost ~Rs 570 billion. Further, railway electrification projects have limited amenability for private participation due to absence revenues.

Further, it is expected achievement of 100% electrification will require substantial investment to convert or replace the railways' existing diesel locomotives. As per various reports, it is estimated replacing the diesel locomotives with electric ones will cost Rs 400 billion; besides the actual electrification cost.

Therefore, the railways may need to provide substantial funding from budgetary support or external debt for this programme. This may chip away the investments in other projects that cannot be financed through PPPs or other extra-budgetary resources.

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<sup>42</sup> Estimated on the basis of ADB's report on recommendation of the President to the Board of Directors for proposed loan to IRFC for electrification of 3,378 km of tracks

# Wagon investment schemes



## **Leveraging private capital for induction of rolling stock**

The MoR has been making continuous efforts to tap various sources of funds for infrastructure augmentation, private capital being one of them. In its pursuit, the Indian Railways has promulgated various schemes for investment in rolling stock. These schemes have seen a number of changes over the years based on the feedback received from industry. As of now, the following schemes are in place for private investments in rolling stock (year in parentheses indicates the year of revision or promulgation).

### **Liberalised Wagon Investment Scheme (2018)**

The scheme strives to attract private investments in high-capacity (two tonne higher than the payload of extant wagons) and special purpose wagons (for specific commodities or group of commodities) to be run in pre-approved closed circuits. To attract players, the scheme has a provision of 12% rebate on base freight and 0.5% for each additional tonne of payload for high-capacity wagons for 20 years, and 15% rebate is granted for special purpose wagons for 20 years.

### **Special Freight Train Operator Scheme (2018)**

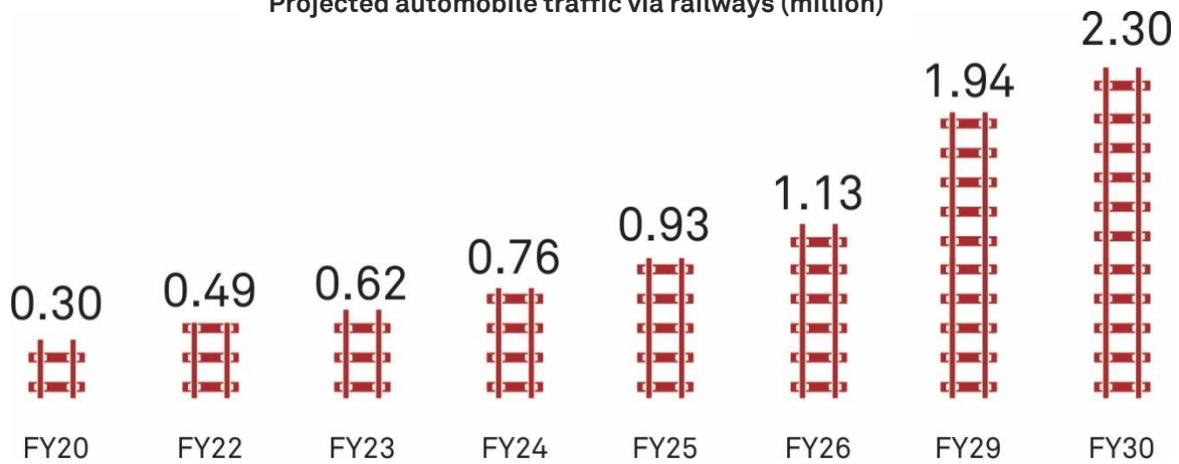
The scheme looks to increase the railways' share in non-conventional traffic by introducing high-capacity and special purpose wagons. Under the

scheme, select commodities are allowed with different registration charges according to the commodity. The scheme allows operations of trains from own private terminals, enabling players to have more control over operations. Various steel companies, food grain transporters and cement companies have evinced interest in the scheme for procurement of specialised rakes. To attract private players, a provision of 10% rebate on base freight and 2% for increase in throughput by 10%, is provided. Further, the rebate is capped to a maximum 10% for high-capacity wagons for 20 years. However, a provision of 12% rebate is granted for special purpose wagons for 20 years.

### **Automobile Freight Train Operator Scheme (2014)**

The scheme was introduced to enhance the Indian Railways' traffic share in transportation of automobiles. No rebates are provided under the policy to the end user or operator. This segment is considered to be one of the most promising segments with multiple players entering into automobile transportation through rail, including TM International Logistics Ltd (venture of Tata, NYK and Martrade), APL Vascor, and new entrant Adani Logistics. It is estimated the railways will be able to carry ~2.30 automobile units by 2030.

Projected automobile traffic via railways (million)



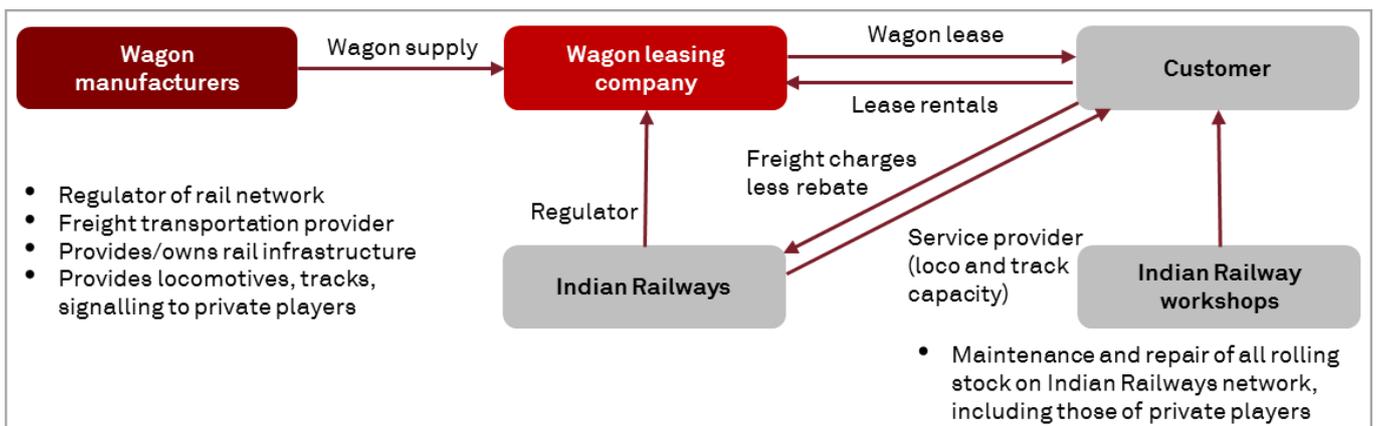
Source: Automotive Mission Plan 2026, SIAM, CRIS analysis

### Wagon Leasing Scheme (2014)

The scheme intends to promote the wagon leasing industry in India with a view to run wagons with better designs and specifications. The scheme allows companies to lease wagons to end users and operators. Rebates are applicable to end users in the case of Liberalised Wagon Investment Scheme.

Rebates are also applicable in the case of wagons purchased from container train operators, special freight train operators, automobile freight train operators, and end users as per the policy under which the wagons were procured. The schematic below provides an overview of the inter-relationships between various parties in wagon-leasing arrangements.

### Inter-relationships between various parties in wagon leasing arrangement



Source: CRIS analysis

## **General Purpose Wagon Investment Scheme (2018)**

The railways, which did not allow investments by private players in conventional wagons, has allowed it for the first time under this scheme. The scheme has a provision of 10% of freight rebate for 15 years, capped to yearly and cumulative lease payments to be made to the IRFC for similar wagon rebates and to recovery of capital cost of the rake. General purpose wagons procured under the scheme will be required to be run on pre-approved circuits. The scheme has garnered interest from various players across industries and allows investment in wagons that can carry multiple commodities.

## **Snags to private investment in rolling stock**

The private investment schemes for rolling stock have been in place for long but the investments by private players have been limited. The GPWIS, launched in 2018, is expected to gain significant traction among private players owing to the huge

requirement by the user industries. However, a few conditions have kept a large portion of private players from investing. As per the conditions of the GPWIS scheme, only circuits with an empty return ratio (ERR) at par or better than the Zonal Railway in which it is running would be approved. This condition acts as a constraint for user industries such as power plants and mine operators that usually have higher ERR.

Further, the scheme allows the wagons to run only on pre-approved circuits which cannot be changed before a given time period. This scenario makes it difficult for logistics companies to invest under the scheme as they need to be responsive to changing markets conditions.

In order to provide a fillip to private investments in rolling stock, the railways may need to take another look at the aforementioned clause under the GPWIS scheme. It may also contemplate allowing the investors to run the rakes on multiple circuits. A conducive change in the policy may unleash private sector capital in rolling stock, registering maximum participation in general purpose wagons

# Way forward



Substantial efforts have been made by the MoR in the past few years to transform the rail network in the country. The initiatives have been multifaceted, focusing on various aspects such as infrastructure augmentation, safety, technological upgradations, and tapping new sources of revenue. The ultimate aim is to provide a reliable service at a reasonable cost to both passenger and freight segments. However, the MoR may consider the following elements for success of its initiatives:

## Have less skin in the game

Railways may consider focussing on setting up core infrastructure and disengage itself from ancillary functions. Encouraging private participation in operations and maintenance may also be considered. Notably, wages, pension and energy constitute more than 50% of the operating expenses of Indian Railways. Engaging the private sector may bring in greater efficiency and also enable railways to deploy financing on projects that are essential but cannot be funded through private sector financing.

## Focus on targeted subsidy

As of now, the Indian Railways recovers only 53%<sup>43</sup> of the cost of passenger fare, incurring a loss of about Rs 330 billion every year<sup>44</sup> in subsidising passenger fares. But, there is a section of customers who may be happy to pay more for the services. Recently, the railways introduced the 'Give it up' scheme for concessional fare for senior citizens, in line with the campaign on cooking gas subsidy. In the past two years, almost 40 lakh senior citizen passengers have given up the subsidy voluntarily. This example corroborates there is a section of consumers who can afford to pay the right price provided the desired service

levels such as reliability, comfort and safety are offered.

Hence, a targeted subsidy may be an important aspect to consider. The railways may restrict subsidy to consumers having more than certain level of income as has been done for the cooking gas subsidy. However, the mechanism for determining the level of subsidy and target populace for the same would need to be deliberated upon.

## Increase non-fare box revenue pie

Currently, the non-fare revenue of the Indian Railways forms a minuscule portion of its overall revenue. It has to be increased to at least 20% over a period of time, in line with global standards. Areas that can be targeted are advertising, rail information displays, FM radio etc. Notably, Delhi Metro, with daily ridership of 3 million, fetched an advertisement revenue of ~Rs 5 billion<sup>45</sup>. This indicates the value the Indian Railways can fetch with 22 million daily ridership. As per a RITES study, only advertising has revenue potential of Rs 100 billion<sup>46</sup>. Focus on such revenue streams may be synergistic with the station redevelopment programme and can be instrumental in enhancing the railways' non-fare box revenue pie.

## Create the right pricing model

The pricing model of the Indian Railways is based on cross-subsidisation of passenger fares with freight fares. India has the lowest fare-to-freight ratio (the ratio of passenger fare and freight rates) of 0.24 compared with several other countries including Japan (1.9), Germany (1.5) and China (1.2)<sup>47</sup>. As per a recent Brookings India report, coal freight is overpriced by 31%, which increases the cost of power, on average by ~10 paise per kWh<sup>48</sup>.

<sup>43</sup> <https://economictimes.indiatimes.com/industry/transportation/railways/railways-want-subsidy-to-go-on-train-tickets/articleshow/69889892.cms?from=mdr>

<sup>44</sup> <https://www.ndtv.com/india-news/railways-to-extend-give-it-up-scheme-to-all-categories-availing-fare-subsidy-1841224>

<sup>45</sup> <https://timesofindia.indiatimes.com/city/delhi/ads-earned-dmrc-rs-492cr-last-fiscal/articleshow/61167384.cms>

<sup>46</sup> Indian Railways: Re-birth of the Colossus, by Edelweiss, page 59

<sup>47</sup> Indian Railways and Coal: An Unsustainable Interdependency, by Brookings India

<sup>48</sup> Indian Railways and Coal: An Unsustainable Interdependency, by Brookings India

This skewed pricing has implications on inflation for the entire economy as well leading to diversion of traffic to roads, resulting in revenue loss for railways. One of the major reasons behind this skewed pricing is the social obligation of the Indian Railways, which cannot be denied completely. Hence, to alleviate railways from this issue, the Rail Development Authority, which has been approved by the cabinet as an independent regulator to recommend passenger and freight fares, should be institutionalised as soon as possible.

### **Prioritise and ensure timely completion of projects**

The Indian Railways has conceived various projects and programmes in the recent years, which are expected to yield results over the long term. In such a scenario, it becomes important the conceived projects are implemented on time. It is often seen the huge project pipeline leads to delays of certain critical projects. It is imperative the issues are tackled in advance and projects are prioritised considering their criticality. Issues such as land acquisition are the primary reasons for delay of railway projects, resulting in cost overruns. Therefore, this will require adequate attention for timely implementation of mega projects such as DFCs and high-speed rail.

### **Customer is the king – Focus on customer experience**

Given the increasing competition from the aviation industry, providing superior customer experience

in all interfaces – ticketing, station touch points and on-board travel engagement (cleanliness, food and beverage, in-coach facilities, etc.) – will be of utmost importance. Passengers prefer convenience, cost-effectiveness, and timeliness. There is enough empirical evidence to suggest a large segment of passengers is willing to pay more for the right services. Considering the consumer has many choices, the railways will have to offer differentiators by reinventing customer experience.

### **Formulation of a national transport policy**

A national transport policy should be formed, aiming at regional development and avoiding over investments in certain pockets of the country. The policy should include a road map for ensuring uniform connectivity to all parts of the country.

The policy should also envisage reaping benefits from synergies emanating from the integration of various modes of transport rather than competition among them. Further, it should also include short-term, medium-term and long-term plans to involve the private sector in the building, operation and maintenance of railway infrastructure assets (covering both passenger and freight).

The Indian Railways is at an inflection point. Challenges are being tackled head-on with the right focus on network expansion and upgradation, customer safety, passenger amenities and various other aspects. Strategic execution of plans on war footing, by engaging the private sector, could fast track growth and lead to transformation of the railways.

Notes

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