



**Ministry of Railways
Government of India**



National Rail Plan – India

National Rail Plan- Objectives

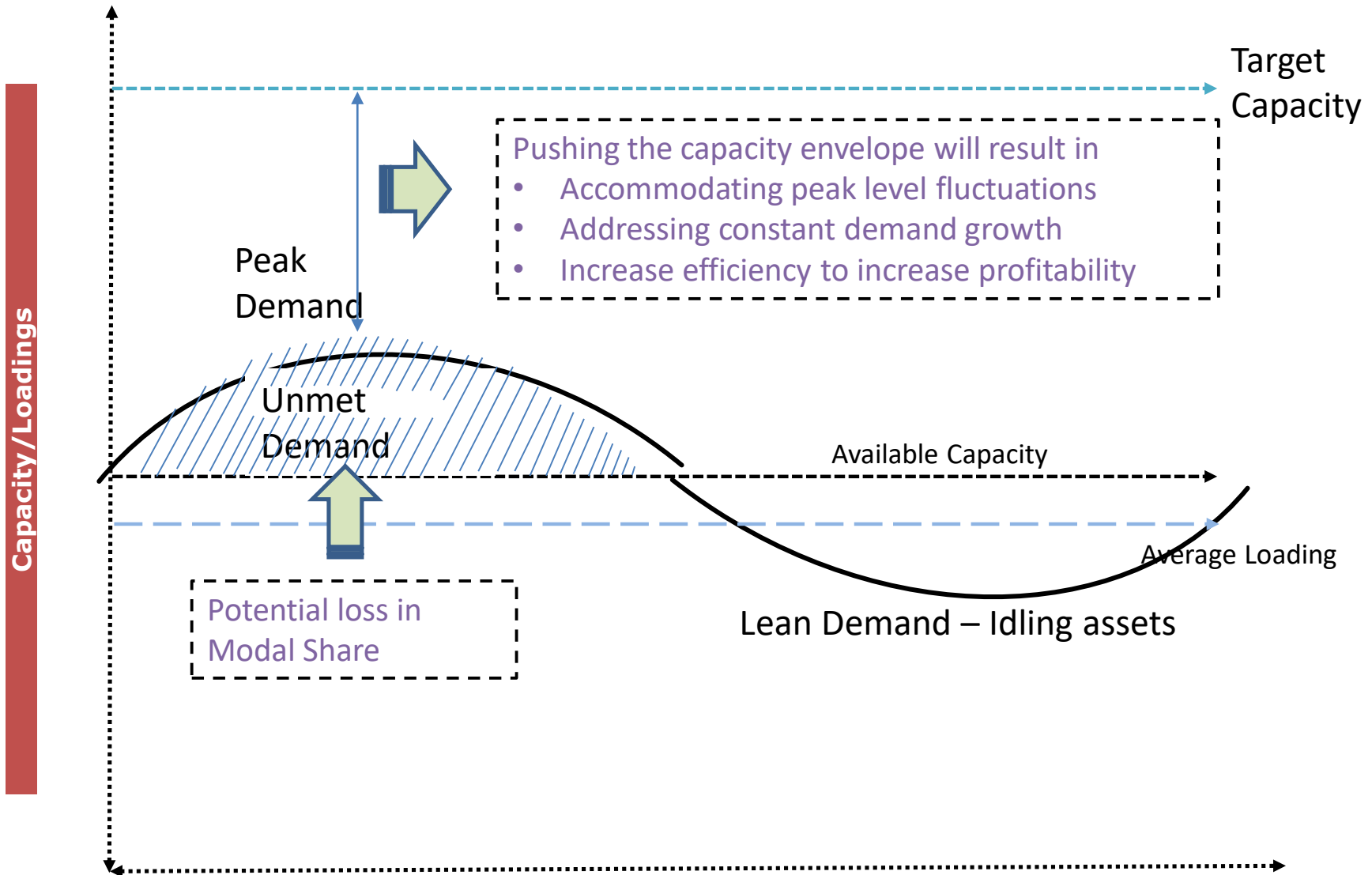
NRP Vision

To develop capacity, infrastructure and enhance rail freight share ahead of the demand. Develop capacity by 2030 that will cater to growing demand up to 2050

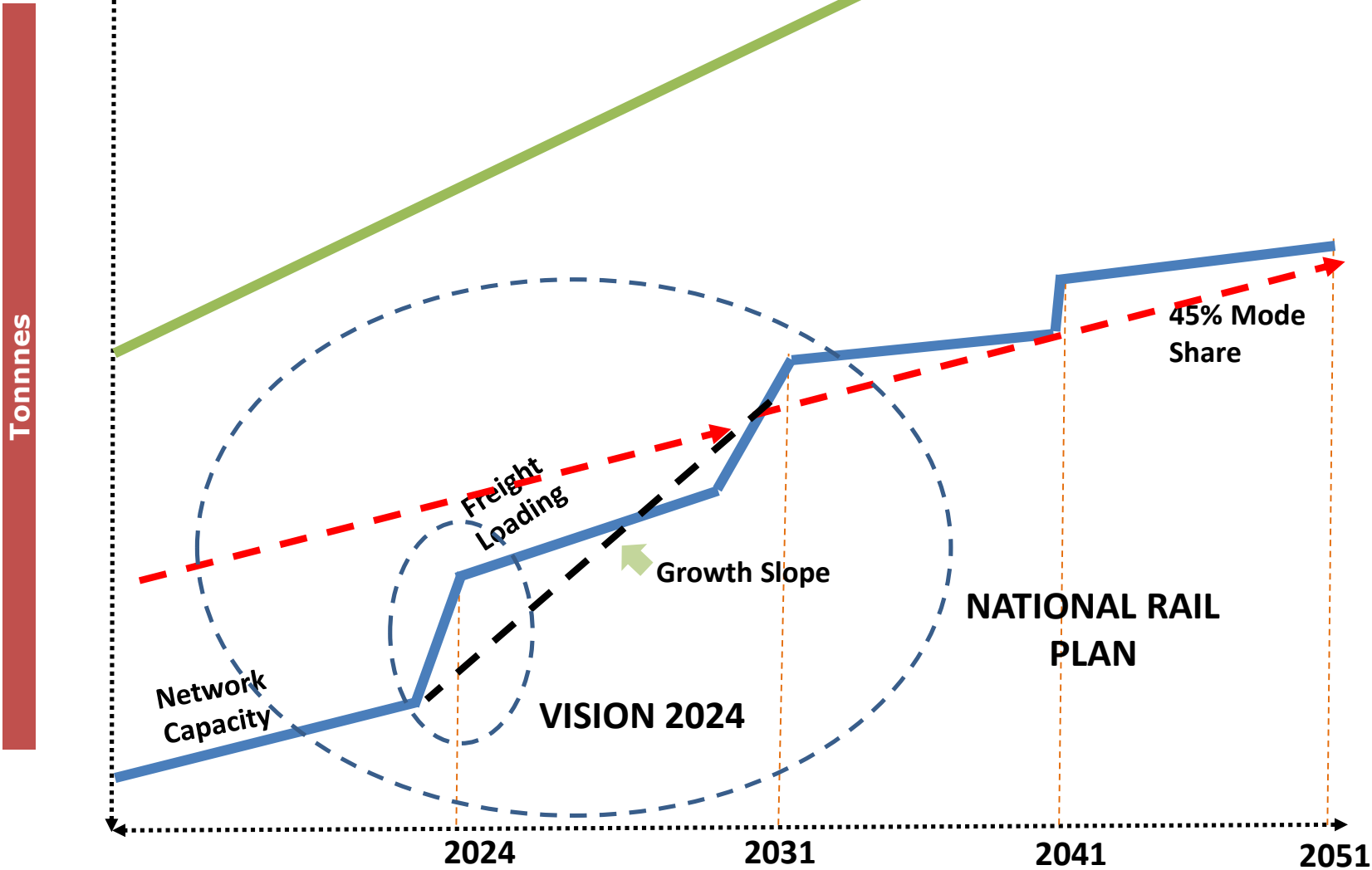
Study Objective

- ❖ To provide an **overall long term rail development** plan
- ❖ **Passenger and Freight Demand Forecast yearly till 2030** and for 10 year period for 2041 & 2051
- ❖ Assessment of **Present and Future Modal Share** of Railways;
- ❖ To study **the rail infrastructure deficiencies**
- ❖ Future **Infrastructure requirements-Fixed and Rolling Stock**, considering the demand forecast and its implication on congested network;
- ❖ Identifications of **Options, Evaluation and Prioritization** of projects;
- ❖ Assessment of **Funding Requirements and Financing** Strategies

Capacity ahead of Demand – Target Peak not averages.



Target 45% Modal Share— VISION 2024 as a subset of NATIONAL RAIL PLAN



Data Collection - Need

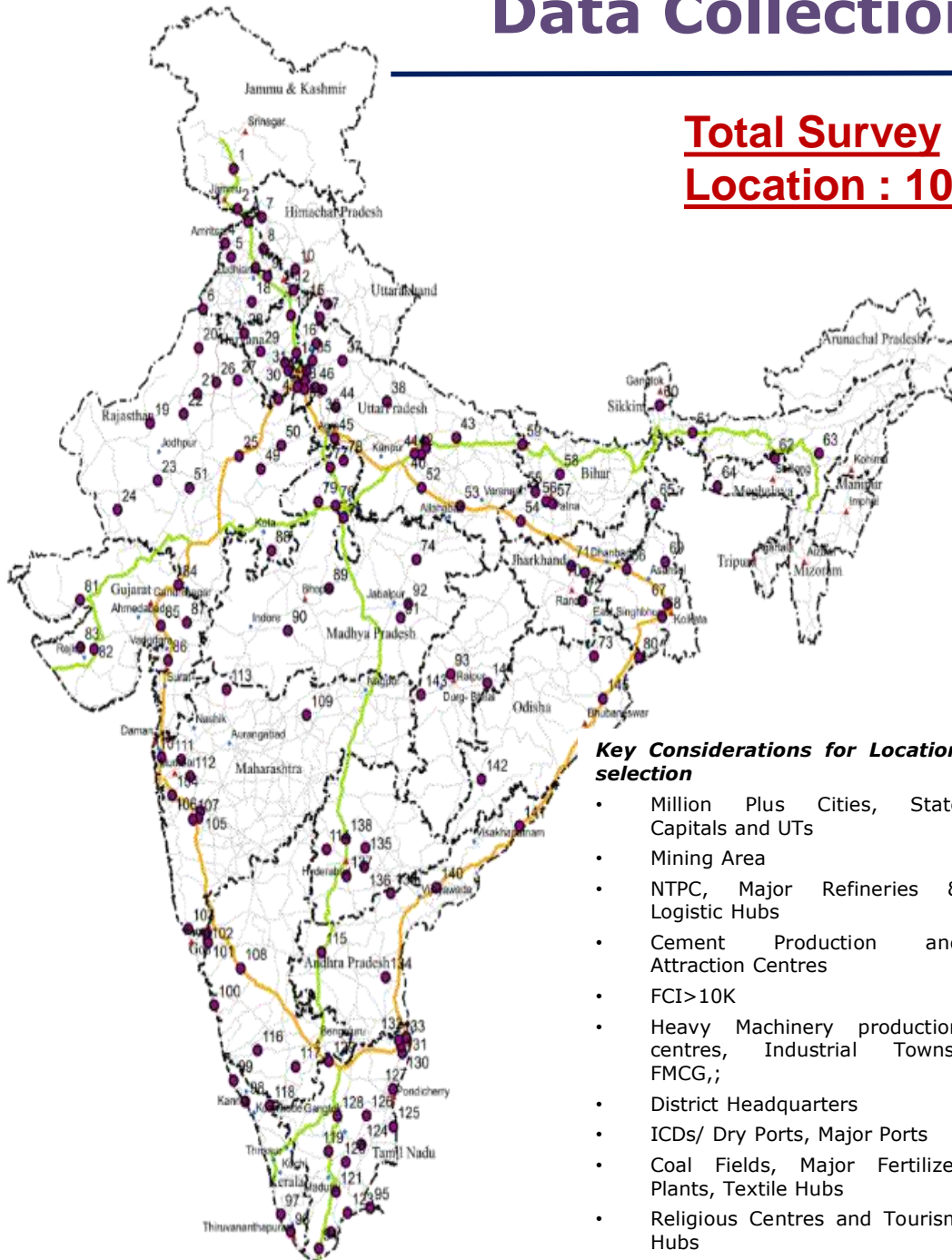
Comprehensive Studies undertaken in the Past

S No	Study Name	Study Done By	Year
1	Total Transport System Study	RITES	2008
2	India Transport Report	National Transport Development Policy Committee	2014
3	National Perspective Plan (Sagarmala)	Mc Kinsey	2016
4	PET Studies for Dedicated Freight Corridor		
5	High Speed Rail Studies for Various Corridors		2010-14
6	Transforming the Nations Logistics	Mc Kinsey	2010
7	LEEP Study	AT Kearney & MoRTH	
8	DFCCIL Marketing Studies	PWC	
10	Indian Container Market Report 2016	Drewry and Gateway Research	2016
12	Summary of Feasibility Study for DFC on Delhi-Mumbai and Delhi-Howrah	JICA	2007
13	Indian Logistics Report	Deloitte	2014
14	Transforming Indian logistics industry	KPMG	2013
16	Report of the Committee for Mobilization of Resources for Major Railway Projects and Restructuring of the Railway Ministry and Railway Board- Debroy Committee Report	Ministry of Railways	2015
17	Report of Expert Group for modernization of railways- Sam Pitroda Committee Report	Ministry of Railways	2012

- Of the Above, Primary Surveys were conducted only in few Studies.
- Last Comprehensive Pan India Primary Data Collection covering Road and Other Sectors was conducted in 2007-08 as part of Total Transport System Study
- For Forecasting the Total Transport Demand & Planning of Rail Infrastructure by creating a robust data base of passenger and freight traffic is required.

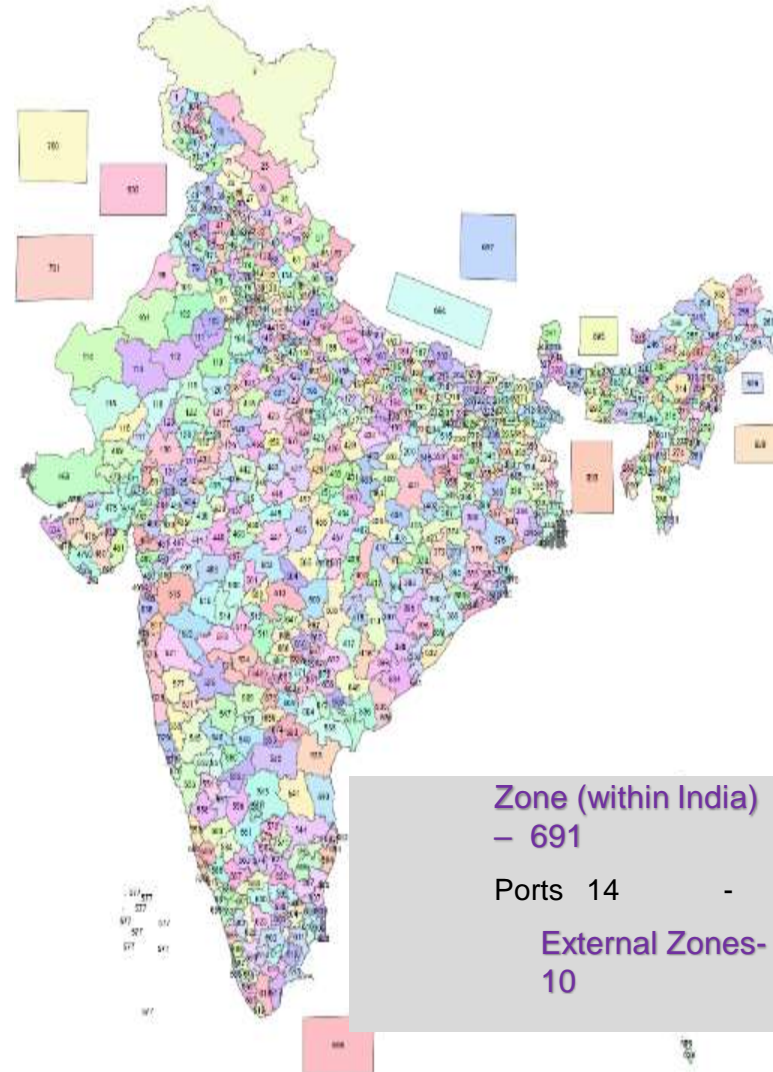
Data Collection (Primary Surveys)

Total Survey Location : 104



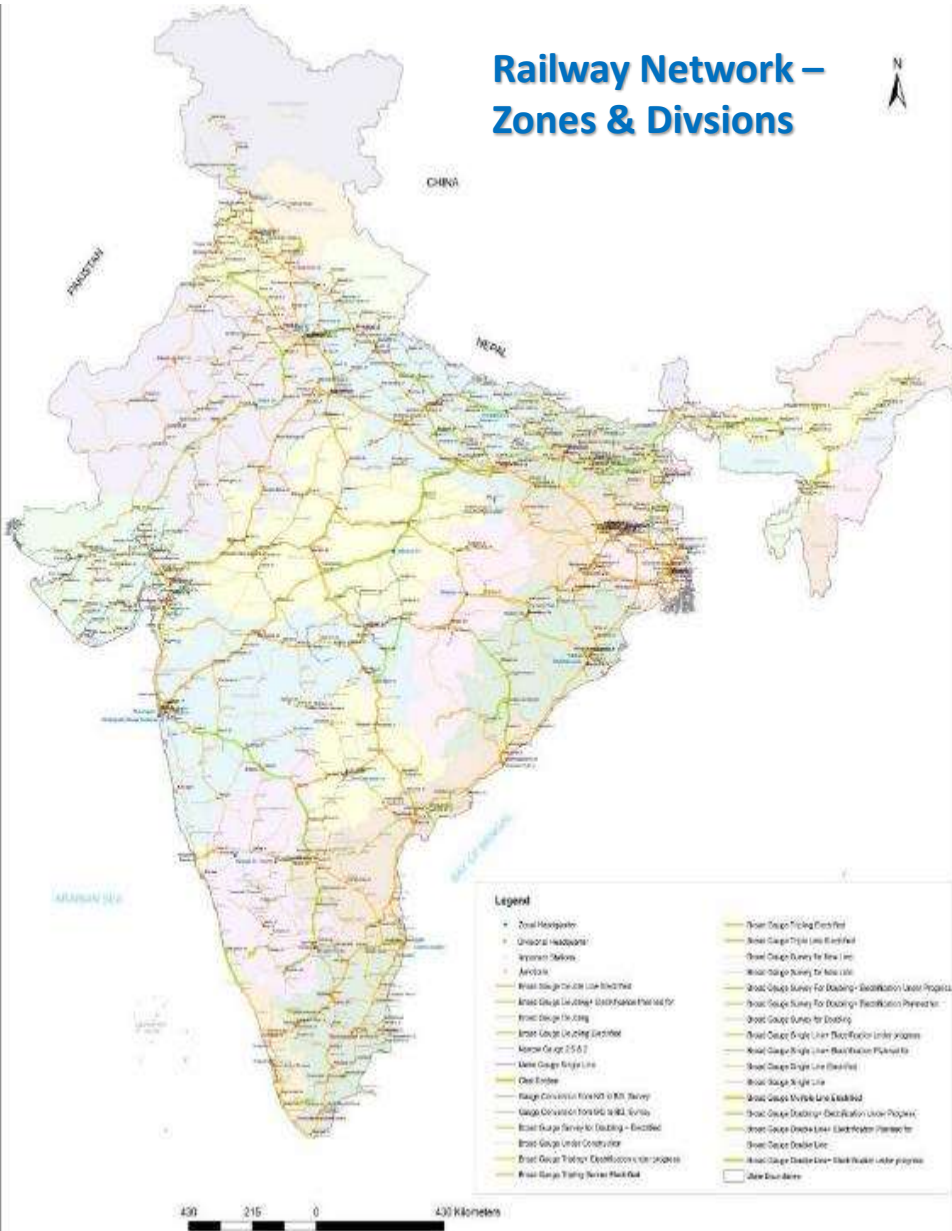
Key Considerations for Location selection

- Million Plus Cities, State Capitals and UTs
- Mining Area
- NTPC, Major Refineries & Logistic Hubs
- Cement Production and Attraction Centres
- FCI>10K
- Heavy Machinery production centres, Industrial Towns, FMCG,;
- District Headquarters
- ICDs/ Dry Ports, Major Ports
- Coal Fields, Major Fertilizer Plants, Textile Hubs
- Religious Centres and Tourism Hubs

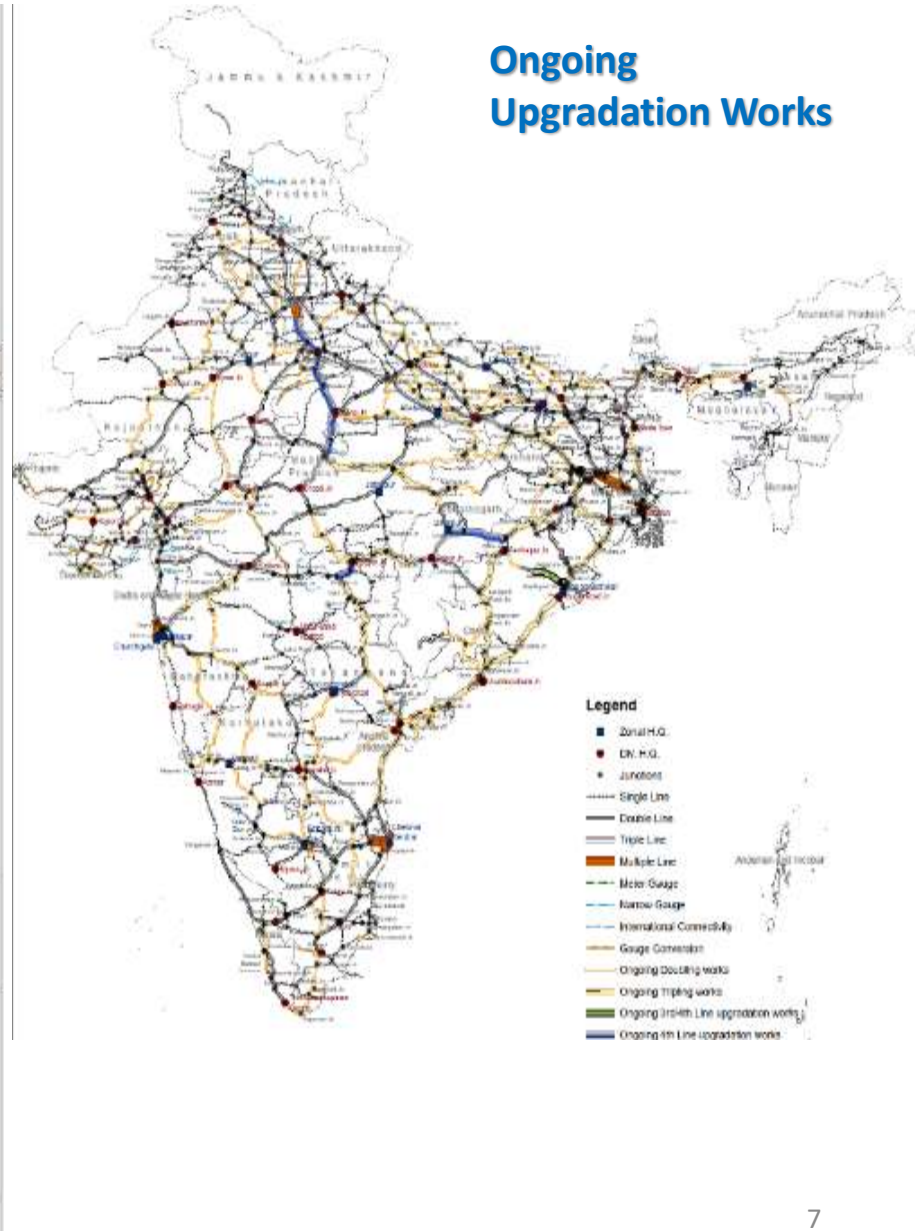


Existing Rail Network on GIS Platform

Railway Network – Zones & Divisions

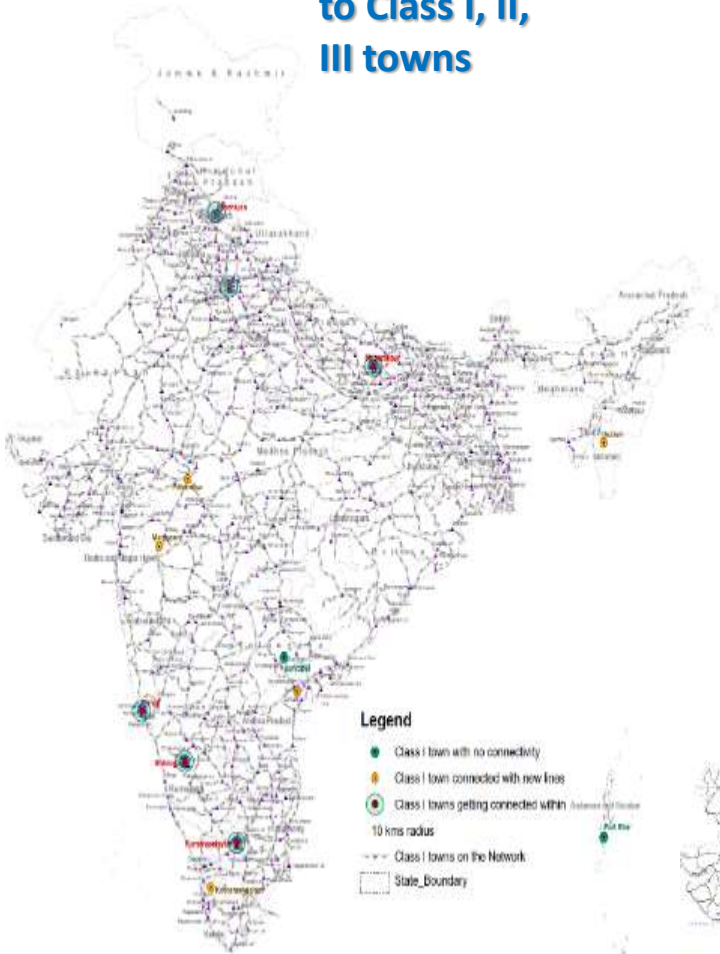


Ongoing Upgradation Works



Existing Rail Network on GIS Platform

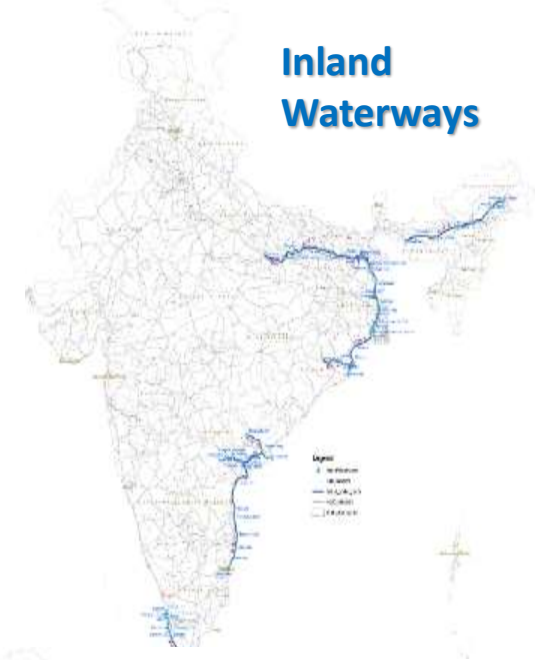
Connectivity to Class I, II, III towns



Tourist Areas



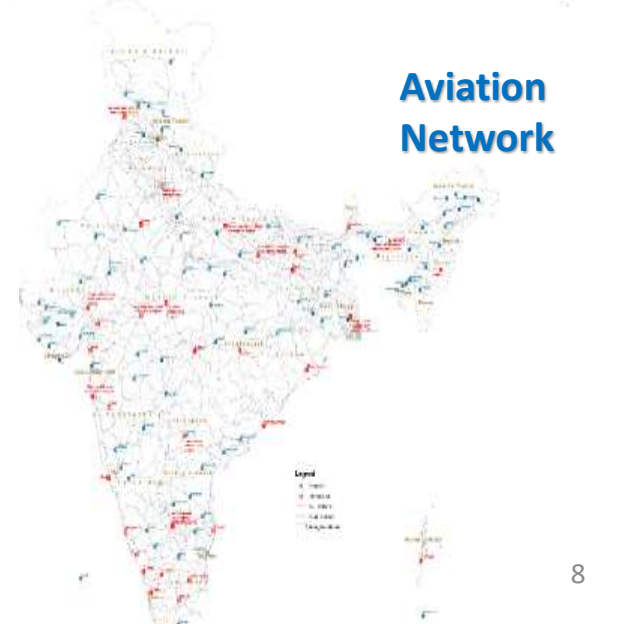
Inland Waterways



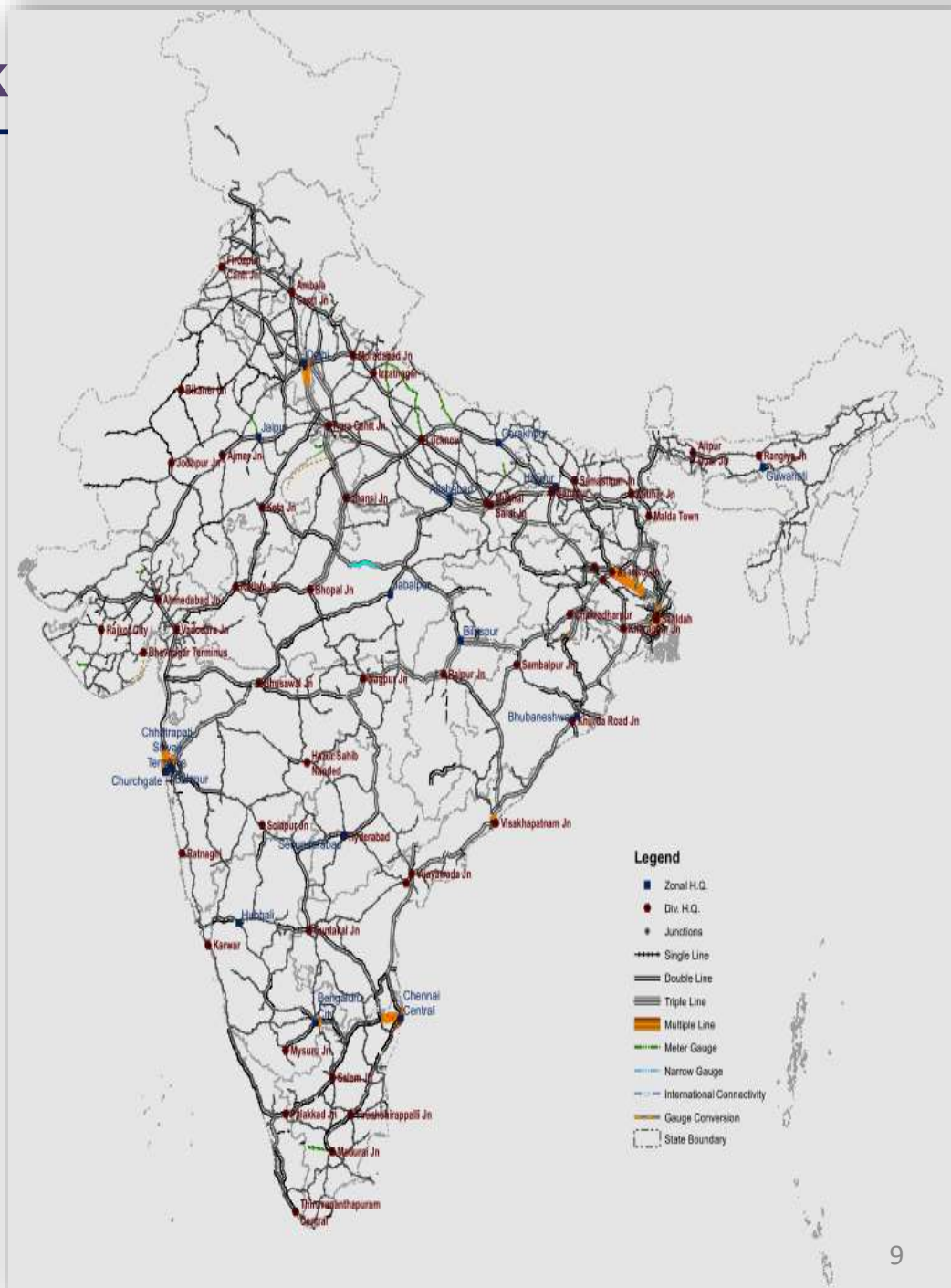
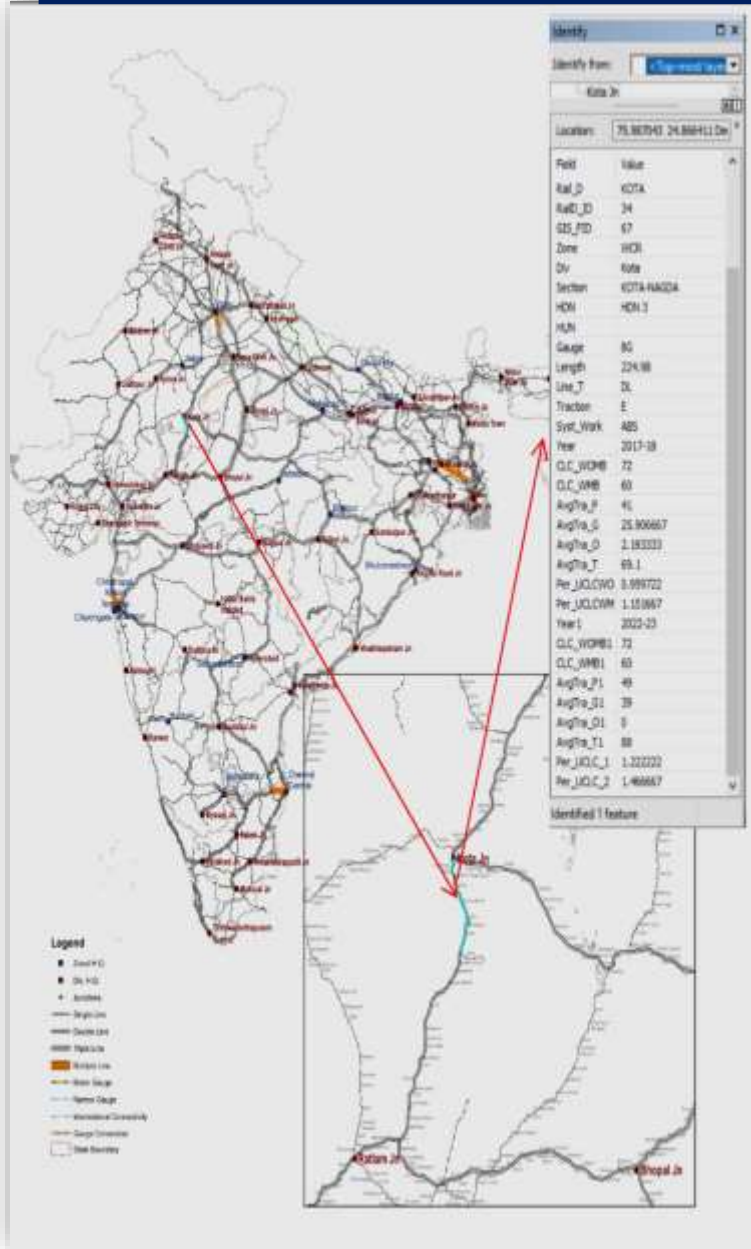
Road Network



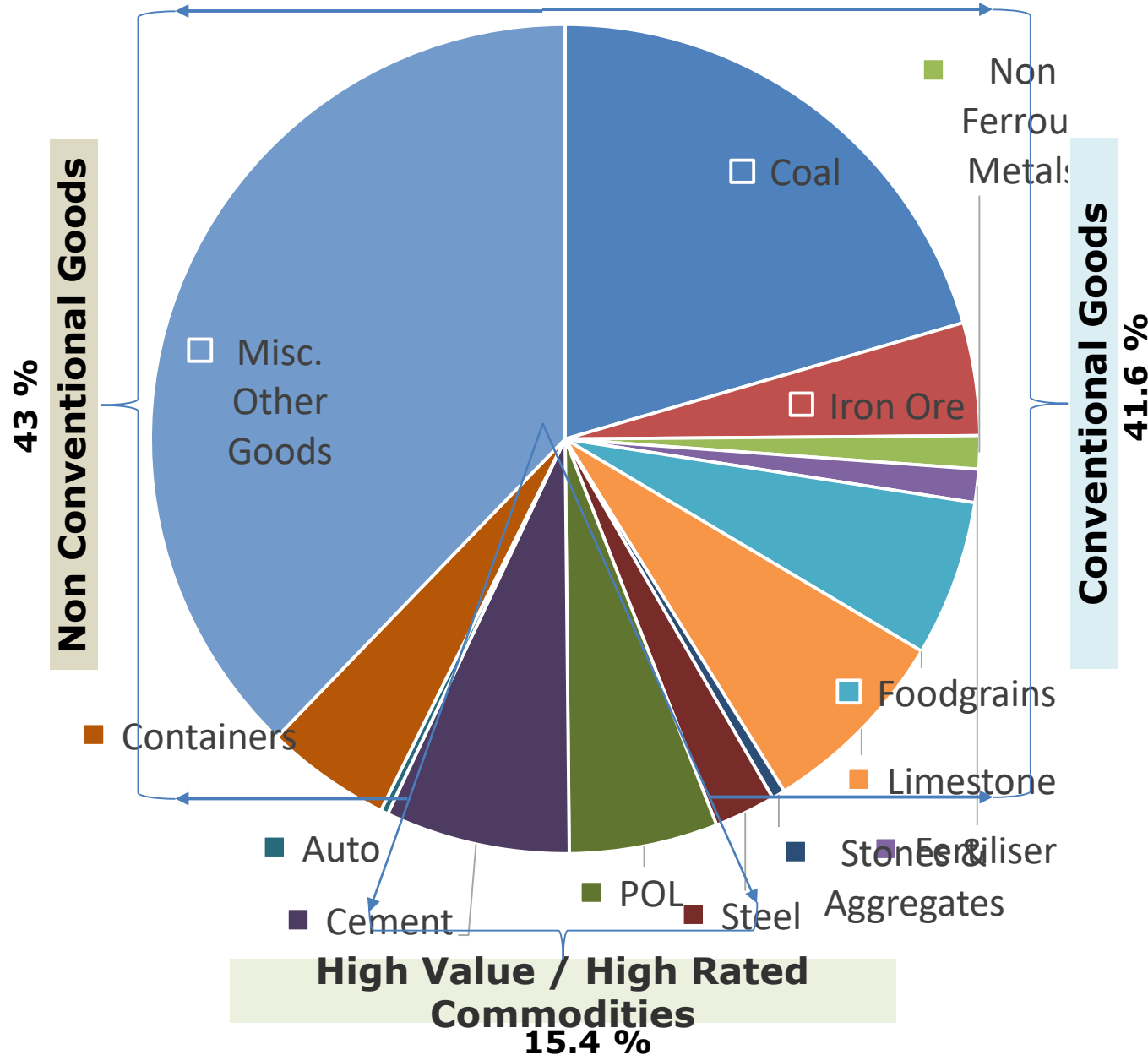
Aviation Network



Existing Rail Network

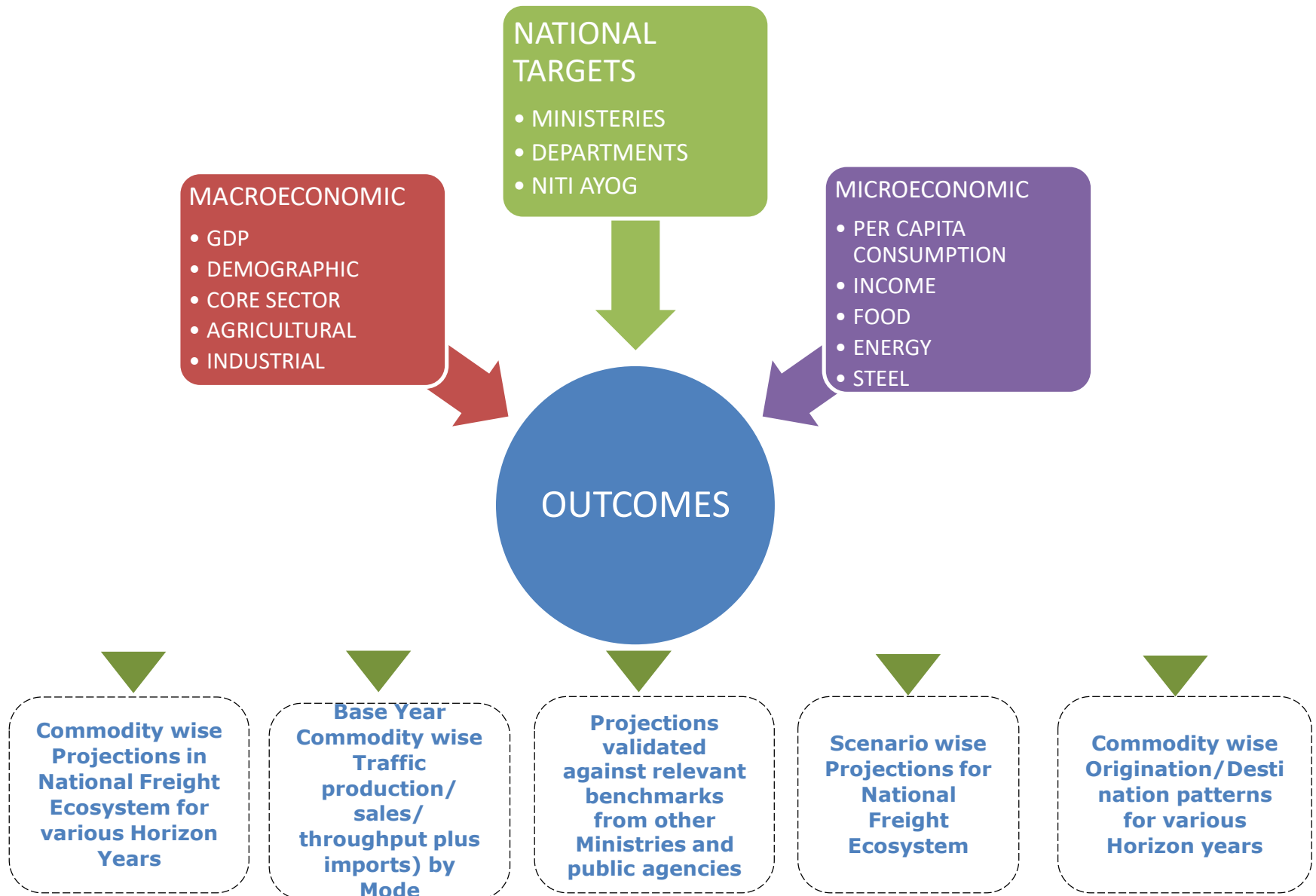


Total Freight Ecosystem – Road + Rail



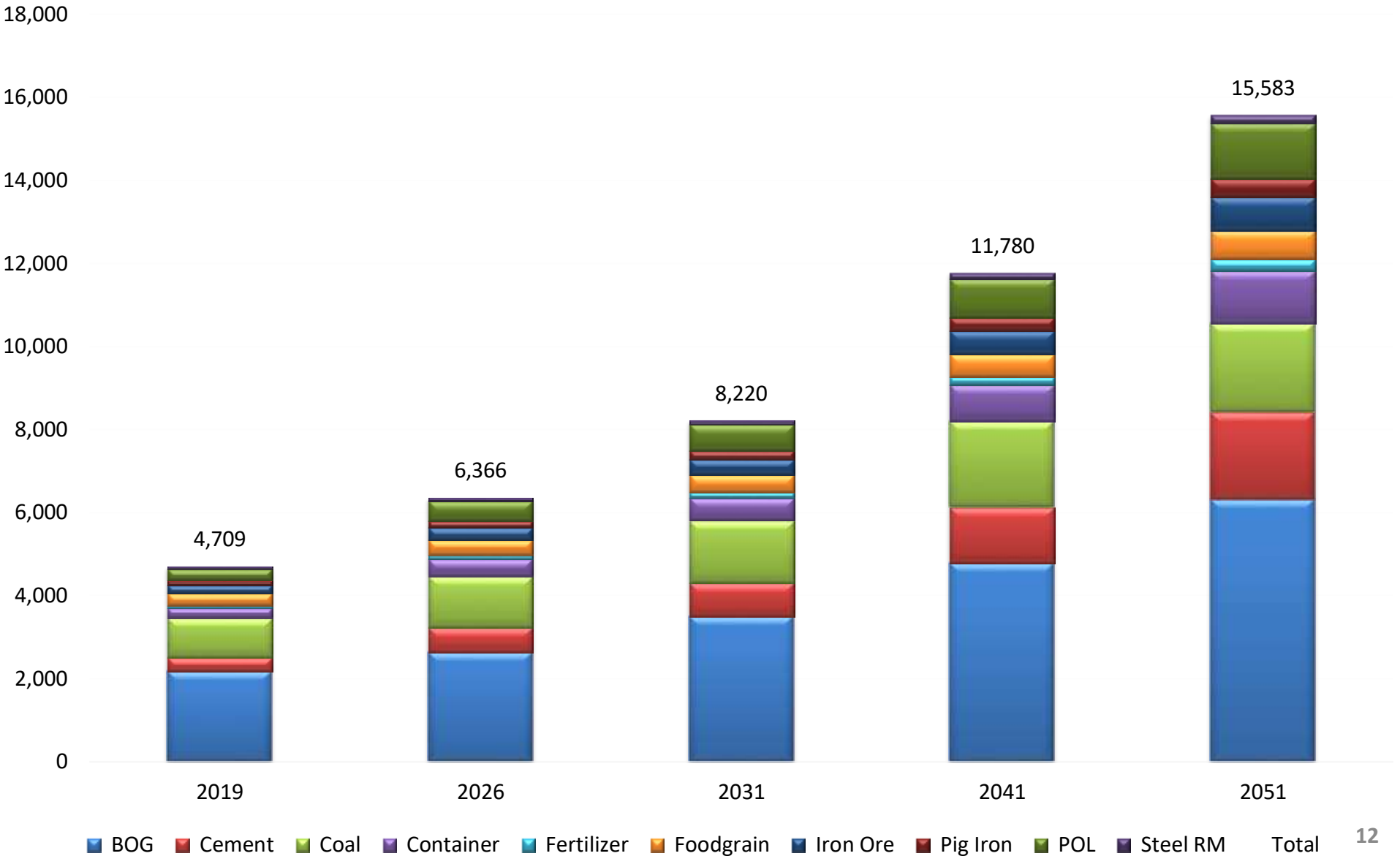
Commodity	Volume (MT)	Percent
Coal	965	20.5%
Iron Ore	207	4.4%
Non Ferrous Metals	61	1.3%
Fertiliser	61	1.3%
Foodgrains	287	6.1%
Limestone	358	7.6%
Stones & Aggregates	24	0.5%
Conventional Goods	1963	41.6%
Steel	113	2.4%
POL	273	5.8%
Cement	339	7.2%
High Value/High Rated	725	15.4%
Auto	14	0.3%
Containers	231	4.9%
Misc. Other Goods	1780	37.8%
Non Conventional	2025	43.0%
Total	4709	100%

Projections For National Freight Ecosystem



Freight Demand Forecast

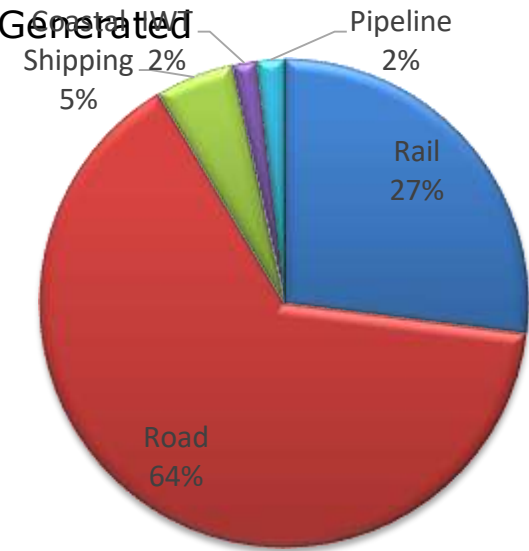
Consolidated Volume Projections (Million Tons)



Existing Rail Freight Share

In 2018-19, Railways carried 1221.5 (27%) of Total Freight Generated

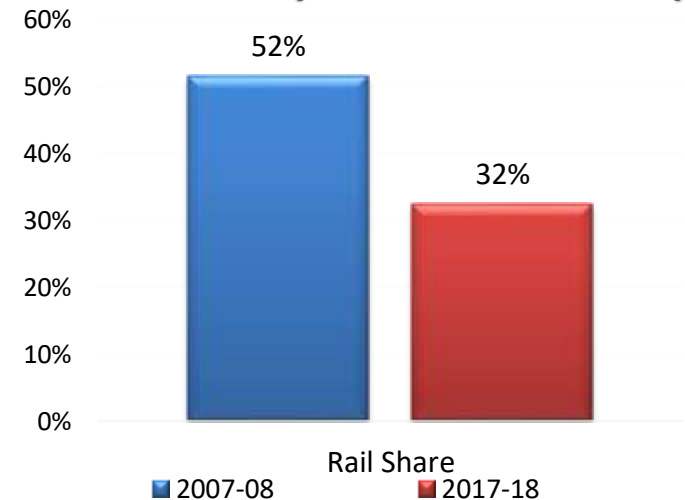
Modes	Tonnes (Millions)	Share (%)
Rail	1221.5	27%
Road	2911.7	64%
Coastal Shipping	234	5%
IWT	72	2%
Pipeline	84	2%
TOTAL	4523.2	100%



Rail Share in Traffic having Leads beyond 300 Km reduced from 51.5% to 32.4%

Total Traffic	2018-19	2007-08 [#]
a) Traffic carried by Road Transport	2911.7	1558.8
b) Traffic Carried by Rail	1221.5	768.7
Traffic Rail & Road (a+b)	4133.2	2327.5
d) Traffic on Road with lead up to 300 km	1393.1	837.8
e) Traffic on Rail with lead up to 300 km	493.9	2.9
Total Traffic with leads up to 300 km (d+e)	1887.0	840.7
Total Potential Traffic moving beyond 300 km		
Rail	727.6	765.8
Road	1518.6	720.9
Total	2246.2	1486.8
Rail Share in Potential Traffic*	32.4%	51.5%

Change in Rail Share over a Decade (for lead over 300 km)



Mode Choice Model for Freight: Binary Logit

Binary Logit Model is used to model mode choice

Parameter;

- Difference in Transit Time
- Difference in Transit Cost

Utility Equation is derived in the form of,

$$U_a = \alpha + \beta \times \delta TT + \gamma \times \delta TC$$

Where,

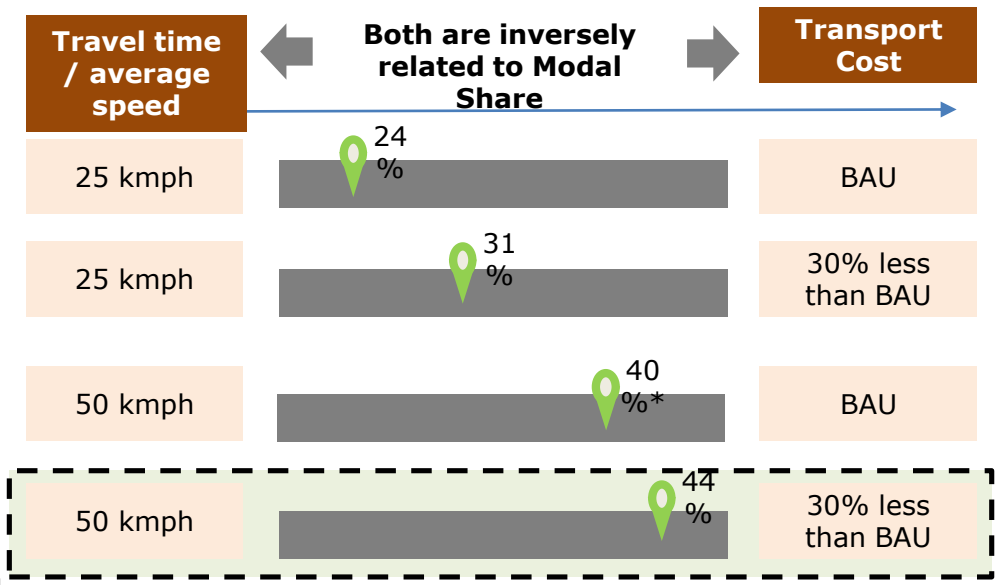
- U_a = Utility Equation
- α = Constant
- β = Coefficient of Difference of Travel Time
- γ = Coefficient of Difference of Travel Cost
- δTT = Difference of Travel Time
- δTC = Difference of Travel Cost

Probability equation for Binary Logit :

$$P(Rail) = e^{\lambda U_a} / (1 + e^{\lambda U_a})$$

where,

- λ = Calibration factor



Optimum Modal Mix – Scenario Building

Scenario Building

Logit Model is based on 2 major parameters which are Time and Cost.

1. Business as Usual (BAU):

Considering implementation of Project **Bharat Mala and excluding speed enhancement, EDFC and WDFC**

2. Enhancement of Speed to 50 Kmph:

a. Implementation of Railway projects corresponds to increase average speed to 50 Kmph.

3. Enhancement of Speed to 50 Kmph with 30% Reduced Cost:

a. Implementation of Railway projects corresponds to average speed to **50 Kmph** & reducing cost except on **4 items** by **30%** by 2026

4. Business as Usual (BAU) with Cost Reduction by 30%:

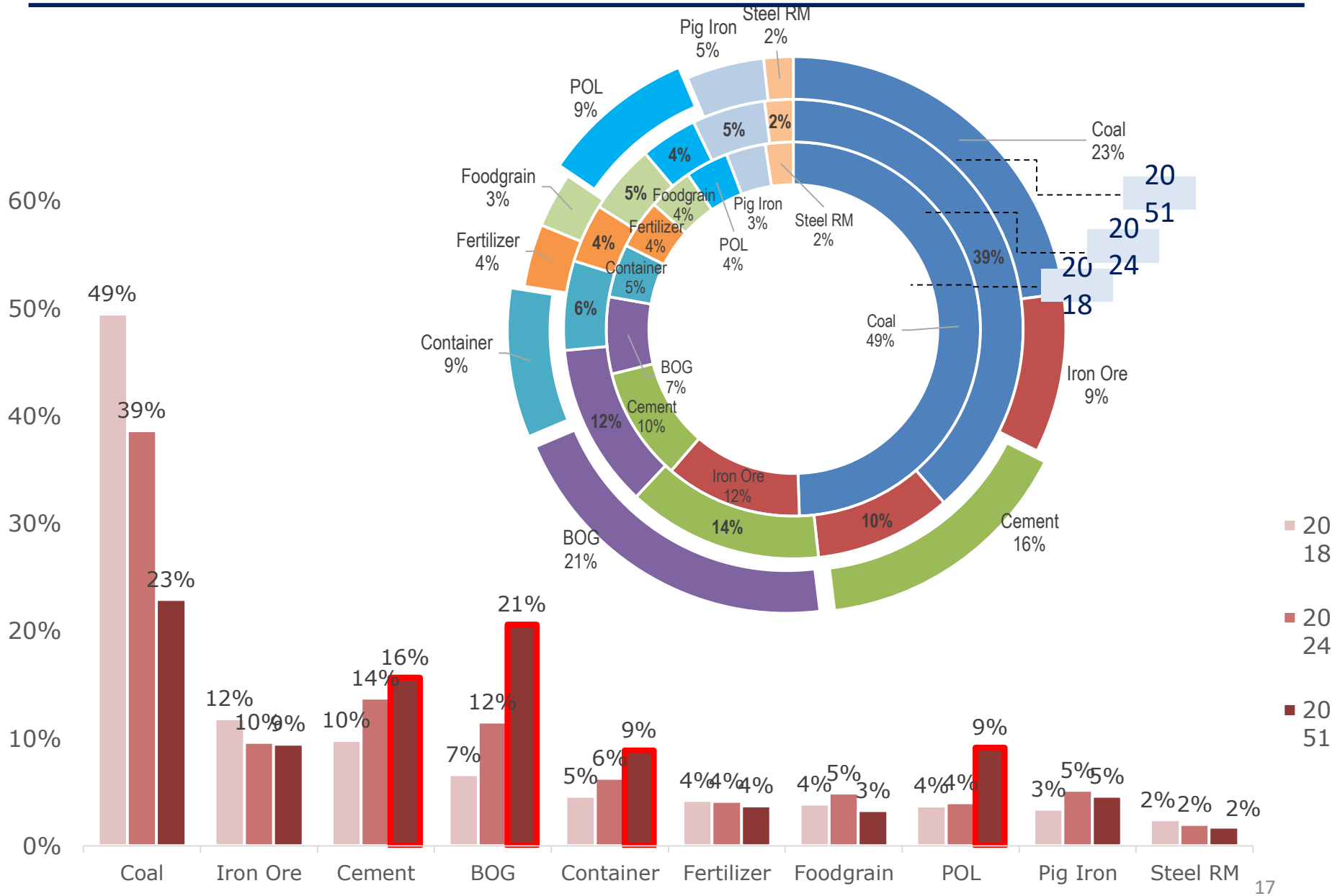
Rail Infrastructure remains same whereas, the cost is reduced by **30%**.

Optimum Modal Mix - Estimation of Rail

Commodities	Existing Scenario	Scenario 1: Business as Usual (BAU)	Scenario 2: Enhancement Average Speed to 50 KMPH	Scenario 3: Enhancement Average Speed to 50 KMPH with 30% Reduced Cost on selected Commodities	Scenario 4: Business as Usual (BAU) with Cost Reduction by 30%
BOG	4%	1%	18%	22%	7%
Cement	37%	38%	42%	51%	48%
Coal*	65%	61%	74%	74%	67%
Container	24%	16%	44%	48%	29%
Fertilizer*	87%	85%	90%	90%	88%
Food grains	16%	17%	21%	32%	29%
Iron Ore*	65%	60%	82%	82%	70%
Pig Iron	49%	49%	57%	70%	65%
POL	18%	9%	44%	48%	14%
Steel RM*	56%	55%	60%	60%	58%
Total	28%	24%	40%	45%	31%

* No cost reduction of fare provided for **Coal, Fertilizer, Iron Ore and Raw Material for Steel** as the share of these commodities increase less than 5% for reduced cost

Commodity-wise Rail Shares



Passenger Demand Forecast

Population and Workforce Forecast

States	2021	2031	2041	2051
Population (Millions)	1380.54	1494.18	1561.38	1632.97
Workforce (Millions)	540.92	619.46	702.46	780.44

Estimated Passenger Growth Rates

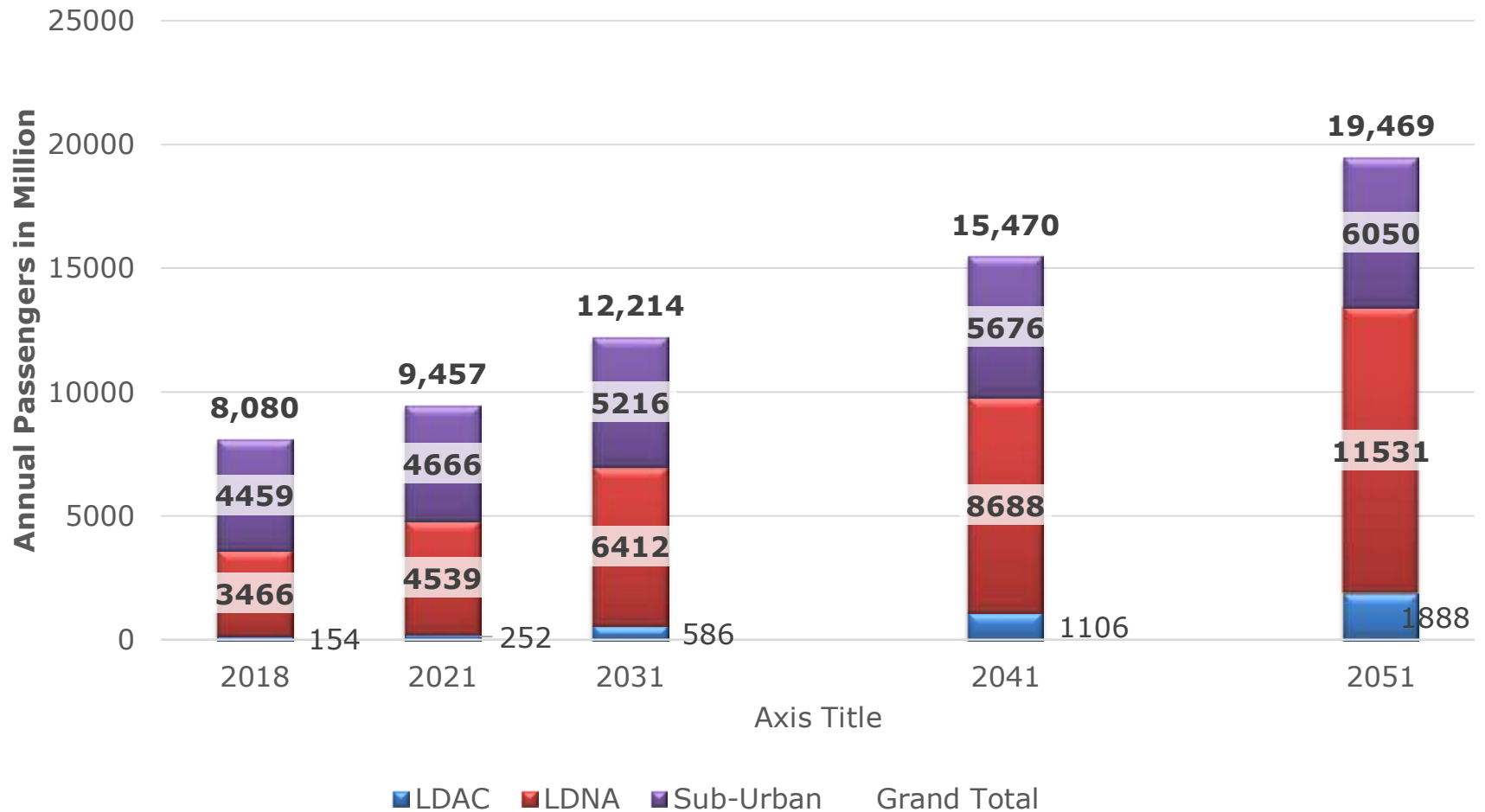
Years	Projected Population CAGR (%)	Projected CAGR (%) LDAC	Projected CAGR (%) LDNA	Projected CAGR (%) Suburban	Grand Total
2021-26	0.79%	8.50%	3.44%	1.17%	2.50%
2026-31	0.80%	9.02%	3.48%	1.07%	2.62%
2031-41	0.44%	6.47%	3.00%	0.85%	2.34%
2041-51	0.45%	5.43%	2.81%	0.64%	2.28%

Rail Passenger Forecast

Categories	2018	2021	2031	2041	2051
LDAC	154.03	252.23	586.42	1106.3	1887.78
LDNA	3,466.40	4538.54	6411.58	8687.69	11530.71
Total	3,620.43	4,790.77	6,998.00	9,793.99	13,418.49
Sub-Urban	4,459.38	4,665.84	5,215.54	5,676.21	6,050.13
Grand Total	8,079.81	9,456.61	12,213.54	15,470.20	19,468.62

Passenger Demand Forecast

Consolidated Passenger Projections (Million per year)

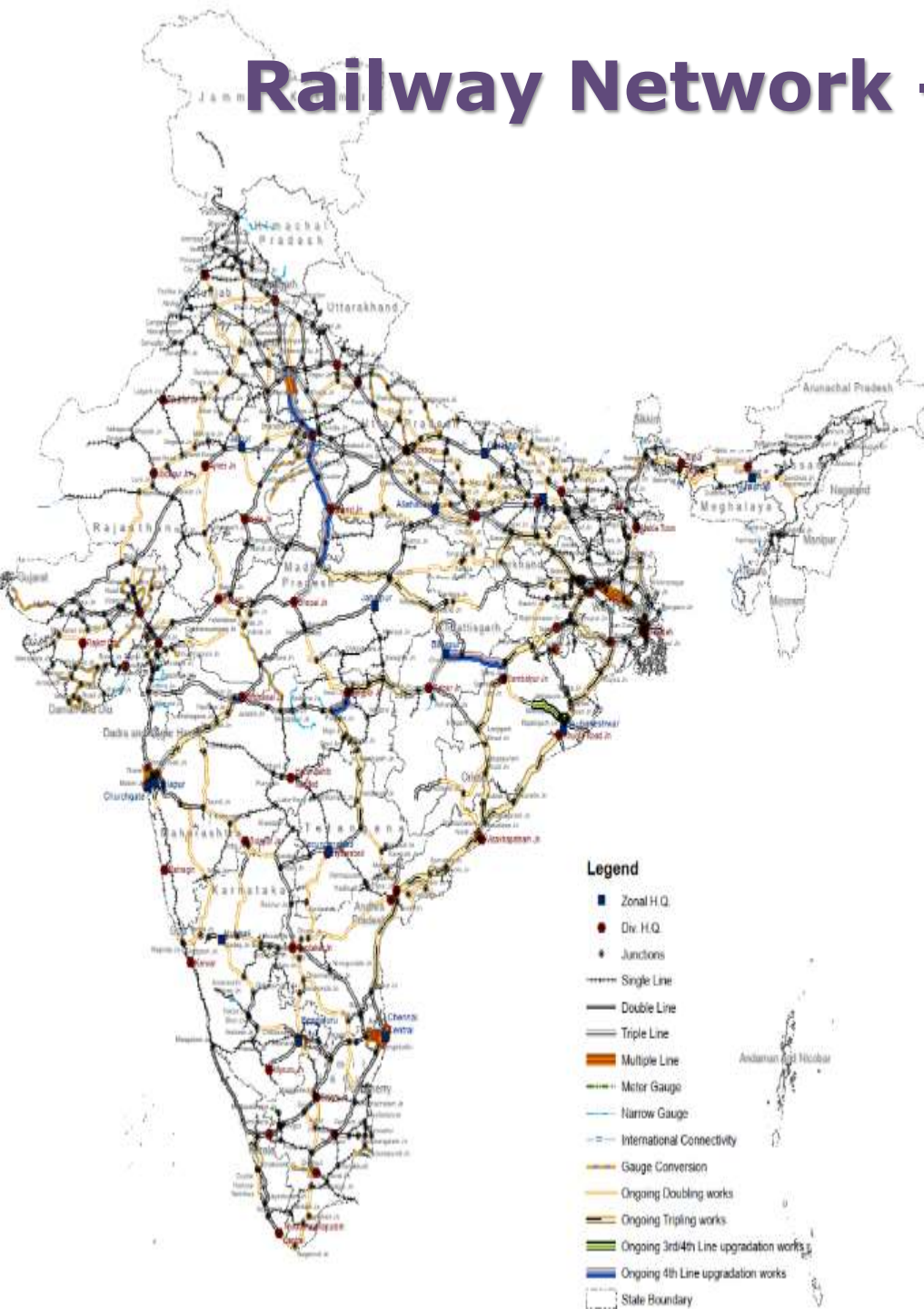


Railway Network – Sanctioned Works

Sanctioned works

Sanctioned/ Ongoing Works	Section Length (Km)
3rd & 4th Line	156
4th Line	1,087
Doubling	1,194
Tripling	4,152
Total	17,340

Length (Km)	508 Km
Included HSR Corridor	Mumbai Ahmedabad, 508 Km (As per NIP)
Length (Km)	3,322 Km
Included DFC Corridor	Eastern DFC, 1,839 Km (Under Construction)
	Western DFC 1,483 Km (Under Construction)



Assignment Model Framework in CUBE

Base Year Rail Assignment on CUBE Voyager

SCENARIO BUILDING

TRAFFIC PROJECTION

NETWORK BUILDING AND CALIBRATION

TRAFFIC GENERATION

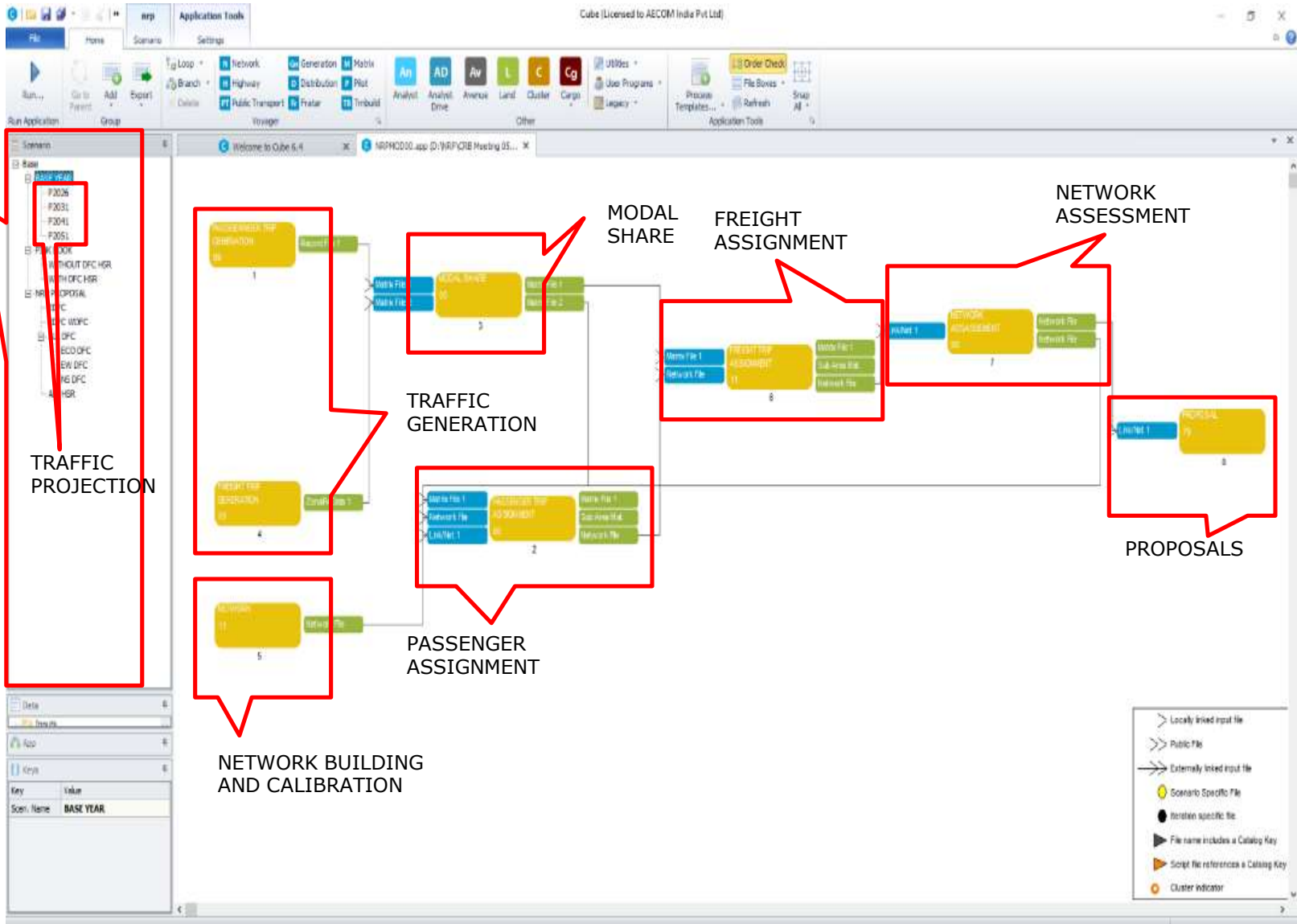
PASSENGER ASSIGNMENT

MODAL SHARE

FREIGHT ASSIGNMENT

NETWORK ASSESSMENT

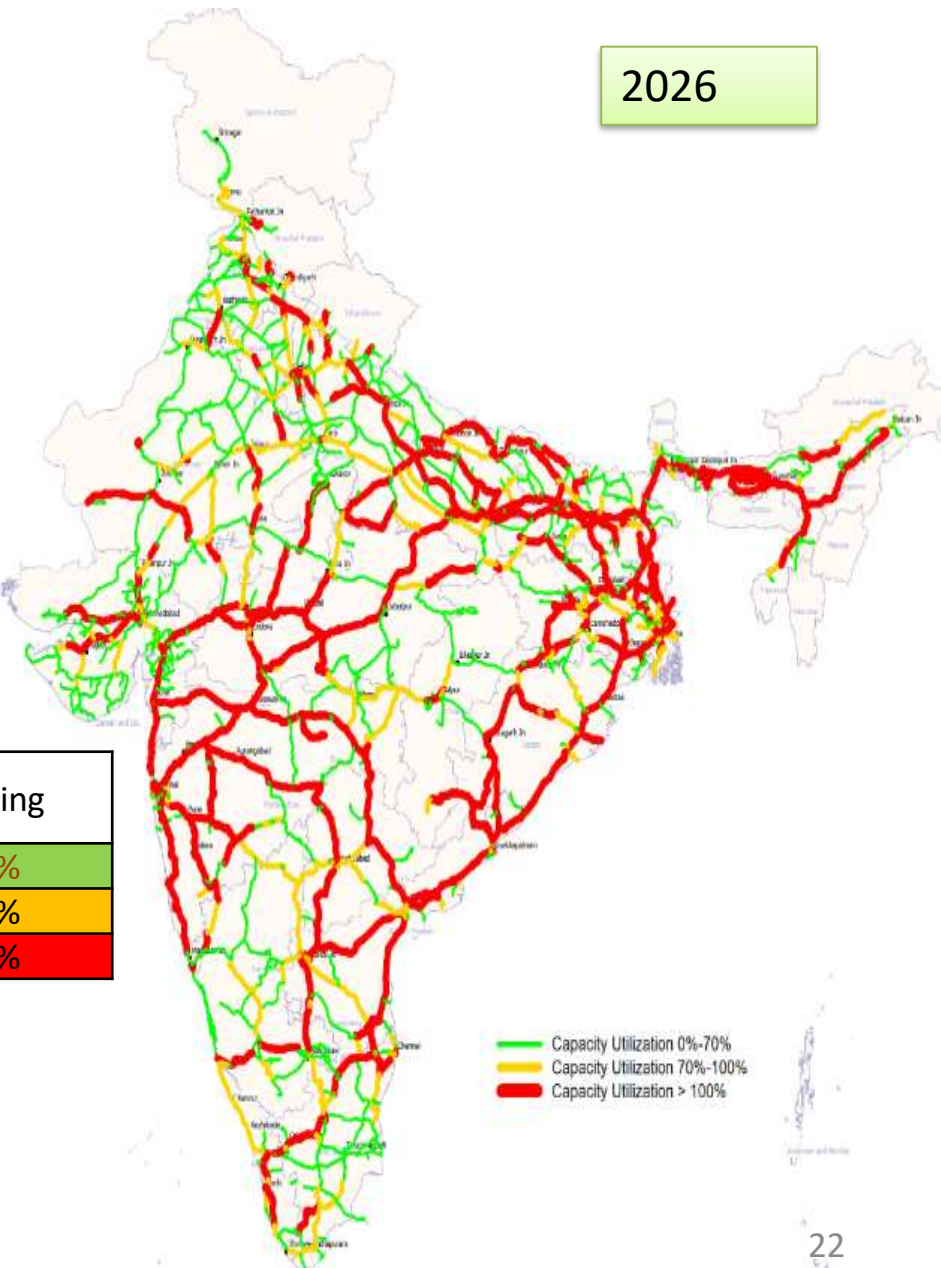
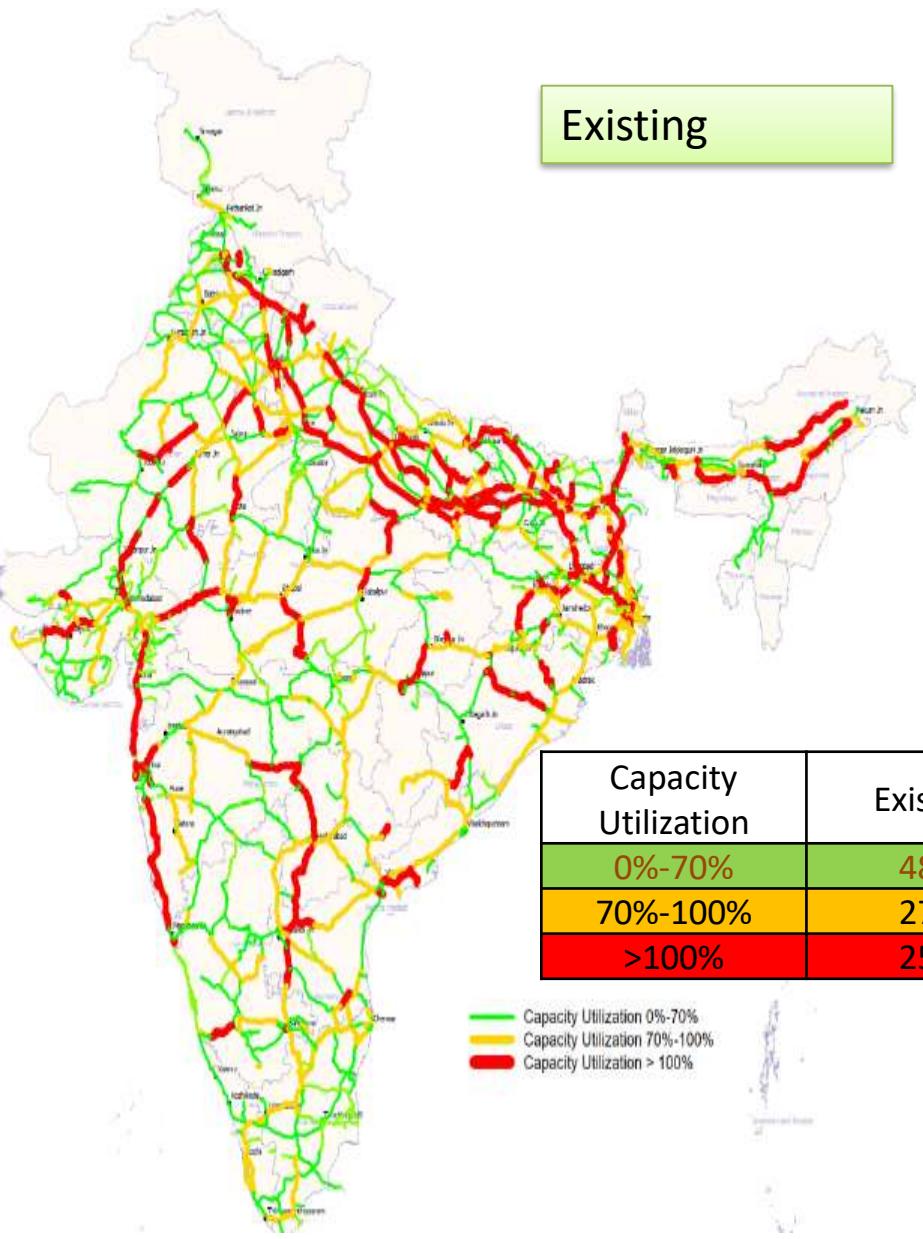
PROPOSALS



Existing Capacity Utilization

Existing

2026



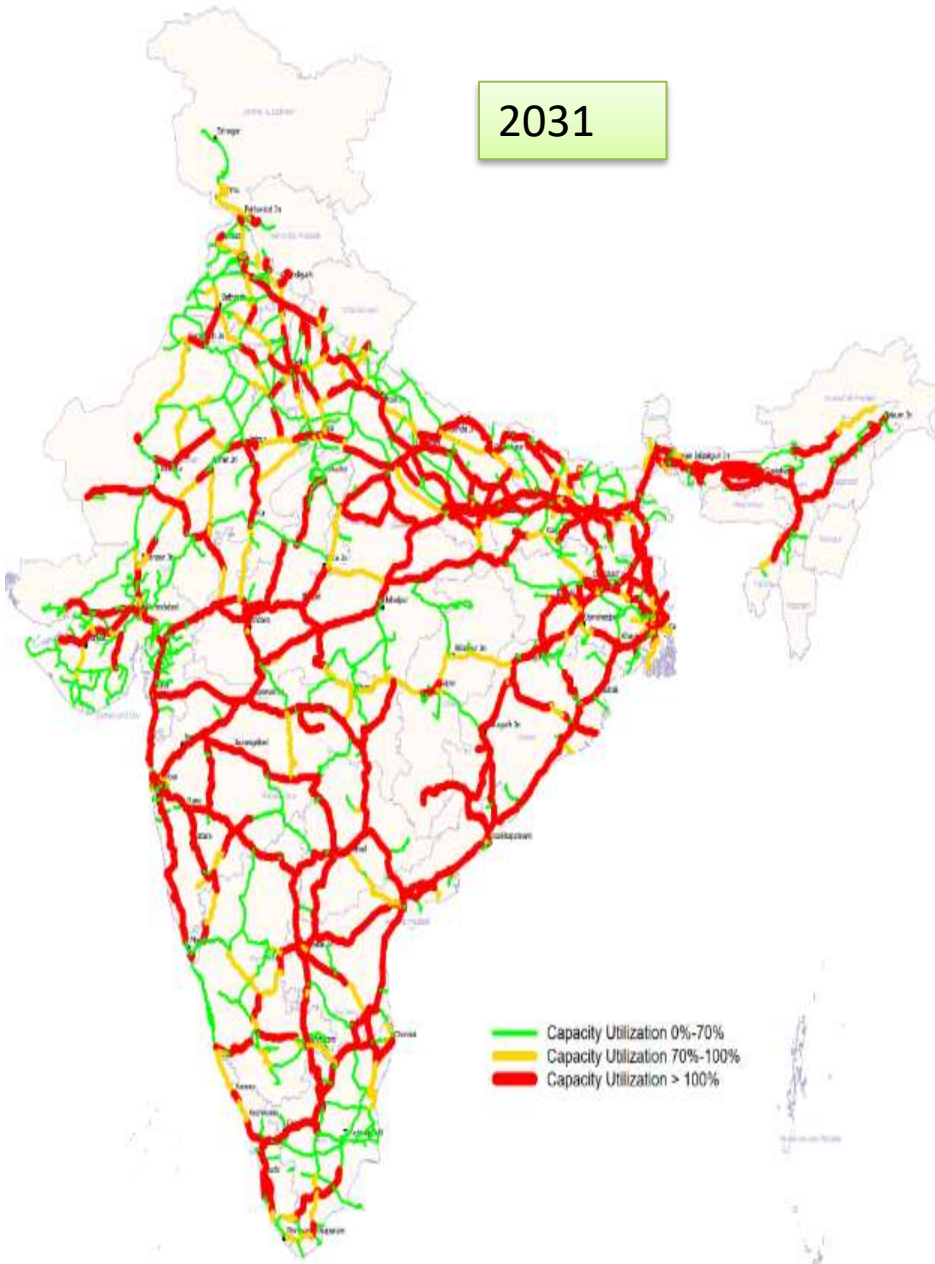
Capacity Utilization	Existing
0%-70%	48%
70%-100%	27%
>100%	25%

— Capacity Utilization 0%-70%
— Capacity Utilization 70%-100%
— Capacity Utilization > 100%

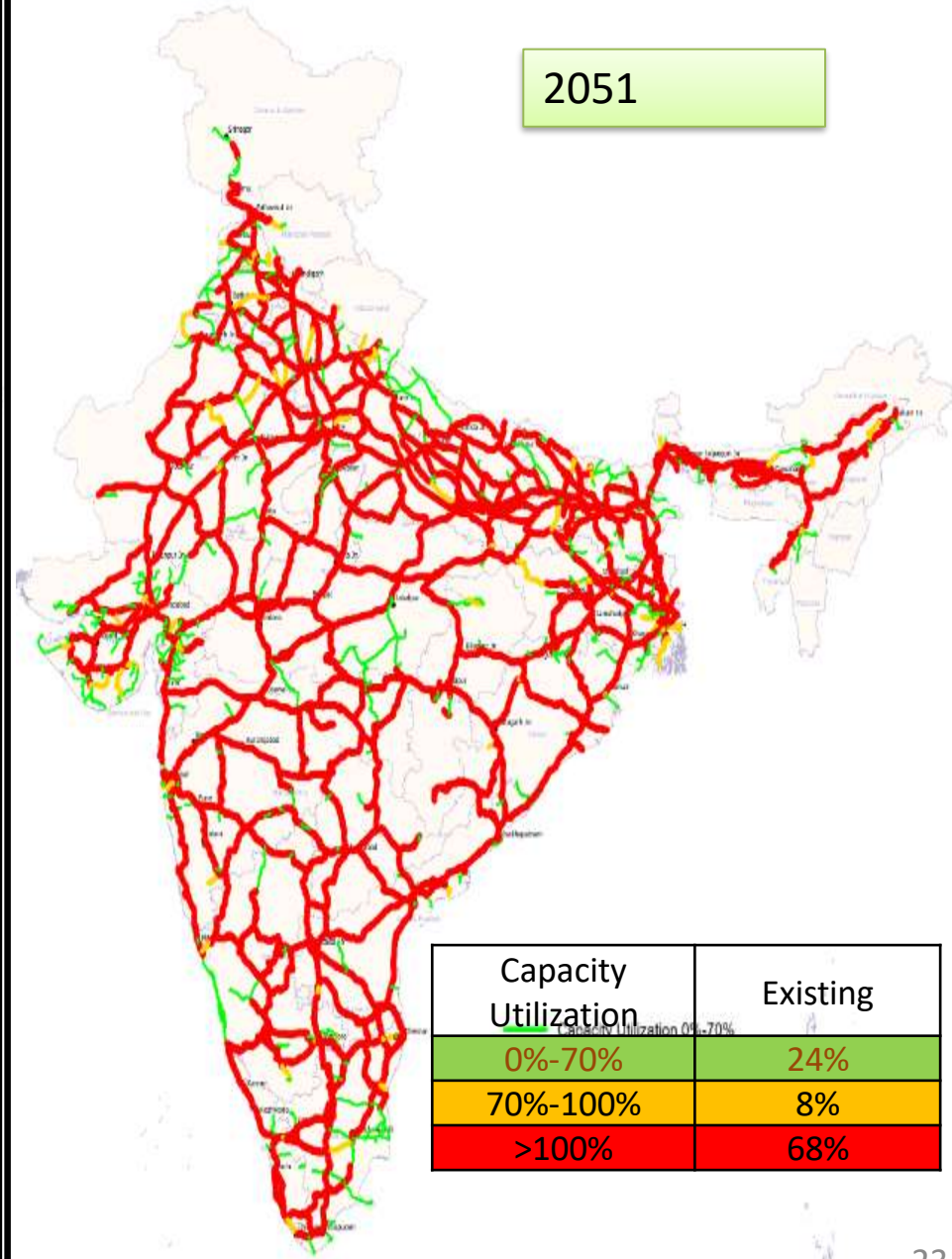
— Capacity Utilization 0%-70%
— Capacity Utilization 70%-100%
— Capacity Utilization > 100%

Capacity Utilization

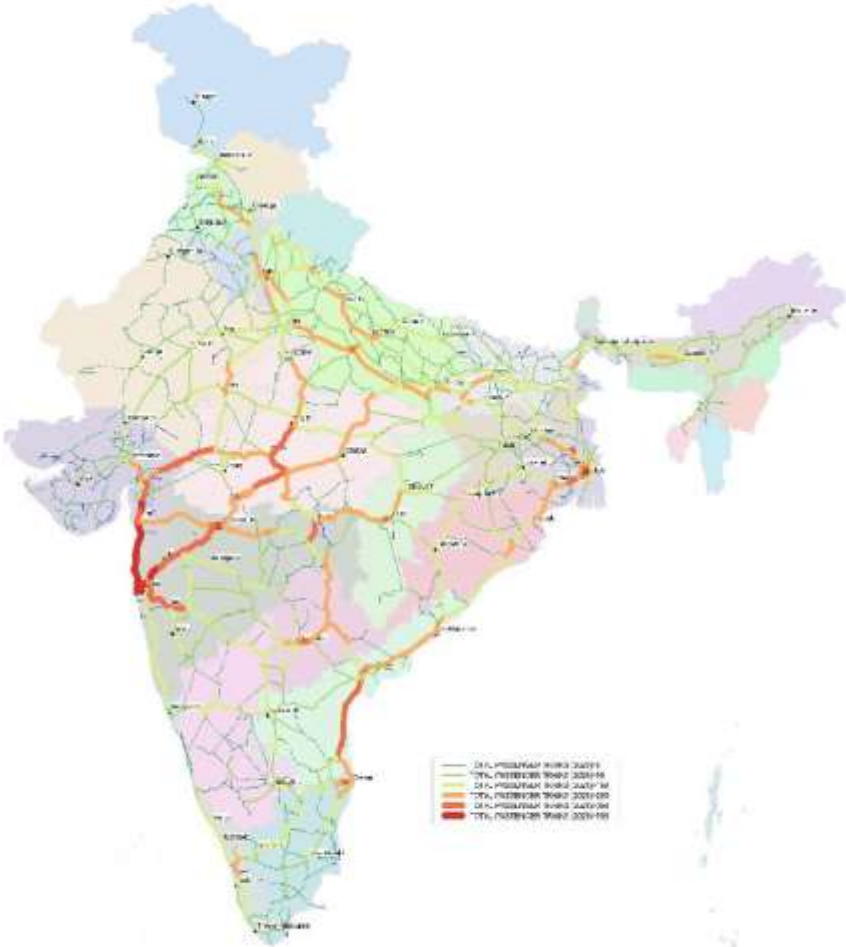
2031



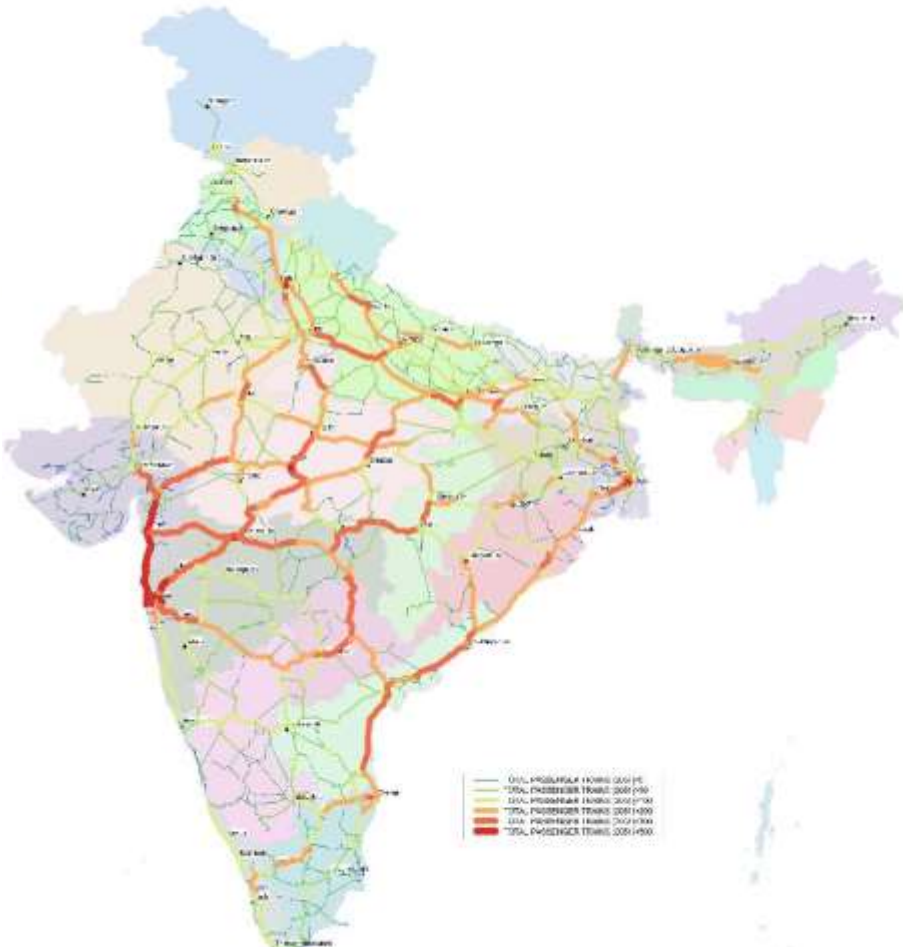
2051



Passenger Train Corridor 2041



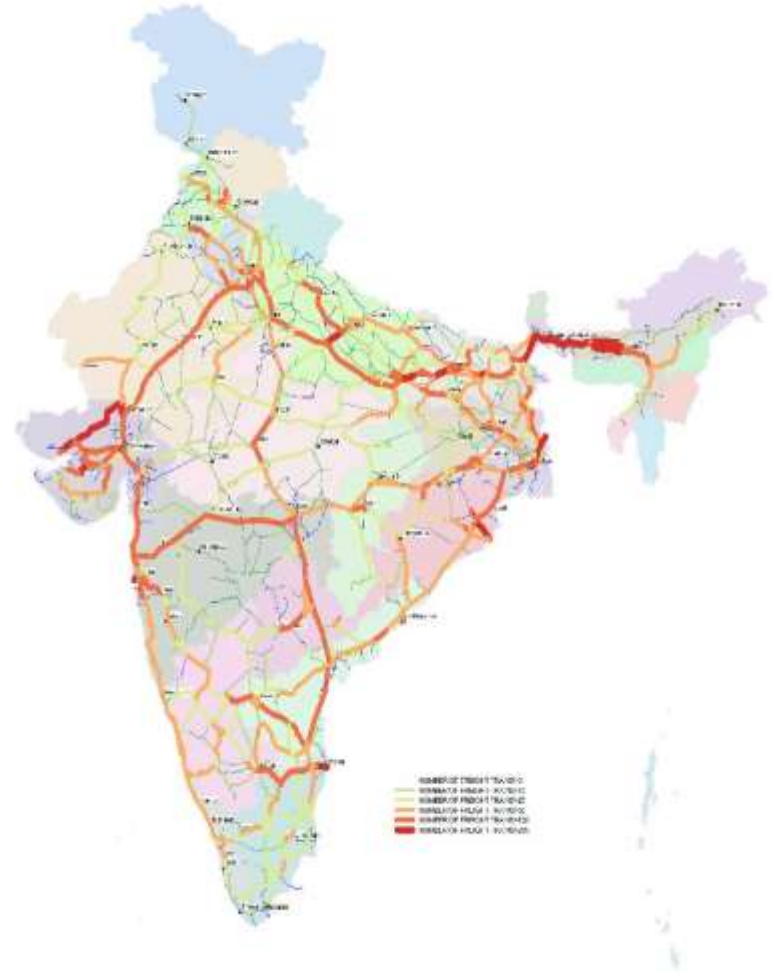
Passenger Train Corridor 2051



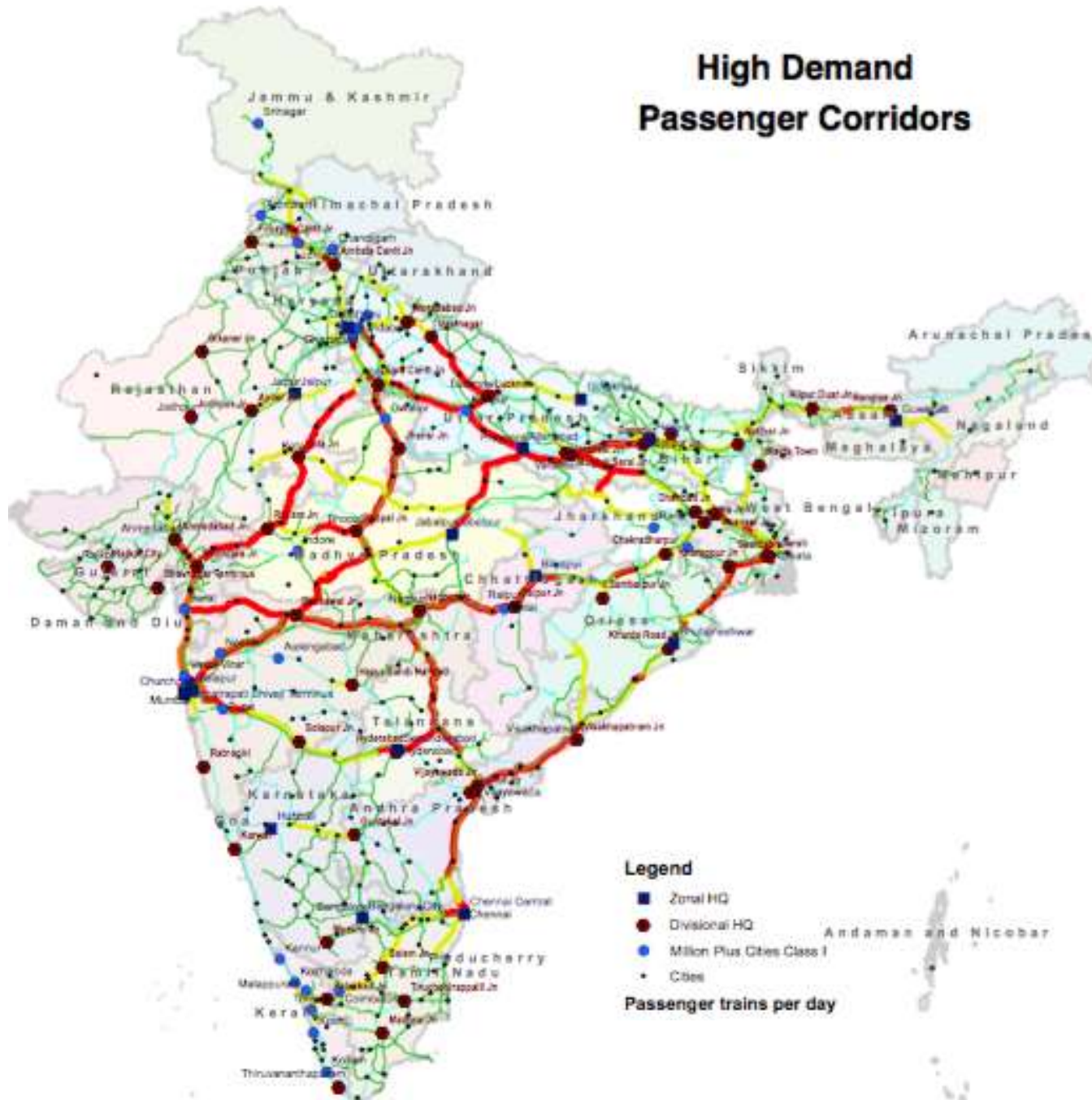
Freight High Demand Corridors - 2024



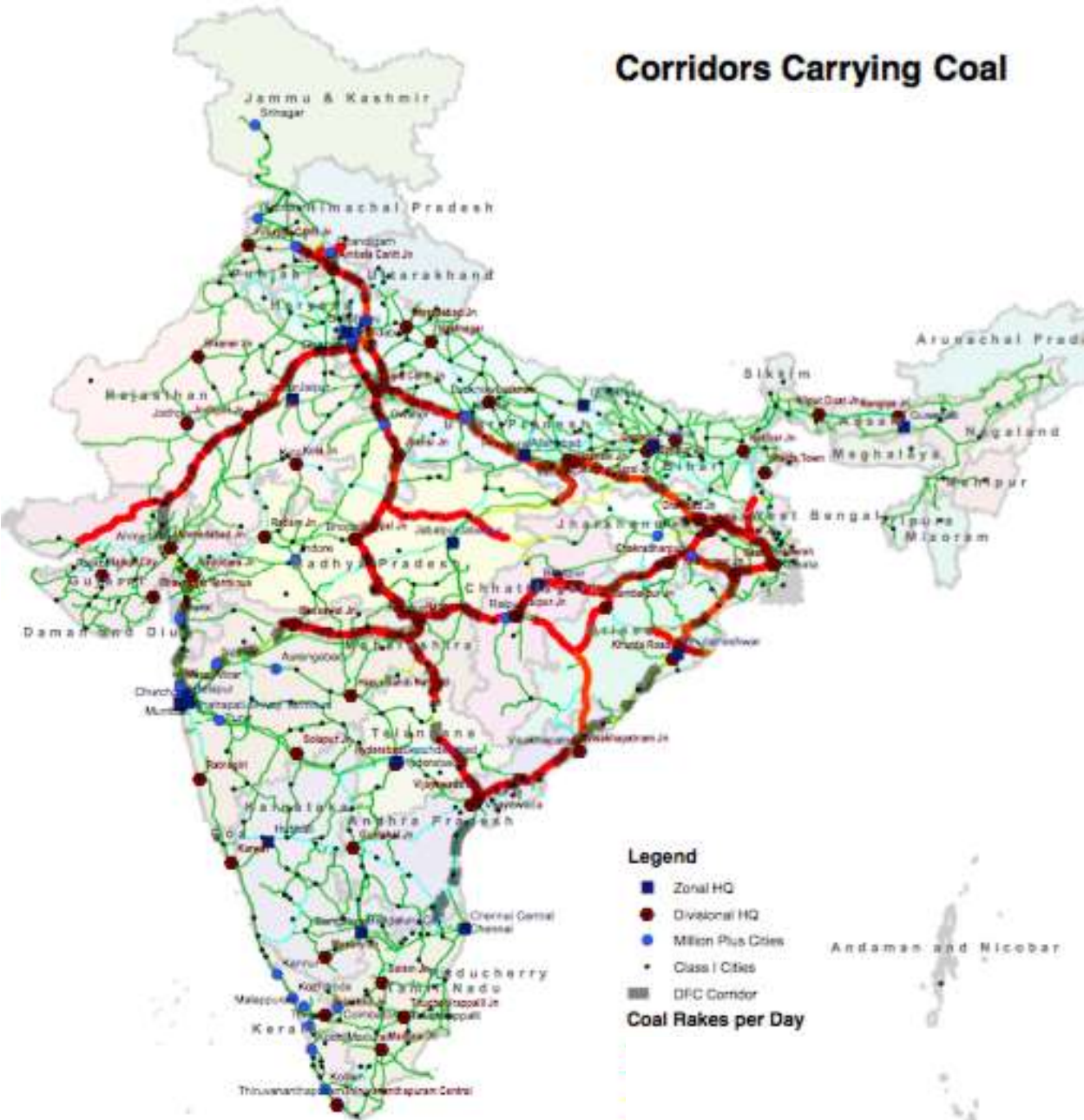
Freight High Demand Corridors - 2031



High Demand Passenger Corridors



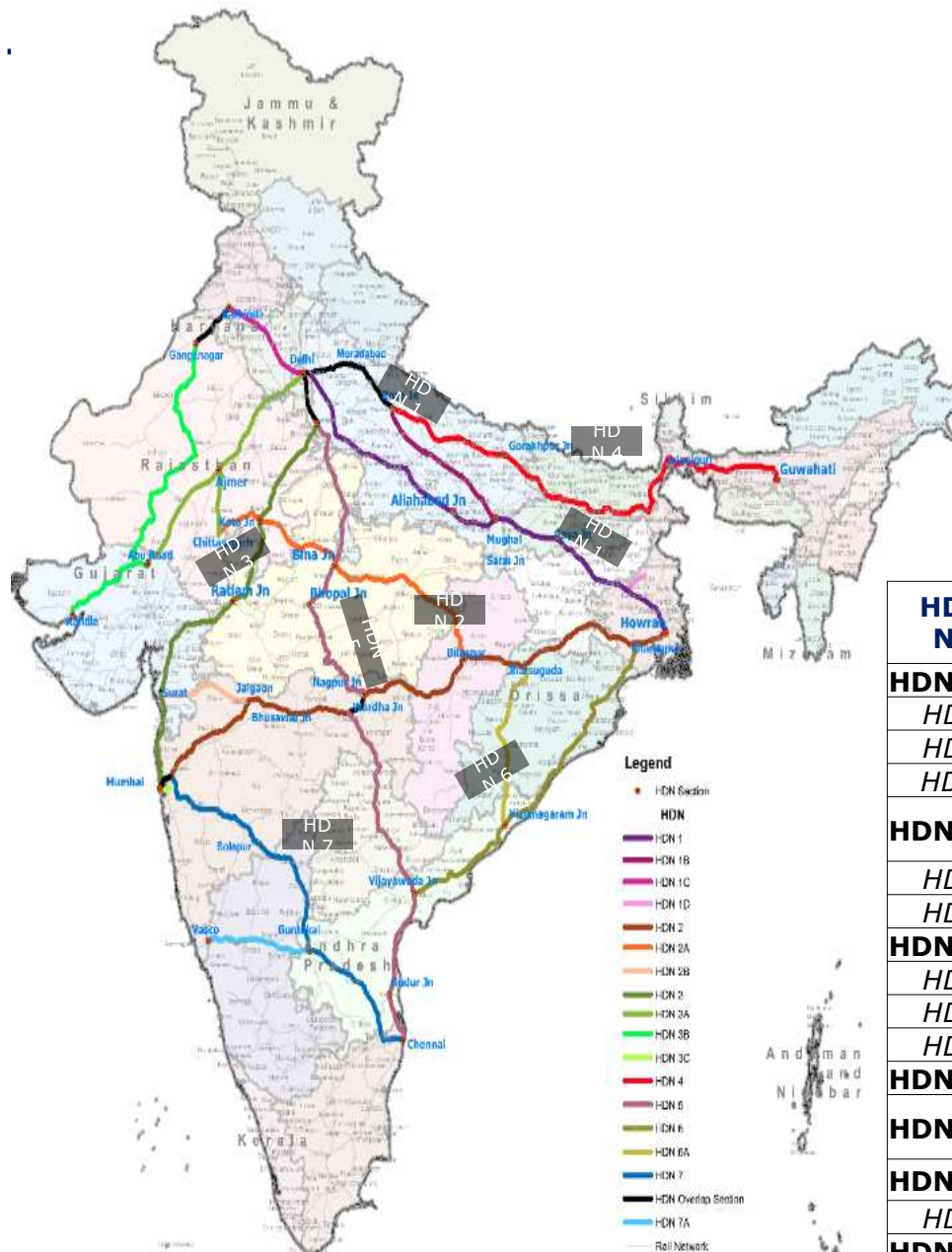
Corridors Carrying Coal



Corridors Carrying Cement -



HDN Network



HDN No	Routes
HDN1	Delhi Howrah Main Route via ALD MGS Gaya
<i>HDN1B</i>	<i>Ghaziabad- Moradabad</i>
<i>HDN1C</i>	<i>Delhi-Rohtak- Bathinda- Suratgarh</i>
<i>HDN1D</i>	<i>Andal-Pandubeshwar- Santhia</i>
HDN2	Howrah - Mumbai main route via Jalgaon, Nagpur, Bilaspur
<i>HDN2A</i>	<i>Bilaspur-Anuppur-Kota-Ruthiyai-Kota</i>
<i>HDN2B</i>	<i>Surat-Jalgaon</i>
HDN3	Delhi-Mumbai Main Route via Kota Ratlam
<i>HDN3A</i>	<i>Delhi-Rewari-Ajmer-Chittorgarh</i>
<i>HDN3B</i>	<i>Gandhidham-Bhildi-Palanpur and Bhildi - Samdari</i>
<i>HDN3C</i>	<i>Panvel - Jasai - JNPT</i>
HDN4	Delhi-Guwahati via Rosa-Gorakhpur-Kumedpur
HDN5	Delhi-Chennai Main Route via BPL-NGP-BPQ-BZA-Gudur
HDN6	Howrah Chennai Main Route
<i>HDN6A</i>	<i>JSG-SBP-TIG-VZM</i>
HDN7	Mumbai-Chennai main route
<i>HDN7A</i>	<i>Guntkal-Bellari-Hospet-Hubli-Londa-Vasco</i>

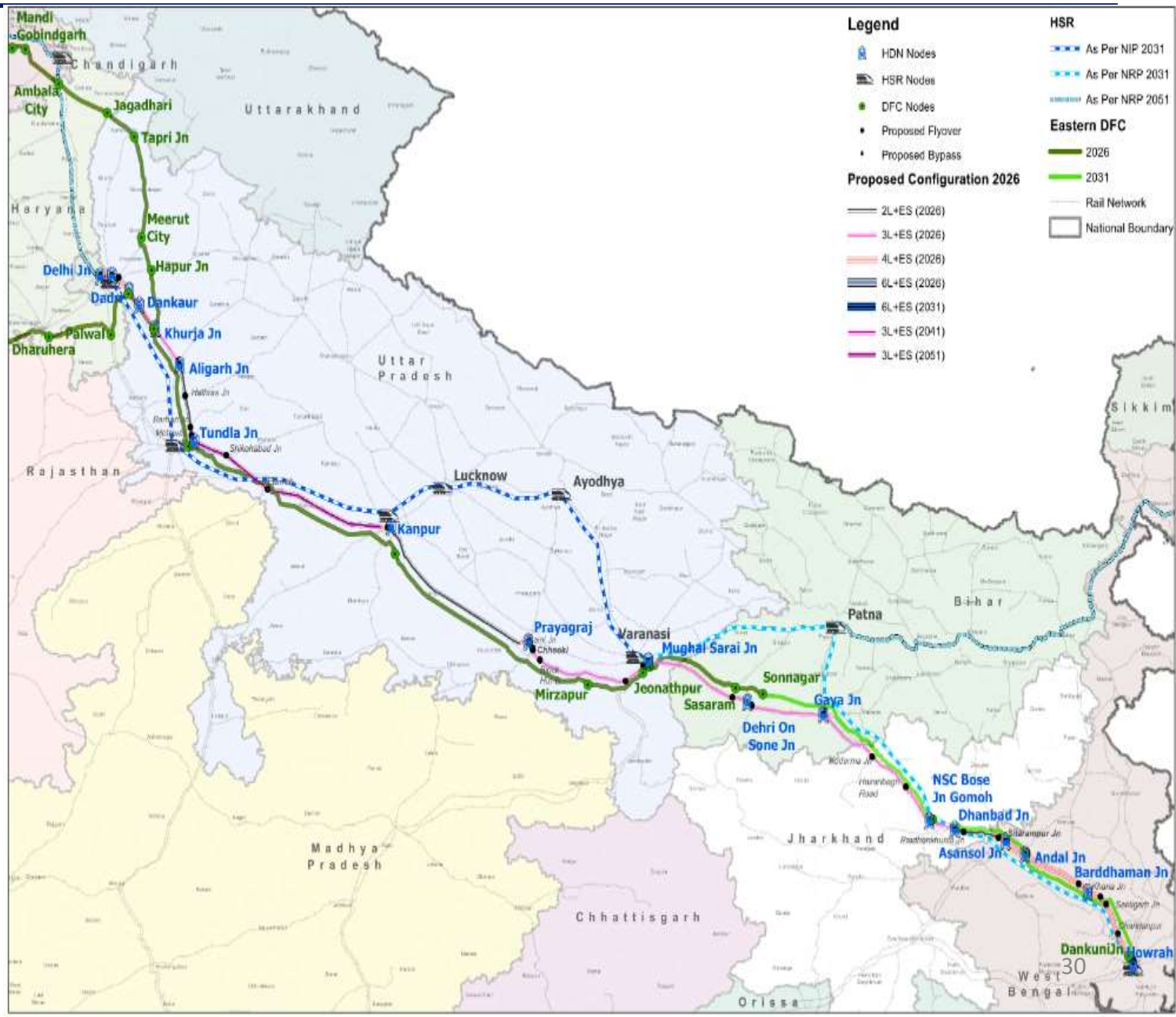
HDN 1

Major Infrastructure Proposals

- EDFC is proposed from Ludhiana to Sonnagar (year 2026) and Dankuni (year 2031)
- HSR Corridor Delhi-Agra-Lucknow-Ayodhya-Varanasi-Patna-Kolkata
- ABS+TCAS+CTC
- Enabling Speed 160 Kmph
- 29 Bypasses & 15 Flyovers Proposed along the corridor

Doubling works

Configuration Conversion	Network Km	Line KM
Double to Triple Line	227	227
Quadruple Line to 6 Lines	8	16
Total	235	243



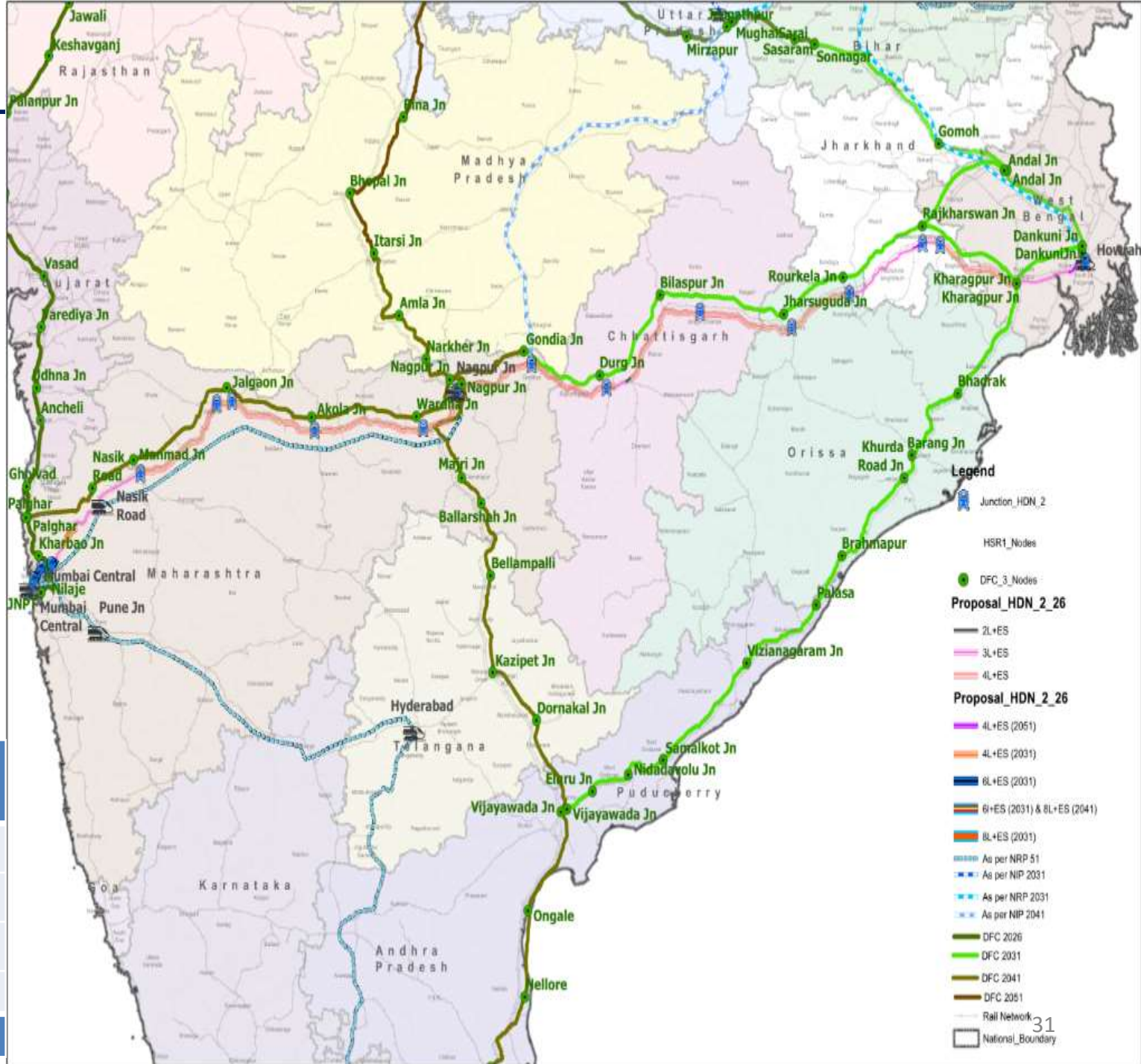
HDN 2

Major Infrastructure

- East-West DFC - 2031
- HSR Corridor Mumbai Pune Nagpur Patna in 2051
- ABS+TCAS+CTC Signaling is proposed for entire corridor
- Enabling Speed 160 Kmph by 2031
- 6 Bypasses & 12 Flyovers Proposed along the corridor

Doubling works

Configuration Conversion	Network Km	Line KM
Double to Triple Line	588	588
Triple to Quadruple Line	337	337
Quadruple Line to 6 Lines	7	14
6 Lines to 8 Lines	2	4
Total	934	943



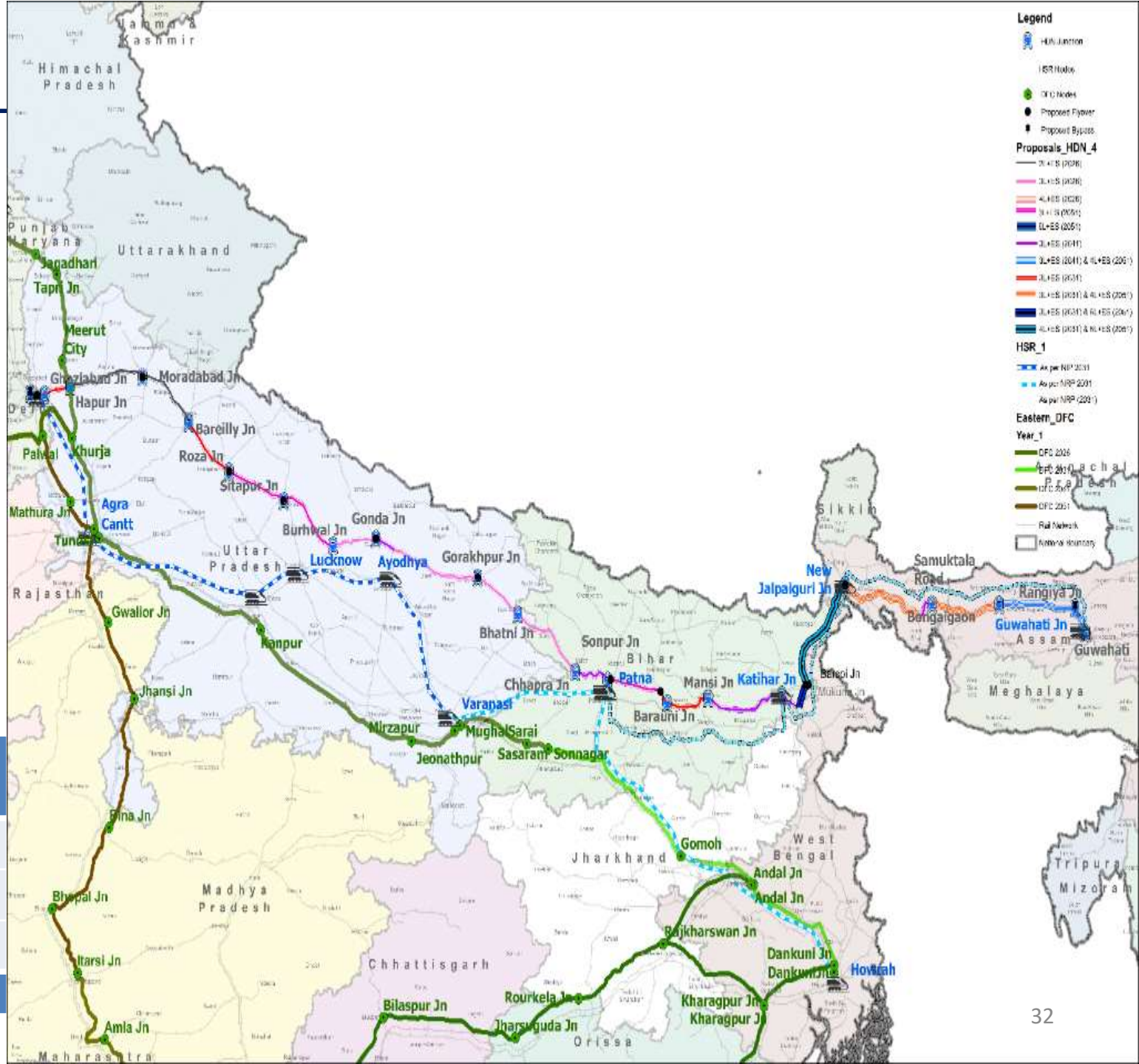
HDN 4

Major Infrastructure

- HSR Corridor coming from Delhi by 2031, Connected to Patna, Kolkata and Guwahati.
- ABS+TCAS+CTC
- Enabling infrastructure for achieving a Speed 160 Kmph by 2031
- 3 Bypasses & 10 Flyovers Proposed

Doubling works

Configuration Conversion	Network Km	Line KM
Double to Triple Line	637	637
Double to Quadruple Line	456	912
Triple to Quadruple Line	978	978
Total	2070	2526



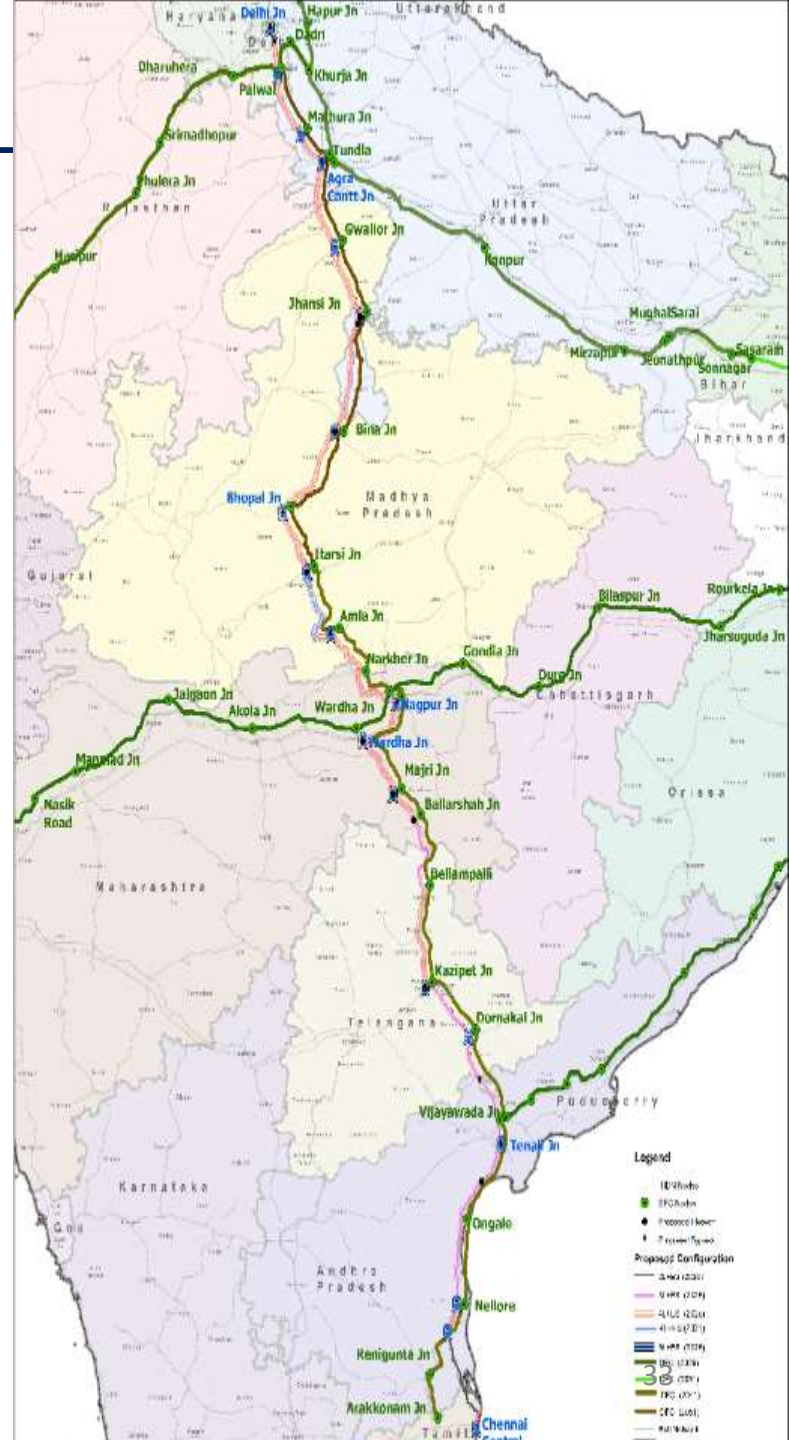
HDN 5

Major Infrastructure

- N-S DFC is Proposed in 2041 from Itarsi to Chennai and extended to Palwal in 2051
- ABS+TCAS+CTC Signaling is proposed for entire corridor
- Enabling infrastructure for achieving a Speed 160 Km/h by 2031
- 10 Bypasses & 10 Flyovers Proposed along the corridor

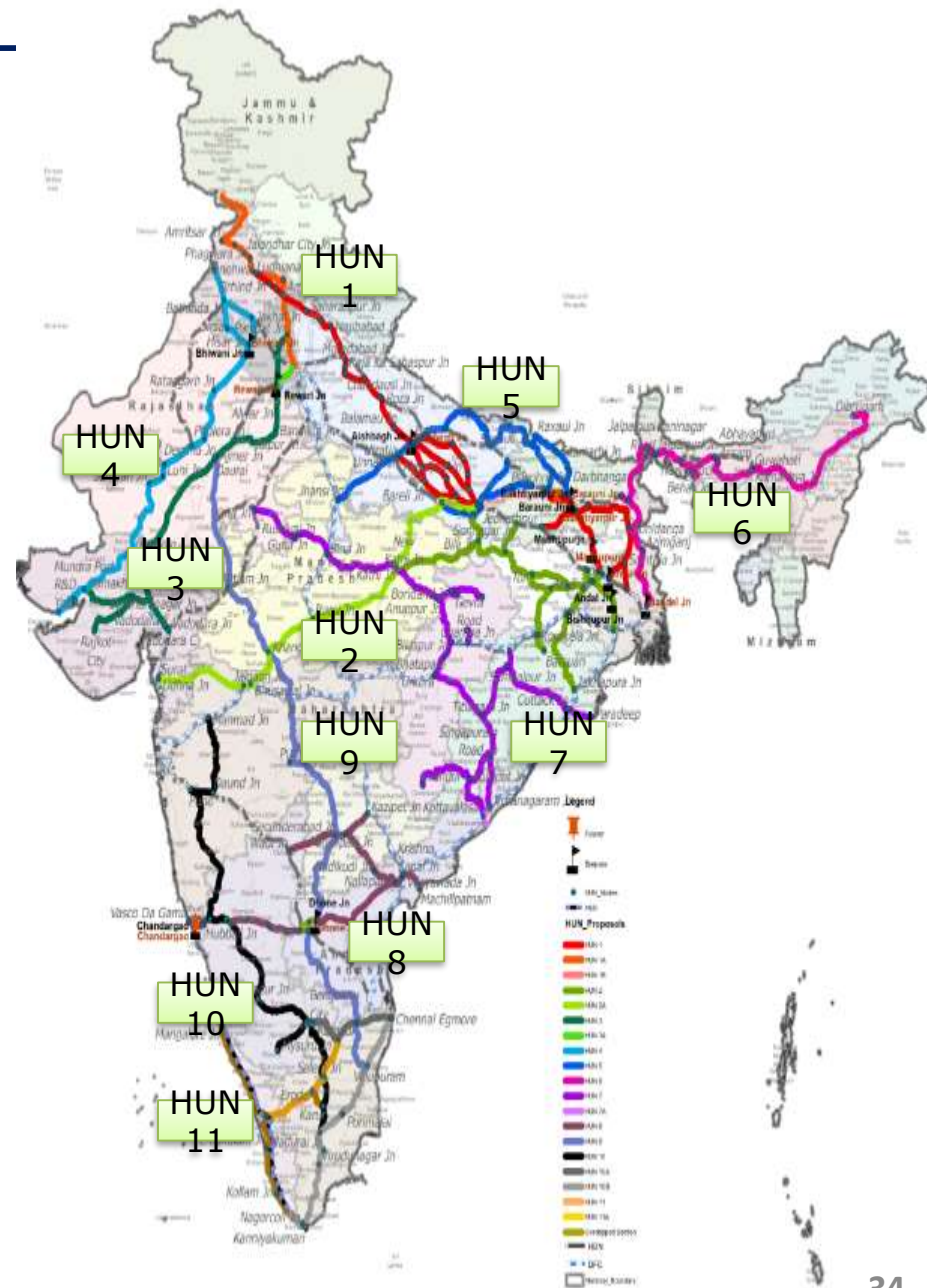
Doubling works

Configuration Conversion.	Network Km	Line KM
Triple to Quadruple Line	105	105
Total	105	105

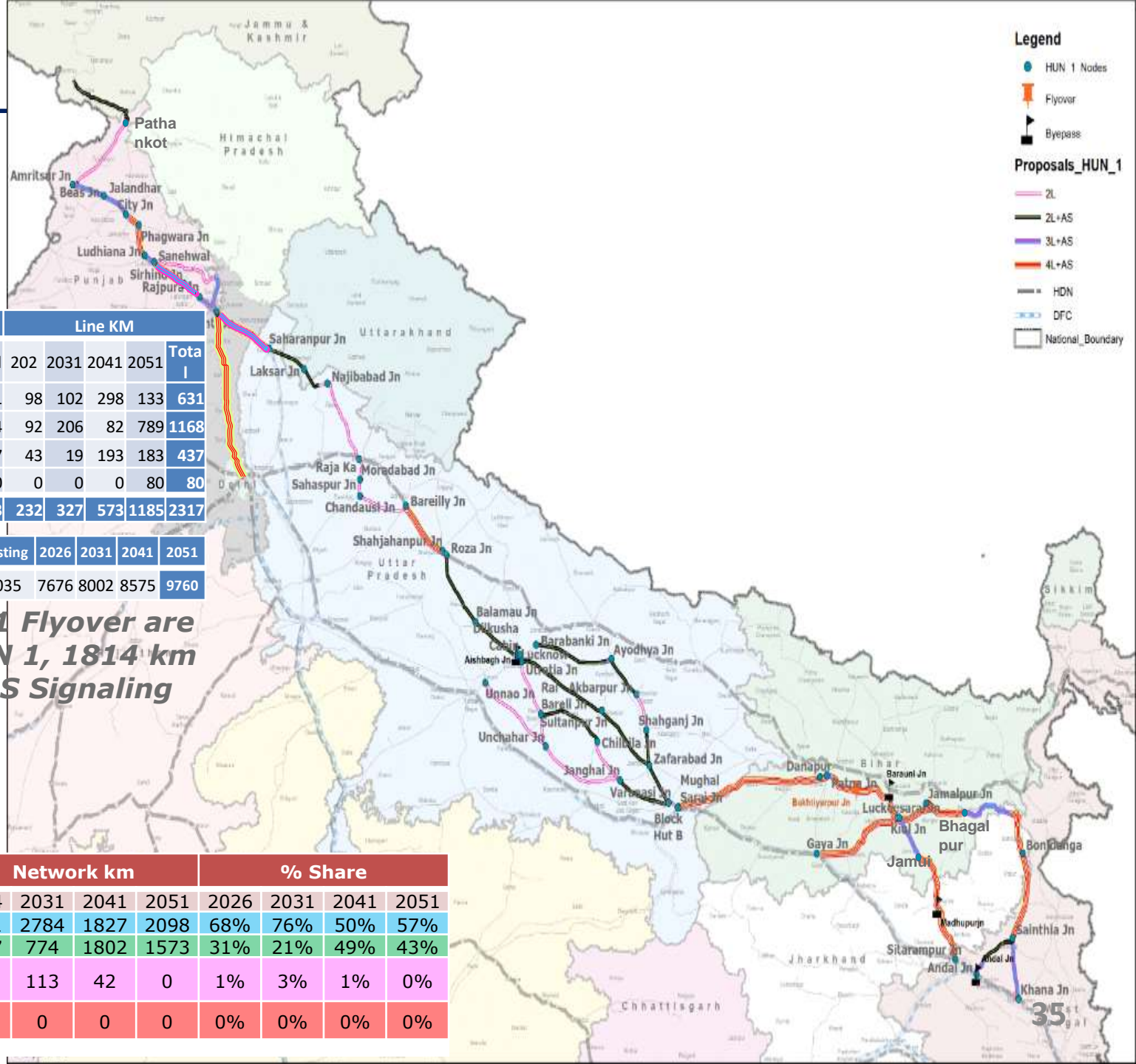


HUN Network

S.NO	HUN Routes	Total Length (km)
HUN 1	Amrit Sagar Sampark Corridor	3,049
HUN 2	Bengal Arab Sagar Sampark Corridor	3,035
HUN 3	Kathiawar Shivalik Sampark Corridor	1,685
HUN 4	Sagar Sutlej Sampark Corridor	1,529
HUN 5	Bundelkhand Tarai Sampark Corridor	2,151
HUN 6	Sagar Purvodaya Sampark Corridor	1,490
HUN 7	Sagar Chambal Sampark Corridor	2,737
HUN 8	Purv Paschim Deccan Sampark Corridor	1,501
HUN 9	Aravali Dakshin Sampark Corridor	2,803
HUN 10	Satpura Coromandel Sampark Corridor	2,232
HUN 11	Konkan Malabar Sampark Corridor	1,134
	Total	23,347



HUN 1



Legend

- HUN 1 Nodes
- | Flyover
- | Bypass

Proposals_HUN_1

- 2L
- 2L+AS
- 3L+AS
- 4L+AS
- HDN
- DFC
- National_Boundary

Conversion	Network KM					Line KM				
	2024	2031	2041	2051	Total	202	2031	2041	2051	Total
2L-3L	98	102	298	133	631	98	102	298	133	631
2L-4L	46	103	41	394	584	92	206	82	789	1168
3L-4L	43	19	193	183	437	43	19	193	183	437
4L-6L	0	0	0	40	40	0	0	0	80	80
Total	186	224	532	751	1693	232	327	573	1185	2317

	Existing	2026	2031	2041	2051
Total Line KM	7035	7676	8002	8575	9760

3 Bypasses and 1 Flyover are proposed on HUN 1, 1814 km upgraded to TCAS Signaling

HUN 1	Network km				% Share				
	2024	2031	2041	2051	2026	2031	2041	2051	
3. 2+ NRP Line Upgradation Proposals	0%-70%	2501	2784	1827	2098	68%	76%	50%	57%
	70%-100%	1147	774	1802	1573	31%	21%	49%	43%
	100%-150%	23	113	42	0	1%	3%	1%	0%
	>150%	0	0	0	0	0%	0%	0%	0%

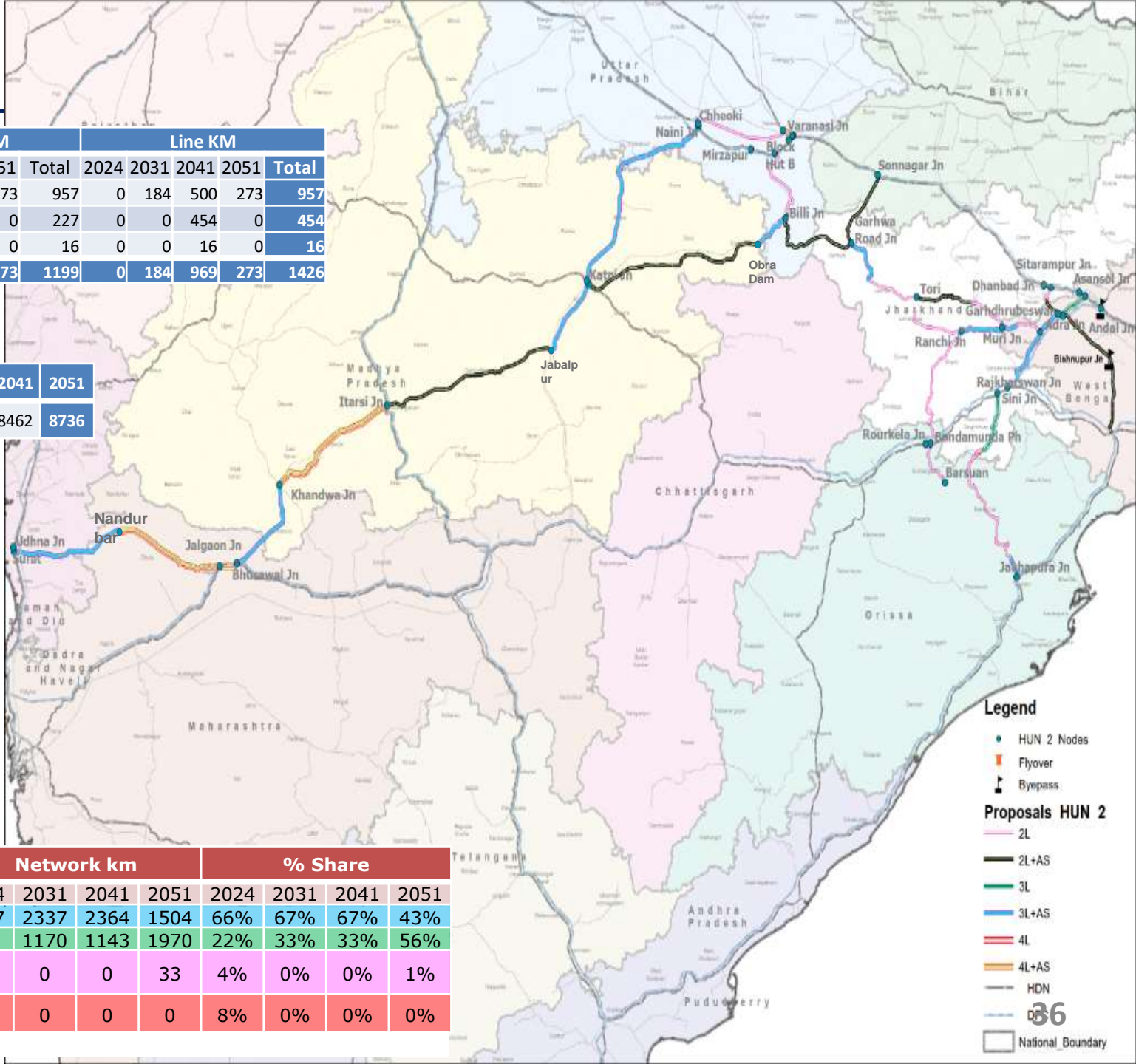
HUN 2

Conversion	Network KM					Line KM				
	2024	2031	2041	2051	Total	2024	2031	2041	2051	Total
2L-3L	0	184	500	273	957	0	184	500	273	957
2L-4L	0	0	227	0	227	0	0	454	0	454
3L-4L	0	0	16	0	16	0	0	16	0	16
Total	0	184	742	273	1199	0	184	969	273	1426

	Existing	2026	2031	2041	2051
Total Line KM	7038	7309	7493	8462	8736

1 Bypass is proposed on HUN 2
2384 km TCAS signaling provided

HUN 2		Network km				% Share			
		2024	2031	2041	2051	2024	2031	2041	2051
3. 2+ NRP Line Upgradation Proposals	0%-70%	2317	2337	2364	1504	66%	67%	67%	43%
	70%-100%	787	1170	1143	1970	22%	33%	33%	56%
	100%-150%	127	0	0	33	4%	0%	0%	1%
	>150%	276	0	0	0	8%	0%	0%	0%



Legend

- HUN 2 Nodes
- Flyover
- Bypass

Proposals HUN 2

- 2L
- 2L+AS
- 3L
- 3L+AS
- 4L
- 4L+AS
- HDN
- DP
- National Boundary

DFC Master Plan & Phasing



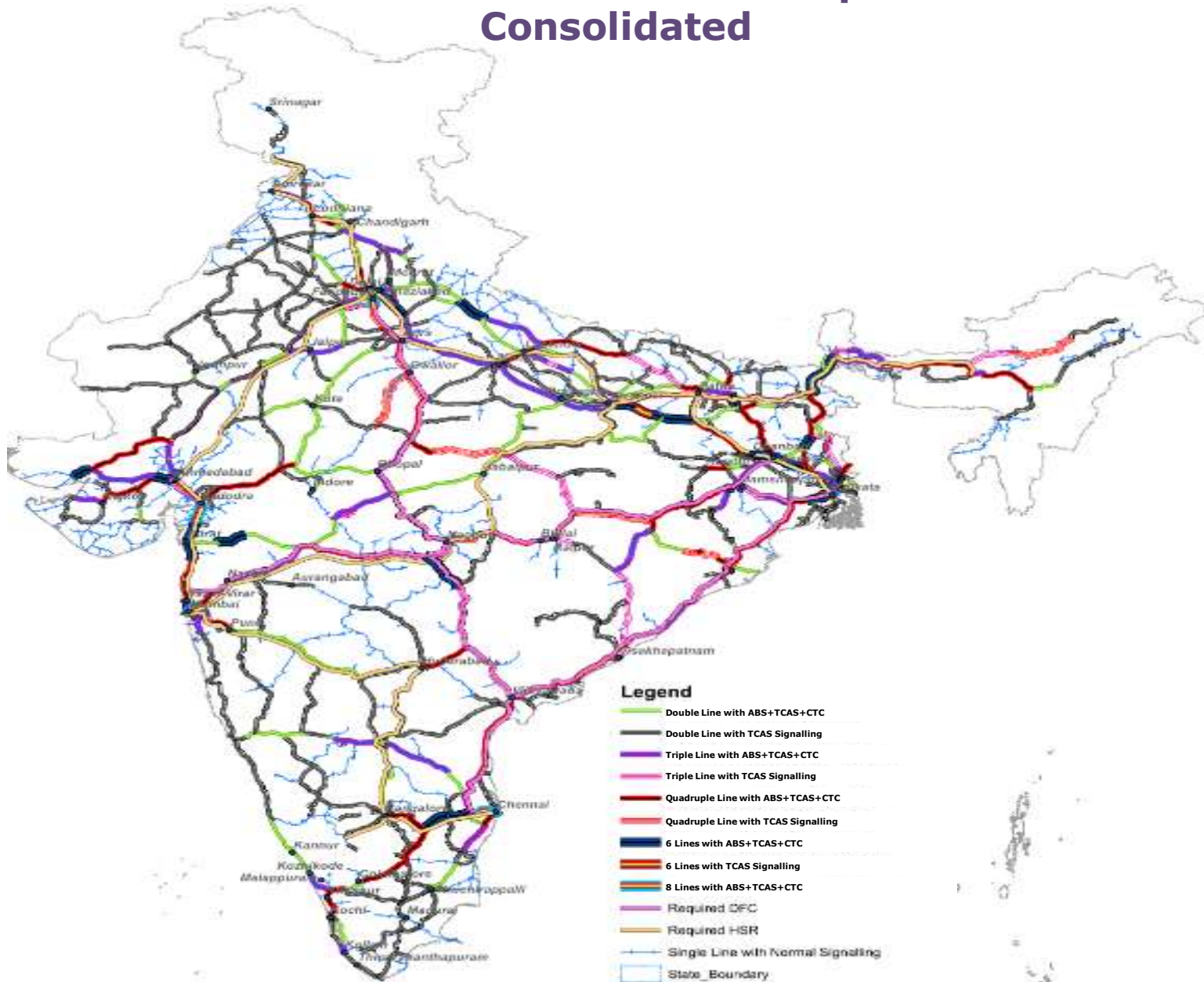
Phasing	2022	2031	2041	2051
Length (Km)	2,807	3,893	1,206	751
New DFC Corridor	Eastern DFC, 1,324 Km (Under Construction till Sonnagar)	East Cost DFC, 1,265 Km (Kharagpur to Vijayawada)	North South DFC, 1,206 Km (Itarsi to Chennai via Nagpur and Vijayawada)	North South DFC, 751 Km (Palwal to Itarsi)
	Western DFC 1,483 Km (Under Construction)	East West DFC, 2,013 Km (Palghar to Dankuni and EDFC Connectors)		
		Eastern DFC, 515 Km (Sonnagar to Dankuni)		

HSR Master Plan & Phasing



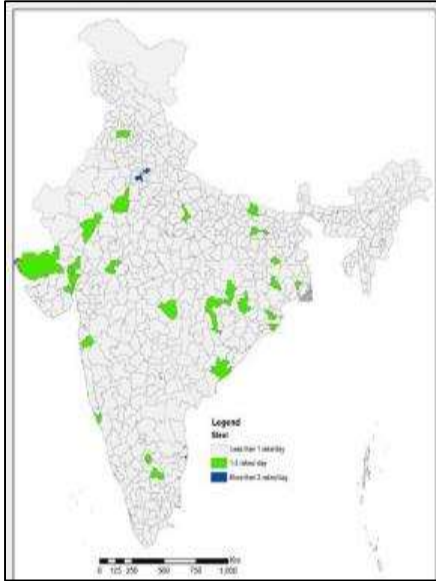
Phasing	2026	2031	2041	2051
Length (Km)	508	2,521	1473	3485
New HSR Corridor	Mumbai Ahmedabad , 508 Km (As per NIP also)	Delhi Varanasi via Ayodhya, 855 Km (As per NIP also, Ayodhya included)	Hyderabad Bangalore, 618 Km (New)	Mumbai Nagpur, 789 Km (As per NIP)
		Varanasi to Patna, 250 kms (New)	Nagpur Varanasi, 855 Km (New)	Mumbai Hyderabad, 709 Km
		Patna to Kolkata, 530 Km (New)		Patna Guwahati 850 Km (New)
		Delhi Udaipur Ahmedabad 886 Km (As per NIP also)		Delhi Chandigarh Amritsar, 485 Km
				Amritsar - Pathankot - Jammu, 190 Km (New)
				Chennai to Mysuru via Bangalore, 462 Km

Rail Network Proposals – Consolidated

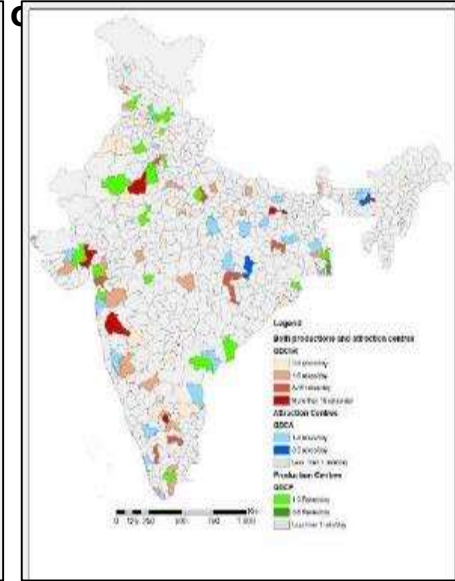


Proposed Terminal Locations

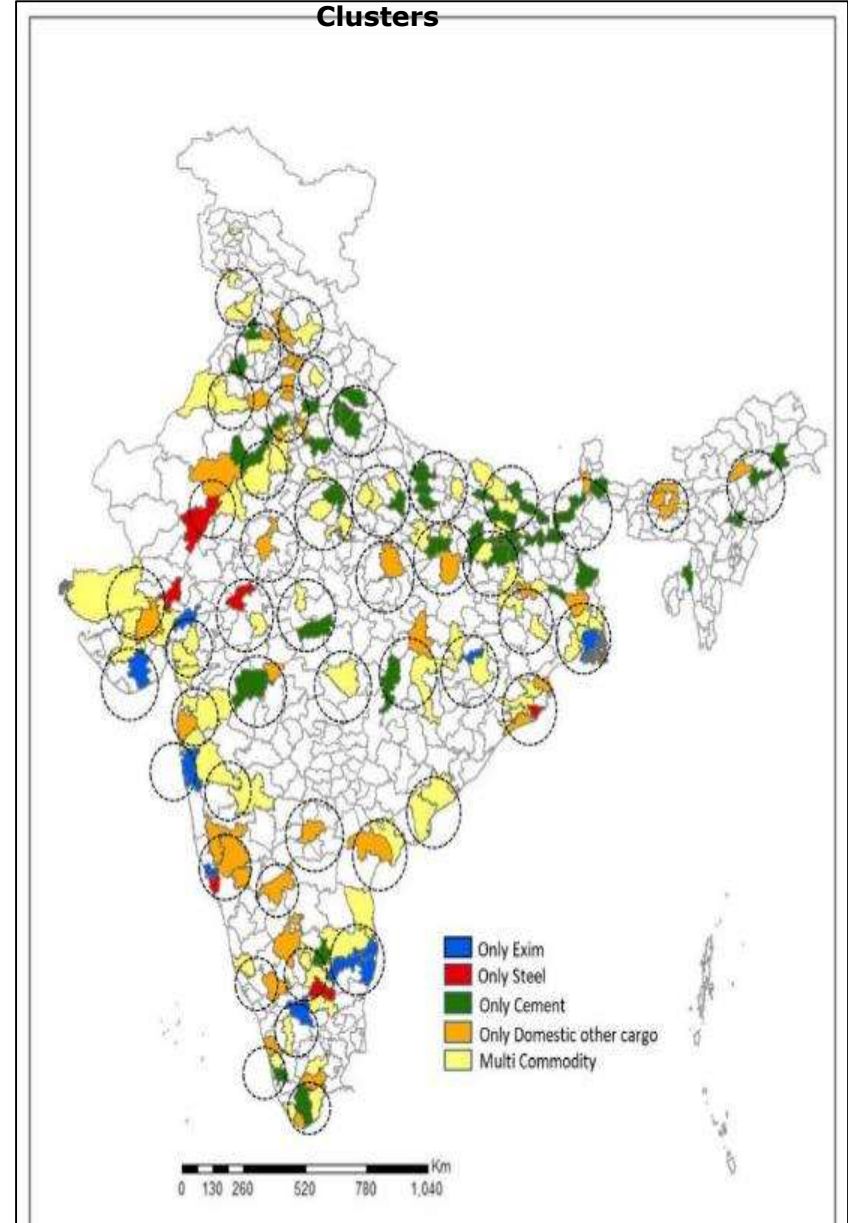
Steel



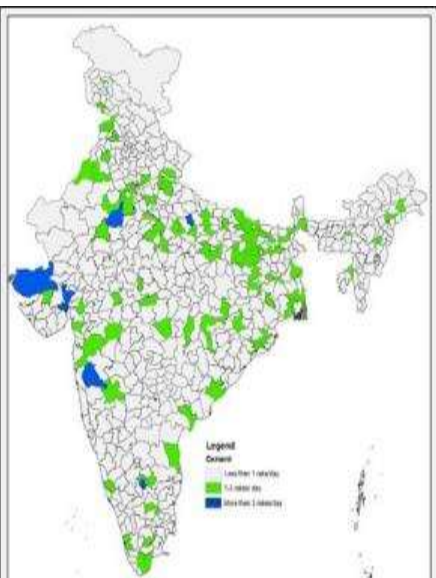
Domestic



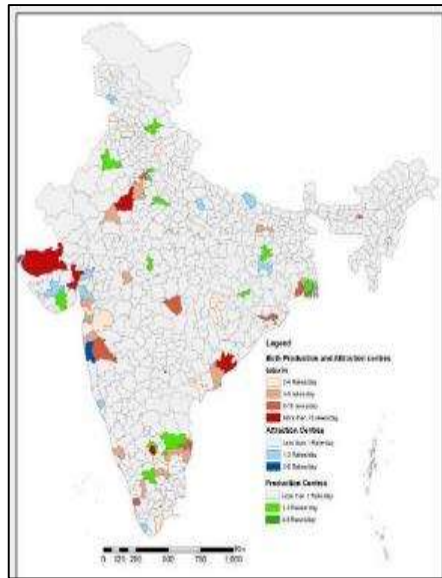
Multi Commodity Clusters



Cement



EXIM




Policy to attract investments & bring efficiencies

Development of new terminals – PFTs / ICDs / private sidings

- **Reduce Transaction and Operating Costs**
 - Lease for connectivity
 - Staff cost
 - Development charges
- **Transparent and time bound**

Upgradation of existing good sheds/terminals

- 
- **Private investment in existing facilities**
 - **Open access for all types of traffic**
 - **Minimum Performance Standards**

New common user models

- **All Public land for common user facilities**
- **IR to support on land acquisition / land as equity**

Rolling Stock Strategies

Single wagon investment policy – encouraging private investment

01



A single policy covering all wagon types -

encourage adoption of innovative designs; consider locomotive ownership over time

02

Wagon ownership should not be linked with any license fee, as private sector is already investing (locking demand)

03

Consistent haulage discount to be considered – to account for cost of ownership

04

Wagon owners to be permitted to maintain their own rolling stock

05

Haulage charge to not include cost of asset (wagons)

06

A streamlined, automatic approval process

In resonance with NRP recommendations toward improving transit and reducing cost

1

Terminals

- Terminal Access Charge Concessions
- E-Drishti updation for goods sheds
- Easing of Weighment Conditions
- Non-levy of Terminal charges at some unloading points
- Easing conditions for Advance Stacking
- Promoting Lifton/Liftoff at CRTs for containers
- Allowing Multiple Co-Users

2

Pricing Related Concessions

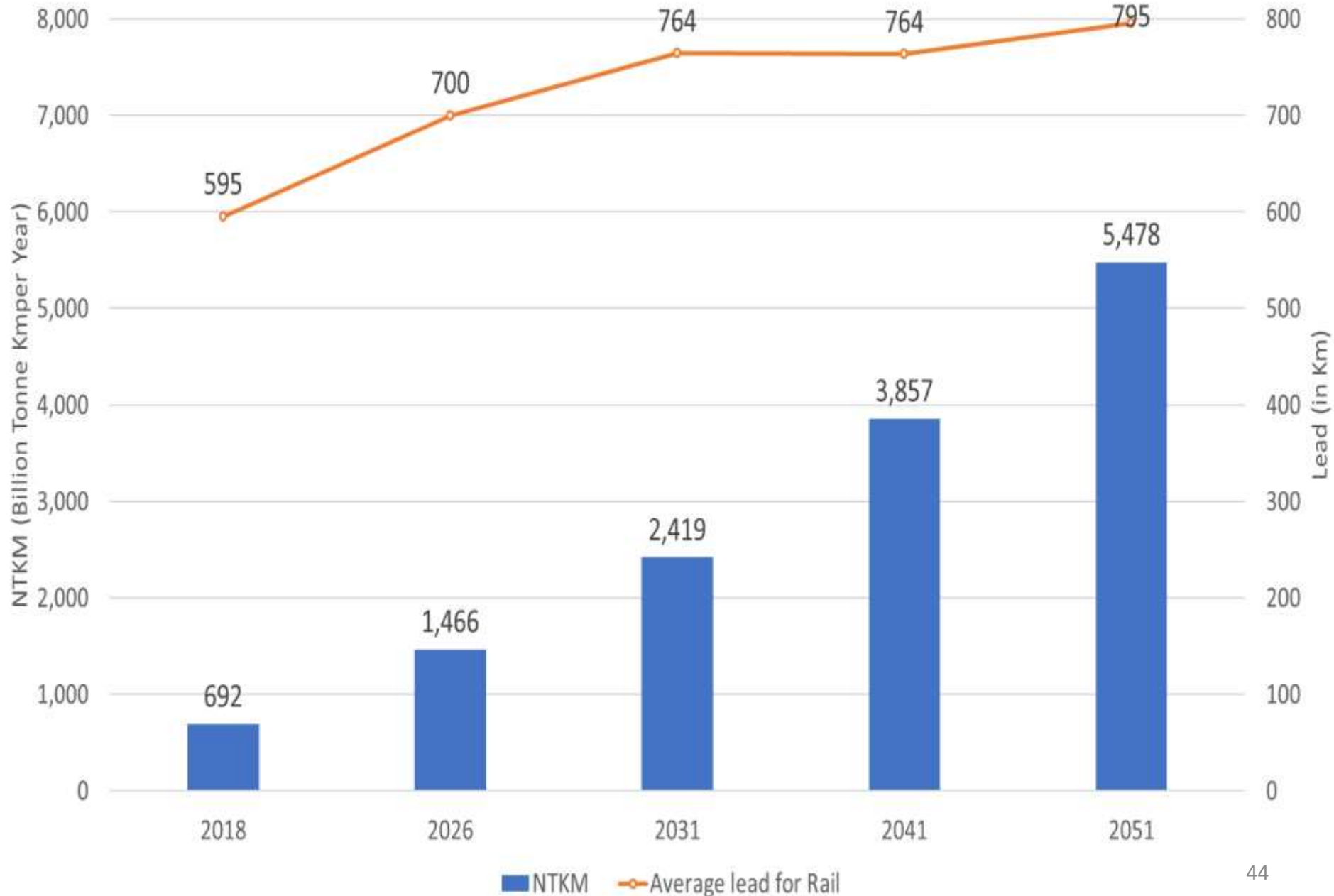
- Empty flow Rating
- Long Term Contracts
- Short Lead, Long Lead and Round Trip Rates
- Removal of Busy Season Surcharge
- Commodity Discounts – Flyash, Containers, More FAK commodities

3

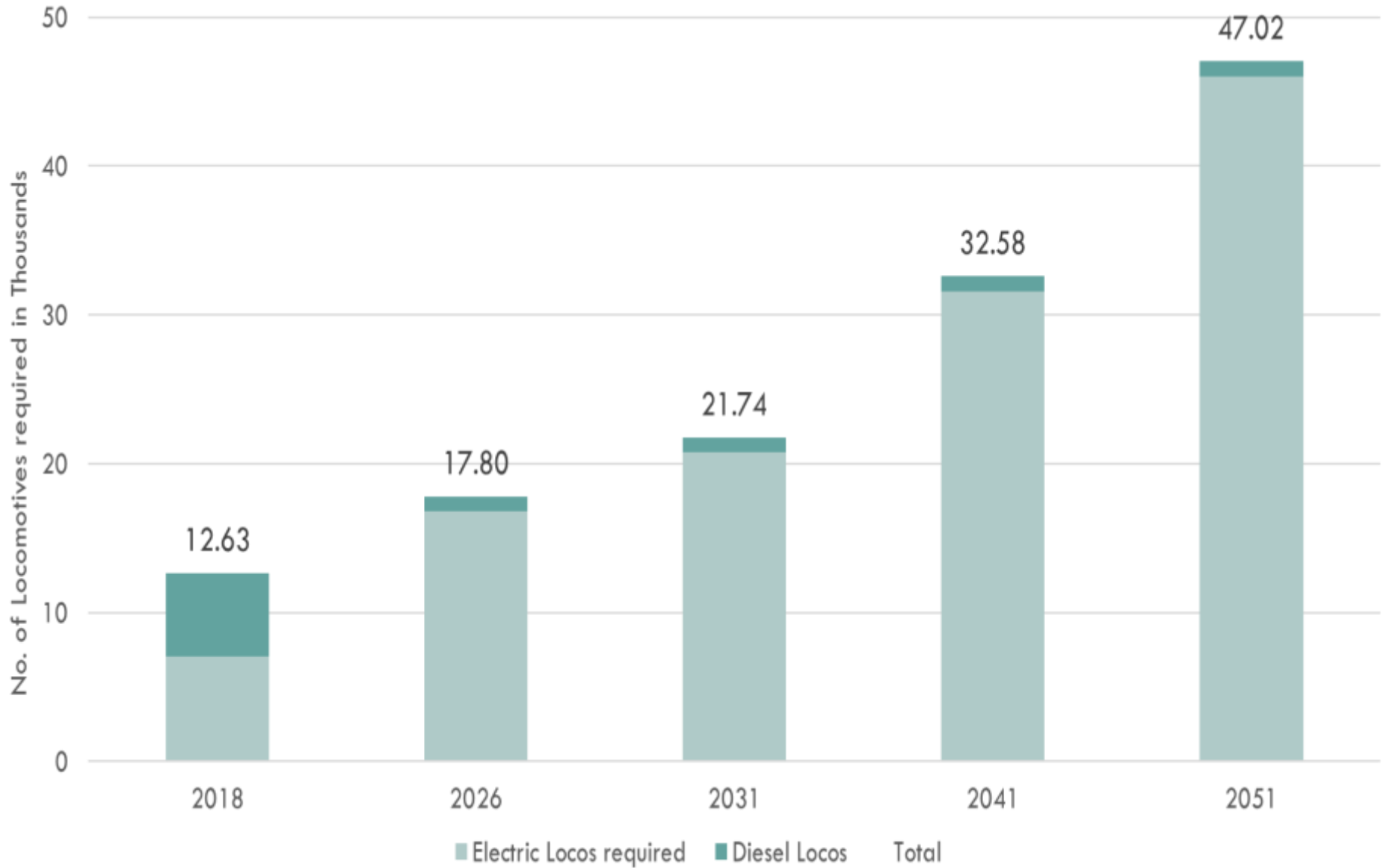
Transport Products and Ease of Business

- Easing Trainload Benefits
- Easing conditions for Mini Rakes
- Electronic Registration of Demand
- E-RR – Electronic transmission of RRs

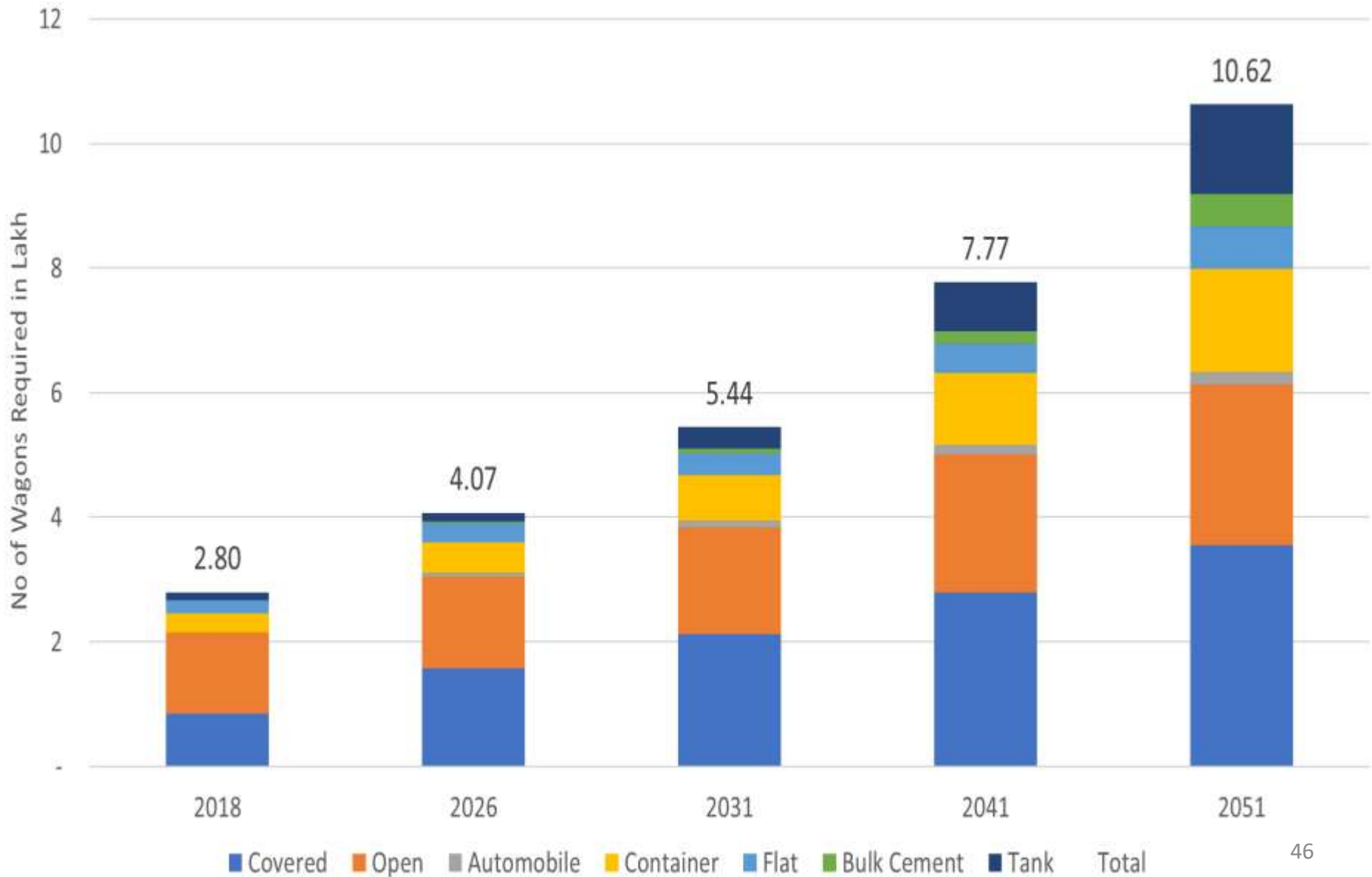
Forecast of NTKM and Average Lead of Rail Traffic



Forecast of Total Locomotives Required

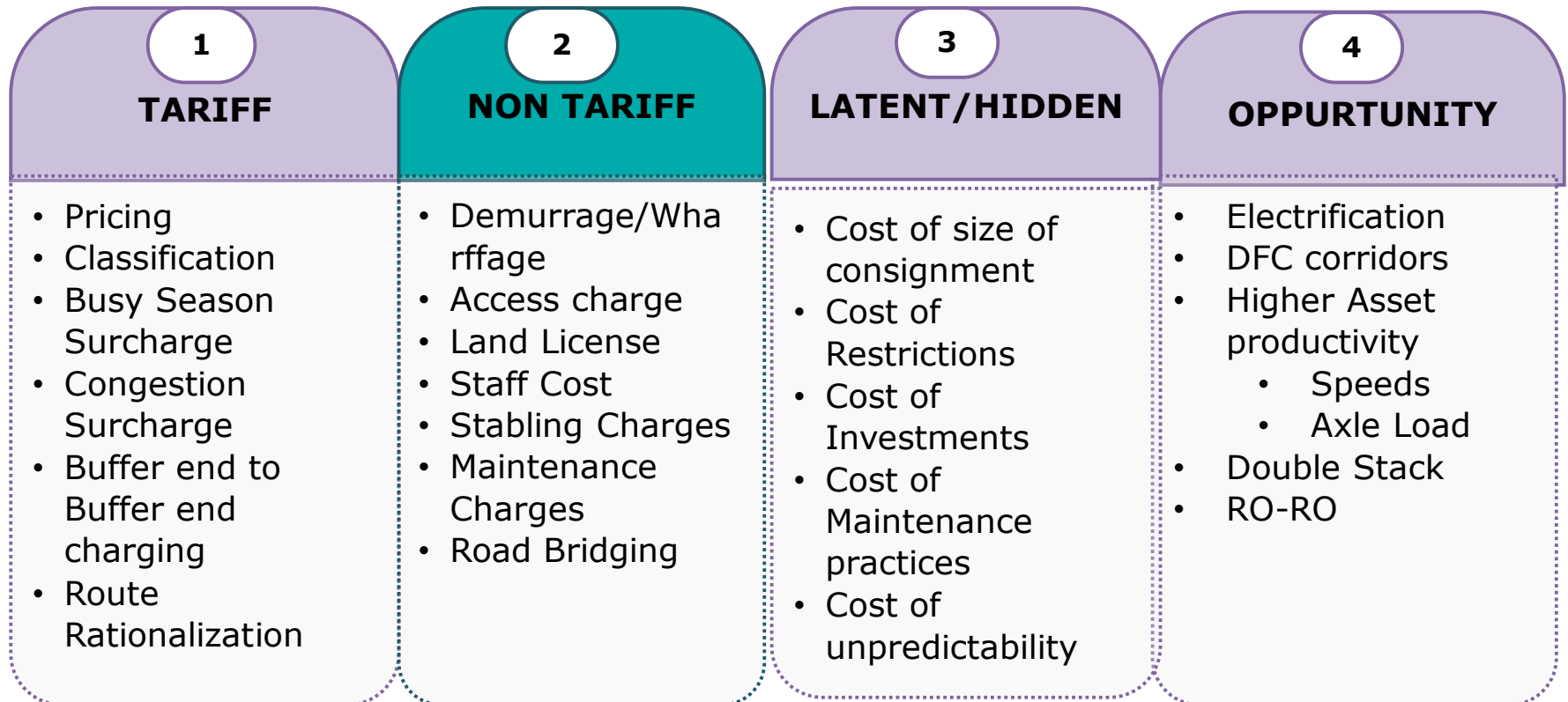


Forecast of Total Wagons Required



NRP – TARGETING 45% MODAL SHARE THROUGH CAPACITY

- CAPACITY AHEAD OF DEMAND ; ENABLE INCREASE IN FREIGHT TRAIN SPEED FROM 25KMPH TO 50KMPH
- REDUCE COST OF RAIL TRANSPORT BY 30% - ACROSS THE COST SPECTRUM
- INFRASTRUCTURE AND BUSINESS PLANNING ON SAME PLATFORM
- INSTITUTIONAL SETUP – CONSTANT UP DATING
- DATA POINTS – COMMODITY TO CUSTOMER MIGRATION



Thank
you



